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

PROGRAM

Diving and Shelling in the Philippine Islands of Cebu and Batangas

Dave Mulliner, award-winning underwater photographer and staff photographer for *The Festivus,* will give a slide program on his recent trip to Cebu and Batangas. His slides will show many of the mollusks he found on the trip. Dave will also bring in a display of items from the Philippines.

Meeting date: January 18, 2001

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CLUB NEWS

Minutes of the
San Diego Shell Club Meeting - November 16, 2000

President Mike Mason opened the meeting at about 7:45 p.m. by welcoming everyone. The minutes of the October meeting were approved as published in *The Festivus*. Librarian Linda Hutsell announced that a copy of Daniel Geiger's dissertation and the new book on abalone will be available in the Club library in January. Carole Hertz reminded everyone of the need to send in the "blue sheet" if you wish to receive the new supplement.

A variety of shell-related items were available for sale at the back of the room and a variety of shells from the Marquesas belonging to John Jackson were displayed for viewing.

Members were reminded that the Christmas Party will be on December 2nd at the Admiral Kidd Club at 6 p.m. The price of the entire meal is $21.00.

Mike presented the slate of Club officers for 2001. It is: Kim Hutsell, President; Jules Hertz, Vice-president; Silvana Vollero, Recording Secretary; Monika Forner, Corresponding Secretary; and Linda Hutsell, Treasurer. There were no nominations from the floor. Carole made a motion to approve the slate and it passed unanimously. The new board will be installed at the Christmas Party.

George Kennedy announced that he has a friend who is looking for a copy of *American Seashells* (1974 edition). If anyone has one for sale, contact George.

Vice President Kim Hutsell introduced the speaker for the evening, Daniel Geiger, the abalone specialist. Daniel began by mentioning that his dissertation is available on CD as well as on the web, including the color plates. A new book called *A Conchological Iconograph of the Family Haliotidae* (selling for $80.00) will be published soon. Daniel's most recent work relates to the vetigastropods.

Daniel began his discussion of abalone by mentioning that there are not many abalone specimens found as fossils. There are three hypotheses about their point of origin: (1) the Pacific Rim (Japan, PI), (2) the Indo-Pacific, and (3) the Tethys Sea. He believes the second is the most likely although this is not necessarily where the oldest fossils are from. Taxonomy remains a problem. For example, is *H. diversicolor* the same or different from *H. squamata*? The abalone mapping project (Abmap) is found on the web. Anyone having information on interesting species is invited to fill out the information on line.

He took a recent trip to French Polynesia, a tropical paradise, and found many octopus, nudibranchs, cones, and limpets. Limpets are related to abalone. It is interesting to note that the radula of abalone are different in the juvenile and the adult within a species.

The winner of the door prize was Jules Hertz. The meeting was adjourned to enjoy the refreshments contributed by the Critchlows and Mike Mason.

Silvana Vollero

Dues are Due

Dues are now due. To be on the membership roster for 2001 and continue to receive *The Festivus*, dues must be received by the end of January.

In Memoriam
Roland Ruthledge Taylor and Kay Taylor

It has recently come to our attention that former longtime, active members, Roland and Kay Taylor had died. Roland died on July 25th 2000 at the age of 92 and his wife, Kay, passed away in 1999. Both Roland and Kay were members of the club for many years, both holding board positions and contributing to the Club in many ways.

COMMENTS ON FOUR MURICOIDEAN (MOLLUSCA) SPECIES FORMERLY ENDEMIC TO ISLA DEL COCO FOUND AT ISLA DE MALPELO

KIRSTIE L. KAISER [1]

Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road,
Santa Barbara, California 93105, USA
E-mail: KLKaiser@pvnet.com.mx

ABSTRACT: Four recently described muricoidean gastropods from Isla del Coco, Costa Rica [*Chicoreus (Phyllonotus) eversoni* (Myers, D'Attilio & Shasky, 1987); *Favartia cocosensis*, *Muricopsis westonensis* and *Coralliophila rocasuciae* all of Myers & D'Attilio, 1990], were collected live at Isla de Malpelo, Colombia. Those species are illustrated, and comments concerning habitat, depth and biogeographic affinities with other tropical eastern Pacific oceanic islands (Islas Revillagigedo, Île Clipperton, Isla del Coco and Islas Galápagos) are noted.

Volcanic in origin, Isla de Malpelo, Colombia (03° 51'N, 81° 35'W), is remote, barren and steep-sided. It lies 620 km ESE of Isla del Coco, Costa Rica (05° 33'N, 87°03'W), and approximately 435 km outside the continental shelf off the Colombian coast on a solitary submarine ridge. The Malpelo "archipelago" which has a NE orientation, is 2.5 km in length and consists of the central island with ten smaller islets located no further than 500 m from the north and south confines. Von Prahl (1990) reports extreme depths to near 4000 m occurring between the Malpelo and Cocos submarine Ridges, producing a significant biogeographic barrier in its relationship with other eastern Pacific oceanic islands.

During March-April 1998 and March 2000, I had the chance to investigate the secluded and rarely examined Isla de Malpelo. My visits resulted in the observation and collection of 26 of the 27 muricoidean species, 19 of which were previously unreported from the island (Table 1). The Malpelo molluscan fauna is most like that of the tropical eastern Pacific mainland. Its muricoidean fauna has its closest island biogeographic affinities with Isla del Coco. All but two of the species which occur at Malpelo have been found or have been previously recorded from Isla del Coco and five of the 27 (18.5%) are shared only with Cocos (Biolley, 1907; Hertlein & Strong, 1955; Montoya, 1983; Shasky, 1983, 1989, 1997; Everson, 1984; D'Attilio, Myers & Shasky, 1987; Myers & D'Attilio, 1990; Chaney, 1992; and Kaiser & Bryce, in prep.). Twenty-one of the 27 muricoidean species which are here recorded from Malpelo occur at Islas Galápagos (Kaiser, 1997). In the Islas Revillagigedo this number drops to 14 (Emerson, 1995; Reyes Bonilla, 1999). It is Île Clipperton (Kaiser, in prep.) which shares the least muricoidean affinities with only ten species (Table 1).

In 1987, D'Attilio, Myers and Shasky described *Chicoreus (Phyllonotus) eversoni,* and in 1990, Myers and D'Attilio described three additional muricoidean species from Isla del Coco: *Favartia cocosensis, Muricopsis westonensis* and *Coralliophila rocasuciae.* Until now, these four species were known only from Isla del Coco.

In March 2000, while SCUBA diving at minus 15 m a living specimen of *Chicoreus (P.) eversoni* (Figure 1) was collected from the clutches of an *Octopus hubbsorum* Berry, 1953. The octopus (approx. 50 cm in length) inhabited a den containing numerous empty shells, mostly *Hexaplex princeps* (Broderip, 1833), in the rocky, barnacle-covered seamount 200 m off the NE face of Malpelo. It is likely that the octopus brought the live *Chicoreus* up from deeper water,

[1] Paseo de las Conchas Chinas #115, Puerto Vallarta, Jalisco CP 48300, México.

as living specimens of *C. (P.) eversoni* have been found in bottom nets mostly at depths of 66-97 m at Isla del Coco. Their habitat is most likely sand and light rubble, according to the fauna and/or substrate that accompanied the *Chicoreus* in the nets at Cocos. The seamount (Tiger Mount) descends precipitously to 44 m before sloping down to sand and rubble.

The Malpelo specimen is 177 mm in height (protoconch absent) with a light pink aperture. The parietal wall and aperture of Isla del Coco specimens range from dark pink to one unusual white specimen (Paratype #14, live collected, K.L. Kaiser Collection), all with the distinctive lustrous brown to almost black coloration on the upper parietal callus.

The other three muricoideans were live collected on both the March-April 1998 and March 2000 expeditions. *Favartia cocosensis* (Figures 2, 3) seen occasionally in pairs, were in small niches on the under surfaces of rocks and dead coral. Because of their small size they were normally inadvertently collected in samples made by shaking rock and dead coral into a canvas collecting bag. Several specimens, the largest measuring 10.1 mm (decollate), were collected at depths of 11-27 m, similar to the habitats and depths that it occupies at Isla del Coco.

The most commonly observed of the four species, *Muricopsis westonensis* (Figure 4), was found living on the undersides of large, flat plated coral heads in depths of 11-30 m. There were as many as eight living individuals, under a single coral head at 21 m. *Muricopsis westonensis* was also encountered among colonies of live *Megabalanus peninsularis* (Pilsbry, 1916) at depths of 11-15 m. *Megabalanus* is an abundant barnacle that, in some areas, covers over half of the rock surfaces of the lower surge zone (7-15 m). *Muricopsis westonensis* has been observed living in much the same habitats and depths (10-33 m) at Isla del Coco. Their coloration appears to be the same as those at Isla del Coco but the size seems to generally run larger in the Malpelo individuals. The largest specimen, height 26.4 mm, width 14.5 mm, is a size record (Hutsell, Hutsell & Pisor, 1999). In studying the specimens from both islands, it was observed that while the younger specimens have short spines on the varices, the mature specimens tend to have more smoothly rounded spines that resemble nodes. It was also noted that all live collected specimens had a light violet tinge to the aperture that seems to fade with time.

Coralliophila rocasuciae were found at 8-30 m depth at Isla de Malpelo (Figure 5) and occupied a distinct habitat. They were normally found associated with the ahermatypic host coral *Astrangia tangolaensis* Durham, 1947, imbedded in, what seems to be, an unidentified encrusting sponge which lives attached to the under surfaces of rocks. The *C. rocasuciae* are well camouflaged; the shells are cryptically colored the same as the coral and are similar in size to the individual polyps. The *Astrangia* colony with sparsely placed polyps and encrusting sponge range in color from a pale yellow to a salmon hue. According to Stephen D. Cairns, this coral species has been reported before from Bahía Malaga, Colombia [Pacific] by von Prahl (1987). He noted that the specimen (Figure 6) appeared to be the first corallite that would subsequently form a small encrusting colony (pers. comm., S.D. Cairns).

Ponder (1998) notes that members of *Coralliophila* are characterized by lacking a radula and living on the exterior of corals. He states that there is little data on what coralliophilids are actually eating but they probably feed directly on the coral polyps. Morton (1989) describes this as a parasitic association in that there is an obligatory relationship between two species, one of which, the smaller, is metabolically dependent on the other—the host. It is not understood if the host coral receives any benefit but it may be that in an unusual case, the coral is able to colonize other areas by attaching itself to the mobile gastropod (Figure 6).

Myers & D'Attilio (1990) reported finding unattached egg capsules in the mantle cavity of *Coralliophila rocasuciae*. This was confirmed from several specimens that were collected at Malpelo. The transparent egg capsules of Malpelo specimens are 3.2 mm in diameter, and are the same flesh color as the aperture. At Isla del Coco, these animals have been reported from depths of 15-36 m. The largest Malpelo specimen is 11.6 mm, a size record (Hutsell, Hutsell & Pisor, 1999).

ACKNOWLEDGMENTS

Clay Bryce, Western Australian Museum, assisted with collecting in the field. Heinz Buchbinder, captain, *M/V Inzan Tiger*, handled the logistics. John E. McCosker, California Academy of Sciences, gave helpful suggestions in preparing the manuscript. Stephen D. Cairns, National Museum of Natural History, Smithsonian Institution, identified the coral species and F.G. Hochberg, Santa Barbara Museum of Natural History identified the *Octopus hubbsorum*.

Table 1 - Isla de Malpelo Muricoidean Species Found at Other Tropical Eastern Pacific Oceanic Islands Including New Distributional Records

Isla de Malpelo	Isla del Coco	Islas Galápagos	Islas Revillagigedo	Île Clipperton
**Aspella hastula*	x	x	---	---
**Chicoreus eversoni*	x	---	---	---
Hexaplex princeps	*x	x	*x	* x
**Muricopsis westonensis*	x	---	---	---
**Bizetiella micaela*	x	---	---	---
**Favartia cocosensis*	x	---	---	---
* *Favartia incisa*	*x	x	---	---
**Pterotyphis lowei lowei*	x	x	---	---
**Pascula rufonotata*	*x	x	*x	* x
Trachypollia lugubris	x	x	---	---
**Vitularia salebrosa*	*x	x	*x	---
**Mancinella speciosa*	x	x	x	x
**Mancinella triangularis*	x	x	---	---
Plicopurpura pansa	x	x	x	x
**Stramonita haemostoma*	x	x	x	x
Stramonita brevidentata	x	x	---	---
**Thais muricata*	x	x	---	---
Thais planospira	x	x	x	x
**Coralliophila macleani*	*x	---	x	---
Coralliophila neritoides	x	x	x	x
**Coralliophila rocasuciae*	x	---	---	---
**Coralliophila nux*	---	x	x	---
**Coralliophila parva*	*x	x	x	*x
Babelomurex costata	---	x	x	---
**Babelomurex hindsii*	*x	x	x	---
Quoyula madreporarum	*x	x	x	x
+*Reliquiaecava robillardi*	x	x	---	x

* New distributional record - currently housed in K.L. Kaiser Collection
+Record cited in von Prahl (1990) as *Coralliophila cumingii* [species not found by Kaiser]

David K. Mulliner photographed specimens in Figures 2 through 6. My sincere appreciation to all of them.

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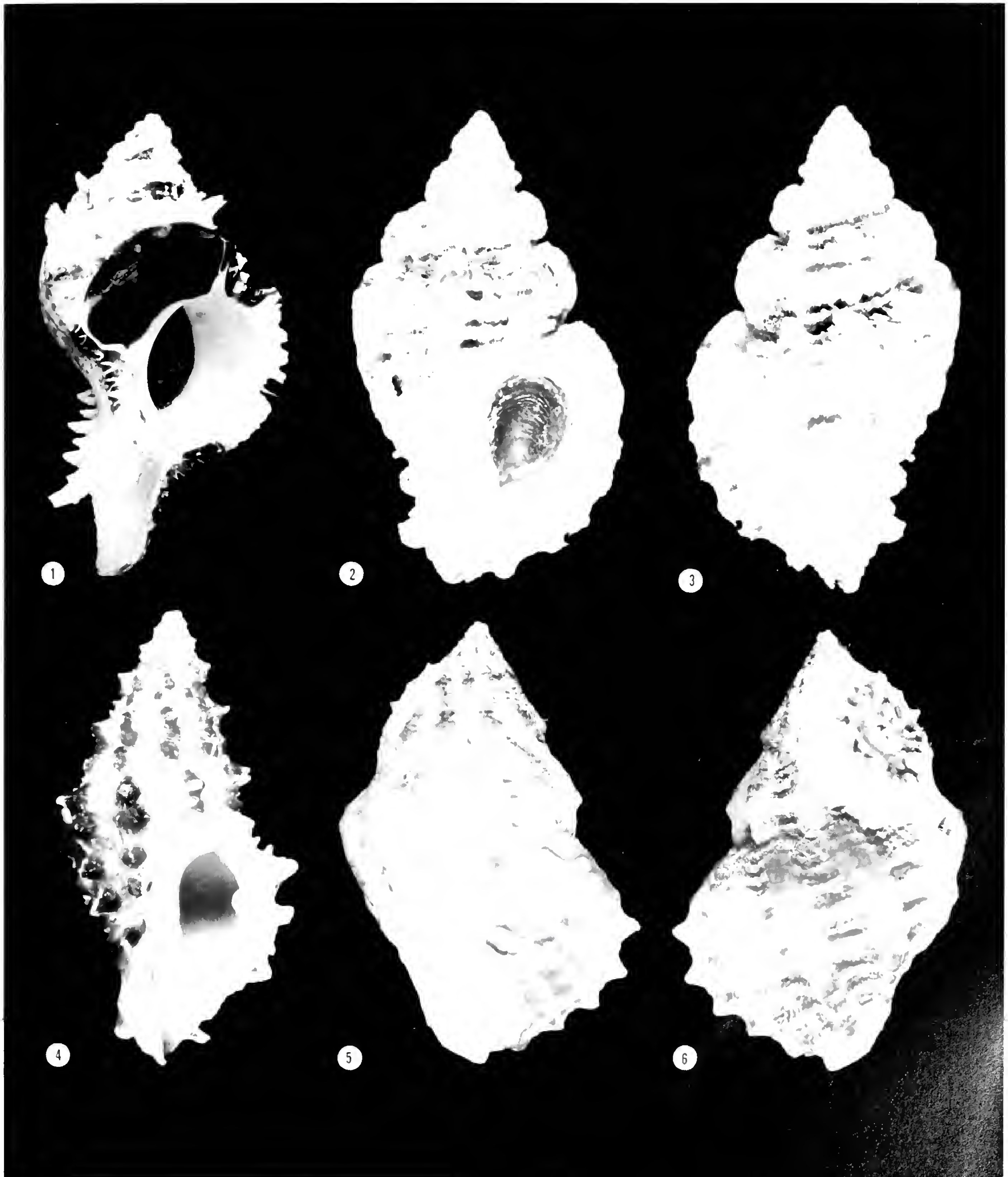
Figures 1-6. Fig. 1. *Chicoreus (Phyllonotus) eversoni* (D'Attilio, Myers & Shasky, 1987); H 177 mm, W 88 mm, live collected, Isla de Malpelo, Colombia, "Tiger Mount" (04°00.44'N, 81°36.09'W), 15 m, H_2O: 68-77°F, in octopus den, 9 March 2000. Leg. K.L. Kaiser. SBMNH 345477. Figs. 2, 3. *Favartia cocosensis* Myers & D'Attilio, 1990; 7.4 mm, live collected, Isla de Malpelo, Colombia, "Coral Gardens", NE end (04°00.226'N, 81°36.247'W), underside of rock, 12-15 m, H_2O: 82°F, 31 March 1998. Leg. K.L. Kaiser. SBMNH 345474, (2) apertural view (3) dorsal view. Fig. 4. *Muricopsis westonensis* Myers & D'Attilio, 1990; 23.2 mm (decollate), crabbed, Isla de Malpelo, Colombia, "Hammer Wall" (04°00.388'N, 81°36.209'W), under turnable rock on scree slope, in 11-20 m, H_2O: 68-77°F, 10 March 2000. Leg. K. L. Kaiser. SBMNH 345475. Figs. 5, 6. *Coralliophila rocasuciae* Myers & D'Attilio, 1990; 10.7 mm, live collected, Isla de Malpelo, Colombia, "Hammer Wall" (04°00.388'N, 81°36.209'W), under turnable rock on scree slope in 11-20 m, H_2O: 68-77°F, 10 March 2000. Leg. K. L. Kaiser. SBMNH 345476, (5) apertural view, (6) associated coral polyp of *Astrangia tangolaensis* Durham, 1947, attached to dorsum of same *C. rocasuciae* specimen shown in Figure 5. Photos 2 through 6: D.K. Mulliner. →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RE-IDENTIFICATION OF TERRESTRIAL SLUGS FROM SEABIRD NESTING BURROWS OFF THE WEST COAST OF VANCOUVER ISLAND

ROBERT G. FORSYTH[1]

Volunteer, Royal British Columbia Museum,
675 Belleville Street, Victoria, British Columbia, Canada V8W 9W2
E-mail: robert_forsyth@telus.net

Abstract: Two species of terrestrial slugs were collected from driftwood and the nesting burrows of Leach's storm-petrels, *Oceanodroma leucorhoa* (Vieillot, 1818), on a small island off the west coast of Vancouver Island in the late 1960s. The species were identified and published as *Ariolimax columbianus* (Gould, 1851) and *Deroceras reticulatum* (Müller, 1774). However, based on external morphology and anatomy of preserved material and remarks on the pigmentation of the living animal, the record is re-identified as *Prophysaon foliolatum* (Gould, 1851). Although incorrectly determined, the original observations of *P. foliolatum* from storm-petrel burrows are noteworthy because of the unusual slug-bird association and habitat.

In 1967 a preliminary biological survey was made at Cleland Island, Clayoquot Sound, off the west central coast of Vancouver Island, British Columbia (ca. 49°10'N, 126°05'W). The survey's emphasis was on bird banding and seabird breeding populations, but non-avian fauna were observed and collected at the same time, including the discovery of terrestrial slugs in the nesting burrows of Leach's storm-petrels, *Oceanodroma leucorhoa* (Vieillot, 1818). Two species of slugs were encountered and originally identified as *Ariolimax columbianus* (Gould, 1851) and *Deroceras reticulatum* (Müller, 1774) (Campbell & Stirling 1968).

Contained in the Invertebrate Collection of the Royal British Columbia Museum (Victoria) are specimens of Cleland Island slugs collected by Campbell. The accompanying label clearly indicates that these specimens were from storm-petrel burrows. The lot (RBCM 990-0815-001), consisting of 6 specimens, was labeled *Ariolimax columbianus* but contained a mixture of two species: *Ariolimax columbianus* (3 specimens) and a *Prophysaon* species (3 specimens), the latter re-cataloged as RBCM 990-0815-004. No specimens of *Deroceras reticulatum* from Cleland Island were found. I suspect that this species was not present on Cleland Island and that *Prophysaon* was misidentified. Campbell acknowledges that the identification was likely wrong (personal communication, 9 July 2000).

The moderately contracted specimens of *Prophysaon* measure 22 mm, 30 mm, and 32 mm in length. The smallest of the three specimens lacks its tail, but otherwise the constriction at the site of self-amputation of the tail is evident. Pigmentation of the skin has mostly faded, but in one specimen (22 mm) there are 2 lateral "bands" on the mantle formed by an irregular series of dark speckles. A rather broad, pale dorsal stripe on the tail is evident in two specimens (22 mm and 32 mm). Where present, the portion of the tail posterior to the constriction is slightly paler than the body anterior to the constriction — a change in pigmentation at the constriction is evident in living examples of *P. foliolatum*. The body "reticulations" appear rather coarse but scarcely pigmented on the preserved specimens.

I dissected one specimen (32 mm). A very long epiphallus, and its abruptly cylindrical anterior portion, indicates the subgenus *Prophysaon* sensu stricto. The relative length and curved form of the cylindrical

[1]Mailing address: 2574 Graham Street, Victoria, British Columbia, Canada V8T 3Y7

section of the epiphallus suggests *P. foliolatum*, rather than *P. andersoni* (J. G. Cooper, 1872). The remark by Campbell & Stirling (1968) that "*Deroceras reticulatum*" was yellow further supports re-identification of these as *P. foliolatum*.

While *Deroceras reticulatum* is a particularly widespread, common introduced European species in British Columbia, it remains rather closely associated with humans, and its presence on Cleland Island — ca. 13 km northeast of Tofino, off the west coast of Vancouver Island — would therefore seem unlikely.

Pilsbry (1948) did not record *Prophysaon foliolatum* from the province, and it seems that the Cleland Island record of the species is likely the first from British Columbia. Cameron (1986) found the species from several localities in southwestern British Columbia, but it is now more generally known from many places along the British Columbia coast (unpublished data).

There are no trees on Cleland Island, and most of the island is bare rock outcroppings. Slugs were observed and collected near the approximate center of the island in the main petrel colony. The area has scattered driftwood throughout this area, presumably deposited throughout the island by winter storms. Campbell & Stirling (1968) noted a number of plant species in the storm-petrel colony: Douglas' aster, *Aster subspicatus* Nees; Cooley's hedge-nettle, *Stachys cooleyae* Heller; dunegrass, *Elymus mollis* Trin.; small-flowered alumroot, *Heuchera micrantha* Dougl.; and cow-parsnip, *Heracleum lanatum* Michx. Campbell et al. (1990:204, fig. 198) have published a photograph of the site. There are few published details of the microhabitat of *Prophysaon foliolatum*. Branson (1977) associated this species with skunk cabbage, *Lysichiton americanum* Hultén & St. John. On Vancouver Island, *P. foliolatum* was observed in humid forests on skunk cabbage, devil's club [*Oplopanax horridus* (J. E. Smith) Miq.], other vegetation, logs and the surface of the ground (unpublished data).

Campbell & Stirling (1968) speculated that the slugs' presence in the burrows of storm-petrels may cause bird deaths. They noted up to 13 slugs (both *Ariolimax columbianus* and *Prophysaon foliolatum*) living in a single burrow and suggested that slug mucus may make flight impossible for an inflicted bird.

Re-identification of the slugs of Cleland Island adds an unusual, additional habitat and bird-slug association for *P. foliolatum*.

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Corrections: In Norrid [*The Festivus* 32(11): 151], Dr. Eugene V. Coan advised that the species from El Golfo de Santa Clara, Sonora, published as *Diplodonta cornea* (Reeve, 1850) is *D. sericata* (Reeve, 1850).

In Skoglund [*The Festivus* 32(11): 149] Dr. José Leal corrected the published number (15001) for the *Raeta* valves in the Bailey-Matthews Shell Museum to 15013.

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

PROGRAM

Critter Love

Lynn Funkhouser, internationally published photographer, author, lecturer, environmentalist and leader in dive travel, will present her slide program on underwater critters from the Komodo Islands, Bali and the Philippine Islands.

Lynn has photographed the Shell Desk Diary for 1988 and the past six years and the shell calendars for three years. She will have calendars and diaries with her.

Meeting date: February 15, 2001

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting - January 18, 2001

President Kim Hutsell called the meeting to order at 7:45 p.m. and welcomed everyone to the first meeting of the new millennium. He mentioned that the Club has been in existence for 40 years and *The Festivus* is celebrating entering its 32nd year of publication. The minutes of the November meeting were approved as published in *The Festivus*. Vice President Jules Hertz announced the speakers for future meetings. They include Lynn Funkhouser, February; Travis Smith, March and Larry Lovell, May. The auction will be on April 21st [see col. 2]. Treasurer Linda Hutsell gave a brief treasurer's report and Corresponding Secretary Monika Forner reported that she had answered recent inquiries.

Carole Hertz announced that Carol Skoglund would autograph copies of her new book. Carol Skoglund announced that member Charlotte Norrid in Tempe, Arizona is interested in selling her nearly new 12 ft. boat and 15 hp motor. [For further information, e-mail Charlotte at: hcnorrid2@aol.com].

Eric Hochberg, from the Santa Barbara Museum of Natural History, was in attendance with Kotaro Tsuchiya from Japan, currently at the SBMNH. They brought a copy of the beautiful new *Marine Mollusks in Japan* edited by Takashi Okutani to share with the membership. It contains over 5000 species and has synopses in English. It is offered to Club members at a 20% discount [For further information contact Dr. Tsuchiya at: ktsuchiya@sbnature1.org]. Next, John Jackson presented information on the 3-volume set of *Corals of the World* by JEN Veron which contains 60-70 newly named species. John very generously donated a copy of the exquisite set to the Club and offered a 50% discount to Club members. [For further information contact John at odyssey@adnc.com].

Kim passed sign-up sheets for refreshments and for volunteers for publicity, host and telephone committee.

Jules introduced the speaker for the evening, Dave Mulliner, who has been a Club member for 35 years and is *The Festivus* photographer. Dave spoke about his May trip to the Philippines focusing on the variety of the underwater sea life. He reported that some coral reefs that were dynamited five years ago are beginning to grow back which is encouraging news. He also said there are over 450 species of nudibranchs in the areas and less than half have been scientifically named. His photography illustrated the spectacular ocean life and his presentation was greatly enjoyed by all.

The winner of the shell drawing was Carol Skoglund. Linda and Kim Hutsell and Silvana Vollero provided the refreshments. The meeting was adjourned to enjoy the shell displays by Dave and Ron Deems, the refreshments, peruse the books on sale and in the library and visit with friends.

Silvana Vollero

The Annual Christmas Party - 2000

The Christmas Party was great. Members and guests attended in their holiday best, the tables were decorated with colorful poinsettias and the gift table tantalized with colorful wrap hiding the shells within.

Master of Ceremonies, Carole Hertz, welcomed everyone and reminded members that the Club was entering its 40th year and *The Festivus* beginning its 32nd year of continuous, on-time publication.

After a delicious dinner, some funny stories, and the acknowledging of those who made significant contributions to the Club in the past year (in addition to the Club board); the new executive board was installed. President Kim Hutsell accepted the rosewood gavel and the plaque listing the Club's charter members, one of whom, Billee Gerrodette, was in attendance.

A delightful program by Mike Miller, with beautiful slides of nudibranchs taken on his recent trip to Bali, was enjoyed by all. This was followed by the traditional gift exchange — exciting for everyone.

It was a warm, fun-filled evening — a great way to begin the holiday season.

The Annual Auction-Potluck

Save the date. The annual auction/potluck will be held on Saturday evening, April 21st.

It is not too early to prepare your donations for the auction. Without the support of members and friends the auction would not be a success. So look into your cabinets and be generous.

Bring your donations to a Club meeting or contact a board member and arrange for pickup.

RANGE EXTENSION FOR *CYPRAEA SPADICEA* SWAINSON, 1823

JOHN JACKSON

11558 Rolling Hills Drive, El Cajon, California 92020, USA

In May 1998, I was a passenger on a motor yacht on a slow trip from San Diego, California, to Cabo San Lucas, at the tip of the Baja California Sur peninsula, México. I would be able to do some diving, sampling a variety of underwater habitats, as we traveled from the temperate waters of southern California through the transition zone to the semi-tropical waters of Cabo San Lucas.

I was particularly interested in locating *Cypraea spadicea* Swainson, 1823, as we traveled down the west coast of Baja. The boat captain, an avid diver with good knowledge of these areas, had told me of one particular offshore pinnacle below Sacramento Reef populated by "thousands" of *C. spadicea* with "handfulls" in every nook and cranny. We would reach this spot on May 24th about midday, a good time to dive.

About 1:00 p.m., we dropped anchor on our dive site about six miles offshore from Punta Canoas (29°21'N, 115°17'W). The water was cold (58°F) and dirty because of wind and rough sea conditions. The pinnacle came up from about 35 meters to within 10 meters of the surface. The habitat looked extremely good, but to my surprise there was not a cowrie to be found alive or dead although I searched as deep as 30 meters! Since a recent El Niño event had caused water in the area to reach temperatures of 80°F or more, we speculated that the cowries had moved to deeper, cooler water. Had the high El Niño temperatures killed off the population, we would have found empty shells in the area.

We continued down the coast, south to our next stop (on May 25th) about 130 miles past Isla Cedros and Isla San Benito, the previously-reported southernmost range of *C. spadicea* (McLean, 1978: 39; Burgess, 1985: 106; and Abbott, 1974: 150). This stop was about three miles south of Isla Asunción, located in the northwest part of Bahía Asunción (27°06'N, 114°18'W). We dove on a high spot that rose to within 20 meters of the surface, a beautiful reef with many big rock formations that had crevices and gutters with turnable rocks. On my dive to 30 meters, I collected three specimens of *C. spadicea*, all in good fresh-dead condition. One of these, a typical shell measuring 53.1 x 30.8 mm, is currently in the collection of the Santa Barbara Museum of Natural History (SBMNH 34570). An interesting note is that I also collected a specimen of *Cypraea arabicula* (Lamarck, 1810) on this dive.

We continued down the coast of Baja that night, arriving about 8:00 a.m. the next day (Tuesday, May 26th) at a very isolated location known as the "13 Fathom Spot" on "The Ridge," a bank about 25 miles offshore of the extreme northern end of Bahía Magdalena. The "13 Fathom Spot" is about 300 miles south of the Isla Cedros and Isla San Benito area and 190 miles north of the tip of Baja (24°56'N, 112°35.5'W). Although the sea was rough, there was no current and we were able to dive in 67°F water with 50-foot plus visibility. This is an exceptional area to dive, with curious and plentiful numbers of both tropical and temperate fish species, including the beautiful Clarion Angelfish, as dive companions near the bottom.

As the name of the area implies, the rocks on the bottom come up to a depth of about 13 fathoms or 26 meters. Most of my dive, however, was from 30 to 35 meters deep. I collected several species of *Conus*, including *C. bartschi* Hanna & Strong, 1949; *C. californicus* Reeve, 1844; *C. fergusoni* Sowerby, 1873; *C. nux* Broderip, 1833, and *C. purpurascens* Sowerby, 1833. I also collected *Cypraea annettae* Dall, 1909, and *C. albuginosa* Gray, 1825. And to my surprise, I collected a very dead, single specimen of *C. spadicea*.

Although dead, the *C. spadicea* specimen represents a significant range extension for the species, extending its distribution to the south by some 300 miles from that previously reported. My specimen measures 42.7 x 24.7 mm and is now in the collection of the Sanata Barbara Museum of Natural History (SBMNH 345469).

It is interesting to note that the most recent reference book on cowries, Lorenz Jr. & Hubert (1993: 119), states that *Cypraea spadicea* is the "...only cowrie species found in its area of distribution..." However, in both my Isla Asunción and "13 Fathom Spot" dive locations, other *Cypraea* species were also collected. What Lorenz and Hubert have to say about the species' exclusivity may be true in the main part of its range, but is not the case in its new southern geographic extension.

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LOW TIDES FOR 2001 IN SAN FELIPE, BAJA CALIFORNIA, MÉXICO

The entries below show periods of low tides of -3.50 feet and below. The times of low tides are given in Pacific Standard Time, except those dates marked with an asterisk are in Pacific Daylight Time. To correct for Puerto Peñasco add one hour to listed times when they are in Pacific Standard Time. Tides below the midriff of the Gulf cannot be estimated using these entries. All entries are approximate times and tides.

Mar. 7	7:14 pm	-4.61 ft	June 23*	10:23 am	-3.92 ft	Sept. 18*	9:47 am	-4.77 ft
Mar. 8	7:55 pm	-5.45 ft	July 20*	8:49 am	-4.85 ft	Oct. 15*	8:12 am	-4.16 ft
Mar. 9	8:34 pm	-5.40 ft	July 21*	9:33 am	-5.18 ft	Oct. 15*	8:12 am	-4.16 ft
Mar. 10	9:11 pm	-4.50 ft	July 22*	10:18 am	-4.79 ft	Oct. 15*	8:34 pm	-4.38 ft
Apr. 6	8:39 pm*	-4.20 ft	Aug. 17*	7:57 am	-4.10 ft	Oct. 16*	8:51 am	-4.16 ft
Apr. 7	9:01 am*	-4.01 ft	Aug. 18*	8:41 am	-5.29 ft	Oct 16*	9:07 pm	-4.79 ft
Apr. 7	9:16 pm*	-3.98 ft	Aug. 19*	9:23 am	-5.70 ft	Oct. 17*	9:40 pm	-4.49 ft
Apr. 8	9:33 am*	-4.20 ft	Aug. 20*	10:05 am	-5.23 ft	Nov. 13	7:11 pm	-4.33 ft
May 7*	9:06 am	-3.93 ft	Aug. 21*	10:47 am	-3.91 ft	Nov.14	7:44 pm	-4.62 ft.
May 22*	8:35 am	-3.58 ft	Sept. 15*	7:46 am	-4:08 ft	Nov. 15	8:16 pm	-4.29 ft
May 23*	9:09 am	-3.97 ft	Sept. 16*	8:28 am	-5.20 ft	Dec.29	7:40 pm	-4.05 ft
June 21*	8:57 am	-4.37 ft	Sept. 17*	9:08 am	-5.44 ft	Dec. 30	8:19 pm	-4.47 ft
June 22*	9:39 am	-4.44 ft	Sept. 17*	9:33 pm	-4.06 ft	Dec.31	9:00 pm	-4.34 ft

NOTE CONCERNING THE DISTRIBUTION OF *TELLINELLA ASPERRIMA* IN THE RED SEA

HENK K. MIENIS

National Mollusc Collection, Berman Building, Department of Evolution, Systematics & Ecology
Hebrew University, IL-91904 Jerusalem, Israel
and
National Mollusc Collection, Department of Zoology, the George S. Wise Faculty of Life Sciences
Tel Aviv University, IL-69978 Tel Aviv, Israel
E-mail: mienis@netzer.org.il & mienis@hotmail.com

Abstract: The first live collected specimens of *Tellinella asperrima* (Hanley, 1844) are reported from the Red Sea. This species is now known in the Eritrean region from three widely separated areas: the Gulf of Aqaba, the Gulf of Suez and the southern part of the Red Sea proper.

Key words: Mollusca, Bivalvia, Tellinidae, *Tellinella asperrima,* distribution, Red Sea.

The Very Rough Tellin, *Tellinella asperrima* (Hanley, 1844), is without doubt one of the loveliest tellinid bivalves occurring in the Red Sea (Oliver, 1992, pl. 33, figs. 6a, 6b). It seems to be a very rare species in the Eritrean region. Oliver (1992: 149) referred only to the find of a single damaged valve by the Dollfuss Expedition to the Red Sea in 1928. This same fragment has been reported previously by Lamy (1938: 33) from Station XVII in the Gulf of Suez.

A study of the Tellinidae present in the National Mollusc Collections of the Hebrew University of Jerusalem (HUJ) and the Tel Aviv University (TAU) revealed the presence of several complete specimens. According to these data, *Tellinella asperrima* is now known at least from the following localities in the Red Sea:

GULF OF AQABA: Israel, Elat, leg. I. Paperna, 1961 (HUJ 84411/1); Elat, leg. A. Hadar, 1948-1968 (TAU)/2).

GULF OF SUEZ: Egypt, at 33°23'-33°24'E; 28°14'N, dredged in 27-29.5 m (Lamy, 1938:33).

RED SEA (proper): Eritrea, Dahlak Archipelago, between Camping Bay on Museri Island and Ras Shoke on Dahlak Kebir Island, 27-36 m, 1965.10.19 (TAU/1 = ISRSE 65/1389).

It can thus be expected throughout the entire Red Sea.

Just outside the Eritrean region, i.e. in the region of the Gulf of Aden, it has been found in Pleistocene deposits in Djijbouti, Ravin de Baghenda (Abrard, 1942:42, pl. 5, fig. 1). Elsewhere it is known from various localities throughout the Indian Ocean and in the western part of the Pacific Ocean: Madagascar (Bertin, 1878), Réunion/Mauritius (Drivas & Jay, 1988), the Philippines (type locality), Indonesia (Prashad, 1932), Western Australia (Lamprell & Whitehead, 1992). However, nowhere does it seem to be a common species.

Figure 1. *Tellinella asperrima* (Hanley, 1844), copy of figure in Hanley, 1846, pl. 60, fig. 135.

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ANNOUNCEMENT OF THE SUPPLEMENT TO VOLUME 32 OF *THE FESTIVUS*

The Festivus is proud to announce its publication of:

Panamic Province Molluscan Literature:
Additions and Changes from 1971 through 2000
I. Bivalvia II. Polyplacophora

This supplement to *The Festivus* by Carol Skoglund updates the bivalve and chiton sections in A. Myra Keen's (1971) *Sea Shells of Tropical West America: Marine Mollusks from Baja California to Peru*, Second edition. The spiral-bound work of over 145 pages includes all the information in Skoglund's (1991) *Additions to the Panamic Province Bivalve (Mollusca) Literature 1971 to 1990* and her (1989) *Additions to the Panamic Province Chiton Literature -1971 through 1988.*

This supplement to Volume 32 of *The Festivus* is now available for purchase. The cost within the United States is $22 postpaid. For overseas (surface mail) the price is $25 postpaid and for overseas (air mail) the cost is $30 postpaid.

For those interested, make checks payable to: The San Diego Shell Club, c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111, USA. For overseas purchases, please send your check on a US bank or US postal money order made out to The San Diego Shell Club.

For further information e-mail: cmhertz@pacbell.net or write to *The Festivus* at the above address.

In Memoriam
Harold "Hal" Norrid
1917-2001

SHELLS FOUND IN OCTOPUS-OCCUPIED BEER BOTTLES

ROLAND C. ANDERSON

The Seattle Aquarium, 1483 Alaskan Way
Seattle, Washington 98101, USA

One would not expect to find shells inside cast-off beer bottles, but that is exactly where I found a number of interesting shells recently while diving in Puget Sound (Washington State) (Figure 1). Red octopuses (*Octopus rubescens* Berry, 1953) are frequently found in beer bottles (Anderson, 1994). During a routine collection of a red octopus and evicting it from its beer bottle home at the Aquarium by holding it upside down over a bucket of sea water, I noticed the shells of a number of small gastropods and other shells inside the bottle. These were all dead and cleaned out, with no flesh remaining inside. On the basis of this casual observation, I began a study with some colleagues of whether the red octopuses were eating these shellfish, whether they were leaving the shells in their beer bottle dens, what species they were eating and what type of beer bottles they preferred.

On the basis of that study (Anderson, et al., 1999) we determined that red octopuses in Puget Sound preferred stubby, brown beer bottles that were overgrown with barnacles or sea anemones. We confirmed by looking at octopus-occupied bottles and comparing them with unoccupied bottles that the octopuses were eating small gastropods, bivalves, chitons, crabs and possibly barnacles (Table 1) and were leaving the shells in their bottles. Both the absolute numbers of shells and the numbers of species were statistically different between occupied and unoccupied bottles. While some of this material is from that paper, the emphasis here is on the shells and some is unpublished data from that study.

The octopuses were mainly eating *Olivella baetica* Carpenter, 1864, *Astyris gausapata* (Gould, 1850), *Nassarius mendicus* (Gould, 1850), and possibly *Balanus crenatus* Bruguière, 1789, but many other species were also found in the beer bottles, some of which were somewhat rare and others were quite attractive (Figures 2-5). As a control it was confirmed at the Aquarium that the octopuses were eating these gastropods and leaving the shells in their bottle dens.

Figure 1. The author places an overgrown beer bottle with a red octopus in it into a plastic bag for examination of the shells left in the bottle.

As some of the bottles found at the study site were more than 100 years old (see Anderson, 1995, for bottle aging techniques), the question arose as to why the bottles didn't fill with cast-off eaten shells over the years. There are two possible reasons this might not occur. First, octopuses are known to clean out new den sites (Yarnall, 1969). The other is that the shells decompose over time. To test this latter hypothesis I put cleaned *O. baetica* and *A. gausapata* shells from live animals into a beer bottle and left it in running sea water for six months. At the end of that period, many of the shells of both species were considerably eroded when examined under a dissecting microscope. I didn't weigh the shells before and after; this would have confirmed their decomposition more rigorously.

While this study (Anderson *et al.*, 1999) proved that beer bottles were an important den resource for red octopuses and determined what they were eating, several questions arose that remain to be answered. These may be suitable subjects for future research. It was suggested by this study and also by Nixon and Maconnaghie (1988) that octopuses may eat barnacles. This needs to be confirmed. The distance of foraging of *O. rubescens* and length of time of residency in each den needs to be studied, and shell decay in sea water needs to be looked at.

I want to acknowledge the assistance of my colleagues in Anderson *et al.*, 1999: Jennifer A. Mather, Craig W. Steele and Paul D. Hughes. Ronald L. Shimek provided invaluable assistance in identifying some of the shells and Tom Rice clarified the current nomenclature of the naticids. Numerous Seattle Aquarium divers aided me in collecting octopuses and their beer bottle dens. Dave Mulliner took the excellent photographs of the shells.

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Figure 2. *Olivella baetica* Carpenter, 1864. This was the most common gastropod found in octopus-occupied bottles. Photo: D. K. Mulliner.

Figure 3. *Astyris gausapata* (Gould, 1850). This can easily be confused with *Alia carinata* (Hinds, 1844) but lacks the shoulder on the body whorl and is found in somewhat deeper water than *A. carinata* (Ronald L. Shimek, pers. comm.). Photo: D.K. Mulliner.

Table 1. Molluscan and Crustacean Prey Found in Octopus-Occupied Beer Bottles.

Gastropods	*Astyris gausapata* (Gould, 1850)
	Calyptraea fastigiata Gould, 1846
	Balcis micans (Carpenter, 1864)
	Kurtziella crebricostata (Carpenter, 1864)
	Nassarius mendicus (Gould, 1850)
	Cryptonatica affinis (Gmelin, 1791)
	Odostomia sp.
	Olivella baetica Carpenter, 1864
	Euspira lewisii (Gould, 1847)
Bivalves	*Chlamys hastata* (Sowerby, 1842)
	Clinocardium nuttallii (Conrad, 1837)
	Lucinoma annulatum (Reeve, 1850)
	Macoma nasuta (Conrad, 1837)
	Pododesmus macrochisma (Deshayes,1839)
	Protothaca staminea (Conrad, 1837)
	Simomactra falcata (Gould, 1850)
Chiton	*Mopalia muscosa* (Gould, 1846)
Crustaceans	*Balanus crenatus* Bruguière, 1789
	Cancer oregonensis (Dana, 1852)

Figure 4. *Balcis micans* (Carpenter, 1864). This beautiful little shell was rare in bottles and on the substrate but can sometimes be found parasitizing giant sea cucumbers. Photo: D.K. Mulliner.

