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THE FESTIVUS

A publication of the San Diego Shell Club

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MEMBERSHIP AND SUBSCRIPTION
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The Festivus is published monthly except Decemher.
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Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM,
Room 104, Casa Del Prado, Balboa Park, San Diego.

Website at: *http://www.sandiegoshellclub.com*
E:mail: *jhertz@san.rr.com*

PROGRAM

On the Road to Extinction? Population Declines of White Abalone (*Haliotis sorenseni)* in Southern California

Dr. Kevin Stierhoff at the Southwest Fisheries Scienee Center in La Jolla is part of the Remotely Operated Vehicle (ROV) Team where he now leads a team of biologists and engineers studying populations of deep-water invertebrates and fishes using optieal sampling technologies. He will discuss the eonditions of the white abalone in our area.

Meeting date: January 17th at 7:30 PM

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CLUB NEWS

Minutes of the San Diego Shell Club
15 November 2012

The meeting was called to order at 7:35 P.M. by Bob Dees, President. The previous minutes were approved as published. Carole Hertz reminded members about the date and location of the club Christmas party and our guest speaker for that occasion. Bob Dees presented the slate of officers for 2013 and the membership unanimously approved them. The position of Vice-President was not filled, so we need a volunteer; if interested contact David Waller.

Paul Tuskes gave a presentation on the biology and diversity of sand dwelling gastropods in Hawaii. The information presented probably applies well to other tropical locations. The characteristics of the sand influences the species composition. Densely packed sand is typically composed of small particles found in deep water or quiet bays. Soft sand is composed of larger particles, while coarse material (1-5 mm and greater) is often associated with strong currents and the surf zone. Ocean swells, surf, currents that contribute to long shore transport, and the slope of the beach and ocean floor are a few factors that sort sand by particle size. Underwater photos demonstrated the characteristics of the sand.

The texture of the sand influences the composition of the worms, clams, echinoderms etc. that live in the sand and are the prey species of predacious gastropods such as augers, miters, cones, spindles, murexes, and moon snails. These and other predators may hunt on the surface of the sand, or more typically, move through the sand and leave behind distinctive trails. The best time to look for these species is at night or early morning before wave action moves sand and covers the trails. Large species such as cassis, murex, and leopard cones are often fully exposed during the day or only partially buried.

Paul used underwater photos to show the difference between feeding trails left by goat fish and orange shoulder surgeonfish vs those made by gastropods. He then showed the trails made by various genera of gastropods and the snail removed from the sand at the end of each trail. Characteristics of the trail were found to be good indicators of the genera and in some cases seemed to be species specific.

The meeting was adjourned at 8:50 P.M. Refreshments were provided by Stephen Mulliner and Marty Schuler.

. Paul Tuskes

The Annual Christmas Dinner Party - 2012

The Club's annual Christmas Dinner Party at the Butcher Shop was a huge success. Members and guests enjoyed the festivity of the room, the delicious dinner and the wonderful program by Richard Herrmann who took us from the farthest east in San Diego County to the coast and wowed us with his fantastic photos of the fauna and flora of each area—a toad on branches of a plant in the desert, the desert in bloom, mountains of beauty and traveling to the beautiful coast that we all love with underwater and above water marvelous views.

Emcee Bob Dees thanked the 2012 Club board for their work and for the terrific year we've had, informing the audience of the many activities that the board and the Club staff accomplish. He then informally installed the board for 2013, presenting president elect David Waller with the rosewood gavel and the frame of the signatures of the Club's original members. Dr. David Leighton is one of those members.

Then the fun of the gift exchange, the lottery to win the Christmas centerpieces and also the scramble by many to collect the shells that provided decoration for the tables.

It was a great time – as always!

Dues are Due

It's that time again. If you have not already paid your dues, they must be received by the beginning of the next month or you will not be included on the published roster with the February issue. The dues have not changed and are published on the front page of the issue. Either send them to the Club address or bring your dues to the January meeting.

REPORT ON GEOGRAPHICAL EXTENSIONS AND RECORD-SIZE SPECIMENS OF *FENIMOREA*, *LEPTADRILLIA* AND *CERODRILLIA* (CONOIDEA: DRILLIIDAE) FROM THE GULF OF MEXICO.

EMILIO F. GARCÍA

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E-mail: Efg2112@louisiana.edu

For more than a decade I have been reporting on mollusean findings made during eruises in the Gulf of Mexieo on the R/V *Pelican*, a vessel managed by the Louisiana Universities Marine Consortium (e.g. Gareía, 1999, 2007a; Gareía & Lee, 2002). Although many interesting speeies, geographical extensions and reeord-size speeimens have been reported in these artieles, a number of noteworthy speeimens of the family Drilliidae have been overlooked. Unless otherwise stated, the geographieal distributions and reported reeord sizes are based on Rosenberg, 2009. They are as follows:

***Cerodrillia girardi* Lyon, 1972 (Figure 1).** The westernmost reported loeality for this speeies is off Egmont Key, west Florida at 27°37′N, 83°58′W. The speeimen shown here (EFG 14604) was dredged in 1994 off Mobile Bay, Alabama at 29°214'N, 88°15'W, in 122 m, and measures 4.2 mm. It is the deepest that this speeies has been reeorded, but it is an empty shell.

***Fenimorea kathyae* Tippett, 1995 (Figure 2).** The only reeord from the Gulf of Mexieo reported by Tippett (1995: 132) was dredged off Egmont Key, west Florida, at 91 m. The speeimen shown here (EFG 24379) was dredged off Louisiana in 2003 at 28° 6.21′N, 91°2.23′W, in 99.3 m, and measures 28 mm. It is the only speeimen that we have dredged.

***Fenimorea petiti* Tippett, 1995 (Figure 3).** Tippett reported this species as having been dredged in west Florida from Cedar Kay to the Florida Keys (p. 133); some of this material was eolleeted by Jim Moore in 1963. The westernmost longitude for *F. petiti* was given as 83°W; however, I have in my eolleetion eight lots dredged in the north-eentral Gulf of Mexieo, ranging from 87°35.10′N (off Alabama) to 92°27.56′W (off Louisiana). The speeimen shown (EFG 27657), ehosen for its intense eoloration, is one of a series dredged at 29°26.28'N, 87°35.10'W in 71-81 m. It measures 12.1 mm. A lot of 2 speeimens (EFG 26123) was also dredged in 2005 at Bahía de Campeehe, Méxieo, at 20°51.16'N, 92°26.28'W, in 93-94 m.

***Fenimorea sunderlandi* (Petuch, 1987) (Figures 4-5).** The speeimen shown in **Fig. 4** (EFG 25988) was dredged in Bahía de Campeehe, at 22°16.57'N, 91°23.06'W, in 114-102 m. It measures 53.2 mm, a reeord size. The speeimen presumably would have grown somewhat larger, as its aperture has not yet developed its adult eharaeters. Two other speeimens (EFG 26010; EFG 2530) were also dredged at Bahía de Campeehe. This speeies had never been reeorded from the southwestern quadrants of the Gulf of Mexieo.

On our way baek from the Mexiean eampaign (Gareía, 2007b) we dredged a fourth speeimen **(Fig. 5)** off the Louisiana eoast, at 27°58.34'N, 92°22.42'W, in 68-86 m. It measures 48.0 mm. The speeies has been reported from the northwestern quadrant of the Gulf, but without a speeifie loeality (Sunderland, 1991).

***Leptadrillia loria* Bartsch, 1934 (Figures 6-9).** This speeies has a very short history. The holotype **(Fig. 6,** 6.8 mm, after Bartseh, pl. 7, fig.1) was dredged off the north eoast of Puerto Rieo in 357 to 274 m, the single loeality on reeord for the speeies. We have dredged nine lots of *L. loria* in the Gulf of Mexieo; all eolleeted as empty shells. Some of the fresh speeimens

are light-brown in coloration (EFG 16995; **Fig. 7**) but otherwise meet Bartsch's criteria for the taxon; translucent white specimens were also collected in the same lot. It seems that live specimens of this species may not be translucent white but light brown. One of the specimens (EFG 23481; **Fig. 8**) measures 8.1 mm, the largest size reported for *L. loria.*

As this is not a well-known species, complete catalogue data for all the lots follow:

ALABAMA
EFG 17015: 29°27.32'N; 88° 17.32'W, in 56 m
EFG 16995:29°27.32 N; 88°17.32 W, in 56m (**Fig. 7**, 6 mm)
EFG 30813: 29°19.62'N, 87°46.19 W, 97-108 m

LOUISIANA
EFG 23481: 27° 59.141'N, 91° 38.832'W, 91-65 m in coralline rubble (**Fig. 8,** 8.1 mm)
EFG 30812: 28°00.86 N, 92°27.56 W, 91-86 m; in mud with shells

BAHÍA DE CAMPECHE, MÉXICO:
EFG 26617: 20°52.40'N, 92°24.83'W, 77-81 m, in mud (**Fig. 9**, 5.6 mm)
EFG 26618: 20°51.16'N, 92°26.28'W, 93-94 m, in granular sediment
EFG 26619: 20°00.35'N, 92°26.10'W, 73-77m, in mud
EFG 26620: 22°16.28'N, 91°30.42'W, 108-107m, in mud

The above data extends the geographical distribution of *Leptadrillia loria* to 29°27'N and 92°27.56 W.

I am most thankful to Phil Fallon, of Farmingdale, New York, who looked at, and confirmed the identifications of all the specimens treated in this report. Mr. Fallon is a student of the western Atlantic Drilliidae.

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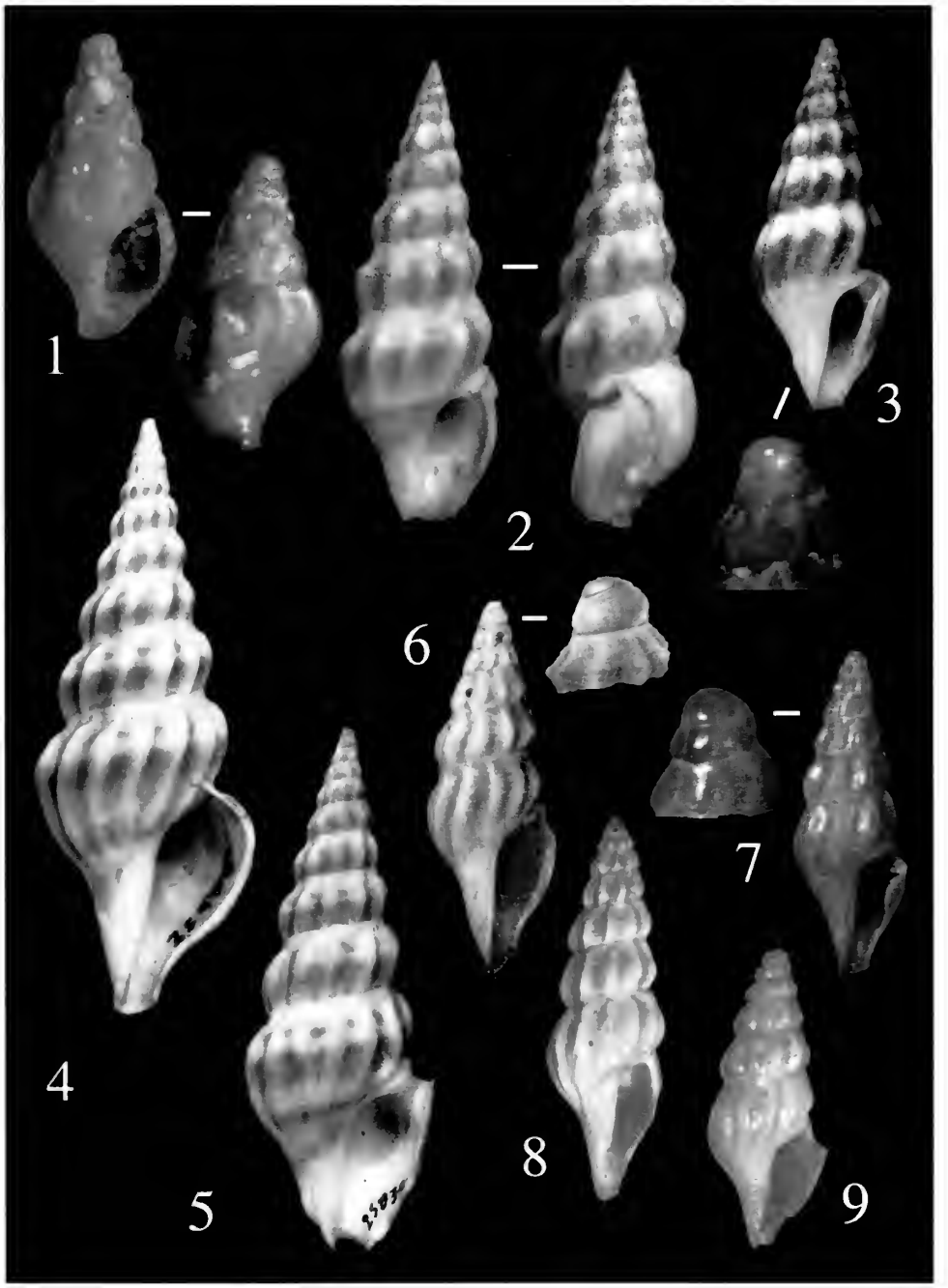

Figures 1-9. (1) *Cerodrillia girardi* Lyon, 1972. **(2)** *Fenimorea kathyae* Tippett, 1995. **(3)** *F. petiti* Tippett, 1995. **(4)** *F. sunderlandi* (Petuch, 1987) [Bahía Campeche]. **(5)** *F. sunderlandi* [off Louisiana coast]. **(6-9) (6)** *Leptadrillia loria* Bartsch, 1934 [holotype]. **(7-9)** *L. loria.*

SOME OBSERVATIONS ON THE BEHAVIOR OF *STROMBUS ALATUS* (GASTROPODA, STROMBIDAE) ON SANIBEL ISLAND, LEE COUNTY, FLORIDA

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Introduction

Strombus alatus Gmelin, 1791, the Florida fighting conch, is a species that occurs from North Carolina to Florida and also along the Gulf of Mexico as far south as Quintana Roo, Mexico (Rosenberg, 2009). A closely related species is *Strombus pugilis* (Linnaeus, 1758), the West Indian fighting conch, which occurs from Florida to Brazil. Both species are similar in size and appearance, and have sometimes even been suspected of being a single species. There are ecological differences however: Rosenberg (2009) reports the depth range for live individuals of *S. pugilis* as 1–55 m, whereas the depth range for live *S. alatus* is given as 0–46 m. Thus, *S. pugilis* is never routinely exposed to the air, because it lives subtidally, but *S. alatus* is exposed to the air during minus tides, which occur on a regular basis during the year.

Although I had seen live *S. pugilis* while snorkeling on Nevis, I had not seen live *S. alatus* until I visited Sanibel Island on the Gulf Coast of Florida from 7-19 December 2011. Off West Gulf Drive in Sanibel (26°26′11.72″N, 82°07′32.75″W), colonies of the species live on sand bars which are exposed to the air during minus tides. I was present during minus tides associated with the new moon, many of which occurred in daylight during the early morning.

Never having seen *S. alatus* before, I was surprised to see they were very active during these extreme low tides. This is in sharp contrast to the behavior of most species of marine gastropods that live in the low intertidal and shallow subtidal zone; it more closely resembled the activity of amphibious species that live in the upper intertidal, such as periwinkles. I was able to photograph some of the behaviors that I saw (Plate 1). It appears that virtually nothing about the behavior of this species in the wild has been reported in the literature. For want of any better information, I am assuming that the behaviors I witnessed are part of the normal repertoire of reponses of the species.

There was a colony of fighting conchs on each section of sandbar. As these areas became exposed to air by the receding tide, approximately one hundred adult conchs rapidly dug their way up out of the sand, popping up onto the surface (Pl. 1, figs. 1 & 2). Many then continued to be quite active, moving around for some length of time in the air, each using its operculum in the characteristic lurching gait typical of conchs. Even those that were stationary had not retracted into the shell, but were "standing still". I saw no juveniles, only adults. It is not known whether the juvenile fighting conchs live in the sandbar but stay buried in the sand during minus tides, or live in a different habitat.

Even more surprising was the fact that a fair number of the individuals maneuvered their shells so that the apertures were high up, facing the horizon (Pl. 1, fig. 4). The animals stayed in this position with their soft parts actively extended out around the shell with the tip of the foot barely touching the ground or not touching it at all. The conchs remained with their bodies exposed for long periods of time. One might argue that this position was accidental and unwanted, but I did not see any animal struggling to get back into a more normal pose. I also did not see evidence that an animal had previously struggled, which could have left a series of faint scratch marks on the sand. Individuals of *S. alatus* are quite strong and agile, are not extremely

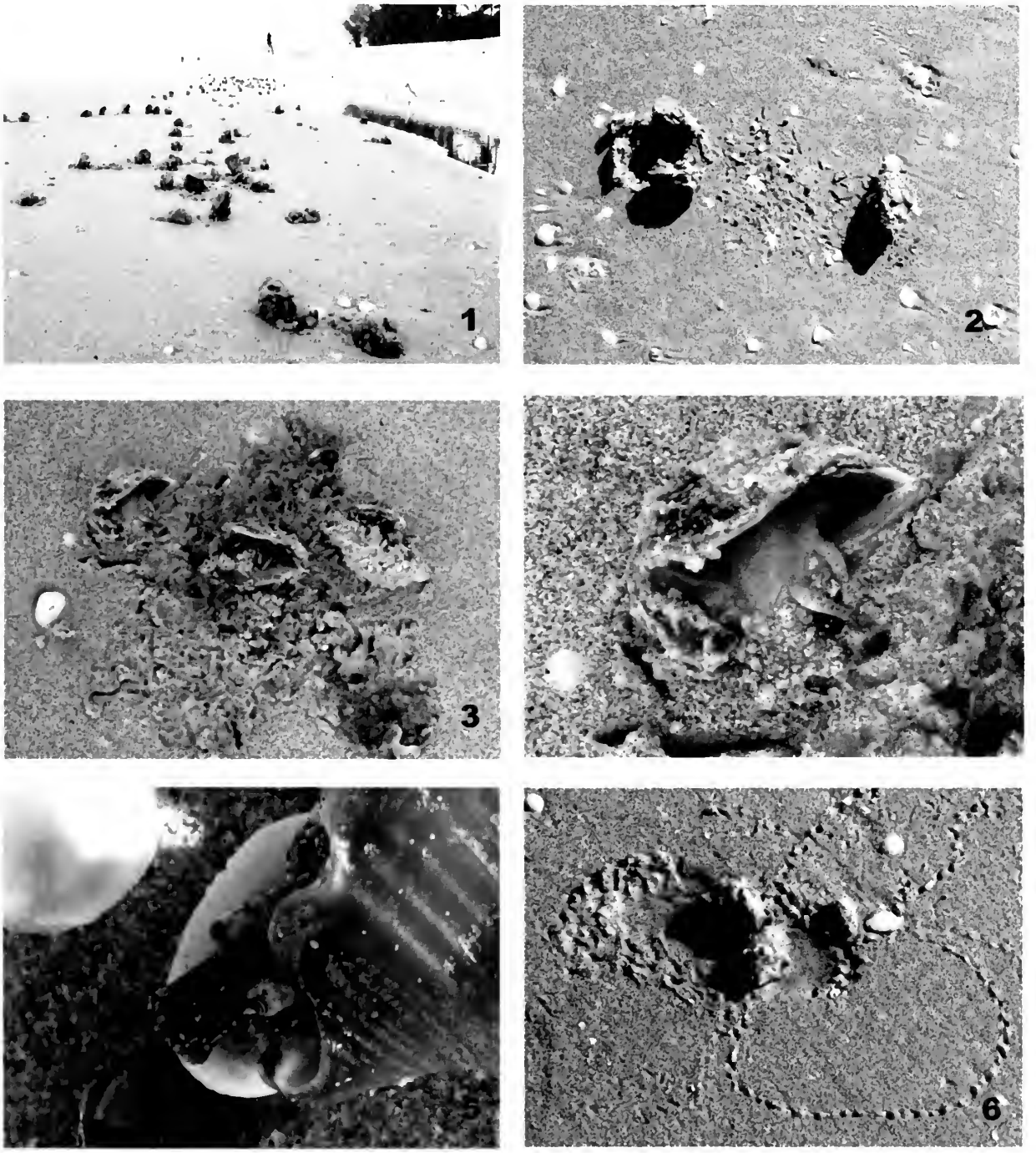

Plate 1 Figures 1-6. **(1)** Colony "popped up" from a sand bar during minus tide. **(2)** One individual having dug itself out. **(3)** Three individuals with shells rotated and soft parts actively extended. **(4)** Close-up of one of the individuals in Figure 3. **(5)** Close-up of an individual in the strand line, with snout and eyestalks protruding. **(6)** Two conchs: might the tracks indicate an attempted mating?

heavy, have a good reach, and can apply a great deal of force using the claw-like operculum. On being picked up many of the conchs reached out of their shells as far as they could, thrashed around, and managed to escape my grasp by pushing on my hand with surprising force. One conch had been washed up some distance into the lowest strand line, where the surface of the sand was still damp but starting to dry out. This individual was also active, with its proboscis and eye stalks protruding from its shell (Pl. 1, fig. 5). The animal did not retract when I approached it, or as my shadow fell on it, or even when I touched it gently, but did withdraw suddenly when it felt the vibration of a beach patrol vehicle approaching.

No mating pairs were observed, but Plate 1, figure 6 shows one conch positioned on top of another, although not in the typical orientation for mating. A captive study reports fewer matings in December than in other months, apparently because of the colder temperatures (Shawl & Davis, 2005). However the circular tracks visible in Figure 6 seem to suggest that the encounter I photographed may have been deliberate rather than accidental, and thus may have been mating related.

It seems remarkable that a species living so far down in the intertidal zone should engage in so much activity while it is exposed to air and sunlight, and presumably at risk of desiccation as well as possible predation from gulls and other opportunistic feeders. I did observe other medium-sized shelled gastropods that were active during the minus tides, but they were either in shallow pools of water (*Chicoreus pomum* (Gmelin, 1791) and *Fasciolaria lilium hunteria* (G. Perry, 1811)), or were plowing through the wet sand (*Oliva sayana* Ravenel, 1834). On two separate occasions I noticed that the upper surface of the shell of an approximately 30 cm horse conch *Triplofusus giganteus* (Kiener, 1840) was exposed to air during a minus tide, but on investigation I found that the animal had its foot down in the wet sand as far as it could reach, with the sole of the foot extended out to its maximum area, like an anchor. The horse conchs were clamped firmly in place, with water trapped under their shells, and they stayed immobile as long as the minus tide lasted.

During one of the minus tides when there were waves on the Gulf, almost 100 live fighting conchs had been washed up into the lowest strand line on one stretch of beach. Because fighting conch colonies are so active during minus tides, it seems that any significant wave action could easily push numerous individuals up on the beach. I would imagine that the behaviors I witnessed during minus tides could be a factor in the mass strandings of thousands of conchs that have been reported locally (Text figure 1).

Text figure 1. A mass stranding of *Strombus alatus* at Bonita Beach, about 25 km southeast of Sanibel, August 29, 2010. Image with permission from *I LoveShelling.com.*

Acknowledgments

I wish to acknowledge helpful communications with Dr. José Leal, director of the Bailey Matthews Shell Museum on Sanibel; Amber Garr (previously Amber Shawl), research associate at the Harbor Branch Oceanographic Institute at Florida Atlantic University; Eric Milbrandt, director of the marine biology laboratory at the Sanibel Captiva Conservation Foundation (SCCF); Richard Bartleson, also of the SCCF, and Pam Rambo of *I LoveShelling.com*

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PROGRAM

Lessons learned from Monographing Micromollusks: a case study of Scissurellidae s.l.

Daniel L. Geiger, Curator of Malacology at the Santa Barbara Museum of Natural History, earned his Ph.D. in marine biology from the University of Southern California. He won the 2000 Annual Award by the Malacological Society of London with his dissertation on the systematics and evolution of abalone. His interest is in global systematic assessments of basal marine snails with special emphasis of small-sized groups. His talk this month will be on the little slit shells, which is the subject of his new two-volume book, which we will be able to see at the meeting.

Meeting date: February 21st at 7:30 PM

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CLUB NEWS

Minutes of the San Diego Shell Club 17 January 2013

The meeting was called to order at 7:45 PM by President David Waller. The previous minutes were approved. There was no Treasurer's report. Carole Hertz announced the Shell Auction will be held on Saturday, April 27th. More later but save the date.

Paul Tuskes offered to fill the vacant 2013 position as VP. The action was approved by the board. We now need a recording secretary to take both club and board minutes.

Paul introduced Dr. Kevin Stierhoff, group leader at the Bureau of Fisheries. Kevin provided an overview of the past abalone fishery, threats to the population, and focused on the current assessments of the white abalone population. *Haliotis sorenseni* was listed as an endangered species in 2002. Tanner Banks and three other locations have been surveyed with ROVs three times. In southern California, the take of any abalone species has been prohibited by the state since 1997. Field data for the four survey sites suggest that the number of white abalone continues to decrease significantly since the survey began in 2002. The decrease is most likely the result of mature animals dying of old age. Abalone broadcast their eggs and sperm into the water, and must be within a few meters of each other to have a high rate of successful fertilization. White abalone, even at the depth of 90 to 200 feet, are so sparse that successful reproduction is probably an infrequent event. Nearly two decades of regulatory protection has only seen the population slide closer to local extinction. Kevin gave a great presentation that included underwater videos from the ROVs and lots of discussion after the presentation.

A discussion followed the formal presentation. The deep water population of white abalone should have been a reserve, yet the population is lower than ever, probably because they are too widely separated to successfully reproduce. Hatchery raised juvenile white abalone have been devastated by withering foot disease. It's likely that white abalone is suffering the same fate as black abalone from this disease. Three stop-gap options were discussed by the group. 1. Raise white abalone and treat with antibiotics in order to maintain a captive breeding population. 2. Raise juveniles isolated from potentially contaminated ocean water and provide the kelp needed to feed them from areas that are thought to be free from the bacteria, such as Canada or Alaska. 3. Raise huge numbers of juvenile white abalone and then expose them to the bacteria in order to select a more resistant strain of white abalone.

The meeting was adjourned at 9:10 PM. Wes Farmer won the door prize and Marilyn Goldammer, Wes Farmer and Ann Tuskes provided the refreshments.

Save the Date

The Club's annual Auction Potluck will be held on Saturday, April 27th at the Community Room of Wes Farmer's condo – as it has been for the past 25 years! Updates will be in future issues of *The Festivus* with information on special items to be included in the auction.

Auction donations will be most cheerfully and gratefully accepted. Contact either David Waller (dwaller@dbwipmg.com) or Carole & Jules Hertz (jhertz@san.rr.com) if you plan to donate.

First notice of the 46th Annual Meeting of the Western Society of Malacologists

The annual WSM meeting will take place from June 23-26 at the Courtyard by Marriott San Diego (San Diego central) at 8651 Spectrum Center Blvd., SD, CA 92123.

Contributed talks on all subjects malacological will take place Sunday through Tuesday with a symposium on Moluscos y los Californios [Molluscs and the Californians] possible for Tuesday. Sunday there will be a wine & cheese social hour with a possible reprint/shell sale to benefit the student grant fund. Monday will feature a poster session and Tuesday a group photo, business meeting and banquet. Deadline for Abstracts is 17 May 2013.

The field trip on Wednesday will be either to Birch Aquarium, Scripps Institution of Oceanography or the San Diego Natural History Museum and Balboa Park.

For further information contact either:
Wendy Enright – wenright@sandiego.gov or
Kelvin Barwick – kelvinbarwick@hotmail.com

FURTHER NOTES ON THE DISTRIBUTION OF *VASUM GLOBULUS* (LAMARCK, 1816) (GASTROPODA, TURBINELLIDAE)

SUSAN J. HEWITT

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Vasum globulus (Lamarck, 1816) is a rare species of Caribbean vase snail (Figure 1). The original combination for the current name is *Turbinella globulus* Lamarck, 1816; the type locality is unknown, not having been stated in the type description (Rosenberg, 2009). This paper on the distribution of the species is an addendum to Hewitt (2010), "A new locality for *Vasum globulus* (Gastropoda, Vasidae): the island of Sint Eustatius, Leeward Islands, West Indies." Rosenberg's 2009 Malacolog 4.1.1 database gives the range for *V. globulus* as 18°N to 17°N, 67°W to 61.8°W, but the western range limit of 67° is presumably an orthographical error, as the only localities mentioned in the entry are Antigua and Barbuda.

In Hewitt (2010) I noted that the species had literature records only from those two islands, plus I reported finding *V. globulus* on the island of Sint Eustatius. I also expressed the opinion that other islands in the Leeward Island group might have suitable habitat for the species.

Shortly after the 2010 paper was published, I was told that the presence of *V. globulus* on St. Eustatius had been recognized some decades earlier. And, during March and April 2012, I learned that *V. globulus* has been discovered in a number of other islands in the Leeward Island chain, although the records have varying degrees of reliability. *Vasum globulus* is, however, hard to mistake for any other species, with the possible exception of *Vasum capitellum* (Linnaeus, 1758), which is considerably more spiny, has a much higher spire and usually a longer siphonal canal.

The following listing explains where *V. globulus* has been reported in the West Indies, along with source information. The islands are given here in sequence from north to south (Map 1). For Antigua and Barbuda, where the occurrence of *V. globulus* is well known, no attempt has been made to mention every published report of the species.

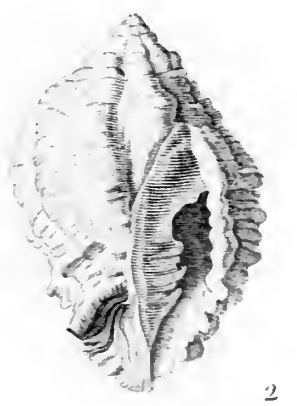


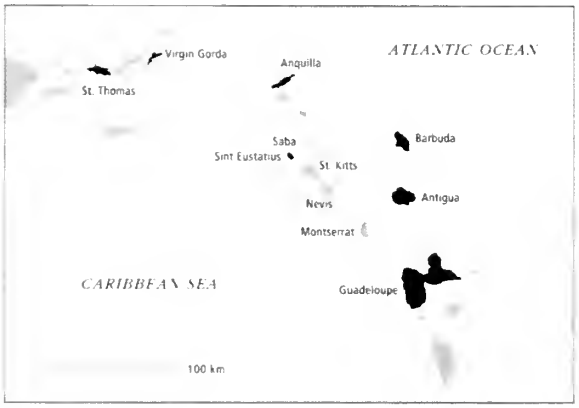
Figure 1: Original Lamarck (1816) engraving of the shell of the species.

St. Thomas, U.S. Virgin Islands, 18°20′N, 64°55′W

In an e-mail communication to me in April 2012, Harry G. Lee of the Jacksonville Shell Club pointed out that the online collection database of the Florida Museum of Natural History lists catalogue number 142790 as a dry lot of *Vasum globulus nuttingi* Henderson, 1919, from the U.S. Virgin Islands, specifically the island of St. Thomas. This lot was collected by C. J. Holeman on 12 March 1961, from Lindberg Beach, which is on the south coast, close to the airport.

Virgin Gorda, British Virgin Islands,18°48′, 64°30′W

Harry G. Lee also told me that on 1 April 2012 on the listserve "Conch-L", William J. Fenzan pointed out



Map 1: A map of the Leeward Islands. The east end of Puerto Rico is in the upper left, and the island of Dominica is in the lower right. Islands from which *Vasum globulus* has been reported are shown in black.

to him that *V. globulus* is known from the island of Virgin Gorda, British Virgin Islands. Listed as catalogue number 203523 in the collections database of the Museum of Comparative Zoology at Harvard is a dry lot of six specimens. These were collected 29 March 1958, by the 1858 Smithsonian-Bredin Caribbean Expedition, in the northern part of Virgin Gorda at Vixen Point on Prickly Pear Island, Gorda Sound.

Anguilla, 18°12′N, 63°03′W

As mentioned in Hewitt (2010), a *Vasum* species described as being intermediate in characteristics between *V. capitellum* and *V. globulus* was reported from the island of Anguilla in Watters, Petuch & Serrand (1999). An image of two additional shells of this kind (found in Anguilla in 2003 by the Whitcher family) are shown on the website of the British Shell Collectors' Club. Dr. Petuch told me in April 2012 (via e-mail communication) that although some collectors refer to these morphotypes as *V. capitellum*, in an upcoming paper in *Visaya* he would be naming this *Vasum* morphotype as a subspecies of *V. globulus*.

Barbuda, 17°37′N, 61°47′W

Vasum globulus was recorded from Barbuda in 1877 by Higgins and Marrat. Shuster & Bode, 1961 (based in part on the 1958 Smithsonian-Bredin Caribbean Expedition) reported the species on the windward side of Spanish Point, Barbuda.

During April 2012, the website *Femorale* displayed images of eight specimens of *V. globulus* collected on an (undated) trip to the island.

Sint Eustatius, 17°29′N, 62°59′W

In May 2010, on the island of St. Eustatius (Hewitt, 2010), I found empty shells of *V. globulus* at Gallows Bay, Zeelandia Bay, and Lynch Beach. Shortly after my paper was published, the Dutch malacologist Dr. Robert G. Moolenbeek (of the Zoological Museum of the Universiteit van Amsterdam) told me via e-mail (26 August 2010) that he had known for some time that *V. globulus* occurred on St. Eustatius. He explained that Laurens Duiveman, manager of of the St. Eustatius National Parks organization from 1998 – 2000, had given him specimens of *V. globulus* which had been found as both live snails and empty shells in Jenkins Bay in 1972, in Gallows Bay in 1972 and 1977, and in Oranjestad Bay in 1996 and 1999.

However, Dr. Moolenbeek told me he believed that information on the presence of *V. globulus* on Sint Eustatius had not been published prior to my paper. It is possible that some material of *V. globulus* from St. Eustatius may already (or will eventually) be in the Zoological Museum's malacology collection, although Dr. Moolenbeek was unable to give me catalogue numbers.

On 12 March 2012, I made e-mail contact with Marien Faber at that same museum. He also knew about *V. globulus* being on St. Eustatius, and on page 71 of Faber (1988) he had made a brief mention of this, stating that *V. globulus* "is confined to the Lesser Antilles from Guadeloupe to St. Eustatius."

Antigua, 17°03′N, 61°49′W

The holotype of *Vasum globulus nuttingi* Henderson, 1919 (a synonym according to Rosenberg, 2009) is from Falmouth Harbour in Antigua, and a paratype is from English Harbour there. Shuster & Bode (1961) reported finding the species in eleven localities on the island and provided extensive notes on its habits and habitats. The species was reported at St. Johns and Fort James by Nowell-Usticke, who in 1969 called it *Vasum globulus antiguensis* and in 1971 *Vasum antiguaensis*, both synonyms according to Rosenberg (2009). Zhang (2012) shows images of nine

specimens from the western and southwestern coasts of Antigua.

Guadeloupe, 16°15′N, 61°28′W

When writing about *V. globulus*, Faber (1988) used the phrase, "confined to the Lesser Antilles from Guadeloupe to St. Eustatius." Reading this in March 2012, the meaning was not clear to me. Firstly, Barbuda (where the species has long been known to occur) is a little further north than St. Eustatius. Secondly, at that point I had not heard of *V. globulus* occurring anywhere further south than Antigua. Finally, the phrase "Guadeloupe to Sint Eustatius" appeared to me to refer to a stretch of the inner arc of the Leewards that comprises the islands of Guadeloupe, Montserrat, Nevis, St. Kitts, and Sint Eustatius. I have visited all of these islands except Guadeloupe to search for marine mollusks, and so far I have found *V. globulus* only on Sint Eustatius. When I questioned Faber about this (March 2012) he replied that when he was writing the 1988 paper he had known that *V. globulus* occurred on Sint Eustatius, and had also found what he considered to be a reliable indication that the species occurred in Guadeloupe, but could no longer remember the source.

In April 2012, a Google search revealed that an image of a shell of *V. globulus* is shown on the website of the Association Francais de Conchyliologie, and also on the website of Bruno Lafitte, a collector and member of the Association. The shell is described on both sites as being from Guadeloupe, specifically from Saint-François, a commune at the southeast point of the island. I contacted Mr. Lafitte via e-mail on 4 April 2012, and he told me he had bought the shell from another collector four or five years before, and had no other data for it. This piece of evidence, although rather weak by itself, tends to reinforce the possibility that the species occurs on Guadeloupe.

Conclusions

Some of the records given here, such as those from Anguilla and Guadeloupe, would benefit from more clarification or confirmation, but the available evidence suggests that *Vasum globulus* occurs on seven of the Leeward Islands. If all of these records prove to be accurate, the known range of the species is greatly increased. Before Hewitt (2010), *V. globulus* was thought to occur only on Antigua and Barbuda which are 63 km apart on the same underwater shelf. After Hewitt (2010), *V. globulus* was thought to occur only on Antigua, Barbuda, and St. Eustatius, three islands that are within 130 km of one another. Now the range for the species appears to span 469 km, from St. Thomas to Guadeloupe.

Map 1 shows that the records are widely spaced over an area which includes numerous other islands. It is certainly possible that the species may be present on some islands where it has not yet been found. *Vasum globulus* is drab in color, is often only about 25 mm in length, and is sometimes restricted to small areas of suitable habitat; all of these factors can make the species easy to overlook.

In general the fauna of this part of the world has not been well investigated, and only a few islands in the area have been thoroughly surveyed. St. Croix, with records of 472 species, probably is not home to *V. globulus*, and I have found no sign of it on Nevis, despite having recorded approximately 600 other species of marine mollusks there.

On 2 May 2011, while I was on Sint Eustatius, I discussed my 2010 *Vasum globulus* paper with another visitor, Joseph Cesar, who suggested that the species might have been introduced to St. Eustatius from Antigua or Barbuda on the ballast rocks that were used in sailing ships of the 17th and 18th centuries, when Sint Eustatius was called "the Golden Rock" because it saw a vast amount of trading. However, if *Vasum globulus* indeed has the extended distribution that is implied by the information presented here, it is probably not necessary to suggest human intervention in order to explain its spread within the Leeward Islands.

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Book Review: Monograph of the Little Slit Shells

Monograph of the Little Slit Shells.
By: Daniel L. Geiger, 2012.
Published by: Santa Barbara Museum of Natural History, Santa Barbara, CA. Two volume set. Monograph Number 7, 1291 pp., 1042 figs.
Price: $80.00 US plus shipping.

The scissurellids, or little slit shells, are a group of exquisitely sculptured micro-mollusks that range in size from half a millimeter to a little over 11 millimeters. Were it not for their tiny size, I don't doubt that they would be as popular among collectors as muricids, abalones, cones or cowries.

Daniel Geiger has spent 12 years researching this very interesting group of basal marine snails (Vetigastropoda), and the only diminutive concept in his impressive two-volume production is the size of the specimens he has studied; all else is gargantuan, including the fact that he has examined some 73,000 specimens belonging to 9,800 lots. The two volumes treat all Recent and fossil taxa ever described as scissurellids, including 17 species described for the first time (Figure 1). In order to navigate through the contents of the 1291 pages the author provides edge markings to indicate the various parts, thus allowing the reader to find the desired section quickly.

Volume I has 728 pages and 589 figures, each figure comprised of multiple images. This volume provides a meticulous, 9-page Table of Contents for Volumes I and II, and includes a list by family and genus of the species treated in both volumes. The Table of Contents is followed by an in-depth, 120-page Introduction to Scissurellids. Some of the interesting topics presented in this section are history, taxon concepts, organization of the descriptions, collecting and curating, specimen preparation, photography and digital imaging, discussion of shell characters including radula and operculum, biology, diagrams of molecular phylogeny, and glossary of terms. To assist the user with the identification of specimens there is a "Thumbnail identification" section; the plates shown in this section are additionally provided as separate cards located as inserts at the end of Volume I. For further assistance, Geiger has provided a list of species by global region. The Introduction ends with four color plates showing the coloration of some shells and animals, as well as a Histology Plate.

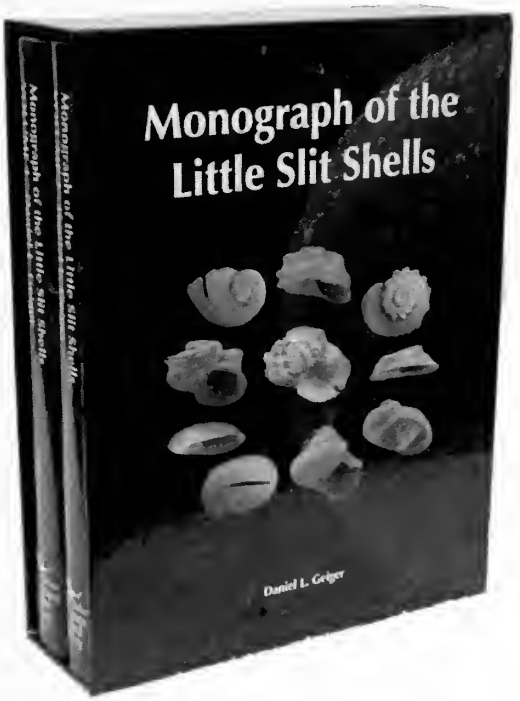

Figure 1. The slipcover of the *Monograph of the Little Slit Shells.*

The second part of Volume I addresses the family Scissurellidae and its genera: *Scissurella*, *Sinezona*, *Sukashitrochus*, *Satondella*, *Incisura* and *Coronadoa*. Once the supraspecific taxa are described (which includes animal characters, if known), the specific epithets are taken alphabetically by genus. The description of each species begins with what the author considers its valid name, followed by chresonomy (i.e. the application of a particular name or combination thereof), synonymy and misidentifications (if pertinent), type material, type species, type locality, etymology, description and comparisons, distribution (including geologic range), specimen and literature records, remarks, and distribution maps.

Each species is accompanied by superb multiple images using scanning electron micrographs (SEM). The very sharp, beautiful images, accompanied by very detailed descriptions and comparisons with similar taxa, make identification of these tiny shells as easy

as possible.

Volume II has an additional 562 pages (729 to 1291) and 453 figures with multiple images. It includes the other 5 families of scissurellids and their genera: Anatomidae (genera: *Anatoma*, *Sasakiconcha*); Larocheidae (genera: *Larochea*, *Larocheopsis*, *Trogloconcha*); Depressizonidae (genus *Depressizona*); Sutilizonidae (genus *Sutilizona*); and Temnocinclidae (Recent genera: *Temnocinclis*, *Temnozaga*; fossil genus *Triassurella*). The volume has the same format, magnificent photography and attention to detail as volume I, and again provides the Thumbnail Identification figures in separate cards as inserts at the end of the volume. After the taxonomic section there are 42 pages of Literature cited, and 10 pages of general Index.

In spite of the superlatives I have used, I still feel like I have not done justice to this publication. For example, if one looks at the treatment of *Anatoma aspera* (Philippi, 1844)(p. 774) one finds 59 names in the Chresonymy section, 15 synonyms, 23 mis-identifications, about 3 pages of tightly packed specimen records, 46 images of shells and radula, and one and a half pages of Remarks. Although not all species are as copiously described, the author does present all that is available at this time for each of them.

My acquaintance with "little slit shells" has been minimal, so I do not pretend to be knowledgeable enough to review this extraordinary publication from a taxonomic standpoint. If one looks to find a negative point, I suppose one may say that, stylistically, there will be rough edges here and there, but these will be almost unnoticeable as the reader encounters the overwhelming amount of data presented.

As one turns the pages of these volumes, it feels like one is looking through a huge magnifying glass at a nature full of hidden beauty and wonders. That is why I believe that, besides its intended purpose and its obvious use as a reference for marine biodiversity professionals, the numerous, exquisite images, the attention to details, and the scope of the work will make this publication very attractive to those who search for beauty in nature and for a better understanding of Mollusca in particular and of life on earth in general.

Emilio García, reviewer

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THE FESTIVUS

A publication of the San Diego Shell Club

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The Festivus is published monthly except December.
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Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM,
Room 104, Casa Del Prado, Balboa Park, San Diego.

Website at: *http://www.sandiegoshellclub.com*
E:mail: *jhertz@san.rr.com*

PROGRAM

A Tribute to James H. McLean followed by a discussion by Jim on his work on the Liotioidea.

Meeting date: March 21st at 7:00 PM
Room 104

CONTENTS

CLUB NEWS

Minutes of the San Diego Shell Club 15 February 2013

The meeting was called to order at 7:45 PM by President David Waller. The previous minutes were approved. The club is still in need of a recording secretary, no experience needed and the pay is double that of last year.

Carole Hertz announced that the Club Shell Auction Potluck will be held on Saturday, April 27th . Just a reminder, that at the March 21st meeting we will be honoring Dr. James Mclean with the *Festivus* Award for his lifelong contributions to Malacology. Please respond to the RSVP on the flyer so that we can have the correct amount of food [see page 24].

Paul introduced Dr. Daniel Geiger, curator of malacology at the Santa Barbara Museum of Natural History. Daniel discussed his work on scissurellids which are a microscopic group of slit shells. Most individuals in this group are only a few millimeters in length. Shell morphology is an excellent tool and scanning electron microscopes produce wonderful images. Morphological studies are another matter, but modern tools have come to the rescue. Animals are removed from the shell, fixed, and then mounted and sliced via a microtome. A computer reads the microtome slides and can combine them to show the entire animal, or any portion of it. Study of the radula is less complex but the scanning electron microscope is needed to really appreciate the details of these structures. The illustrations were amazing, and the techniques to work on micro species are most impressive.

Daniel has recently published the fine 2-volume book via SBMNH on scissurellids, *Monograph of the Little Slit Shells* and the outstanding work *Abalone of the World*, published by Conch Press. Both books were on display and available for purchase or order. In addition the 2-volume set by Coan & Valentich-Scott on *Bivalve Seashells of Tropical West America* was also available for order from SBMNH.

The meeting was adjourned at 9:05 PM and numerous members stayed to visit, review the books on display and finish the snacks. Refreshments were provided by Dave Waller and Carole and Jules Hertz.

Paul Tuskes

Additions and Changes to the Roster

Change of phone and e-mail

COAN, EUGENE, Phone (H) 650-493-8242, (C) 650-283- 8959. E-mail: genecoan@gmail.com

Too late for the roster

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Please advise the editor of any errors on the roster so that corrections can be made.

Save the Date

The Club's annual Auction Potluck will be held on Saturday, April 27th at the Community Room of Wes Farmer's condo – as it has been for the past 25 years! A signup sheet for the potluck will be passed at the March meeting.

The auction will feature some very special shells. Auction lists will be made available online for those who wish to have one before the event. Additional lists will be available at the auction [see page 25.]

Auction donations will be most cheerfully and gratefully accepted. Contact either David Waller (dwaller@dbwipmg.com) or Carole & Jules Hertz (jhertz@san.rr.com) if you plan to donate.

PLIOCENE FOSSIL MOLLUSKS COLLECTED FROM A SHRIMP TRAP OFF SAN CLEMENTE ISLAND, SOUTHERN CALIFORNIA

CHARLES L POWELL, II

U.S. Geological Survey, 345 Middlefield Road, MS 975, Menlo Park, CA 94025

E-mail: cpowell@usgs.gov

Introduction

In November 1993 Ralph Ferguson of Ferguson's Shells in Wilmington, California gave my father a small collection of what are, at least in part, fossil shells. According to the label accompanying them, they were collected in a shrimp trap at 400 fathoms (730 m) off San Clemente Island, southern California (California Academy of Sciences locality 72573; hereafter referred to as the shrimp trap fauna). The presence of hermit crabs in two of the specimens indicate that the shells were most likely carried into the shrimp trap. Although detailed locality data do not exist, water depths between 500 and 1,000 m occur on both sides of San Clemente Island and to the south, in the Catalina Basin to the east, San Nicolas Basin to the west, and San Clemente Basin to the south and southwest (Figure 1). Fossil mollusks are rarely reported from the marine environment and these represent only the fourth report of Pliocene fossils from offshore California. The first report is by Hanna (1952) who reported fossil shells from the Wildcat Group (Pliocene to Pleistocene; Dodd and others, 1984) collected offshore of Trinidad Head, Humboldt County, and similar specimens dredged in 1950 from off Eureka as far as 30 miles offshore and as deep as 120 fathoms (220 m). In southern California, Hawkins and others (1971) give an account of the Pliocene index fossil, *Patinopecten healeyi* (Arnold, 1906) from the Northeast Bank west of San Clemente Island in the southern California Borderland. The third is Vedder and others (1976) who discuss outer sublittoral mollusks of possible Pliocene age from southeastern Coronado Bank. The fossils discussed here represent the fourth report of Pliocene fossils known from the eastern Pacific Ocean and include one specimen that represents a new species. This new species will not be described at this time, but is illustrated and compared with a similar looking *Cantharus* from the Panamic Province.

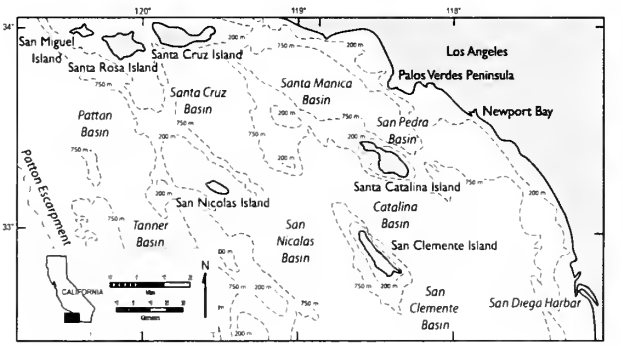

Figure 1. Map of the southern California Borderland, highlighting the islands and submarine basins (italicized) marked. The shrimp trap fauna was collected off San Clemente Island and could have been collected from the San Nicolas, Catalina, or San Clemente basins at water depths between 500 and 1000 m.

Discussion

The sample, CAS locality 72573, contains single specimens of an indeterminate new species of *Cantharus*, *Calicantharus fortis* (Carpenter, 1864), *Calliostoma platinum* (Dall, 1890), *Fusitriton oregonensis* (Redfield, 1846), *Neptunea tabulata* (Baird, 1863), and *Opalia varicostata* (Stearns, 1875) (all Mollusca: Gastropoda).

The indeterminate *Cantharus* (pl. 1, figs. 1, 4) represents a new species similar to *C. shaskyi* Berry, 1959 (pl. 1, figs. 9, 10), and is referred to as *Cantharus* aff. *C. shaskyi*. The new species can be easily separated from *C. shaskyi* in being longer between the widest part of the body whorl and the end of the siphon, in having a higher spire; and in having fewer varices that become obsolete near the middle of the body whorl whereas they extend across most of the body whorl in *C. shaskyi*. *Cantharus shaskyi* occurs from the Golfo de California, México (Keen, 1971), south to off Buenaventura, west Colombia (M. Coltro, e-mail 11/2012) and as a single specimen from Isla La Plata,

Ecuador (L. Groves, e-mail, 11/2012). This species occurs at water depths between 13 and 400 m (L. Groves, e-mail, 11/2012; M. Coltro, e-mail 11/2012), although the full extent of its geographic range and depth range is not well documented.

Calicantharus fortis (pl. 1, figs. 2, 3) is an extinct species and has been reported from the late Miocene "Jacalitos" California provincial molluscan stage; (Stanton, 1966; Ensley & Verosub, 1982) to middle Pleistocene (Arnold, 1903; 1906; Clark, 1931; Woodring et al., 1946; Lajoie et al., 1991) in central and southern California.

Calliostoma platinum (pl. 1, fig. 6) occurs off the west coast of North America from Forrester Island, southeastern Alaska, south to Isla Cedros, Baja California Sur, México on rocky bottoms at 10 to 60 m in the north, and below 60 m in southern California (McLean, 1996), and reported from 90 to 750 m (50 to 414 fathoms) by Abbott (1974). It has not previously been reported as a fossil but was collected by R.G. Greene in 1931 from a poorly located site in Laurel Canyon, Santa Cruz Mountains, Santa Cruz County, attributed to the late Miocene to late Pliocene Purisima Formation (California Academy of Sciences loc. 2326).

Modern *Fusitriton oregonensis* (pl. 1, fig. 5) ranges from the Pribilof Islands, Alaska to San Nicolas Island, Santa Barbara County, and off San Diego County, southern California from water depths between the intertidal zone and 220 m (Smith, 1970; 120 fathoms). As a fossil this species has been reported from California in late Miocene to Pleistocene deposits (Smith, 1970; Groves, 1991). However, its Miocene occurrences are in formations that range from late Miocene into the Pliocene, so the lowest stratigraphic occurrences are not known with certainty, and could be as young as early Pliocene.

Neptunea tabulata (pl. 1, fig. 8) has a modern range from Petersburg, Alaska, south to Newport Bay, Orange County, southern California on soft bottoms between 50 and 200 m (McLean, 1996). It has an extensive fossil record in the eastern Pacific from the Miocene of Alaska (Kanno, 1971, as cf.) and possibly California (Powell, 1998), Pliocene of Clallam County, Washington, south to Orange County, southern California and from the Pleistocene from Curry County, Oregon, south to Los Angeles County, southern California (Nelson, 1974).

Opalia varicostata (pl. 1, fig. 7) is a large extinct epitonid that occurs in the Etchegoin (Nomland, 1917), Niguel (Kern & Wicander, 1974, as Capistrano Formation) formations, sediment attributed to the San Diego Formation in the Santa Monica Mountains based on a fauna similar to the San Diego Formation in San Diego County (Arnold, 1907; Hoots, 1931), San Diego (Stearns, 1875; Cooper, 1888; Arnold, 1903), and Saugus (Woodring, 1930(?); Groves, 1991a, b) formations. In addition, Durham (1937) reports a single specimen from CAS locality 202 collected along the Wishkah River, Washington, and questionably assigned it to the Monteano Formation [late Miocene (Pliocene?) age according to Durham (1937)]. There is also one record from the Pleistocene (Kern et al., 1971), but these specimens are reworked from the underlying San Diego Formation. Overall occurrences confirm *O. varicostata* as a Pliocene index fossil and Durham's specimen and its geologic setting will need to be reexamined.

Extant species in the shrimp trap fauna have overlapping depth ranges between 50 and 200 m, much shallower than the 730 m from which the assemblage was collected and deeper than the modern range of all the extant species except *C. platinum*. A number of theories have been proposed as to how shallow water mollusks could be deposited into deeper water. Two of these may apply here: Hawkins et al. (1971) suggested that most of the change in depth is from isostatic rebound and Haq et al. (1987) propose the change in depth is likely due to lower sea levels in the past.

Pliocene age fossils are known from San Clemente Island (Vedder & Moore, 1976; Susuki & Stadum, 1978; Powell et al., 2009). However, the Pliocene fauna from San Clemente Island and the shrimp trap fauna have only *O. varicostata* in common. Whether this is due to differences in taphonomy, paleoecology, sea-level, or age is impossible to determine, but it probably results from a combination of several factors.

Summary

A small fauna of five fossil gastropod species was recovered from a shrimp trap off San Clemente Island in the 1990s. Extant species from the shrimp trap fauna indicate the specimens lived at a depth of between 50 and 200 m, much shallower than the 730 m from which the fauna was collected. In addition, they all lived near or at the latitude of the fossil locality, suggesting water temperature may have been about the same as it is today when the fauna was deposited.

Because the assemblage was likely carried to the shrimp trap by hermit crabs, it is impossible to determine if all the specimens are fossil or if some are younger. It seems extremely unlikely that they would be older based on the preservation and the stratigraphic ranges of the known species. With the exception of *Calliostoma platinum* they all appear to be fossil because of their dull, worn surfaces. The *C. platinum* specimen could also be fossil because its nacreous shell is dissimilar to the other species and therefore does not show the dull wear that characterizes the other species. The presence of extinct species indicates that at least part, or possibly all, of the fauna are fossils. A Pliocene age is indicated by the occurrence of *Opalia varicostata*. This is also the first documented fossil occurrence of *Calliostoma platinum*.

Acknowledgments

Thanks to Lindsey T. Groves (Natural History Museum of Los Angeles County) and Mary McGann (U.S. Geological Survey) for their helpful reviews.

Also thanked are Marcus and José Coltro (www.femorale.com) for the distribution and depth data and use of their photographs of *Cantharus shaskyi*.

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Author's note: I am interested in hearing of other fossils from under the ocean. If you have collections that appear old or that contain species that appear "out-of-place" (either at a depth or at a latitude where they are not expected) please contact me. Other papers on Pleistocene "out-of-place" faunas that I have written are: Powell, C. L., II, 1994, "Molluscan evidence for a late Pleistocene sea level lowstand from Monterey Bay, central California": *The Veliger*, v. 37, no. 1, pp. 69-80, and Powell, C.L., II, and McGann, M., 2008, "Late Pleistocene mollusks and foraminifers from near Cordell Bank, offshore central California: their age and environmental significance": *The Festivus*, v.40, no. 9, pp. 101-114.

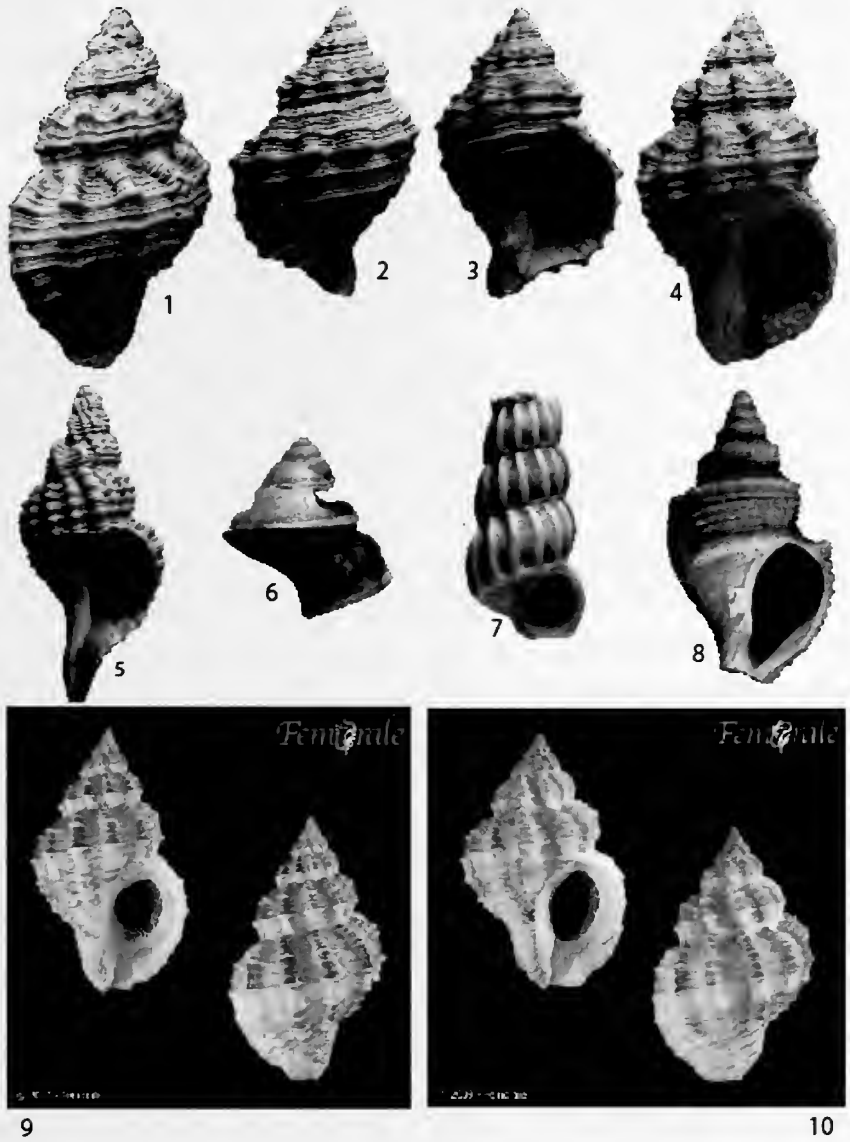

Plate 1. Mollusks from the shrimp trap fauna collected off San Clemente Island, southern California (CAS locality72573) and of *Cantharus shaskyi*. 1, 4. *Cantharus* aff. *C. shaskyi?*, CAS hypotype 72575, height 47.5 mm, width 26.7 mm; 1. Abapertural view, 4, Apertural view. 2, 3. *Calicantharus fortis*, CAS hypotype 72573, height 44.3 mm, width 29.3 mm; 2, Abapertural view, 3 Apertural view. 5. *Fusitriton oregonensis*, CAS hypotype 72576, height 52.0 mm, width 23.6 mm, apertural view. 6. *Calliostoma platinum*, CAS hypotype 72574, height 19.4 mm, width 17.5 mm (measurement approximate as the specimen is falling apart), apertural view. 7. *Opalia varicostata*, CAS hypotype 72578, height, 51.2 mm, width 25.0 mm, apertural view. 8. *Neptunea tabulata*, CAS hypotype 72577, height 35.6 mm, width 21.8 mm, apertural view. 9. *Cantharus shaskyi*, height 40 mm, width not measured, abapertural and apertural views. Collected from Canal de Isla Adentro west Panamá, dredged at 80-100 m, by J. Ernest, February 1995; ex-collection of G.& B. Cook. Photographs courtesy of Femorale.com. 10. *Cantharus shaskyi*, height 46.4 mm, width not measured, abapertural and apertural views. Collected from Punta Mala, west Panamá, dredged at 300-400 m, by local people, January 2008. Photographs courtesy of Femorale.com.