Figure 5. *Kurtziella crebricostata* (Carpenter 1864). This elegant shell is rare everywhere but the octopuses had no trouble finding them. Photo: D.K. Mulliner.

SAN DIEGO SHELL CLUB
Membership List - 2001

ADAMS, ROSEMARY,1206 Red Jade Ct., Henderson, NV 89014, (702) 435-9660
ALBI, YVONNE, P.O. Box 45828, Los Angeles, CA 90045, E-mail: holaster@aol.com
AMERICAN MUSEUM OF NATURAL HISTORY, Serials Unit, Library, Central Park West at 79th St., New York, NY 10024, (212) 769-5714
ANDERSON, ROLAND, 2000 Minor E. #8, Seattle, WA 98102, (206) 329-5815, E-mail: roland.anderson@ci.seattle.wa.us
ARNOLD, TERRY, 2975 B St., San Diego, CA 92102, (619) 235-8181, FAX (619) 235-0016, E-mail: tarnold@computer.org
BIELER, RÜDIGER, Field Museum of Natural History, Dept. of Zoology, 1400 S. Lake Shore Dr., Chicago, IL 60605, (312) 665-7720, E-mail: bieler@fmnh.org
BISHOP, JOHN A., 3026 Freeman, San Diego, CA 92106, (619) 223-6038, E-mail: jandebishop@home.com
BISHOP MUSEUM LIBRARY, 1525 Bernice St., Honolulu, HI 96817-2704
BOYD, EDWARD & PATRICIA, 18218 Paradise Mountain no. 197, Valley Center, CA 92082-7000, (760) 749-9033, E-mail: patsyboyd@webtv
BRADNER, HUGH & MARGE, La Jolla Village Towers, 8515 Costa Verde Blvd. #110, San Diego, CA 92122, (858) 646-7525, FAX (858) 646-7524, E-mail: hbradner@ucsd.edu
BRATCHER-CRITCHLOW, TWILA & TOM, 939 Coast Blvd. #15H, La Jolla, CA 92037, (858) 456-7241
BROWN, CHRIS, 4575 N. Ave. del Cazador, Tucson, AZ 85718, (520) 297-2521, E-mail: flashcove@mindspring.com
BURCH, TOM & BEATRICE, P. O. Box 309, Kailua, HI, 96734, (808) 261-7465, FAX (808) 263-6408, E-mail: taburch@gte.net
CADIEN, DONALD B., 2425 E. 5th Street No. 10, Long Beach, CA 90814, (562) 433-4116, E-mail: dcadien@lacsd.org and dcadien@mindspring.com
CARR, WALTER E. JR, 2043 Mohawk Dr., Pleasant Hill, CA 94523, (925) 938-2251, FAX (925) 934-4683, E-mail: terrycarr@home.com
CHANEY, BARBARA, 1633 Posilipo Lane, Santa Barbara, CA 93108, (805) 969-1434
CHANEY, HENRY W., 1701 La Vista Grande, Santa Barbara, CA 93103, (805) 682-4711 ext. 334 (work), FAX (805) 963-9679 (home), E-mail: hchaney@sbnature2.org (work)
CHIPPEAUX, EDITH & HARRY, 1308 Biltmore Dr., Fort Myers, FL 33901-8710
CLARK, ROGER, 1839 Arthur St., Klamath Falls, OR 97603-4617, (541) 883-7582, E-mail: insignis@cdsnet.net
CLOVER, PHILLIP W., P.O. Box 339, Glen Ellen, CA 95442, Phone/FAX (707) 996-6960
COAN, EUGENE V., 891 San Jude Ave., Palo Alto, CA 94306-2640, (650) 493-8202 (home), (415) 977-5681 (work), FAX (415) 977-5790, E-mail: gene.coan@sierraclub.org
COOK, BUNNIE & GEORGE, 1120 Makaiwa St., Honolulu, HI 96816, (808) 737-8050, E-mail: g.-b.cook@juno.com
COOVERT, GARY & HOLLY, 36 Prospect Ave., Dayton, OH 45415-2232, (937) 890-3803, E-mail: gacoovert@yahoo.com
DAUGHENBAUGH, JOHN, 203 N. Wilton Pl., Los Angeles, CA 90004-4025, E-mail: shoduffy@mediaone.net
DEEMS, RON, 1768 Hermes, San Diego, CA 92154-2814, (619) 424-3750
DOI, MATTHEW S., 16209 Taylor Ct., Torrance, CA 90504-1902, (310) 329-3201
DREZ, PAUL E., 8816 Cherry Hills Rd. NE, Albuquerque, NM 87111, (505) 828-9857, FAX (505) 828-1342, E-mail: drez@nmia.com
DULLAS, NORMA M. & WILLIAM, 13231 North 65th Dr., Glendale, AZ 85304, (623) 979-8758
EERNISSE, DOUGLAS J., Dept. of Biological Science, MH 282, California State University, Fullerton, CA 92834-6850, (714) 278-3749, FAX (714) 278-3426, E-mail: deernisse@fullerton.edu
EMERSON, WILLIAM K., 10 E. End Ave. Apt. 18E, New York, NY 10021-1184, (212) 879-7645 (home), (212) 769-5714 (work), FAX (212) 769-5783, E-mail: emerson @AMNH.org
EVERSON, GENE, 500 Nottingham Pkwy., Louisville, KY 40222, (502) 429-5788
FARMER, WES, 3591 Ruffin Rd. #226, San Diego, CA 92123-2561, (858) 576-2143, E-mail: wmfarmer@adnc.com
FLENTZ, MARY & JOHN B., 4541 Lambeth Court, Carlsbad, CA 92008-6407, (619) 434-2522
FORNER, MONIKA M., 575 Otay Lakes #32, Chula Vista, CA 91913, (619) 397-0970, E-mail: mforner@lhsl.com
FRANK, WILLIAM M., 1865 Debutante Dr., Jacksonville, FL 32246-8645, Phone/FAX (904) 724-5326, E-mail: wfrank@sprynet.com
GARCÍA, EMILIO F., 115 Oak Crest Dr., Lafayette, LA 70503, (337) 232-2662, E-mail: efg2112@louisiana.edu
GERRODETTE, BILLEE L. & GEORGE, 6333 La Jolla Blvd. #171, La Jolla, CA 92037, (858) 454-5788
GORI, SANDRO, Via Semesi 7, 57123 Livorno, Italy
GREEN, DAVE, LUCILLE & KRISTEN, 6610 Baker Ct., Colleyville, TX 76034, (817) 421-6887, E-mail: dgreen@comwerx.net

HERRMANN, RICHARD & GINNY, 12545 Mustang Dr., Poway, CA 92064, (858) 679-7017, FAX (858) 679-3346, E-mail: rbherrmann@aol.com

HERTZ, JULES & CAROLE M., 3883 Mt. Blackburn Ave., San Diego, CA 92111, Phone (858) 277-6259, E-mail: cmhertz@pacbell.net

HICKMAN, CAROLE S., PT05, Museum of Paleontology, University of California, Berkeley, CA 94720-4780, (510) 642-3429, FAX (510) 642-1822, E-mail: caroleh@ucmp1.berkeley.edu

HOLLMANN, MICHAEL, Stockumer Heide 44, D-58454 Witten, Germany, Phone 01149-2302-944-255, FAX 01149-234-230-4225, E-mail: Michael.Hollmann@ruhr-uni-bochum.de

HOUSTON, ROY, Dept. of Biology, Loyola Marymount University, Loyola Blvd. at West 80th St., Los Angeles, CA 90045, (213) 642-3126 (work), (310) 329-6444 (home), E-mail: rhouston@lmu.edu

HUTSELL, KIM & LINDA, 5804 Lauretta St. #2, San Diego, CA 92110, (619) 294-3914, E-mail: khutsell@ix.netcom.com

JACKSON, JOHN, 11558 Rolling Hills Dr., El Cajon, CA 92020, (619) 579-8405, FAX (619) 579-7901, E-mail: odyssey@adnc.com

JOFFEE, ANNE, 1157 Periwinkle Way, Sanibel Island, FL 33957, (941) 472-3151, FAX (941) 472-3153, E-mail: sanibelchiton@aol.com

JORDAN, SCOTT, 1620 El Travesia Dr., La Habra Hts., CA 90631, (562) 903-0287, FAX (562)697-1268, E-mail: sjordan2@prodigy.net

KAISER, KIRSTIE L., Paseo de las Conchas Chinas #115 Depto. 4, Fracc. Conchas Chinas C.P. 48390, Puerto Vallarta, Jalisco, Mexico, 52 (322) 15041, FAX 52 (322) 15042, E-mail: klkaiser@pvnet.Com.Mx

KALOHI, KATHY, 13901 Wilkie Ave., Gardena, CA 90249, (310) 719-1816, E-mail: jkalohi@earthlink.net

KANNER, PAUL, 10609 Esther Ave., Los Angeles, CA 90064, (310) 559-7140, FAX (310) 538-3889, E-mail: kann@mediaone.net

KEMP, BRUCE & EMI, 9420D Carlton Oaks Dr., Santee, CA 92071, (619) 449-7610, FAX (619) 553-6391, E-mail: bkemp@nosc.mil

KENNEDY, GEORGE, 8997 Moisan Way, La Mesa, CA 91941, (619) 667-1030, FAX (619) 594-4372 (work), E-mail: gkennedy@geology.sdsu.edu

KING, BOB, 2635 2nd Ave., Apt. 205, San Diego, CA 92103-6555, (858) 296-0574

KLAUS, KAY & DEL, 8674 Glenhaven St., San Diego, CA 92123

KRONENBERG, GIJS C.,Den Bult 98, NL-5616 GJ Eindhoven, the Netherlands, E-mail: gijsckro@worldonline.nl

LAGRANGE, JOHN & LINDA, 533 North Rios Ave., Solana Beach, CA 92075-1245, Phone/FAX (858) 755-7215, E-mail: lagrange@adnc.com

LANCE, JAMES R., 746 Agate St., San Diego, CA 92109, (858) 488-2132

LEAL, JOSÉ H., The Bailey-Matthews Shell Museum, P.O. Box 1580, Sanibel Island, FL 33957, (941) 395-2233, FAX (941) 395-6706, E-mail: jleal@shellmuseum.org

LEVIN, DEBRA J.,1848 Rust Ridge Pl. #202, Corona, CA 92881, (909) 898-3945, E-mail: levinj@att.net

LEWIS, JUDITH A., 2117 Via Estrada, Carrollton, TX 75006, (972) 416-4712, E-mail: judylewis@earthlink.net

LIFF-GRIEFF, PHIL, 2447 Kemper Ave., La Crescenta, CA 91214, (818) 541-1232

LINDAHL, KEN & MARGE, 202 Grand Canal, Balboa Island, CA 92662, (949) 675-5858

LONHART, STEVE, Department of Biology, EMS A316, University of California, Santa Cruz, CA 95064, (831) 459-5063, FAX (831) 459-4882, E-mail: lonhart@biology.ucsc.edu

LOVELL, LARRY, Benthic Invertebrate Collection, SIO/UCSD/Mail Stop 0206, 9500 Gilman Drive, La Jolla, CA 92093-0206, (858) 822-2818, E-mail: llovell@ucsd.edu

LUCARELLI, MARILYN N., 81-B Carriage Hill, Twin Lakes Apt., Clifton Park, NY 12065, (518) 899-5201, E-mail: mariluca@nycap.rr.com

LUTHER, DOUG & MARY, 1535 Ipukula St., Honolulu, HI 96821-1419, (808) 377-5173, E-mail: dluther@soest.hawaii.edu

MCCLINCY, RICHARD J., 809 St. George Rd., Danville, CA 94526, (510) 838-3217, E-mail: richard.mcclincy@kvaerner.com

MCPEAK, RONALD H., P.O. Box 2136, Battle Ground, WA 98604-2136, (360) 687-1972, FAX (360) 687-1791, E-mail:mcpeak@worldaccessnet.com

METZ, GEORGE E., 121 Wild Horse Valley Dr., Novato, CA 94947-3615, (415) 892-4960, E-mail: romageometz@earthlink.net

MICHEL, JOHN & NOLA, 4758 Mt. Cervin Dr., San Diego, CA 92117, Phone/FAX (858) 278-9088, E-mail: ejmco@san.rr.com

MOGOLLÓN, VALENTIN, Francia 726, Lima 18, Perú, E-mail: svmogollon@yahoo.com

MULLINER, DAVID K. & MARGARET, 5283 Vickie Dr., San Diego, CA 92109, (858) 488-2701, E-mail: mulliner1@juno.com

MUSEUM OF COMPARATIVE ZOOLOGY, Dept. of Malacology, Harvard University, 26 Oxford St., Cambridge, MA

02138, (617) 495-2468, E-mail: ckenaley@OEB.Harvard.edu
MUSEUM OF NEW ZEALAND, Hector Library - Librarian, P.O. Box 467, Wellington, New Zealand
MYERS, JOHN & BARBARA W., 3761 Mt. Augustus Ave., San Diego, CA 92111, (858) 279-9806
NATURALIS, BIBLIOTHEEK, Postbus 9517, 2300 RA Leiden, The Netherlands
NELSON, LOIS, 7222 N. 15th Ave., Phoenix, AZ 85021-8658, (602) 997-9196
NORRID, CHARLOTTE, 233 E. Cairo Dr., Tempe, AZ 85282-3607, (602) 967-4957, E-mail: hcnorrid2@aol.com
PASQUA, ROBERT A., 2236 Via Chalupa, San Clemente, CA 92673-3634, (949) 492-6855, E-mail: iampasqua@aol.com
PAYNE, TRAVIS L., 2703 Wayne Circle SE, Decatur, AL 35603-9392, E-mail: tlpayne@hiwaay.net
PERRIN, MARILYN, 10960 Via Abaca, San Diego, CA 92126, (858) 586-0175, E-mail: mimiperrin@aol.com
PIERCE, ROSEMARY & FRANK, 43099 Tenaja Road, Murrieta, CA 92562, (909) 674-9370
PISOR, DON & JEANNE, 10373 El Honcho Pl., San Diego, CA 92124, (858) 279-9342 (home), (619) 234-0249 (warehouse), FAX (619) 234-0250, E-mail: d-jpisor@ix.netcom.com
RICE, TOM, P.O. Box 219, Port Gamble, WA 98364, Phone/FAX (360) 297-2426, E-mail: ofseashr@pacifictelebyte.com
ROBERTS, DALE L. & KIMBERLY, 28402 Harvest View Lane, Trabuco Canyon, CA 92679, (949) 459-8886, FAX (949) 888-2786, E-mail: robertdl@war.wyeth.com
ROMER, BILL & CAROL, 3249 Towser, San Diego, CA 92123, (858) 278-2389, E-mail: wromer1@san.rr.com
RUTKAS, TERRY, 13311 B Meyer Rd., Whittier, CA 90605, (562) 941-5439
SANTA BARBARA MUSEUM OF NATURAL HISTORY, Department of Invertebrate Zoology, 2559 Puesta del Sol Rd., Santa Barbara, CA 93105-2936, (805) 682-4711
SCHNEIDER, WILLIAM & NANCY, 12829 Carriage Rd., Poway, CA 92064-6045, Phone/FAX (858) 748-2822, E-mail: jtkcmom@msn.com
SCHOENING, ROBERT C., 10607 Norman Ave., Fairfax, VA 22030, (703) 273-9755, FAX (703) 352-7124, E-mail: rschoening@aol.com
SCOTT, PAUL VALENTICH, Santa Barbara Museum (NH), 2559 Puesta del Sol Rd., Santa Barbara, CA 93105, (805) 682-4711 ext. 319, FAX (805) 569-3170, E-mail: pvscott@sbnature2.org
SENCKENBERGISCHE BIBLIOTHEK, Zeitschriftenabteilung/DFG, Bockenheimer Landstr. 134-138, D-60325, Frankfurt am Main, Germany
SKOGLUND, CAROL, 3846 E. Highland Ave., Phoenix, AZ 85018, Phone/FAX (602) 955-2072, E-mail: carolskoglund@msn.com
SMALL, MICHAEL, c/o/A.D. Small, 753 Lonsdale Rd., Ottawa, Ontario K1K0J9, Canada, 537-24-25 -16/17 (work), FAX 537-337725 (home), E-mail: michael.small@dfait-maeci.gc.ca
UNDERWOOD, DORIS K., 698 Sheridan Woods Dr., West Melbourne, FL 32904, (407) 724-2449, E-mail: dunderwood1@cfl.rr.com
VELARDE, RON, Marine Biology Lab., 4918 N. Harbor Dr. Suite 101, San Diego, CA 92106, (619) 758-2331, FAX (619) 758-2350, E-mail: rgv@sdcity.sannet.gov
VOLLERO, SILVANA & BOB PETROSKI, 5613 Carnegie St., San Diego, CA 92122, (858) 625-0756, FAX (858) 535-1810 (work), E-mail: gluckchildcare@sd.znet.com (work)
VON KRIEGELSTEIN, DOUG, 11288-A San Juan, Loma Linda, CA 92354, (909) 825-7207, FAX (909) 796-9658, E-mail: dougvon@hotmail.com
VOSO, ED & HELEN, 1815-134 Sweetwater Rd., Spring Valley, CA 91977, (858) 469-8308
WATERS, CHARLES, 2703 Hutchison, Vista, CA 92084, (760) 941-2067
WEBER, GLADYS, 3607 Sylvan Meadows Court, Modesto, CA 95356-2011, (209) 549-1071, E-mail: gladweber@aol.com
WEBSTER, HERB & MELLA, 34021-A Ruby Lantern, Dana Point, CA 92629, (949) 240-1606, E-mail: mellamella@aol.com
WHITE, JACKIE, 886 Mountridge Ct., Las Vegas, NV 89110-2911, (702) 452-9651, E-mail: jcwshells@aol.com
WOMACK, EDWIN B. & JEAN, 2126 S. Arroyo Vista, Cottonwood, AZ 86326, (520) 639-2112
WOOLSEY, JODY, 3717 Bagley Ave. Apt. 206, Los Angeles, CA 90034-4148, (310) 839-1604, E-mail: mjwoolsey@earthlink.net
WU, SHI-KUEI, 4175 Amber St., Boulder, CO 80304, Phone/FAX (303) 444-2306, E-mail: skwu@spot.colorado.edu
YIN, BOB, 1275 Torrey Pines Rd., La Jolla, CA 92037, (858) 454-2342, E-mail: ryin1@san.rr.com
YOUNG, HERB & WILMA, 14550 Stone Ave. North, Shoreline, WA 98133-6218, (206) 364-8327

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

PROGRAM

Holocene Molluscan Reef Fauna of the Dominican Republic

Travis Smith, a doctoral student at Scripps Institution of Oceanography, will give a slide presentation on the 6000 year old coral reef fossils from the Dominican Republic. The fossil fauna there continues into the Recent. He will also have a display of the corals and fauna of the area.

Meeting date: 15 March 2001

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting - 15 February 2001

President Kim Hutsell welcomed everyone to the meeting. The minutes of the January meeting were accepted as published in *The Festivus*. Vice President Jules Hertz mentioned that speakers are lined up for the months of March, May, and June. The Auction will, of course, be in April. Treasurer Linda Hutsell said that the Club opened a money market account that earns higher interest than a savings accounts. Corresponding secretary Monica Forner sent a thank you letter to our January speaker.

As librarian, Linda said that there are several new books in the library ready to be checked out. They include the new abalone monograph and CD by Daniel Geiger, *Marine Mollusks in Japan* edited by Takashi Okutani, and *Corals of the World*, vols.1-3 by JEN Veron.

Auction donations are needed and may be given to any Board member. Mark Scott brought in a number of shells from the Philippines for everyone to enjoy.

Jules introduced Lynn Funkhouser, a diver and world-renowned underwater photographer. Lynn showed lovely photos of beautiful coral reefs full of amazing sea life including fish, nudibranchs, seahorses, eels and more, many which we had never seen before. She even had shots of fish and nudibranchs laying their eggs. She noted that the crocodile fish has the most amazing eyelashes. She also had a photo of the extremely rare leaf fish. She then talked about the grave effects of global warming and blast fishing. She revealed that the reason she originally became interested in shells is that she loved the architecture of the shell. Lynn's presentation was greatly enjoyed by all.

The winner of the shell drawing was Marilyn Perrin.

A thank you goes to John Bishop for the evening's refreshments. The meeting was adjourned at 8:50 p.m.

Silvana Vollero

[For information on the Auction/Potluck, see writeup on page 28.]

Additions and Changes to the Roster

New members

Barwick, Kelvin, 6134 Carling Way, San Diego, CA 92115, 619-583-6582

Forsyth, Robert, 2574 Graham St., Victoria, BC V8T 3Y7, Canada, e-mail: robert_forsyth@telus.net

Langstroth, Libby & Lovell, 651 Sinex Ave, Apt. 101, Pacific Grove, CA 93950

Marr, Lauretta, 4428 Lanham St., Midland, TX 79705, 915-683-1901, e-mail: RLMMID@aol.com

Tupen, Jeff, Morro Group, Inc., 1422 Monterey St., Suite C-200, San Luis Obispo, CA 93401, 805-543-7095, FAX 905-543-2367, e-mail: jtupen@morrogroup.com

Renewals

Berschauer, David & Felicia, 25411 Cabot Rd., Ste 109, Laguna Hills, CA 92563, 949-457-9210, e-mail: trophon@the grid.net

Doneddu, Mauro, via Palau, 5, 07029 Tempio (ss) Italy, e-mail: maurodo@tiscalinet.it

Lavaleye, Marc, De Ruyterstraat 58, 1792 AK Oudeschild, The Netherlands, e-mail: lava@NIOZ.NL

Perini, Maurizio, Via Pedrazza, 9, I-36010 Zane (VI), Italy, +39.0445.380378, FAX: +39.0445.384784, e-mail: mperini@witcom.com

Pras, Stephane, 15 Rue Marbeau, 75116 Paris, France, e-mail: stephane.pras@noos.fr

Reitz, Charles "Chuck", 410 Orpheus Ave., Leucadia, CA 92024, 760-943-1029 (home), 760-471-8657 (work), FAX 760-471-6894

Vawter, Doris "Dee", 3208 Bonita Mesa Rd., Bonita, CA 91902, 619-479-7687, e-mail: vevawter@worldnet.aol.net

Wise, John B., Dep't. of Malacology, Houston Museum of Natural Science, One Hermann Circle Dr., Houston, TX 77030-1799, 713-639-4677, FAX: 713-523-4125

E-mail changes

McPeak, Ron: rmcpeak@worldaccessnet.com

Rice, Tom: ofseashr@sinclair.net

Webster, Mella & Herb: mellamella@earthlink.net

A REMARKABLE DEEP-WATER *COCHLESPIRA* FROM GOLFO DE CHIRIQUÍ, SOUTHWESTERN PANAMÁ

EMILIO F. GARCÍA

115 Oak Crest Drive, Lafayette, Louisiana 70503, USA
E-mail: efg2112@louisiana.edu

In the past two years trawling, dredging, and SCUBA operations off southern Panamá have brought to light such unexpected findings as *Phalium pilsbryi* (Woodring & Olsson, 1957) (Garciá & Marr, 1998); *Serpulorbis oryzata* (Mörch, 1862) (Garciá, 1999a); *Oliva foxi* Stingley, 1984 (Kaiser, 1999); *Cancellaria (Ekuclia) laurettae* Petit & Harasewych, 1998; and *Columbella marrae* (García, 1999b). The last two species were named after Mrs. Lauretta Marr, of Midland, Texas, who has been collecting in Panamá for a number of years and has amassed a large molluscan collection from that area.

At the last Conchologists of America Convention in Houston, Texas, Mrs. Marr brought with her some unusual specimens she wanted me to see, either because of their size, such as a spectacular *Colubraria procera* (Sowerby, 1832) measuring 92.6 mm in length, or to try to identify them. The *Cochlespira* treated in this article was the most challenging. It was trawled in Golfo de Chiriquí, southwestern Panamá, in approximately 330 m by shrimp boats. When I first saw the specimen, the sheer size of the 52.4 mm shell and its white color made me think it had to be an undescribed species since *Cochlespira cedonulli* (Reeve, 1843), the only known species of that genus from the Panamic Province, is much smaller (large specimens average about 35 mm), and has an altogether different coloration. Mrs. Marr allowed me to borrow the specimen for further study.

There are differences between the giant *Cochlespira* and *C. cedonulli*, other than size and color. While the latter has an almost smooth, silky surface with barely a hint of axial growth lines, the former has heavy, somewhat sinuous axial lines. These lines become sigmoid at the flat shoulder of the whorls. Also, while *C. cedonulli* has a raised spiral cord along the middle of the shoulder of the whorls, this feature appears as a raised lamella in the specimen in question (Figure 1b).

Although the number of whorls and the position and shape of the sinus are the same in both, the spines are shorter, wider, and more numerous in Mrs. Marr's specimen. The average number of spines in the last whorl of the *C. cedonulli* specimens from Panamá in my collection is 13 (see Figure 4), while the giant *Cochlespira* has 24 (Figure 3). However, I do have a *C. cedonulli* from the Galápagos Islands measuring only 19 mm with 22 spines in the last whorl.

The size of the giant *Cochlespira*, although extraordinary, would not be an indication of a new taxon. A number of extraordinarily large specimens have been obtained from deep water off Panamá such as Mrs. Marr's *Colubraria* mentioned above; and I have in my collection a *Trigonostoma (Ventrilia) bullatum* (Sowerby, 1832) (Figure 5) from that same general area measuring 76 mm, 16 mm larger than the world record listed by Wagner and Abbott (1989). Besides, the *Cochlespira* specimen was dead collected, and some types of substrata have a tendency to bleach the shell complete. This bleaching often produces the same effect as the "whitening" used to photograph specimens to enhance the shell sculpture, and may make it more obvious.

The facts that the single specimen of the *Cochlespira* has a broken protoconch, and that most of the apparent differences between it and *C. cedonulli* can be explained, lead me to consider the specimen, at least temporarily, as a deep water form of *C. cedonulli*.

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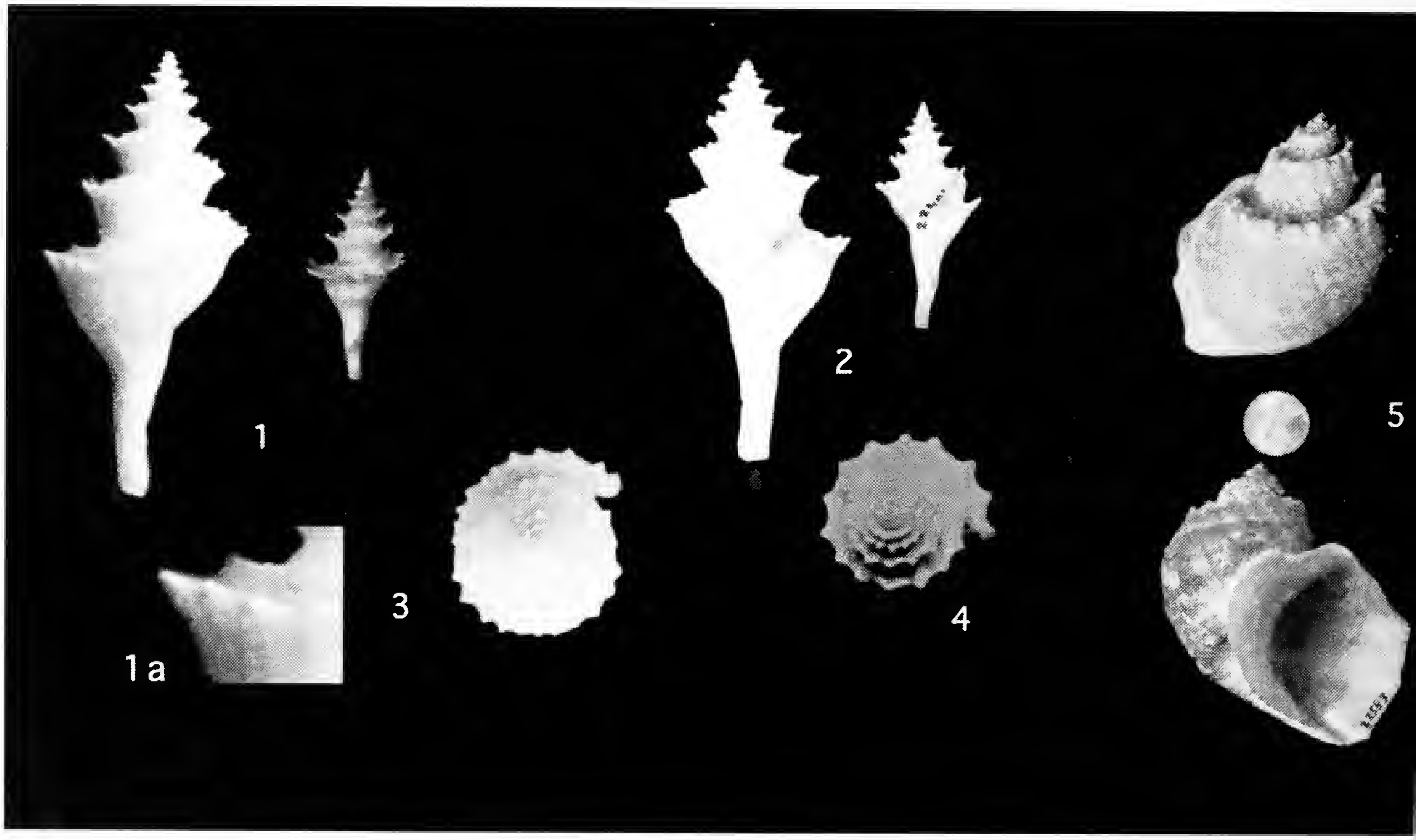

Figures 1a-5. (1) Dorsal view of *Cochlespira* aff. *cedonulli* (left, 52.4 mm) and *Cochlespira cedonulli* (30 mm) (1a) view of raised lamella on shoulder of whorls of *Cochlespira* aff. *cedonulli*. (2) ventral view of *Cochlespira* aff. *cedonulli* (left, 52.4 mm) and *Cochlespira cedonulli* (30 mm) (3) apical view of *Cochlespira* aff. *cedonulli* showing spine formation (4) apical view of *Cochlespira cedonulli* showing spine formation (5) *Trigonostoma (Ventrilia) bullatum* (76 mm).

BOOK NEWS

A Living Bay
The Underwater World of Monterey Bay
by Lovell Langstroth and Libby Langstroth. 2000.
University of California Press/Monterey Bay Aquarium Series in Marine Conservation, 2
392 pages, 8.5 x 10 inches, 248 color illustrations, 14 line illustrations, 1 map
Price: $60.00 hardbound, $29.95 paperback
Order information at:
http://www.ucpress.edu/books/pages/8342.html

A Living Bay provides a dazzling visual and verbal glimpse into one of the most diverse temperate marine biotas in the world. The authors provide comprehensive summaries of the biological interactions of the marine plants and animals of the Monterey Bay region. Equally important are the compelling color photographs that allow the readers to "see and feel" the powerful beauty of these creatures and the amazing intricacies of their relationships with each other and the environment.

Similar to the classic *Between Pacific Tides*, *A Living* Bay is organized by habitat and incorporates the intertidal zone, wharfs and docks, the kelp forest, the outer bay, subtidal reefs, the sandy seafloor, and the Monterey Canyon. The introduction is a primer of basic marine biology covering upwelling, food webs, reproductive cycles, and a discussion of the incredible diversity of life in the ocean.

The reader is then lured into learning about the amazing lifestyles of the thousands of different plants and animals in the region between the tides. Full color photographic images entice the reader into wanting to learn more about the fascinating beasts that make the ocean-swept shores their home. The images pop off the page and depict voracious rove beetles devouring kelp, lowly limpets blending with granitic boulders, a pompous oystercatcher searching for invertebrate prey, and scarlet sea hares in a tumultuous mating dance. The prose is engaging and easy to read, spinning interesting vignettes for each of the illustrations, and weaving the stories into the "big picture" of life in the region.

Wharfs and docks provide a three-dimensional wonderland for marine invertebrates and plants. While staring into the compound eye of a seemingly alien "cruising male" *Jassa* amphipod, the reader learns that this animal is an invader from another port and also discovers how it reproduces so successfully along our shores. Shag-rug nudibranchs lay delicate egg strings, while the text explains how these furry slugs mate, grow, and consume stinging sea anemones with relative ease.

The Pacific Coast marine environment is best known for flowing kelp forests that are found in the near shore waters. *A Living Bay* devotes considerable attention to the intricate and intermeshed life cycles of the massive kelp plants and the animals that rely on them for food and shelter. From snails and slugs to moss animals, fishes and otters, the kelp forest is shown to be bursting with color and never-ending stories on how each plant and animal interacts and survives.

The "Outer Bay" of Monterey has "no apparent sides or bottom" and yet the reader can't help but be lured into learning about the stinging tentacles of the purple-striped jellyfish, or the flashing beads of a solitary salp. While this open ocean environment covers most of the earth's surface, little is known about the creatures that inhabit it. *A Living Bay* gives us tantalizing images and language that make one want to learn more about this mysterious realm.

Scuba divers and snorkelers will be delighted with the extensive section on subtidal reefs. From outrageous orange puffball sponges, to pink-fingered hydrocorals and the delicate, colorful tentacles of serpulid worms, the reader will be enthralled with this chapter. Brimming with magnificent mollusk photos and stories, a malacologist is also sure to be pleased by this section. This reviewer was fascinated to see and learn about the defensive posture of the rough keyhole limpet, *Diodora*, when faced with a ravenous ochre seastar.

Another environment familiar to divers is the sandy seafloor. *A Living Bay* takes this somewhat monotone region and delves into the mysteries that encompass its inhabitants. Lowly purple olive snails, painted limpets, and moon snails suddenly become important actors in the never-ending play that enfolds in the shifting sands.

The unabashed alien forms in the deep waters of Monterey Canyon are sure to grab any reader. Modest mushroom corals push out crimson feeding polyps that search for prey. Predatory tunicates wait for large animals to consume with their implausibly wide mouths. One can even appreciate the hardship a cold-seep clam, *Calyptogena*, must endure while trying to survive in the 318 atmospheres of pressure and the total darkness of the cold underwater canyon waters.

The book ends with an appendix outlining characteristics of the animal phyla found in the region, a glossary of scientific terms, references to scientific papers cited in the text, and a useful index to scientific and common names, habitats, and biologic processes.

A Living Bay is an instant classic. It will not only serve well as a visually stunning coffee table book, but also as an incredible resource for divers, shell collectors and anyone interested in the natural history of the Pacific coast marine environment. The lush photographs and accessible text graphically depict biologic processes that will translate well the world over. Given the incredibly low cost for this full color monograph, this book qualifies for the deal of the century and is an absolute "must have" on any bookshelf.

Paul Valentich Scott
Santa Barbara Museum of Natural History
2559 Puesta del Sol Road
Santa Barbara, CA 93105, USA

[This book will be available for circulation in the Club library at the March meeting. Ed.]

UPCOMING MOLLUSCAN MEETINGS

The Western Society of Malacologists (WSM) Annual Meeting will be held 20-23 June 2001 in San Diego, California. In this preliminary notice, three symposia are proposed: a Nudibranch Symposium (in honor of the 50th anniversary of the death of Frank Mace MacFarland) [For more information, e-mail Dr. Ángel Valdes (at the California Academy of Sciences: avaldes@casmail.calacademy.org], a Paleontology Symposium and a Symposium on Latin American Malacology organized by Dr. Jorge Caceres (CICESE, Ensenada, Baja California, Mexico). For further information, e-mail Dr. Caceres at jcaceres.cicese.mx

2001 Shell Odyssey, Conchologists of America Convention hosted by the Astronaut Trail Shell Club, will be held 7-11 July at the Radisson Resort at the Port, Port Canaveral, Florida. In this preliminary announcement a pre-convention field trip to Harbor Branch Oceanographic Institute is announced as well as a general outline for the meeting. For further information, contact Doris Underwood (321) 724-2449.

The World Congress of Malacology will be held in Vienna, Austria, 19-25 August, 2001. It joins the 14th International Congress of Unitas Malacologica, the 67th Annual Meeting of the American Malacological Society, and the Jahresversammlung der Friedrich Held Gesellschaft. The Congress is hosted by the Institute of Zoology, University of Vienna, in cooperation with the Institute of Paleontology, the Naturhistorisches Museum Wien, and the Zoologisch-Botanische Gesellschaft. An informal workshop on molluscan genetics, with the provisional title, "Population genetics and evolutionary processes within the molluscan populations" is planned.

The 4th International Conference on Molluscan Shellfish Safety will be held in Santiago de Compostela (Galicia, Spain) from June 4 to 8, 2002. The Conference should provide a broad forum for scientists, health and shellfisheries public and private agencies, and shellfish growers/associations. It will be hosted by the Centro de Investigacións Mariñas (CIMA) and the Centro de Control da Calidade do Medio Mariño (CCCMM), both depending on the Consellería de Pesca, Marisqueo e Acuicultura of the Xunta de Galicia. The official language will be English. For further information, e-mail: icmss@cimacoron.org

Eighth Aquaculture National Congress (Spain) will be celebrated in Santander N·(Spain) 22-25 May 2001. For more information, consult in the Revista AquaTIC (http://aquatic.unizar.es).

4th International Workshop of Malacology on "Systematics, Phylogenesis & Biology of Polyplacophora" will be held from 13-17 June 2001 in Menfi, Sicily in the conference hall of the Torre Federiciana. The workshop will be in Italian and English. The proceedings of the workshop will be published in a special issue of the *Bolletino Malacologico*. For further information, e-mail the organizational committee at: vannarotolo@futuralink.it

GROWTH CHANGES IN *CADUCIFER CINIS* REEVE, 1846 (MOLLUSCA: BUCCINIDAE) FROM THE PANAMIC PROVINCE

KIRSTIE L. KAISER[1]

Associate, Santa Barbara Museum of Natural History,
2559 Puesta del Sol Road, Santa Barbara, California 93105, USA
E-mail: KLKaiser@PVnet.com.mx

In previous articles on growth changes (Kaiser, 1999; Hertz, 1999; Skoglund,2000) it was noted that it is difficult to identify to species the juvenile shells of some mollusks. At times this results in misidentifications or the erroneous naming of new species.

Four representatives from a growth series of *Caducifer cinis* Reeve, 1846, ranging in size from a mature specimen of 25.6 mm to a juvenile at 4.2 mm (Figure 1) illustrates such a case. These specimens were collected on 23 February 1988, at Isla del Coco, Costa Rica, off Roca Sucia (05°33'01"N, 87°05'01"W) on a scree slope in 17 to 30 m (55-100 ft).

The juvenile specimen (Figure 2) shows the large nucleus is frequently eroded in the adult. The immature aperture lacks the anal sulcus with the two heavy teeth that are a defining character in the adult, and the wrinkled columellar callus has not yet formed at 4.2 mm.

The sculpture on this representative juvenile has only three postnuclear whorls and lacks periostracum. It has prominent nodes on the axial ribs where they

Figure 1. *Caducifer cinis*, Four specimens. L to R: 25.6, 8.5, 7.2, 4.2 mm. K.L. Kaiser Collection. Photo: D. K. Mulliner.

[1]Mailing address: Paseo de las Conchas Chinas #115, Depto. 4, Puerto Vallarta, Jalisco, CP48390, México.

cross the spiral cords which become less apparent as the animal continues to add more whorls.

My thanks to David K. Mulliner for taking the photographs.

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1999. Growth changes in the muricid *Dermomurex obeliscus* (A. Adams, 1853). The Festivus 31(10): 110, fig. 1.
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1999. Growth series of common molluscan species (family Muricidae). The Festivus 31(9): 98-100, figs. 1-6.
SKOGLUND, CAROL
2000. Growth series of three species of *Pitar (Hysteroconcha)* with comments on a fourth species (Bivalvia: Veneridae) from the Panamic Province. The Festivus 32(3): 27-31, color pl. 1, figs. 1-6,

Figure 2. *Caducifer cinis*, enlargement of 4.2 mm specimen shown in Figure 1. Photo: D. K. Mulliner.

THE SAN DIEGO SHELL CLUB'S ANNUAL AUCTION/POTLUCK

The Club's annual Auction/Potluck on Saturday evening April 21st is the Club's biggest fundraiser and biggest social event. Thanks to the kindness of Wes Farmer, it will again be held at his Clubhouse, a perfect venue for the affair. (A map will be in the April issue.)

The Club needs your participation to make this event the successful, good-time party that it has always been. Remember, your donations support the Club in its activities such as *The Festivus*, Science Fair awards, grants to scientific and educational causes, etc. Look through your collections and be generous.

Several fantastic donations have already been received. The deep-water *Pleurotomaria teremachii*; the endemic (to the Marquesas) *Cypraea astaryi*, *Lambis crocata pilsbryi* and *Cyrtulus serotinus*; *Cypraea nigropunctata* (endemic to the Galápagos) and *Cypraea rosselli* are among the special items. Some of the books and reprints donated are also unusual and possibly sought after — a 2-page section on *Meta* from Conchologia Iconica with a colored plate; Glibert (1933) Monographie de la faune Malacologique...Bruxelles and Glibert (1945) ...du Miocene de la Belgique; Liltved's (1989)*Cowries and Their Relatives of Southern Africa* and others.

It's a good start. Please bring your donations to the March meeting or contact a board member to arrange for pickup. For out-of-towners who will not be at the March meeting, either send your donation(s) to the Club address listed on the front page or e-mail the Club at: cmhertz@pacbell.net or call 858-277-6259 giving us the name(s) of what you will donate. We will ask you to bag them and give you auction numbers to place on them. Then you can bring them to the auction.

And most important of all — come to the Auction!

FIFTH ANNUAL SCUM MEETING

The fifth annual meeting of The Southern California Unified Malacologists (SCUM) was held on 20 January 2001 at the Los Angeles County Museum of Natural History. The meeting began at 10:00 a.m. and early arrivals enjoyed coffee/tea with muffins or Danish pastry while conversing with other attendees. There were 40 in attendance with some from as far away as Santa Barbara, San Diego and Phoenix.

George Davis opened the meeting by welcoming the attendees and he and Lindsey Groves co-hosted the meeting. At the beginning of the meeting there was a round of self introductions followed later by short informal presentations from most of the attendees. Several longer, more formal presentations including the use of slides were scattered throughout the day. Some of the highlights are listed below.

Larry Lovell spoke of a recent Scripps Institution of Oceanography working trip that he went on to Deception Island, Port Foster Bay, off Antarctica. He showed slides of the ship, the Lawrence M. Gould a semi-icebreaker, the various grab and sampling devices that were used, and pictures of some of the bivalves and polychaetes that were obtained. We were also able to see pictures of many of the birds and animals that were seen on the trip as well as many beautiful slides of the natural beauty of the area.

Jim McLean gave a status report on his book on the gastropods from Alaska to northern Baja California, México. He spoke of financing problems and discussed the fact that he will be retiring shortly, although he will continue to work in his office at the museum. His immediate project will be a monograph on the Liotiinae, which will contain a huge number of new genera and species.

Don Cadien reported that he had 85 5-gallon buckets of material taken by sled from off the coast of Oregon in 400-2800 m. Preliminary sorting shows many new species of aplacophorans. Daniel Geiger is continuing his work on the Haliotidae and has started on the Scissurellidae. He is also working on a translation of a rare Lichtenstein catalogue on mollusks from the original German and Latin. George Kennedy reported on some of his fossil work and mentioned that the fossil and Recent collections housed at San Diego State University will be going to the San Diego Natural History Museum. Dan and Hiromi Yoshimoto are working on a portion of the Talmadge Collection that is housed at the College of the Redwoods. Hans Bertsch described his recent work on describing Panamic nudibranchs and discussed his plans for the next Western Society of Malacologists (WSM) meeting which will be held 20-23 June 2001 in San Diego. He is planning three symposia with the most novel one featuring the work of malacologists from Mexico, Central America and South America.