The San Diego Shell Club Invites You

To celebrate Dr. James H. McLean receiving the 2013 *Festivus* Award for his Lifetime Contributions to Malacology

The festivities will begin at 7:00 PM on Thursday, March 21st with a social hour including hors d'oeuvres, light beverages and desserts followed at 7:30 PM by the presentation of the SDSC *Festivus* Award for Outstanding Lifetime Contributions to Conchology / Malacology to Dr. McLean.

The event will be in the Club's meeting room in Balboa Park's Casa del Prado, Room 104. (The Casa del Prado is just west of the San Diego Museum of Natural History). For directions, see the SDSC website at *sandiegoshellclub.com*

Following Dr. McLean's award, he will give a presentation regarding his work on the Liotioidea. After comments and questions on Jim's talk, there will be time for more socializing and snacking.

Please join the members of the San Diego Shell Club as we enjoy an evening honoring Dr. James H. McLean.

We request that you RSVP by March 15th to David Waller dwaller@dbwipmg.com President, SDSC.

TO ALL OUR SHELLING FRIENDS

YOU ARE CORDIALLY INVITED TO ATTEND SAN DIEGO SHELL CLUB'S ANNUAL AUCTION/POTLUCK

Bring Family and Friends
Have we got shells for you!!!

The San Diego Shell Club's annual auction/potluck will be held on Saturday evening April 27th in the community room of Wes Farmer's condo at 3591 Ruffin Rd., San Diego, CA 92123. [Maps are available if you don't know how to get to the auction.]

The festivities will begin at 5 p.m. with soft drinks, bottled water and coffee while you view the auction tables. Unfortunately, the Club can no longer provide alcoholic beverages because of insurance issues, but individual attendees are welcome to bring their own wine or beer – and even share with others. Dinner will be at 6 p.m. sharp and the voice auction will begin promptly at 7 p.m.

Among some of the very special items for auction are a number of excellent books and many beautiful shells. Among the shells are cowries *like C. oweni, mauiensis wattsi, marginata consueta, thersites, nigropunctata and Jeaniana sherylae;* outstanding cones, such as *C. gauguini* and *baccatus* and muricids such as *Trophon clathratus, Pteropurpura centrifuga Babelomurex takahashii,Chicoreus litos* and *crosnieri; Voluta motutaraensis* and the delicate *Amalda hilgendorfi.* And besides the voice auction, there will be a huge and wonderful silent auction and $1 table.

If you are unable to attend the auction and want to be a part of it, you can request an auction list by e-mailing jhertz@san.rr.com and a list will be sent to you. Should you wish to bid on any items, an attending Club member will bid for you following your instructions. If you plan to attend, please contact Carole or Jules Hertz at (858) 277-6259 or at the e-mail address above. You can bring either a main course, salad, or dessert to serve 12.

This is the Club's only fundraiser and the biggest social event of the year. Your help is needed to make it a success. The annual auction provides the Club with the funds necessary to support its many activities such as *The Festivus*, Club library purchases, donations toward student grants and other scientific efforts and the Greater San Diego Science Fair participation as well as the Club's social functions. Any donations will be appreciated and held for the 2010 auction since the list for this auction has already been completed.

Hope You Can Attend - We Miss Seeing You!!!

ISSN 0738-9388

THE FESTIVUS

A publication of the San Diego Shell Club

Volume: XLV April 11, 2013 Number: 4

MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club.
Membership (includes family). Domestic $20.00;
Overseas (air mail):$50.00; Mexico/Canada (air mail):$30.00.
Address all correspondence to the San Diego Shell Club, Inc.,
c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111, USA.

The Festivus is published monthly except December.
The publication date appears on the masthead above.
Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM,
Room 104, Casa Del Prado, Balboa Park, San Diego.

Website at: *http://www.sandiegoshellclub.com*
E:mail: *jhertz@san.rr.com*

PROGRAM

Come to the Auction Potluck
Saturday, April 27th
[See Club News page for details.]

There is no regular meeting this month.

CONTENTS

CLUB NEWS

Minutes of the San Diego Shell Club 21 March 2013

The meeting was called to order at 7:37 P.M. by President David Waller. The previous minutes were approved. Carole Hertz announced that the Shell Auction Potluck will be held on Saturday, April 27th and a signup sheet for food was passed around. If you need directions to the auction, please contact Carole Hertz [see col. 2]. Marilyn Goldammer announced that the two volume set on the scissurellids by Daniel Geiger has been added to the Club library.

The meeting room was open at 7 P.M. so the members could come early and visit with our speaker and guest of honor, Dr. James H. McLean. Plenty of food and soft drinks were provided. Twenty-seven members were present, including a number from the Los Angeles area. Bob Dees, past president, introduced Jim and reviewed the highlights of his long career in malacology and then presented him with the Festivus Life Time Achievement Award. Dr. McLean has over 80 publications from 1959 to the present. He was curator of Mollusks at the Los Angeles County Museum of Natural history from 1964 to 2001 and has been curator emeritus from 2001 to the present. In addition to his technical work, Jim was noted for the help he's readily given to professionals and others in the field, and mentoring many students.

Dr. McLean presented an overview of his work on the Liotioidea and Dichostasiidea (extinct). The liotioids are divided into two groups the Liotiidae and Areneidae. Both groups are grazers and often, but not always, broadcast spawners; the exception being a few that brood their young in the open umbilical cavity of the shell. Both groups are widely distributed and appear to be more diverse in the Pacific and Caribbean than elsewhere. Liotiidae range in size from 1-2 mm to nearly 30 mm and are typically low profile shells with determinate growth, little color and an operculum that is composed of calcareous rings. Areneidae share many traits, but in general have pigmented shells, more exaggerated axial growth, and differences in the operculum.

After his presentation and questions, members and guests visited until it was time to go. The meeting was adjourned at 9:05 PM and many members stayed to visit, review the books and finish the snacks.

Paul Tuskes

Additions and Changes to the Roster

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SCRIPPS INSTITUTION OF OCEANOGRAPHY (SIO) SIO Library 0219, 9500 Gilman Drive, La Jolla, CA 92093-0219

Please advise the editor of any errors on the roster so that corrections can be made.

Save the Date

The Club's annual Auction Potluck will be held on Saturday, April 27th at the Community Room of Wes Farmer's condo – as it has been for the past 25 years! The address is 3591 Ruffin Rd., San Diego and festivities begin at 5 P.M. with soft drinks, bottled water and coffee. Feel free to bring alcoholic beverages, for yourself and friends, but the Club can no longer provide them because of insurance issues.

A signup sheet for the potluck was passed at the March meeting. If you were unable to sign and wish to attend the big event, please call Carole Hertz (858-277-6259) and let her know that you will attend and what potluck contribution you will bring.

Come and view the voice auction table and the silent tables which will be available at 5 P.M. [the dollar table will not be available until the middle of the evening.]

Dinner will begin promptly at 6 p.m. and the voice auction will begin at 7 P.M. sharp.

The auction will feature some very special shells from a list of 190 entries. Auction lists will be available at the auction for those who have not received them online.

Editor's Note: See page 34 for a host of photos of the group of people that attended the special meeting honoring Jim McLean.

All photos were taken by Wesley Farmer.

FURTHER SURVEYS OF THE MARINE MOLLUSK FAUNA OF THE ISLAND OF SAINT KITTS, LEEWARD ISLANDS, WEST INDIES, PART II

SUSAN J. HEWITT

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Introduction

Saint Kitts is one of the inner arc islands in the northern half of the Leeward Island chain of the Lesser Antilles, West Indies (for map of the area, see Hewitt 2011a). The island lies at 16°45′N 62°12′W, adjacent to the island of Nevis, which since 1997 has been my main focus of study during annual visits. In 2012, my searching on St. Kitts was confined to three areas that are easily accessed from Nevis via ferries, bus and walking.

En route to Nevis from New York, I arrived in St. Kitts on 25 April 2012. Before taking the ferry across the Narrows (the channel between St. Kitts and Nevis), I spent 10 minutes searching the beach drift on Majors Bay (described and illustrated in Hewitt (2010b, 2011a, 2012b), at the tip of the southeastern peninsula. Later, on 1 May, I searched for two hours on the black sand beach (17° 17′ 35.45″ N, 62° 45′ 11.0″ W) at the University of Medicine and Health Services (UMHS) west of the capital Basseterre, as described in Hewitt (2012b). On 3 May, I searched Majors Bay for two hours, and afterwards walked 3 km to access a new locality, Cockleshell Bay, the next bay east-northeast of Majors Bay, at 17°13′46″N, 62°38′06″W. And finally, on 9 May, on the way back to New York, I was able to make another 10-minute stop to search Majors Bay.

Results

The following table shows only those species I found in 2012 which were new additions to the previous list for St. Kitts, i.e. the list in Rosenberg (2009) plus species from Hewitt (2010b, 2011a, 2012b). Binomial names are taken from Rosenberg (2009).
Notations: UM = UMHS beach, MB = Majors Bay, CB = Cockleshell Bay.

Table 1. Species found in 2012 but not mentioned in Hewitt (2012b)

GASTROPODA	
Lottiidae	
Lottia cf *leucopleura* (Gmelin, 1791)	UM
Fissurellidae	
Fissurella barbouri Pérez Farfante, 1943	MB
Turbinidae	
Lithopoma tectum (Lightfoot, 1786)	CB
Truncatellidae	
Truncatella clathrus Lowe, 1832	MB
Liotiidae	
Arene cruentata (Mühlfeld, 1829)	UM
Phasianellidae	
Eulithidium adamsi (Philippi, 1853)	UM
Columbellidae	
Costoanachis catenata (Sowerby I, 1844)	UM
Muricidae	
Favartia cellulosa (Conrad, 1846)	UM
Mangeliidae	
Brachycythara biconica (C. B. Adams, 1850)	MB
Architectonicidae	
Heliacus cylindricus (Gmelin, 1791)	UM
Aplustridae	
Micromelo undatus (Bruguière, 1792)	UM
BIVALVIA	
Mytilidae	
Brachidontes modiolus (Linnaeus, 1767)	UM
Gryphaeidae	
Hyotissa mcgintyi (Harry, 1985)	UM
Lucindae	
Pleurolucina hendersoni (Britton, 1972)	MB
Veneridae	
Transennella cubaniana (d'Orbigny, 1853)	MB

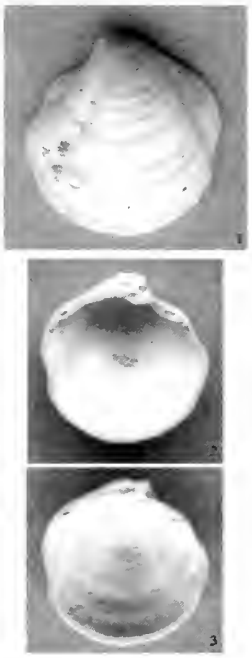
Commentary

At the time of my 2012 visits, Majors Bay had still not been affected by the planned development mentioned in Hewitt 2010b; however, the beach is increasing in slope each year due to erosion, and the amount of beach drift is decreasing proportionately, although it still contains noteworthy specimens, and in fact yielded an extraordinary one.

It was at Majors Bay on 3 May 2012 that I found a single left valve of a small species of lucinid that I could not identify (Figures 1, 2, 3). Lucinidae is a large and diverse bivalve family in the tropical Western Atlantic; at Majors Bay since 2010 I had already found 10 species of lucinids that are fairly common in shallow water. The valve in question matched none of these. The valve was a *Pleurolucina*, but it was clearly not *Pleurolucina leucocyma* (Dall, 1886), the best-known Western Atlantic species in the genus. Measuring 8.5 mm, the unidentified valve from Majors Bay appeared to be adult; it was moderately inflated, chalky-white, with raised commarginal ridges and two strong radial grooves notching the margin. Eventually I was able to make an identification, but that in turn led to another mystery.

Rosenberg (2009) lists three *Pleurolucina* species from the Western Atlantic. Information in that source led me to a 1972 paper by Joseph C. Britton, in which the author named and described *Lucina (Pleurolucina) hendersoni*, and also showed images of *Lucina (Pleurolucina) sombrerensis* (Dall, 1886). The photograph and description of the 12.3 mm holotype of *P. hendersoni* matched my valve well, although in my specimen the erect concentric lamellae had mostly been worn down to ridges. Britton recorded the species from Cuba in the Greater Antilles, as well as from Antigua (the type locality) and Barbados, both in the Lesser Antilles. St. Kitts falls well within this biogeographical range.

Lucina (Pleurocina) hendersoni is, however, a deep-water species; when named it was known only from 12 single valves which had been found at depths of 91 m to 232 m. Britton's holotype valve and three paratypes came from off English Harbor, Antigua, at 220 m depth. Britton also examined one valve from off La Habana, Cuba in 232 m, and valves from three stations in Barbados: one valve off Pelican Island in 183 m, four valves off Paynes Bay Church in 91 m (including the largest at 12.5 mm), and one valve off Telegraph Station in 91 to 110 m. Britton indicated that these were all National Museum of Natural History



Figures 1-3. Three views of an 8.5 mm left valve of *Pleurolucina hendersoni*. **(1)** external view **(2)** internal view with well-illuminated hinge line **(3)** internal view with well-illuminated lower half.

(NMNH) lots, but he gave no catalogue numbers, and did not offer any information about when the material was collected, who collected it, or how it was collected. The NMNH online collections database gives the holotype lot as NMNH 503399. This is described as coming from a microhabitat of "rough coral" off Antigua, and as having been collected by the eponymous J. B. Henderson (who was described in Britton (1972) as "a collector *extraordinaire* during the early years of this [the 20th] century").

It is certainly not an everyday occurrence for a deep-water species such as *Pleurolucina hendersoni* to be found in beach drift, as happened at Majors Bay. The nearest suitably deep water is about 7 km away, just beyond the northern end of the Narrows. A steep drop-off there causes water to well up, and a strong current sweeps south through the Narrows, with one offshoot pushing into Majors Bay. However, it seems unlikely that the current alone could have been enough to transport the valve. One is forced to speculate that it may have been carried into shallow water by a combination of currents and hurricanes, molluscivorous fish, or have become snagged in a deep-water fish trap and subsequently transported to shallow water.

In Hewitt (2011b), I had reported finding another interesting, uncommon species in Majors Bay in 2010; one 5.5 mm *Hipponix costellatus*. On 25 April 2012, I found a 6.3 mm shell of that same species in the bay, and a 6.7 mm shell on 3 May 2012 (Figure 4).

Transenella cubaniana is a small venerid which I recently reported finding on the island of Montserrat (Hewitt, 2012d). On 3 May 2012 at Majors Bay I found 30 valves of *T. cubaniana* (Figure 5), the largest being 9 mm in length. Five more valves were found at Majors Bay on 25 April 2012 and another five on 9 May 2012. Many were in good condition: they showed both the characteristic diagonally grooved inner margin of all *Transenella* spp. as well as the commarginal ridges on the entire outer surface of the valve that are characteristic of *T. cubaniana*. Some also showed magenta umbones and brown flecks similar to the valve that was found in Montserrat.

Another interesting find in Majors Bay was an orange-tan, 4.1 mm shell of a *Truncatella* (Figure 6), found on 3 May. Unfortunately the shell is broken at the aperture, but it has 14 well-shouldered ribs per whorl, with crowded microscopic spiral striae between the ribs. Judging by Redfern (2001), this species seems to be *Truncatella clathrus*, which is known from Florida, Bermuda and the Bahamas. Assuming my identification is correct, this is a significant range extension: St. Kitts is 2,000 km southeast of the Florida Keys.

I also found one somewhat damaged shell of *Fissurella barbouri* at Majors Bay on 25 April. On most of the Leeward Islands I have visited, this species is rare in the drift. Additionally I found two 3.5 mm shells of *Brachycythara conica* (Figure 7), a species that ranges from North Carolina to Brazil. Phil Fallon explained to me that this mangeliid is not uncommon, but like many micro "turrids", it is often overlooked.

As was the case at Majors Bay, the small beach at the University of Medicine and Health Services was steeper than it was in 2011 and had less beach drift. However, the drift was still rich, and a two-hour search yielded six additional species for St. Kitts, including two shells of *Micromelo undatus,* 8.8 mm and 7.7 mm (Figure 8) with their characteristic pattern of dark red lines. On Nevis, in 14 years of visits I have found a shell of *M. undatus* only twice, and both times on a beach that faces a sheltered habitat: a quiet lagoon with seagrass beds behind a fringing coral reef. In contrast the university beach faces into relatively exposed rock substrates with coral reef further out. The delicate shells of *M. undatus* are easily crushed, and, thus were probably not carried great distances. This aplustrid is known to live in shallow water on coarse sediments and on rock surfaces with algal turf.

UMHS also yielded a worn shell of a *Costoanachis* species with a pattern of dark, squarish, subsutural and submedial blotches, closely resembling the shell shown in Plate 20 of Warmke & Abbott (1961), where it is listed as *Costoanachis catenata*. However, the shell I found was missing its protoconch, and Faber (2004) states that without the protoconch it is impossible to distinguish *C. catenata* from *C. sparsa*. I also found one broken valve of *Hyotissa mcgintyi* (Harry, 1985), which indicates that this foam oyster occurs off St Kitts, as well as off Nevis and Sint Eustatius as reported in Hewitt (2010a). Prior to that paper the species had not been recorded at all in the Lesser Antilles, except from an ancient archaeological site (Hewitt, 2011d).

At UMHS, a single shell of a *Lottia* species was found (Figure 9); it is 11.9 mm in length, thick, highly elevated, mostly white with white ribs and a central apex. The interior is white with a brown central callus. It closely resembles the 14 mm shell from Nevis shown as figure 4 in Hewitt (2009), where it was identified as *Lottia* cf. *leucopleura*. However, in Zhang (2012), a similar 16.3 mm shell from Antigua, number 004 (2-3), is identified as *Lottia cubensis*. It is possible that neither of these two identifications is correct because, as I mentioned in Hewitt (2009), *Lottia* species in the Caribbean Sea are not well understood, and there are almost certainly some undescribed and/or lost species. Another UMHS find was a 3 mm juvenile shell of *Heliacus cylindricus*. Rosenberg (2009) reports the species from Guadeloupe, Martinique and Venezuela as well as the east coast of Central America.

Cockleshell Bay is adjacent to Majors Bay at the tip of the southeastern peninsula of St. Kitts. It also faces south, but instead of opening out into unobstructed sea, it looks across the Narrows, and has smaller headlands. I had expected that the drift in Cockleshell Bay would be similar to that of Majors Bay, i.e. composed mostly of small and minute shells. However, on 3 May 2012, the drift at Cockleshell Bay was primarily shells of larger species including *Arca zebra* (Swainson, 1833), *Americardia media* (Linnaeus, 1758), *Anadara notabilis* (Röding, 1798), and *Tucetona pectinata* (Gmelin, 1791). One worn and broken shell of *Lithopoma tecta* was the sole species I

found there that was new to the St. Kitts list.

Conclusions

Prior to this paper, the taxa reported from St. Kitts in the literature were 35 species from Rosenberg (2009), 41 from Hewitt (2011a), 94 from Hewitt (2011b), and 81 from Hewitt (2012b). During the 2012 visits to St. Kitts, 15 additional species were found, giving a total of 266. *Pleurolucina hendersoni*, a deep-water lucinid, is an unexpected and interesting find.

Acknowledgments

Many thanks to Dr. Thomas Last, Dean of Students at UMHS, who arranged for me to be able to access the UMHS beach in his absence. I am grateful to Harry G. Lee, Phil Fallon and Colin Redfern for their feedback on my identifications, and to Captain Arthur Anslyn MBE for explaining the bathymetrics and currents at the southeastern tip of St. Kitts. The information from Gary Rosenberg's database Malacolog 4.1.1 is provided with the permission of the ANSP.

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SMITHSONIAN INSTITUTION COLLECTIONS SEARCH CENTER
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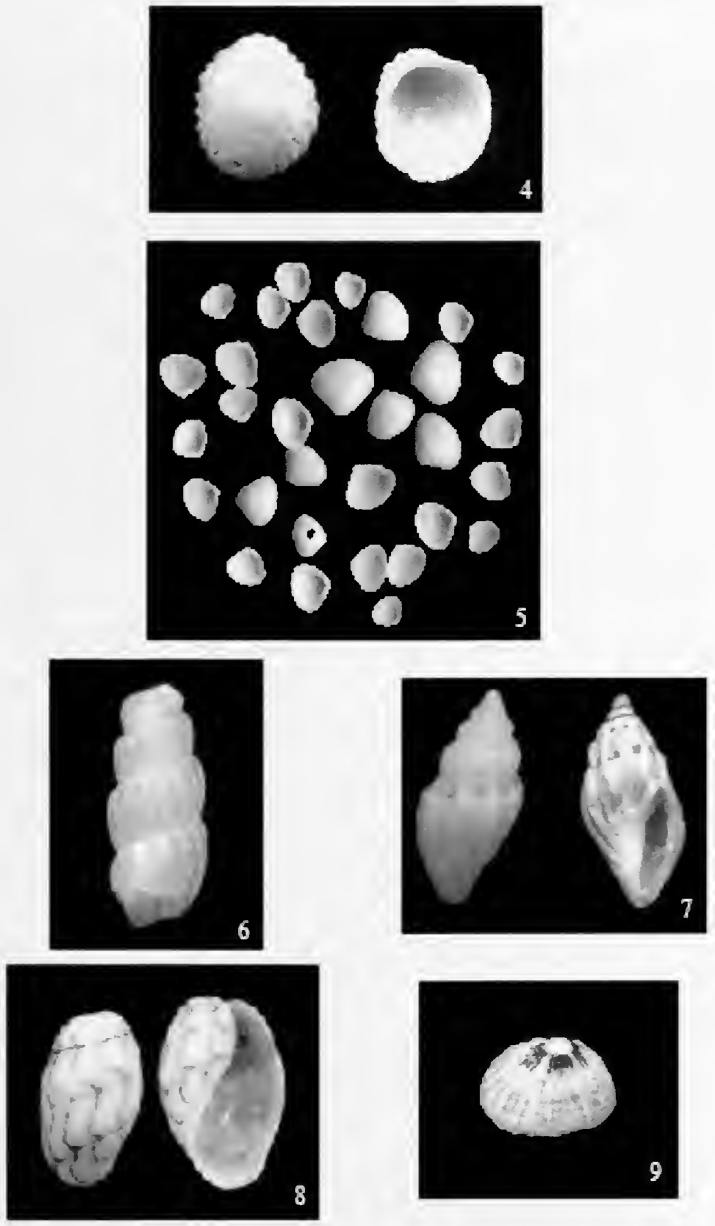

Figures 4-9. **(4)** Two shells, 7.7 mm and 6.6 mm of *Hipponis costellatus* **(5)** 30 valves of *Transennella cubaniana,* largest 9 mm **(6)** One 4.1 mm shell of *Truncatella clathrus* **(7)** Two 3.5 mm shells of *Brachycythara biconica* **(8)** Two shells 7.7 and 8.8 mm of *Micromelo undatus* **(9)** One 11.9 mm shell of *"Lottia* cf. *leucopleura".*

Captions for the montage of the McLean celebration

Group photo top left, back row l-r: Doug Eernisse, John LaGrange, Rick Negus, Paul Tuskes, Ralph Marchewka, Daniel Ituarte, Jim Goldammer, Bob Dees, Pat LaFollette, George Kennedy, Jules Hertz, Bruce Kemp, Lance Gilbertson,Terry Rutkas.

Front row l-r: Stephen Mulliner, Marty Schuler, Ann Tuskes, Marilyn Goldammer, Jim McLean, Katherine Rutkas, Carole Hertz, Bob Abela, Dave Waller, Bill Schramm.

Top right: Stephen Mulliner, Marty Schuler. And just below: Pat LaFollette, Ann Tuskes.

Center rows l-r: George Kennedy, Dave Waller. And just below: Bruce Kemp, John LaGrange, Doug Eernisse Bob Dees, Jim McLean.

Bottom row l-r: Carole Hertz, Dave Waller, Jim McLean, Paul Tuskes, Marilyn Goldammer, Bob Dees, Jim McLean, Doug Eernisse, Lance Gilbertson.


Brome

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THE FESTIVUS

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MEMBERSHIP AND SUBSCRIPTION
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Meeting date: third Thursday, 7:30 PM,
Room 104, Casa Del Prado, Balboa Park, San Diego.

Website at: *http://www.sandiegoshellclub.com*
E:mail: *jhertz@san.rr.com*

PROGRAM

Sorting out *Siphonaria* from the Gulf of California, Channel Islands and Hawaiian Islands

Dr. Douglas Eernisse of California State University, Fullerton, will give a presentation on the common intertidal *Siphonaria* with images showing variation, habitats, old type specimens, misinterpreted species as well as some name changes and discuss the distributions of the species, some of which have changed.

Meeting date: May 16, 2013

CONTENTS

CLUB NEWS

Minutes of the San Diego Shell Club
The Club Auction/Potluck

The Club's annual auction/potluck was held on Saturday April 17th. It was a fantastic evening with over 40 attendees waiting for the action on the voice auction to begin. Browsing time for the voice auction table and the silent auction began at 5:00 p.m. with dinner beginning at 6:00 pm.

We got pleas for an early dinner which Carole Hertz denied so that all the attendees from out-of-town had time to arrive. Promptly at 6:00 p.m. the lineup for the wonderful potluck dishes was already long. The dinner items looked to be all home-made and smelled wonderful and were truly delicious.

The next set of "suggestions" was for the voice auction to begin early – again denied-- because people were still eating. At long last, promptly at 7:00 p.m., auctioneer Carole Hertz announced the start of the voice auction. The rules of the game were explained and the serious and hilarious business of bidding began.

The voice auction table was crammed with wonderful shells, shell related items and books. It was hard to know where to begin. Carole did start the auction with a giant 343 mm *Lambis truncata sebae*, a perfect specimen complete with operculum. And there were so many exciting shells. *Conus gauguini*, a gorgeous specimen, provided a great deal of excitement finally going for over $200. And so it went with much fun and laughter in the audience while the auctioneer always encouraged the bidders to raise their bids!

During the dessert break, attendees had their last chances to get their silent auction choices and the newly opened Dollar Table was jammed with a crowd of bargain hunters. Great fun.

There were so many shells left to bid on during the second half that the auction continued beyond 10:00 p.m. As the last few shells were auctioned, the auctioneer thanked everyone and the audience applauded for a great evening.

Many people made the auction the success it was. Auction material was donated by Marty Beals, Bob Dees, Carole & Jules Hertz, Kirstie Kaiser, Paul Kanner, Julian Lee, Ralph Marchewka, Michael Mayer, Rick Negus, Chase Parlett, Suzanne Parlett, Nancy Schneider, Bill Schramm and David Waller.

The Club board helped with everything for this Auction Potluck from donating, being "bag" people preparing the shells for auction and setting up and cleaning up for the party-- Treasurer Silvana Vollero with the difficult job of tracking the bids and billing, Paul Tuskes who prepared the silent auction and dollar table, and the biggest hero of them all – Wes Farmer who has hosted this auction now for 26 years. It just could not have been the success it was without his effort.

The Forty-Sixth Annual Meeting of the Western Society of Malacologists (WSM)

The meeting will be held in San Diego, California from June 23-26, 2013 at the Courtyard by Marriott in central San Diego. For more information see: http://www.marriott.com/hotels/travel/sancy-courtyard-san-diego-central. If transportation is needed from the airport, e-mail wenright@sandiego.gov

The preliminary schedule will be two symposia, one on Opisthobranchs and other one on Moluscos y los Californios in addition to Contributed papers and a poster session. A social reception will be held on the first evening (Sunday) and a banquet on Tuesday evening.

On the final day there will be a choice of two field trips – either to the Birch Aquarium and Scripps Institution of Oceanography or to the San Diego Natural History Museum and Balboa Park.

For further information and/or a registration form, contact Wendy Enright at wenright@sandiego.gov Registration forms should be submitted by Friday May 17th either by e-mail to Wendy Enright or by mail to Kelvin Barwick, 16391 Del Oro Circle, Huntington Beach, CA 92649.

Additions and Changes to the Roster

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Please advise the editor of any errors on the roster so that corrections can be made.