Steve Lonhart gave a slide presentation and talk entitled, "*Kelletia*, Shells and Sea Otters - as far North as Monterey Bay: Tropic Interactions." He discussed what the *Kelletia* feed on and what feeds on them. He showed pictures of broken shells and gave his thoughts about the mechanisms which could cause such fractures.

Jeff Tupen gave a slide presentation and talk entitled, "Further Spread of *Rumina decollata*." He discussed the California law which prohibits the sale of *Rumina* in the central and northern counties of the state, and the potential disastrous effect the snail might have on the endangered species *Helminthoglypta walkeriana*.

Carol Steadman showed slides of Pecten Reef in Saddleback Valley and showed how some of the material was being used to make a Fossil Park for the use of the local community.

Eric Hochberg gave a slide presentation and discussion entitled, "Web Brooding in a Deep Sea Octopod..." He discussed Graneledone distribution, one species occurring in Costa Rica and another in Perú at 1000-2000 m. He showed pictures of egg masses and very large individual egg cases. Eric also volunteered to host the sixth annual SCUM meeting in Santa Barbara.

At the conclusion of the meeting, Jim McLean invited attendees to visit the Malacology Department and Daniel Geiger offered to give them a demonstration on how DNA is determined.

Jules Hertz

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Website at: http://www.molluscs.net/SanDiegoShellClub/index.html Email: cmhertz@pacbell.net

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

COME TO THE AUCTION/POTLUCK

Saturday evening, April 21, 2001
5:00-? p.m.
For further information, see page 32.
There will be no regular meeting this month.

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting - 15 March 2001

President Kim Hutsell called the meeting to order at 7:40 p.m. Twenty members and guests were in attendance. The minutes of the February meeting were accepted as published in *The Festivus*. Vice President Jules Hertz mentioned that speakers are lined up for the months of May, June and July.

Larry Lovell announced that the May meeting will be held at Scripps Institution of Oceanography with a tour of the collection to follow his talk on his trip to Antarctica. A map and further information will be in the May issue.

Kim announced that the September party will again be at the Arnold's home with a date yet to be decided.

A sign-up sheet for the Auction/Potluck was passed around. Donations are still requested and may be given to any Board member [See Col. 2, this page.].

Jules announced that the WSM meeting will be here in San Diego from June 20 to the 24th. For further information, see page 46.

Kim announced that the updated *Registry of World Shells* will be published on July 1st. Final date for inclusion in the book will be April 15th.

Jules introduced Travis Smith, the speaker for the evening, who gave a very interesting talk on his participation in an investigation of a fossil coral reef around Lago Enriquillo, a hyper-saline lake in the Dominican Republic.

The group tried to find different areas with different types of fauna; supposedly there are fifteen different environments there. Among the areas investigated were a sediment area near the lake approximately one meter below sea level, an *Acropora* zone with Arcas still bysally attached, and a colony of coral 10 ft across. In some areas worm reefs grew over the coral. *Tagelus* beds were also found. Travis also brought in a display of corals and mollusks recovered from the areas studied. It was a most interesting presentation.

The winner of the shell drawing was Ron Deems.

A thank you goes to the Hertz and Mulliner families for the evening's refreshments.

The Auction/Potluck — 2001

The Club's annual Auction/Potluck will be held on the evening of Saturday April 21st at the community room of Wes Farmer's condo [see map last page for address and directions]. The festivities will begin at 5 p.m. with "Dave's punch," socializing and browsing the auction table and silent auction material. Dinner will begin promptly at 6 p.m. so that the auction can begin on time at 7 p.m.

If you have not signed up for your potluck contribution or made your shell donation, it's not too late, just contact Carole Hertz (858-277-6259) and let her know what food contribution you will bring and what shell material, if any, you plan to donate.

The auction is not only a great party, but it is the Club's only fundraising event. Your donations and purchases provide the means by which the Club's publication, *The Festivus*, continues to operate and publish occasional supplements (free to members), allows the library to buy books which are too costly for many home libraries (such as the new acquisition *Marine Molluscs in Japan*) and provides for donations for scientific grants and student scholarships.

Most important of all is to attend the Auction, have a fantastic time and help the Club at the same time. See you at the Auction!

Additions and Changes to the Roster

New members

Johnson, Scott & Jeanette, Box 325, APO, AP96555

Renewals

Reitz, Charles "Chuck", 440 Orpheus Ave., Leucadia, CA 92024, 760-471-8657 (work), FAX 760-471-6894

The Natural History Museum, Dept of Library Services, Cromwell Rd., London SW7/5BD, England, e-mail: e.jamieson@nhm.ac.uk

Wuyts, Jean, Koningsarendlaan 82, B-2100 Deurne, Belgium, e-mail: wuyts.jean@jri.be

Change of e-mail address

Webster, Herb & Mella, e-mail: mellamella@earthlink.net

FIRST RECORDS OF ATLANTID HETEROPOD MOLLUSKS FROM THE GOLFO DE CALIFORNIA

ROGER R. SEAPY

Department of Biological Science
California State University, Fullerton, CA 92834, USA
<rseapy@fullerton.edu>

and

CAROL SKOGLUND

3846 E. Highland Ave., Phoenix, AZ 85018, USA
<carolskoglund@msn.com>

ABSTRACT Shells of atlantid heteropods that comprised 28 lots and 122 specimens belonging to ten species were identified and enumerated from dredge samples collected in the Golfo de California. The ten species, and the number of specimens encountered, were: *Atlanta gaudichaudi* (64), *A. peroni* (39), *A. fusca* (4), *A. tokiokai* (4), *A. lesueuri* (4), *A. echinogyra* (2), *A. inflata* (2), *A. turriculata* (1), *A. plana* (1), and *A. inclinata* (1). Three of the species (*A. tokiokai, A. echinogyra,* and *A. plana*) have not been reported previously from the North Pacific Ocean east of Hawaii. To our knowledge, this study presents the first published records of atlantid heteropods from the Golfo de California.

INTRODUCTION

Among the 34 species of heteropods currently recognized from the world's oceans, the family Atlantidae includes 21 species, 19 of which are in the genus *Atlanta* (Richter & Seapy, 1999). The atlantids are microscopic snails that can withdraw into their shells and have an operculum to close off the shell aperture. In contrast, the other two heteropod families, the Carinariidae and Pterotracheidae, are macroscopic with elongate, gelatinous bodies. The maximal shell diameters of most atlantids are less than 6 mm, although one species, *Atlanta peroni* Lesueur, 1817, can attain a diameter of 10 mm. All atlantids are visual predators that live at epipelagic depths, i.e., in the upper several hundred meters of the water column (reviewed by Lalli and Gilmer, 1989). Geographically, the atlantids are almost entirely limited to tropical and subtropical waters, and the majority (13 of the 21 species) are circumglobal (Richter & Seapy, 1999). Among the three major oceans, the Pacific boasts the highest species richness (19 of the 21 known species).

The literature on the atlantid fauna of the eastern North Pacific is limited to two studies published in the 1960s and a new species description in the 1990s. From the extensive zooplankton collections of the California Cooperative Oceanic Fisheries Investigations (CalCOFI) program, McGowan (1967) reported on the species composition, relative abundance and distribution of heteropods and pteropods from a large oceanic area off Oregon, California and Baja California, México. Those species of heteropods collected from waters off Oregon and California represent cold water, California Current faunal components. McGowan recorded two atlantids (*Atlanta peroni* and *Atlanta* sp.) and one carinariid (*Carinaria japonica* Okutani, 1955). In 1993, Seapy and Richter described *Atlanta californiensis*, which probably represented many, if not most, of the specimens identified as *Atlanta* sp. in McGowan's 1967 CalCOFI Atlas. Both *C. japonica* and *A. californiensis* range through the Transition Zone Faunal Province

(McGowan, 1971; Seapy, 1974; Seapy & Richter, 1993), which borders the U.S. west coast. From CalCOFI stations off the west coast of Baja California, McGowan (1967) reported six species of atlantids: *Atlanta lesueuri* Souleyet, 1852; *A. peroni*; *A. inflata* Souleyet, 1852; *A. gaudichaudi* Souleyet, 1852; A. *inclinata* Souleyet, 1852 (most, if not all specimens, probably = *A. tokiokai* van der Spoel & Troost, 1972; see Richter, 1990); and *A. turriculata* d'Orbigny, 1836.

Records of atlantids most proximal to the Golfo de California were contained in a zooplankton sampling study conducted by McGowan and Fraundorf (1966) at a location 181.5 km southeast of Cabo San Lucas (22° 35´N, 108° 14.6´W). This location was selected because the authors considered it to be near the northern limits of the tropical Equatorial Water Mass where high zooplankton species diversity would be anticipated. Nine species of atlantids were identified from their samples: *Atlanta gaudichaudi, A. inflata, A. lesueuri, A. peroni, A. turriculata, A. fusca* Souleyet, 1852, *A. inclinata* (most, if not all, specimens probably = *A. tokiokai*, as noted above), *A. megalope* Richter, 1961 (= *A. gibbosa* Souleyet, 1852; see Richter, 1990), and *Oxygyrus keraudreni* (Lesueur, 1817). Among these species, the first four comprised over 95% of the total atlantid abundance.

With a single possible exception, we are unaware of any published records of atlantid species from within the Golfo de California. In his global distribution map for *Atlanta inclinata*, van der Spoel (1976) indicated its presence in the Golfo de California. Van der Spoel (personal communication with the senior author) stated that his notes indicated that this record was based on Golfo de California sediment literature, which he thought was attributable to Dall. Review of the Dall citations in van der Spoel (1976) indicated that two of the titles (Dall, 1871 and 1921) might include a reference to *A. inclinata* from the Golfo de California. However, neither reference contained any such records.

MATERIALS AND METHODS

All of the shells used in this study were dredged from nearshore to offshore depths within the Golfo de California. The shells are housed in the molluscan collections of the Los Angeles County Museum of Natural History and the Santa Barbara Museum of Natural History, and in the private collections of David and Margaret Mulliner (San Diego, CA) and Carol Skoglund (Phoenix, AZ).

The tentative identification of *Atlanta gaudichaudi* was verified by examining three shells, each from a different collection site, under a Hitachi Model S-2400 Scanning Electron Microscope.

RESULTS

Ten species of *Atlanta* were identified from a total of 28 lots, which included 15 from the Los Angeles County Museum of Natural History, seven from the Santa Barbara Museum of Natural History, five from the Skoglund Collection, and one from the Mulliner Collection. The total number of specimens belonging to each species (Tables 1-3) were: *Atlanta gaudichaudi* (64), *A. peroni* (39), *A. fusca* (4), *A. tokiokai* (4), *A. lesueuri* (4), *A. echinogyra* (2), *A. inflata* (2), *A. turriculata* (1), *A. plana* (1), and *A. inclinata* (1).

Species identifications can be made using the key in Seapy (1990), with the exception of *A. gaudichaudi* and *A. inclinata*. These two species can be distinguished from those that are most similar to them in appearance (*A. plana* and *A. tokiokai*, respectively) by consulting Richter (1987 and 1990), or Richter & Seapy (1999). Descriptions and distributions of each species are presented below.

Atlanta gaudichaudi Souleyet, 1852
(Figure 1)

Description: Shell moderately small (less than 3 mm diameter); surface of shell whorls smooth, lacking spiral sculpture; spire low conical, consisting of about 3¼ whorls; shell colorless, but keel with a brown base; eyes type b and operculum type b (Richter & Seapy, 1999).

Distribution: This was the most frequently represented species among the samples examined, occurring in 23 of the 28 lots (Table 1). It was collected off Baja California (four sites) and Baja California Sur (16 sites), at sites ranging from Isla Smith, Bahía de los Angeles in the north to Cabo San Lucas in the south. Along the coast of mainland México in Sonora it was collected at two sites; off Isla San Pedro Nolasco and off Bahía San Carlos.

This species has a circumglobal distribution at tropical and subtropical latitudes (van der Spoel, 1976). In the eastern Pacific Ocean, it ranges from waters off southern California (McGowan, 1967) to northern Perú (van der Spoel, 1976).

Atlanta peroni Lesueur, 1817

Description: This species achieves the largest shell diameter (to 10 mm) among the 19 species currently recognized in the genus *Atlanta*. Shell flattened and colorless, with a low, rounded spire that consists of about 3½ whorls (see Seapy, 1990: Fig. 4F, H); spire and adult whorl surfaces smooth, lacking sculpture; keel moderately elevated, rounded in profile and with a brown base in larger specimens; eyes type b and operculum type b (Seapy, 1990; Richter & Seapy, 1999).
Distribution: This was the second most frequently collected species, occurring at 11 of the 28 sites (Table 2). It was recorded from one site in Baja California (Punta la Gringa, Bahía de los Angeles), eight sites in Baja California Sur (between Isla Tortuga in the north and near Punta Palmilla in the south), and two sites in Sonora (at Libertad and Bahía Saladita).

This species has a circumglobal distribution at tropical to subtropical latitudes (van der Spoel, 1976). In the eastern Pacific Ocean it ranges from waters off southern Oregon (McGowan, 1967) to northern Perú (van der Spoel, 1967).

Atlanta fusca Souleyet, 1852

Description: Shell small (to 2 mm diameter); spire elevated and cone-shaped, consisting of about 4 whorls, each with a prominent basal spiral ridge and a complex pattern of ornamentation (see Seapy, 1990, Fig. 10C, D); shell color yellow-brown (amber) to brown; keel tall and rounded, inserting between the fifth and sixth shell whorls in animals larger than about 1.5 mm; eyes type a and operculum type a (Seapy, 1990; Richter & Seapy, 1999).
Distribution: A total of four specimens were collected (Table 3) off Punta Arena, Baja California Sur (two individuals), Isla Ceralvo, Baja California Sur (one individual), and Bahía San Carlos, Sonora (one individual).

This species has a circumglobal distribution at tropical to subtropical latitudes (van der Spoel, 1976). In the eastern Pacific Ocean, *A. fusca* ranges from waters off southern Baja California Sur (McGowan & Fraundorf, 1966) to northern Perú (van der Spoel, 1976).

Atlanta tokiokai van der Spoel & Troost, 1972

Description: Shell moderately small (less than 3 mm diameter); spire tilted (or "inclined") relative to the shell plane, large and beehive-shaped, and consists of about 5½ whorls (see Seapy, 1990, Fig. 12B, D), with very shallow sutures; spire whorls with tubercula arranged in distinct spiral lines; shell color light yellow-brown (amber); internal wall structure of spire consists of radially-arranged lines (visible only using transmitted light); keel tall and rounded; eyes type b and operculum type c (Seapy, 1990; Richter & Seapy, 1999).
Distribution: Four specimens were collected off Punta Arena (three individuals) and Isla Ceralvo, Baja California Sur (one individual) (Table 3).

This species has a circumglobal distribution at tropical to subtropical latitudes (Richter & Seapy, 1999). Assuming that many, if not most, of the specimens identified as *A. inclinata* by McGowan (1967) and McGowan & Fraundorf (1966) were actually *A. tokiokai* (see Richter, 1990), the latitudinal range of this species in the eastern Pacific is from waters off southern California (McGowan, 1967) to northern Perú (van der Spoel, 1976).

Atlanta lesueuri Souleyet, 1852

Description: Shell can attain a moderately large size (to 6 mm diameter); spire very small and low, consisting of 2½ whorls, with low conical shape and prominent sutures; shell smooth, colorless and transparent; keel very tall and truncate along its leading edge, without pigmentation at keel base; eyes type b and operculum type b (Seapy, 1990; Richter & Seapy, 1999).
Distribution: Four specimens were collected off Punta Arena, Baja California Sur (Table 3).

This species has a circumglobal distribution at tropical to subtropical latitudes (Richter and Seapy, 1999). Its range in the eastern Pacific is from waters off southern California (McGowan, 1967) to northern Perú (van der Spoel, 1976).

Atlanta echinogyra Richter, 1972

Description: Shell small (to 2.5 mm diameter); spire moderately elevated, with a low conical shape, slightly tilted relative to the shell plane, consisting of 3¾ whorls, with well-developed spiral ridges and associated sculpture; spire reddish brown, while adult whorls and low keel are clear; eyes type a and operculum type c; opercular gyre elevated and bears about 12 broad-based spines (Seapy, 1990).
Distribution: Single specimens were collected off Isla

Ceralvo and Punta Arena, Baja California Sur (Table 3). This species has been reported from the Pacific and Indian Oceans at tropical to subtropical latitudes (Richter & Seapy, 1999). Aside from the present records from the Golfo de California, its range in the eastern Pacific Ocean is unknown.

Atlanta inflata Souleyet, 1852

Description: Shell very small (to 1.5 mm diameter) and inflated (shell width about 40% of shell diameter); spire relatively flat, consisting of about 4½ whorls, with evenly-spaced, spiral ridges on the second to fourth whorls; shell colorless, although pigmentation of tissues may give spire region reddish-brown to yellow-brown color; keel tall and truncate on anterior margin; eyes type a and operculum type c (Seapy, 1990).
Distribution: Two specimens were collected off Punta Arena, Baja California Sur (Table 3).

This species has a circumglobal distribution at tropical to subtropical latitudes (Richter & Seapy, 1999). Its range in the eastern Pacific is from waters off southern California (McGowan, 1967) to northern Perú (van der Spoel, 1976).

Atlanta turriculata d'Orbigny, 1836

Description: Shell very small (to 1.7 mm diameter); spire protrudes laterally as a narrow and elongate "turret", formed by strongly elevated second and third whorls and capped by the protoconch; spire consists of about 4 whorls with a light reddish-brown color that grades into a clear outer shell whorl and keel; keel well-developed and rounded, inserting between the fourth and fifth shell whorls in animals larger than about 1.3 mm; eyes type a and operculum type a (Seapy, 1990).
Distribution: One specimen was collected off the southern coastline of Baja California Sur near Punta Palmilla (Table 3).

This species occurs in the Indian and Pacific Oceans at tropical to subtropical latitudes (Richter & Seapy, 1999). In the eastern Pacific Ocean it ranges from waters off southern California (McGowan, 1967) to northern Perú (van der Spoel, 1976).

Atlanta plana Richter, 1972

Description: Shell moderately small (to 4 mm diameter); spire forms a low cone, consisting of about 3¼ whorls, with two low and weakly-developed spiral ridges on the second and third whorls; shell colorless, although the spire sutures are a light violet color; keel rounded and somewhat low, with a copper-brown to golden-brown color; eyes type a and operculum type b; opercular gyre with about 20 flattened and outwardly-directed spines (Seapy, 1990).
Distribution: One specimen was collected from off the southern coast of Baja California Sur near Punta Palmilla (Table 3).

This species is distributed in the Pacific and Indian Oceans at tropical to subtropical latitudes (Richter & Seapy, 1999). In the Pacific it has been reported only from the western South Pacific by van der Spoel, Newman & Estap (1997) and off Hawaii by Seapy (1990). Aside from the present record from the Golfo de California, its range in the eastern Pacific Ocean is unknown.

Atlanta inclinata Souleyet, 1852

Description: Shell large (to 6-7 mm diameter); spire tilted (or "inclined") relative to the shell plane; spire large, beehive-shaped, consisting of about 4½ whorls with shallow sutures; spire whorls with tiny tubercula scattered on the spire surface, sometimes forming irregular spiral lines; shell colorless or light yellow; internal wall structure of spire consists of radially-arranged lines (visible only using transmitted light); keel of moderate height and rounded; eyes type b and operculum type c (Richter & Seapy, 1999).
Distribution: One specimen of *A. inclinata* was collected off Punta Arena, Baja California Sur.

This species has a circumglobal distribution at tropical to subtropical latitudes (Richter & Seapy, 1999). Conceivably, some of the specimens identified by McGowan and Fraundorf (1966) and McGowan (1967) could have been *A. inclinata*. If the distribution of this species overlaps that of *A. tokiokai*, its range in the eastern Pacific also would be from waters off southern California to northern Perú.

DISCUSSION

The ten species of *Atlanta* identified in this study exceed the numbers reported from the studies of McGowan (1967) off Baja California (six) and McGowan & Fraundforf (1966) southeast of Cabo San Lucas, Baja California Sur (eight). The six species identified by McGowan (*A. gaudichaudi, A. peroni, A.inclinata, A. lesueuri, A. inflata,* and *A. turriculata*) also were recorded by McGowan and Fraundorf and in the present study. A seventh species, *A. fusca*, was reported in the McGowan and Fraundorf study and here. The eighth species reported by McGowan and Fraundorf, *A. gibbosa*, was not recorded off Baja California by McGowan or by us in the Golfo de California.

Three of the species that we identified from the Golfo de California (*A. echinogyra*, *A. plana* and *A. tokiokai*) were unknown at the time of the McGowan and Fraundorf (1966) and McGowan (1967) studies. All three were described in 1972; the first two by Richter and the third by van der Spoel and Troost. Seapy (1990) reported the first records of these species from the North Pacific (in Hawaiian waters), and this paper represents the first records for these species from the tropical to subtropical eastern Pacific.

Among the four species in the genus *Atlanta* that possess tilted or inclined spires (*A. inclinata, A. gibbosa, A. tokiokai,* and *A. meteori*), only two (*A. tokiokai* and *A. inclinata*) were identified in this study. These findings would appear to conflict with the identity of only a single species with a tilted spire, *A. inclinata*, by McGowan (1967) and by two species (*A. inclinata* and *A. gibbosa*) by McGowan and Fraundorf (1966). Historically, in the mid 1960s only *A. inclinata* was recognized as a valid species, following the taxonomic revision of the genus by Tesch (1949), in which all previously described species with inclined spires were synonymized with *A. inclinata*. Since it wasn't until 1972 that Richter reestablished *A. gibbosa* as a valid species, the identity of this species by McGowan and Fraundorf is curious. In this same paper, Richter described a new species, *A. meteori* from the Indian Ocean. Also, in 1972 van der Spoel and Troost described *A. tokiokai* based on a single, juvenile specimen. Eighteen years later, Richter (1990) reviewed the species of atlantids with inclined spires and reported that most of the specimens identified previously as *A. inclinata* were, in fact, *A. tokiokai*. This observation is supported in the present study, where four specimens were identified as *A. tokiokai* while only one was identified as *A. inclinata*.

When working only with the shells of atlantids, correct species identification can be difficult. However, when the body of the animal is present, important characters (particularly eye and operculum morphologies) can be used to distinguish species with shells that are close in appearance. The species represented most frequently in this study, *Atlanta gaudichaudi*, is an excellent example of this problem. The discoidal shape of the shell, shape and number of whorls comprising the spire, and pigmented keel base enable one to distinguish the shell of this species from those of other atlantids except for *A. plana*, which was represented in this study by one specimen. Because the above attributes for the shell of *A. gaudichaudi* are virtually the same in *A. plana*, the only way to confidently distinguish the two species is to examine the spire whorls. In *A. gaudichaudi* the whorls are smooth (i.e., they lack spiral sculpture; see Figure 1), while in *A. plana* there are two weakly developed spiral lines on the second and third whorls (see Fig. 8c,d in Seapy, 1990). Depending upon the condition of the shell, these weak spiral lines may be difficult or impossible to resolve using a dissection microscope. However, if one is working with preserved specimens that include the animal's body, these species are easily separated on the basis of eye morphology; type b in *A. gaudichaudi* and type a in *A. plana*. In addition, the opercula of the two species also differ, although partial destruction of the outer shell whorl may be necessary to expose this structure. In both species the operculum is type b, but in *A. plana* the opercular gyre has distinctive, outwardly directed spines (photographs in Seapy, 1990, Fig. 9a,b)

The proximity of the McGowan and Fraundorf (1966) study to the Golfo de California enables a comparison of the relative abundances of the species from the two studies. Although *A. gaudichaudi* was the most numerous species in both studies, the ranked order after *A. gaudichaudi* was different. For McGowan and Fraundorf these were *A. inflata* > *A. lesueuri* > *A. peroni* > *A. turriculata* > *A. fusca*, while in the present study the order was *A. peroni* > *A. fusca* = *A. tokiokai* = *A. lesueuri* > *A. inflata* = *A. echinogyra*. Particularly noteworthy in this ranking is that while the second and third ranked species in the McGowan and Fraundorf study were *A. inflata* and *A. lesueuri,* only two specimens of the former species and four of the latter species were recorded in the present study.

ACKNOWLEDGMENTS

We are most grateful to James H. McLean (Los Angeles County Museum of Natural History), Paul Valentich Scott (Santa Barbara Museum of Natural History), and Margaret Mulliner (San Diego) for providing the atlantid shells used in this study. We also thank Steve Karl (Electron Microscope Facility at California State University, Fullerton) for his assistance in producing the photographic plate.

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Figure 1. Scanning Electron Micrographs of the right side of an *Atlanta gaudichaudi* shell. Specimen was collected by Paul and Carol Skoglund off Punta la Gringa, Bahía de los Angeles, Baja California. The lower two photographs were taken at a 60° angle of tilt. Scale bars for the upper and lower left photographs = 0.5 mm, and for the upper and lower right photographs = 0.1 mm. →

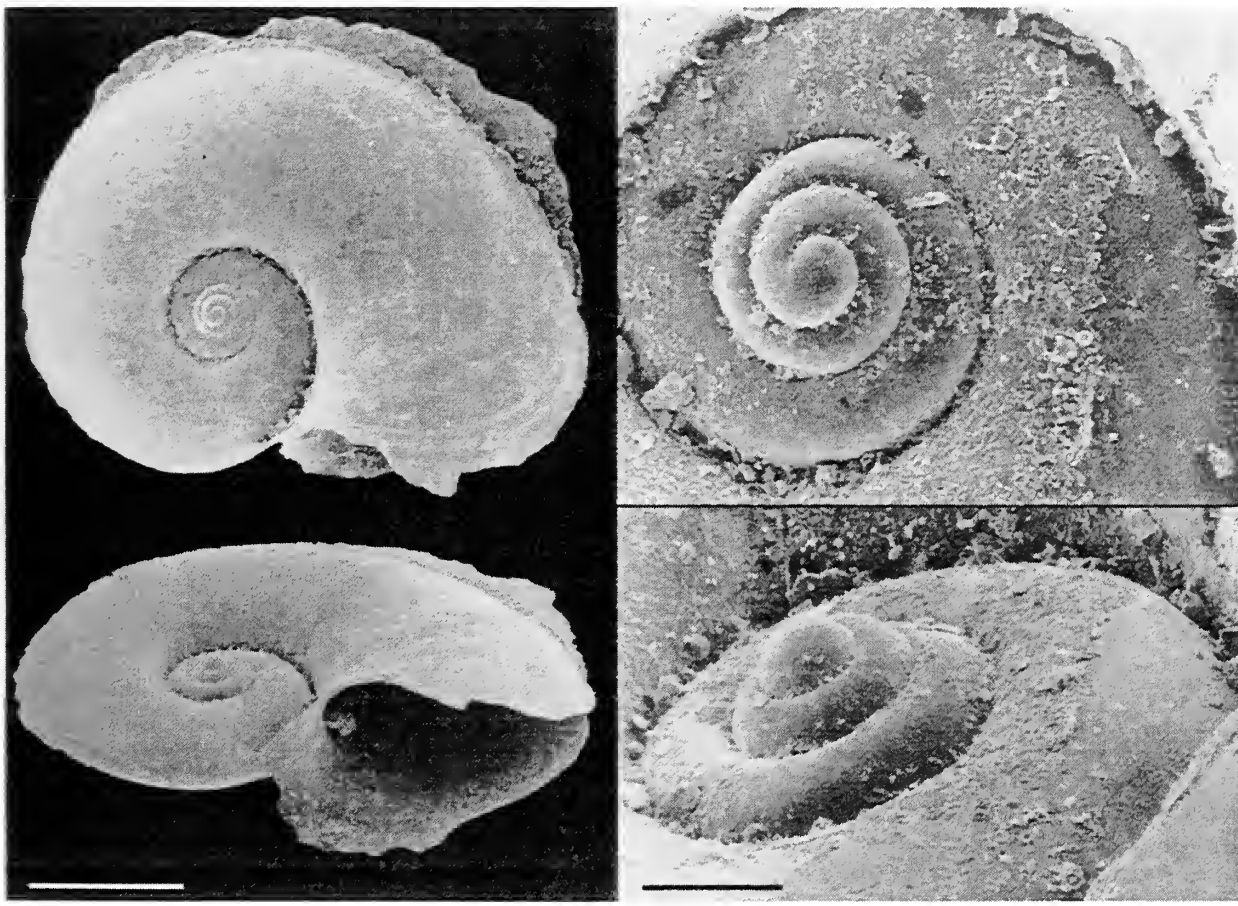

Table. 1. Records of *Atlanta gaudichaudi* from dredge samples collected in the Golfo de California

Collection Lot No.	No of Specimens	Dredging Location	Latitude / Longitude	Date	Collector(s)	Depth (m)
Skoglund Coll.	2	NW Isla Smith (= Isla Coronado), Bahía de los Angeles, Baja California	29.10° N 113.51° W	6-9 May 1993	Paul & Carol Skoglund	120-193
Skoglund Coll.	3	Punta la Gringa, Bahía de los Angeles, Baja California	29.05° N 113.54° W	May 1976 – May 1993	Paul & Carol Skoglund	20-40
Mulliner Coll.	2	Punta la Gringa, Bahía de los Angeles, Baja California	29.05° N 113.54° W	Oct. 1985	David & Margaret Mulliner	65
SBMNH 345480	2	Isla las Animas, Baja California	28.70° N	27 Oct. 1982	Donald Shasky	18-24
SBMNH 345478	1	SE tip of Isla San Pedro Nolasco, Sonora	28.00° N 111.23° W	14 Oct. 1981	Donald Shasky	15
LACMNH 64-26	1	Off Bahía San Carlos, Sonora	27.93° N 111.08° W	Dec. 1964	Roy & Forrest Poorman	18-36
SBMNH 345479	1	Bahía San Carlos, Sonora	27.92° N 111.08° W	23 Oct. 1984	Donald Shasky	intertidal
LACMNH AHF 2025	1	Mouth of Bahía de Concepción, Baja California Sur	26.92° N 111.87° W	15 Mar. 1937	Not Identified	55
LACMNH 73-122	1	Off Isla Blanca, Bahía de Concepción, Baja California Sur	26.73° N 111.88° W	19 Jan. 1973	Walter Barber	11-18
Skoglund Coll.	3	Off W Isla Danzante, Baja California Sur	25.75° N 111.25° W	Oct. 1976 - 1992	Paul & Carol Skoglund	30-40
LACMNH 78-120	2	Off Isla Danzante, Baja California Sur	25.77° N 111.25° W	6 Nov. 1978	David Mulliner & Gale Sphon	43-55
LACMNH 66-22	3	Bahía Muertos, Baja California Sur	24.92° N 109.77° W	8 Apr. 1966	James McLean, Peter Oringer & Louie Marincovich	18-55
SBMNH 345477	1	Off Punta Lobos, Isla Espiritu Santo, Baja California Sur	24.50°N 110.27° W	29 July 1975	Donald Shasky	27

Table 1 continued

Collection Lot No.	No of Specimens	Dredging Location	Latitude / Longitude	Date	Collector(s)	Depth (m)
LACMNH 71-24	5	W side of Isla Ceralvo, Baja California Sur	24.17° N 109.87° W	3 Feb. 1971	James McLean	9-15
LACMNH 66-23	1	Off Punta Ventana, Baja California Sur	24.07° N 109.82° W	8 Apr. 1966	James McLean, Peter Oringer & Louie Marincovich	27-37
LACMNH 66-21	26	Off Punta Arena, Baja California Sur	23.53° N 109.56° W	7 Apr. 1966	James McLean, Peter Oringer & Louie Marincovich	18-36
LACMNH 71-22	2	1.5 mi S of Punta Arena, Baja California Sur	23.52° N 109.44° W	2 Feb. 1971	James McLean	9
LACMNH A.5392	1	Off Punta Pulmo, Baja California Sur	23.43° N 109.40°W	Mar. 1970	Faye Howard	91-122
LACMNH 66-20	1	S end of Bahía Pulmo, Baja California Sur	23.37° N 109.42° W	6-7 Apr. 1966	James McLean	6
Skoglund Coll.	2	Los Frailes, Baja California Sur	23.35° N 109.40° W	Mar. 1972	Paul & Carol Skoglund	50-66
LACMNH 66-17	1	Between Rancho El Tule and Rancho Palmilla, Baja California Sur	22.97° N 109.73° W	5 Apr. 1966	James McLean & Peter Oringer	18-36
LACMNH 66-13	1	Next to cannery at end of beach, Cabo San Lucas, Baja California Sur	22.88° N 109.88° W	2 Apr. 1966	James McLean, Peter Oringer & Louie Marincovich	intertidal
LACMNH 67-76	1	.25 mi NE of pier, Cabo San Lucas Submarine Canyon, Baja California Sur	22.87° N 109.88° W	18 Dec. 1967	James McLean (Dwyer Expedition)	24-35

Table. 2. Records of *Atlanta peroni* from dredge samples collected in the Golfo de California

Collection & Lot No.	No. Specimens	**Dredging Location**	**Latitude / Longitude**	**Date**	**Collector(s)**	**Depth (m)**
Mulliner Coll.	18	Punta la Gringa, Bahía de los Angeles, Baja California	29.05° N 113.54° W	Oct. 1985	David and Margaret Mulliner	65
LACMNH 67-17	1	W of airstrip, Libertad, Sonora	28.13° N 111.98° W	24-25 Mar. 1967	James McLean	intertidal
SBMNH 345482	1	Bahía Saladita, Sonora	27.88° N 110.98° W	Aug. 1970	Donald Shasky	10
SBMNH 345483	6	16 mi, 073°T from E end of Isla Tortuga, Baja California Sur	27.52° N 111.57° W	27 Nov. 1967	Stillman Berry	1,841
LACMNH 78-120	2	Off Isla Danzante, Baja California Sur	25.77° N 111.25° W	6 Nov. 1978	David Mulliner & Gale Sphon	43-55
LACMNH 66-22	1	Bahía Muertos, Baja California Sur	24.92° N 109.77° W	8 Apr. 1966	James McLean, Peter Oringer & Louie Marincovich	18-55
LACMNH 71-24	5	W side of Isla Ceralvo, Baja California Sur	24.17° N 109.87° W	3 Feb. 1971	James McLean	9-15
LACMNH 66-21	2	Off Punta Arena, Baja California Sur	23.53° N 109.56° W	7 Apr. 1966	James McLean, Peter Oringer & Louie Marincovich	18-36
SBMNH 345484	1	Fourth Reef, Cabo Pulmo, Baja California Sur	23.44° N 109.40° W	28 May 1967	Donald Shasky	no data
LACMNH 66-20	1	S end of Bahía Pulmo, Baja California Sur	23.37° N 109.42° W	6-7 Apr. 1966	James McLean	6
LACMNH 66-17	1	Between Rancho El Tule and Rancho Palmilla, Baja California Sur	22.97° N 109.73° W	5 Apr. 1966	James McLean & Peter Oringer	18-36

Table. 3. Records of *Atlanta fusca*, *A. tokiokai*, *A. lesueuri*, *A. echinogyra*, *A. inflata*, *A. turriculata*, *A. plana*, and *A. inclinata* from dredge samples collected in the Golfo de California

Collection & Lot No.	No. Specimens	Dredging Location	Latitude / Longitude	Date	Collector(s)	Depth (m)
Atlanta fusca						
LACMNH 66-21	2	Off Punta Arena, Baja California Sur	23.53° N 109.56° W	7 Apr. 1966	James McLean, Peter Oringer & Louie Marincovich	18-36
LACMNH 71-24	1	W side of Isla Ceralvo, Baja California Sur	24.17° N 109.87° W	3 Feb. 1971	James McLean	9-15
Skoglund Coll.	1	Off Bahía San Carlos, Sonora	27.92° N 111.08° W	Aug. 1973 – Nov. 1982	Paul and Carol Skoglund	15-30
Atlanta tokiokai						
LACMNH 66-21	3	Off Punta Arena, Baja California Sur	23.53° N 109.56° W	7 Apr. 1966	James McLean, Peter Oringer & Louie Marincovich	18-36
LACMNH 71-24	1	W side of Isla Ceralvo, Baja California Sur	24.17° N 109.87° W	3 Feb. 1971	James McLean	9-15
Atlanta lesueuri						
LACMNH 66-21	4	Off Punta Arena, Baja California Sur	23.53° N 109.56° W	7 Apr. 1966	James McLean, Peter Oringer & Louie Marincovich	18-36
Atlanta echinogyra						
LACMNH 71-24	1	W side of Isla Ceralvo, Baja California Sur	24.17° N 109.87° W	3 Feb. 1971	James McLean	9-15
LACMNH 71-22	1	1.5 mi S of Punta Arena, Baja California Sur	23.52° N 109.44° W	2 Feb. 1971	James McLean	9
Atlanta inflata						
LACMNH 66-21	2	Off Punta Arena, Baja California Sur	23.53° N 109.56° W	7 Apr. 1966	James McLean, Peter Oringer & Louie Marincovich	18-36
Atlanta turriculata						
LACMNH 66-17	1	Between Rancho El Tule and Rancho Palmilla, Baja California Sur	22.97° N 109.73° W	5 Apr. 1966	James McLean & Peter Oringer	18-36

Table 3 continued

Collection & Lot No.	No. Specimens	Dredging Location	Latitude / Longitude	Date	Collector(s)	Depth (m)
Atlanta plana						
LACMNH 66-17	1	Between Rancho El Tule and Rancho Palmilla, Baja California Sur	22.97° N 109.73° W	5 Apr. 1966	James McLean & Peter Oringer	18-36
Atlanta inclinata						
LACMNH 66-21	1	Off Punta Arena, Baja California Sur	23.53° N 109.56° W	7 Apr. 1966	James McLean, Peter Oringer & Louie Marincovich	18-36

STUDENT RESEARCH GRANT IN MALACOLOGY — 2001

As part of their commitment to the continued study of mollusks, the WESTERN SOCIETY OF MALACOLOGISTS in conjunction with the SANTA BARBARA MALACOLOGICAL SOCIETY, the SOUTHWESTERN MALACOLOGICAL SOCIETY, the SAN DIEGO SHELL CLUB and the NORTHERN CALIFORNIA MALACOZOOLOGICAL CLUB are again pleased to announce the availability of grants to support student research in malacology. Funds are available for actual research costs, including but not limited to, field and laboratory equipment, chemicals, photographic supplies, computer time and supplies, microscope usage fees, and reasonable research travel costs.

ELIGIBILITY: Applicant must be a full time student in a formal graduate or undergraduate degree program. There are no citizenship or affiliation restrictions. The thesis, dissertation or research project must be focused primarily on the systematics, biology, ecology, physiology, biochemistry, or paleontology of marine, terrestrial or freshwater mollusks. Research currently in progress or beginning in the 2000-2001 academic year will be considered.

REQUIREMENTS: 1. Cover application page with the following information: proposal title, applicant name, addresses, contact numbers, etc, including a listing of no more than FIVE keywords that describe the proposed research.

2. The proposal, limited to two pages, which discusses the research project and its malacological significance including details of the work to be aided by this grant.

3. A budget which outlines how the grant funds will be used.

4. A resume or outline of the applicant's academic background.

5. A letter of recommendation from the applicants research advisor (must be transmitted or mailed separately by advisor).

6. A list of grants and amounts that are currently being received or have been applied for in the 2000-2001 academic year.

ELECTRONIC SUBMISSIONS: Applications can be submitted either as attached WORD documents or in PDF format. E-mail to: hchaney@sbnature2.org

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THIRTY-FOURTH ANNUAL MEETING OF THE WESTERN SOCIETY OF MALACOLOGISTS (WSM)

The 34th annual meeting of the WSM will be held at the Ramada Inn and Conference Center, 5550 Kearny Mesa Road, San Diego, California from 20-24 June 2001 with a welcoming reception scheduled for Wednesday evening.

The meeting features two symposia: Opisthobranch Symposium in honor of the 50th anniversary of the death of Frank Mace MacFarland (Thurs., 21 June) and a Latin American Malacology Symposium (Fri. 22 June). On Saturday (23 June) there will be a paleontology session and contributed papers and posters.

In addition to the welcoming reception, there will be other social events such as an informal slide show /video night on Thursday evening, Reprint Sale and Auction on Friday evening, the Banquet on Saturday evening, and a paleontology field trip to Ensenada on Sunday 24 June (also the check out and departure date).

For further information on hotel registration, conference registration, submission of papers and/or posters, contact either President Hans Bertsch at: Ph: 619-423-8900; FAX: 619-423-0118, or E-mail: hbertsch@nu.edu or contact Treasurer Cynthia Trowbridge at: Ph. 541-574-8020, FAX, 541-867-0105 or e-mail: trowbric@bcc.orst.edu

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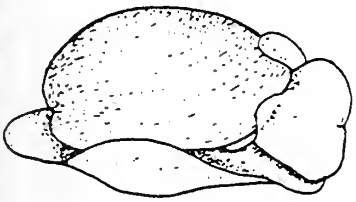

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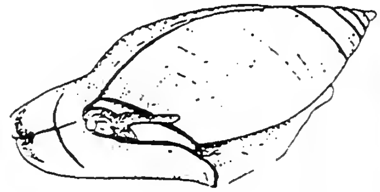
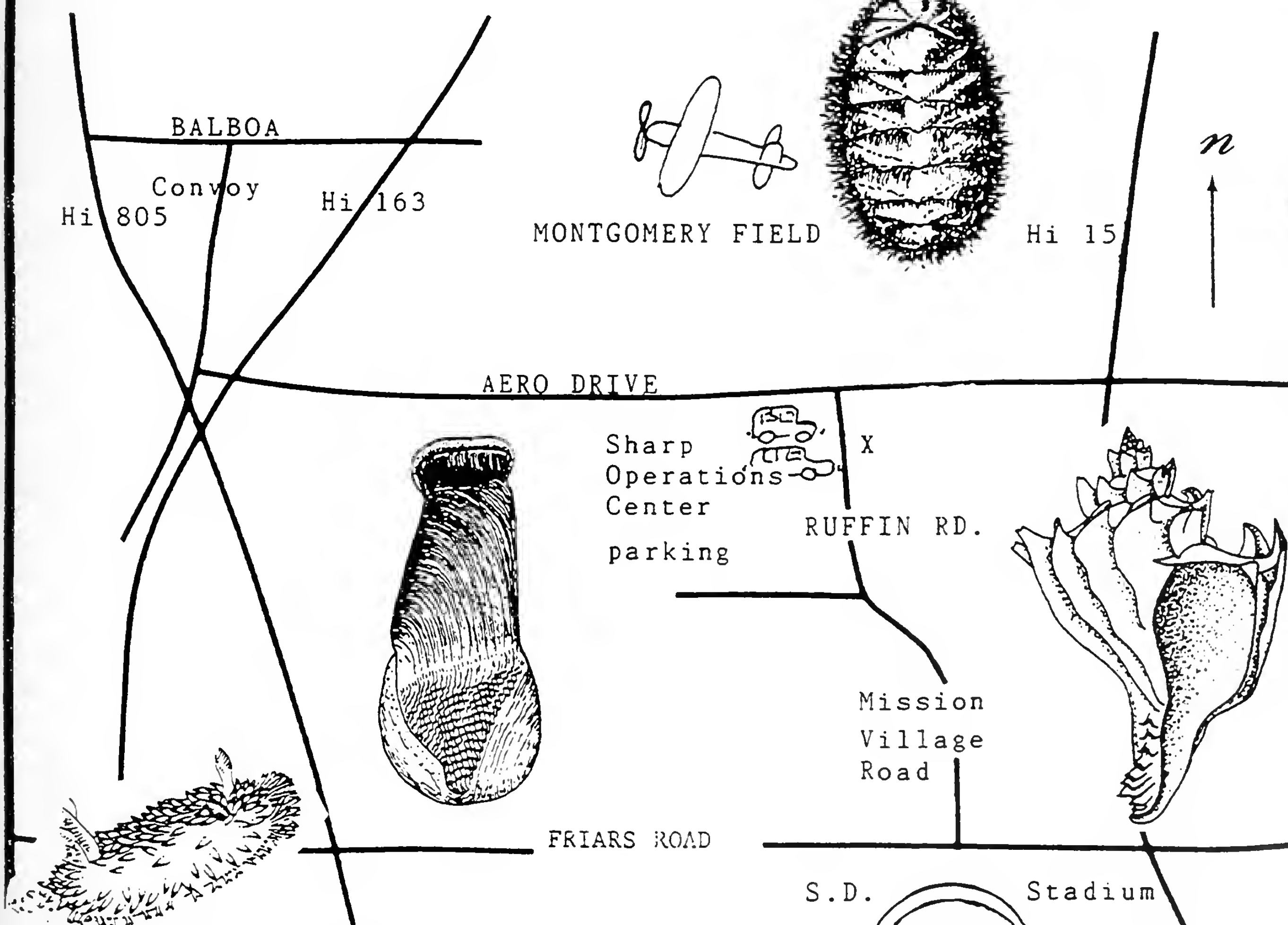
April 21, 2001



DIRECTIONS TO THE AUCTION: from 805: exit onto Balboa, east to Convoy, south to Aero Dr., east to Ruffin Rd., south about a block or two. Clubhouse on East side of street; park at Sharp Operations Center on West side.
From San Diego Stadium on Friars Road: up Mission Village Drive to Ruffin Rd., right turn or north about a half mile, parking on the west side of the street at Sharp Operations Center across from the Clubhouse.
THE ADDRESS: 3575 Ruffin Rd. at the Summer Hill Clubhouse.
TIME: 5:00 p.m. - ??

REMEMBER TO BRING: Your potluck dish with serving utensils. Also, please bring eating utensils for yourself (plates, cups and napkins will be provided). And come ready to have fun!!



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PROGRAM

"Deception Island - Antarctic Adventure"

Larry Lovell, Collection Manager of Benthic Invertebrates at Scripps Institution of Oceanography, will host the May meeting at Endurance Hall at Scripps. The evening will begin with Larry's slide presentation on his recent trip to the Antarctic.

Following his talk, members will be invited to view the benthic invertebrate collection in its new quarters and enjoy refreshments in that area.

Meeting date: May 17, 2001
Meeting place: Endurance Hall, Scripps Institution of Oceanography
(See enclosed flyer for directions.)

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CLUB NEWS

Dr. James H. McLean Retires

The retirement of Dr. James H. McLean from the Malacology Department of the Los Angeles County Museum has just been announced. He is succeeded by Dr. Ángel Valdés, who has been working at the California Academy of Sciences under Dr. Terrence Gosliner in a post-doctoral capacity.

We wish Dr. Valdés well in his new position and are confident that Dr. McLean will enjoy his retirement — and remain in the Malacology Department working on his many research projects.

The 47th Annual Greater San Diego Science and Engineering Fair

For its 29th consecutive year, the San Diego Shell Club has participated in the Greater San Diego Science and Engineering Fair. This year the Club's judges were Carole Hertz (chair), Barbara Myers and Marilyn Perrin.

They chose as this year's Club award winner, Karla Franco, a 12th grader at Mt. Miguel High School. Karla also won a 2nd place in Zoology in the senior division, a Scripps Institution of Oceanography award, and a Sea World award for her project entitled, "Rates of Nematocyst and Spirocyst Discharge between Clone Anemone Colonies."

Karla will be able to choose her award from three books offered each year by the Club: either Barnes' *Invertebrate Zoology*; Ricketts, Calvin & Hedgpeth's *Between Pacific Tides*; or Morris, Abbott & Haderlie's *Intertidal Invertebrates of California*.

A date will be selected for Karla to present an overview of her winning project to the Club and receive the Club's book award of her choice.

Opening of the New Wing of the San Diego Natural History Museum

The first week of April saw the long-awaited opening of the grand new wing of the San Diego Natural History Museum. Already completed in this newly-expanded area is the welcoming Atrium at the new north entrance, the Legler Benbough Exhibition Hall of some 8500 square feet, an 1800 square foot museum store off the Atrium and the stunning new 300-seat Charmaine and Maurice Kaplan Theater.

The giant-screen film, *Ocean Oasis*, a San Diego Natural History Museum/Pronatura production, is currently showing in this multi-use theater. The almost one-hour long film has some of the most beautiful and fascinating nature sequences that this writer has ever seen. It is certainly a must for those interested in the world of the Golfo de California and the Baja California desert.

Addition to the Roster

Renewal

Perrone, Antonio, via Palermo 7, 73014 Gallipoli, Italy

LUCINOID? A NEW E-MAIL DISCUSSION GROUP

There have been a considerable number of publications recently on lucinoid bivalve mollusks. Because of this growing interest in the coevolution of chemosynthetic symbionts, recent discoveries of new deepwater faunas, breakthroughs in functional morphology, and fossil relationships, enhanced communication among workers of the Lucinoidea is much desired. All individuals or organizations interested in lucinoid bivalve mollusks are invited to join and participate in a new e-mail discussion group.

To subscribe to the list:

1. Send an e-mail to: lucinoid-request@sbnature2.org
2. In the body of the text include the word ?subscribe?
3. You will receive an e-mail verification of your intent to subscribe. Simply reply to this verification request and you will be subscribed to the discussion list.

Make sure your e-mail is sent in ?plain text? format, not in ?MIME? or ?HTML? format.

If you have questions or problems, please send an e-mail to me at pvscott@sbnature2.org

Paul Valentich Scott

EULIMIDAE (MOLLUSCA) FROM THE SAN FELIPE AREA, BAJA CALIFORNIA, MÉXICO, IN THE GEMMELL COLLECTION

BARBARA W. MYERS[1], CAROLE M. HERTZ[2]
Santa Barbara Museum of Natural History,
2559 Puesta del Sol Road, Santa Barbara, California 93105-2936, USA

JOYCE GEMMELL
Ridgecrest, 13594 Highway 8 Business, space 50
Lakeside, California 92040, USA

Introduction: In our continuing study of the Gemmell Collection from the San Felipe area in the northern Golfo de California, México, we have been examining species in the family Eulimidae collected by Gemmell. Six of the 14 species collected are newly reported here from the San Felipe area: *Eulima salsa, E. townsendi, Niso interrupta, Turveria encopendema, T. pallida*, and *Vitreolina yod*. All other species collected by Gemmell are illustrated here as well, although we have been unable to identify most of them beyond the genus level. These species are *Niso excolpa* and species of *Eulima, Microeulima, Melanella* and *Hypermastus*. They were not collected with their hosts and many were collected dead. The Gemmell specimens were compared with material in the Carol Skoglund Collection. Many of her specimens were examined by Dr. Anders Warén in July 1994 some of which he identified only to genus. Where, in the text, we credit Warén with the identifications, it is our decision based on Skoglund material he studied.

The eulimids in the Gemmell Collection are currently housed in the Marine Invertebrate Department of the San Diego Natural History Museum.

Format: The species are listed in taxonomic order according to Keen (1971) as updated by Skoglund (1992) and each species is illustrated by a camera lucida drawing by Gemmell. An asterisk before a species indicates a range extension, with each species entry followed by the original citation, synonyms, if present, number of specimens and size range (length only), collecting data for the species, remarks, if any, and previously known distribution. For more information on the collecting areas mentioned here, see Gemmell, Myers & Hertz, 1987.

Family EULIMIDAE
Eulima Risso, 1826
**Eulima salsa* (Bartsch, 1927)
(Figure 1)
Proceedings of the United States National Museum 69(2646): 18, 19, pl. 3, fig. 4.

Specimens collected: 2 specimens, 12.4 & 15.4 mm L, dead. Dredged by the fishing boat *Chamizal II* [Station 4,5] W end of Isla El Muerto & W end of Isla Salvatierra [30°04'30", 114°33'42"W and 29°57'48"N, 114°28'00"W], 1.6 km (1 mi) offshore in sand and pumice from 1.8-4.6 m (6-15 fm), 8-9 July 1969.

Remarks: The glossy light tan shell with occasional squarish brown dots and semi-transparent bands at the suture is long and slender. Warén (1983:13) states that these color patterns "...are usually specific for the species."

We compared the Gemmell specimens with two lots of *Eulima salsa* in the Skoglund Collection determined by A. Warén in July 1994. We consider the Gemmell specimens conspecific with those in the Skoglund Collection.

[1]Mailing address: 3761 Mt. Augustus Ave., San Diego, CA 92111, USA.

[2]Mailing address: 3883 Mt. Blackburn Ave., San Diego, CA 92111, USA.

Distribution: Ecuador (Keen, 1971); off Bahía San Carlos, Sonora, México [25 specimens] and San Marcos, S of Santa Rosalia, Baja California Sur, México [3 specimens] (Skoglund Collection, unpublished). This is the first report of the species in the northern Golfo de California at Bahía San Luis Gonzaga.

**Eulima townsendi* (Bartsch, 1917)
(Figure 2)

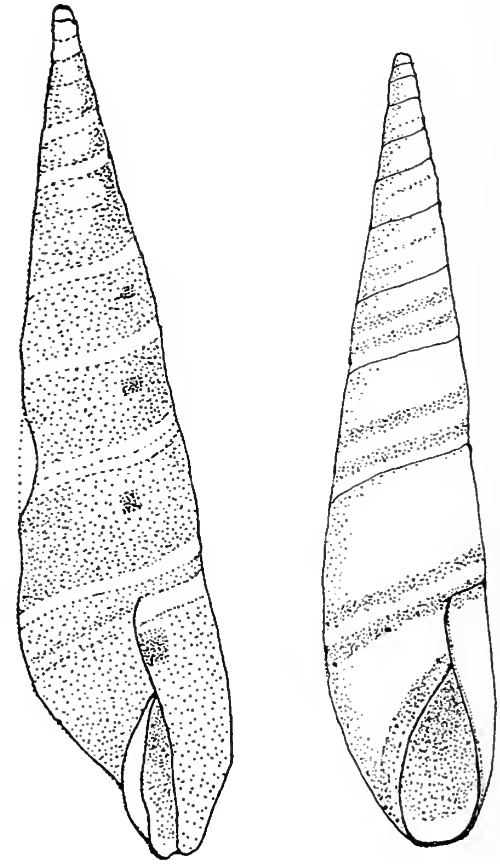
Proceedings of the United States National Museum 53: 340, pl. 46, fig. 4.

Specimens collected: 2 specimens, 4.7 & 5.4 mm L, 19 km (12 mi) N of Pta. San Felipe, in drift.
Remarks: This slender, semi-transparent, light tan shell has two prominent brown spiral lines mid-whorl on each whorl. The Gemmell specimens were compared with *Eulima panamensis, E. lapazana* and *E. townsendi* all of (Bartsch, 1917) from Isla Smith, Bahía de los Angeles, Golfo de California in the Skoglund Collection. These specimens are conspecific with *E. townsendi* in her collection, as determined by A. Warén, July 1994.
Distribution: Guaymas, Sonora, México (DuShane & Poorman, 1967); La Paz, Golfo de California (Keen, 1971); Manabí Province, Ecuador (Shasky, 1984). This is the first published record of the species in the northern Golfo de California.

Microeulima Warén, 1992
=*Balcis* Leach, 1847
Microeulima sp.
(Figure 3)

Specimen collected: 1 specimen, 3.0 mm L, Campo Uno, San Felipe, in drift, 20 June 1969.
Remarks: Examination of this specimen found no chink or umbilicus visible; a straight columella; axial microsculpture evident under 50X magnification on penultimate and final whorls; at least a 3-whorled protoconch; aperture angulate, broad.

Warén (1992: 183) characterized the genus as small with brownish color [Gemmell specimen white] with "fine, sharp, indistinct axial lines present." We compared the Gemmell specimen with a lot of five Skoglund specimens (from Bahía Concepción) of *Microeulima* as determined by Warén (July 1994). Three specimens in the lot had an angulate aperture, the other two more rounded, and no axial sculpture was



Figures 1, 2. (1) *Eulima salsa* (Bartsch, 1927), 15.4 mm, profile view showing squarish brown spots (2) *Eulima townsendi* (Bartsch, 1917), 5.4 mm, apertural view showing prominent brown spiral lines.

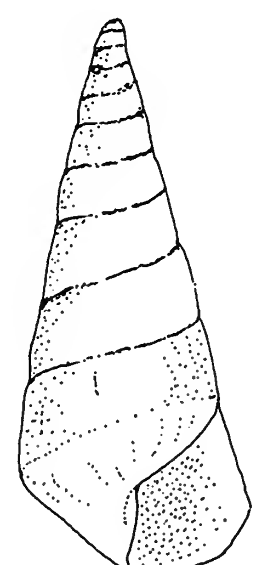


Figure 3. *Microeulima* sp., 3.0 mm, apertural view showing angulate body whorl reflected in the aperture.

visible on the 5 specimens. The Gemmell specimen has an angulate body whorl and aperture.

Melanella Bowdich, 1822
Melanella sp. 1
(Figure 4)

Specimens collected: 55 specimens, 3.8-10.0 mm L, San Felipe, dredged in 18-24 m (60-80 ft) in shrimp nets, from seastar stomachs, 11 November 1971 & 3-4 March 1972.

Remarks: Glossy white shell with dense opaque-white spiral bands just below the suture. Protoconch of approximately 3-4 glassy whorls; aperture slanted-teardrop shape with swelling on interior of outer lip just below the sulcus.

The 7.0 mm L specimen shown here was illustrated in Gemmell, Hertz & Myers (1980, p.39, fig. 4) as *Balcis* sp. In that paper the specimens were separated into two lots trawled at the same locality with different dates. Warén (1983: 32) states, "*Balcis* [Leach, 1847] can hardly be separated from *Melanella*, but might be kept as a subgenus. I have seen a few Pacific species which might be placed in that subgenus." McLean (1996) considers *Balcis* a genus, but did not treat the Panamic eulimids.

Melanella sp. 2.
(Figure 5)

Specimens collected: 2 specimens, 4.7-4.8 mm L, Playa Alicia, San Felipe, in fine sand among rocks during minus 1.5-1.8 m (minus 5-6 ft tide), 6:00-6:30 a.m., 14-16 March 1976.

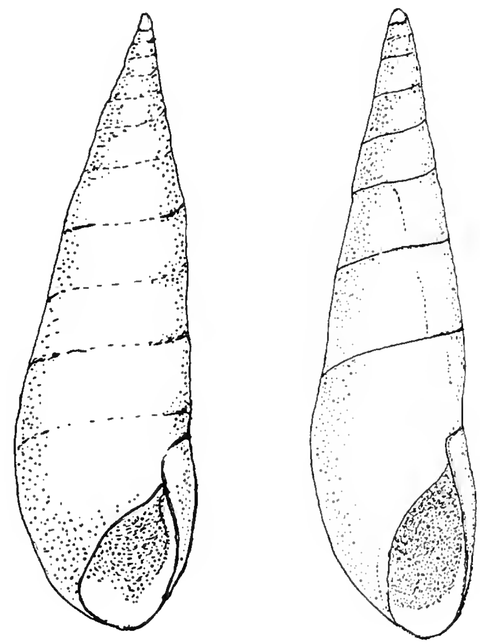
Remarks: The white semi-transparent specimens have 9 whorls including the protoconch, are straight-sided and tapering with no spots or sculpture. The aperture is teardrop-shaped. The scars from the former positions of the outer lip can be seen in this species.

Melanella sp. 3
(Figure 6)

Specimens collected: 15 specimens, 3.4 to 7.3 mm L, Campo Uno, San Felipe, intertidal in drift, 30 June 1969.

10 specimens 2.6 to 5.0 mm L, Campo Uno, San Felipe, intertidal on -1.5 m (-5.0 ft.) low tide.

Remarks: The species is glassy, flat-sided with 10-11



Figures 4, 5. (4) *Melanella* sp. 1, 7.0 mm, apertural view. Note swelling on interior of outer lip. (5) *Melanella* sp. 2, 4.7 mm, apertural view. Note the scars from the previous lips.

whorls; a somewhat reflected inner lip with the aperture broadly ovate. It was compared with specimens of *Melanella* in the C. Skoglund Collection. We consider them conspecific with her *Melanella* sp. 1, determined by A. Warén, July 1994.

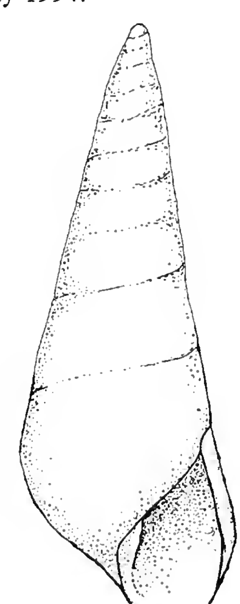


Figure 6. *Melanella* sp. 3, 5.0 mm, apertural view showing inner lip reflected.

Melanella sp. 4
(Figure 7)

Specimens collected: 1 specimen, 6.0 mm L, Campo Uno, San Felipe, in -1.4 m (-5.0 ft) low tide, on mud flat, dead collected.
Remarks: The specimen is thick-shelled, flat-sided, tapering, with a thickened callus on inside of outer lip; shell white, opaque, shiny, lightly tinged with tan on body whorl and above; no axial or spiral sculpture seen under magnification.

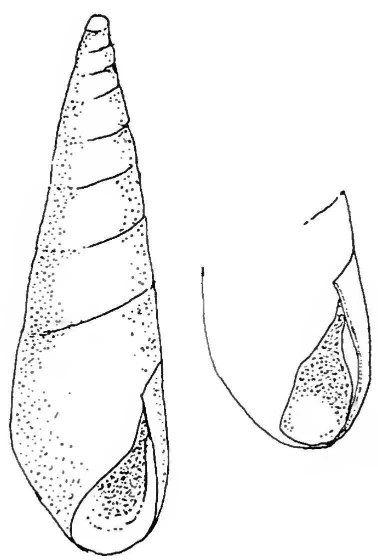


Figure 7. *Melanella* sp. 4, 6.0 mm, apertural view and detail of aperture showing thickening on interior of outer lip.

Niso Risso, 1826
Niso excolpa Bartsch, 1917
(Figure 8)

Proceedings of the United States National Museum 53(2207): 348-349, pl. 48, fig. 4. Also figured: Keen #753 (holotype).

Specimens collected: 4 specimens, 15.0-15.9 mm L, dredged by shrimp boat *Chamizal* II off San Luis Gonzaga (29°47'N, 114°15'W), 12 July 1969, live collected with operculum.
Remarks: Shell glossy-tan, mottled with brown colorations of random axial lines and spots and faint spiral lines; 5-whorled protoconch, cream colored with no markings; umbilicus brown, aperture angulate, corneous amber-brown operculum. Compared with specimens of *N. excolpa* in the Skoglund Collection and found to be conspecific.
Distribution: S end of Isla Angel de la Guarda; off Isla Ceralvo; head of Bahía Concepción; off La Paz; Bahía Mulegé, all Golfo de California (Bartsch, 1917); Golfo de California to Panamá (Keen, 1971). Roca Consag, off San Felipe (DuShane & Brennan, 1969); Guaymas, Sonora, México (DuShane & Poorman, 1967).

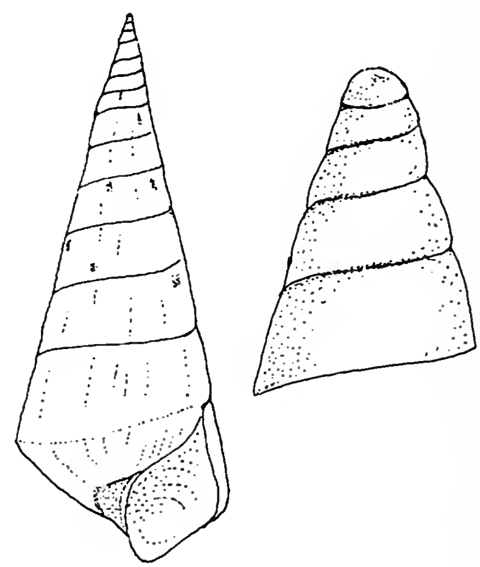


Figure 8. *Niso excolpa* Bartsch, 1917, 15.0 mm, detail of spire and apertural view of shell showing angulate outer lip and umbilicus.

**Niso interrupta* (G.B. Sowerby 1st , 1834)
(Figure 9)

Proceedings of the Zoological Society of London [for 1833]: 7. Figured: Keen #750; Emerson (1965, figs. 4, 5).

Specimen collected: 1 specimen, 13.2 mm L, dredged in the northern Golfo de California, between San Felipe and San Luis Gonzaga
Remarks: Shell opaque, shiny white; umbilicus deep, broad; columellar area stained brown; outer lip stained

brown as well as occasional brown stains on spire (tip of spire broken); body whorl angulate. Bartsch (1917: 349) mentions microscopic fine spiral lines on the shell. We have not found this on the Gemmell specimen under 50x magnification.

Distribution: Guaymas, Sonora, México (DuShane & Poorman, 1967); Golfo de California near Isla San Pedro Martír to Guayaquil, Ecuador (Keen, 1971); S to Bahía de Panamá; off Corinto, Nicaragua; off Port Parker, Costa Rica; off Isla Tobaquilla, Panamá (Emerson, 1965). This is the first record of the species in the northern Golfo de California.

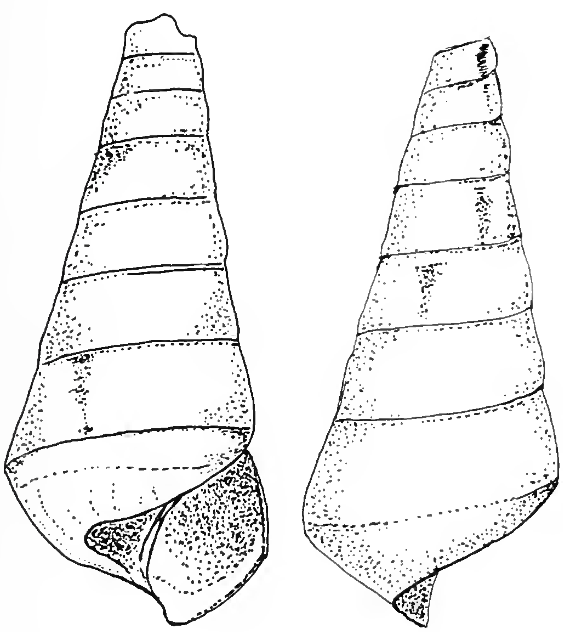


Figure 9. *Niso interrupta* (Sowerby 1st, 1834), 13.2 mm, apertural and dorsal views of decollate specimen showing umbilicus.

Genus *Turveria* Berry, 1956

**Turveria encopendema* Berry, 1956
(Figure 10)

American Midland Naturalist 56(2): 355-357, fig. 2. Also figured: Keen # 762

Specimens collected: 5 juvenile specimens of *Turveria encopendema* on 3 specimens of sand dollar *Encope grandis* Agassiz, 1841. [Two specimens later fell off (approx. 1 mm each).] All live collected at -1.5 m [-5.0 ft] low tide at edge of water, 5 km (3 mi) south of Punta Estrella, 2 May 1973.

1 specimen, 4.0 mm L, San Felipe, 19 km (12 mi) N of Pta. San Felipe, in drift.

Remarks: See Warén & Crossland, 1991: 108, figs. 12 H,I, 13 A,H. Berry (1956, p. 355, fig. 1) shows a studio photograph of the sand dollar *Encope grandis* with the *T. encopendema* on it. Draper (1982, figs, 1-4, 6) show the species *in situ*.

The Gemmell shells are glassy with brown bands. Since both *T. encopendema* and *T. pallida* Warén, 1992, are reported to be found on *Encope grandis* (Warén, 1992), we compared the Gemmell specimens of *Turveria* with specimens of *T. encopendema* and *T. pallida* in the C. Skoglund Collection for which identifications were confirmed by A. Warén in July 1994. The five Gemmell specimens listed above are conspecific with the *T. encopendema* in the Skoglund Collection.

Distribution: Sonora, México on *Encope* (Keen, 1971); Bahía San Luis Gonzaga and Bahía La Paz, Golfo de California (Warén & Crossland, 1991). This is the first report of the species from the northern Golfo de California at San Felipe, approximately 160 km (100 mi) north of Bahía San Luis Gonzaga.

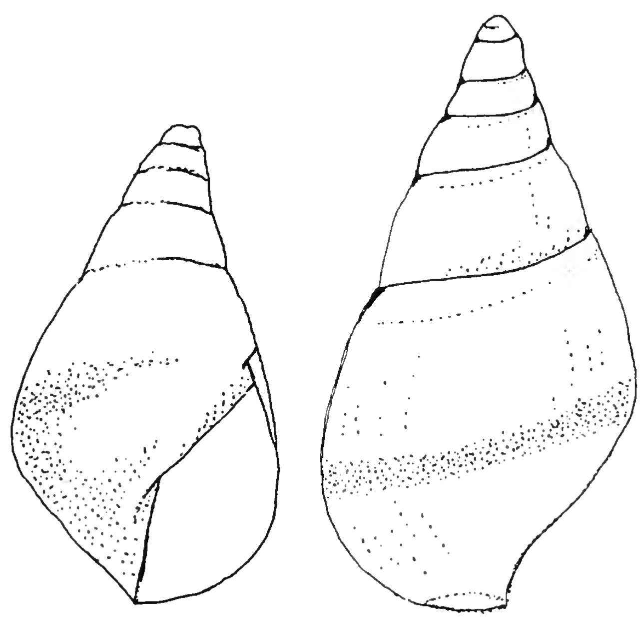


Figure 10. *Turveria encopendema* Berry, 1956, apertural view of 1.0 mm specimen showing umbilicus; dorsal view of 1.2 mm specimen showing brown spiral line on body whorl.

Turveria pallida Warén, 1992
(Figure 11)

The Veliger 35(3): 179, figs. 7. 8, 13 (paratype).

Synonym: *Turveria schwengelae* Warén, 1991 *not* Bartsch, 1938.
Specimens collected: 11 specimens, 4.6-9.0 mm L, Bahía San Felipe at Pta. Estrella [Station G], intertidal at -1.0 to -1.8 m (-4.0 to -6.0 ft) low tides, 11-13 May 1972, from seastar stomachs, bodies within.
1 specimen, 4.4 mm, Playa Alicia, San Felipe, in grunge, dead.
1 specimen, 4.3 mm, 19 km (12 mi.) N of Pta. San Felipe, dead.
Remarks: This species is figured in Gemmell Hertz & Myers (1980: 39, fig. 23) as *Balcis* sp. This specimen has brown spots on the outer lip and on the suture at irregular intervals. Warén (1992: 179) states the species has one "blotch at the lower part of the outer lip and one less-distinct sometimes absent similar spot just below the corner between the outer lip and the suture."
Distribution: Isla Willard, Bahía San Luis Gonzaga, Baja California; Bahía Concepción, Baja California Sur, México (Warén, 1992). This is the first report of the species in the San Felipe area.

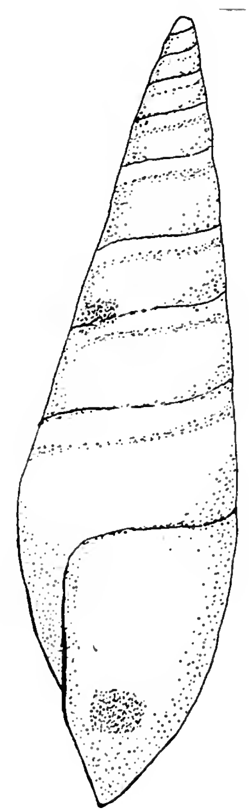


Figure 11. *Turveria pallida* Warén, 1992, 5.0 mm, profile view showing squarish brown spots.

Hypermastus Pilsbry, 1899
Hypermastus sp.
(Figure 12)

Specimens collected: 4 specimens, 4.0-5.4 mm L (all but one specimen decollate), 8 km (5 mi) N of Pta. San Felipe, in drift.
Remarks: Shell with one-whorled rounded protoconch, nine teleoconch whorls, color opaque shiny-white, suture slightly impressed; inner lip reflected, base of aperture squared off (see detail, Figure 12).

Warén (1983: 16-18) states "Almost all eulimids have scars from earlier positions of the outer lip. These are formed by the growth pattern typical for eulimids: they grow rapidly 0.3-1 whorl and then they stay at that size for a considerable time. During this standstill in growth, the outer lip is thickened and when it starts growing again, there is left a scar marking the position and the shape of the old lip. These scars appear very regularly in some species, in others the intervals are variable." In the Gemmell specimen illustrated here, this scar is apparent and forms a continuous line up the spire. We also compared the Gemmell specimens with

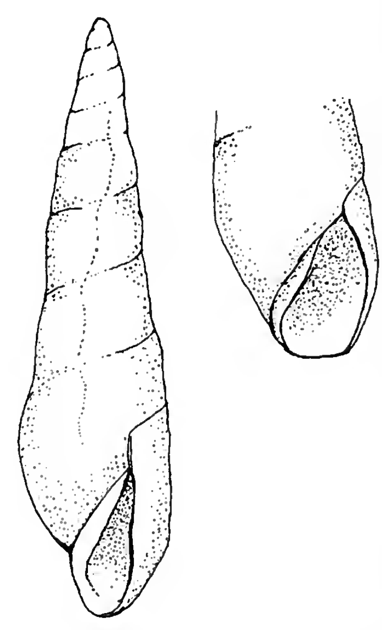


Figure 12. *Hypermastus* sp., 4.0 mm, profile view showing scars of previous lips and detail of aperture showing reflection of inner lip and squared-off base of aperture.

two lots of *Hypermastus* in the C. Skoglund Collection, from Bahía Banderas, Nayarit, and Bahía Santiago, Colima, México [Skoglund, sp. 1], determined by Warén (July 1994) and found them to be conspecific with Skoglund's sp. 1.

Genus *Vitreolina* Monterosato, 1884

**Vitreolina yod* (Carpenter, 1857)
(Figure 13)

A catalogue of the collection of Mazatlan shells in the British Museum. pp 441-442. Figured: Brann (1966, Tablet 2027[556], p. 73); Keen (1971, #740 [from Bartsch (1917, p. 330, pl. 40, fig. 9)]; Keen (1968:407, text fig. 35).
Synonym: *Melanella taravali* Bartsch, 1917: 330.
Specimens collected: 7 specimens, 1.4-2.0 mm L, dredged by shrimp boat *Chamizal* I 13 km [8 mi] ENE of Roca Consag (31°08'30"N,114°21'W, course 340°) on clumps of *Pteria sterna* (Gould, 1851) from washings, collected live, 29 June 1968.
2 specimens, each 1.6 mm L, Playa Alicia, 35 km [22 mi] S of San Felipe, in grunge, dead.
1 specimen, 3.4 mm L, Campo Uno, San Felipe, in drift, 30 June 1969.
Remarks: The species was placed in *Vitreolina* by McLean (1996: 76). In Keen (1971) the illustration used is from Bartsch (1917). Bartsch (1917: 330) stated he'd never seen the four Carpenter syntypes. Keen (1968: 407) wrote, "My own drawing [fig. 35] of the largest syntype differs only in the rendering of the inner lip." The Gemmell specimens match the drawing by Keen (1968). McLean (1996: 76) mentions 13 lots in the LACM collection from southern California.
Distribution: Guaymas to Mazatlán (Keen, 1971); N to Cabo Tepoca (Skoglund, 1974); Manabí Province, Ecuador (Shasky, 1984); Puerto Peñasco (Koch, 1992). Santa Maria Basin, California, to Mazatlán (McLean, 1996). This is the first record of the species in the San Felipe area.

Eulimidae sp. 1
(Figure 14)

Specimens collected: 2 specimens, 5.0-6.0 mm L, Campo Uno, intertidal at low tide of -1.5 m (-5.0 ft) on mud flat.
Remarks: We compared these specimens with material in the Skoglund Collection determined by A. Warén

Figure 13. *Vitreolina yod* (Carpenter, 1857), 1.9 mm, apertural and dorsal view with detail of aperture.

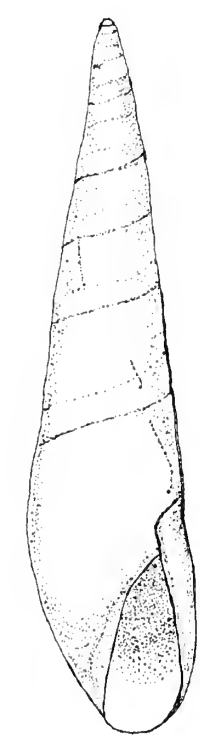


Figure 14. Eulimidae sp. 1, 6.0 mm, apertural view showing "false suture" and thin callus on inner lip.

(July 1994) and labeled "Eulimidae sp. 12". The Gemmell specimens seem to match this material. The species has 10-11 straight-sided flat whorls, shell long, slender with minutely pitted surface; first three whorls including rounded protoconch transparent and glossy; rest of teleoconch opaque with area of "false suture" semi-transparent; indistinct suture below the transparent band; frequent scars from former outer lip edges. Aperture elongate, teardrop-shaped, inner lip thinly callused.

ACKNOWLEDGMENTS

Carol Skoglund lent comparative material and the San Diego Natural History Museum made work space available to us. We thank them both.

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A NOTE ON THE DISTRIBUTION OF *STRIATURA PUGETENSIS* IN BRITISH COLUMBIA

ROBERT G. FORSYTH
2574 Graham Street, Victoria, British Columbia, Canada V8T 3Y7;
E-mail: robert_forsyth@telus.net

The range of *Striatura pugetensis* (Dall, 1895) (Figure 1) is generally given to extend from Vancouver Island, British Columbia, south to southern California and Isla Guadalupe, Baja California, Mexico, east to Glacier National Park, Montana, and on the island of Kauai (Berry 1919; Pilsbry 1946; Smith et al. 1990). There are no records of this species north of Vancouver Island, with the exception of some recently acquired material from the Queen Charlotte Islands (Forsyth, in preparation). *S. pugetensis* is suspected to occur along the mainland north coast of British Columbia, but this is a region of difficult access that has yet to be investigated for small terrestrial mollusk species. This species has not previously been found east of the Coast Mountains in British Columbia.

One specimen (Staatliches Museum für Naturkunde Görlitz, p5960) was collected on 14 July 1998 by H. Reise and J.M.C. Hutchinson at Thunder River rest area, Highway 5, NE of Blue River, Cariboo Mountains (Columbia Mountains) B.C. (52°13.55´N, 119°13.00´W; elevation approximately 690 m). The shell measures 1.8 mm wide and has 2¾ whorls. The umbilicus is 0.54 mm wide. This example is slightly larger than the majority of coastal British Columbia examples seen but is within the dimensions given by Berry (1919) for Glacier National Park material, which he characterized as larger, flatter and coarser than coastal shells.

The discovery of *Striatura pugetensis* in British Columbia east of the Interior Plateau in the Interior Wet Belt implies a broader distribution for this species away from the coast and is the first inland record (east of the Coast Mountains) for British Columbia. This locality is over 500 km east of Bella Coola on the coast and approximately 70 km southwest of the closest point of the crest of the Rockies.

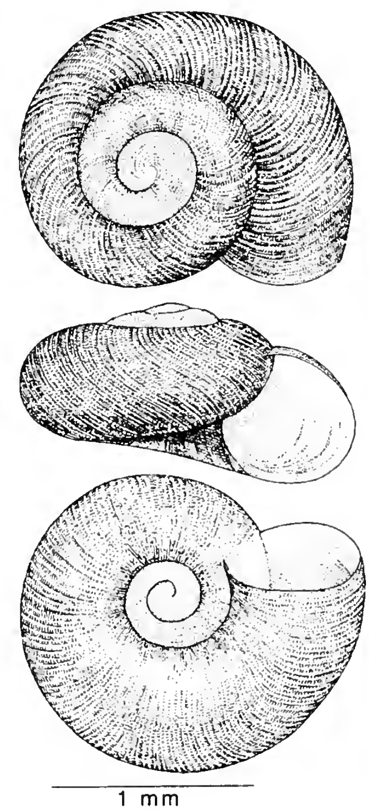

Figure 1. *Striatura pugetensis*; a specimen from Surrey, British Columbia.

I thank Heike Reise (Staatliches Museum für Naturkunde Görlitz) and John M.C. Hutchinson (Max Planck Institute for Human Development, Berlin) for allowing me the opportunity to view the specimen.

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2001 SUMMER & FALL SHELL SHOWS AND MEETINGS

Compiled by DONALD DAN
6704 Overlook Drive, Ft. Myers, FL 33919, U.S.A.
E-mail: donaldan@aol.com

Jun. 26 - Jul. 1. Oregon Shell Show, Portland, OR. Oregon Museum of Science & Industry, Portland. Maxine Hale, 347 N.E. 136 Avenue, Portland, OR. 97230-3308, (503) 253-5379.

Jul. 7-11. Conchologists of America Annual Convention, Port Canaveral, FL, Radisson Resort at the Port. Bobbi Cordy, 385 Needle Blvd., Merritt Island, FL 32953. (321) 452-5736, E-mail: cordy@yourlink.net

Jul. 14-15. Jacksonville Shell Show, Jacksonville Beach, FL, Brampton Inn, 1201 N. First Street, Jacksonville Beach. Carol Rishel, 2115 Beach Avenue, Atlantic Beach, FL. (904) 247-7876, E-mail: rrishel@earthlink.net

Jul. 21-23. Keppel Bay Shell Show, Yeppoon, Queensland, Australia. Jean M. Offord, 277 McDougall St., N. Rockhampton, Qld. 4701, Australia. (79) 283-509

Jul. 28-29. Townsville Shell Show, Townsville, Queensland, Australia, Cutharinga Bowls Club on Harold Street, West End. Glenda Rowse, 19 Farrell Street, Kirwan 4814, Queensland, Australia. (7) 47 73 28 17

Aug. 17-18. Jersey Cape Shell Show, Stone Harbor, New Jersey, Wetlands Institute, Stone Harbor. Jersey Cape Shell Club, P.O. Box 124, Stone Harbor, NJ 08247. (609) 653-8017

Aug. 19-25. American Malacological Society / Unitas Joint Meeting, Vienna. University of Vienna, Vienna, Austria. Dr. Janice Voltzow, Department of Biology, University of Scranton, Scranton, PA 18510-4625. (570) 941-4378 E-mail: voltzowj2@scranton.edu

Sept. 14-16. North Carolina Shell Show, Pine Knoll Shores, NC, North Carolina Aquarium at Pine Knoll Shores. Ann Buddenhagen, 804 Westwood Drive, Raleigh, NC 27607. (919) 787-7103, E-mail: pabjetster@aol.com

Sept. 15-16. International Shells & Fossils Bourse, Ottmarsheim, France. Salle Polyvalente, Rue de la Priscine. Michel Rioual, 2 Rue des Vergers, 68490 Ottmarsheim, France. (3) 89-26-16-43

Sept. 28-30. Annual German Shell Fair, Öhringen KULTURA, Öhringen. Kurt Kreipl, Meeresmuseum, Höhenweg 6 D-74613 Öhringen-Cappel, Germany. 49 (7941) 62826 E-mail: meeresmuseum@t-online.de Fax: 49 (7941) 2065

Oct. 19-21. Sea Shell Searchers Shell Show, Lake Jackson, Texas, The Lake Jackson Civic Center. Wanda Coker 332 Banyan, Lake Jackson, Texas 77566. (979)297-0852, E-mail: sdcoker@brazosport.cc.tx.us

Oct. 27. British Shell Collectors' Club Shell Show, London, England, Napier Hall, Hide Place & Vincent Street. Kevin Brown, 12 Grainger Road, Isleworth, Middlesex TW7 6PQ, England. (181) 568-8333

Nov. 3 - 4. Philadelphia Shell Show, Philadelphia, PA, Academy of Natural Sciences, Parkway & 19th St. Al Schilling, 419 Linden Ave., Glenside, PA 19038. (215) 886-5807, E-mail: alsch@bellatlantic.net

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Website at: http://www.molluscs.net/SanDiegoShell Club/index.html Email: cmhertz@pacbell.net

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

PROGRAM

Kodiak — Alaska's Emerald Island

Club member and award-winning photographer, Richard Herrmann, will be the evening's speaker. His slide presentation will be on his recent trip to Kodiak Island, where he photographed above and below water with images of marine invertebrates, salmon and stunning views of this last frontier.

Meeting date: 19 July 2001
Shells of the month: Alaskan and cold-water mollusks

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CLUB NEWS

Minutes of the June 21st Meeting of the San Diego Shell Club

President Kim Hutsell called the meeting to order at 7:40 p.m. He welcomed everyone including guests and members from out of town who were in San Diego for the WSM meeting. He called for the approval of the minutes of the May meeting as published in *The Festivus*. The motion was approved by general consensus. The refreshment sign-up sheet was passed around. Vice President Jules Hertz mentioned that the list of upcoming speakers was published in *The Festivus*. Kathy Kalohi will be the presenter in October. Treasurer Linda Hutsell reported that the Auction was a success and the Club is financially solvent. As librarian, Linda mentioned that the new Haliotidae iconograph is going to be bound and will be available at the next meeting. The new *Registry of World Record Shells* contains over 1,000 new entries and is available to Club members at the discounted price of $20.00.

Carole Hertz announced that the WSM auction will be the following evening. Corresponding secretary Monika Forner said that all correspondence is up-to-date. Kim mentioned that he received a request from Elizabeth Glover that she has a collection for sale. If interested, see Kim for her phone number.

Karla Franco, the winner of the Club's Science Fair prize this year (among other awards), discussed the subject of her project, "Rates of Nematocyst and Spirocyst Discharge between Clone Anemone Colonies". Interestingly, her results were that the rates increased among their own colony rather than with their prey. She received her Club prize — a copy of the book, *Intertidal Invertebrates of California*.

Jules introduced the speaker for the evening, Monika Forner, a new member who recently relocated to San Diego from Boston. Monika gave a wonderful travelogue of her two trips to Trinidad and Tobago, off the eastern coast of the Caribbean. She began by showing scenes from a rain forest and bird sanctuary in Trinidad. There was a rich variety of bromeliads, orchids, ferns, trees, fungi, and birds including rare hummingbirds. She spotted butterflies, snakes, porcupines, iguana, giant tree frogs, and colored ants as well. Then she went on to the eastern part of Tobago, Charlotteville, where there are fewer tourists. She described it as unbelievably picturesque, remote and quiet, surrounded by many tropical flowers and fruit trees. Waterfalls, hibiscus, and wild ginger were everywhere. The most interesting features of the shells of the area are their unusual whiteness and the dwarf or record sizes of the shells. The same pattern was true in the gastropods as well as bivalves. She brought quite a few of the shells for viewing.

Thank you to Twila and Tom Critchlow, Billee and George Gerrodette, and George Kennedy for the delicious refreshments. Jules was the winner of the drawing. The meeting was adjourned at about 9:10 p.m.

Silvana Vollero

Additions and Changes to the Roster

New member

Monroe, Alice, 2468 Timbercrest Circle West, Clearwater, FL 33763-1626. Ph: 727-796-5115. E-mail: monroea@spjc.edu

Renewal

Knapik, Tom, 4669 71st St., La Mesa, CA 91941. Ph: 619-462-1805. E-mail: tkn1234@aol.com

Save the Date

The date for the Club's annual Christmas Dinner Party has been set. It will be on Saturday evening, December 8th. Mark your calendars.

IN MEMORIAM

Alex Kerstitch

Alex, a former member of the San Diego Shell Club, sometime contributor to *The Festivus* and longtime diver/collector/sea-life illustrator, passed away after a short illness at his home in Tucson, Arizona, on March 31st at the age of 61. See *The Festivus* [1993, 25(3): 29, 31, pl. 1, figs. 6-7, 1 text fig.; 1994, 26(4): 47, 49-50, pl. 1, figs. 5, 6].