DISTINGUISHING *EROSARIA ACICULARIS ACICULARIS* FROM *EROSARIA SPURCA* (MOLLUSCA: CYPRAEIDAE)

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Abstract: Twelve specimens of *Erosaria acicularis* (Gmelin, 1791), five specimens collected by Capt. J.F. Anderson (Capt. J.F. Anderson Collection, San Diego Natural History Museum (SDNHM) Lot No. 11221) and seven specimens collected by H.N. Lowe (H.N. Lowe Collection, SDNHM Lot No. 24552) in the Mediterranean Sea were identified as *Cypraea spurca* Linnaeus, 1758. Both lots are mixed lots, each containing eight specimens. In lot No. 11221, four of the *E. acicularis acicularis* specimens are juveniles and one is subadult. In lot No. 24552, five are juveniles and two are subadult. These twelve specimens are described on the basis of their conchological characteristics and compared to *E. acicularis acicularis* from Florida in the United States and Brazil, *E. acicularis sanctaehelenae* from St. Helena Island and *E. spurca* from the Mediterranean Sea. *Erosaria acicularis* is distinguished from *E. spurca* by its generally rhomboidal shape, white base, white internal dorsal coloration and dorsal hump. *Erosaria spurca* from the Mediterranean Sea is distinguished from *E. acicularis* of the United States and Brazil by its pyriform shape, light cream to chestnut colored base with white teeth, light purple interior dorsal coloration and gradual sloping dorsum. The *E. acicularis* specimens collected by J.F. Anderson and H.N. Lowe have many of the distinguishing characteristics of the species.

Introduction

Two specimen lots at the San Diego Natural History Museum, one collected by Capt. John F. Anderson and donated on his death in 1927 with his collection (San Diego Sun, 1927) and the other collected by Herbert Nelson Lowe donated with his collection after his death in 1936 (Hertz, 1986), identified as *Cypraea spurca* collected in the Mediterranean Sea contain specimens of *E. spurca* and *E. acicularis*. Most are juvenile specimens. The finding of misidentified lots in museum collections is not unusual specifically when specimens are obtained from donated collections. In this case, the date when these specimens were labeled is significant since both species, *Cypraea spurca* and *E. acicularis*, have been previously listed as *Cypraea spurca* (C.M. Burgess, 1985) and only recently been restored to separate nominate status (Lorenz & Hubert, 2000). It appears that these specimens were collected in the early twentieth century. However, the collection dates were not provided in the data. Consequently, it is not unexpected that they would be labeled as *C. spurca*. Similar lots have been reported in the Natural History Museum of Los Angeles County (LACM) (personal communication L. Groves). In addition, the H.N. Lowe Collection lot contains a data slip in which the location "Cuba" has been crossed out and replaced with the location "Mediterranean." The content of each lot raises the question of the presence of *E. acicularis* in the Mediterranean Sea and the modified data slip in the H. N. Lowe lot raises the question of the presence of *E. spurca* in the Caribbean Sea. However, there is insufficient information accompanying the SDNHM lots to confirm that all of the shells in the lots were collected in the areas indicated on the data slips. Consequently, this paper does not address a potential range extension for *E. acicularis* or *E. spurca* but focuses on the physical characteristics of the shells in this genus to allow for proper identification of these species in the future.

Capt. J. F. Anderson and Herbert Nelson Lowe were prominent shell collectors whose collections were donated to the SDNHM after their deaths. The shells in this paper appear to have been collected dead and no remains of the animal were available for anatomical or molecular studies.

Discussion

Erosaria acicularis are widely distributed in the Gulf of Mexico along the Yucatan Peninsula south into the Caribbean Sea along the northern coast of South America heading south along Brazil's Atlantic coast to Rio de Janeiro and east to Florida and including the Greater and Lesser Antilles. Locations where specimens have been reported include Aruba, Belize, Bonaire, Brazil, Cayman Islands, Colombia, Costa Rica, Cuba, Curaçao, Florida, Honduras, Jamaica, Mexico, Panama, Puerto Rico and Venezuela. This species lives in shallow to intertidal water at depths ranging from 3 to 20 meters, on tropical reefs, dead corals and under rocks. Some specimens have been collected at depths ranging from 30 to 80 meters. A single dead specimen was found at Wafer Bay, Cocos Island in the Panamic region (Groves, 1992 and Skoglund, 1992). The presence of this species in the region was rejected because it was the sole record in the eastern Pacific. It is believed that this specimen originated in the Caribbean Sea, was transported through the Panama Canal on a Pacific bound vessel and discarded at Cocos Island (Emerson & Chaney, 1995). In support of this conclusion, there has been no further evidence of *E. acicularis* reported over the past several years despite intensive collecting in the region. Synonyms for this species include *Cypraea lunata*, Fischer Von Waldheim, 1807; *C. aleina,* Schilder, 1939; and *nitidiuscula,* Coen, 1949 (Lorenz & A. Hubert. 2000). A subspecies of *E. acicularis* named *E. acicularis sanctaehelenae* (Schilder, 1930) is found off the West Coast of Africa on Ascension and Saint Helena Islands.

Erosaria spurca is widely distributed in the Mediterranean Sea. Specimens have been found in Famagusta, Cyprus; Kythnos, Greece; Ognina Island, Sicily; Cape Palos, Spain; Larache, Morocco; Silifka, Turkey; and Haifa, Israel. This species lives in shallow intertidal waters usually ranging in depth from 2 to 20 meters in underwater meadows of *Posidonia oceanica*, under rocks and in rock crevices. Some specimens have been found as deep as 50 meters. Synonyms for this species from Worldwide Mollusc Species Data Base (WMSDB) include: *E. lota* Linnaeus, 1758; *E. elliptica* Gray, 1825; *E. inaequipartita* Monterosato, 1897; *E. limitaris* Monterosato, 1897; *E. inversa* Pallary, 1900; *E. luridoidea* Pallary, 1900; *E.viridula* Sullioti, 1924; and *E. inflata* Coen, 1949.

Comparison: *Erosaria acicularis* differs morphologically from *E. spurca* in shape, basal coloration, internal coloration, marginal topography and posterior profile (Table 1). The shape of *E. acicularis acicularis* is rhomboidal (Figures 1-5), which is easily distinguished from the pyriform shape and in some cases elongated pyriform shape of *E. spurca* (Figure 6).

The basal coloration of *E. acicularis* is white and can be distinguished from specimens of *E. spurca* in having basal coloration that ranges from light cream to chestnut with lighter colored or white teeth. This coloration extends from the marginal callus onto the base fading to white near the teeth. In some specimens of *E. acicularis* a light tan coloration along the marginal callus can be observed that extends almost imperceptibly to the perimeter of the base fading to white at about a third to half the distance to the aperture. Marginal spotting present on the columellar side of *E. spurca* can extend onto the base in some specimens but is seldom observed in *E. acicularis*. While the basal coloration was consistent in all *E. acicularis* specimens investigated, a few specimens of *E. spurca* have base coloration that is so light it may be considered white. The internal coloration of *E. acicularis* is usually white. However, some specimens have been observed with a very light purple internal coloration. By comparison the internal coloration of *E. spurca* can range from light purple to purple.

The extremity configuration of *E. acicularis acicularis* is more blunt-ended than that of *E. spurca,* which is more elongated and often extends beyond the dorsal curvature (Figure 11). The dorsum of *E. acicularis acicularis* is humped whereas *E. spurca* has a continuous sloping dorsum (Figure 12).

Another significant morphological difference is the marginal pitting present in *E. spurca.* In mature specimens, the pitting with dark brown pigmentation extends along the entire length of the labral margin (Figure 7). In *E. acicularis acicularis* pitting is present at the anterior and posterior ends but generally absent about the middle of the labral margin (Figures 1-5). There is substantially less pigmentation of the pitting than in *E. spurca* and the coloration is generally an orange brown. However, some specimens of *E. spurca* have been observed that do not have pitting

about the center of the labral margin.

Dorsal coloration and patterns are similar and vary so substantially that there does not seem to be a distinguishing factor to allow for easy separation of the two species. This similarity of pattern and color may explain the misidentification of *E. acicularis acicularis* specimens found in these lots.

The posterior end profile is also a dominant distinguishing character of these species. After full development calluses form along the labral and columellar margins of *E. acicularis acicularis,* which are generally not present or as pronounced in *E. spurca* (Figure 13). This can be observed from the average W/L value of 0.73 for *E. acicularis acicularis* versus 0.61 for *E. spurca* (Table 1). The initial development of these calluses can be seen in Figures 9 and 10. Unfortunately, the specimens contained in SDNHM Lot No. 11221 and 24552 are subadults and their calluses have not fully developed. Consequently, their posterior end profiles look identical to *E. spurca* (Figure 12).

In this investigation none of the specimens of SDNHM Lot No. 11221 and 24552 were found to be the subspecies *E. acicularis sanctaehelenae* or *E. spurca verdenium.* However, it is important to note the physical characters that helped in determining that they were not present in these lots.

Erosaria acicularis sanctaehelenae can be distinguished from *E. acicularis* by its dorsal pattern and marginal spotting. Unlike *E. acicularis, E. sanctaehelenae* usually has a single distinct dorsal band extending across its dorsum (Figure 7). The band is generally darker than the rest of the dorsal pigmentation. In addition, *E. sanctaehelenae* typically has dense and often indistinct spotting along both margins as compared to *E. acicularis*, which has sparse but distinct marginal spotting. This subspecies can be distinguished from *E. spurca* in the same ways as *E. acicularis. Erosaria sanctaehelenae* is generally rhomboid in shape having a white base, a white to light purple interior with pitting along the margin significantly reduced or absent about the middle and substantial calluses on both the labral and columellar margins in adult specimens.

Erosaria spurca verdenium can be distinguished from *E. spurca* by its shape and dorsal spotting. *E. verdenium* has an elongated pyriform to elongated cylindrical shape as compared to the general pyriform shape of *E. spurca* with often clear distinct dorsal spotting not often observed in *E. spurca* (Figure 8). This subspecies can be distinguished from *E. acicularis acicularis* by its elongated shape, basal coloration which ranges from light orange to light purple and the absence of callusing along the margins. However, in some specimens the basal coloration is so light that it appears white.

The J.F. Anderson and H.N. Lowe specimens (SDNHM Lot No. 11221 and 24552) have the white basal color, dark brown dispersed spotting along the margins as well as the red brown colored pitting along the posterior and anterior end margins, which is consistent with *E. acicularis acicularis.* Neither specimen has the dorsal banding of *E. sanctaehelenae* nor the shape or basal coloration characteristic of *E. verdenium.* However, the values calculated for H/W and W/L are similar to those for *E. spurca* (Table 1). This is primarily due to the reduced or absent marginal callusing often observed in subadult specimens.

Conclusion

The five specimens from the H.N. Lowe Collection, SDNHM Lot No. 24552, and seven specimens from the J.F. Anderson Collection, SDNHM Lot No. 11221, are *E. acicularis acicularis.* The initial misidentification of these specimens was likely due to the similarity of these juvenile shells to *E. spurca.* There is no information indicating whether these specimens were collected on the same day at a particular location or collected on separate expeditions and later combined. However, if these specimens were collected in the Mediterranean Sea it could be that their misidentification resulted from the absence of reported findings of *E. acicularis* in the region at that time. What is particularly interesting is that several mixed lots at the LACM containing *E. acicularis* and *E. spurca* from the Mediterranean Sea were identified by Lindsey Groves from at least three collections. This might suggest that *E. acicularis* occurs in the Mediterranean. However, there is insufficient data to support this conclusion at the present time.

Table 1: Morphological data of *E. acicularis acicularis, E. spurca, E. acicularis sanctaehelenae and E. spurca verdenium*. The specimens are from the collections of Marty Beals and David Waller.

Name Character	*E. acicularis acicularis*	*E. spurca*	*E. acicularis sanctaehelenae*	*E. spurca verdenium*
Specimens	7	8	3	4
Shell Shape	Rhomboid	Elongated Pyriform/ Pyriform	Rhomboid	Elongated Pyriform
Shell L **Average** **Range**	25.4 mm 28.9-23.2 mm	28.4 mm 39.3-23.0 mm	21.8 mm 26.1-16.9 mm	21.9 mm 24.8-20.2 mm
Shell W/L **Average** **Range**	 0.73 0.71-0.76	 0.61 0.57-0.64	 0.72 0.70-0.75	 0.59 0.57-0.63
Shell H/W **Average** **Range**	 0.71 0.68-0.74	 0.78 0.73-0.82	 0.69 0.67-0.73	 0.77 0.73-0.80
Basal Color	White	Light cream to orange brown	White	Light orange to light purple
Marginal Spotting	Dark brown dispersed spotting along both labral and columellar margins.	Some brown dispersed and indistinct spotting along both labral and columellar margins with the dark brown pitting obscuring spotting on the columellar margin.	Dark black/brown dense spotting along both labral and columellar margins.	Dark black/brown dense and distinct spotting along both labral and columellar margins. Spots often obscure brown pitting along columellar margin.
Marginal Callus	Present on both labral and columellar margins.	Slight to none	Present on both labral and columellar margins.	Slight to none
Marginal Pitting	Red-brown pitting along margins near anterior and posterior ends. Pitting usually absent or reduced about the middle of the columellar margin.	Dark brown pitting along margins near anterior and posterior ends. Pitting usually continuous along columellar margin.	Red-brown pitting along margins near anterior and posterior ends. Pitting usually absent or reduced about the middle of the columellar margin.	Both sides of anterior and posterior ends.

Acknowledgments

Special thanks to the reviewers for their comments and to the Marine Invertebrate Department, San Diego Natural History Museum for allowing access to their collection for this investigation. My appreciation to Lindsey T. Groves for providing data for specimens in the LACM Collection.

Thanks to James Berrian, Field Entomologist at the SDNHM, for his photographic expertise and to Carole Hertz for her help. Thank you to Marty Beals for furnishing specimens that helped to provide the information to distinguish these specimens.

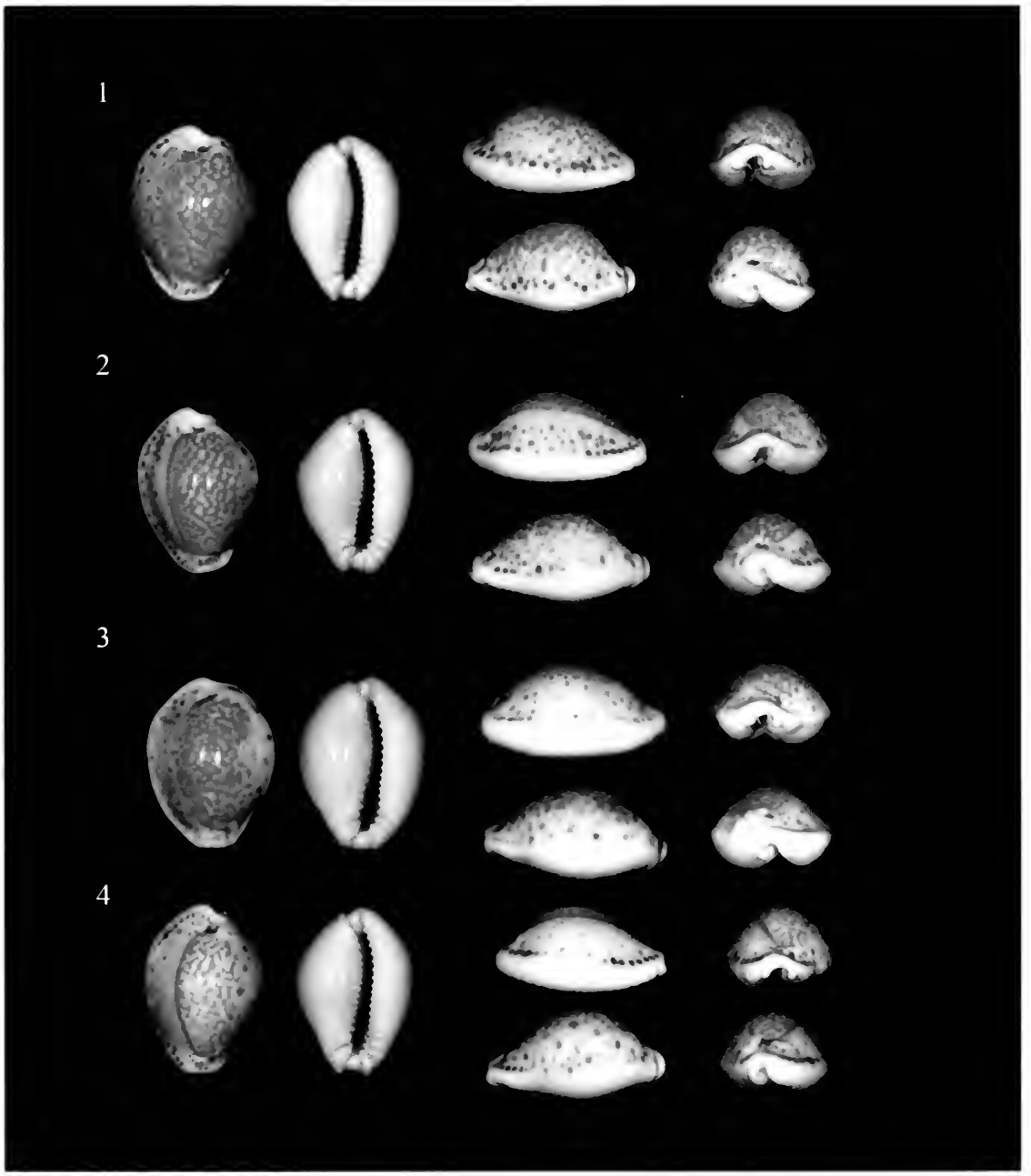

Figure 1-4: *Erosaria acicularis acicularis* from Florida **(1)**; Columbia **(2)**; Jamaica **(3)**; and Guadeloupe French West Indies **(4)**.

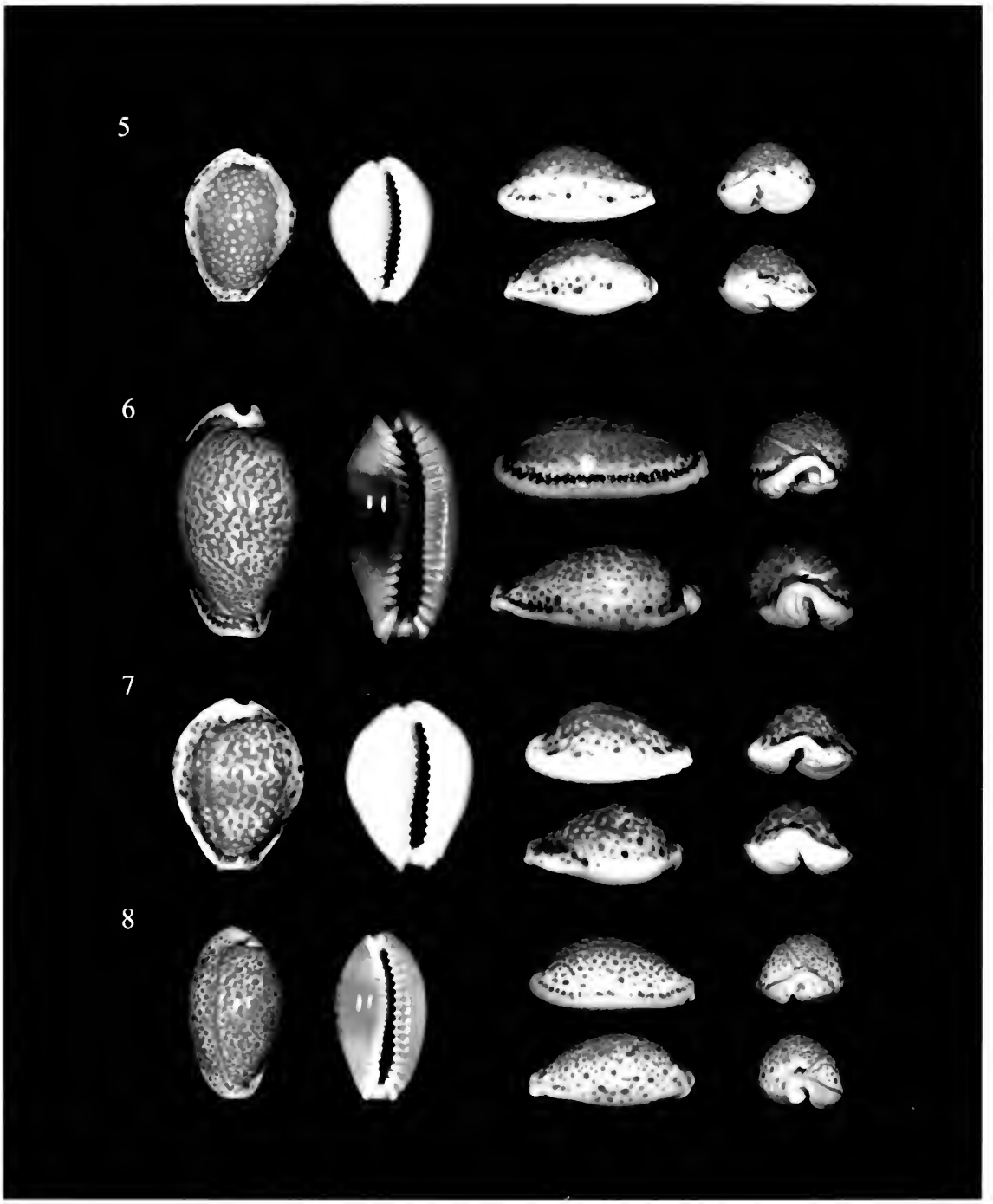

Figure 5-8: *E. acicularis acicularis* from Brazil **(5)**; *E. spurca* from Sicily **(6)**; *E. acicularis sanctahelenea* from Ascension Island **(7)**; and *E. spurca verdenium* from Cape Verde Island **(8)**.

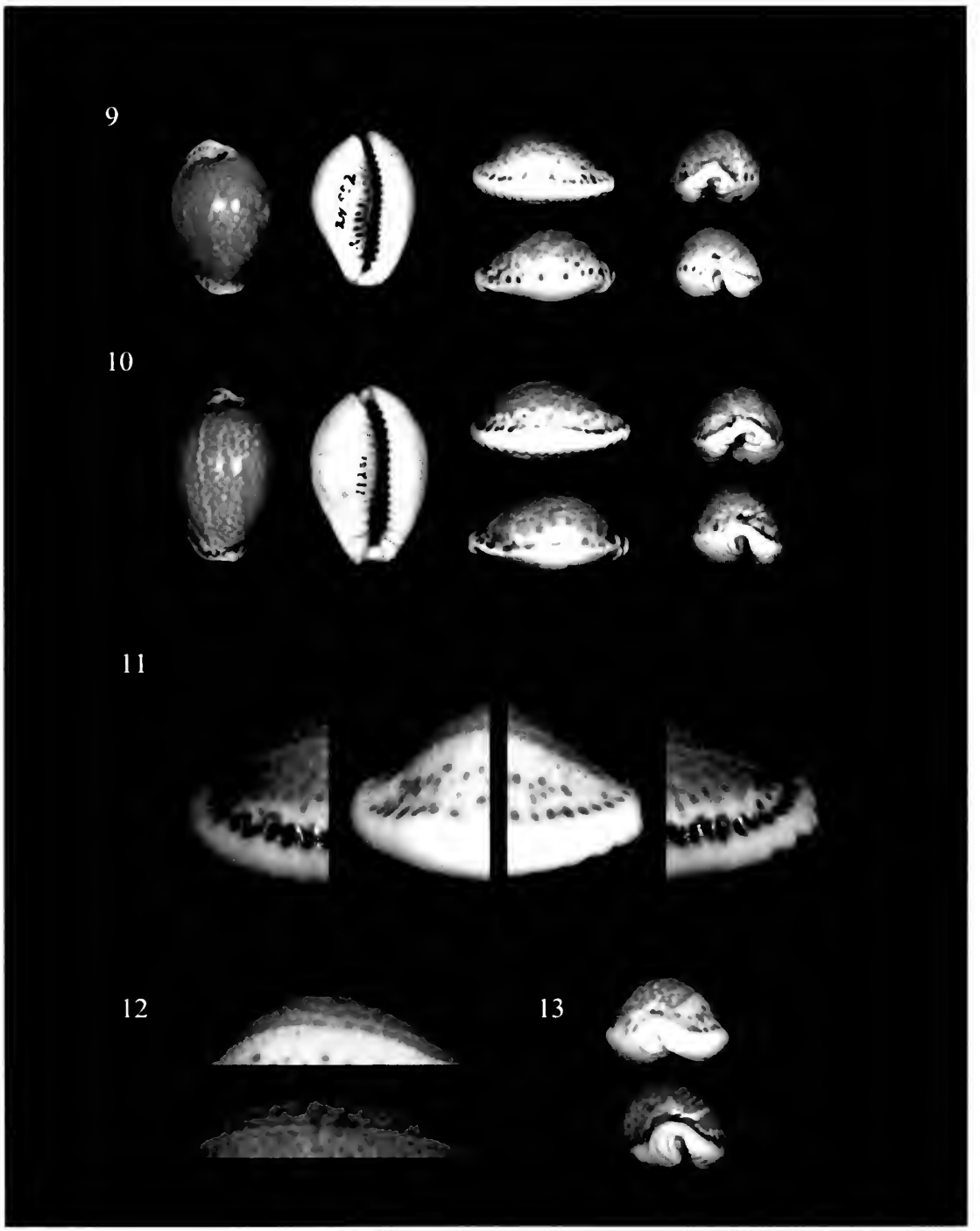

Figure 9-13: *E. acicularis acicularis* from SDNHM Lot No.: 24552 collected by H.N. Lowe **(9)**; *E. acicularis acicularis* from SDNHM Lot No.: 11221 collected by Capt. J.F. Anderson **(10)**; Terminal end comparison *E. acicularis* (interior) *and E. spurca* (exterior) **(11)**; Dorsum profile of *E. acicularis* (top) and *E. spurca* (bottom) **(12)**; and posterior terminus profile *E. acicularis* (top) and *E. spurca* (bottom) **(13)**.

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WMSDB Worldwide Mollusc Species Data Base, www.bagniliggia.it.

Figure captions for auction plate

Top row l-r: At the dollar table, Jeanne Pisor, Barbara Myers. **One row down l-r**: At the auction table, Debbie Catarius and Curran, The voice auction in action **Middle row l-r:** previewing the auction table, Carole Hertz & David Waller, Ginny Herrmann, **One row down l-r:** Sara & Mike Mangum, Wes Farmer, John LaGrange, Lawrence Moser **Bottom row l-r:** Jules Hertz & Mary Rider, Larry Catarius, Carole & Jules Hertz→


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MEMBERSHIP AND SUBSCRIPTION
Annual dues are payable to San Diego Shell Club.
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Meeting date: third Thursday, 7:30 PM,
Room 104, Casa Del Prado, Balboa Park, San Diego.

Website at: *http://www.sandiegoshellclub.com*
E:mail: *jhertz@san.rr.com*

PROGRAM

SHOW AND TELL

For a change of pace, this meeting will be a relaxed sharing of stories about favorite shells or shells with interesting stories.

Each member is asked to bring in a shell (or two shells) and tell something about them. It will make for a fun evening for all.

Meeting date: June 20, 2013

CONTENTS

CLUB NEWS

Minutes of the San Diego Shell Club 16 May 2013

The meeting was called to order at 7:50 p.m. by President David Waller. The previous minutes were approved. David read a thank you letter from the Western Society of Malacologists (WSM) for the Club's donation to its student grant fund.

Larry Buck offered to organize a trip to visit the collection at LACMNH or the SBMNH and also offered his house on Saturday 22 June for people to come over and talk about shells, trade or sell shells. If you are interested in any of these, contact Larry Buck for more details at Larry@GI.Plumbing.

Wendy Enright, President of WSM, reminded members of the upcoming annual meeting in San Diego, starting on June 23rd and going to the 26th. The meeting will be at the Courtyard Marriott. For details do a search on Western Society of Malacology and you will find the schedule, field trips, and registration forms online. If you wish to help at the meetings, contact Paul Tuskes (858-274-5829).

Paul introduced Dr. Douglas Ernissee who gave an outstanding talk on the *Siphonaria* of the Gulf of California, Channel Islands, and Hawaii. *Siphonaria* may look and act like limpets but this highly evolved group of snails belongs to the pulmonates. *Siphonaria* have lungs to breathe air and gills to survive while submerged. So, how do you tell a *Siphonaria* from a limpet? The shell tends to have more ribs on the dorsal surface that extend to the margin, giving the margin a serrated appearance. Two significant morphological characteristics can be seen on the ventral surface (1) there is a flaring of the shell (siphonal groove) on the right side to aid respiration and (2) if the animal is removed from the shell there a C-shaped muscle scar can be seen with the opening to the side. Limpets do not have the flaring for respiration in the shell, and the opening of their C-shaped muscle scar is located anteriorly, not laterally. There are three species in the Gulf of California, one species in California, and one from Hawaii. DNA studies show *S. gigas* (one of eight Panamic species) is not as closely related to the Gulf of California material as has been previously thought. The species from California is clearly related to material from the Gulf. Hawaiian material was assumed to be one species, but DNA work has identified three clades, each from a different area (Japan, Africa and the Indo-Pacific).

The meeting was adjourned at 9:15 p.m. Refreshments were provided by Bruce Kemp and Carole and Jules Hertz.

Paul Tuskes

A Get-together at Larry Buck's House

Larry Buck has invited members to his house in Encinitas on Saturday, June 22nd. Bring your own snacks and beverages and visit, trade, sell or buy shells. Event starts at 1 p.m. and ends at 4 p.m. The phone number for Larry is 760-580-1726 and the address is 3649 Sage Canyon Drive, Encinitas, 92024. Please RSVP by calling Larry.

Update on the 46th Annual Meeting of the WSM

The meeting, as announced, will be held in the Courtyard by Marriott in Central San Diego at 8651 Spectrum Center Blvd, San Diego, CA 92123 from June 23-26th. Registration packets may be picked up each morning during the coffee socializing between 8:00 a.m. and 30 minutes before the first talk of the day.

There will be contributed talks on Sunday through Tuesday with two symposia and evening activities
Sunday: Evening social reception (wine and cheese)
Monday: poster session
Tuesday: group picture, business meeting and banquet (which will be held at the Marriott)
Wednesday: field trips to either Birch Aquarium and Scripps Institution of Oceanography or the San Diego Natural History Museum and Balboa Park

For further information on registration and activities, contact Wendy Enright at wenright@sandiego.gov

NEW HOSTS DISCOVERED FOR PARASITIC PYRAMIDELLID SNAILS (GASTROPODA: PYRAMIDELLIDAE)

RICK HARBO[1], PATRICK LAFOLLETTE[2], NEIL MCDANIEL[3] & DOUGLAS SWANSTON[4]

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[2] Research Associate, Malacology, Natural History Museum of Los Angeles County, 900 Exposition Blvd, Los Angeles, CA 90007, USA. E-mail: pat@lafollette.com
[3] Neil McDaniel Photography and Cinematography, Vancouver, B.C. Canada V6N 2N5
[4] Seacology, North Vancouver, B.C., Canada V7K 2G4

It all started rather casually in February of 2011. Divers Douglas Swanston and Neil McDaniel noticed a number of tiny (3 mm) white snails on the siphons of the Fat Gaper Clam *Tresus capax* (Gould, 1850) in Vancouver Harbour. Neil sent some photos to Rick Harbo, recently retired from Fisheries and Oceans Canada, asking if he knew what they were and commenting that they were quite common. Rick recognized that they were probably parasitic snails and sent the question and photos to James H. McLean at the Natural History Museum of Los Angeles County. Recognizing that the snails were pyramidellids, Jim passed the photos along to Patrick LaFollette, who specializes in that family. Pyramidellid snails are known to feed on a variety of snail and clam hosts, sucking their "juice" like mosquitoes with a long thin extensible proboscis equipped with a suction cup and piercing stylet at the tip The snail extends its proboscis to a tender fleshy spot on the host, pokes a hole, and sucks fluids.

Pat thought the snails (Figures 2-4) were probably the odostomid *Evalea tenuisculpta* (Carpenter, 1865), described from Neah Bay, Washington, but there were some questions. Pyramidellids had never before been reported on *Tresus*. If they were the native species, and common on *Tresus,* why had no one noticed them before? A disturbing possibility was that they might be a newly invasive species introduced to Vancouver Harbour from somewhere else.

To help answer these questions, Neil reviewed videos taken previously in Vancouver Harbour and found that the snails were on gaper clams at several locations. Rick, Neil, and Doug returned to the original locality to collect and photograph more specimens of both snails and hosts. This resulted in perhaps the best photos ever taken of pyramidellid snails caught in the act of feeding (Figures 3-4). A commercial clam harvesting device, known as a hydraulic "stinger," was loaned by the Underwater Harvesters Association (Figure 1). It was used to collect some of the host gaper clams. This provided confirmation of the identification of *Tresus capax* and allowed voucher specimens of

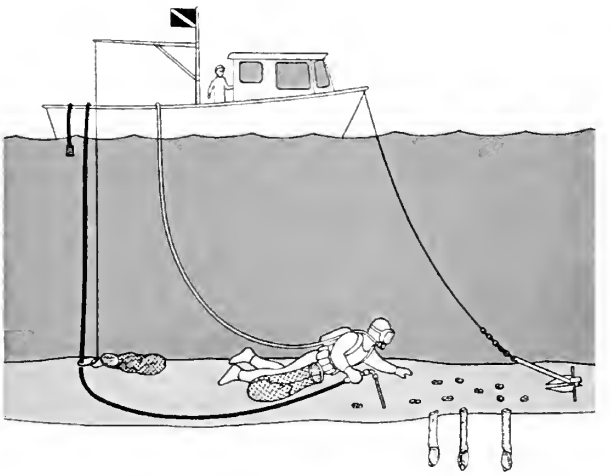


Figure 1. Diagram of a hydraulic clam "stinger" used for harvesting *Tresus*. Drawing from Shells and Shellfish of the Pacific Northwest. A Field Guide. By Rick M. Harbo, 1997.

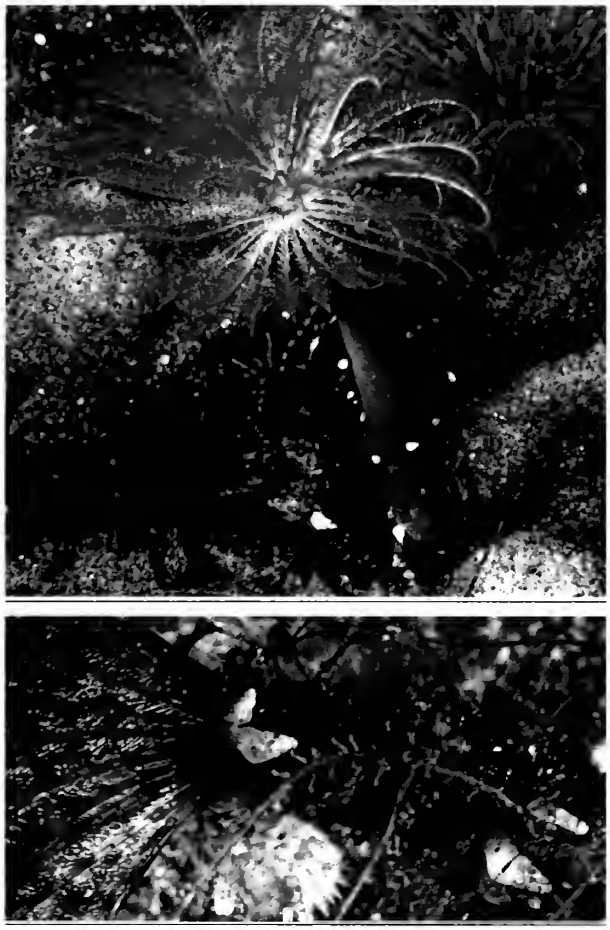
hosts and parasites to be deposited at the Royal British Columbia Museum and the Natural History Museum of Los Angeles County. An e-mail was broadcast to divers and collectors in Washington, British Columbia, and Alaska with photos and the question, "Have you seen this snail?" A notice and photos were published in *Dredgings*, the newsletter of the Pacific Northwest Club in Seattle.

Figure 2. Specimens of *Evalea tenuisculpta* on severed siphon of *Tresus capax*, Port Moody Arm, Vancouver Harbour, British Columbia, 2011. Photo by Rick Harbo. Specimens are about 4 mm L.

Figure 3. *Evalea tenuisculpta* feeding on *Tresus capax*, Port Moody Arm, Vancouver Harbour, British Columbia, January 30, 2012. Photo by Neil McDaniel.

Figure 4. Closeup of *Evalea tenuisculpta* feeding on *Tresus capax*, Port Moody Arm, Vancouver Harbour, British Columbia, January 30, 2012. Photo by Neil McDaniel.

Figure 5. *Evalea tenuisculpta* on *Mopalia kennerleyi* (Carpenter, 1864), Oak Bay, Jefferson County, Washington, May 9, 2009. Photo by Linda Schroeder.



Figures 6a, b. *Evalea tenuisculpta* on Sabellid Polychaete tube worm *Eudistylia catharinae*, 9 mile Point, Sechelt Inlet, British Columbia, March 8, 2012. Photos by Neil McDaniel.

Figure 7. *Evalea tenuisculpta* on *Cranopsis cucullata*, Rich Passage, near Bremerton, Washington (47° 35′ 22″ N, 122° 33′ 29″ W), depth 32 ft., January 16, 2010. Photo by Karin Fletcher.

Figure 8. *Evalea tenuisculpta* feeding on *Haliotis rufescens* at UC Davis Bodega Marine Laboratory. Specimens collected at Sea Ranch, Sonoma Co., California. (38°42′N, 123°26′ W), October 2012. Photo by Athena Maguire.

Figure 9. *Evalea tenuisculpta* on *Haliotis kamtschatkana*, Sea Ranch, Sonoma Co., California (38°42′N, 123°26′W), depth 60 ft., October 2012. Photo by Athena Maguire.

The response was both startling and gratifying. It turned out that there was more information "out there" than we imagined. Reports, photographs, and specimens have been received from a number of divers and collectors up and down the coast. *Evalea tenuisculpta* was reported on both northern species of *Tresus (T. capax* and *T. nuttallii* (Conrad, 1837)) and on the Pacific Geoduck *Panopea abrupta* (Conrad, 1849) from a number of locations in British Columbia, Washington and Alaska, putting to rest concerns that the snail was an invasive species in Vancouver Harbour. This and other species of pyramidellids were recognized on a variety of other hosts, including other clams, chitons (Figure 5), polychaete worms (Figure 6), and gastropods. Images of odostomids on several hosts were found when old photos were reviewed highly enlarged. They had gone unnoticed before. This was the case for the *E. tenuisculpta* on *Endistylia catharinae* Banse, 1979 (Figure 6) and on the Hooded Puneturella *Cranopsis cucullata* (Gould, 1846) (Figure 7). In northern California, *E. tenuisculpta* was observed on abalone. Figure 8 shows an *Evalea* feeding through a respiratory hole of the Red Abalone (*Haliotis rufescens* Swainson, 1822) and Figure 9 on the shell of a northern or Pinto Abalone (*Haliotis kamtschatkana* Jonas, 1845).

Relationships between pyramidellid snails and their hosts are poorly known. Most of the records that we have received have never been reported in the literature. A detailed report is planned for the near future. Wishing to expand the project beyond the Pacific Northwest, we invite readers of *The Festivus* who may have collected or photographed pyramidellids living on their hosts to let us know, and to keep them in mind on future dives and collecting trips, and when reviewing old photos.

Rick Harbo is acting as the information clearing house for the project, maintaining a spread sheet of reports and photos, locations, collectors, dates, whether voucher specimens are available, and if so where they are deposited. Pat is identifying the pyramidellid specimens. Voucher specimens of hosts and parasites are catalogued into the mollusk collection of the Natural History Museum of Los Angeles County. A special effort is being made to obtain pyramidellid specimens preserved in 95% ethanol for DNA analysis. Observations and photographs should be e-mailed to Rick. Specimens of both pyramidellids and hosts should be sent directly to Pat at the address above.

Acknowledgments

Contributors to date are Linda Sehroeder, Karin Fletcher, Bert Bartleson and Alan Aylesworth (WA data), Andy Lamb, Grant Dovey, Mike Atkins and William Merilees (B.C. data), Scott Walker, Alaska Dept. of Fish and Game, Ketchikan, Alaska, Ron Shimek and Roger Clark (AK data), Athena Maguire and Laura Rogers-Bennett, California Dept. of Fish and Wildlife and UC Davis Bodega Marine Laboratory (CA data). The Underwater Harvesters Association, Vancouver, B.C. provided some equipment and funding for field sampling. Host species of worms were identified by Sheila Byers, Beaty Biodiversity Museum, University of British Columbia, Vancouver B.C. and Leslie Harris, Natural History Museum of Los Angeles County.

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IN MEMORIAM

NANCY DAWSON SCHNEIDER

August 28, 1929 – May 12, 2013

It is with deep sadness that we report the passing of our longtime friend Nancy Schneider. Nancy had been an active member of the San Diego Shell Club since 1992, serving on the Club board, contributing papers to *The Festivus* and always ready to help with any project. She was also a faithful volunteer for other organizations like Campfire Girls, Sunday school teacher, Poway Performing Arts usher and "rock lady" in the Poway schools to teach about rocks and minerals.

Nancy was born in San Diego in Mercy Hospital, later attended San Diego High School and graduated from Washington University in Saint Louis, Missouri in 1951 as an Occupational Therapist.

She met her future husband, Bill, in 1953 and they married in 1954. They both had a passion for beach-combing and polishing rocks. This hobby became a business in 1960 – Schneider's Rocks and Minerals in Poway, California and thrived for 36 years during which she and Bill participated in gem and mineral shows across the country. The interest later expanded to include shells and fossils.

After their four children were grown, Nancy and Bill began traveling to Baja California and Mulegé became their favorite vacation spot. In their times at Mulegé, they visited the little natural history museum in the area. Together Nancy and Bill redesigned and re-sized some large, old-fashioned glass-topped specimen cases to fit in the museum and filled them with fossil and Recent mollusks which they donated to the museum. Nancy even gave instruction to the high school students there so that they would be able to inform visitors about what they were viewing

Nancy and Bill's love of the ocean led them to become active members of "Friends of the Collection" at Scripps Institution of Oceanography. This organization works hard to raise funds and help with planning for the Institution.

As a result of her service to Scripps, Nancy was honored by having a bivalve species named for her and a valve of the new species was presented to her in a beautiful plaque at a reception.

Nancy is survived by the following members of her close and loving family; her brother Sam Dawson and her four children; Jeannie Hume, Tom Schneider, Kelly

Nancy at the San Diego Shell Club's annual auction in April 2010. Photo by Wes Farmer.

Ann Schneider and Caroline Lepore and her five Grandchildren: Christopher Hume, Taylor Lepore, Lexi Schneider, Carlie Lepore and Julie Hume.

Publications on Mollusca by Nancy Schneider

1997. A late Pleistocene *Cypraea (Macrocypraea) cervinetta* . *The Festivus* 29(6):53, figs. 1-2.

1999a. Not all shells in Baja California are Recent (a new listing of molluscan fossil species from the Mulegé Formation and environs). *Ibid* 31(1): 3-16, figs. 1-12, tables 1-2.

1999b. Correction and additions to "Not all shells in Baja California are Recent." *Ibid* 31(5): 58.

2004. A report on the Pliocene mollusks from Arroyo de Santa Agueda, south of Santa Rosalia, Baja California Sur, México. *Ibid* 36(11): 133-143, figs. 1-18, table 1.

Officer of the San Diego Shell Club
Corresponding Secretary – 2004-2007

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E-mail: *jhertz@san.rr.com*

The Festivus is published monthly except December.
The publication date is on the masthead above
Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM,
Room 104, Casa Del Prado, Balboa Park, San Diego.

PROGRAM

Restoration of Native Olympia Oysters in Southern California
If We Make Their Bed, They Will Lie in It

Dr. Danielle Zaeherl, Assoeiate Professor of Biological Seienee at CSU Fullerton will discuss the Olympia oyster, *Ostrea lurida* , the only oyster native to the US west eoast. discussing its deelines since the early 1900s duc to overharvesting and habitat destruction. and talk about efforts to restore habitats to bays in Southern California.

Meeting date: July 18, 2013

CONTENTS

Minutes of the San Diego Shell Club 20 June 2013

The meeting was ealled to order at 7:45 p.m. by President David Waller. The previous minutes were approved. The elub is still in need of a reeording seeretary. The treasurer and librarian were absent so there were no reports. Larry Buek reminded members about the Saturday get-together to swap stories and possibly shells at his house. Paul reminded the group that the WSM meetings are being held in San Diego and start on Sunday. Carole reminded everyone that she was hosting the WSM tour of the SDNHM on Wednesday.

The format for the June meeting was different as eaeh member brought his/her favorite shell and diseussed the story behind it. Larry Buek displayed and diseussed the largest *Conus princeps* that any of us had seen and a eowry from Japan that eame with a story about a Buddhist temple. Paul Tuskes displayed a large tiger eowry that he colleeted this year on the Big Island in Hawaii. It was found on the bottom at 50 feet in eight pieees after having been erushed by an eagle ray. Ann Tuskes showed a tree snail neeklaee purehased in the Caribbean for $2. Carole Hertz diseussed a day in 1968 eolleeting horse eonehs intertidally in the Florida Keys. She showed one of the shells and a photo taken of her holding the shells the day she found them. John LaGrange shared a speeial jewel box *Chama* he colleeted near his house and the story of its find. David Waller shared a spiny elam found in Mexieo and told how he put it in a plastie eup found on the beaeh and paeked it with sand to proteet the spines --- it made it all the way home in the eup with spines intaet. Wes Farmer showed a beautiful larger-than-life aeeurately detailed nudibraneh model he'd made and embedded in plastie. Marty Sehuler brought some marginellas that ranged from moderate to large in size and diseussed his new interest in the group. Bill Sehramm brought a rare eowry he had reeeived that day and shared the information with the group.

All of the eookies brought by Ann and Paul Tuskes and David Waller were eonsumed and everyone had an enjoyable time visiting. It was interesting to see how many of us have had similar experienees.

The meeting was adjourned at 9:10 p.m.

A Host is Needed for September

The Club needs a host for the big annual September party/potluek whieh is usually held out-of-doors. The Catarius family has generously hosted these fun get-togethers for the past several years, for whieh we thank them.

This is always a very enjoyable event – pure soeializing with old friends and new. The festivities usually begin about 4 p.m. with the potluek dinner at 5:30 p.m. so that everyone will be able to be there.

If you are willing to host this party, please eontaet either Dave Waller (dwaller@dbwipmg.eom) or Carole & Jules Hertz (jhertz@san.rr.eom).

Additions and Changes to the Club Roster

Judith Garfield P.O. Box 293, La Jolla, California 92038. E-mail: jgarfield@uesd.edu

Esteban Fernando Félix-Pico Centro Inter-diseiplinario de Cieneias Marinas del Instituto Politéenieo Naeional, La Paz, B.C.S, Méxieo E-mail: efelix@ipn.mx

Valentín Santos Mogollón Roma 350, Lima 18, Perú, E-mail: svmogollon@yahoo.eom

A Circus of Shells II, COA Convention 2013

The COA Convention 2013 will be held from July 17-21 with field trips July 14-16, 19, 21. The Convention will be held at the Hyatt Regeney, Sarasota, Florida. There will be many eolleeting field trips, shell eraft seetions during the bourse setup and eheap shells during registration. There will also be a weleome party, oral auetion and banquet with speaker Dr. Henry Chaney.

For COA registration information as well as a registration form, eontaet Donna Cassin (deassin94111@verizon.net).

IAN McTAGGART COWAN (1910-2010) AND HIS CONTRIBUTIONS TO WEST COAST MALACOLOGY

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Dr. Ian McTaggart Cowan (Figure 1) will be remembered for his contributions as a vertebrate biologist, whose scientific reputation was based on his knowledge of the wildlife of British Columbia. However, he had broad interests and his contributions in other fields are also noteworthy. As an inspirational teacher, mentor to many graduate students in wildlife biology, and a person who instilled enthusiasm and energy into countless other undergraduates and individuals, he was second to none. The recent tribute in the Canadian Field Naturalist (Silver, et al., 2010) enumerates many of his considerable accomplishments, but almost entirely omits any reference to his many contributions to our understanding of West Coast mollusks.

The senior author, Bill Merillees, first met Ian Cowan in 1957, and has always shared with him an interest in mollusks. Most of the notes here are based on frequent contact with Ian over the intervening years up to his passing in 2010.

During his childhood in Vancouver, the Cowan family would take their summer holidays at various locations along British Columbia's south coast. At these times, Ian and his younger brother Patrick, at the insistence of their mother, usually had a small boat at their disposal and during low tides would explore the shore, developing a fascination for marine life. Flatfish in the tide pools and salmon traps (then still in operation) at Boundary Bay and the rocky shore line of

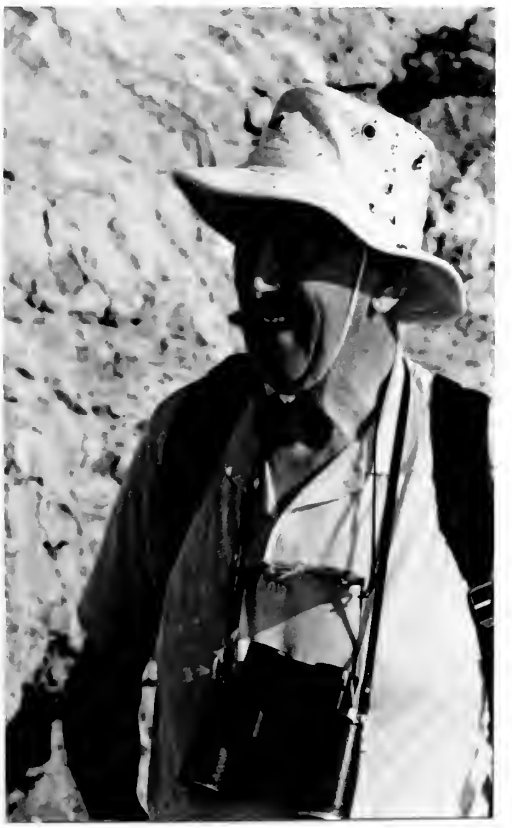

Figure 1. Dr. Ian McTaggart Cowan in Baja California, 1970s, while bird watching, as guest lecturer on a Linblad Expedition.

Bowen Island were among his earliest seashore recollections. Upon entry to the University of British Columbia as an undergraduate, Ian met Dr. C. McLean Fraser, a world authority on hydroids who taught a course in invertebrate zoology. From these beginnings, Ian's interests in marine biology gravitated to mollusks, and by the late 1950s and in the 1960s had focused on the study of chitons, in part because he considered that of the mollusks they "were least known, but with a reasonable literature."

Ian took a Ph. D. at the University of California, Berkeley under the noted vertebrate zoologist, Professor Joseph Grinnell. Upon entering this program, all new grad students were grilled by the faculty through rigorous questioning. Finally Dr. Grinnell said to Ian, "You are not enjoying this are you? How would you like to ask us some questions?" Ian replied "I think I could make you just as uncomfortable as I have been – but, I'd be a damn fool to do it!" Every one present laughed – such was the early wisdom of this gifted student.

Upon completing his PhD, Dr. Cowan returned to British Columbia where he took up duties at the Provincial Museum in Victoria. On Friday afternoons, staff at the Biological Station in Nanaimo would conduct seminars that Dr. Cowan would attend. Here he met Dr. Wilbur Clemens, who soon was to become head of the Biology Department at U.B.C. After his Berkeley experience, Ian's heart was really into university education. When an opening happened at U.B.C., Dr. Clemens offered Dr. Cowan a teaching position.

During the 1950s, increasing teaching and administration responsibilities precluded long periods in the field that were required for meaningful research on mammals and birds. Supervising graduate students and research projects that could be undertaken in shorter time periods became a necessity.

The Cowans, Ian, wife Joyce, son Garry and daughter Ann regularly took their summer vacation in August at Saturna Island, south from Vancouver. A 19-ft. clinker built boat with an inboard-mounted, Jeep engine by the name of 'Tuchi' became their mode of transportation. This was a sea-worthy boat, equipped with a roller and windlass for the purpose of towing and lifting a naturalist's dredge. Dredging became the means to rekindle his fascination with marine biology, especially the study of mollusks.

Also, beginning in 1950 and continuing to 1967, the Fisheries Research Board of Canada at the Biological Station in Nanaimo, Vancouver Island, under the direction Dr. Dan Quayle, began systematic invertebrate surveys along the British Columbia coast. Littoral and offshore habitats were sampled with an emphasis on mollusks. Dr. Quayle often invited Dr. Cowan to participate in this program. Ian is acknowledged (Bernard, 1967) for his encouragement and assistance with these surveys, as well as being relied upon for the identification of much of the mollusk material collected.

On one of these early trips, off the West Coast of Vancouver Island, in the dead of night and in pouring rain, their large trawl snagged up a considerable load of large boulders. The trawl with an opening of 21 feet across and towed by a half inch steel cable, was bent in half. With extreme difficulty and considerable effort from the ship's winches, they finally got the haul on board. The boulders were encrusted with "silver dollar" scallops (*Delectopecten vancouverensis*). In 2005, reflecting on this particular experience, Ian remembered being totally immersed in the situation – but he regretted not spending more effort looking for chitons.

The junior author, Jim McLean, recalls that he first met Dr. Cowan in 1963, having been recommended as a knowledgeable graduate student interested in eastern Pacific marine gastropods by Dr. Myra Keen of Stanford University. Jim was invited to join Chief Scientist Ian Cowan on a six-day survey cruise of the Fisheries Research Board's vessel *Ekholi*, May 18-23, 1963. Dredging stations were made in the Georgia Strait and there were diving and intertidal stations at Hope Island and Negei Island off the north end of Vancouver Island (Figure 2). Extra specimens from the dredging stations were made available for the NHM collection, at which Jim became curator of mollusks in 1964. Thus began a friendship and research collaborations that lasted for many years thereafter.

Ian's interests in mollusks were catholic. His collection, although primarily of British Columbian species, grew to 10,701 cataloged entries, including worldwide specimens. When travel opportunities became available, his wife Joyce was an active collecting partner. Another vacation activity included salmon fishing with their friends Tom and Margaret Denny (Figure 3) Their specimens were purchased or exchanged, and many were received as gifts from colleagues, students and friends. Drs. Daniel Quayle and Frank Bernard of the Pacific Biological Station in Nanaimo were particularly instrumental, through their faunal surveys, in supplying specimens. In addition to his numbered accession list, tallies of the species and the number of each, was also recorded for each collecting station sampled. More than 1,000 stations were represented from his field surveys.

Figure 2. Ian as chief scientist of the expedition of the *Ekholi*, May 1963, examining the coarse screenings from a haul with the beam trawl. Specimens to be kept are placed in the glass jar. Photo: J. McLean.

In addition, Dr. Cowan encouraged and assisted many individuals with their interest in mollusks. Notable among this group was Peter Henson, the Indian Agent for the Queen Charlotte Islands, at Masset (Merilees, 2009). From 1957 to 1962, Peter amassed a considerable collection from this area including many first records for British Columbia (Cowan, 1964; Turner, 1962) and species new to science. During Ian's research, reference materials in a number of languages, photos of type specimens in the United States National Museum, and bound copies of John Q. Burch's *Distributional List of the West American Marine Mollusks* (three volumes), were made available to serious collectors and researchers. Dr. Cowan was also an early member of the Pacific Northwest Shell Club where his first publications on mollusks appeared.

Among Dr. Cowan's more fascinating finds would be the diminutive razor clam *Siliqua sloati* Hertlein, 1961, found off Saturna Island. However, based on shell characters, Coan, Scott and Bernard (2000) considered this species to be inseparable from juvenile *Siliqua alta* (Broderip & G. B. Sowerby I, 1829).

Probably Dr. Cowan's most satisfying discovery was made near their summer cottage on Mayne Island. Together with his son Garry, they collected a colorful new species of chiton, which they described as *Mopalia spectabilis* Cowan & Cowan, 1977.

The majority of the Cowan Mollusk Collection, and his other research materials are now housed at the Royal British Columbia Museum, in Victoria. Material deposited in the teaching collection at the University of British Columbia in Vancouver is now part of the Beaty Biodiversity Museum at that institution.

Conclusions

Dr. Ian Mctaggart Cowan was a man of many interests – stamps, rhododendrons, alpine plants, mollusks and above all, wildlife ecology. In each of these fields he was recognized for his expertise. During the 1970s Ian's fascination with the wildlife of Baja California led to his invitation as a guest lecturer on Linblad Expedition vessels (Figures 1 & 4). His enthusiasm was infectious as well as inspirational. Never a man of half measures, in addition to being recognized as the "father of wildlife biology in British Columbia," he also made time to add substantially to our knowledge of the west coast mollusk fauna.

Figure 3. Ian (at left) with friends Tom and Margaret Denny collecting salmon fishing gear tossed or lost by commercial fishermen somewhere along the Baja California coast circa 1980.

Figure 4. Ian in Baja California, 1970s, taking close photos of a spiny lizard, as guest lecturer on a Lindblad Expedition.

Molluscan species named in honor of Ian McTaggart Cowan

Cuspidaria cowani Bernard, 1967 – a septibranch bivalve. Journal of the Fisheries Research Board of Canada, 24(12): 2629-2630.

Cocculina cowani McLean, 1987 – a wood-feeding cocculinid limpet. Zoologica Scripta, 16(4): 325-333.

Molluscan species described by Ian McTaggart Cowan

Aligena (*Odontogena*) *borealis* Cowan, 1964. (This proved to be a thyasirid, the status of which is still unsettled. It may be a valid genus (*Odontogena*) and species, (E. V. Coan, pers. comm.).

Puncturella (*Cranopsis*) *decorata* McLean & Cowan, 1968.

Fissurisepta pacifica Cowan, 1969.

Mopalia spectabilis I. M. Cowan & G. M. Cowan, 1977.

Molluscan publications by Ian McTaggart Cowan

1962. Molluscs of a single dredge haul. Pacific Northwest Shell News, 2(3): 37.

1963. *Tonicella lineata* Reeve in British Columbia. Pacific Northwest Shell News, 3(5): 53.

1963. The preservation of color in chitons. Pacific Northwest Shell News, 3(6): 65.

1964. The egg capsule and young of *Beringius eyerdami* Smith (Neptuneidae, Mollusca Gastropoda). The Veliger, 7(1): 43-45.

1964. A new species of the Lamellibranch genus *Aligena* from Western Canada. The Veliger, 7 (2): 108-109.

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Acknowledgments

Rick Harbo, of Nanaimo, B.C. and Ian's daughter Ann Schau are thanked for photos and other contributions to this paper. Eugene Coan read the text and made useful suggestions.

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REPORT OF THE WSM MEETING – 2013

JULES HERTZ

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The 46th annual meeting of the Western Society of Malacologists (WSM) was held June 23-28, 2013 in the Mesa Room at the Courtyard by Marriott Hotel in central San Diego, California. The meeting was organized and ably run by WSM President Wendy Enright. There were 50+ registrants in attendance, many from far-off places in México (see Figure 1).

The technical presentations began on Sunday morning, the 23rd. The opening speaker Paul Tuskes gave one of the best papers of the meeting on the *Mollusks of Mission Bay, San Diego, California.* Although I had heard versions of this paper previously, I was impressed by how well he had organized the subject and presented the information. There were quite a few pictures that he had never presented in the past, and his comparison of his recent study with previous studies as far back as the 1930s was of particular interest to the audience. This was followed by a talk by Paul Valentich-Scott entitled *Bivalvian Triptych: Bivalve Seashells of Western South America.* Paul and other authors are now working on a book of the bivalves of the Perú-Chile Province as a follow-up to the two monographs he and others have published in the past which covered the marine bivalve mollusks from the Arctic to northern Perú. Although the book on the Panamic bivalves covered 892 species, so far the new monograph will cover only 217 species.

Later in the morning, Susan Kidwell gave a very interesting overview entitled, *Evaluating human impacts on coastal ecosystems using dead shell assemblages and very young fossil records.* This was a kick-off to a number of talks on assemblages from different localities in the Americas which she coauthored. The most interesting to me was presented by Katie Cramer and entitled *Historical anthropogenic change in reef coral and molluscan communities in Caribbean Panamá.* The authors analyzed coral and molluscan fossil assemblages from reefs in Panamá to construct a timeline of ecological change from the 19th Century to the present. Their data strongly support the hypothesis that Caribbean reef degradation predates coral bleaching and disease outbreaks linked to anthropogenic climate change. The evening's entertainment was a silent auction of shells and books.