NEW DISTRIBUTIONAL RECORDS FOR EIGHT EASTERN PACIFIC MOLLUSCAN SPECIES AT PANAMÁ

KIRSTIE L. KAISER[1]

Santa Barbara Museum of Natural History,
2559 Puesta del Sol Road, Santa Barbara, California 93105-2936, USA
E-mail: KLKaiser@pvnet.com.mx

In April 2000, I participated in the Smithsonian Tropical Research Institute's Oceanographic Expedition aboard the R/V *URRACÁ*. The nine day expedition consisted primarily in trawling the waters off the Pacific coast of Panamá, using an otter trawl with 60 x 33 cm boards and 6 mm inner net. The trawling was done at 3.0 knots with trawl times of 30-40 minutes. Depths ranging from 8 to 138 m were sampled and various substrates were encountered in the 170 trawls completed. The primary areas investigated were Bahía de Panamá and the Golfo de Chiriquí.

As for other collecting methods, the multi-disciplinary group of scientists boarded several Panamanian registered shrimp trawlers while at sea to collect live specimens from their hauls. These "camaroneros" used 2.0 cm mesh on otter trawls and normally trawled for three to four hours before bringing up their catch and releasing it on the large aft deck. Intertidal collecting was accomplished by using the small inflatables to drop several of us on shore during the low tides, while the R/V *URRACÁ* continued the trawling activities.

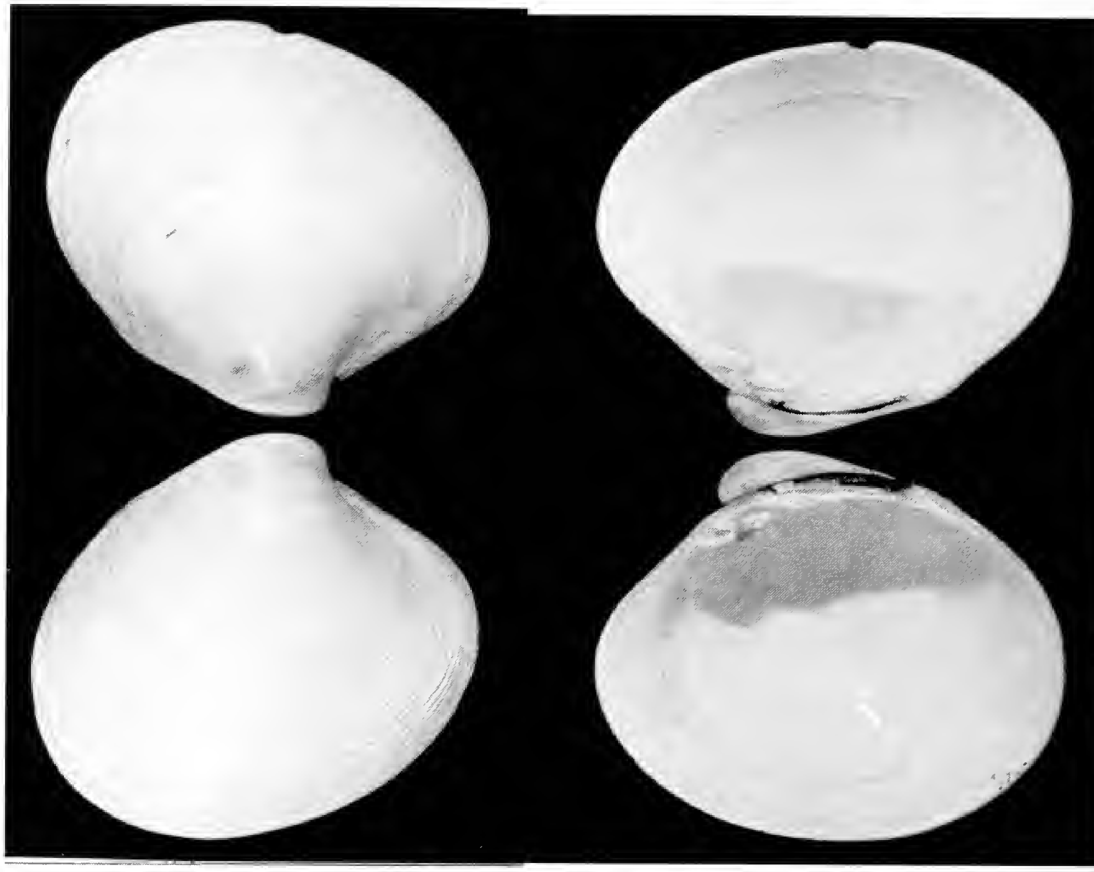
A large diversity of mollusks were collected, not all of which have been identified at this time. Eight of the molluscan species collected have not previously been reported from Panamá.

One of the new records is for *Raeta plicatella* (Lamarck, 1818). On 26 April 2000 two valves were trawled at 20-23 m, north of Isla Gobernadora and south of Isla Santa Catalina, Panamá (07°34.85'N, 81°14.69'W to 07°35.37'N, 81°16.41'W). In addition, in February 1999, I collected valves of *R. plicatella* at La Cruz de Huanacaxtle, Bahía de Banderas, Nayarit, México. Skoglund (2000) reported that this Atlantic species is present in the eastern Pacific from Bahía Matanchén, between Santa Cruz and Platanitos, Playa Novillero and Teacapan, all in the state of Nayarit, México. She also reported specimens trawled by shrimpers near Guaymas, Sonora, and found intertidally at Ensenada Blanca, San Felipe, Baja California, México, and she figured eastern Pacific specimens (Skoglund, 2000).

The specimen of *Pitar* (*Hyphantosoma*) *aletes* Hertlein & Strong, 1948, shown in Figures 1 and 2 was trawled north of Isla Gobernadora and south of Isla Santa Catalina, Panamá (07°33.59'N, 81°20.14'W to 07°34.19'N, 81°21.19'W), on 26 April 2000 at a depth of 52-55 m in a thick, brown mud substrate. The previously known distribution was from Arena Bank and Guaymas, Golfo de California, to Punta Judas, Costa Rica, at depths of 77 to 110 m (Keen, 1971). The specimen measures 38.8 mm in length by 33.5 mm in height.

A third new bivalve record for Panamá is *Cyathodonta dubiosa* Dall, 1915. The specimen shown in Figures 3 and 4 was trawled off the southeast corner of the Peninsula de Azuero, Golfo de Panamá (07°43.40'N, 79°54.33'W to 07°42.44'N, 79°52.92'W), on 24 April 2000 at a depth of 73 m in a sand substrate. The specimen measures 26.2 mm in length and 19.0 mm in height. Keen (1971) reported its distribution as San Pedro, California, to Guatemala in depths to 26 m. Coan (1990) reported this species from Isla Smith, Bahía de los Angeles, Baja California, and Punta San Antonio, Sonora, to Puerto Huatulco, Oaxaca, México, in depths of 13 to 183 m. Coan (1990) and Coan, Valentich Scott & Bernard (2000) stated that the California distribution records were for *Cyathodonta*

[1]Paseo de las Conchas Chinas #115, Depto 4, Fracc. Conchas Chinas, C. P. 48390 Puerto Vallarta, Jalisco, México.



Figures 1 and 2. *Pitar* (*Hyphantosoma*) *aletes* Hertlein & Strong, 1948. Size: 33.5 x 38.8 mm
(1) Dorsal view (2) Internal view of specimen shown in Figure 1. Photos: D.K. Mulliner.

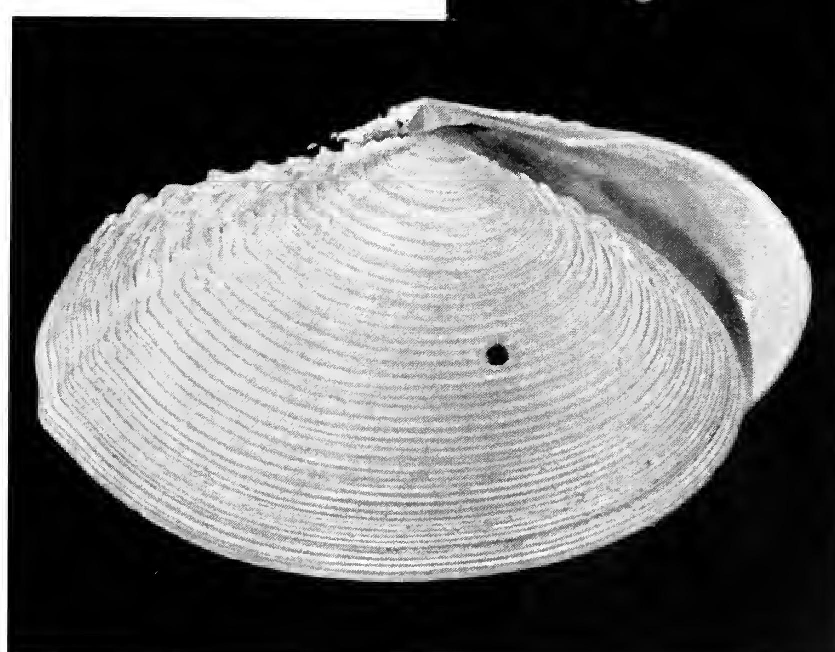
pedroana (Dall, 1915), not this species.

Two tellins were also trawled that had not been previously reported from Panamá. *Tellina* (*Phyllodina*) *pristiphora* Dall, 1900 (Figures 5 and 6), was trawled east of Isla de Coiba, Golfo de Chiriquí, Panamá (07°15.56'N, 81°14.93'W to 07°16.70'N, 81°13.68'W), on 28 April 2000 at a depth of 107-137 m, with the substrate of sand, mud and shell rubble. The shell is 30.1 mm in length and 19.3 mm in height. It was reported by Keen (1971) as occurring from Bahía Santa Inez, Golfo de California, to Puntarenas, Costa Rica, in 22 to 155 m, but she overlooked the occurrence near Guaymas, Sonora, México, reported by DuShane & Poorman (1967). A single valve of *Tellina* (*Tellinella*) *zacae* Hertlein & Strong, 1949 (Figure 7), was trawled off the southeast corner of the Peninsula de Azuero, Golfo de Panamá (07°34.56'N, 79°48.84'W to 07°33.23'N, 79°50.46'W), on 24 April 2000 at depths of 85-88 m on a sand substrate. The valve measures 36.4 mm in length by 16.5 mm in height. Keen (1971) reported this tellin as occurring in the southwestern part of the Golfo de California in 64 to 165 m. The range was extended to Isla Danzante, Golfo de California, México, by M. Mulliner (1996).

Three gastropod species were also collected that had not been previously reported from as far south as Panamá. *Crucibulum* (*Dispotaea*) *concameratum* Reeve, 1859, was trawled northeast of Isla Canal del Afuera and south of Punta Jabalif in the Golfo de Chiriquí, Panamá (07°54.75'N, 81°43.07'W to 07°56.61'N, 81°43.35'W), on 27 April 2000 at depths of 44-48 m with the substrate consisting of mud and shell rubble. The live-collected specimen shown in Figure 8 is 10.1 mm in length. Two additional specimens were trawled on 26 April 2000 north of Isla Gobernadora and south of Isla Santa Catalina, Panamá (07°34.85'N, 81°14.69'W to 07°35.37'N, 81°16.41'W), at 20-23 m in a substrate of thick brown mud. The previously

Figures 3 and 4. *Cyathodonta dubiosa* Dall, 1915. Size: 19.0 x 26.2 mm. (3) Dorsal view (4) External view of ligament of specimen shown in Figure 3.

Figures 5 and 6. *Tellina (Phyllodina) pristiphora* Dall, 1900. Size: 19.3 x 30.1 mm. (5) External view of ligament of specimen shown in Figure 6. (6) Dorsal view. Photos: D.K. Mulliner.



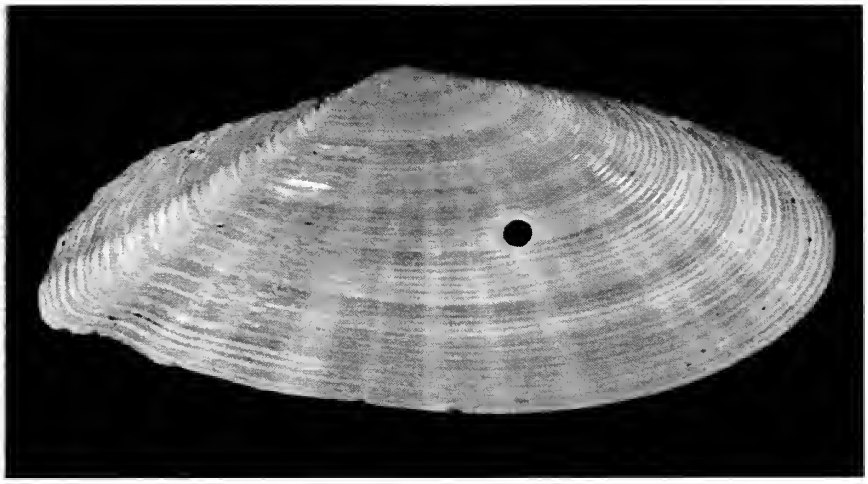


Figure 7. *Tellina (Tellinella) zacae* Hertlein & Strong, 1949.
Size: 16.5 x 36.4. Dorsal view of single valve. Photo: D.K. Mulliner.

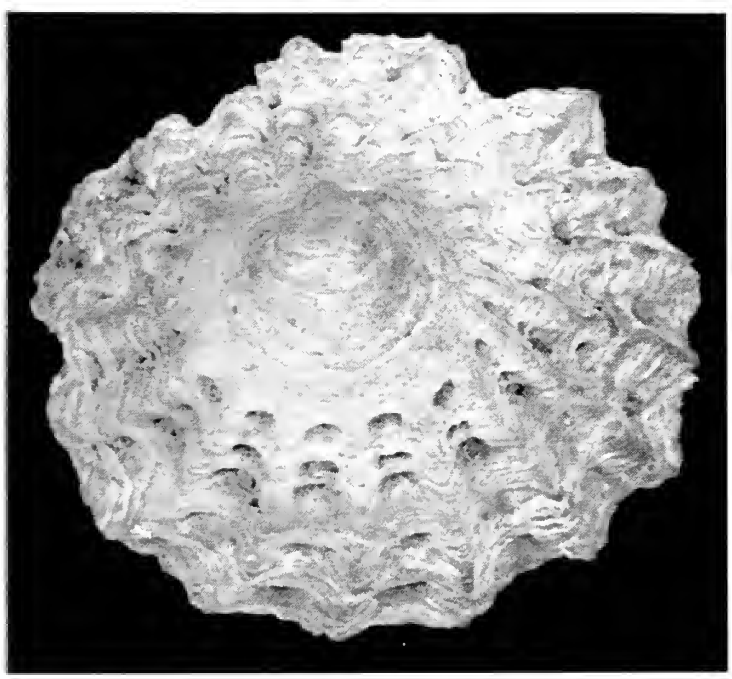


Figure 8. Dorsal view of *Crucibulum (Dispotaea) concameratum* Reeve, 1859. Length: 10.1 mm. Photo: D.K. Mulliner.

reported distribution was throughout the southern end of the Golfo de California and south to Acapulco, México, in depths of 7-90 m (Keen, 1971).

A second gastropod species new for Panamá is *Trajana perideris* (Pilsbry & Lowe, 1932). *Trajana acapulcana* (Pilsbry & Lowe, 1932) is a synonym

Figure 9. Apertural view of *Trajana perideris* (Pilsbry & Lowe, 1932). Length: 28.0 mm. Photo: D.K. Mulliner.

(Cernohorsky, 1980). The specimen shown in Figure 9 is from a lot of 22 trawled in Bahía de Parita, Bahía de Panamá, Panamá (07°54.05'N, 79°56.07'W to 07°53.60'N, 79°55.33'W), on 22 April 2000 at depths of 68-70 m in a substrate of coarse sand and mud.

Another specimen was trawled northeast of Isla del Canal de Afuera (07°54.75'N, 81°43.07'W to 07°56.61'N, 81°43.35'W), west off Isla de Coiba, Golfo de Chiriquí, Panamá on 27 April 2000 at depths of 44-48 m in a mud and shell rubble substrate. Keen (1971) reported *T. perideris* in the Golfo de California from La Paz, Baja California, to Guaymas, Sonora, México, and reported *T. acapulcana* from Acapulco, Guerrero, to the Golfo de Tehuantepec, Oaxaca, México. The range was extended south to the Golfo de Nicoya, Costa Rica (Cruz, 1996). The figured specimen has a length of 28.0 mm.

Agatrix strongi (Shasky, 1961) is also newly reported from Panamá. The specimen shown in Figure 10 was trawled east of Isla de Coiba, Golfo de Chiriquí, Panamá (07°15.56'N, 81°14.93W to 07°16.70N, 81°13.68W), on 28 April 2000, at depths of 107-137 m in a sand-mud and shell rubble substrate. The shell measures 17.2 mm in length. Keen (1971) reported it from the Golfo de California, from Punta Arena, Baja California, to Guaymas, Sonora, México, in depths of 37 to 165 m. The distribution was extended north on the Baja side of the Golfo de California to Isla Danzante in 200 m (Petit, pers comm., 1982, *in* Skoglund, 1992), Bahía de los Angeles, Baja California, México (Skoglund, 1988), and south to Mazatlán, Sinaloa, México (Hendrickx & Toledano Granados, 1994).

The author is indebted to Carol Skoglund and Carole & Jules Hertz for help in identifying, sorting and organizing the collected material. My thanks to D.K. Mulliner for photographing the voucher specimens. All the specimens discussed are housed in the K.L. Kaiser Collection.

Figure 10. Apertural view of *Agatrix strongi* (Shasky, 1961). Length: 17.2 mm. Photo: D.K. Mulliner.

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Issues and Supplements of THE FESTIVUS

Supplements

2001. **Panamic Province Molluscan Literature Additions and Changes from 1971 through 2000 I Bivalvia, II Polyplacophora** by Carol Skoglund, over 140 pp., spiral bound, $20 domestic postpaid, $25 overseas surface postpaid, $30 overseas air mail postpaid.

1999. **Illustration of the Types Named by S. Stillman Berry in His "Leaflets in Malacology" Revised** by Carole M. Hertz, 43 pp., 92 figs + cover photo, $15 domestic postpaid, $20 overseas surface postpaid, $25 overseas air mail postpaid.

1997. **The Recent Molluscan Marine Fauna of the Islas Galápagos** by Kirstie L. Kaiser, 67+ pp., $16 postpaid domestic, $20 overseas surface postpaid, $25 overseas airmail postpaid.

1996. **An Atlas of Cowrie Radulae (Mollusca: Gastropoda: Cypraeoidea: Cypraeidae)** by Hugh Bradner & E. Alison Kay, 179 pp., profusely illustrated. $25 postpaid domestic, $28 overseas surface postpaid, $32 overseas airmail postpaid.

1996. **Comprehensive Index to The Festivus 1970-1995**, compiled by Carole M. Hertz & Jules Hertz (pp. 1-31). $5 postpaid domestic, $6 overseas surface postpaid, $12 overseas airmail postpaid.

1992. **Additions to the Panamic Province Gastropod (Mollusca) Literature 1971 to 1992** by Carol Skoglund, (24: viii+169 pp.). $20 postpaid domestic, $22 overseas surface postpaid, $29 overseas airmail postpaid.

1990 **Additions to the Panamic Province Opisthobranch (Mollusca) Literature 1971 to 1990** by Carol Skoglund, (22:i-iii+27 pp.). $6 postpaid domestic, $7 overseas surface postpaid, $12 overseas airmail postpaid.

1988 **An Illustrated Catalogue of the Family Typhidae Cossmann, 1903** by Anthony D'Attilio & Carole M. Hertz, (20:73 pp., 109 figs). $11 postpaid domestic, $12 overseas surface postpaid, $15.50 overseas airmail postpaid.

1986 **A Faunal Study of the Bivalves of San Felipe and Environs, Gulf of California, from the Gemmell Collection (1965 to 1976)** by Joyce Gemmell, Barbara W. Myers & Carole M. Hertz (18:1-72 pp., 78 figs). $9 postpaid domestic, $10 overseas surface postpaid, $15.50 overseas airmail postpaid.

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Make checks payable to the San Diego Shell Club, c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111, USA. For further information contact Carole Hertz, phone: 858-277-6259, e-mail: cmhertz@pacbell.net or write to 3883 Mt. Blackburn Ave., San Diego, CA 92111, USA.

FIRST RECORDS OF THE EUROPEAN LAND SLUG *LEHMANNIA VALENTIANA* IN BRITISH COLUMBIA, CANADA

ROBERT G. FORSYTH

2574 Graham Street, Victoria, British Columbia V8T 3Y7, Canada
E-mail: robert_forsyth@telus.net

ABSTRACT: The synanthropic slug, *Lehmannia valentiana* (Férussac, 1821), is recorded in British Columbia for the first time. The identification of an adult specimen from Victoria, Vancouver Island, is confirmed by dissection. Additional records, based on undissected immature specimens, photographs and sightings, are known from nearby sites on southern Vancouver Island and from an island in the Strait of Georgia.

Some European terrestrial slugs have shown great ability for dispersal by human beings and colonize new areas throughout the world. Since the discovery of the first introduced species of slug in British Columbia by Taylor (1889, 1891), many additional species have been encountered. Presently there are at least 13 introduced species confirmed for the province, including *Lehmannia valentiana* (Férussac *in* Férussac & Deshayes, 1821) (Figure 1). The exact number of species is complicated by unconfirmed accounts and problems with species recognition in the genus *Arion*. Carl and Guiguet (1958, 1972) and Hanna (1966) summarized what was known for the exotic slug species in British Columbia before the mid-1970s. Rollo and Wellington (1975) presented updated and new information on European slugs in Greater Vancouver and the lower Fraser Valley. Most recently, Reise et al. (2000) detailed the first records of *Boettgerilla pallens* Simroth, 1912, in British Columbia and North America. Nevertheless, the extent of invasion by exotic slugs in British Columbia remains incompletely known.

A number of slug species have enlarged their range and become more abundant worldwide due to habitat modification by humans. Reduced species diversity brought on by agricultural and horticultural activities allow for synanthropic slug species to flourish. In turn, slugs are agricultural and horticultural pests, capable of much damage to crops (South, 1992; Waldén, 1960). Exotic slugs can also act as vectors of plant diseases and animal parasites, or compete with native species (South 1992; Rollo & Wellington, 1979; Rollo, 1983a, b).

Figure 1. *Lehmannia valentiana* from Victoria, British Columbia (RBCM 000-00147-001).

Lehmannia valentiana, native to the Iberian Peninsula, is now widely introduced in Europe and worldwide (Waldén, 1961; Kerney & Cameron, 1979; South, 1992). In North America, *Lehmannia valentiana* has also been recorded as *L. poirieri* (Mabille, 1883) and *L. marginata* (or *Limax marginatus*). *L. poirieri* is a synonym of *L. valentiana* (Waldén, 1960, 1961), and most North American records of *L. marginatus* were based on *L. valentiana* (Quick, 1960).

In Britain *L. valentiana* was known only from greenhouses until recently when it was discovered at open sites (Kerney, 1987). In North America it has been found in greenhouses and at cultivated or otherwise disturbed open sites (Getz & Chichester, 1971). *L. valentiana* is well established in California (Hanna, 1966, as *Limax marginatus*), but in Canada it is previously only known to be introduced into Winnepeg, Manitoba, where the species is confined to greenhouses and is incapable of overwintering in the open (Howe & Findlay, 1972). Among an assemblage of exotic slugs and snails in Lynnwood, Washington, Roth and Pearce (1984) did not find *L. valentiana*.

Introduction of *L. valentiana* into new areas is attributed to movement of plant material (Waldén, 1960; Howe & Findlay, 1972). Whereas *L. marginata* is arboreal, climbing trees and plants, *L. valentiana* is confined to the ground (Quick, 1960; Kerney & Cameron, 1979).

I report the first British Columbia records of *Lehmannia valentiana*. All are from open sites in the vicinity of Victoria.

Records of *Lehmannia* in British Columbia

Specimens of *Lehmannia* sp. were collected or observed at a several sites on southern Vancouver Island and the Gulf Islands, British Columbia. Specimens of *Lehmannia* are deposited in the Invertebrate Collection of the Royal British Columbia Museum (RBCM), Victoria. The map datum used for geopositions is NAD83.

Vancouver Island: Victoria: 2574 Graham Street (48°26.24´N, 123°21.33´W). RGF coll., 31 January 2000 (3 specimens, RBCM 000-00072-002), in compost bin. *Ibid.* RGF coll., 8 July 2000 (2 specimens, RBCM 000-00147-001), in compost.

Vancouver Island: Colwood: E of the mouth of Colwood Creek, Esquimalt Lagoon, Royal Roads University, (48°25.95´N, 123°28.02´W); RGF and K. Ovaska, observers, 29 July 2000 (1 individual, not collected), coniferous wooded area.

Vancouver Island: Saanich Peninsula: Central Saanich District Municipality: 2385 Twin View Drive (48°33.42´N, 123°24.75´W); K. Sendall, observor, 16 October 2000 (1 individual, not collected), in compost. *Ibid.* K. Sendall, collector, 28 October 2000 (2 individuals, RBCM 000-00149-001) in compost.

Gulf Islands: North Pender Island: shopping centre, Bedwell Harbour Road (48°46.78´N, 123°16.86´W); T.J. Forsyth and RGF, collectors, 6 June 1999 (2 specimens, RBCM 999-00147-004), in garden.

The Victoria site is an urban back yard, which also has an assortment of other exotic mollusks, including: *Arion hortensis* aggregate; *Arion subfuscus* (Draparnaud, 1805); *D. panormitanum* (Lessona & Pollonera, 1882); *Deroceras reticulatum* (Müller, 1774); *Limax maximus* Linnaeus, 1758; and *Oxychilus draparnaudi* (Beck, 1837).

The North Pender Island site has *Lehmannia valentiana* apparently confined to a narrow garden in a shopping complex. Ornamental shrubs and small trees are planted along the north wall of a grocery store. The garden is kept moist by its northern exposure and by a trickle of water from a pipe (presumably part of the air-conditioning system). The ground is covered with layers of plastic and bark mulch. Four species of mollusks were found in association with *Lehmannia*: *Arion subfuscus*; *Deroceras reticulatum*; *Oxychilus alliarius* (J.S. Miller, 1822); and *Vitrea contracta* (Westerlund, 1871).

The Esquimalt Lagoon site is a remnant natural forest with invasive plant species. The dominant trees are Douglas-fir (*Pseudotsuga menziesii menziesii*) and Western Redcedar (*Thuja plicata*). Western Yew (*Taxus brevifolia*) and willow (*Salix sp.*) were also present in the immediate area where *Lehmannia* was observed. Herbaceous plants included native Dull Oregon-grape (*Mahonia nervosa*) and naturalized Spurge-laurel (*Daphne laureola*). *Lehmannia* was observed on a piece of dead wood on the ground. Other species found in the immediate area were: *Ariolimax columbianus* (Gould, 1851); *Arion ater* aggregate; *Arion intermedius* Normand, 1852; *Haplotrema vancouverense* (Lea, 1839); *Lauria cylindracea* (da Costa, 1778); *Monadenia fidelis* (Gray, 1834); *Oxychilus alliarius*; *Punctum randolphii* Dall, 1895; and *Vespericola columbianus* (Lea, 1838).

In the absence of adult material from the North Pender Island and Esquimalt Lagoon sites, identification could not be verified by dissection. Identification of the Central Saanich individuals was based on photographs and external characters of subsequently collected material. All individuals, however, have the general appearance - body pigmentation, habits, etc. - of *L. valentiana*.

Similar species and identification

Lehmannia valentiana is a medium-sized slug (extended length up to approximately 70 mm) (Figure 1). The body is yellowish grey or yellowish violet, slightly darker on the head, and somewhat translucent. The mantle of *Lehmannia* bears a pattern of fine, close concentric ridges. Pigmentation of the mantle typically consists of a median dark band and a pair of dark lateral bands that form a lyre-shape. There usually is one dark band on each side of the tail and sometimes a second, weaker pair below. Young individuals tend to have darker markings, but the bands of adults are often paler and less conspicuous. The midline of the body has a ridge or keel on its posterior portion and not quite reaching the mantle. The sole is pale grey. The mucus is watery, not very sticky and colourless.

Genera that may be confused with *Lehmannia* include *Limax* and *Deroceras* because the mantle of these also bears a pattern of concentric ridges. Young *Lehmannia valentiana* and *Deroceras* spp. are especially closely similar in form. However, *Deroceras panormitanum* and *D. reticulatum* are never banded, and the sticky mucus of *D. reticulatum* often becomes milky white when the animal is irritated. A larger species, *Limax maximus* has a mottled rather than banded mantle and an overall different pigmentation and sticky mucus. Both *Limax* and *Deroceras* differ anatomically from *Lehmannia* (see for example, Quick, 1960).

Within the genus *Lehmannia*, the size and shape of the penial flagellum is important for identification of species (Waldén, 1961; Quick, 1960; Kerney & Cameron, 1979). *L. valentiana* is recognized from *L. marginata* by its short finger-like or slightly bulbous flagellum (Figure 2), not tapered and pointed as in *L. marginata*.

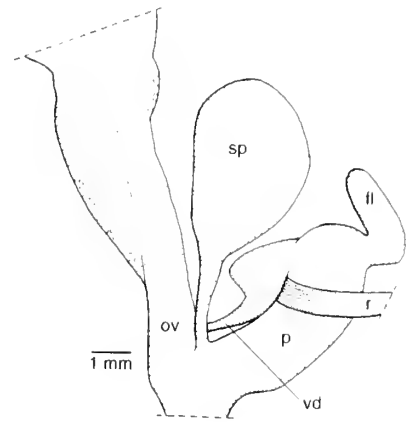

Figure 2. Distal genitalia of a Victoria, British Columbia specimen of *Lehmannia valentiana* (RBCM 000-072-002); fl = penial flagellum; ov = oviduct; p = penis; r = penial retractor; sp = spermatheca; vd = vas deferens.

ACKNOWLEDGMENTS

I thank Kristiina Ovaska, Victoria, for supplying the photograph in Figure 1; Kelly Sendall, Collection Manager, Invertebrates, Fish and Herpetology, RBCM, for providing details of his record of this species; and Tammy Forsyth, as always, for her assistance.

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WRITING FOR *THE FESTIVUS*

The Festivus publishes papers on all aspects of malacology (descriptions of new species are not accepted at this time) as well as more popular articles related to mollusks. Book reviews, meeting announcements etc. are also included. All papers accepted are published completely free of charge and authors receive five complimentary copies. For those wishing additional reprints, orders can be submitted to the editor before publication and the author is charged only actual costs.

Authors should send manuscripts in duplicate, double spaced, pages numbered consecutively, with literature citations and figure legends, where applicable. Line drawings, color prints, slides and b&w photographs are gladly received, and specimens can also be photographed by *The Festivus* by prior arrangement. Photographs need not be mounted. Please follow *The Festivus* format for "Literature Cited" as shown here.

SKOGLUND, CAROL
1983. Range extensions of Muricidae in the Gulf of California, Mexico. The Festivus 15(11): 107-108, figs. 1-4.
1992. Additions to the Panamic Province Gastropoda (Mollusca) Literature 1971 to 1992. The Festivus (Supplement): 1-viii + 1-169.

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All papers received are acknowledged and sent out for critical evaluation. Authors will receive the reviewed manuscripts for their consideration and response. One copy only of the revised/corrected final manuscript (with diskette, if possible) need be sent to the editor for publication.

Manuscripts should be sent to Carole M. Hertz, editor, at 3883 Mt. Blackburn Avenue, San Diego, California 92111, USA.

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Website at: http://www.molluscs.net/SanDiegoShellClub/index.html *Email: cmhertz@pacbell.net*

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

PROGRAM

Half a Billion Years of Chitons

Doug Eernisse, Associate Professor of Biology at California State University, Fullerton, will present an overview of his diverse research on worldwide chitons. His talk will feature some of the more spectacular examples of morphological and ecological diversity among living and fossil chitons. He will also briefly discuss his ongoing study of higher-level chiton relationships, his studies of contrasting reproductive traits in West Coast *Lepidochitona*, his software to keep track of chiton taxonomic and distributional data worldwide, and a new web site of chiton images at: http://biology.fullerton.edu/deernisse/chitons/

Shells of the month: Chitons
Meeting date: 16 August 2001

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CLUB NEWS

Minutes of the July 19th Meeting of the San Diego Shell Club

President Kim Hutsell called the meeting to order by welcoming everyone. There were four visitors, including one member from out of town. The minutes of the June meeting as published in *The Festivus* were approved with a motion by Margaret Mulliner and a second by Monika Forner. Vice President Jules Hertz said that the speakers are set for the entire year. He also said that this year's Christmas party will be held at the Ramada Inn and Convention Center. The cost will be $25.00 per person [see col. 2, this page]. Treasurer Linda Hutsell reported that the Club continues to be financially solvent and as librarian, Linda mentioned that the Haliotidae iconograph will be bound and ready for circulation at the next meeting. Linda also reported that the *Spondylus* book is missing [see col. 2, this page]. Kim added that the new giant clam book is excellent. John LaGrange announced that the sand replenishment in North County is resulting in many shells showing up on the beaches.

Jules introduced the speaker for the evening, long-time Club member Richard Herrmann. Richard is a professional photographer and has won awards for his work. He described his two recent trips to Kodiak Island, Alaska, and said Alaska is truly a last frontier and a rugged place.

Kodiak Island is the second largest island in the U.S. and has the largest fishing fleet in Alaska. People travel around the area by floatplane or ATV. He showed images of the stellar sea lions of the area which are three times as large as California sea lions. He said there are big tidal changes at Kodiak and the shell specimens there are larger than in other areas. He showed photographs of sea stars, sponges, nudibranchs, and algae. Richard said that drug companies are interested in studying sponges for medicinal purposes.

Because the water quality is still good, the streams are full of fish, including pink and red salmon. He showed pictures of the salmon as they underwent their morphological changes as they returned to the fresh water to spawn, and die. As a bonus, Richard also showed a few photos from his recent trip to Hawaii. The wonderful presentation was enjoyed by all.

The meeting was adjourned at 8:45 p.m. at which time members could enjoy the displays of shells and other invertebrates from Alaska brought in by members John LaGrange, Larry Lovell and Billee Gerrodette.

Thank you to Marilyn Perrin and Monika for the delicious treats. Dave Mulliner and Christian Petroski were the winners of the drawing.

Silvana Vollero

Another "Munchie Madness" The September Party

The September party will again be held in Terry and Marty Arnold's garden on Saturday evening the 22nd with the festivities beginning at 6 p.m. Members are asked to bring munchies — grazing foods - easily prepared and very easily enjoyed -- hot foods, cold foods and desserts. Beverages, plates and utensils will be provided by the Club.

This is the purely social party of the season - a time to just enjoy each other's company. Come and enjoy the evening.

A map will be included in the August issue.

Club Library Book Missing

The book, "*Spondylus* Spiny Oyster Shells of the World" by Kevin Lamprell (1987) is missing from the Club library. It was evidently borrowed without signing the book out on the book's library card and so it is difficult to trace the borrower.

If you have borrowed this book, kindly contact librarian Linda Hutsell (619-294-3914 or e-mail: khutsell@ix.netcom.com) and arrange for its return.

The Club Christmas Party

The date and location for the Club's annual Christmas Dinner Party has been set. It will be on Saturday evening, December 8th at the Radisson Hotel and Conference Center at 5550 Kearny Mesa Road in San Diego. We have been assured that members traveling from out of the local area will be able to get a reduced overnight rate at the hotel.

A menu listing, cost, map and other details will be discussed later. But save the date, it's always a great party.

HITCH-HIKING ON THE ALGARVE

GIJS C. KRONENBERG

Milieu Educatie Centrum
Postbus 435, NL-5600 AK Eindhoven, the Netherlands
E-mail: gijsckro@worldonline.nl

During our early summer holiday of 2000, my partner Marianne and I went to the Portugese Algarve coast. We heard that although the water was still cold, shelling could be very good, so we took our chances. We settled in Armação de Pera, a town just between the sandy part and the rocky part of the Algarve. This old village has turned into a tourist hotel city, and little of the old atmosphere is still present.

However, one of the very nice things is that the local fishermen still pull their boats on the beach before they start cleaning their nets. A stroll along these small boats easily yields common shallow water species such as *Pecten jacobaeus* Linnaeus, 1758, *Acanthocardia aculeata* (Linnaeus, 1767), *Acanthocardia tuberculata* (Linnaeus, 1758), *Lutraria lutraria* (Linnaeus, 1758), *Bolma rugosa* (Linnaeus, 1767), *Semicassis saburon* (Bruguière, 1792), *Charonia lampas* (Linnaeus, 1758), *Hexaplex trunculus* (Linnaeus, 1758), *Bolinus brandaris* (Linnaeus, 1758) and *Cymbium olla* (Linnaeus, 1758). Some of these are eaten by the Portugese, but others are nothing more then surplus catch, entangled in the nets, and are discarded in plastic barrels and containers on the beach. "Barrel" combing these containers is very rewarding if you don't mind the flies.

Between the discarded shells, we regularly noticed specimens of *Stramonita haemastoma* (Linnaeus, 1758) which were heavily encrusted with a limey deposit. We left them as they were, as it would take a lot of work to clean them, and anyway I already had specimens of this species. But one is always tempted to take some home, and on one of the final days I collected three of them, the animal still inside, but already dead under the hot sun (Figure 1).

Figure 1. *Stramonita haemastoma* (Linnaeus, 1758). Portugal, Armação de Pera, on beach discarded by local fishermen, 25 May 2000. Leg. G. C. Kronenberg. Dorsal view with large part of the limey deposit removed. Note, however, the limey "hood" on the apex.

Back home again we started to clean the shells. For removing the thick limey deposit on solid shells like *S. haemastoma*, I often use a bodkin, relying later on dental tools, toothbrushes etc. Using these various tools, I work my way starting at the aperture, following the whorls up to the apex. The thick part of the limey deposit came off rather easily, and suddenly at the apex of one of the specimens I noticed a lithophagid, which upon closer examination turned out to be a specimen of *Lithophaga aristata* (Dillwyn, 1817). So being sedentary in the limey deposit, this boring mussel still wandered around, hitch-hiking on the rock shell (Figure 2).

Stramonita haemastoma and *Lithophaga aristata* occur in both the Mediterranean and adjacent part of the

Atlantic Ocean as well as in the Panamic faunal province (Keen, 1971). The lithophagid even has a world-wide tropical distribution (Keen, 1971: 70) and is very well known for its behaviour of boring into other shells rather then rock (Keen, loc. cit.). From personal observation I have noticed that *L. aristata* can occur in great numbers on other bivalves, such as a specimen of *Hyotissa hyotis* Linnaeus, 1758, which was collected in 1995 by Mr. Jan-Paul Buys and I near the Islas Santa Ines in the Sea of Cortez.

So, as I noted before (Kronenberg: 1996) it can be very rewarding to take along some things that don't look that appealing at first sight.

Taxonomical note: I have used the name *Stramonita haemastoma* following Skoglund (1992) instead of *Stramonita biserialis* (Blainville, 1832) employed by Keen (1971, in the genus *Thais*). It appears, however, that *S. biserialis* should be used, and there may be another, closely related species living in the Panamic faunal province (Geerat Vermeij, pers. comm.).

I thank Marianne for her help during collecting and cleaning of shells, and her lasting support.

Figure 2. *Stramonita haemastoma*, apical view of specimen in Figure 1 with "limey hood" removed, showing specimen of *Lithophaga aristata* (Dillwyn, 1817) in situ. Specimens in collection of GCK no. 6018.

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NEW BILINGUAL NEWSLETTER ON THE WEB

California Sea Grant announces a new quarterly, bilingual newsletter on water quality, coastal watersheds and habitat issues in the Southern California Bight. The publication, ***Bight Bulletin (Boletín de la Cuenca)***, will strive "to provide a mechanism for timely information exchange for local, state and federal officials, educators, students, and nongovernmental organizations. The newsletter is the result of a joint effort of the San Diego Association of Governments, and California Sea Grant, with support from the North American Commission for Environmental Cooperation, and the Dirección General de Ecología de Baja California. The first issue is posted on the web at http://www-csgc.ucsd.edu."

"Relevant ideas, announcements, and articles from readers (in either spanish or English) are welcome and encouraged. Please send these to bightb@seamail.ucsd.edu"

Also announced is a paper by Burton & Tegner (2000) entitled "Enhancement of red abalone *Haliotis rufescens* stocks at San Miguel Island: Reassessing a success story." Mar. Ecol. Prog. Ser. 202:303-308.

REPORT OF THE WSM MEETING - 2001

JULES HERTZ[1]

Santa Barbara Museum of Natural History,
2559 Puesta del Sol Road, Santa Barbara, California 93105-2936, USA

The 34th annual meeting of the Western Society of Malacologists (WSM) took place at the Ramada Inn and Conference Center, San Diego, California, on 20-24 June 2001. There were 65-70 attendees. The meeting began on the 20th with registration and a Welcoming Reception. There were two symposia, contributed papers, a poster session, social events and a field trip. Hans Bertsch, the WSM President opened the technical portion of the meeting on the 21st. The first symposium, **Opisthobranch Symposium, Festschrift in Honor of Frank Mace MacFarland**, was introduced by Ángel Valdés, and it ran the entire day and part of the 23rd. This symposium had many excellent papers, my favorite being the one presented by P.M. Johnson (Figure 1) entitled "Sea hare defensive secretions function differently against fish, crustacean, and cnidarian predators." He reported that "in field assays with live *Aplysia parvula* and *Stylocheilus longicauda*, reef fish were not deterred by ink/opaline secretions." All of the *S. longicauda* were eaten whether or not the individual sea hares had full or depleted glands, while most of the *A. parvula* were rejected regardless of gland fullness. He reported that spiny and slipper lobsters and portunid crabs were tested with live sea hares and secretions of *Aplysia californica*, *S. longicauda*, and *Dolabella auricularia*. "Live sea hares were readily attacked and eaten but were often dropped if ink/opaline was released." He also reported that *Aplysia* ink causes tentacle shrinking in sea anemones and a "vomiting" response. Several of the papers in this symposium were primarily video or slide shows of nudibranchs in action. Two of them were particularly outstanding, i.e. (1) "Nudibranchs in Action" by Alan Grant, and (2) "The Secret Lives of Sea Slugs" by Mary Jane Adams. They showed nudibranchs in a wide variety of activities including feeding, swimming, copulating, and egg laying.

Figure 1. P.M. Johnson presenting his paper.

A **Latin American Malacology Symposium** was held on the 22nd with introductory comments by Jorge Cáceres-Mártinez (Figure 2). All but one of the speakers gave their talks in English and many used very advanced computerized slide presentations. I particularly enjoyed the papers "Grazing rates and growth of postlarval abalone (*Haliotis* spp.)" by Ricardo Searcy Bernal and Casandra Anguiano Beltrán and "Parasites and diseases of molluscs in Latin America" by Jorge Cáceres-Mártinez. The first paper summarized the experimental results of post-larval *Haliotis fulgens* and *H. rufescens* feeding on the benthic diatom *Navicula incerta*. Video recordings were subjected to digital image analysis to estimate post-larval size and grazing rates. The relationship between grazing and growth

[1]Mailing address: 3883 Mt. Blackburn Ave., San Diego, CA 92111, USA.

Figure 2. Jorge Cáceres, convener of the Latin American Malacology Symposium.

Figure 3. Cynthia Trowbridge and George Kennedy at the registration table.

rates was discussed and preliminary efforts to model the post-larvae/diatom system was presented. The second paper described studies conducted in Latin America on parasites, diseases and other epibionts of mollusks which have a negative effect on commercial development. Described were specific problems associated with the commercial development of pectens, abalone, oysters and mussels, and the types of damage produced by the specific parasites and diseases. The day concluded with a Poster Session, an evening barbecue and an auction.