Monday's technical session started with an Opisthobranchia Symposium led by Ángel Valdés. Dr. Valdés gave the opening talk: *Alien sea slugs and ecosystem change.* He and his students evaluated the population genetics of two species that have recently invaded the Mediterranean Sea: *Aplysia dactylomela* and *Haminoea japonica.* The *Aplysia* is a conspicuous species easy to identify and its spread into the Mediterranean is well documented. Since *H. japonica* is very similar to native Mediterranean species the spread was largely undetected. The authors' research indicated that the *Aplysia* dispersed naturally and the *Haminoea japonica* spread through human-mediated vectors. Later in the day, Terrence Gosliner and a number of coauthors presented interesting papers on systematics and taxonomy of different nudibranchs and other opisthobranchs. The most popular paper of the day was presented by Jeffrey Goddard entitled *Name changes in northeastern Pacific Dendrodorididae.* By reexamination of morphological and anatomical evidence in the literature of the last 100+ years in addition to unpublished materials from the James Lance collection at the California Academy of Sciences, the author was able to untangle the true identities of *Doriopsilla rowena* and *Dendrodoris nigromaculata.* His work was acknowledged by the experts in the audience with the advice that the work be published as soon as possible.

A Poster Session was held in the evening in conjunction with a very popular reprint sale run by George Kennedy, with all proceeds going to the Student Grant Fund.

The last day of technical papers was Tuesday the 25th, with presentations predominantly by our Mexican friends. The first paper of the day by Carlos Figueroa-Beltrán et al. was entitled: *Culture and*

Environment in a Lost Paradise. The Mollusks of Prehistoric Laguna Percebu, Baja California. This was of particular interest to me, since my wife Carole and I had collected intertidally there in the late 1960s. The archaeological excavations were conducted in the fall of 2012 in the sand dunes not far from the high-tide zone. The marine faunal remains revealed the resources which sustained the prehistoric human settlement. The area is being bought by wealthy entrepreneurs and will likely be made into a golf course and resort.

The afternoon featured a series of papers on abalone. I was most interested in a paper by Roberto Cruz-Flores et al. entitled *Distribution prevalence and intensity of Xenohaliotis californiensis parasite of abalone, Haliotis fulgens and Haliotis corrugata in the Peninsula of Baja California, México.* The parasite is widely distributed in the main fishing area and its prevalence and intensity seems to be greater in abalones with external signs of the withering foot syndrome than those without these signs.

During the Business Meeting, President-elect Paul Valentich-Scott discussed the 2014 annual meeting to be held 23-27 June 2014 in México City. WSM will meet jointly with the American Malacological Society, the Asociación Latinoamericana de Malacología and the Sociedad de Malacología de México. They are expecting hundreds of attendees and the program will cover any topic on mollusks including, but not limited to, taxonomy, ecology, biology, evolution, fisheries and the distribution and conservation of marine, terrestrial and freshwater mollusks.

The annual banquet was held Tuesday night on the hotel's patio. The hotel did a marvelous job of converting this space to look like a formal dining area with large round tables. There was a beautiful buffet of Mediterranean style foods and very attentive staff to make sure that we each had the wine, beer or soft drinks that we desired. The food was delicious and the conversation very enjoyable.

On Wednesday the 26th there was a field trip to the San Diego Natural History Museum to visit the Marine Invertebrate and the Paleontology Departments. The tour at the Marine Invertebrate Department was led by Carole Hertz after which she brought the group to the Paleontology Department for a presentation by Curator Dr. Tom Deméré. Visitors were then able to enjoy visiting other exhibits in the museum.

Figure 1. Group photo of attendees at the 2013 annual meeting of the WSM. Photo by Daniel Ituarte.

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THE FESTIVUS

A publication of the San Diego Shell Club

Volume: XLV August 8, 2013 Number: 8

MEMBERSHIP AND SUBSCRIPTION
Annual dues are payable to San Diego Shell Club
Membership (includes family). Domestic $20.00;

Address all correspondence to the San Diego Shell Club, Inc.
c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111, USA
Website at: *http://www.sandiegoshellclub.com*
E-mail: *jhertz@san.rr.com*

The Festivus is published monthly except December.
The publication date is on the masthead above
Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM,
Room 104, Casa Del Prado, Balboa Park, San Diego.

PROGRAM

Indian Trade Routes Based on the Presence of Abalone Shells in Various Cultures

Dr. Hans Bertsch will present an illustrated program on these Indian trade routes, noting that at one time a good shell was worth as much as a good horse. The presence of the abalone shells in Indian history will be discussed. It will be an interesting talk based on a great deal of historical research.

Meeting date: August 15, 2013

CONTENTS

Minutes of the San Diego Shell Club
18 July 2013

The meeting was called to order by President Dave Waller at 8:40 p.m. The minutes were approved as published in *The Festivus* and treasurer Silvana Vollero reported that the Club was solvent. It was announced that the September party will be held on Saturday September 28th at the home and garden of Silvana Vollero and family (see col. 2).

Dave announced that the Club was looking for a Hospitality Chairperson to be responsible for the refreshments at the meetings. If you are interested, please notify Dave at <dwaller@dbwipmg.com>.

Bob Dees introduced the speaker for the evening, Dr. Danielle Zacherl, Associate Professor of Biological Science at CSU Fullerton. She discussed the Olympia Oyster, *Ostrea lurida* Carpenter, 1864, the only native oyster on the US west coast. In past years it was very common but began to decline in the early 1900s due to over harvesting and habitat destruction.

She was a stimulating speaker, deeply involved in efforts to restore *Ostrea lurida* habitats to bays in Southern California. She explained the group's planning in order to learn what sort of habitat preparations would result in the best increases in the species and she had excellent visuals to explain her project. Her work surveyed the bays up and down the coast to determine the areas in which this oyster was prevalent in the past and used this information to help decide where to set up the project for rehabilitating the species. She also set up experiments to determine the sort of substrates in which *Ostrea lurida* would best succeed in expanding its habitat.

It was an exciting talk by a talented speaker who made us all a bit more fascinated by oysters.

The meeting was adjourned at 9:30 p.m. The refreshments were provided by Wes Farmer and Carole Hertz.

The Club's Annual September Party
September 28, 2013

The September party will be held on Saturday September 28th at the home and garden of Silvana Vollero and family at 5613 Carnegie St., San Diego, 92122 (858-625-0756). Festivities will begin at 4 p.m. and last until?

The party is always a potluck and great fun. The sign-up sheet for the party will be passed at the August meeting. If you are unable to attend the August meeting and want to attend the September party, please contact Carole Hertz (858-277-6259) and let us know if you prefer to bring a salad, entrée or dessert – always to serve 12.

As always there will be soft drinks, water and coffee provided by the Club. If you would like to bring wine or beer, that will be fine.

The September party is a special event – a get-together, to enjoy great food and maybe even talk shells!!

So save the date and come to the party.

Changes to the roster

Change of address
Robert Schoening, 742 Wall St. Coupeville, WA 98239
Phone: 360-678-3951; e-mail: rschoening@aol.com

The Club's Annual Christmas Dinner Party

Save the date for the Club's annual dinner party which, once again, will be held at the Butcher Shop in Kearny Mesa. The date is December 7th, the first Saturday of the month.

Mark your calendar, you'll not want to miss the party!

MARINE MOLLUSKS FROM THE ISLAND OF SABA, LEEWARD ISLANDS, WEST INDIES

SUSAN J. HEWITT

Volunteer Staff, Invertebrate Paleontology, American Museum of Natural History (AMNH)
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Introduction

Saba (pronounced "SAY-ba") is a Dutch West Indian island situated at 17°38′N, 63°15′W. This small volcanic island is part of the inner arc of the northern half of the Leeward Island chain of the Lesser Antilles (Figure 1). Saba is 50 km south-southwest of Sint Maarten (which is the southern half of the island of Saint Martin and the connection point for travel to Saba).

In outline, the island of Saba is roughly rhomboidal (Figure 2). It is about 13 km^2 in area, approximately 5.5 km from north to south, and 4 km from east to west. The island is mountainous, consisting primarily of a dormant volcano. There are numerous hills, and the highest peak is Mount Scenery at 870 m. The majority of Saba's surface is steeply sloping, and most of the coast consists of cliffs. Underwater the seabed drops to more than 305 m depth within 0.75 km of the shore. Extending around the whole island from the high tide mark out to a depth of 60 m is the "Saba National Marine Park", a protected area.

Approximately 5.5 km to the southwest of Saba is the northern edge of a large submerged atoll known as Saba Bank (Figure 1). This approximately 60 km by 30 km area of shallow-water habitat is the top of a seamount, and it is unusually rich in biodiversity (Laloup, 2010). In 2010, the entire atoll was designated the "Saba Bank National Park". Both this and the previously mentioned Saba National Marine Park are officially designated National Parks of the Netherlands.

Saba was formerly one of the islands in the Federation of the Netherland Antilles, which was dissolved in 2010. Aruba, Curacao and Sint Maarten are currently all autonomous countries. Saba is a "special municipality" or "public body" of the Netherlands, as are Bonaire and Sint Eustatius; together these three are known as the Caribbean Netherlands.

The population of Saba is less than 2,000, and is

Figure 1. The Antilles from Hispaniola to Venezuela, with inset showing Saba, the Saba Bank and adjacent islands.

mostly concentrated in four settlements: St. John's, Windwardside, Hells Gate, and The Bottom, which is the capital. Although Dutch is the official language, English is the main language spoken on the island.

Saba has three dive shops and numerous hiking trails. From land, the intertidal zone is accessible in only a few places by road or trail. In the northeast, the main road zigzags down to the airport on Flat Point; immediately south of the airport are Cove Bay and Spring Bay; the latter can be reached via a trail. In the southwest, the main road descends steeply to the island's only harbor at Fort Bay, with Tent Point a little further west. On the northern part of the west (or leeward) coast, a minor road leads directly to Wells Bay. Further south on the west coast, for people who are willing to climb down an almost vertical trail of 800 stone steps known as "The Ladder", it is possible to

Figure 2. Map of Saba showing main road and three settlements.

access Ladder Bay.

Saba has a reputation for having no beaches, but brown volcanic sand beaches do sometimes appear and disappear again at Wells Bay and Cove Bay. The scarcity of beaches on Saba means that recording species from empty shells in drift is usually not an option. In addition, within the Saba Marine Park, taking live or dead invertebrates is forbidden; this applies not only underwater, but also on the coast up to the high-water mark.

Rosenberg (2009) lists 17 species of marine mollusks that have been reported from Saba in the literature; the majority of these are deep-water taxa. As of this writing (April 2013), I have not yet been able to visit Saba, having only seen the island in the distance from Sint Eustatius (Figure 3). However, I was keen to try to record at least some of the common intertidal species of Saba, and so since 2010 I have been remotely compiling information on the fauna. I used the same techniques with which I investigated the fauna of the island of Sint Eustatious before visiting it (see Hewitt, 2010c). Starting with the local conservation authority, I attempted to contact residents or visitors who were interested in the biology of the island, and asked them if they would send me images of live mollusks or shells. I also e-mailed the dive shops, and examined images on the official Saba tourism website. In this way I have been able to put together a preliminary list of the shallow-water marine mollusks of this small island.

Fortunately, Sue Hurrell, the education officer of

Figure 3. View from Sint Eustatius of Saba, 32 km in the distance.

the Saba Conservation Foundation, put me in touch with Michiel Boeken, a Dutch biologist and an education administrator who, before returning to the Netherlands, was principal of the Saba Comprehensive School from July 2010 to July 2012. Michiel was researching the White-tailed Tropicbirds and endemic orchids of Saba, but at my request he also found time to make images of marine mollusks, many of them live, but some only as shells. The live animals were photographed at Tent Point, at the harbor at Fort Bay, and at Cove Bay.

Michiel Boeken put me in touch with Sylvia van Leeuwen, who is also Dutch; she is a serious amateur malacologist and a member of the Nederlandse Malacologische Vereniging (Netherlands Malacological Society). Sylvia had visited Saba from 16 to 20 May 2012 and investigated the molluscan fauna, visiting most of the intertidal areas that can be accessed from land. She was kind enough to share her images and information with me.

Rüdiger Bieler of the Field Museum of Natural History in Chicago, also visited Saba, in October 2010, during the island's annual month-long "Sea & Learn" environmental awareness event. By scuba diving, and with a special permit, he live-collected vermetids, including some previously undescribed species.

On 30 October 2012, I mentioned Saba in an e-mail to Marien Faber of the Zoologisch Museum, Universiteit van Amsterdam, and he told me that Robert Moolenbeek of the museum had collected some material from the island in the early 1980s. Faber also said that the Naturalis Biodiversity Center in Leiden, Netherlands has some unsorted material from Saba Bank. Ríos (2003: 50) reports one record of *Lepidochitona rosea* Kaas, 1972, a small pink chiton from the Saba Bank ("Banco de Saba").

Materials and Methods

As previously mentioned, I have not yet been able to visit the island of Saba. Because of the strict regulations on collecting even empty shells, no specimens have been sent to me, and none are likely to be sent -- only photographs. Thus, I did not come into direct contact with any of the material indicated in the list below. However, the information and photographs were provided by people in positions of responsibility whom I consider to be extremely trustworthy, and who have, at the very least, a background in biology. The majority of the records listed here are based on extensive photographic evidence, most of which was created specifically for this study. I am experienced in identifying the common intertidal species of the Leeward Islands, and in many cases I was able to examine images of live material that was in situ. The photographs were often taken from more than one angle, including views of the aperture and operculum where applicable. I have deliberately excluded from the list a few taxa where I felt there might be ambiguity concerning the identity.

Future investigators of Saba's marine life need to know that Cove Bay (on the northeastern part of the coast) has been the site of an unusual human intervention. In 2011, a large quantity of dredged white sand from Great Bay in Sint Maarten was shipped to Saba. The plan was to add the imported sand (100 truck-loads in total) to the edge of Cove Bay in an attempt to create a white sand beach there (rather than the brown volcanic sand beach which appears only sporadically at this location). Once on Saba, the sand was allowed to sit for at least a month before most of it was deposited on the intertidal area at Cove Bay on 11 July 2011. The remainder was applied more than a year later in October 2012. The white sand from St. Maarten contained numerous shells. However, because of the time that had lapsed before the sand was set down, one presumes that no organisms were still alive. Not surprisingly the sand did not stay where it had been placed. Sue Hurrell of SCF explained to me (in an e-mail) that by October 2012, storms had already caused much of the first application of white sand to move out into the bay and surrounding areas.

Sylvia van Leeuwen visited Cove Bay with Michiel Boeken on 19 May 2012, almost a year after the first application of imported sand, and six months before the second application. At that point in time, a pile of white sand that had not yet been placed on the beach was stored across the road from the shore. For her own interest, Sylvia searched through part of that pile in order to record which shells from Sint Maarten had been brought in with the sand. At the time of Sylvia's visit there were numerous empty shells in driftlines on Cove Bay; one must assume that these were a mixture of imported Sint Maarten shells and local Saba shells.

There are ten live species recorded from Cove Bay in the following list, but I have used only two records of dead shells from that locality. One fresh shell of *Astraea caelata* (Gmelin, 1791) was found underwater at some depth, before the white sand had spread out into the bay. The other, *Astralium phoebium* (Röding, 1798), was photographed in the drift at Cove Bay in May 2012, after the first application of white sand; however, the shell appeared so dark and fresh-looking that I felt confident it was part of the Saba fauna.

List of marine mollusks of Saba 2005–2013

Sources of information: MB = Michiel Boeken, SvL = Sylvia van Leeuwen, RB = Rüdiger Bieler, SS = Sea Saba, ST = Saba Tourism website, * RH = records already published by Roger Hanlon et al.
Type of record: LI = photographed live in the intertidal zone, LU = observed or photographed live underwater, FA = fresh dead attached to a lobster cage, F = very freshly dead, E = empty shell, H = hermit-crabbed
Localities: SB = Spring Bay, CB = Cove Bay, FB = Fort Bay, TP = Tent Point, LB = Ladder Bay, Saba = more precise locality data unknown

GASTROPODA

Lottidae			
Tectura antillarum (Sowerby I, 1843)	MB	LI	CB, TP
Fissurellidae			
Fissurella angusta (Gmelin 1791)	MB	E	Saba
Fissurella nodosa (Born, 1778)	MB	LI	TP, CB
Diodora viridula (Lamarck, 1822)	MB	E	Saba
Trochidae			
Cittarium pica (Linnaeus, 1758)	SvL	LI	SB, TP
Tegula excavata (Lamarck, 1822)	MB SvL	LI	TP CB
Turbinidae			
Astralium phoebium (Röding, 1798)	MB	F	CB
Astraea caelata Gmelin, 1791	MB	F	CB
Neritidae			
Nerita peloronta Linnaeus, 1758	MB SvL	LI	CB, FB, SB
Nerita tessellata Gmelin, 1791	MB SvL	LI	FB
Nerita versicolor Gmelin, 1791	MB SvL	LI	TP, FB, WB, SB
Planaxidae			
Hinea lineata (da Costa, 1778)	MB	LI	CB
Supplanaxis nucleus (Bruguière, 1789)	MB SvL	LI	TP, FB, WB
Strombidae			
Eustrombus gigas (Linnaeus, 1758)	MB RB	LU	LB
Littorinidae			
Cenchritis muricatus (Linnaeus, 1758)	SvL	LI	FB
Echinolittorina meleagris (Potiez & Michaud, 1838)	MB	LI	Saba
Echinolittorina interrupta (Philippi, 1847)	MB	LI	CB
Echinolittorina tuberculata (Menke, 1828)	MB	LI	TP CB
Echinolittorina ziczac (Gmelin, 1791)	MB	LI	TP
Muricidae			
Plicopurpura patula (Linnaeus, 1758)	MB SvL	LI	TP
Mancinella deltoidea (Lamarck, 1822)	MB	LI	CB
Ovulidae			
Cyphoma gibbosum (Linnaeus, 1758)	ST MB	LU	Saba
Olividae			
Oliva fulgurator form *reticularis* Lamarck, 1811	MB	FE	LB
Plakobranchidae			
Elysia crispata (Mörch, 1863)	MB	LU	WB
Chromodorididae			
Mexichromis kempfi (Ev. Marcus, 1971)	MB	LU	Saba
Dolabrifera dolabrifera (Rang, 1828)	MB	LU	CB

BIVALVIA			
Glycymerididae			
Tucetona pectinata (Gmelin, 1791)	MB	FE	LB
Ostreidae			
Dendrostrea frons (Linnaeus, 1758)	SvL	FA	FB
Chamidae			
Chama sp.	SvL	FA	FB
Tellinidae			
Laciolina magna (Spengler, 1798)	MB	EU	LB
POLYPLACOPHORA			
Chitonidae			
Acanthopleura granulata (Gmelin, 1791)	MB	LI	TP
Chiton marmoratus Gmelin, 1791	MB	LI	FP, TP
Chiton squamosus Linnaeus, 1764	MB, SvL	LI	FB, TP
Chiton tuberculatus Linnaeus, 1758	MB	LI	CB
CEPHALOPODA			
Loliginidae			
Sepioteuthis sepioidea (Blainville, 1823)	SS	LU	Saba
Octopodidae			
**Amphioctopus burryi* (Voss, 1950)	RH	LU	Saba
**Macrotritopus defilippi* (Vérany, 1851)	RH	LU	Saba
**Octopus vulgaris* Cuvier, 1797	RH	LU	Saba

Results

The total for this list is 38 taxa, comprising 26 gastropods, 4 bivalves, 4 species of large chitons (known as "holdfast" on Saba and used as a food item), and 4 cephalopods. The sole species that is also listed in Rosenberg (2009) is *Dolabrifera dolabrifera*, the spotted sea hare. Three octopus species were already reported in Henson (2010). The number of previously unreported records in the list is 35. Out of the 28 taxa that were observed live for this study, 20 are characteristic of rocky intertidal exposed coasts in the West Indies.

One of the more interesting new subtidal records is the colorful nudibranch *Mexichromis kempfi* (Figure 4). This species has been recorded from Florida to Brazil (Rosenberg , 2009), however, it has not, until now, been reported from the Lesser Antilles.

Another unusual record is an 88 mm right valve of *Laciolina magna*, the great tellin (Figures 5, 6). This valve was found by Michiel Boeken off Ladder Bay at a depth of 10 m. In that area there is stable sand substrate which supports sand eels and queen conch, and thus it seems likely that the animal had originally lived reasonably close to where the valve was found. Mikkelsen and Bieler (2004) give the range for *L. magna* as North Carolina, East Florida, West Florida, the Florida Keys, and Bermuda, without any mention of other areas. I initially thought that Saba, being 2,000 km east south-east of the Florida Keys, was a striking range extension for this species. However, it turns out there are also records of this species from the Bahamas and the Caribbean Sea. Redfern (2001) lists *L. magna* from Abaco, Bahamas. Within the Caribbean Sea, the West Indian island of Guadeloupe, which is 230 km southeast of Saba, was d'Orbigny's 1853 type locality for *Tellina vitraea* (a synonym of *L. magna* according to Rosenberg (2009)). The species has also been recorded approximately 630 km to the southeast of Saba, in Carlisle Bay, Barbados (National Museum of Rotterdam (NMR), 2013).

Harry G. Lee of the Jacksonville Shell Club pointed out via e-mail that *L. magna* has been recorded from the Cayman Islands (checklist at jaxshells.org), nearly 2,000 miles west northwest of Saba. Harry contacted Emílio F. García of the University of Louisiana at Lafayette, who reported having collected *L. magna* in shallow water on a sand bottom with seagrass and coral rubble at Las Salinas in the Dominican Republic (in the island of Hispaniola), approximately 700 km west-northwest of Saba. Finding *L. magna* at Saba sheds a little more light on the distribution of this uncommon but large and showy species.

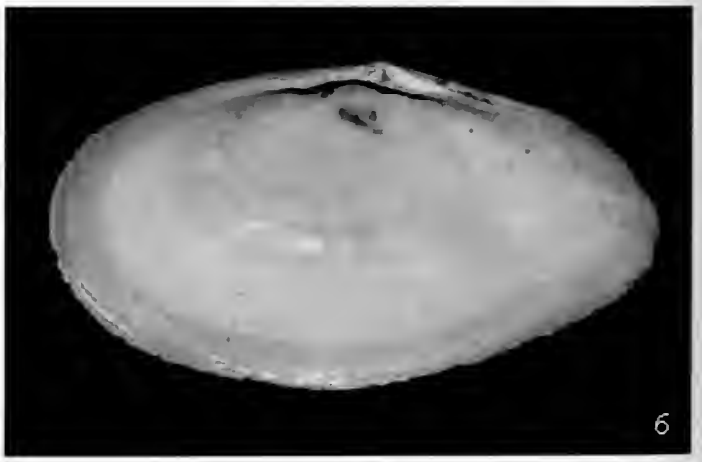
In 2005, the octopus species of Saba were investigated by Hanlon et al. (2010), who reported observing *Macrotritopus defilippi*, *Amphioctopus burryi* and *Octopus vulgaris*. Liz Shea explained (e-mail communication April 2013) that octopus taxonomy is in flux and that *O. vulgaris* may be a species complex. Lynn Costenaro of Sea Saba reported the presence of *Sepiotenthis sepioidea*, the reef squid, around Saba coral reefs (e-mail 2012); I am accepting this record because no other West Indian cephalopod resembles this cuttlefish-like animal in appearance and behavior. Lynn also mentioned seeing "Caribbean reef octopus", but without photographs one cannot ascertain whether or not this was indeed *Octopus briarens* Robson, 1929.

Adding the 38 items to the 17 preexisting records in Rosenberg (2009) brings the total of taxa recorded up to 55. Although the list presented here is still not very extensive, the overall number of species recorded for Saba is now more than triple the previous total. In particular the macromollusks of the rocky shore intertidal zone are better represented.

I hope I may be able to add further species in the future, either by continuing with the same type of work, or by visiting the island.

Acknowledgments

As is clear from the species list, this research would have been impossible without the fieldwork and photography of Michiel Boeken and that of Sylvia van Leeuwen, both currently of the Netherlands. Thanks also to Sylvia's husband Bart van Tooren for showing me photographs he took on Saba. I am grateful to Kate Walker, previously of STENAPA on St. Eustatius; Kai Wulf, Parks Manager of the Saba Conservation Foundation (SCF); and Sue Hurrell of the SCF Marine Park division, who answered numerous questions. Thanks to the staff of Sea Saba, especially to Lynn Costenaro and Becca Knight, and to Liz Shea of the Delaware Museum of Natural History for advice on cephalopod questions. Thanks also to Marien Faber and Robert Moolenbeek of the Amsterdam Museum, and Rüdiger Bieler of FMNH. Many thanks also go to Harry Lee and Emílio García who both kindly shared information about *Laciolina magna*, and to the anonymous reviewer who located the NMR record for that species and made many other helpful corrections and additions. The information from Gary Rosenberg's database Malacolog 4.1.1 is provided with the permission of the ANSP.



Figures 4-6. (4) Two live individuals of *Mexichromis kempfi* (5) Outer surface of 88 mm right valve of *Laciolina magna* (6) Inner surface of same valve.

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Meeting date: third Thursday, 7:30 PM, Room 104,
Casa Del Prado, Balboa Park, San Diego.

PROGRAM

COME TO THE SEPTEMBER PARTY
on September 28th

There will be no regular meeting this month.

CONTENTS

Minutes of the San Diego Shell Club
15 August 2013

The meeting was called to order at 7:48 p.m. by Paul Tuskes. The previous minutes were approved. The treasurer was absent so there was no report. Carole Hertz reminded members that *The Festivus* is always looking for papers. Save Saturday, September 28 for the annual summer picnic at the house of Silvana Vollero and Bob Petroski, more info in the September issue.

Paul Tuskes introduced Dr. Hans Bertsch, who spoke on the use of abalones by the Native Americans in the southwest and their distribution marking ancient trade routes. Abalone were an ideal food source as they are available year round and unlike clams they did not expose the consumer to paralytic shellfish poisoning during red tides. The meat could be transported cooked or dried. The shells of abalone were highly prized and the three most commonly found in middens and abandoned communities in the southwest are the red, green and black abalone.

In addition to their use as food, the shell was made into a number of different tools. The oldest dated material is from seven to eight thousand years ago. Naturally occurring asphalt from deposits on land and material that washed ashore was used to fill the breathing holes on the side of the shell, making them convenient bowls for both liquid and dry materials and may have been used to bail the ocean-going canoes. The shells were used to make fishing hooks, scrapers, and various types of decorations, for inlay in some carvings. Abalone shells were also associated with some burials. Trade routes took the shells as far east as western Texas and north to Nevada. It is presumed that the shells and meat were traded for other foods and resources that did not naturally occur in the Californias.

Evelyn and Don Smith provided the most excellent cookies. Hans Bertsch won the door prize which he graciously gave to Wendy Enright. The meeting was adjourned at 8:47 p.m. by David Waller, president.

Paul Tuskes

The Club's Annual September Party
September 28, 2013

The annual September party will be held on Saturday September 28th at the home and garden of Silvana Vollero and family at 5613 Carnegie St., San Diego, 92122 (858-625-0756). Festivities will begin at 4 p.m. and last until?

The party is always a potluck and great fun. If you want to attend the September party, please contact Carole Hertz (858-277-6259) and let us know if you prefer to bring a salad, entrée or dessert – always to serve 12.

As always there will be soft drinks, water and coffee provided by the Club. If you would like to bring wine or beer, that will be fine.

The September party is a special event – a get-together, to enjoy great food and maybe even talk shells!!

So save the date and come to the party.

The Club's Annual Christmas Dinner Party

Save the date for the Club's annual dinner party which, once again, will be held at the Butcher Shop in Kearny Mesa. The date is December 7th, the first Saturday of the month. There will be additional information in a later issue of *The Festivus.*

Mark your calendar, you'll not want to miss the party!

Looking for a Host for the Monthly Meetings

The Club is looking for a member who would be willing to be responsible for the refreshment table at monthly meetings. This person would provide the desserts (and be reimbursed for their cost), set up the table with cloth, utensils, coffee, tea, hot chocolate, etc.

If you have any interest in this very necessary position, please contact David Waller dwaller@dbwipmg.com >.

OBSERVATION ON THE BIOLOGY OF THE CHESTNUT COWRY *NEOBERNAYA SPADICEA* IN MISSION BAY

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Abstract. The chestnut cowry *Neobernaya spadicea* (Swainson, 1823) has been previously placed in the genera *Cypraea* and *Zonaria*. Although the species is included in guides to marine invertebrates of the region, there is a lack of specific biological information regarding the chestnut cowry. The purpose of this paper is to present new and more detailed biological information for this species.

Introduction

Neobernaya spadicea occurs from Isla Cedros off the southwest coast of Baja California, México to Santa Barbara, and then uncommonly to Monterey, California (McLean, 1978). In addition to examining specimens in the San Diego Natural History Museum (SDNHM), the computerized data bases for the Smithsonian Institution National Museum of Natural History (NMNH), the California Academy of Sciences (CAS), the Santa Barbara Museum of Natural History (SBMNH) and the Natural History Museum of Los Angeles County (LACMNH) were also examined. The SDNHM has material from Isla Guadalupe, an oceanic island located approximately 170 miles off the west coast of Baja California, México. In addition, there are two records in the SBMNH for Isla Asunción, approximately 40 air miles SSW of Guerrero Negro in Baja California Sur. Isla Asunción is currently the most southerly record for this species and in a transitional zone from the Californian to the Panamic Province as defined by Keen (1971) in *Sea Shells of Tropical West America*. This transitional region has been renamed numerous times and the scope of the Panamic region reduced, but the history of those changes are not relevant to this paper. Only two records were found north of Santa Barbara, both from Monterey, California, (Ingram, 1938) and a specimen in the collection of CAS taken in 1961.