On the 23rd, there was a session of Contributed Papers, the third session on opisthobranchs and the Banquet. The paper that was most intriguing to me was "Genetic variation in stenophagous herbivores on native vs. introduced algal hosts" by Elizabeth J. Walsh and Cynthia D. Trowbridge (Figure 3). The authors presented some preliminary information on the genetic variation of the common sacoglossan sea slugs associated with native and introduced plants. They are investigating three major ecological questions: (1) Are sympatric conspecific slugs from different green algal host species genetically differentiated? (2) Do "conspecific" populations of *Placida dendritica* from Pacific and Atlantic shores in the northern and southern hemispheres form a single widely distributed species or a complex of sibling species? (3) Are slugs feeding on the native, non-weedy subspecies of *Codium fragile* genetically differentiated from conspecifics on introduced conspecific hosts?

The social events were generally well done, beginning with an excellent Welcoming Reception. The food for this event was very good and the setting allowed all to relax and get acquainted with their fellow attendees. The Barbecue again had very good food and a nice comfortable setting, allowing everyone to relax before the evening's events, i.e. (1) the reprint sale conducted by George Kennedy and (2) the auction of shells, shell-related items and books conducted by Carole Hertz. Both George and Carole had spent months soliciting and gathering materials for these events. The participants had great fun and the proceeds generated benefit The Western Society of Malacologists' Student Grant Fund.

The final social event was the Banquet, held on the 23rd. Although the food was mediocre, the banquet speaker was excellent. Dr. Paul Dayton, marine ecologist and professor at Scripps Institution of Oceanography, spoke on the problems of non-sustainable harvesting of our oceanic habitats and the use of marine reserves. It was a very enlightening presentation, challenging and encouraging our global conservation efforts.

The 35th annual meeting of WSM is scheduled for 20-24 July 2002 at Asilomar, Monterey Peninsula, California. It is being arranged by newly elected President Christopher L. Kitting and promises to be one of the finest yet. Please plan to attend and participate.

A NOTE ON *MERCENARIA MERCENARIA* IN BRITISH COLUMBIA, CANADA

ROBERT G. FORSYTH and TAMMERA J. FORSYTH

2574 Graham Street, Victoria, British Columbia, Canada V8T 3Y7;
E-mail: robert_forsyth@telus.net

Two recent publications have mentioned our discovery of *Mercenaria mercenaria* (Linnaeus, 1758) in Boundary Bay, British Columbia (Turgeon et al. 1998: 194; Coan et al. 2000: 373). We here give additional unpublished information on this record and provide photographs of the specimen.

A single specimen of *Mercenaria mercenaria* (Figure 1) was found by us in Boundary Bay, British Columbia (circa 49°04´N, 122°57.5´W), on 24 May 1996, on the intertidal flats south of the south end of 96 Street, Delta District Municipality. It was live, mostly buried in muddy sand with a small portion (approximately 1 cm) of the posterior end of the shell exposed. The shell is 117.6 mm long, and is larger than any other west coast specimens seen by Coan et al. (2000). The inner margins of both valves are deep violet.

The size and establishment of a population of *M. mercenaria* in Boundary Bay is unknown. Over several years we did not encounter additional individuals or shells in the immediate site of discovery and in Boundary Bay - Mud Bay region in general. The specimen (Figure 1) is now deposited in the Invertebrate Collection of the Royal British Columbia Museum (Victoria), catalog number 000-00148-001.

Figure 1. *Mercenaria mercenaria*, 2 views. Boundary Bay, British Columbia, Canada. RBCM 000-00148-001.

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

PROGRAM

COME TO MUNCHIE MADNESS

(There is no regular meeting this month.)

Saturday evening, September 22nd at the Arnold's
See Club News (p. 86) for details.

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Notes on *Rhizochilus antipathum* Steenstrup, 1850 (Gastropoda: Coralliophilidae) with new records from Île Clipperton and Isla del Coco (tropical eastern Pacific).
Kirstie L. Kaiser & Carole M. Hertz 87

CLUB NEWS

Minutes of the August 16th Meeting of the San Diego Shell Club

The meeting was called to order at 7:50 p.m. by President Kim Hutsell. The September Party was discussed (see col. 2 and map enclosed), Librarian Linda Hutsell showed issues of recent publications received, and after the brief business meeting, Vice President Jules Hertz, introduced the speaker for the evening, Doug Eernisse, Associate Professor of Biology at California State University, Fullerton. Doug gave a fascinating program entitled, *Half a Billion Years of Chitons*.

Doug told that there are between 800 and 900 chiton species worldwide and discussed their close relationship with aplacophorans, a group which also has spicules on their girdle. He noted that the radulae of chitons are coated with magnetite and that there is some research to see if these radulae can have a medical application. He said that the image of chitons as mostly herbivores is false since only in the intertidal and subtidal are there plants on which to feed and since there are many deep-water chitons, they would have to feed on non-plant material. He explained, also, that chitons are the only group with living shell layers which have thousands of eyes on the valves. Without getting too technical, Doug traced the history of chitons, showing at one point an incredible, ancient chiton (roughly 450 Mya) with long sharp spines on its girdle. This was a photo of the first complete specimen ever found. The most fascinating aspect of Doug's talk was his discussion of the extra cellular coverings of the chiton eggs — and their use as tools for identification. He showed images of some of the intricate capsules of different species. A discussion in the question and answer period arose concerning the "whys" of the forms of these capsules.

Finally Doug spoke briefly about his internet software to keep track of chiton taxonomic and distributional data worldwide. The presentation was certainly appreciated by those in attendance.

Following Doug's talk members had time to view the information on Doug's web site of chiton images and the display of chitons brought in by Carole and Jules Hertz. The door prize was won by Dave Mulliner and the refreshments were provided by Bill Romer and Carole and Jules Hertz.

Changes to the Membership Roster

New member
Perdue, Robert E., 78-715 Maracas Ct., La Quinta, CA 92253-2420. 760-564-1980.
Change of Address
Berschauer, David and Felicia, 25461 Barents St., Laguna Hills, CA 92653

The September Party

Saturday evening, September 22nd is the date for this year's Munchie Madness at the Arnold's garden with festivities beginning at 6:00 p.m.

Please remember to bring your food contribution — either hot or cold munchies, tapas or desserts. Only those who bring munchies get to eat. Bring plenty. Your contribution should serve 12 - everyone likes to munch! If you have hot trays, crock pots, skillets etc., the Arnolds have plenty of outlets.

This is always a very enjoyable get-together. Plan to attend. If you have questions, contact either the Arnolds (619-235-8181) or Carole Hertz (858-277-6259). A map is included with this issue.

The Christmas Party

The Club's annual Christmas Party will be in the Lisbon Room at the Ramada Inn and Conference Center off Clairemont Mesa Blvd. and Kearny Mesa Rd. in San Diego. (Accommodations at reduced rate are available for those who wish to stay over.) The dinner party will be on December 8th beginning at 6 p.m.

The dinner menu offers a choice of Blackened Mahi Mahi with rice pilaf and vegetable medley or Chicken Italiano with garlic rosemary potatoes and vegetable medley. All dinners include salad, rolls and butter, coffee and a choice of dessert - either Amaretto cheesecake or cherry pie.

The Club will provide table wine and/or sparkling apple cider. The cost for the evening is $25 per person including tax and gratuity.

Save the date and plan to attend. It's always a wonderful evening. More details later.

NOTES ON *RHIZOCHILUS ANTIPATHUM* STEENSTRUP, 1850 (GASTROPODA: CORALLIOPHILIDAE) WITH NEW RECORDS FROM ÎLE CLIPPERTON and ISLA DEL COCO (TROPICAL EASTERN PACIFIC)

KIRSTIE L. KAISER[1]

Santa Barbara Museum of Natural History,
2559 Puesta del Sol Road, Santa Barbara, California 93105, USA
E-mail: KLKaiser@PVnet.com.mx

and

CAROLE M. HERTZ[2]

Santa Barbara Museum of Natural History,
2559 Puesta del Sol Road, Santa Barbara, California 93105, USA
E-mail: cmhertz@pacbell.net

Abstract: *Rhizochilus antipathum* Steenstrup, 1850, a cryptic species, is newly reported from Île Clipperton [French possession] and Isla del Coco, Costa Rica, both in the tropical eastern Pacific living on two different *Antipathes* (black coral) species.

Introduction: In April-May 1998, while SCUBA diving off the Smithsonian Institution's R/V *URRACÁ* at Île Clipperton (10°17.493'N, 109°13.538'W), the senior author collected seven specimens of a *Rhizochilus* sp. (Figures 1, 2) living inconspicuously on the lower branches and holdfast of a single, living, black coral colony of *Antipathes* sp., at a depth of 27 m (90 ft) (Figures 3, 4). In searching for more information and study material of *Rhizochilus*, inquiries were made to the following institutions: American Museum of Natural History (AMNH), California Academy of Sciences (CAS), Natural History Museum of Los Angeles County (LACM), Muséum National d'Histoire Naturelle, Paris (MNHN), National Museum of Natural History, Smithsonian Institution (USNM), Santa Barbara Museum of Natural History (SBMNH), San Diego Natural History Museum (SDNHM), Scripps Institution of Oceanography (SIO) and Western Australian Museum of Natural Science (WAMNS).

Material studied: The SBMNH contains four lots of *R. antipathum*. Two lots are from Isla del Coco, Costa Rica, collected by Kevin Burke (ex D. R. Shasky Collection): (SBMNH 345462), nine solitary specimens from holdfast and central stalk of *Antipathes* sp. (Figure 5), SCUBA, 45 m (150 ft), Submerged Rock (05°30'15.8"N, 87°03'21.4"W), April 1983; and (SBMNH 345463), a solitary specimen detached from coral and three specimens (one broken, two live collected), embedded in fragment of *Antipathes* sp., two specimens on holdfast of *Antipathes* sp., Submerged Rock, SCUBA, 48 m (160 ft), 26 April 1987.

[1]Mailing address: Paseo de las Conchas Chinas #115-4, Puerto Vallarta, Jalisco CP 48300, México.
[2]Mailing address: 3883 Mt. Blackburn Ave., San Diego, CA 92111, USA.

The other two lots (SBMNH 145313, 145314, ex Poorman Collection), are from Sonora, México, taken by commercial shrimp trawlers, 20-60 m, seemingly collected live, embedded in the *Antipathes* sp. and identified in SBMNH as *Rhizochilus antipathus* (Figure 6). SBMNH 145313 included three large *Antipathes* branches, not identifiable to species (D. Opresko, 2000, pers. comm.).

The Kaiser specimens (K.L. Kaiser Collection) from Île Clipperton were collected in April-May 1998. A dried branch of the coral colony was sent to the USNM for study by Dennis Opresko. He was able to identify the black coral to genus *Antipathes*, and thought it may be a new species (pers. comm., 1999) (Figure 4).

An additional record is a specimen collected by SCUBA in 30 m at Bahía San Carlos, Sonora, México (ex Virginia Upton Collection), now in the Skoglund Collection.

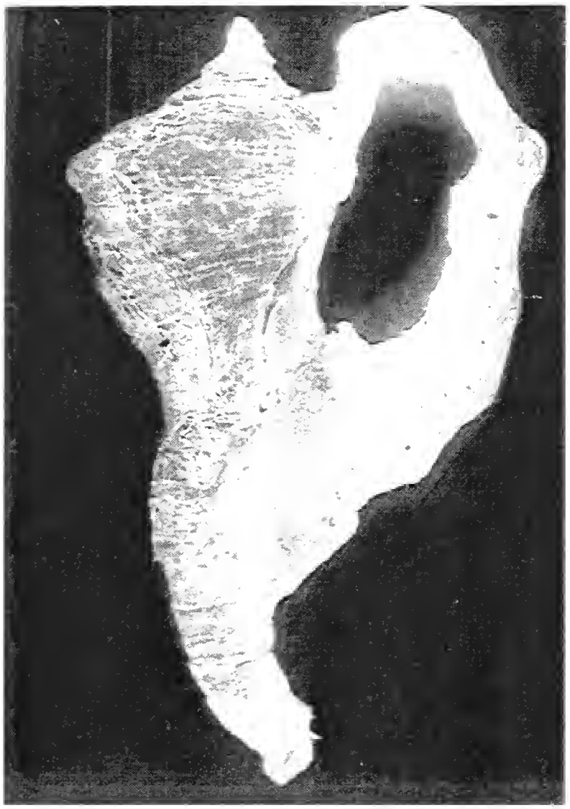
Background: In 1850, Steenstrup described as a new genus and species, *Rhizochilus antipathum*, from the Indian Ocean. At that time it was considered to be related to *Purpura* and was found attached to the axis of the black coral host *Antipathes ericoides* Pallas, 1766. One year later, after examining three of Steenstrup's specimens, Gray (1851: 477) observed and described in detail, several unique generic characteristics of *Rhizochilus*:

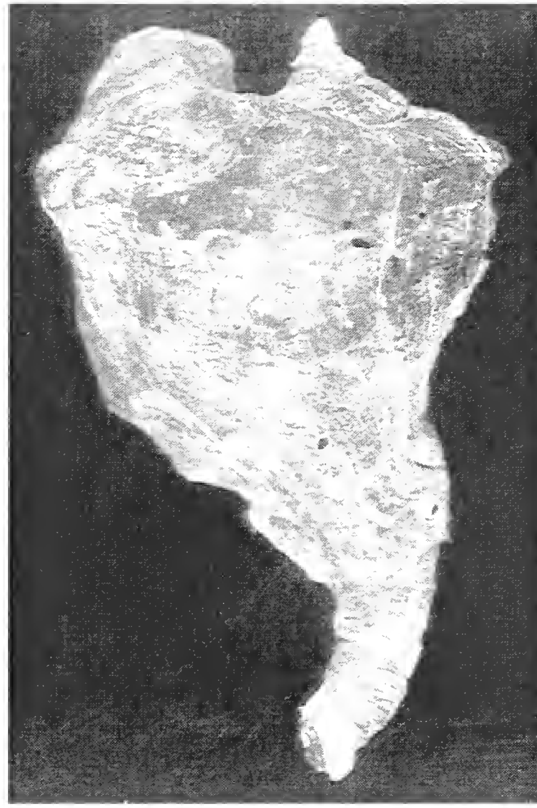
> "The shell of this genus while the animal is growing is free, and would be considered in this state as belonging to the genus *Rapana*, nearly allied to *R. papyracea*, but of a more solid consistence; but when the animals have arrived at their full development, two or more congregate together in groups, each animal forming a more or less irregular, opake, white, solid shelly extension of the outer and inner lip, clasping the axis of the coral or the neighbouring shells, or both, and at length entirely closing the mouth of the shell, and firmly attaching the shells to the coral, or to one another, in such a manner that the animal is completely surrounded by a solid shelly case having no communication with the outer world but through the case of the anterior siphon of the mantle, which, by the contraction of the mouth of the shell, has been converted into a shelly tube.
>
> This self-immurement of the animal within its shell has not been described in any other mollusk, and one is lead to inquire if by so doing the animal commits voluntary suicide, or has a prolonged existence; if the latter, one should expect that it must be of a very torpid or lingering description, as the animal is entirely precluded from procuring its usual or indeed any other food for its subsistence, and the supply of water for respiration which can enter by the single siphon must be of a very limited quantity, there being only one aperture for its entrance and exit, in comparison with the continued current which usually circulates over the gills when the two apertures (one for entrance and the other for exit), which always exist in all Mollusca, are open for the purpose."

Gray (1851) amended the specific name to *antipathicus* (in his figure legend, p. 479) which initiated errors in the nomenclature for years to come. Within the next few decades, both H. Adams & A. Adams (1853:135) and Tryon (1880:206) repeated the record [as: *R. antipathicus*] and used the same illustrations as Steenstrup (1850). Later Thiele (1931:301) continued it as *antipathicus*; Gage (1962:3) and Kay (1979: 258) used *antipathicus* for specimens from the Hawaiian Islands. Wenz (1962:1134) returned to the original *antipathum* as did Clover (1982). Okamura & Habe (1976: 91, 92) referred to it as *antipaticus* [*sic*] and Poorman (1981:165) referred to the species as *antipathus*. The genus, of Greek origin, meaning "root-lip" is neuter. With the species taking the gender from the genus, the ending would be neuter as well - "um" (E.V. Coan, pers. comm, 1999).

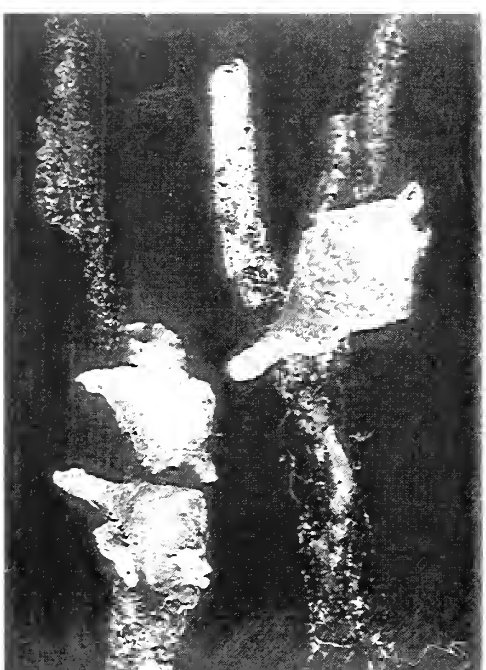
A. Adams (1854: 96) described five other coralliophilids within the subgenus *Rhizochilus*; *Rapana* (*Rhizochilus*) *coralliophila, pulchella, suturalis, scala,* and *fragilis* from the Cuming Collection. Later E.A. Smith (1876: 404) described *Rhizochilus* (*Coralliophila*) *squamosissimus* from the island of Rodriguez [*sic*] [Rodrigues], the type locality for *R. antipathum*. Three of the A. Adam's *Rapana* (*Rhizochilus*) species (*coralliophila, suturalis* and *fragilis*) were synonymized with *Coralliophila erosa* by Kosuge and Suzuki (1985: 32). They placed the other two species (*pulchella* and *scala*) in *Coralliophila* as well as considering *Rhizochilus squamosissimus* as *Coralliophila*. They also placed *Rapana* (*Rhizochilus*) *clathrata* A. Adams in *Coralliophila* (p. 31). Both Kosuge and Suzuki (1985: 31) and Kosuge and Meyer (1999: 111), cite *Rapana* (*Rhizochilus*) *clathrata* as in A. Adams, 1854: 97), and we found no mention of the species there. Finally, Kosuge & Suzuki (1985:50) listed *Rhizochilus distans* Carpenter, 1857, and *Rhizochilus* (*Coralliophila*) *madreporinum* H. & A. Adams, 1858, as *nomen nuda*.

The most recently named rhizochilid, *R. teramachii* Kuroda (1953:118-119), was from Tosa Bay, Shikoku

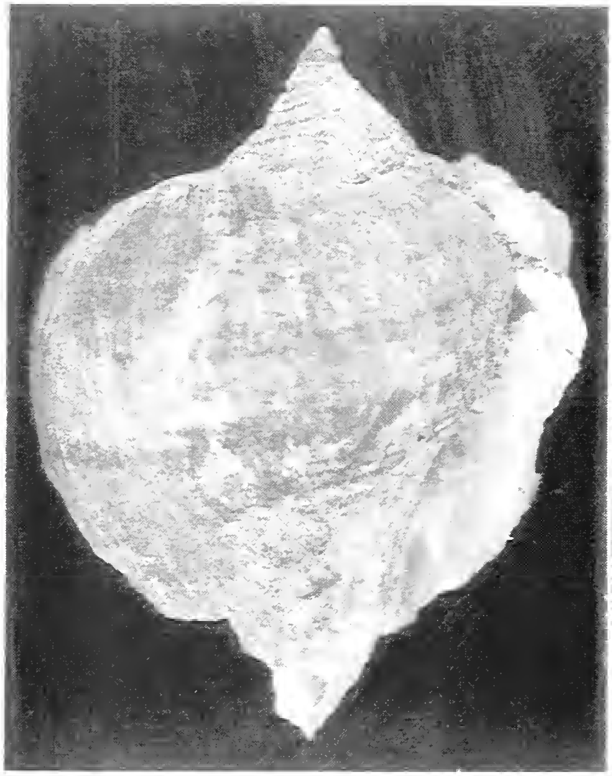


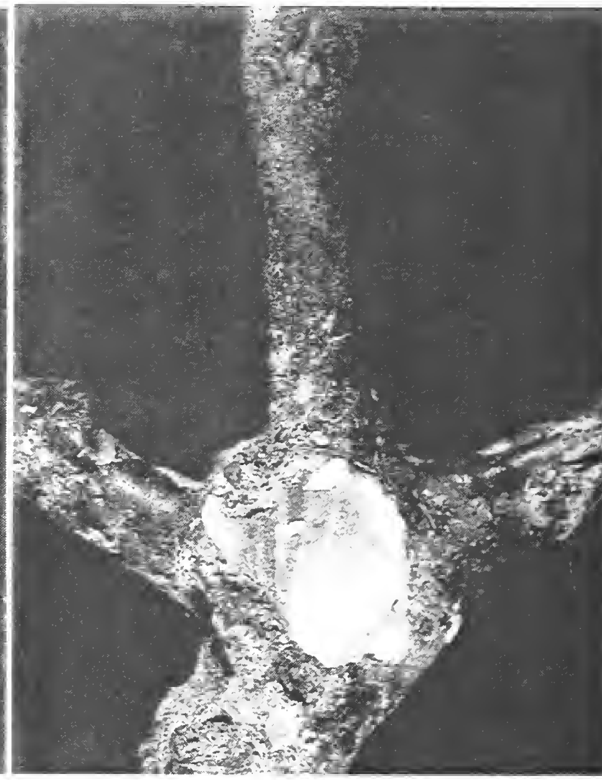


Figures 1, 2. *Rhizochilus antipathum*, (K.L. Kaiser Collection), 13.2 mm L, Ile Clipperton, R/V *URRACA*, SCUBA, 27 m, H^2O 84°F, on black coral *Antipathes* sp., May 1998. Leg. K.L. Kaiser. (1) apertural view (2) dorsal view of same specimen. Photos: D. K. Mulliner.



Figures 3, 4. *Rhizochilus antipathum*, (3) cluster of three *Rhizochilus* specimens (11.6, 9.7, 8.2 mm), on branch of black coral *Antipathes* sp., (K.L. Kaiser Collection). Same locality as above. Photo: D.K. Mulliner. (4) Colony of dried *Antipathes* sp. (K.L. Kaiser Collection). Same locality as above. Leg. K.L. Kaiser.





Figures 5, 6. *Rhizochilus antipathum*, (5) (SBMNH 345462, ex Shasky Collection), 10.1 mm from *Antipathes* sp., SCUBA, 45 m, Submerged Rock, Isla del Coco, Costa Rica, April 1983. (6) (SBMNH 145313, ex Poorman Collection), 20.1 mm, on *Antipathes* sp., by commercial shrimp trawlers off Guaymas, Sonora, México. Photos: D.K. Mulliner.

Island, Japan, and "supposed to be from 80 to 90 fathoms." It was described as "pyriform in outline, pale reddish brown..." The host was not known at the time but presumed to be *Antipathes*. Okamura and Habe (1976: 91) confirmed the host to be *Antipathes japonica*. Kosuge and Suzuki (1985) synonymized *R. teramachii* with *R. antipathum*.

In addition to the habitat information by Steenstrup (1850), Gray (1851) and Gage (1962), Hyman (1967: 170, 337) noted that the aperture of *Rhizochilus* puts out projections "that fuse with the branches of antipatharians, closing the aperture except for the siphonal canal" (Figures 1, 11). In 1961 Gage (1962:3) found *Rhizochilus antipathicus* [*sic*] (det. H. Rehder) at approximately 38 m (125 ft) off Mokamanu Island, Hawaiian Islands, a range extension of approximately 7,000 miles, since it had been known previously from the Red Sea and the Indian Ocean, off the island of Rodrigues. In his detailed account, it was reported as having an operculum and was "found buried deep inside of soft coral which is attached to the axis of the black coral *Antipathes grandes* [*sic*] [*grandis*]." Kay (1979: 258) cited Gage's record. Poorman (1981: 165) reported thirteen lots of a *Rhizochilus* sp. from the Sonoran coast, México, of which three lots were beach specimens from Cabo Haro. He noted a species of *Rhizochilus* from the Marquesas Islands from a personal communication by Harald Rehder to Joseph Rosewater at the USNM. Clover (1982) listed both the Japanese species *R. teramachii* and *R. antipathum* in his checklist of the family Coralliophilidae and illustrated the two nominal species. Shortly thereafter, Kosuge & Suzuki (1985) synonymized *R. teramachii* Kuroda, 1953, with *R. antipathum* Steenstrup, 1850, leaving the genus again with a single, variable species. In 1999, Kosuge & Meyer reported a new distributional record for *R. antipathum* as Natal, South Africa, to the Indo-Pacific, a "wide distribution from the tropical to the temperate zone."

Discussion: The specimens from Sonora, México; Isla del Coco, Costa Rica; and Île Clipperton, provided us with a challenge. The *Rhizochilus* specimens reported here from the various localities of the tropical eastern Pacific are living on dissimilar black coral species. Are these tropical eastern Pacific species the same as *Rhizochilus antipathum* or a new species?

The genus *Rhizochilus* has a sessile mode of life and is associated with more than one species of antipatharian: Gray (1861: 477) and Tryon (1880: 206) reported *Rhizochilus antipathum* on *Antipathes ericoides*; Gage (1962: 3) listed it on *Antipathes grandis* and Okamura and Habe (1976: 91) stated that *Rhizochilus teramachii*, a synonym of *R. antipathum*, live on the black coral *Antipathes japonica* (Brook). The *Rhizochilus* species at Isla del Coco lives on an undetermined *Antipathes* sp. and the Clipperton *Rhizochilus* lives on yet another species of *Antipathes* considered to be undescribed (D. Opresko, pers. comm., 1999).

Close examination of the shell morphology of the specimens collected at Isla del Coco, Île Clipperton and Sonora, México, shows great variability in shell shape due to the size and form of the black corals on which they live. The juvenile *Rhizochilus* settle on the holdfasts and branches of antipatharians or on each other and become sedentary (Figure 8). As the corals grow, they may envelop the shell of the *Rhizochilus* (Figure 7) sometimes resulting in extraordinary length of the siphonal canal (Figure 9). The new coral growth frequently covers all but the distal end of the canal.

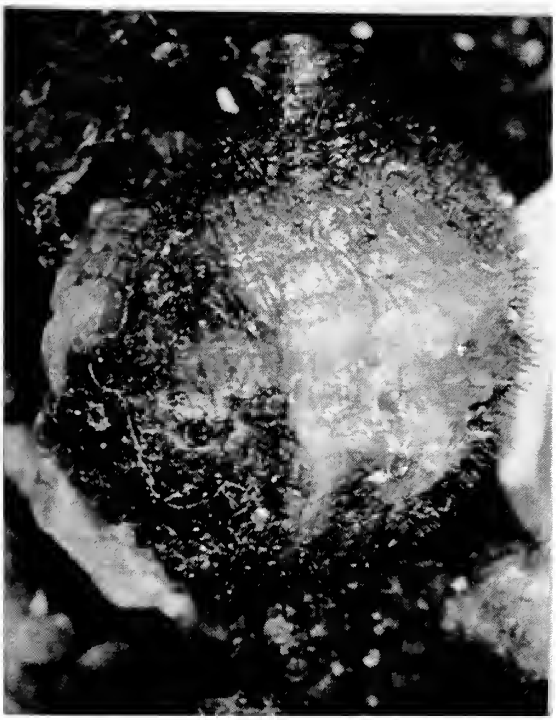
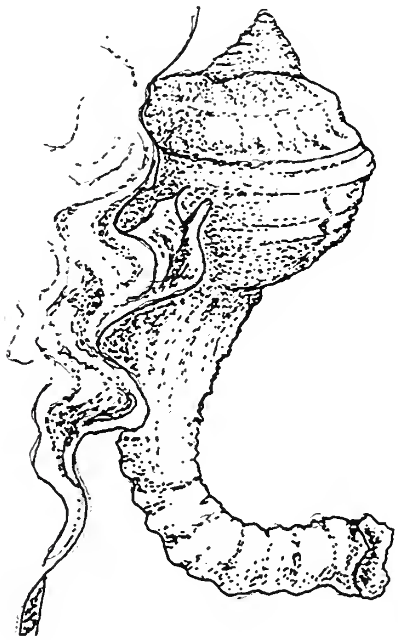


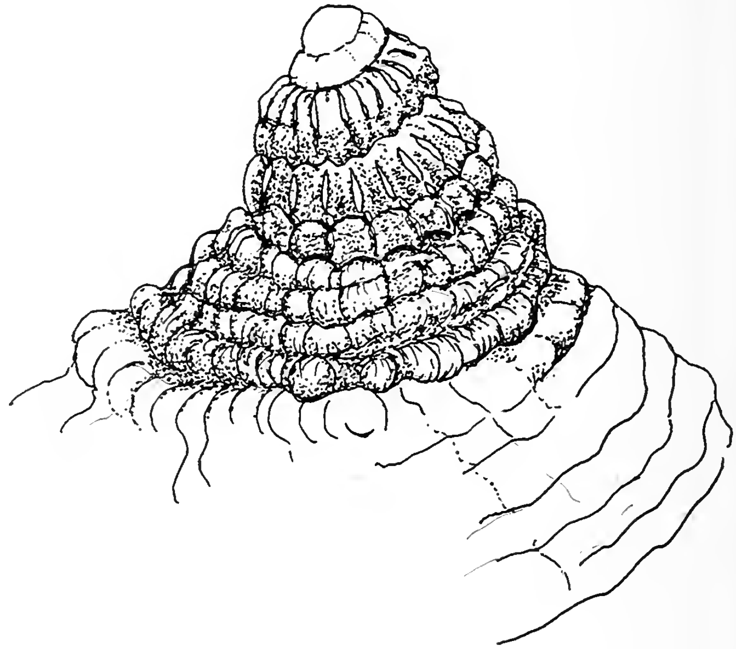
Figure 7. *Rhizochilus antipathum*, (SBMNH 345462, ex Shasky Collection), 6.5 mm specimen showing *Antipathes* sp. enveloping shell of the sessile *R. antipathum*. Photo: D.K. Mulliner.

Figure 8. *Rhizochilus antipathum*, (SBMNH 145314, ex Poorman Collection), large specimen 20.5 mm L, on cut piece of *Antipathes* sp., with smaller specimen, 13.7 mm L, attached to spire of larger specimen. From commercial shrimp trawler off Sonora, México. Photo: D.K. Mulliner.

We were only able to locate specimens from the eastern Pacific for study. However, we did compare the eastern Pacific specimens with the descriptions and original figures of *R. antipathum* from Steenstrup (1852: 61, pl. 3, figs. 1-3) and with other figures of type material: *R. teramachii* = *R. antipathum* from the Indo-Pacific in Kuroda (1953: 119, figs. 1, 2) and Okamura and Habe (1976: 92, figs. 1-6); *R. antipathum* in Kosuge & Suzuki (1985: 43, pl. 50, fig. 6 and pl. 45, fig. 12 [as *R. teramachii*]); and *R. antipathum* in Kosuge and Meyer (1999: 113, figs. 1, 2). Also studied were the illustrations of specimens of *R. antipathum* from the Hawaiian Islands in Gage (1962: 3, figs. 1-4) and Kay (1979: 254, fig. 90k).

All tropical eastern Pacific *Rhizochilus* examined were pyriform, though variable in shape and sculpture, a result of adhering to the colony of *Antipathes*. At first look, live collected specimens seemed to be covered with bryozoa or brown periostracum with raised hairs extending to the tip of the canal. This is actually the enveloping coral (Figure 7) (H.W. Chaney, pers. comm., 2001). Of the fifteen specimens studied from Isla del Coco, only one specimen had a complete protoconch (Figure 10). The planktotrophic nucleus is





Figures 9, 10. *Rhizochilus antipathum* (SBMNH 345463, ex Shasky Collection), 11.2 x 4.0 mm, Isla del Coco, Costa Rica. (9) Camera lucida drawing of specimen on large *Antipathes* segment showing elongate canal. (10) Camera lucida drawing of protoconch of Isla del Coco specimen. in Figure 9. Drawings: J. Gemmell.

tilted, of 3¼ to 3½ expanding whorls with deeply impressed sutures; first whorl nearly smooth, last quarter bearing microscopic, axial lines; second and third whorls with faint nodes subsuturally, one noded spiral cord at periphery, a second at base of whorl; axial lines, evenly spaced rendering spiral cords nodose (Figure 10); color cream to tan. Spiral sculpture of teleoconch with wavy cords, sometimes heavy and noded and sometimes flattened, heaviest at periphery, extending to canal, some specimens showing intercalary spiral cords. Axial sculpture of weak growth lines; color varying from cream to light reddish-brown within a cluster. Anterior siphon tipped away from host coral; operculum corneus; aperture obliquely elongate with irregular, flattened outer margin (Figure 11).

Of the seven specimens examined from Île Clipperton, a 6.8 mm specimen (Figure 12) reveals a protoconch of 3 to 3¼ tilted turns comparable to the 11.2 mm Isla del Coco specimen (Figure 10); teleoconch surface sculpture of wavy, spiral ribs, sometimes noded, and fine axial striae giving the spiral cords a noded appearance; many at least partially encrusted with coral; color and aperture similar to the Isla del Coco specimens.

Comparison of the lots from Sonora to those from

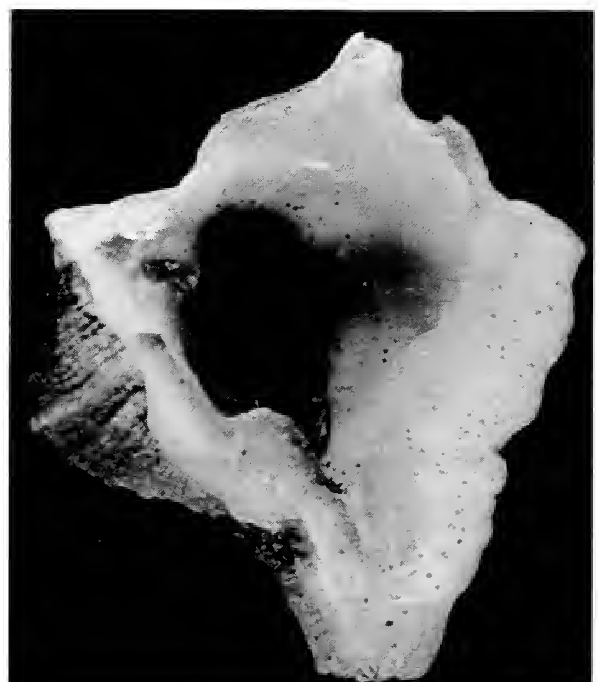


Figure 11. *Rhizochilus antipathum*, (SBMNH 145314) 10.1 mm. Apertural view of specimen shown in Figure 5. Note irregular, flattened apertural margin and corneous operculum. Photo: D.K. Mulliner.

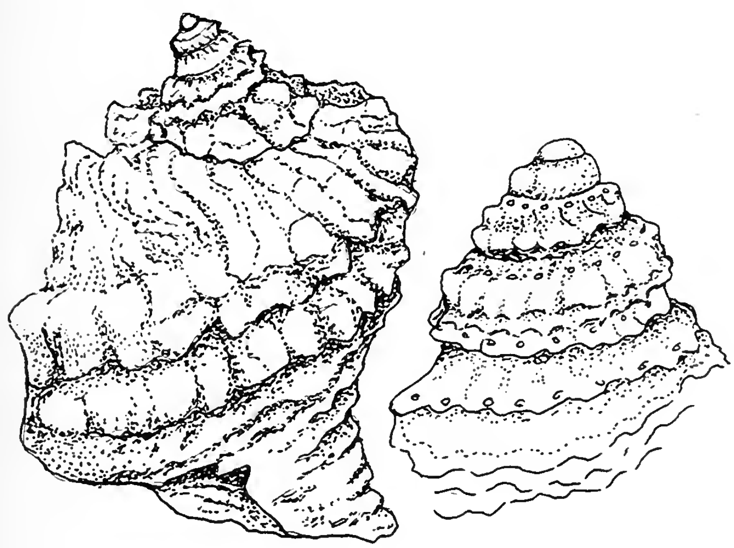


Figure 12. *Rhizochilus antipathum*, (K.L. Kaiser Collection). Camera lucida drawing of the dorsal view of a 6.8 mm Clipperton specimen, and detail of a 1.0 mm section of the protoconch. Drawings: J. Gemmell.

Isla del Coco and Île Clipperton showed them to be conspecific. Poorman (1981: 165) stated that the specimens from México had several characteristics which differed from those previously described for *Rhizochilus antipathus* [*sic*] and left the Golfo de California species undetermined. He noted that the west Mexican specimens have a thin horny operculum "at all stages of growth," Steenstrup in his original description having stated that the "*operculum testae junioris corneum, nucleo laterali.*" However, Gage (1962, fig. 4) and Kay (1971, fig. 90k) illustrate mature specimens of *R. antipathum* from the Hawaiian Islands with operculum. Poorman also observed that the west Mexican specimens he studied had, in addition to the open end of the siphonal canal, "an irregular hole at the posterior end of the aperture" and "a depression in the posterior wall, and sometimes a shallow canal, to provide for circulation of water." We were unable to discern these features on any of the Poorman specimens or in any of the other tropical eastern Pacific specimens studied.

Study of the protoconchs of the Sonoran specimens revealed no significant differences from those of Isla del Coco and Clipperton; all appeared coralliophilid. See D'Attilio (1972) for discussion of coralliophilid protoconchs. However, the protoconchs on the Poorman specimens, unfigured in Poorman (1981) and likened to that of *Quoyula madreporarum* (Sowerby, 1834), were somewhat abraded which would account for not observing the faint nodes subsuturally on the second and third nuclear whorls nor the additional spiral cord on the second nuclear whorl.

Conclusion: More than one hundred and fifty years after Steenstrup's description, *Rhizochilus* remains a monotypic genus.

Our comparison of the tropical eastern Pacific specimens of *Rhizochilus* with the aforementioned illustrations and descriptions of specimens from the Indo-Pacific, Hawaiian Islands, Red Sea, and Indian Ocean reveals a similar habitat and comparable variability of sculpture throughout its known range. We were unable to discern any consistent morphological differences in the specimens of *Rhizochilus* and consider there to be one variable species, *Rhizochilus antipathum,* living on local *Antipathes* spp.

ACKNOWLEDGMENTS

We thank the following individuals for searching their institutions for specimens of *Rhizochilus* and for other assistance: Clayton W. Bryce, WAMNS; Henry W. Chaney, SBMNH, for identification of incrustations on *Rhizochilus* specimens; William K. Emerson, AMNH; Liz Kools, CAS, who researched several obscure journals; Philippe Maestrati, MNHN; James H. McLean and Lindsey T. Groves, LACM, who provided research assistance and Paul Valentich Scott, SBMNH, who lent specimens from the collection.

Our thanks to Stephen D. Cairns and Theodore Bayer, USNM for help with identifications of the Clipperton *Antipathes* sp.; Eugene V. Coan, SBMNH, for help with rules on nomenclature; Jules Hertz proofread drafts of the paper and gave helpful suggestions; Carole Hickman for information on the protoconch; Barbara Myers, San Diego, California, for bringing to light material from the Donald R. Shasky Collection; Dennis Opresko, USNM, for examining the *Antipathus* species; the SDNHM for providing research space and making their scientific library available to us; Carol Skoglund, Phoenix, Arizona, for helpful suggestions and lending study material and Conner Watts, Park City, Utah, for technical assistance.

We further thank the National Geographic Society for funding (grant #5831-

96) to D. Ross Robertson, Smithsonian Tropical Research Institute, Panamá); to Joyce Gemmell for preparing the camera lucida drawings and to David K. Mulliner for the photography.

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THE FESTIVUS

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

Website at: http://www.molluscs.net/SanDiegoShell Club/index.html Email: cmhertz@pacbell.net

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

PROGRAM

Four Days of Reef & Wreck Diving off the East Coast of the North Island of New Zealand

Joe & Kathy Kalohi will present their pictures of the underwater world from the Cavalli Islands down to the Fanal Islands on the North/East coast of New Zealand.

They also will show some of their topside adventures during their stay along with a display of shells that were collected from the beaches of this beautiful country.

Meeting date: 18 October 2001
Shells of the month: New Zealand shells

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CLUB NEWS

The September Party

It was a lovely evening. Members gathered on the deck of the Arnold's garden and enjoyed each other's company and the munchies brought by everyone. Surely, Linda LaGrange's home-baked chocolate chip macadamia cookies took the prize! It's fun to have a gathering in which shells are certainly mentioned, but are not the first topic of the evening. It's amazing to hear about all the different interests held by Club members.

Once again, the Club thanks the Arnolds for opening their home and garden to the Club for another wonderful September party.

Membership Announcement

With this issue members will find a blue sheet inserted in their envelopes. It is both a membership renewal slip and an announcement of special publications. Please read it carefully and return it, if you are interested in one or both of the publications. Only those returning the sheet, marked appropriately, can receive a free member's copy of the publication(s).

All subscription monies received from October 2001 on will be considered as memberships in 2002.

An Addition to the Club Library

A copy of the *Monograph of the Living Zoila* by Felix Lorenz has generously been donated to the Club library by John Jackson. [See review, p. 102.]

The Club's Christmas Dinner Party

The Club's annual Christmas Party will be in the Lisbon Room at the Ramada Inn and Conference Center off Clairemont Mesa Blvd. and Kearny Mesa Rd. in San Diego on Saturday evening December 8th. Festivities will begin with a no-host bar at 6 p.m., and dinner will be served at 6:30 p.m.

The dinner menu offers a choice of two entrees and two desserts. Table wine will be provided by the Club as always. The entree choices are: 1) Blackened Mahi Mahi with rice pilaf and vegetable medley or 2) Chicken Italiano with garlic rosemary potatoes and vegetable medley. Dessert choices are: 1) Amaretto cheesecake or 2) cherry pie. The dinners include bread and butter, salad, dessert and coffee or tea.

The total cost for the evening, including tax and gratuity is $25. per person. There will be further details including a map to the venue in the November issue. Plan to attend. It's always a special evening.

INTERNATIONAL MARINE BIVALVE WORKSHOP, FLORIDA KEYS, 19-30 JULY 2002

Associated with a U. S. National Science Foundation grant from the Partnerships in Enhancing Expertise in Taxonomy (PEET) program (http://peet.fmnh.org), a two-week workshop on marine bivalves will be held in the Florida Keys in July 2002.

The emphasis will be on the taxonomy and anatomy of selected shallow-water species. Twelve students [bachelors-level degree (masters preferred), proficient in English, ability to swim (preferably to snorkel] will work one-on-one in research teams with twelve of the world's leading marine bivalve experts, culminating in a series of publishable manuscripts for a dedicated issue of an internationally recognized journal.

Full student funding for the workshop will be provided including air transportation to and from Miami, local transportation (land and sea), dormitory-style housing, all shared meals, etc.

The dates are immediately preceding the American Malacological Society annual meeting (3-7 August 2002) in Charleston, South Carolina, facilitating attendance at both events.

Applications must be received by 1 Nov. 2002. E-mail transmission preferred.

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For further information, contact:

Paula M. Mikkelsen, Ph.D. mikkel@amnh.org
Rüdiger Bieler, Ph.D. bieler@fieldmuseum.org

NOTES ON THE VALIDITY OF *STRAMONITA DELESSERTIANA* (D'ORBIGNY, 1841) AND *CANCELLARIA (MASSYLA) CUMINGIANA* PETIT DE LA SAUSSAYE, 1844

VALENTÍN MOGOLLÓN AVILA

Laboratorio de Invertebrados Acuáticos y Estación Marina de la Isla Pachacamac
Facultad de Oceanografía, Pesquería y Ciencias Alimentarias
Universidad Nacional Federico Villarreal
Paul Pradierifodere (Francia) 726, Lima 18, PERÚ
E-mail: svmogollon@yahoo.com

Abstract: *Stramonita delessertiana* (d'Orbigny, 1841) is a valid species, and not a synonym of *Thais (Thaisella) kiosquiformis* (Duclos, 1832) or *Stramonita biserialis* (Blainville, 1832). New geographic distribution and comments on habitat are given for the species. *Cancellaria (Massyla) cumingiana* Petit de la Saussaye, 1844, and *Cancellaria (Massyla) obtusa* Deshayes, 1830, are distinct species.

Stramonita delessertiana

Stramonita delessertiana is a brown shell covered with small spiral threads. The interior is bluish white. The aperture is bounded by a thin, brown color band. Two geographic forms are found in Perú. Those I have collected in the north, between Caleta Cabo Blanco (04°14.9'S) and Bahía de Sechura (05°38'S), Piura Department, have prominently shouldered whorls (Figures 1-6). The body whorl has two rows of conspicuous nodes, the one at the periphery being the strongest. A second row of smaller nodes and two equally spaced heavy spiral ribs lie between the shoulder and the anterior end of the shell. Average height: 35 mm. I also have collected this form of *S. delessertiana* at Bahía de Paita (05°4.9'S), the type locality. These shells match the d'Orbigny syntypes in The Natural History Museum, London (BMNH 54.12.4.4.493), figured by Keen (1966: 4, pl. 1, fig, 15; 1971: 551, fig. 1078). The specimen (Figures 1, 2) herein is a worn shell similar to the d'Orbigny material.

I have collected a second form of *S. delessertiana* on the central and south coasts of Perú from Isla Los Chimus, Ancash (09°20.9'S) to Playa Pocoma, Moquegua (17°25'S). This form (Figures 9-14), which may be a different species, is more globose, with greatly reduced nodes and heavier dark brown spiral threads on a brown shell. It is also larger, attaining a height of 55 mm. One specimen collected at Isla San Lorenzo (12°5'S) (Figures 7, 8), has sharp nodes, but this is not common. Other specimens from Bahía de Sechura are similar to this shell, but this form is always smaller than the globose form.

Both the noded and globose forms are found in the intertidal zone in rocky areas where they prey on the very abundant small mussel *Semimytilus algosus* (Gould, 1850) and *Brachidontes purpuratus* (Lamarck, 1819) and are found to a depth of 15 m on rubble, gravel and ground shells where they prey on bivalves such as *Argopecten purpuratus* (Lamarck, 1819), *Cardita spurca* (Sowerby, 1833), *Chione (Lirophora) peruviana* (Sowerby, 1835) and *Transennella pannosa* (Sowerby, 1835). Dr. Mario Peña has, in his collection, five live collected specimens of the northern form. They were found in the summer of 1994 in 8 m at Puerto de Talara (04°34.4'S) by commercial divers on a bed of the pearl oyster *Pteria sterna* (Gould, 1851). He recorded this species at Pisco, Ica Department (13°42.5'S) (Peña, 1970). I have never found *S. delessertiana* north of Caleta Cabo Blanco, neither in Tumbes Department in Perú nor in Ecuador and believe the mangrove zone is a natural barrier in distribution to the north. The figured shells are in the C. Skoglund Collection (SC) in Phoenix, Arizona, USA.

Marincovich (1973) proposed *S. delessertiana* as a possible synonym of *Stramonita haemastoma*

Linnaeus, 1767. Vokes (pers. comm. *in* Skoglund, 1992) used it as a synonym of *Thais (Thaisella) kiosquiformis* (Duclos, 1832). Vermeij (2001) in his review of *Stramonita,* considers *S. biserialis* the Recent eastern Pacific species and states that *S. haemastoma* is not found in the eastern Pacific.

Stramonita delessertiana is not a synonym of *S. biserialis* because *S. biserialis* has a light orange aperture, the inner part of the outer lip is strongly denticulate and it is a taller and heavier shell. Externally, the shell color is several shades of brown, sometimes variegated with cream. Proportionally, the siphonal fasciole of *S. biserialis* is less prominent. I have collected *Stramonita biserialis* (Figures 17, 18) along the Peruvian coast, including mangrove areas from Ecuador to Chile.

Thais kiosquiformis (Duclos, 1832) (Figures 15, 16) differs from *S. delessertiana* in having an angulate outline, a more elevated spire, a greyish-brown color with a frilled suture and a row of sharp nodes at the periphery of the whorls. The interior is creamy-grey, siphonal fasciole very prominent.

MATERIAL OF *STRAMONITA DELESSERTIANA* STUDIED

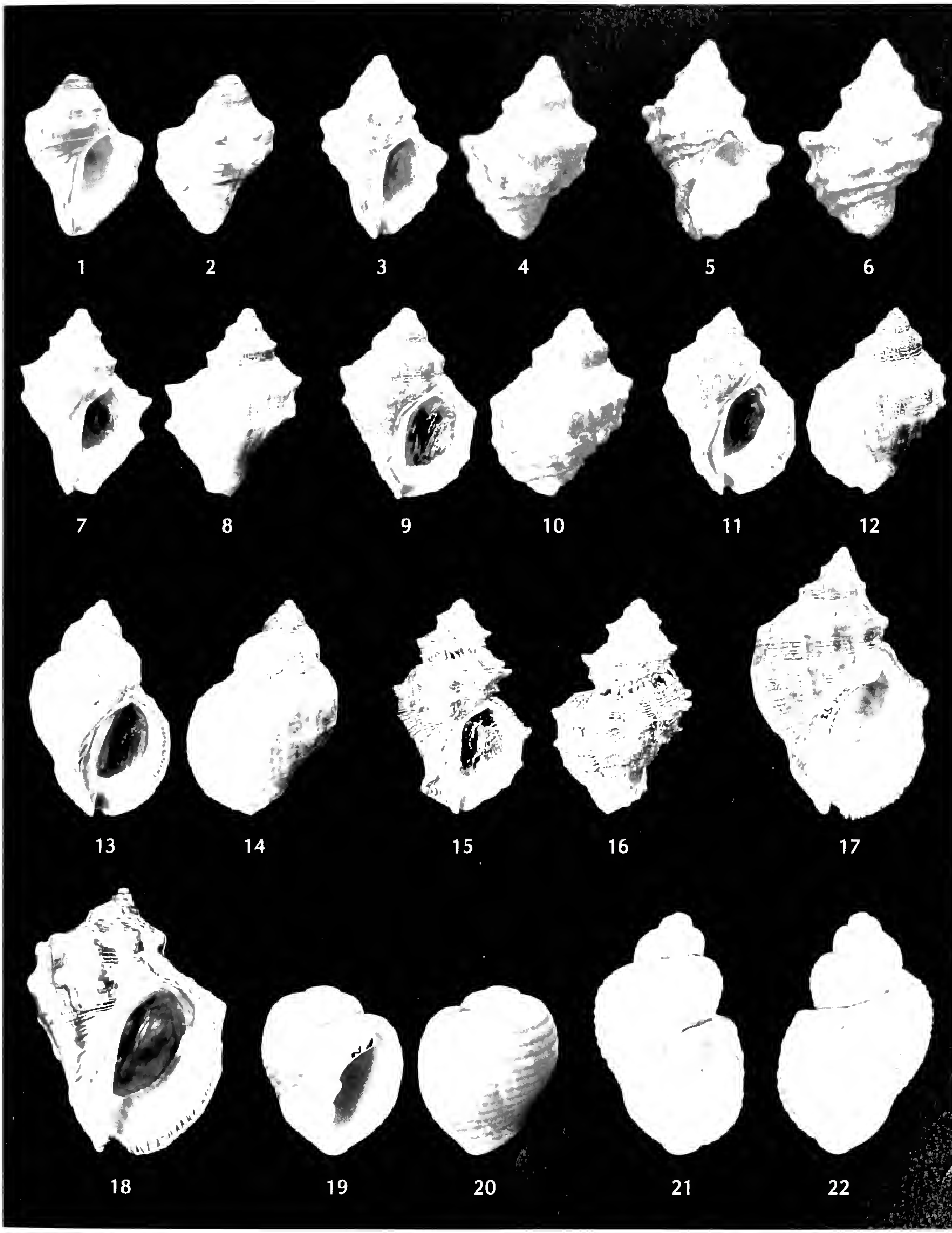
Northern form

- Caleta Cabo Blanco, Piura Department (04°14.91'S), 10 beach specimens, Jan. 1989 and recent dates.
- Punta Peña Negra, Piura Department (04°17'S), 7 beach specimens, Jan. 1989 and recent dates.
- Puerto de Talara, Piura Department (04°34.4'S), 1 live collected, rocky intertidal zone, Oct. 1992.
- Puerto de Talara, Piura Department, 5 live collected, diving, 8 m, summer 1994 (G. Mario Peña Gonzáles Collection).
- Caleta Yacila, Piura Department (05°7.2'S), 3 live collected, rocky intertidal zone, 2 Jan. 1989.
- Caleta Yacila, Piura Department, 5 beach specimens, 14 Feb. 1994.
- Caleta Bayóvar, Piura Department (05°47.5'S), 1 beach specimen, June 1996 (Federico Gutierrez Aliaga Collection).
- Bahía de Sechura, Piura Department (05°38'S), 2 specimens, 1 live juvenile and 1 dead adult, dredged, 10 m, mud, Aug. 1998. Leg. Manuel Figueroa Vargas Machuca.

Central and southern form

- Isla Los Chimus, Ancash Department (09°20.7'S), 13 live, eroded specimens, dredged 10-15 m, gravel, rubble, ground shells, Sept. 1997 and Oct. 1998; 5 live collected specimens, dredged, 10-15 m, gravel, rubble, ground shells, Sept. 2000.
- Bahía de Ancón, Lima Department (11°44.5'S), 15 live collected specimens, rocky intertidal zone, Jul. 1991.
- Isla San Lorenzo, Callao Province (12°5'S), 2 live collected specimens, diving, 10 m, thick sand, 12 Jan. 1995. Leg. Javier Esparza Hidalgo (R.I.P.) & William Rivera Peña.
- Isla Pachacamac, Lima Department (12°18'S), 100+ live collected specimens, rocky intertidal zone, Aug. 1995.
- Bahía de Paracas, Ica Department (13°51.5'S), 7 live collected specimens, rocky intertidal zone,

Figures 1-14. *Stramonita delessertiana* (d'Orbigny, 1941), **(1, 2)** worn specimen similar to d'Orbigny's material, Punta Peña Negra (04°17'S), two views of same specimen; H=21.8 mm, W=15.9 mm (SC). **(3, 4)** live collected specimen, Caleta Yacila, Piura (05°07.2'S), two miles S Paita (type locality), intertidal on rock crevices, 2 Jan. 1989, two views of same specimen; H=29.8 mm, W=21.3 mm (SC). **(5, 6)** H=38 mm, W=27 mm, two views of same specimen (SC). **(7, 8)** Isla San Lorenzo (12°5'S), diving, 10 m on thick sand, 12 Jan. 1995, two views of the same specimen; H=28.3 mm, W=20.2 mm. **(9, 10)** (central coast form), live collected, Isla Los Chimus, Ancash (09°20.7'S), 10-15 m, on rubble, gravel and ground shells, Sept. 2000, two views of same specimen; H=40.5 mm, W=28.8 mm (SC). **(11, 12)** (central coast form), live collected, Isla Pachacamac, Lima (12°18'S), intertidal on rock crevices, 4 Aug. 1995, two views of same specimen; H=43.2 mm, W=29.9 mm (SC). **(13, 14)** (central coast form), live collected, Isla Pachacamac, Lima, intertidal, 4 Aug. 1995, two views of same specimen; H=48.2 mm, W=31 mm (SC). **Figures 15, 16.** *Thais (Thaisella) kiosquiformis* (Duclos, 1832), live collected, Puerto Pizarro, Tumbes (3°30'S), on mangrove roots, 26 Aug. 1997, two views of same specimen; H=49 mm, W 30.3 mm (SC). **Figures 17, 18.** *Stramonita biserialis* (Blainville, 1832) **(17)** beach specimen, Caleta Cabo Blanco, Piura (04°14.9'S), Sept. 1993, apertural view; H=76.6 mm, W=48.3 mm (SC). **(18)** live collected, Punta Peña Negra, Piura (04°17'S), intertidal on rocks, 13 Oct. 1992, apertural view; H=50 mm, W=39 mm (SC). **Figures 19, 20.** *Cancellaria (Massyla) obtusa* Deshayes, 1830, beach specimen, Punta Peña Negra (04°17'S), Sept. 1993, (19) apertural view (20) dorsal view; H=24.7 mm, W= 20.3 mm (SC). **Figures 21, 22.** *Cancellaria (Massyla) cumingiana* Petit de la Saussaye, 1844, Bahía de Sechura (05°38'S), dredged, sand and mud, 12-15 m, 22 Mar. 1979. (21) apertural view (22) dorsal view; H=49.9 mm, W=32.6 mm (Zamora-Corcuera Collection). All photos: Roberto Zamora.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summer 2000. Laura Ostos Segura Collection.

- Playa Pocoma, Moquegua Department (17°25'S), 20 live collected specimens, rocky intertidal zone, 11 Jan. 2001.

Cancellaria (Massyla) obtusa

Cancellaria (Massyla) obtusa Deshayes, 1830, and *Cancellaria (Massyla) cumingiana* Petit de la Saussaye, 1844, have similar shells. Petit (1983) thought that they might be synonyms, but material from Perú shows that they are distinct species. The shells of *C. obtusa* (Figures 19, 20) are heavy and solid, with a low spire and low spiral ribs without beading attaining a height of 35 mm. The figured shell is in the C. Skoglund Collection. I collected ten beach specimens of *C. obtusa* at Caleta Cabo Blanco (04°14.9' S) and at Punta Peña Negra (4°17'S), Perú.

The shell of *C. (M.) cumingiana* is less solid and is taller with a more elevated spire. The spiral ribs are beaded. Keen (1971) wrote that the larger of the two syntypes of *C. (M.) cumingiana* in the BMNH, is 46 mm high and 31 mm wide. I collected a beach specimen of *C. (M.) cumingiana* at Caleta Yacila, near Paita, Perú, 14 February 1994. Despite having a broken spire, it measures 41.2 mm high and 32.5 mm wide. This shell is also in the C. Skoglund Collection. The figured shell (Figures 21, 22), dredged at Bahía de Sechura, 22 March 1979, is in the Zamora-Corcuera Collection in Lima, Perú.

ACKNOWLEDGMENTS

I thank Mrs. Carol Skoglund of Phoenix, Arizona, who encouraged me to write this note, read the manuscript and offered valuable suggestions. I also thank Mr. Roberto Zamora and his wife Mrs. Zoila Corcuera for the loan of material for study and for making all the photos; Dr. Mario Peña, Mr. Federico Gutierrez Aliaga and Miss Laura Ostos Segura for allowing me to review their collections; Mr. Manuel Figueroa Vargas Machuca, Mr. Javier Esparza Hidalgo (RIP) and Mr. William Rivera Peña for legacy of material and Miss Polianich Figueroa for being my partner on several collecting trips.

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NEW PANAMIC PROVINCE DISTRIBUTION RECORDS FOR TWO SPECIES OF *PARVITURBO* (MOLLUSCA: SKENEIDAE)

CAROL SKOGLUND[1]

Santa Barbara Museum of Natural History,
2559 Puesta del Sol Road, Santa Barbara, California 93105 USA
e-mail: carolskoglund@msn.com

Two species of *Parviturbo* were dredged at Bahía de Los Angeles, Baja California, México, both off Punta la Gringa in 20 to 40 m, and off N.W. Isla Smith in 120 to 183 m by my late husband Paul and me. This is the first record in the northern Golfo de California for these two species. All specimens were dead taken.

Parviturbo acuticostatus (Carpenter, 1864) (Figures 1, 2) has been known from Monterey, California, to Cabo San Lucas at the southern tip of Baja California Sur, and into the southern Golfo de California at Isla Cerralvo, México (McLean *in* Keen, 1971). LaFollette (1976) figured the species and included all the southern California Channel Islands and offshore banks in the distribution.

Parviturbo stearnsii (Dall, 1918) (Figures 3, 4) was known from Isla Asunción on the outer coast of Baja California, and north in the Golfo de California to Guaymas, Sonora, México, and south to Porto Utrea, Colombia (McLean *in* Keen, 1971). This distribution was extended south to Manabí Province, Ecuador (Shasky, 1984) and later to Isla del Coco, Costa Rica, (Shasky, 1996).

I would like to thank James H. Mclean of the Los Angeles County Museum of Natural History for confirming my identification of the two species, and David K. Mulliner for the fine photographs.

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1996. Distributional records of interesting and rarely collected marine gastropods from the tropical eastern Pacific. The Festivus 28(4): 35-45, figs. 1-11 (Apr. 11).

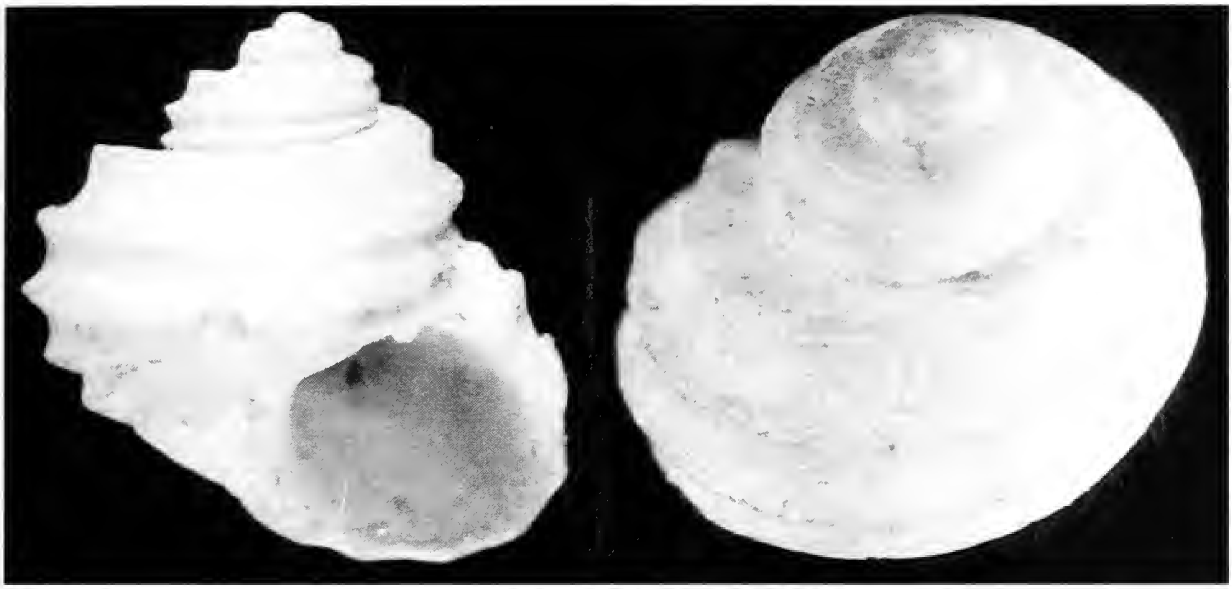
[1]Home address: 3846 E. Highland Avenue, Phoenix, Arizona 85018, USA.

Photographer's Note

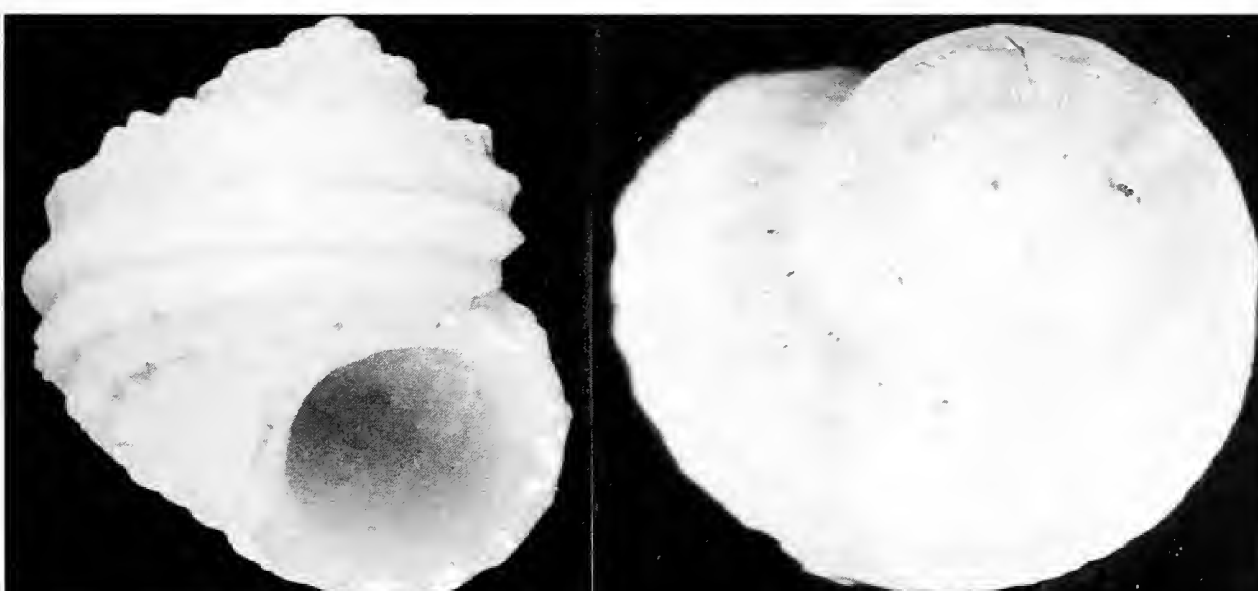
To take pictures of very small sea shells (such as *Parviturbo*), and get fine detail and good contrast, a camera and bellows is mounted on a copy stand. The lens is mounted to the bottom of the bellows; in this case a Zeiss Luminar 16 mm, F2.5, specially made to do micro-photography.

All pictures were taken on Kodak Plus X film with aperture set on F16 to get maximum depth of field. The shells were illuminated with two strobe lights for maximum detail.

David K. Mulliner



Figures 1, 2. *Parviturbo acuticostatus* (Carpenter, 1864). (1) Apertural view of 2.2 mm specimen. (2) Dorsal view of 2.1 mm specimen. Photos: D.K. Mulliner.



Figures 3, 4. *Parviturbo stearnsii* (Dall, 1918). (3) Apertural view of 2.0 mm specimen. (4) Dorsal view of 2.2 mm specimen. Photos: D.K. Mulliner.

BOOK NEWS

MONOGRAPH OF THE LIVING *ZOILA*
A FASCINATING GROUP OF AUSTRALIAN ENDEMIC COWRIES (MOLLUSCA: PROSOBRACHIA: CYPRAEIDAE)
A systematic-taxonomic and iconographic revision of the genus.
By: Dr. Felix Lorenz.
With the description of *Zoila ketyana bataviensis* nov. ssp. by Dr. Felix Lorenz & Hugh Morrison.
Publisher: Conch Books, Hackenheim, Germany. 2001. 187 pages, 54 color plates, 9 maps (8 distributional maps in color).
Price: approximately $45.00.

The *Zoila* are a genus of highly prized cowries endemic to western and southern Australia. The number of assigned species and subspecies is large (caused perhaps in part by their lack of a veliger stage), and the validity of the taxonomic assignments is subject to heated debate.

The author states "The aim of this book is to revise the systematic taxonomy of the genus, to give an iconographic overview to its vast conchological diversity, and to add some aspects to ongoing debates." The author approaches this goal by presenting a systematic taxonomy of the living members of the cypraeid genus *Zoila*. This taxonomy is based on a well described approach to evaluating the systematic units "species" and "subspecies". The occurrence and taxonomic importance of intermediate phenotypes are discussed as well as ecological and geographical factors. All of the listed species, subspecies, and the various forms and variations are described, discussed, and illustrated in color with distribution maps. One new subspecies is described. Lectotypes are designated for two species and six subspecies. Unfortunately this badly needed taxonomic action is potentially flawed in that only one of the designated lectotypes is stated as being deposited in a museum collection. The remaining five lectotypes are listed as being in the collection of a prominent dealer (Raybaudi). None of the lectotypes are designated in terms of specific collection numbers. This may place the validity of the lectotype designations in doubt under the provisions of the ICZN (article 74.7.2).

The author attempts to solidify taxonomic assignments among the *Zoila*, which are perhaps the most contested of the Cypraeidae. The complexity of his task can be sensed in his Table 1 which shows a comparison of the systematic assignments of twenty-one taxa of *Zoila* by five recent authors, and his Table 2 which lists sixty-four names that have been introduced within the genus *Zoila*.

The author has attempted a very difficult task, since he is trying to solidify assignments by using criteria that may be subjective, on specimens that may be highly variable or subtly different. But in this attempt he has produced a thoughtful and beautiful book in which fifty-four plates and nine distribution maps show more than 840 color photographs of these coveted members of the genus *Zoila*. The plates and distribution maps alone are sufficient to justify purchase of this book by anyone interested in this beautiful genus of mollusks.

LITERATURE CITED

INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE
1999. International Code of Zoological Nomenclature, fourth edition. The International Trust for Zoological Nomenclature. 306 pp.

Terry S. Arnold and
Hugh Bradner, reviewers

Also received for the Club library is the most recent edition (25th, 2001-2002) of Tom Rice's *A Sheller's* Directory of Clubs, Books, Periodicals and Dealers. Complimentary copies are sent to those organizations which provide Of Sea and Shore Publications with current information on their clubs/organizations.

This publication along with the *Zoila* book will be available for circulation at the regular October meeting.

ISSN 0738-9388

THE FESTIVUS

A publication of the San Diego Shell Club

Volume: XXXIII | November 8, 2001 | Number: 11

MEMBERSHIP AND SUBSCRIPTION
Annual dues are payable to San Diego Shell Club.
Membership (includes family). Domestic $15.00;
Overseas (air mail):$30.00; Mexico/Canada (air mail):$20.00.

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.

Website at: http://www.molluscs.net/SanDiegoShell Club/index.html *Email: cmhertz@pacbell.net*

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

PROGRAM

Cones and Their Toxins

Michael Hollmann, Club member and Chair of the Biochemistry Department at Ruhr University in Bochum, Germany, will give a general overview of the biology of *Conus* venoms, how the animals use them, what the chemical nature of the toxins is, and what their major physiological actions are. He will further discuss in detail some of the most interesting toxins in terms of potential research and clinical applications.

AND, as a Naticidae specialist he has invited members to bring in their problem naticids!

Meeting date: 15 November 2001
Shells of the month: Naticidae (moon snails)

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CLUB NEWS

Minutes of the October 18th Meeting of the San Diego Shell Club

In the absence of President, Kim Hutsell, Vice President Jules Hertz presided over the meeting. He called the meeting to order at 7:45 p.m. There was no approval of the minutes because of last month's party. There was no treasurer report because of treasurer Linda Hutsell's absence.

Jules announced the nominating committee's slate of candidates for next year's Board: Jules Hertz as President, Linda Hutsell as Treasurer, Silvana Vollero as Recording Secretary, and Monika Forner as Corresponding Secretary. The position of Vice-president is vacant so Jules invited members to consider taking this on. Other nominations from the membership and the election of officers will take place at the November meeting. They will be installed at the Christmas party.

The Christmas Dinner Party is set for December 8th. See Column 2, this page, for details.

Jules thanked George Kennedy and Nancy and Bill Schneider for the delicious refreshments for the evening. He also reminded members that *The Festivus* will be publishing an occasional paper and supplement soon.

The program for the evening was about diving in New Zealand and was presented by Kathy and Joe Kalohi. They traveled to the eastern part of North Island. They enjoyed several wreck dives and collected beach specimens. They reported that Auckland has a beautifully renovated beachfront and marina. They stayed in an area called the "Hibiscus Coast" and they noted an interesting mix of plants with hibiscus, fern trees, pine trees, and grassy plains.

During the wreck dives, they saw lots of marine life. Joe especially enjoyed the variety of fish. They said that many of the species of marine life seen there had comparable species in our area. For example, the lobsters there also have no claws. They photographed some nudibranchs with their egg cases.

After diving, they spent a few days as tourists and enjoyed the black sand beaches and an area with bubbling pools, geysers, limestone caves, and ostrich farms. Their closing picture of a sunset reflected their view that it is a peaceful country - a perfect place for a relaxing vacation.

Nancy Schneider was the winner of the drawing. The meeting was adjourned at 8:45 p.m. to enjoy the refreshments and to peruse the library and the New Zealand specimens brought in by the Kalohis.

Silvana Vollero

Membership Announcement

In the October issue, members received a blue sheet inserted in their envelopes. It is both a membership renewal slip and an announcement of special publications. Please read it carefully and return it, if you are interested in one or both of the publications. Only those returning the sheet, marked appropriately, can receive a free member's copy of the publication(s).

All subscription monies received from October 2001 on will be considered as memberships in 2002.

The Club's Annual Christmas Dinner Party

The Club's annual Christmas Party will be in the Lisbon Room at the Ramada Inn and Conference Center off Clairemont Mesa Blvd. and Kearny Mesa Rd. in San Diego on Saturday evening December 8th. [See map with this issue.] Festivities will begin with a no-host bar at 6 p.m., and dinner will be served at 7:00 p.m.

The dinner menu offers a choice of two entrees and two desserts. Table wine will be provided by the Club, as always. The entree choices are: 1) Blackened Mahi Mahi with rice pilaf and vegetable medley or 2) Chicken Italiano with garlic rosemary potatoes and vegetable medley. Dessert choices are: 1) Amaretto cheesecake or 2) cherry pie. The dinners include bread and butter, salad, dessert, and coffee or tea.

The total cost for the evening, including tax and gratuity is $25 per person. Reservations with checks are needed, at the latest, by Monday December 3rd. Please indicate on your check which entree and dessert you want.

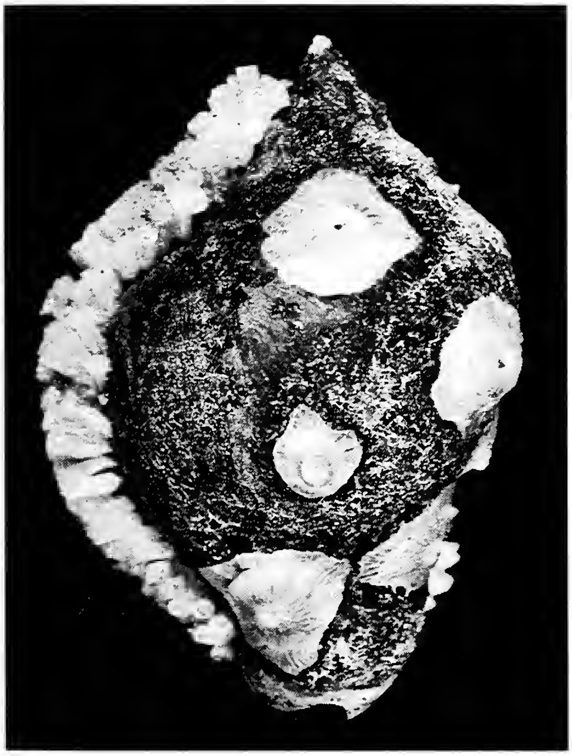
Also remember that there will be the traditional gift exchange. To be included, bring a wrapped shell gift with only very general locality on the outside (eastern Pacific, Caribbean, etc.) to place under the tree.

The Club is also planning a program for this party. So plan on attending. It's always a wonderful evening.

TRIUMPHIS (NICEMA) SUBROSTRATA FOUND WITH EGG CASES

JULES HERTZ[1]
Santa Barbara Museum of Natural History,
2559 Puesta del Sol Road, Santa Barbara, California 93105-2936, USA

Keen (1971) reported *Triumphis (Nicema) subrostrata* (Wood, 1828) "as fairly common on the mud flats at San Blas, México, but is otherwise rare, ranging south to Colombia." I spent three days at San Blas, Nayarit, in February 2001 and a similar amount of time in 1999 but never encountered a specimen intertidally. Several specimens were dredged by K. L. Kaiser and C. Skoglund off Bahía Potrerillo (21°30.713'N, 105°12.833'W to 21°23.023'N, 105°14.039'W), one bay south of Bahía Jolotemba, Nayarit, México, on 9 February 2001. The dredging was a 10 minute pull at 7-13 m, and the substrate was sand and mud with tree litter. One specimen was found with egg cases and is shown in Figure 1.



Figures 1, 2. *Triumphis distorta* with egg cases found off Bahía Potrerillo, Nayarit (1) dorsal view showing anemones on surface (2) apertural view showing surface almost completely obscured by egg capsules. Photos: D.K. Mulliner.

[1] 3883 Mt. Blackburn Ave., San Diego, CA 92111, USA.

The laying of eggs on the shells of buccinid species is not uncommon. Keen (1971) in her discussion of the genus *Solenosteira* stated "A habit shared only occasionally by species of other genera is that of depositing the egg masses on the outside of the shell; many specimens may be completely encrusted with the chaffy, wheat-shaped capsules." Gemmell (1973) observed and photographed a large number of *Solenosteira macrospira* Berry, 1957, congregating to deposit eggs and postulated that the egg capsules are attached to the dorsal surface of the shell of one of the other members of the breeding aggregation. She never witnessed the actual deposition of the egg capsules. In the past, I have seen egg cases on *Solenosteira macrospira* (Figure 3) and *Solenosteira capitanea* (Figure 4) both of Berry, 1957, at San Felipe, Baja California, México. Keen (1971) has a photograph of such eggs on *Solenosteira gatesi* Berry, 1963.

My thanks to David K. Mulliner for the photography of the species.

LITERATURE CITED

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1973. Field observations on gastropod breeding and egg laying. The Festivus 4(5): 32-34, 4 figs.

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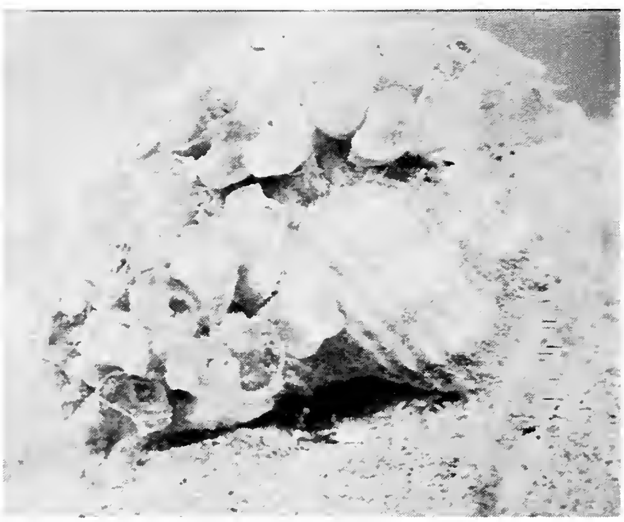

Figure 3. *Solenosteira macrospira* with egg cases found at Bahía San Felipe, Baja California, México in April 1972. Photo: D.K. Mulliner.

Figure 4. *Solenosteira capitanea* specimen with egg capsules on its dorsum found at Bahía San Felipe in April 1972. Photo: D.K. Mulliner.

NEW PANAMIC PROVINCE RECORDS FOR THE DEEP-WATER BUCCINID *NEPTUNEA AMIANTA* (DALL, 1890) (GASTROPODA: BUCCINIDAE)

KENT D. TREGO

441 Ravina Street, #3, La Jolla, CA 92037

The deep-water buccinid *Neptunea amianta* (Dall, 1890) is found in 300 to 1500 m depths off the west coast of North America as far south as Punta San José, Baja California, México (31°N) (McLean, 1996). The Benthic Invertebrate Collection of the Scripps Institution of Oceanography (SIO) has two Panamic Province records south of the given range for *Neptunea amianta*. They are as follows:

SIOBIC M2517 — 1 dead collected specimen, collected northwest of Isla Cedros (28°50'N, 115°43'W) in 1511-1536 m depth, R/V Horizon, 10 June 1985 (Figure 1).

SIOBIC M8171 — 3 live collected specimens, 72 x 41.5 mm, 70.2 x 41.0 mm and 68.2 x 39.0 mm in length, collected Panama Basin (5°9.8'N, 81°41.2'W to 5°11.3'N, 81°40.5'W) by Otter trawl 3900-4000 m depth, R/V *Melville*, 3 October 1981 (Figure 2).

My thanks to Larry Lovell (Benthic Invertebrate Collection, SIO), Roberta Baldwin (Marine Biology Research Division, SIO) and David K. Mulliner (photography) for their assistance.

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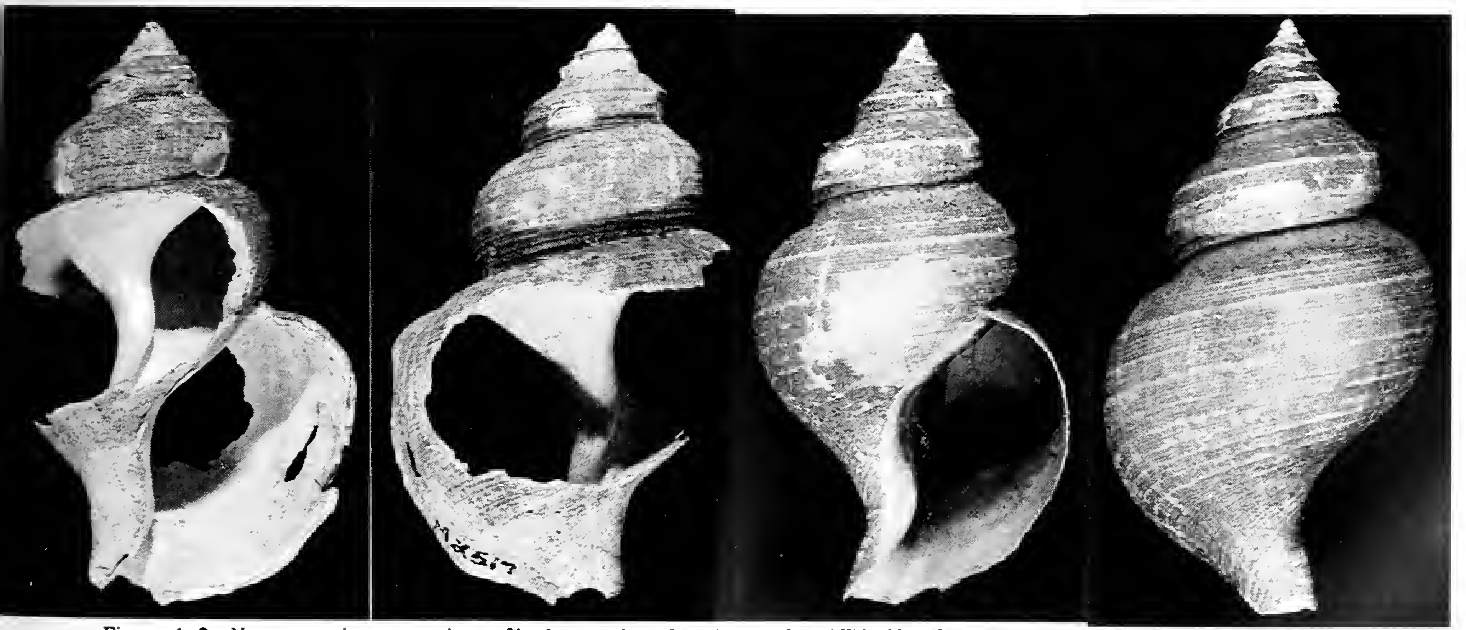
McLEAN, JAMES H.
1996. The Prosobranchia. Taxonomic Atlas of the Benthic Fauna of the Santa Maria Basin and Western Santa Barbara Channel. Vol. 9 — The Mollusca Part 2. The Gastropoda, 160 pp., figs. 1.1-1.29.



Figures 1, 2. *Neptunea amianta*. two views of broken specimen 94 x 61 mm, from NW of Isla Cedros (2) two views of live collected specimen, 72 x 41.5 mm, from Panama Basin. Photos: D.K. Mulliner.

2002 WINTER AND SPRING SHELL SHOWS AND OTHER EVENTS

Prepared by Donald Dan, COA Award Chairman

6704 Overlook Drive, Ft. Myers, FL 33919, USA.

Jan. 18-20. Space Coast Shell Festival, Melbourne, FL, The Melbourne Auditorium, 625 E. Hibiscus Blvd. Jim & Bobbi Cordy, 385 Needle Blvd. Merritt Is., FL 32953. E-mail: cordy@yourlink.net (321) 452-5736.

Feb. 1-3. Broward Shell Show, Pompano Beach, FL Pompano Beach Recreation Center, NE 18th Av. & NE 6th St. Jim VunKannon, 2219 NE 16th Court Ft. Lauderdale, FL 33305. (954) 561-0120.

Feb.15-17. Naples Shell Show, Naples, FL The Nature Conservancy, 14th Avenue N. Gary Schmelz, 5575 12th Ave. SW, Naples, FL 34116. (941) 455-4984. E-mail: schmelz@att.net

Feb.15-17. Sarasota Shell Show, Sarasota, FL Sarasota Municipal Auditorium, Tamiami Trail. Lynn Gaulin, 3417 58th Ave., W. Bradenton, FL 34210. (941) 755-1270. E-mail: ehgaulin@worldnet.att.net

Feb. 22-24. St. Petersburg Shell Show, Treasure Is., FL, Treasure Is. Community Center, 1 Park Place. Bob & Betty Lipe, 348 Corey Avenue, St. Petersburg Beach, FL 33706. (727) 360-0586. E-mail: rlipe1@tampabay.rr.com

Mar. 1-3. Sanibel Shell Show, Sanibel, FL, Sanibel Community Center, Periwinkle Way. Richard Willis, 5305 Darby Court, Cape Coral, FL 33904. (941) 540-7380. E-mail: rwwillis@ix.netcom.com

Mar. 7-9. Marco Island Shell Club Show XIX, Marco Is., FL, Wesleyan United Methodist Church, Barfield Road. Jean Sungheim, P.O. Box 633, Marco Island, FL 34146. (941) 642-7247.

Mar. 9 -10. XIVéme Recontres Internationales du Coquillage, Espace de Blanc Manteaux, 48 Rue Vieille-du-Temple, Paris, France. M. & D. Wantiez, 88, Rue du General Leclerc, 95210 Saint Gratien, France. 33 (1) 34-17-00-39.

Mar. 23-24. 4th Australian National Shell Show, Brisbane, Australia. Greek Club & Convention Center, 29-31 Emondstone St., S. Brisbane. The Shell Show Committee, MSA Qld Branch, PO Box 64, Brisbane 4004.E-mail: msaqld@powerup.com.au

May 4-5. Central Florida Shell Show, Orlando, FL, Central Florida Fairgrounds, Exhibition Hall A, 4603 W. Colonial Drive. Phyllis Gray, 1212 S. Eola Drive, Orlando, FL 32806. (407) 422-0253. E-mail: pgray@kennesaw.lawco.com

May 4-5. XI Belgium International Shell Show, Antwerp, Belgium. Schijnpoort, Schijnpoort Straat, R. De Roover, Vorsterslaan 7, 2180 Ekeren-Donk, Belgium. 32 (3) 644-3429. E-mail: bvc.deroover@village.uunet.be

Jul. 13-18. Conchologists of America Annual Convention, Sarasota, FL, The Hyatt Hotel, 1000 Boulevard of the Arts. Peggy Williams, P.O. Box 575 Tallevast, FL 34270. (941) 355-2291. E-mail: shellelegant@mindspring.com

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E-mail: cmhertz@pacbell.net *Website at:*
http://www.users.cts.com/crash/t/tarnold/SDSC/index.html

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

PROGRAM

Reproductive Strategies in Cephalopod Mollusks

Dr. F.G. (Eric) Hochberg of the Santa Barbara Museum of Natural History, a cephalopod specialist, will discuss new information on spawning and brooding behavior in squids and octopuses.

Meeting date: 17 January 2002

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CLUB NEWS

Minutes of the November 15th Meeting of the San Diego Shell Club

In President Kim Hutsell's absence, Vice President Jules Hertz welcomed everyone to the meeting, especially the guests. The minutes of the October meeting were approved as written in *The Festivus* with a motion by Hugh Bradner. There was no treasurer or corresponding secretary report since those officers were unavailable.

Carole Hertz invited everyone to the Christmas Party at the Ramada Inn and Conference Center. She said that entrees selected were very tasty. Everyone was encouraged to bring slides of their own travels.