Although this species is usually associated with rocky reefs and jetties, I have observed *N. spadicea* on numerous occasions in the eelgrass habitat at Ventura Cove, and on submerged detached bundles of giant kelp *Macrocystis pyrifera* that sunk and settled in the cove. This behavior is opportunistic as adults on the kelp were grazing on the fauna that lives on the fronds. They have not been observed on the fronds of erect kelp growing on rocks elsewhere. MacGinitie & MacGinite (1968) indicate the adults are carnivorous, feeding on sponges, anemones, ascidian tunicates, snail eggs, and a dead abalone. I have also observed them feeding on bryozoans and hydroids and suspect their diet is broader than reported. In captivity a juvenile in the bulla stage was reared to maturity by Darling (1965) on frozen shrimp. Ingram (1938) described the bulla stage of the species, and the transition from juvenile to adult.

While diving during the day at a study site on the Mission Bay jetty (14 May 2013), I observed a number of *N. spadicea*; typically the species is hidden during the day and forages at night. During the dive four female *N. spadicea* sitting on egg clusters were found. On 16 and 28 May four additional females on eggs were observed north and south of the study site. On 3 June, one additional female was observed preparing a site to receive eggs. Numerous additional dives were made to follow the progress of these brooding snails. Observations regarding site selection, eggs, egg capsules, and brooding were made while SCUBA diving. During this time photos were taken, samples collected and animals and nests were measured. Egg capsules were opened and the developing larvae placed on a slide and photographed via a microscope. The images were greatly enlarged and an accurate count of larvae in 10 separate capsules from one cluster was made.

Discussion

Nest Locations: Five of the nests were made in the right valves of large rock scallops *Crassadoma gigantea* (Gray, 1825) (syn. *Hinnites giganteus*) that remained attached to the rock after the animals had died (Figure 1). All of the scallop valves were in narrow gaps between ledges or recesses between rocks. One nest was

made on the underside of a rock scallop's left valve that was not attached to a rock (Figure 2). This shell was inverted and wedged between rocks with only enough space for the snail to enter. Two nests were made on smooth rocks; one was sheltered by an empty scallop shell attached to the adjoining rock, and the other sheltered by a large rock. Commonality of all sites was their secluded nature and the protected vertical or overhead orientation of the nests on smooth surfaces. Seven of the eight nests were associated with large empty rock scallop shells. The nests were located at depths from 4-5.5 m; the maximum depth in the area surveyed was 6 m.

Nest Preparation and Brooding: After the female has selected a potentially smooth shell or rock with the proper orientation and seclusion, she removes the fouling organisms such as sponges, algae, bryozoans etc., (Figure 3) so that the egg capsules can be attached directly to the substrate. During this time no males were present. Once the site is ready, I assume that the female attracts a male or males to the prepared site and mating occurs. The number of males attending each female ranged from one to three with two being the norm. Females sit upon the eggs with the foot extended and flattened to cover the largest area possible (Figure 4). No males were observed on the eggs but were located around the margin of the nests. Females measured 55 to 60 mm, while males were typically less than 52 mm.

Why multiple males initially remain present at seven of eight nests is not known. Egg capsules are deposited on the substrate in a circular or oval pattern that is 45-60 mm in diameter. A clear gelatinous material forms the base and attaches the capsules to the substrate. Shortly after deposition the base material becomes firm and somewhat elastic. The necessity to remove the fouling organisms is apparent once the cluster of egg capsules is observed. The base matrix that covers the rock would presumably smother the algae, sponges, and bryozoans etc., which in turn may die and separate from the shell or rock causing the nest to be dislodged. It is also possible that bacteria that decompose the trapped material (or their byproducts) may be injurious to the eggs. By the end of the second week, only one male remained present at a single nest. Based on the lack of missing egg capsules, it did not appear that males had been waiting on the margins of the nest to consume eggs. Although egg predation is possible it was not observed. It is possible that males remain to guard the nest, but if so, why would they leave halfway through the incubation period?

The female was always present on the capsules, making it difficult to accurately determine the number of capsules per nest. An initial attempt to remove a female in order to photograph and later count all of the capsules resulted in 31 capsules coming off with the female; that nest contained 296 capsules. To avoid damage to nests, the remainders were photographed with the female in place. The area of the female covering capsules was estimated and knowing the number of capsules in a similar area of the exposed nest, an estimate of the total number of capsules was made. The smallest nest contained 196 capsules and the largest 296; the average was 239 capsules/nest.

There is some variation in the shape and size of individual egg capsules within a nest. The shape may be oval, curved, or pyriform and the length varied from 4-4.5 mm with an average of 4.2 mm. The base of each capsule has a short pedicle that attached the capsule to the supporting matrix. The length of the pedicle is included in the overall length of the capsule. The width of the capsules ranged from 2-2.5 mm. The capsule may swell slightly to accommodate the increased volume of larvae, but 1-1.5 mm is typical for their thickness. The average number of embryos per capsule was 1,018 (Table 1) with a range from 865 to 1,137 embryos/capsule. Developing larvae in the veliger stage measured 0.16 mm in diameter. The planktonic larvae emerged from the capsules after 2.5-3 weeks. Initially egg capsules are translucent light yellow. By the second week the egg capsules are gray, and they became gray brown as the larvae prepare to exit the capsules. Based on the smallest and largest nest, the number of developing larvae per nest ranged from a low of approximately 200,000 to a high of 301,000. Water temperature in mid-May was 64F. On 16 June, no new nests were found and the eight prior nests were empty; the water temperature was still 64F.

Abbott and Haderlie (1990) reported reproductive activity for this species in July with approximately 800 eggs per capsule and 100 to 120 capsules per nest.

Table 1. Number of eggs per capsule, all ten from one nest.

865	972	1076	1137
927	1009	1099	Average
956	1035	1102	1018

Although I was not able to identify the source of their information, I suspect that smaller females may deposit fewer capsules. The numbers they presented could also be normal variability that occurs from one location to the next or during different years. The eight nests observed in this report clearly do not represent the range of reproductive variability.

Size of Adults and Color: While looking for information regarding the reproductive biology of this species I found multiple sources that gave the mature size of the shell as 120 mm [(Sept, 2002) & (Abbott & Haderlie, 1990)]. The source of this erroneous information is a paper by Donohue (1965) who incorrectly reported the maximum size of *N. spadicea* measured by Schilder (1961) as 120 mm. Later, Donohue (1966) addressed the error in his 1965 paper; the increments on his scale should have been 10 mm, not 20 mm. As a result the graph shows all species as being twice their normal size. Some authors failed to note the errors in the initial paper and missed the published correction. Schilder (1961) reports that 90% of the 120 shells measured were between 33 and 56 mm in length. In a later paper, Schilder & Schilder (1966) provided more information, with the largest specimen in the upper 5% range being 67 mm. Ingram (1938) measured 160 mature shells from San Pedro, Laguna Beach, and San Diego; the largest measured 61 mm and the smallest 31 mm. Based on personal observations while diving at Point Loma, Mission Bay, La Jolla, and the offshore islands, less than 1% of the shells exceed 62 mm in length.

On occasion, adults with juvenile patterns are found. Ingram (1938) observed that during the transition from juvenile to adult, the last characteristic to change is shell pattern and coloration. In addition to the traditional color, chestnut cowries have been found that have spots on the lateral surface, others that are very dark brown, reddish-brown, and in rare instances completely white.

Acknowledgments

I wish to thank Carole and Jules Hertz for allowing me to use their personal library, and Ann McGowan-Tuskes for reading and commenting on the manuscript many times. A thanks to the San Diego Natural History Museum for allowing me to use their library and review material in their collection and to the various museums that have their collection databases on-line for the use of all researchers; NMNH, SBMNH, LACMNH, and the CAS.

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Figure 1. Female sitting on egg capsules with three other *Neobernaya spadicea* around margin of nest which is in the right valve of rock scallop still attached to rock. Photo rotated 180 degrees from natural position.

Figure 2. Nest constructed in detached left valve of rock scallop, photo rotated right 90 degrees from natural position.

Figure 3. Females removing fouling organisms from nest on rock prior to mating and depositing eggs.

Figure 4. Foot of female broadly expanded as she tends to the egg capsules.

NOTES ON THE COWRY *NEOBERNAYA SPADICEA*: NOVEL OBSERVATION OF AN UNSPOTTED AND UNIQUELY COLORED MANTLE

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On January 15, 2013, I observed an unusual chestnut cowry, *Neobernaya spadicea* (Swainson, 1823) (aka *Cypraea spadicea*), while scuba diving in the San Diego-La Jolla Underwater Park Ecological Reserve. Located off La Jolla Shores in San Diego, California, part of the reserve comprises the bowl-shaped head of a submarine canyon, which lies about 135 meters from the beach. The cowry was nestled along the upper terraced ledge of the southern part of the canyon at a depth of about 20 meters. The shell displayed a pattern of alternating light- and dark-brown bands and measured about 25 mm in length, which is characteristic of a very young *N. spadicea*. The mantle, which was fully extended, was atypical in that it was devoid of pattern. At this growth phase (the bulla stage), the mantle is generally some tint or shade of orange-brown and scattered with dark-brown dots covering the tips of the papillae. Due to a lack of collecting permit and the location (an ecological reserve), the animal was photographed but otherwise left undisturbed (Figure 1).

Figure 1. The banded shell (~25 mm) is typical of a very young *Neobernaya. spadicea*. The exception is the mantle, which is devoid of pattern. (The white comma shape is a polychaete worm tube.) Photo: Judith Lea Garfield ©2013.

Figure 2. This young (~25 mm) *Neobernaya spadicea* was photographed off Catalina Island in 2007 (Kevin Lee, written communication). The banded shell and dark-spotted mantle are characteristic of *N. spadicea* in early development. Photo: Kevin Lee.

Figure 3. A typical adult *N. spadicea* (~50 mm) with a brown patch on the shell's dorsal surface, the rest of the shell white; the mantle is pale orange-brown and studded with dark-brown spots.
Photo: Judith Lea Garfield ©2013.

To help clarify whether this observation was unique, I reviewed some past publications for consensus (Darling, 1965; Groves, 1992 and Morris, Abbott & Haderlie, 1980). Most specimens described were based solely on the shell.

Neobernaya spadicea is known to undergo numerous developmental phases including changes to the appearance of the mantle and shell (other than an outlier albinistic form indicated solely by a white shell): http://www.marinespecies.org/aphia.php?p=taxdetails&id=580674)

Mantle color ranges from deep to pale orange-brown to whitish; however, the dark-brown dots seem to be a universal feature from juveniles through adults (Figures 2, 3).

Without genetic analysis in the juvenile, the definitive status of the *N. spadicea* with an unspotted mantle remains a mystery, other than to clarify that it is not an albino based on the shell's phenotype. For the present, this *N. spadicea* may best be considered a color variant of the mantle.

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THE SAN DIEGO SHELL CLUB SHELL BAZAAR

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On Saturday June 22, 2013, the San Diego Shell Club held its annual Shell Bazaar for the first time in many years. Larry and Toni Buck graciously hosted the event at their home in Encinitas. For some it was déjà vu and for others it was a new and exciting shell club event. The Shell Bazaar provides an opportunity for individuals interested in collecting shells to interact, trade or sell shells. This includes San Diego Shell Club members, guests and dealers. Attendees range from serious shell collectors to those individuals interested in learning more about shells and shell collecting.

Figure 1: From left to right: Larry Buck and Paul Kanner.

At the Shell Bazaar individuals of all levels meet with others and learn more about conchology and malacology in a relaxed and comfortable environment. Those who attended included Marty Beals, Larry Buck, Larry Catarius, John (Duffy) Daughenbaugh, Shawn Dietrick, Paul Kanner, John LaGrange, Julian Lee, Layla Nash, Chuck Reitz, Bill Schramm, Marty Schuler, Paul Tuskes and David Waller.

The afternoon was filled with stories of the "shell that got away," unforgettable historic trips, and famous

Figure 2: From left to right: Bill Schramm and Marty Beals.

Figure 3. Marty Schuler, Paul Tuskes and Larry Catarius.

shellers past and present. Despite horrible traffic, members came from as far away as Los Angeles making this event even more special.

Whether you were able to attend or not, the Club is always interested in suggestions on how future Shell Bazaars or similar San Diego Shell Club events can be improved. Please write to us and let us know at our website at: <http:// www.sandiegoshellclub.com>.

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MEMBERSHIP AND SUBSCRIPTION
Annual dues are payable to San Diego Shell Club
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The Festivus is published monthly except December.
The publication date is on the masthead above.
Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM, Room 104,
Casa Del Prado, Balboa Park, San Diego.

PROGRAM

Interacting Agents of Change in Southern California's Estuarine Ecosystems

Jeff Crooks has been the Research Coordinator at the Tijuana River National Estuarine Research Reserve since 2002. He received his Ph.D. from the Scripps Institution of Oceanography and was also a Post-Doctoral Fellow at the Smithsonian Environmental Research Center. He will discuss that climate has been and will continue to be one of the primary drivers of change in coastal wetlands, along with other major forces. The growing body of evidence, suggests that habitat modification, biological invasions, and climate change may act synergistically, thereby compounding the threat to our coastal ecosystems. A holistic approach to management, which seeks to improve the integrity of ecosystems as a whole, can simultaneously address multiple stressors and improve the resilience of our local estuaries.

Annual Book and Reprint Sale
Meeting date: October 17, 2013

CONTENTS

The Club's Annual September Party
September 28, 2013

The annual September party was held on Saturday September 28th at the home and garden of Silvana Vollero and family at 5613 Carnegie Street, San Diego. The over 20 attendees began to arrive at 4 P.M., with their potluck contributions, prepared to have a great time – which we all did have. It was lovely in their back garden and many decided on the cool breezes outside. Conversation was lively as always when old friends and new get together.

As always, the potluck contributions were wonderful. Delicious salads and entrees and some mouth-watering desserts. Soft drinks were provided by the Club and wine and beer was brought as well.

As is usual at the September parties, members enjoyed being together and oohed and aahed while viewing Silvana's shell collection – which showed her preference for muricids – can't fault that!!

It was a wonderful party and we all owe Silvana and Bob a very big vote of thanks for hosting all of us.

The Club Survey

Please spend a few moments to take the survey included with this issue and printed separately on blue paper. It discusses whether or not the Club's members might prefer to receive their issues of *The Festivus* in electronic form or continue to receive them as hard copies by U.S. mail. We request that you read the survey carefully and please return it to the Club address either by e-mail or U.S. mail. Your views on this are very important.

New Member

WRIGHT, JOEL F., 5800 Lake Murray Blvd, Unit 47, La Mesa, CA 91942-2515.
E-mail: joelabay@earthlink.net

The Club's Annual Holiday Dinner Party

Save the date for the Club's annual Christmas dinner party which, once again, will be held at the Butcher Shop in Kearny Mesa. The date is December 7th, the first Saturday of the month. The festivities will begin at 6 P.M. with no host cocktails and dinner will be served at 7 P.M. Bob Dees will again serve as MC for this fun holiday party.

The menu for the affair has been chosen and is as follows: Mixed green salad with choice of dressing and dinner rolls and butter. For entrees there is a choice of Prime Rib of beef au jus with Yukon gold garlic mashed potatoes and vegetables or mesquite broiled Mahi Mahi topped with cilantro-lime sauce served with wild rice blend and vegetables. A steamed vegetarian medley with butter and spices served with potatoes is available. The dessert will be carrot cake served with a choice of coffee or tea.

The cost of the evening will be $30 per person and will include an exciting video presentation by marine photographer Mike Miller.

As is usual, members are asked to bring a gift-wrapped shell or related item with only general information on the outside for the traditional holiday drawing.

Mark your calendars now so that you don't miss this special event.

The Annual Book and Reprint Sale

October is the month for our annual book and reprint sale. There is a huge amount of reprints and books awaiting new homes. The material will all be laid out on tables in the back of the meeting room. Most will be priced VERY REASONABLY and payment for items purchased is on the honor system – merely put your money in the glass jar!!

All funds raised are used to buy new books for the Club library. You'll be seeing the latest new book purchase very soon.

SOME NOTES ON PREDATION IN MARINE GASTROPOD SHELLS ON SANIBEL ISLAND, LEE COUNTY, FLORIDA

SUSAN J. HEWITT

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Introduction

Predation is a fact of life (and death) for mollusks, as it is for other animals. For the malacologist, it can be helpful to recognize signs that a shelled mollusk was attacked by a predator, and in some cases it is possible to deduce which kind of animal made the attack. I became particularly aware of predation during my visit to Sanibel Island on the Gulf Coast of Florida in December 2011. While searching the beach drift I found several remnants of medium-sized shells which had been broken so completely that almost nothing remained except the columella. Two of these cores were from the dextral species *Fasciolaria tulipa* (Linnaeus, 1758) and juvenile *Triplofusus giganteus* (Kiener, 1840). The shells of both of these species are robust; it did not seem possible that the breakage was simply from random mechanical damage, especially considering that the substrate around Sanibel is sandy, with few rocks. I therefore suspected predation was responsible.

Later on the same trip I found two shells of *Fasciolaria lilium hunteria* (G. Perry, 1811) that seemed to show even more clearly that they had been opened up by predators (Figures 1a, b). In the first, quite fresh shell (Figure 1a), all of the body whorl had been opened, apparently bit by bit, leaving small pieces of shell still attached at the suture. In the second, more worn shell, both the body whorl and the previous whorl had been opened, in an area right below the suture and parallel to it (Figure 1b). After my visit to Sanibel I was able to view images of other shells from the area that seemed to have been broken by predators, including two shells of *Scaphella junonia* (Lamarck, 1804) which had been opened at the widest part of the shell (Figure 2).

Figure 1a, b: Two shells of *Fasciolaria lilium hunteria*. 1a, Fresh shell 54 mm, with body whorl opened by a predator, suture showing evidence of chipping. 1b, Worn shell 56.9 mm, with body whorl and previous whorl opened.

Figure 2: Two examples of *Scaphella junonia* from Sanibel, showing predation damage. Images from iLoveShelling.com

Discussion

The malacologist Geerat Vermeij has studied the results of predation in fossil and Recent mollusks, the latter both as live animals and as empty shells collected from beach drift. In Vermeij (1994, p. 102) the author discusses crabs that prey on mollusks, some by peeling the shell open, and some by crushing the shell. The peeling technique is attributed primarily to box crabs in the family Calappidae. Vermeij (1982) explains that the method used by all *Calappa* species consists of "chipping away the outer shell wall piece by piece in a spiral direction, beginning at the outer lip." In contrast, he describes the simpler crushing predation as follows: "a shell as a whole is compressed between apposing surfaces" such as "the massive crusher claws of some crabs." The crushing technique is attributed to stone crabs in the genus *Menippe*, family Menippidae. In a 1993 paper, Vermeij reports that *Menippe mercenaria* (Say, 1818), the Florida stone crab (Figure 3) can apply a claw "bite force" of 800 Newtons (180 pounds force), which is a considerable amount for a small animal.

Figure 3: A dead Florida stone crab, *Menippe mercenaria*, approx. 130 mm in width, washed up on Sanibel. Image from iLoveShelling.com

Citizen scientist Harry G. Lee put me in contact with another researcher who has studied predation, Gregory P. Dietl, Director of Collections at the Paleontological Research Institution and Adjunct Assistant Professor in the Department of Earth and Atmospheric Sciences at Cornell University. Dr. Dietl told me (pers. e-mail com., January 2012) that calappids could very well be responsible for the peeled gastropods I had found.

As Dr. Dietl explained, "[Calappids] use a specialized projection...on their claw like a can-opener to peel back the shells of snails (or chip at the edges of some clams). It is not uncommon to find shells that have been peeled back several whorls." The breakage to the *Fasciolaria* shells shown in Figure 1 seems to fit fairly well the description of predation by a *Calappa* species, and indeed, Sanibel is home to the Florida flame box crab, *Calappa flammea* (Herbst, 1794), (Figure 4). However, Dr. Dietl also points out (pers. e-mail com., July 2012): "There are other non-crab predators that are able to peel back shells, such as certain species of mantis shrimp and spiny lobsters. It would be difficult to distinguish traces from these predators and calappids."

Figure 4: A dead flame box crab, *Calappa flammea*, approx 100 mm in width, found washed up on Sanibel. Image from iLoveShelling.com

Hughes & Elner (1989) observed that when a *Calappa* crab attacks a shelled mollusk, the predator inflicts its damage by using special "peg" and "cusp" structures on the right claw, only found in the Calappidae family (for illustrations see Hughes & Elner (1989, p. 95), and Vermeij (1994, p. 104)). Interestingly, the peeling claw of box crabs is always the right claw. Ng & Tan (1985) suggested this may be an adaptation to the fact that most marine gastropod shells are dextral or right-handed in their coiling. Dietl & Hendricks (2006) reported that the shells of sinistral sea snails showed fewer predator scars than the shells of

dextral snails, and that Calappa crabs when offered sinistral sea snails would pick them up at first but then drop them, showing a clear preference for species with right-handed coiling.

When looking at shell remnants, one cannot always reliably distinguish the results of crushing predation from those of peeling predation. As Dr. Dietl told me, "Stone crabs can produce similar damage to calappids if damage is limited to the final whorl of the shell, but if the distinctive peeling fracture continues to earlier whorls in most cases you are safe to assume it was a calappid."

One remnant I found in Sanibel was a 100 mm core of *Busycon sinistrum* Hollister, 1948 (Figure 5). This core appeared to be quite fresh and presented something of an enigma. Since *Calappa* crabs are apparently not generally interested in left-handed snails, perhaps this snail had been attacked by *Menippe mercenaria*, but then it would seem odd that several whorls of the shell were demolished. Perhaps another predator altogether was responsible for this damage.

Other predators also attack marine mollusks; underwater threats include the lobsters and mantis shrimp that Dr. Dietl mentioned, as well as sea stars, turtles, octopuses, and numerous kinds of fish. In addition, carnivorous marine gastropods prey on their fellow mollusks. Most collectors are familiar with predation marks left by naticids as they drill through a shell, leaving beveled holes through which the soft parts of the victim were accesssed. Muricids and octopuses also leave drill holes in shells, but those holes are straight-edged, not beveled like the ones made by naticids. Predation by carnivorous gastropods is far less destructive to the shell than crab predation.

Naturally not all predation attempts are fatal. Most collections contain shells that show one or more scars from unsuccessful efforts, where an attacker has managed to break a substantial piece off the growing lip of the shell, but the mollusk survived the attack, and was able to repair itself (see Tuskes, 2009).

Conclusion

For someone like me whose research in recent years has been based primarily on beach drift, as was the case on Sanibel, it is helpful to be aware of the changes that occur during, and after, the death of a shelled mollusk and before the shell washes up. While it is not always possible to determine which predator attacked a shelled mollusk, in some cases the type of breakage may identify the animal responsible. The destructive signs of predation are part of a large area of study that paleontologists know as taphonomy. Recognizing predation and its effects can be useful to the malacologist as well as to the paleontologist.

Figure 5: Remnant of shell of *Busycon sinistrum* 100.3 mm from Sanibel.

Acknowledgments

Thanks to Harry G. Lee, Gregory P. Dietl, and Pamela Rambo of iLoveShelling.com.

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COLLECTING PISMO CLAMS *TIVELA STULTORUM* (MOLLUSCA: VENERIDAE)

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Introduction

Long before surfboards and palm trees became the image of Southern California, it was the ocean, tuna and the Pismo clam. The clam was identified in 1823 by John Mawe and named *Tivela stultorum*, and is still an icon of southern coastal California and northern Baja California communities (Figure 1).

The Pismo clam is in the family Veneridae, and the largest species of surf clam found in Southern California. It primarily inhabits clean sand in surf zones and can range from intertidal areas to a depth of 80 feet. It has also been found in bays and estuaries. Pismo clams have a short siphon. Consequently, they may be exposed above or just a few inches below the surface of the sand. Feeding and water turbulence influences their depth. They orient themselves with their hinges parallel to the incoming waves, which allows the water to sweep over the shell without causing sand to erode from around the clam. Clams that are washed out of the sand, or not properly buried by collectors, may be washed onto the beach exposing them to predation and higher temperatures. For these reasons, any clam that is collected, but not kept, must be reburied in the sand as close as practical to where it was removed.

Regulations

A copy of the California Fish and Game regulations may be obtained from the Internet at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=59205&inline=true or by acquiring a hard copy at a sporting goods store or Fish and Game office (see section 29.40 for collecting information on the Pismo clam).

In Southern California the minimum legal length of a Pismo clam is 4.5 inches, while in central California it is 5 inches. The daily limit is 10 and a valid California saltwater fishing license and gauge to accurately measure the length of the clam are required when collecting. The rules no longer require collectors to carry a fishing license on their person while in the water. However, the collector is required to produce the license if requested by an officer. Consequently, securing the license to a bucket of water that will later hold the clams is recommended. This precludes the need for a long walk back to the car to retrieve the license.

Figure 1. Mature Pismo clam

Pismo Clams

The seminal papers on Pismo clams were published by Frank W. Weymouth in 1923 and William Shaw and Thomas Hassler in 1989. These papers review the distribution, biology, and historical catch data starting in 1916.

Pismo clams, *Tivela stultorum,* are broadcast spawners with reproduction occurring during the summer and fall. Clams as small as 0.5 inch may be sexually mature, but they can take nine or

more years to reach a size of 4.5 inches. Mature Pismo clams have a thick periostracum and the shell is often gray. A small percentage of the clams have an attractive blue to violet sunray pattern that radiates outward from the hinge area.

Pismo clams are filter feeders and should not be eaten in red tide areas. Like other filter feeding bivalves, toxins from mobile microscopic dinoflagellate algal blooms that cause red tides are absorbed into their tissues. It is important to note that cooking does not destroy these toxins and consuming Pismo clams that are contaminated can cause Paralytic Shellfish Poisoning (PSP). Symptoms of PSP poisoning often appear within a couple of hours after eating contaminated shellfish and may include gastro-intestinal distress, hot and cold sensations, headache, chills and generalized muscle weakness. In short, don't take clams or mussels when red tide warnings are announced or posted.

The commercial take of Pismo clams was halted at the end of 1947, but the take of these clams by the public remains open. Shaw and Hassler (1989) documented the significant impact of sea otters on the clam population at Pismo Beach in Central California. It has been estimated that an otter can eat as many as 80 clams per day. Currently Pismo clams are common only south of the otter's range. Various bony fish and rays feed on these clams, as do seagulls when clams are exposed.

Equipment

Collecting gear consists of (1) a hat to protect the face and ears from the sun (2) a small bag with a shoulder strap to hold collected clams (3) a gauge to accurately measure the clams (4) a pitchfork or rake with 4 to 5 inch tines placed about 1.5 to 2 inches apart (5) a bucket with a handle placed above the incoming tide to deposit clams from the shoulder bag and (6) a pair of beach walkers that extend above the ankles. Some collectors use their feet to locate clams. Using this method eliminates the need for rake, pitchfork or beach walkers. However, in areas where stingrays are present, it is recommended to always use beach walkers. Personal experience indicates that one can expect to encounter a ray about once in every five outings.

Collecting

Collecting is preferably done during low tides of less than minus 0.5 of a foot. Good locations for collecting in San Diego are from Coronado to Silver Strand State Beach. Plan to arrive about 45 minutes before the low tide. This will give sufficient time to organize gear, select an area to search for clams and collect clams before the tide changes significantly. Before entering the water, always access the surf condition and determine the location of any outgoing riptides and deep pockets in the sand.

Clams can be easily found buried in ankle deep water. However, if collecting is done in water above the knee or deeper it is recommended that the individual be an experienced swimmer with knowledge of local surf and water conditions.

When locating clams always face the ocean and move parallel to the shore while pulling the rake (Figure 2). When the rake contacts a clam, stop and rework the area with the rake until the clam is relocated, then insert a hand into the sand and under the clam to remove it. If using a pitchfork, penetrate the sand every 6-12 inches. Most clams will be near the surface, usually less than five inches under the sand. Once a clam is found, expand the search area in a circular pattern, as clams are often found in groups. On a typical day, one might expect to catch the legal limit

Figure 2. Keeping an eye on the ocean while dragging a rake for clams

in 30 minutes. If larger clams, in the range of six or more inches are collected, it may take an hour to reach the limit. Measure clams before placing them in your bag, and again as you place them in the transport bucket (Figure 3).

During the summer when the surf is low, clams can be collected in deeper water, which requires diving to retrieve the clams. On those days, a wetsuit is recom-

Figure 3. Measuring shells

mended to keep warm. One might expect to find larger clams where few people collect, but that is not always the case. The largest clam that we have taken is 6.4 inches in length, five inches in width and three inches in thickness. The empty shell weighted 1 pound 12 ounces. However, larger specimens up to 7.2 inches have been found (John Lagrange pers. comm.).

Cleaning

Upon returning home, place the clams in warm water and bring them to a boil. Once the clams pop open remove them from the water and allow them to cool in the sink. Next, remove the animal from the shell and separate the foot and stomach from the rest of the animal (Figure 4). Open and rinse the stomach with fresh water. Next remove the siphon and adductor muscles. The adductors are tasty but quite stringy, as a result, package them separately from the foot and siphon. If the clams are not going to be eaten immediately, vacuum pack and date the freezer package.

Pismo clams may be used to prepare a number of fabulous dishes including baked clams served on the half shell, clam risotto, and clam chowder. You can find an endless number of Pismo clam recipes along with additional suggestions for collecting clams on the Internet.

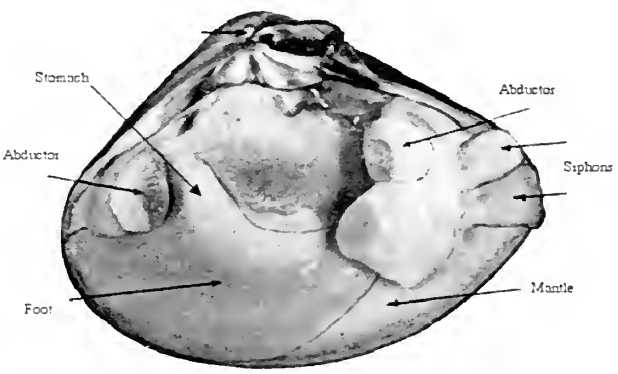

Figure 4. Pismo clam anatomy

Best San Francisco Clam Chowder
Ingredients Serves 4-6

5 cups clam juice
1 pound baking potatoes, peeled and diced
1.5 pounds fresh or frozen clams, diced
1/8 pound salt pork/bacon, diced
1 small onion, diced
1/2 cup butter
1/2 cup flour
1 pint half-and-half
Salt and pepper to taste
Dash hot Tabasco™ sauce
Dash Worcestershire sauce

Bring potatoes and clam juice to a boil. Cook until potatoes are tender, about 10 to 15 minutes. Add clams and cook about 5 minutes. Set aside.

Add pork to a saute pan and cook over low heat until rendered. Add onions and cook until transparent. Add butter and allow it to melt. Add flour and cook until slightly brown in color. Bring the clams, juice and potatoes back to a boil. Gradually stir in the cooked roux. Bring to a rolling boil to thicken. Stir continuously while cooking. Beat the half-and-half and add to the soup to desired thickness. Adjust the seasoning and add a dash of hot pepper sauce and Worcestershire sauce before serving.

Adjust the batch size based on the number of people to be served. Variations: pork is optional; potatoes can be replaced with fresh or frozen corn; vegetable stock can be used in place of clam juice. The chowder should be thick enough so that the chopped clams don't all settle to the bottom of the bowl.

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Annual dues are payable to San Diego Shell Club
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The Festivus is published monthly except December.
The publication date is on the masthead above.
Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM, Room 104,
Casa Del Prado, Balboa Park, San Diego.

PROGRAM

Historical anthropogenic change in reef coral and molluscan communities in Caribbean Panamá

Katie L Cramer, Post-doctoral Fellow, Smithsonian Institution, and visiting Scholar, at Scripps Institution of Oceanography, UCSD, will discuss the decline of reef corals across the Caribbean since the 1980s following regional episodes of coral bleaching, coral and urchin disease, and algal overgrowth. However, the extent of earlier degradation due to historical anthropogenic disturbances such as land clearing and overfishing remains unresolved. She analyzed coral and molluscan fossil assemblages from reefs near Bocas del Toro, Panamá from the 19th century to present. Large changes occurred before 1960 in coastal lagoons with deforestation for banana agriculture and after 1960 on offshore reefs. Striking changes included the demise of the previously dominant staghorn coral *Acropora cervicornis* and oyster *Deudrostrea frons* that lives attached to gorgonian and staghorn corals. Reductions in bivalve size and a decline in carnivorous gastropods further implicate increasing environmental stress on reefs.

This paleoecological data strongly support the hypothesis that Caribbean reef degradation predates coral bleaching and disease outbreaks linked to anthropogenic climate change.

Meeting date: November 21, 2013

CONTENTS

CLUB NEWS

Minutes of the San Diego Shell Club 17 October 2013

The meeting was called to order at 7:45 P.M. by President David Waller. The previous minutes were approved. The treasurer was absent so there was no report. Dave reported the proposed slate of officers for 2014: Pres. Larry Buck, Vice Pres. Richard Negus, Treasurer Silvana Vollero, Recording Secy. Martin Schuler, Corresponding Secy. Silvana Vollero. The election of officers will be at the November meeting.

Carole Hertz summarized information on the Club Christmas dinner party on December 7th at the Butcher Shop in Kearny Mesa (more details in this newsletter). Make sure to get your reservation in soon. The book and reprint sale was a hit with many members adding material to their personal libraries.

Paul Tuskes introduced the speaker Dr. Jeff Crooks. Jeff is a biologist and research project manager at the Tijuana River National Estuarine Sanctuary. His presentation touched on a number of subjects related to the use of bivalves as indicator species and characteristics of a few of our invasive species. Numerous factors influence the suitability of bays and estuaries for both native and invasive species. Temperature, water quality, and substrate are a few factors that impact bivalves. Studies have compared tolerances of native and non-native species and often found non-natives have broader tolerance to temperature ranges and pollutants. Species such as *Venerupis philippinarum, Musculista senhousia,* and *Crassostrea gigas* have successfully colonized our area. As ocean temperatures increase, we might see additional species establishing or re-establishing the San Diego area from more southern waters. Fortunately *Venerupis* and *Crassostrea* seem to prefer a different habitat than our native oyster and little neck clams. Jeff also shared data from old Indian middens that demonstrated shifts in the species composition and abundance. These changes may have been the result of continued human pressure with less desirable or more difficult to acquire species increasing as other species commonly gathered become less common. A great presentation followed by many questions from members. The meeting was adjourned at 9:01 P.M. by David Waller. Refreshments were provided by Marilyn & Jim Goldammer, John LaGrange and Paul & Ann Tuskes.

Paul Tuskes

The Club's Annual Holiday Dinner Party Saturday December 7, 2013

The date for the Club's annual Christmas dinner party which, once again, will be held at the Butcher Shop in Kearny Mesa is December 7th, the first Saturday of the month. The festivities will begin at 6 P.M. with no host cocktails and dinner will be served at 7 P.M. Bob Dees will again serve as MC for this fun holiday party. If you need directions or a map, contact Carole Hertz.

The menu for the affair is as follows: Mixed green salad with choice of dressing and dinner rolls and butter. For entrees there is a choice of Prime Rib of beef au jus with Yukon gold garlic mashed potatoes and vegetables or mesquite broiled Mahi Mahi topped with cilantro-lime sauce served with wild rice blend and vegetables. A steamed vegetarian medley with butter and spices served with potatoes is available. The dessert will be carrot cake served with a choice of coffee or tea. Wine will be served with dinner.

The cost for the entire evening will be $30 per person and will include an exciting video presentation by marine photographer Mike Miller.

As is usual, members are asked to bring a gift-wrapped shell or related item with only very general information on the outside to place under the tree for the Club's traditional holiday drawing. Only those who bring a gift can participate in this enjoyable event.

Please send in your check to the Club for your reservation (with your choice of entrée listed on) it by November 23rd. The restaurant (and the Club) need this information ahead of time to prepare for the evening. You may include your dues for 2014 ($20 for US members) with your check for the Christmas party if you desire.

A New Book on the Muricinae Purchased for the Club Library

Librarian Marilyn Goldammer purchased this new book, *Fossil and Recent Muricidae of the World. Part I. Muricinae* ,by Merle, Garrigues & Pointier published in 2011, for the Club library. Its purchase was made partly with money the Club has raised from sales of books and reprints at our annual book & reprint sales in October. This beautifully illustrated book in color will be available for circulation at the November meeting.

A SECOND SHORT SURVEY OF THE MARINE MOLLUSKS OF THE ISLAND OF MONTSERRAT, LEEWARD ISLANDS, WEST INDIES

SUSAN J. HEWITT

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Introduction

The Caribbean island of Montserrat, known for its active volcano, is situated at 16°45′N, 62°12′W, and is part of the inner arc of the northern half of the Leeward Island chain in the Lesser Antilles, West Indies. Montserrat is 62 km southeast of the island of Nevis, which since 1997 has been my main focus of study on annual visits. Hewitt (2012) includes a map and more information about Montserrat, and lists marine mollusk records from my first visit in 2011 when colleague Nikki Johnson and I (with some help from the Green Monkey Dive Shop) found 89 taxa that were additional to the pre-existing Rosenberg (2009) list of 14 species for the island.

On 5 May 2012, I was again able to visit Montserrat from Nevis. Gerard Gray, Montserrat's Director of the Department of the Environment, was kind enough to supply me, at very short notice, with a collecting permit (a Memorandum of Understanding) based on my 2011 application.

The boat from Nevis docked at Little Bay (16°48′05″N, 62°12′20″W). Rain began to fall and continued for the whole five hours I was on the island. A short distance (0.4 km) north of Little Bay is a locality I wanted to visit, known as Rendezvous Bay (Figure 1). The official tourism brochure says the bay is good for snorkeling and has the island's only white sand beach; I thought that the beach drift might be interesting there.

Rendezvous Bay (16° 48′29.5″N, 62°12′18.6 ″W) can only be accessed by sea or via the "Rendezvous Bay Nature Trail", which begins near the port on Little Bay. The trail runs up and over the intervening 112 m high headland, which is part of the mountainous Silver Hill area at the northern end of Montserrat. Despite the rain, I hiked the trail, described in the brochure as taking an hour and being "moderate" in difficulty. The trail is in fact quite strenuous: a long steep climb and descent despite frequent hairpin turns. The path was as narrow as a goat trail (circa 30 cm), and had not been well maintained. Because the ground was wet that day, the trail was dangerously slippery where clay was exposed.

Figure 1. View of Rendezvous Bay (in the foreground) from the boat approaching Montserrat, 2012.

When I reached the beach, which turned out to be composed of yellow sand, the light rain became a tropical downpour. I noticed that wave action had formed a sand ridge close to, and running parallel with, the water. About 3 meters further inland on the beach there was a long, shallow depression which had trapped a thin layer of beach drift. The layer was composed mainly of fresh but broken shells, but it also included some whole shells, especially of smaller species.

A group of Montserratians had hiked to the bay for an Easter holiday picnic, and two of them told me that the shells were broken because of the volcanic

eruptions. It is true that 12 kilometers further south on the island pyroclastic flows have often reached the sea, with devastating effects on the marine life; however, I would think that the shells on Rendezvous Bay were broken by more mundane processes. The drift was rich in biodiversity, and I spent about two and a half hours hand-picking it. The rain was churning up the water, so I did not snorkel. The picnickers offered me a ride back to Little Bay in a rubber dinghy, and because I was tired, cold, and soaked through from the rain, I gladly accepted, even though it meant I had to cut short my search of the drift, and forego looking on the margins of the bay for live intertidal species and shells trapped between rocks.

Results

In this list, the taxonomy at species, genus and family level is based on that used by the World Register of Marine Species (Appeltans et al., 2012). Two of the species on this list had already been recorded for Montserrat in Rosenberg (2009); these are marked with an "M". Species found only as one or more fragments are marked with an "f"; those that were found only as juveniles are marked "j". Boldface indicates species I found that were new to Montserrat, i.e. not included in Rosenberg (2009) and Hewitt (2012).

Species found on Rendezvous Bay, Montserrat in 2012

GASTROPODA

Lottiidae
Eoacmaea pustulata (Heibling, 1779)
Lottia albicosta (C.B. Adams, 1845)
Lottia antillarum (Sowerby I, 1843)
***Lottia leucopleura* (Gmelin, 1791)**
Fissurellidae
***Diodora arcuata* (Sowerby II, 1862)**
Diodora listeri (d'Orbigny, 1842) f
Diodora minuta (Lamarck, 1822)
***Diodora variegata* G.B. Sowerby II, 1862**
***Diodora viridula* (Lamarck, 1822)**
***Hemimarginula pumila* (A. Adams, 1852)**
Fissurella angusta (Gmelin, 1791)
Fissurella barbouri Pérez Farfante, 1943
Fissurella nodosa (Born, 1778)
***Fissurella punctata* Pérez Farfante, 1943**
Fissurella rosea (Gmelin, 1791)
Hemitoma octoradiata (Gmelin, 1791)
***Lucapina sowerbyi* (G. B. Sowerby II, 1835)**
***Lucapina philippiana* (Finlay, 1930)**
Calliostomatidae
***Calliostoma ?jujubinum* (Gmelin, 1791) f**
Tegulidae
Cittarium pica (Linnaeus, 1758)
Tegula excavata (Lamarck, 1822) M
***Tegula hotessieriana* (d'Orbigny, 1842)**
Turbinidae
Lithopoma caelatum (Gmelin, 1791) f
Lithopoma tuber (Linnaeus, 1767) f
Phasianellidae
***Eulithidium adamsi* (Philippi, 1853)**
Neritidae
***Nerita peloronta* Linnaeus, 1758 f**
Nerita tessellata Gmelin, 1791
Nerita versicolor Gmelin, 1791
***Puperita pupa* (Linnaeus, 1767)**
Cerithiidae
***Cerithium lutosum* Menke, 1828 f**
Modulidae
***Modulus modulus* (Linnaeus, 1758)**
Planaxidae
Hinea lineata (da Costa, 1778)
***Supplanaxis nucleus* (Bruguière, 1789)**
Cypraeidae
Macrocypraea sp. f
Luria cinerea (Gmelin, 1791) f
Ovulidae
Cyphoma gibbosum (Linnaeus, 1758) f
Littorinidae
***Cenchritis muricatus* (Linnaeus, 1758) f**
Echinolittorina angustior (Mörch, 1876)
***Echinolittorina meleagris* (Potiez & Michaud, 1838)**
Echinolittorina tuberculata (Menke, 1828) f
Echinolittorina zicac (Gmelin, 1791) f
Naticidae
***Naticarius canrena* (Linnaeus, 1758) f**
***Natica livida* Pfeiffer, 1840**
Polinices lacteus (Guilding, 1834)
Rissoinidae

***Zebinella ?decussata* (Montague, 1803)**
"Rissoina" sp.
Schwartziella sp.
Tonnidae
Cypraecassis testiculus (Linnaeus, 1758) f
Semicassis cicatricosa (Gmelin, 1791) f
Tonna pennata (Mörch, 1852) f
Ranellidae
***Monoplex nicobaricum* (Röding, 1798) f**
Hipponicidae
***Cheilea equestris* (Linnaeus, 1758)**
***Cheilea striata* Nowell-Usticke, 1959**
Hipponix cf. *antiquatus* (Linnaeus, 1767)
***Hipponix* cf. *incurvus* (Gmelin, 1791)**
***Hipponix* cf. *subrufus* (Lamarck, 1819)**
Vanikoridae
***Vanikoro sulcatus* (d'Orbigny, 1842) f**
Triviidae
***Niveria quadripunctata* (Grey, 1827) f**
***Pusula pediculus* (Linnaeus, 1758) f**
***Niveria suffusa* (Grey, 1827) f**
Vermetidae
"Vermetid" sp.
***Dendropoma corrodens* (d'Orbigny, 1842)**
Epitoniidae
***Epitonium turritellula* (Mörch, 1875)**
***Opalia pumilo* (Mörch, 1875)**
Triphoridae
***Metaxia* sp.**
***Cosmotriphora melanura* (C. B. Adams, 1850)**
***Nototriphora ?decorata* (C. B. Adams, 1850)**
***"Triphora"* sp.**
Cerithiopsidae
"*Cerithiopsis*" sp.
Buccinidae
***Engina turbinella* (Kiener, 1836) f**
***Gemophos auritulus* (Link, 1807) f**
Gemophos tinctus (Conrad, 1846) f
Pisania pusio (Linnaeus, 1758) f
Colubrariidae
***Colubraria* sp. f**
Columbellidae
Columbella mercatoria (Linnaeus, 1758) f
***Conella ovulata* (Lamarck, 1822) f**
Nitidella nitida (Lamarck, 1822)
Rhombinella laevigata (Linnaeus, 1758) f M
***Suturoglypta* sp. j**
Fasciolariidae
Leucozonia nassa (Gmelin, 1791) f
***Leucozonia ocellata* (Gmelin, 1791) f**
***Pustulatirus virginensis* Abbott, 1958**
Nassariidae
***Nassarius ?antillarum* (d'Orbigny, 1847) f**
***Nassarius* cf. *albus* (Say, 1826) f**
Muricidae
Coralliophila caribaea Abbott, 1958
***Dermomurex* sp., cf. *D. alabastrum* (A. Adams, 1864) f**
***Muricopsis rosea* (Reeve, 1846) f**
***Stramonita rustica* (Lamarck, 1822) f**
***Morula nodulosa* (C. B. Adams, 1845)**
Costellariidae
***Vexillum dermestinum* (Lamarck, 1811)**
***Vexillum histrio* (Reeve, 1844) f**
***Vexillum moniliferum* (C. B. Adams, 1850) f**
***Vexillum exiguum* (C. B. Adams, 1845)**
Harpidae
Morum oniscus (Linnaeus, 1767) f
Marginellidae
***Volvarina avena* (Keiner, 1834) f**
Mitridae
***Mitra barbadensis* (Gmelin, 1791)**
Mitra nodulosa (Gmelin, 1791)
Olividae
Oliva reticularis Lamarck, 1791 f
Olivellidae
***Olivella exilis* (Marrat, 1871)**
Conidae
Conus mus Hwass in Bruguière, 1792
Conus regius Gmelin, 1791
Terebridae
Impages cinerea (Born, 1778)
***Hastula hastata* (Gmelin, 1791)**
Pseudomelatomidae
***Crassispira* sp. f**
Cancellariidae
***Tritonoharpa lanceolata* (Menke, 1828)**
Architectonicidae
***Heliacus cylindricus* (Gmelin, 1791) j**
Bullidae
Bulla striata Bruguière, 1792 j
Cylichnidae
***Acteocina* sp.**
Trimusculidae
***Trimusculus goesi* (Hubendick, 1946)**

BIVALVIA
Arcidae
Acar domingensis (Lamarck, 1819)
Arca imbricata (Bruguière, 1789)
Fugleria tenera (C.B. Adams, 1845)
Noetiidae

Arcopsis adamsi (Dall, 1886)
Glycymerididae
Glycymeris undata (Linnaeus, 1758)
Tucetona pectinata (Gmelin, 1791)
Mytilidae
***Botula fusca* (Gmelin, 1791)**
Isognomonidae
***Isognomon radiatus* (Anton, 1838)**
Ostreidae
Dendrostrea frons (Linnaeus, 1758)
Limidae
Ctenoides mitis (Lamarck, 1807)
Lima caribbaea d'Orbigny, 1853
***Limaria pellucida* (C. B. Adams, 1848)**
Pectinidae
***Antillipecten antillarum* (Récluz, 1853)**
***Caribachlamys ornata* (Lamarck, 1819)**
***Spathochlamys benedicti* (Verrill & Bush, 1897)**
Spondylidae
Spondylus tenuis Schreibers, 1793
Anomiidae
***Anomia simplex* d'Orbigny, 1853**
Lucinidae
***Cavilinga blanda* (Dall & Simpson 1901)**
Ctena orbiculata (Montagu, 1808)
Parvilucina costata (d'Orbigny, 1845)
Chamidae
Chama congregata Conrad, 1833
***Chama florida* Lamarck, 1819**
Chama sarda Reeve, 1847
***Pseudochama cristella* (Lamarck, 1819)**
Cardiidae
Laevicardium pictum (Ravenel, 1861)
Papyridea semisulcata (Gray, 1825)
Veneridae
***Chioneryx pygmaea* (Lamarck, 1818)**
***Tivela trigonella* (Lamarck, 1818)**
Transennella cubaniana (d'Orbigny, 1853)
Transennella gerrardi Abbott, 1958
Tellinidae
Arcopagia fausta (Pulteney, 1799)
Tellina radiata (Linnaeus, 1758)
***Tellinella listeri* (Röding, 1798)**
Semelidae
***Cumingia lamellosa* G. B. Sowerby I, 1833**
***Semele proficua* (Pulterney, 1799)**
Corbulidae
***Varicorbula limatula* (Conrad, 1846)**

POLYPLACOPHORA
Chitonidae
***Acanthopleura granulata* (Gmelin, 1791)**
***Chiton tuberculatus* Linnaeus, 1758 f**

SCAPHOPODA
Dentaliidae
***Graptacme eborea* Conrad, 1846**

Analysis

On the beach at Rendezvous Bay I found shells of 148 taxa of marine mollusks, the majority of which could be identified to species. More than half of these (87) were new for Montserrat: 68 gastropods, 16 bivalves, 2 chitons, and 1 scaphopod.

I found one 22.2 mm shell of *Cheilea striata* (Figures 2 & 3) in the beach drift on Rendezvouz Bay. In my experience this species is uncommon in drift in the Leeward Islands. There are several good images of material from Abaco, Bahamas, in Redfern (2013). Rosenberg (2009) lists it only from Abaco in the Bahamas and from St. Croix in the Virgin Islands; it is also recorded from Antigua in Zhang (2011). The Montserrat record is a slight range extension of 33 km southwest from Antigua.

In Hewitt (2011d) I reported finding one shell of *Fissurella barbouri* on Little Bay, Montserrat. In the Leeward Islands localities I have visited, this species is extremely uncommon in beach drift, as seems also to be the case in Abaco, Bahamas, where Redfern (2013) reported it as rare. Zhang (2011) listed it from the west coast of Antigua as "less common" and in direct personal communication on 12 June 2013, he described its occurrence as "rare". To my surprise, however, on Montserrat's Rendezvous Bay I was able to find 39 shells of *F. barbouri*, varying in size from 6.8 mm to 16 mm. As can be seen in Figure 4, the shell of this species is characterized by an orifice that is usually trilobate in outline; a large inner callus around the orifice which is normally all red; and (especially in juveniles) irregular reddish and/or blackish rays on the external surface. Two of the *F. barbouri* shells had an individual of the vermetid *Dendropoma corrodens* (d'Orbigny, 1841) on their outer surface.

One shell of *Epitonium turritellula* was found. This is a small (maximum recorded size 6.5 mm) and somewhat uncommon, high-spired wentletrap which has a range that stretches from Cuba to Venezuela (Rosenberg (2009) and Zhang (2011)).

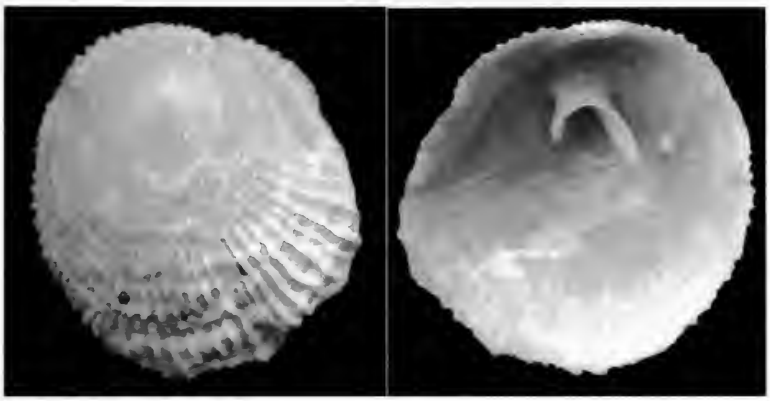

Figure 2. Outer surface, and Figure 3. inner surface, of a shell of *Cheilea striata*, 22.2 mm.

There are 15 named species of *Dermomurex* in the Western Atlantic, but most are very uncommon and not well represented in collections. When live-collected, they all have a soft outer shell layer known as intritacalx; in beach drift specimens this is however almost completely worn away. Underlying the intritacalx is a hard shell layer that is all-white in some species, but in others it is sometimes tinted with brown. On Rendezvous Bay I found one 11.2 mm piece of a shell of *Dermomurex*, which consists of one third of the body whorl of an adult shell, from the lip of the aperture to the preceding varix. Externally it is a pale orange-brown in color, darker on the varices, although the siphonal canal is white, as is the interior.

For comparison, in Figure 5, the fragment from Montserrat (5c) is shown alongside a whole shell of *D. alabastrum* found on Nevis in 2001 and a chipped fragment of what appears to be the same species found on Nevis in 2002 (5b & 5a, also shown in Hewitt 2003). The piece from Montserrat is a good deal more worn and sand-polished than the Nevis material, but nonetheless there is a strong resemblance in terms of proportions, coloring, and sculpture. Structural similarities include the three pronounced ridges on the lower part of the apertural varix, and the rounded buttress or "lobiform erect scale" (*squama lobiforma erecta*) at the suture line. The latter feature is mentioned in the type description by A. Adams (1864). However, the Montserrat fragment is a little less steeply shouldered than the Nevis shell, and the siphonal canal is shorter (possibly a result of being so beach-worn). On the advice of Roland Houart (personal e-mail communication, September 2013) I have listed the Montserrat fragment as *Dermomurex* sp. cf. *D. alabastrum*.

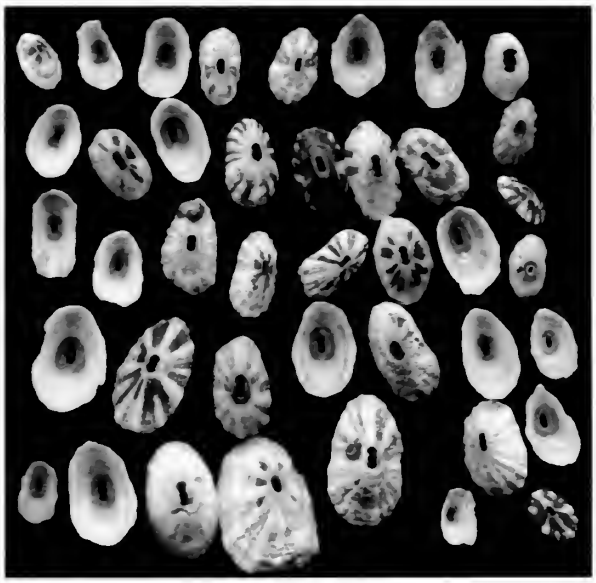

Figure 4. Shells of *Fissurella barbouri* from 6.8 mm to 16 mm in size.

In Hewitt 2012) I reported finding one valve of *Transennella cubaniana* on Montserrat at little Bay. On Rendezvous Bay I found another six valves of this small, often overlooked venerid. Figure 6 shows the markings on the exterior of the freshest two of these valves.

The genus *Hipponix* in the tropical Western Atlantic (from the perspective of a researcher in the more southerly parts of the faunal zone) is discussed in Simone (2002). Information about this genus within the Caribbean Sea is still somewhat lacking; in an e-mail communication in August 2013, Professor Luiz Simone

Figure 5. Left to right: 5a, fragment of *Dermomurex* from Nevis 2002; 5b, whole shell of *Dermomurex alabastrum* from Nevis, 2001, 5c, fragment of *Dermomurex* from Montserrat 2012.

Figure 6. Two valves of *Transennella cubaniana*, 8 mm in length.

of the Museu de Zoologia, Universidade de São Paulo, Brazil told me, "the geographic range of these northern hipponicids is rather unclear". On Montserrat's Rendezvous Bay in 2012 there were shells of three *Hipponix* species in the drift, although none had well-preserved protoconchs which would have made identification more certain. Figure 7 shows a group of shells, excluding a few larger white ones that are discussed in the next paragraph. Using this photograph, Luiz Simone said that these pink shells almost all appeared to be *Hipponix incurvus*, with the three flattest shells appearing to be *H. subrufus*.

Hipponix antiquatus (Linnaeus, 1767) is a species that was until recently considered to occur in both the Eastern Pacific and the Western Atlantic. The shell is relatively large and white, with a strong, irregular, concentric sculpture of scales, and almost no radial sculpture. In Hewitt (2012d) I listed *H. antiquatus* from Montserrat's Little Bay; I also found a few similar shells at Rendezvous Bay in 2012. Indeed, I have found what I assumed was *H. antiquatus* in all the other islands in the Lesser Antilles that I have visited. However, in Simone (2002), the author stated that *H. antiquatus* is restricted to the Eastern Pacific, and he named a similar-looking tropical Western Atlantic species *H. leptus* Simone, 2002.

In 2009, Rosenberg commented, "*H. antiquatus* was described without a type locality and so a neotype designate may be required to resolve the issue. Simone's *H. leptus* may prove to be the correct name for at least some Western Atlantic records of *H. antiquatus.*" Simone mentioned in his 2013 e-mail to me that *H. leptus* may possibly be restricted to Brazil. If it turns out that the range of *H. leptus* does not include the West Indies, then the appropriate name for the large white *Hipponix* which is present in that area is currently undecided. In this paper I have listed what I had previously called *H. antiquatus* as *Hipponix* cf. *antiquatus*. (I am sending some material of the various *Hipponix* that I have found in the Leeward Islands to the São Paulo museum at Luiz Simone's request.)

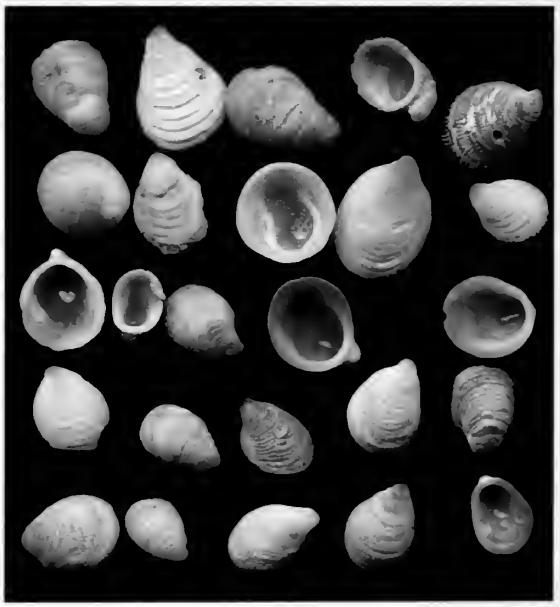

Figure 7. A group of *Hipponix* shells (maximum size 10 mm) from Rendezvous Bay, Montserrat. According to Simone, most are *H. incurvus*, the three flatter ones are *H. subrufus*.

Conclusions

Finding 148 taxa of marine mollusks during a two and a half hour search of beach drift in one locality

appears to reflect a rich biodiversity. The 87 taxa that are new records for Montserrat, added to the Rosenberg (2009) list of 14 species, plus the Hewitt (2012) list of 89 taxa found in 2011, brings the overall total for the island to 190. This is significant progress in assessing the marine mollusk fauna of Montserrat. I hope I will have an opportunity to make a third visit to the island and be able to expand the list further.

Acknowledgments

I thank Gerard Gray for providing the MoU; the staff of the Bank of Montserrat for generously offering me the dinghy ride back to Little Bay; and numerous other Montserratians for a very kindly greeting and farewell. Special thanks go to Professor Luiz Ricardo Lopes de Simone, Professor at the Museu de Zoologia, Universidade de São Paulo, Brazil, and to Roland Houart of the Museum national d'Histoire naturelle, Paris for information on *Hipponix* and *Dermomurex* respectively. Harry G. Lee helped with identification of several taxa, and Ed Subitzky gave invaluable assistance throughout the writing of this paper. The information from Gary Rosenberg's database Malacolog 4.1.1 is provided with the permission of the ANSP.

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