The slate of officers for next year's Board was presented and voted on. The officers, elected uananimously, will be: Jules Hertz, President; Terry Arnold, Vice-President; Linda Hutsell, Treasurer; Silvana Vollero, Recording Secretary; Monica Forner, Corresponding Secretary and Kim Hutsell, Past President. Carole Hertz will continue as editor of *The Festivus*.

Jules introduced the speaker for the evening, Dr. Michael Hollmann. Michael is a long-time Club member. He lives in Germany and is an expert on naticids. Michael began by saying that he'd promised to do this talk for 13 years and was very pleased to be able to finally do so. He talked about his work with cone shells and the neurotoxins they produce. It is a large family with one genus which is difficult to subdivide according to morphological features. Another way to do this is through biology.

He described the cones as hunters. They eat worms, other shells, or fish. The fish-eaters are the most interesting to scientists. Their technique is to shoot a poison harpoon-like arrow to catch the fish. Their venom is fast acting.

These toxins have potential biomedical applications since they block certain events in the central nervous system. Baldomero Olivera was the first to study them. Scientists use a non-invasive method that Michael described as "milking a cone" to get the venom. The properties of the toxins are that they are highly specific, unusually potent, and extremely variable.

The conotoxin inhibits pain, especially pain that cannot be treated by morphine or other opiates. The toxin does not get rid of the pain, but because the conotoxins block the ion channels, the pain is not sensed. Michael gave a brief explanation of the neuroscience involved in the process. The conotoxins cannot be ingested but must be directly injected into the spinal cord which is still a risky procedure for use in humans. Further research on the potential use of conotoxins is needed.

The shell drawing winner was John Michel. Jules thanked Bob and Silvana for bringing the evening's refreshments. The meeting was adjourned at 9:00 p.m.

Silvana Vollero

The Annual Christmas Dinner Party

The annual Christmas Party was held in the beautifully decorated Lisbon Room of the Ramada Hotel and Conference Center. Over 25 members gathered early to greet friends and have a social time before sitting down to dinner. It was a delicious meal enjoyed by all, with very fine service by the attentive hotel staff.

Master of Ceremonies Carole Hertz welcomed everyone to this 40th anniversary meeting of the Club and made the sad announcement of the passing of friend and Club member, George Hanselman.

After dessert had been served, Carole continued the program with some amusing anecdotes interspersed with Club happenings. She announced that *The Festivus* had completed 32 years of continuous, on-time publication and that some special issues were to be published shortly.

Beautiful slides were shown by Carole and Jules, Kim Hutsell and Richard Herrmann after which came the excitement of the traditional gift exchange. Members lingered for quite awhile enjoying the company of friends. It was a lovely evening.

Dues are Overdue

For those who have not paid their dues for 2002, this will be the last issue. To resume membership, send your dues to the address on the masthead.

MOLLUSKS FOUND ON BONAIRE (1998-2001)

ROLAND C. ANDERSON

The Seattle Aquarium, Waterfront Park, Seattle, WA 98101, USA
E-mail: roland.anderson@ci.seattle.wa.us

I have been lucky to participate in an annual research project on the Caribbean island of Bonaire for three of the last four years. The island is located in the southern Caribbean Sea, just a hundred miles north of Venezuela. The study, being conducted by Dr. Jennifer Mather, is on the behavior of the Caribbean reef squid *Sepioteuthis sepioidea* (Blainville, 1823). Her study has concerned various aspects of squid behavior, including what they signal with their colorful and changeable skin patterns, what the various courtship displays and the zebra display mean and understanding the circumstances surrounding their use. There is the question of whether or not squid communicate with the color patterns on their skin, if they have a language of color patterns, whether or not they "lie" or equivocate with their color patterns, if they can double signal (do two things at once) and what is the context of the various color patterns, such as the deimatic body pattern (see below). Dr. Mather uses volunteers to help in her research and I have been lucky to join her for two weeks in 1998, 1999 and 2001.

This research involved snorkeling to watch the squid as they gathered in small schools at regular locations. As we hung in the shallow, warm, clear water, we could easily watch the squids' behavior just 1-2 meters beneath us and record it on underwater slates. Later, we put this information into computers for statistical analysis. In addition to watching what the squid were doing, we also took regular squid censuses over 2 km of the shoreline – we saw up to 70 squid during such a survey.

It was impossible not to notice other animals in the rich, warm tropical water, whether it was fish such as yellowtail snappers that precipitated a full-scale panic among the squid, or parrotfish that caused the squid to "snarl" with the use of a deimatic display, during which the squid turned pale and showed large false eyespots. As we were all cephalopod specialists during the first 2001 session, it was hard not to look for and notice the many octopuses we saw as we swam to and from our squid schools and conducted squid surveys. In 2001, we seemed to see more octopuses than in previous years, several maintaining residence just a few meters from the shore access of a popular dive resort. One day we saw eleven in shallow water while we were snorkeling to and from our squid schools over about 1 km of shoreline. These were the Caribbean common octopus, *Octopus vulgaris* Cuvier, 1797, a species which is probably going to be re-named, since it is most likely a different species from the *O. vulgaris* of the Mediterranean (Mangold, 1998; Voss and Toll, 1998).

We also noticed many other invertebrates, some of them mollusks eaten by octopuses, others as shells on the sand or in the coral. A local naturalist asked us to compile a list of the invertebrates we saw during the course of this study, for use in scuba diving classes, and we were glad to comply.

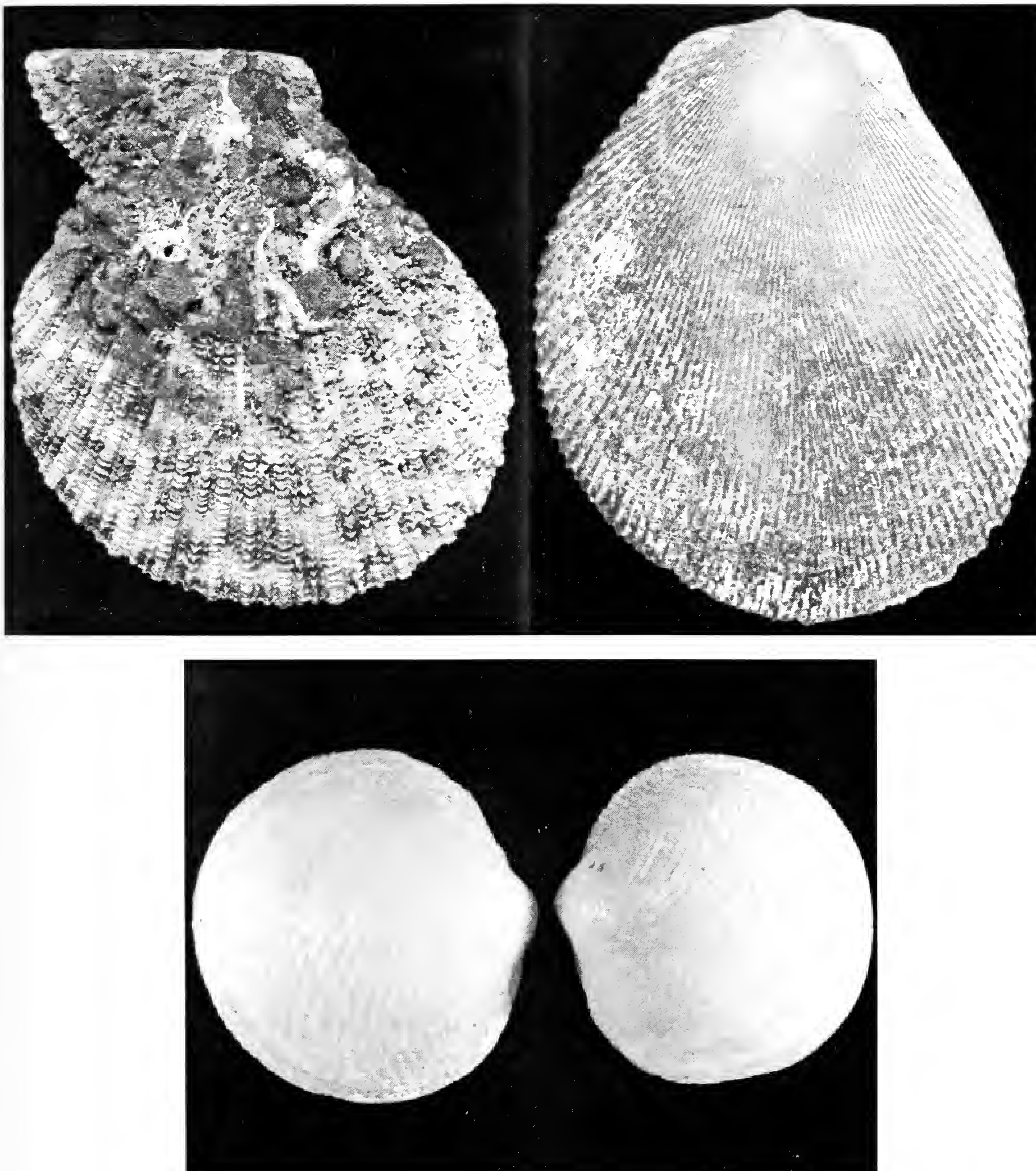
Mollusks found as a result of that request are listed in Table 1. No live animals were taken from the shores or waters from Bonaire, as it is surrounded by a strictly-regulated marine park where nothing may be taken (however, on several occasions we noted local fishermen using seines in shallow water, even in front of a resort). Note that this list is a work-in-progress and further species will be added in future years. It is by no means complete, as it just reports our casual observations and it only covers the shallow water on the protected side of the island. However, several interesting and rare mollusks were seen.

Identifications were made using various references, the most useful being Humann (1990), Abbott (1974; 1984), Warmke and Abbott (1961), and de Jong and Coomans (1988). Baker (1924) was used to identify the land shells (see also Anderson, 1999, and Anderson and Sinn, 2000).

I thank Tom Rice for confirming the identification of some of the specimens and Dave Mulliner for photographing the shells for this paper.

Table 1. MOLLUSKS FOUND ON BONAIRE, 1998-2001

	Common Name	Scientific Name
Bivalves		
	Turkey Wing	*Arca zebra*
	Rigid Venus	*Antigona rigida*
	Gaudy Asaphis	*Asaphis deflorata*
(Figure 1)	Ornate Scallop	*Chlamys ornata*
	Sentis Scallop	*Chlamys sentis*
(Figure 2)	Rough Lima	*Ctenoides scabra*
(Figure 3)	Cross-hatched Lucina	*Divaricella quadrisulcata*
	Pennsylvania Lucina	*Linga pennsylvanica*
	Thick Lucina	*Lucina pectinatus*
	Atlantic Wing Oyster	*Pteria colymbus*
	Atlantic Thorny Oyster	*Spondylus americanus*
	Faust Tellin	*Tellina fausta*
(Figure 4)	Speckled Tellin	*Tellina listeri*
	Antillean Strawberry Cockle	*Trigoniocardia antillarum*
Marine Gastropods		
	Eight-ribbed limpet	*Hemitoma octoradiata*
(Figure 5)	Atlantic Yellow Cowry	*Cypraea acicularis*
(Figure 5)	Atlantic Gray Cowry	*Cypraea cinerea*
	Milk Moon Snail	*Polinices lacteus*
	Atlantic Hairy Triton	*Cymatium pileare*
	Smooth Dove Shell	*Columbella laevigata*
	Netted Olive	*Oliva reticularis*
	Archer's Lyria	*Lyria archeri*
	Striated Bubble Shell	*Bulla striata*
	Lettuce Sea Slug	*Tridachia crispata*
Terrestrial Gastropods		
	--	*Cerion uva*
	--	*Tudora bonairensis*
Cephalopods		
	Caribbean Reef Squid	*Sepioteuthis sepioidea*
	Caribbean Reef Octopus	*Octopus briareus*
	Atlantic Longarm Octopus	*Octopus defilippi*
	Caribbean Two-spot Octopus	*Octopus filosus*
	Caribbean Common Octopus	*Octopus "vulgaris"* (see text)



Figures 1-3. (1) *Chlamys ornata*, top left (2) *Ctenoides scabra*, top right (3) *Divaricella quadrisculcata*, bottom; three bivalve species found empty on the island of Bonaire during 1998-2001. Photos: D.K. Mulliner.

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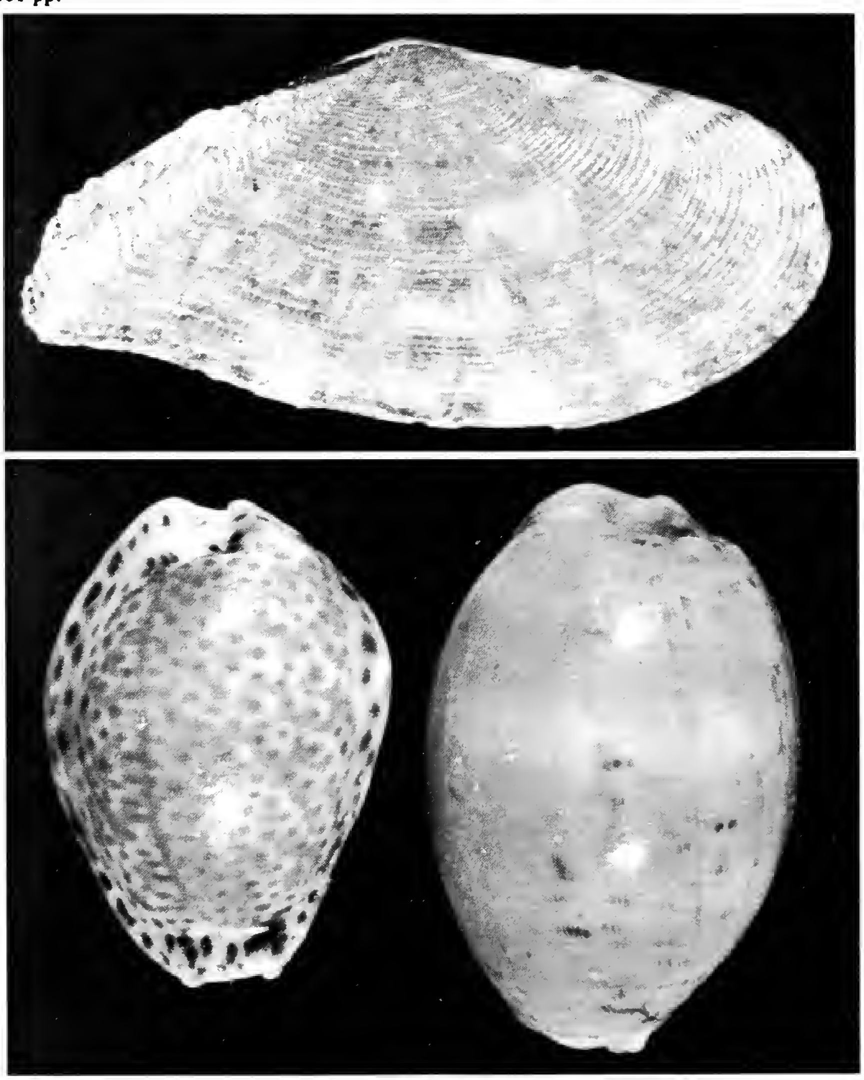

Figures 4, 5. (4) *Tellina listeri*, top (5) *Cypraea acicularis*, bottom left, and *Cypraea cinerea*, bottom right, found empty on the island of Bonaire, 1998-2001. Photos: D.K. Mulliner.

COLLECTING IN THE SOUTHERN SEA OF CORTEZ WITH NOTES ON THE OCCURRENCE OF *CONUS TESSULATUS* (BORN, 1776)

RICHARD J. MCCLINCY

809 St. George Road, Danville, CA 94526, USA
E-mail: richard.mcclincy@kvaerner.com

During the past twelve years, my collecting activity in the Sea of Cortez has been limited to annual SCUBA diving trips aboard recreational dive boats and a few spring forays to San Felipe, Baja California. In late August 2001, I made one of these weeklong trips aboard the M/V *Solmar* V based in Cabo San Lucas, Baja California Sur, México. The *Solmar* V is a comfortable 34 m (112 ft) custom dive boat that operates in the southern part of the Sea of Cortez during the summer months and then spends the winter months traveling to México's Archipiélago Revillagigedo, including Isla Socorro. Diving itineraries in the southern part of the Sea of Cortez include portions of the Eastern Cape and several of the many offshore islands ranging northward to the exposed reef off Isla San Diego (25°12'N, 110°31'W).

We stopped first at a small islet called Arrecife de la Foca (24°27'N,109°58'W), located a few kilometers off the northern end of Isla Cerralvo. Diving here is usually confined to the south side of this small exposed rock because a current is often running and this area offers the best anchorage just above an old shipwreck. It's hard to tell what the wreck once was, other than a large steel-hulled boat. Little is left except the stern with its propeller and some other large heavy components. It is very old and well-scattered about 100 m south of the rock in 23 m of water.

Shells were not very numerous here but I did find two *Conus tessulatus* on my first two dives in the morning. Although the smaller of the two was found dead, a 40.3 mm shell was found alive with only its dorsum exposed in the coarse sand near the wreck. These two shells were located in almost exactly the same spot as another live specimen that I collected here a few years ago. Two more daytime dives produced a few *Cardites crassicostata* and some juvenile *Conus dalli* that I fanned out of small sand pockets on the solid rock near the base of the islet. During late afternoon I discovered almost a dozen live *Strombus galeatus* lying partly buried in the sand looking much like small rocks. These senile old strombs were not particularly large, but they were extremely thick and heavy. It is uncommon to find a colony of these shells in the Sea of Cortez today because they have been heavily fished for so many years. These were deep enough that they should stay well protected.

Another interesting find at Arrecife de la Foca was a large number of fragments of *Cypraecassis tenuis* scattered about where the bottom was flat and mostly sand. Probably eight to ten individuals had met their demise here in the jaws of the ubiquitous parrotfish. Several of these broken shells were very fresh, but only one was found whole. Other dead shells of this helmet have been found here on previous trips, but not in such numbers.

The second dive spot on this trip was the wreck of the *Salvatierra,* a large car ferry that operated between La Paz and Mazatlán and sank during the mid-1970s in the San Lorenzo Channel, north of La Paz. It ran aground on nearby Suwanee Reef and now lies in 15 m of water on a sand bottom. The whole superstructure has been broken off by storm action and it lies now to one side. Several large trucks lie about, upside down, and the top of the hull looks like a huge steel dance floor – the car deck. Penetration of this wreck is possible if you take your tank off but it didn't look appealing enough to try it.

A curious green moray eel eyed me suspiciously from its lair in a toilet near the wheelhouse. The wreck is surrounded by small bushes of black coral and dense colonies of anemones and small corals can be found inside some of the more accessible compartments. Although shells were sparse here, I did collect a nice large *Conus brunneus* from inside a collapsed compartment. This particular cone is common to abundant farther north, especially around San Carlos, Sonora, and the nearby islands, but I rarely see it around the islands in the southern part of the Sea of Cortez.

Punta Tintorera marks the northern headland of a large bay on the west side of Isla Partida, north of La Paz. We made a night dive here one evening before seeking a safer anchorage elsewhere. The shore at the point is mostly a series of steep cliffs with large, blocky rubble below water. The rocks thin out to a flat bottom at 15-18 m that is composed of sand mixed with fragments of coralline algae and shell debris. The rocks were too large to turn over, so I swam off over the sand hoping to find some of the mollusks that lie buried during the daylight hours. To my disappointment, there were no tracks in the sand here and after spending enough time to wander out of sight of the other divers' lights I decided to turn around and swim back to where I thought they should be. On the way back I happened on a live 47.8 mm *Conus tessulatus* crawling along on top of the sand. Even with its periostracum, this shell was clearly a beauty with a complete color change at a growth line running down the middle of its dorsum. One side of the shell is marked with rectangular red-orange spots while the other is marked with dark maroon spots.

After the dive we found an anchorage between Isla Partida and Isla del Espiritu Santo, to the south, where we usually park for the night when the boat is in this area. Sand diving here at night has always intrigued me, but I have never been able to convince anyone else to accompany me and night diving alone is not allowed. Before sunrise the next morning the water all around the boat was churning with thousands of flying fish and needlefish attracted by our lights.

The next day our boat headed for Los Islotes, which consist of a couple of small rocky islets lying just north of Isla Partida. We planned to stay here all day and dive a total of four tanks. I've never before been very fond of this spot because collecting is usually poor and the main attraction for divers is a large colony of sea lions. It was a beautiful day, however, with pleasant air and water temperatures, little current and no wind, so I vowed to enjoy the diving regardless. Our first dive of the day was made to a "garden" of black coral in 33 m of very cold water off the north-east end of the islets. No shells were seen on this dive other than the ubiquitous *Conus diadema* that can be found virtually everywhere throughout southeastern Baja. A few of us managed to follow a leopard grouper in its golden color phase to the biggest jewfish I have ever seen before. At more than five feet in length, he must have weighed several hundred pounds, or more.

The second dive at Los Islotes was made parallel to the shore along the rocky rubble zone at about 15 m in depth. The rocks here shelter a fair number of octopus and it is always interesting to sort through their middens to see what bivalves can be found. Often these shell heaps are composed only of *Chione undatella*, sometimes with fantastic patterns, and the large *Megapitaria aurantiaca*. The *M. aurantiaca* have become noticeably less common in recent years (probably because they taste so good) but they can still sometimes be found as large as coconuts. During past dives here, *Semele formosa* was collected in fresh, hinged pairs; but on this dive only a few left valves were seen. This time I also collected several specimens of *Acrosterigma pristipleura*, one fresh *Pitar frizzelli* and a large and colorful 43.4 mm *Americardia guanacastensis* near the northern limit of its range.

In the afternoon we took a *panga* back to the western end of Los Islotes to dive over the shallow rubble eastward along the south side. That afternoon I decided to change my tactics and I separated from the others to dive over the sand well out from shore. After reaching the bottom, I swam out to sea for about 100 m before turning east over a field of small craters in the sand. Most of these holes were surrounded by dead shells and pieces of coral that had been uncovered during all the digging. It was a few minutes before I realized that most had some "mealy-looking" mass in the bottom and many had a large finescale triggerfish hovering overhead and pumping water on the stuff in the bottom of the holes. The whole area turned out to be a nursery where the triggerfish had laid their eggs. There were hundreds of "nests" arranged in orderly rows and most were guarded by a "nurse" fish. One of these had excavated a large, 130 mm, *Cypraecassis tenuis* which, even though it was alive, was apparently unable to right itself and so, there it lay waiting for me to pick it up.

On the last dive of the afternoon I swam straight out to sea for approximately 200 m over coarse sand at about 24 m in the direction of Isla Partida. The sandy bottom was densely littered with colonies of coralline algae and occasional free hard corals (*Cycloseris ? elegans*). Buck (1995) described how these algae form unattached clusters, or rhodoliths, that accumulate in colonies of several different species and can reach more than a foot thick. Individual colonies can extend to over one-half acre in size and they are commonly found in the Sea of Cortez at least as far north as Isla San Pedro Martír, in the midriff. Several more live *Conus tessulatus* were collected from the thinner colonies where the sand was partially exposed. A single dead specimen of this cone was also collected that measures 55 mm. Other shells were scarce on this sandy bottom in daylight, but one large *Oliva porphyria* was dug from the end of a long trail.

Our last full day of diving was spent on the reefs off Cabo Pulmo on the East Cape. The whole bay lying between Cabo Pulmo to the north and Cabo los Frailes to the south has been designated a national park and marine reserve in recent years, although it is not clear where the actual boundaries lie. I had only visited here briefly once before in 1990 when I dove a single tank on a windy day when the sea was rough and the water was very murky. The only shells I had seen then were *Conus diadema* and *C. tiaratus*, both of which were common in sand around the coral heads. The reefs are mostly rock with numerous coral heads reaching up to four or five feet in diameter and, sometimes, height. The most common types seem to belong to *Pavona*, *Pocillopora* and *Porites*. Cabo Pulmo is reputed to be the only true coral reef in the Sea of Cortez.

This time the water was a sheet of glass in the early morning and conditions were ideal. Our *pangeros* knew where the larger reefs were and quickly took us about twenty minutes inshore from where we had anchored the *Solmar* V to dive one end of a large formation called *El Bajo de los Moros*. We dove twice here, well offshore and almost directly out from Cabo Pulmo itself. The various reefs were well separated from one another, however, and the two dives explored different territory.

The first dive of the morning was made on the "El Bajo" end of the reef, which consists of three large rock ridges rising in parallel to about 3 m above the sandy bottom at 18 m. The first thing I noticed on reaching the bottom was a live *Conus tessulatus* lying partly buried in the sand directly below me. We had come here for the teeming fish life, however, and so I joined the other divers and began to seek out the many schools of colorful fish for which these reefs are so well known. While more than a hundred different species can be seen here, often in large schools and in a single day's diving, there is one fish story for which "El Bajo" is truly famous.

The Panamic porcupinefish is a common sight throughout the Sea of Cortez. It paddles around searching in crevices and under rocks for the reef invertebrates on which it feeds. If you annoy it enough, it will fill itself up with water until it is almost spherical and all its spines stand straight out from its body. In this defensive posture, the porcupine fish can barely swim and it simply hovers there in front of you with its pectoral fins fluttering away until you leave it alone, or go away. Both snorkelers and divers are used to seeing this fish in shallow reef areas where up to a dozen or more will be seen on one dive.

At the lower end of *El Bajo* more than a hundred porcupine fish can usually be found swimming in formation about 3 m above the bottom. They space themselves about 0.5 m apart in a single layer and swim slowly against a light current such that the whole school appears to be hovering motionless. I had no trouble in locating them, but after watching them for a while I could not resist the urge to take up my position at the back of the school and swim right along with them. Although the porcupinefish didn't seem to mind my tagging along, I felt curiously foolish about my urge to participate in what seemed like a cartoon sequence. This school has been known for at least several years.

While swimming in formation with the porcupinefish, I noticed a large patch of coralline algae a short distance away. By now I was beginning to associate this type of substrate with *Conus tessulatus*. When I approached closely enough to see details, there were obviously at least four live individuals nestled in the sand among the clusters of algae.

The second dive of the day was made on another reef called "El Cantil". Fish life here was fantastic and large schools of hundreds, and even thousands, of many different species kept us fascinated. The most common fish seen were several jacks and snappers, but the sheer variety and quantity of reef fish here would be hard to duplicate, or even describe. Only a few dead bivalves were seen on this dive, although I spent most of my time looking upwards.

The third dive at Cabo Pulmo was made on the "Los Morros" end of the same reef that we dove in the morning. This area consisted of numerous small rock structures spread over a large area. The incredible fish life continued to impress me, until I began to see more *Conus tessulatus* peeking out of the sand. One dead shell with a large hole in it measured about 65 mm as compared later to the length of my finger. I left it behind with the others because the park is a marine reserve and collecting is not allowed. During the three dives off Cabo Pulmo in a single day, at least fifteen *Conus tessulatus* were found partly visible on the surface of the sandy bottom in daylight.

The last dive of the day was made farther south, off Cabo los Frailes and just outside the marine reserve. My first Panamic *Conus tessulatus* was collected alive here over ten years ago and on this dive three more were added to my growing take for the week.

The occurrence and distribution of *Conus tessulatus* in the Sea of Cortez have both been known for many years. Jackson (1994) reported on finding this cone at Isla Cayo, off Isla San José, and referred both to other known specimens and to literature references to its occurrence elsewhere in the Panamic Province. Several excellent color photographs typical of Sea of Cortez specimens accompanied his article. More good photographs of a world-wide series of this cone can be found in volume 1 of Röckel's (1995) *Manual of the Living Conidae*. While previously considered to be uncommon, or even rare, in the Sea of Cortez, *Conus tessulatus* was the most common cone seen along the East Cape where we had been diving that week, especially on the reefs at Cabo Pulmo. Farther north, particularly above Isla Cerralvo, it becomes less common, although it is no longer rare. From one to a few specimens were collected at almost every dive site we visited. At Isla Partida and Los Islotes, it could be classified as locally common.

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IN MEMORIAM

1910 — GEORGE A. HANSELMAN — 2001

Col. George Hanselman, with his wife, Virginia, began collecting shells in 1963 while stationed in Okinawa with the United States Air Force. On settling in San Diego, they became active in the San Diego Shell Club, and were at the first meeting of amateurs and professionals instrumental in the formation of the Western Society of Malacologists. George was a longtime member of the WSM and was a member of the San Diego Shell Club through the year 2000.

As time passed, George became very interested in chitons, developing a method of preparing them for the cabinet which preserved the specimens, bodies intact, flat and supple [unpublished]. To those of us in the Club, it became known as the "Hanselman Method". He also wrote articles on chitons for *The Festivus* and for *Of Sea and Shore* [see column 2].

As George's interest in chitons grew, so did his library of chiton texts and his interest in chiton photography. Always a meticulous worker, his color photos of chitons not only showed their beauty, but highlighted details of their sculpture as tools for identification. By this time, George collected chitons exclusively and many Club members would bring their chitons to him for identification.

He volunteered his expertise and spent many hours curating the chiton collection in the San Diego Natural History Museum, even adding specimens from his own collection to supplement those of the Museum. He was always available to professionals and amateurs for help and conversation about chitons.

After the passing of his wife, George donated his chiton collection (as well as the rest of the family shell collection), chiton photos, and mollusk library to the Santa Barbara Museum of Natural History. Two chiton species were named in his honor. He is survived by his daughter Joan Wong, three grandsons and two great-grandchildren.

Those of us who were privileged to know George Hanselman will always treasure that friendship.

Publications by George A. Hanselman

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1973b. Some hints on the identification of chitons (Pt 2). The Festivus 4(5): 35-37, figs. 18-31.

1973c. Some hints on the identification of chitons (Pt. 3). The Festivus 4(6): 41-45, figs. 32-45.

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1990. "Twins" *Mopalia cirrata* Berry and *M. sinuata* Carpenter. The Festivus 22(1): 3-7, figs. 1, 2.

Species named for George A. Hanselman

Calloplax hanselmani Ferreira, 1982 [The Veliger 24 (4): 321, figs. 1-8].

Placiphorella hanselmani Clark, 1994. [The Veliger 37 (3): 290-311 (304)].

Carole M. Hertz

LOW TIDES FOR 2002 IN SAN FELIPE, BAJA CALIFORNIA, MÉXICO

The entries below show periods of low tides of -4.0 feet and below. The times of low tides are given in Pacific Standard Time, except those dates marked with an asterisk are in Pacific Daylight Time. To correct for Puerto Peñasco add one hour to listed times when they are in Pacific Standard Time. Tides below the midriff of the Gulf cannot be estimated using these entries. All entries are approximate times and tides.

Jan. 27	7:34 pm	-4.44 ft	Mar. 30	9:23 am	-4.38 ft	Oct. 5	8:45 pm*	-4.54 ft
Jan. 28	8:15 pm	-5.29 ft	Apr. 25	8:12 am*	-4.07 ft	Oct. 6	9:01 am*	-5.00 ft
Jan. 29	8:56 pm	-5.41 ft	Apr. 26	8:47 am*	-4.95 ft	Oct. 6	9:20 pm*	-5.11 ft
Jan. 30	9:38 pm	-4.71 ft	Apr. 27	9:22 am*	-5.10 ft	Oct. 7	9:40 am*	-4.21 ft
Feb. 25	7:25 pm	-4.79 ft	Apr. 28	9:57 am*	-4.51 ft	Oct. 7	9:56 pm*	-4.90 ft
Feb. 26	8:05 pm	-5.77 ft.	May 25	8:24 am*	-4.50 ft	Nov. 2	6:45 pm	-4.02 ft
Feb. 27	8:45 pm	-5.85 ft	May 26	9:00 am*	-4.52 ft	Nov. 3	7:21 pm	-5.19 ft
Feb. 28	9:24 pm	-4.98 ft	Aug. 8	8:55 am*	-4.48 ft	Nov. 4	7:56 pm	-5.62 ft
Mar. 26	7:09 pm	-4.51 ft	Aug. 9	9:34 am*	-4.94 ft	Nov. 5	8:32 pm	-5.26 ft
Mar. 27	7:49 pm	-5.30 ft	Aug. 10	10:15 am*	-4.64 ft	Nov. 6	9:09 pm	-4.15 ft
Mar. 28	8:14 am	-4.50 ft	Sept. 6	8:40 am*	-5.12 ft	Dec. 2	7:01 pm	-4.80 ft
Mar. 28	8:28 pm	-5.15 ft	Sept. 7	9:19 am*	5.49 ft	Dec. 3	7:39 pm	-5.16 ft
Mar. 29	8:48 am	-4.82 ft	Sept. 8	9:59 am*	-4.95 ft	Dec. 4	8:17 pm	-4.84 ft
Mar. 29	9:07 pm	-4.09 ft	Oct. 5	8:22 am*	-4.86 ft			

THE FESTIVUS PUBLISHES AN OCCASIONAL PAPER

The Festivus is proud to announce the publication of its first Occasional Paper. This spiral-bound book by Kirstie L. Kaiser and Clayton W. Bryce entitled *The Recent Molluscan Fauna of Isla de Malpelo* was published on 14 December 2001 and is a part of Volume 33 of *The Festivus*.

The 149-page work with 49 black and white plates and 5 full color plates is a scholarly and well-written report on this poorly studied island. It documents the mollusks collected and studied by them on their two expeditions to this remote outpost.

This book is now available for sale at $30.00 postpaid, domestic; $35.00 postpaid, Canada and Mexico; and $40.00 postpaid, overseas air mail.

Orders should be accompanied by a check on a US bank made to The San Diego Shell Club. Send your orders to: The San Diego Shell Club
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E-mail: cmhertz@pacbell.net *Website at: http://www.users.cts.com/crash/t/tarnold/SDSC/index.html*

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

PROGRAM

Human Impacts on Rocky Intertidal Mollusks in Southern California

Dr. Allen Collins, of the University of California at San Diego, will discuss his project which involves surveying various intertidal localities throughout the southern California area, gathering historical data from museums, private collections, and published literature to determine the health of the rocky intertidal environment.

Meeting date: 21 February 2002
Shells of the month: rocky intertidal mollusks from southern California

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CLUB NEWS

Minutes of the January 17th Meeting of the San Diego Shell Club

President Jules Hertz opened the first meeting of the new year at 7:40 P.M. Guests and new member Patricia Beller were introduced and welcomed. The minutes of the November meeting were accepted as published in *The Festivus* and Jules then announced some of the upcoming events of this new year — the auction/potluck, the September party (a luau this year) and the Christmas Dinner Party [see calendar, col. 2].

Jules encouraged people to take some of the free used plastic boxes set out on the back table, a donation from the George Hanselman estate, and to view Bob Yin's beautiful children's books with their wonderful photography. The little books can be ordered from Dominie Press.

A reminder was given that the SCUM meeting will be held at the Santa Barbara Museum of Natural History Saturday, January 26th.

Vice President Terry Arnold introduced the speaker, Dr. F.G. (Eric) Hochberg of the Santa Barbara Museum of Natural History, a cephalopod specialist, whose talk was titled "Reproductive Strategies in Cephalopod Mollusks" — or as he jokingly referred to it "Sex and the Single Octopus."

Eric's talk was informative, exciting and beautifully illustrated. Much new information for the non-specialist was given. Many of those in attendance probably learned that the male octopus can be discerned from the female by observing the suckers, the male having some conspicuously large suckers, with the amount depending on the species. Also of interest is that the male octopus clears out the female's oviduct of any sperm before depositing his sperm. However, Eric noted that there are "sneaker males" which await any distraction by the copulating male, to quickly insert their sperm into the female's oviduct.

Following Eric's talk, member and award-winning underwater photographer Bob Yin showed some *in situ* slides of cephalopods. Eric narrated and identified the species shown and all were grateful to Bob for showing his beautiful images.

The meeting was adjourned at 9:15 P.M. and members enjoyed the refreshments provided by Carole and Jules Hertz as they lingered to socialize, look for books in the Club's extensive library and choose some of the plastic boxes. The shell drawing was won by Larry Lovell.

Calendar of Club Events

Club Auction/Potluck — Saturday evening April 20th
September Luau— Saturday evening Sept. 14th
Christmas Dinner Party — Saturday evening Dec. 7th
Club meetings — 3rd Thursday, 7:30 P.M., Casa del Prado, Balboa Park Mark your calendars.

The Annual Club Auction/Potluck

The annual Club Auction/Potluck will be held on Saturday evening, April 20th, beginning at 5:00 P.M.

Through the kindness of Wes Farmer it will again be held in his Clubhouse [Map in April issue], a perfect location. Viewing of shells and socializing (with punch and soft drinks) begin at 5:00 P.M.; dinner promptly at 6:00 P.M. and the auction starts EXACTLY at 7:00 P.M. As is customary, there will also be a silent auction and a dollar table.

It is not too early to check your collections and donate to the Club auction. All proceeds from the auction benefit the Club by supporting *The Festivus*, enabling the Club to make contributions to student grants and the Science Fair, and purchasing new books for the Club's extensive circulating library.

So — look hard — and bring your donations to a Club meeting or contact a board member to arrange for pickup.

In Memoriam
Robert A. Foster
1938-2002

OBSERVATIONS ON THE REPRODUCTIVE BIOLOGY OF *EUPLEURA TRIQUETRA* (REEVE, 1844) (GASTROPODA: MURICIDAE) FROM THE GOLFO DE CALIFORNIA

GREGORY S. HERBERT

Department of Geology and Center for Population Biology,
University of California, Davis, California 95616, USA
E-mail: herbert@geology.ucdavis.edu

In previous studies of the reproductive biology of the Muricidae, two characters observed in species of the genus *Eupleura* H. & A. Adams, 1853, have been reported to be either unique to this group or uncommon in closely related genera. In particular, D'Asaro (1991) noted that the presence of a conical protuberance on the apical portion of the capsule resembling a second mucoid plug has only been reported in two muricids, *Eupleura caudata* (Say, 1822) and *Eupleura sulcidentata* (Dall, 1890). Solitary spawning, a behavior observed in these two species (MacKenzie, 1961; D'Asaro, 1986), is rare in related drills, such as in species of *Urosalpinx* Stimpson, 1865, and *Nucella* Röding, 1798 (Radwin & Chamberlin, 1973; D'Asaro, 1991; Herbert, personal observation).

One testable hypothesis based on these observations

Figures 1 and 2. (1) Egg capsules of *Eupleura triquetra* (Reeve, 1844) (2) Communal spawning by seven individuals of *E. triquetra* near a boat landing at Bahía la Cholla, México, during a tide of minus three feet. Photos: Paul Skoglund.

is that each of these traits represents a shared derived condition (i.e. a synapomorphy) for the genus and is present in the species of *Eupleura* not yet studied, which include seven species from the tropical eastern Pacific. In this short note, observations on the egg capsule morphology and spawning behavior of one of these eastern Pacific species, *Eupleura triquetra* (Reeve, 1844), are documented for the first time based on photographs made by the late Paul Skoglund. The photographs were taken near a boat landing during tides of minus three feet at Bahía la Cholla, Sonora, México, in April 1968 and May 1969.

As can be seen from the photos, the ovocapsules of *E. triquetra* are typical for the muricid subfamily Ocenebrinae as outlined by D'Asaro (1991) in having an ampulliform suture pattern, a projecting mucoid plug, a flask-like shape, and a long stalk. There are noticeable differences from the egg capsule morphology and spawning patterns of other *Eupleura* species, however, including the lack of any conical protuberance resembling a second mucoid plug (Figure 1) and communal rather than solitary spawning (Figure 2). Thus, the conical projection and solitary spawning behavior may be "peculiar" to the genus *Eupleura* (D'Asaro, 1991), but these features apparently do not occur in all of its constituent species. An interesting question to examine now is whether these features were present in the earliest species of *Eupleura* and lost over evolutionary time in the lineage leading up to the modern *E. triquetra* (and possibly other eastern Pacific *Eupleura* species), or whether they are recently acquired states and possibly limited to only the lineage leading up to the western Atlantic species. Answering this question will require two steps: (1) additional documentation of egg capsule morphology and spawning behaviors in the remaining eastern Pacific species, and (2) a phylogenetic analysis incorporating all of the living *Eupleura* species to resolve the branching patterns of evolution within this group.

ACKNOWLEDGMENT

I would like to thank Carol Skoglund for graciously providing the photographs of *E. triquetra* for this study.

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THE RECENT MEXICAN CHITON (MOLLUSCA: POLYPLACOPHORA) SPECIES

ADRIANA REYES-GÓMEZ[1] and M. ALEJANDRO SALCEDO-VARGAS[2]

Laboratorio de Ecología, Departamento de Zoología, Escuela Nacional de Ciencias Biológicas, IPN.
Apartado postal 11340, Casco de Santo Tomás, México.
E-mail: quitonreyes@yahoo.com and ikatako@hotmail.com

Abstract: This paper provides the first updated checklist of the chitons from the Mexican coasts. A total of 127 species belonging to 10 subfamilies and 21 genera have been recorded in the area. Geographical distribution in Mexican waters is given for each species and is associated with five marine regions: the west coast of the Baja California Peninsula (44 species), the Golfo de California (53 species), the Mexican Tropical Pacific (12 species), the Golfo de México (4 species) and the Mexican Caribbean Sea (14 species), and is also associated with two zones: the Coastal Zone (107 species) and the Deep Zone (20 species). Fifty endemic species have been recorded and 77 have a wider range of distribution.

Introduction

Polyplacophorans are an ancient molluscan group, distinguished by their eight overlapping shell plates. Chitons attach firmly to or creep over hard substrates of the rocky shores with a broad sticky foot (Eernisse & Reynolds, 1994). Chitons in Mexico have been poorly studied, because the main malacological studies are on species of economic importance; such as oysters, which make up 50% of all studies. With regard to chitons, Thiele (1929) was the first author to record some chitons in Mexican waters. After that, Keen (1958; Thorpe *in* Keen, 1971) and Abbott (1954, 1974) reported about forty species in their well-known monographic studies. However, the most important reviews were made by Ferreira (1974, 1976, 1978a, 1978b, 1979a, 1979b, 1980, 1982a, 1982b, 1983a, 1983b, 1984, 1985, 1986, 1987) and Smith (1960, 1977). These authors based their work on Northern, Central, Southern and Insular American chitons. Other contributions that describe the chiton fauna from Mexican waters have been made by Bullock (1985, 1988), Lyons (1988), Kaas (1993), Kaas & Van Belle (1985a, 1985b, 1987, 1990, 1994, 1998), Watters (1981, 1990) and Clark (1994, 2000).

Concerning Mexican collections, the Mollusca Collection of the Instituto de Ciencias del Mar y Limnología, (ICMyL-UNAM) at Mazatlán, which has a number of chiton species determined by J. A. Ferreira (Hendrickx & Toledano-Granados, 1994), represents the only well organized and available one for study in México. Another chiton collection, the Colección Nacional de Moluscos (CNMO) of the Instituto de Biología, UNAM, was recently studied as a thesis topic by one of the authors of the present paper (Reyes-Gómez, 1999). However, the number of species recorded in both collections repesents less than 30% of the total of the nominal reported species, which gives an indication of the poor status of the group in Mexican institutions. More species may be held in other Mexican collections, but those are not available in either catalogues or publications (personal observations, MASV).

Other authors (Reguero & García-Cubas, 1989; González E, 1993) have published short lists of chiton species from Mexican coasts, but their bibliographic

1 Mailing address: 3737 22nd Ave. South., Minneapolis, MN 55407, USA.
2 Mailing address: 88 Tomes Road, Papanui, Christchurch 8005, New Zealand.

review has not been extensive. In the present paper, the purpose is to provide an account of the chiton fauna in the surrounding Mexican waters; both endemic chitons and species with a wide distribution, providing a comprehensive review and updating the available information.

Materials and Methods

The literature was extensively reviewed to obtain a more complete list of the chitons in Mexican waters. Papers specifically on Mexican chitons, monographic studies and distribution and ecological works were studied.

The distribution of chitons from Mexican waters (Figure 1) is described in terms of five regions: 1) the west coast of the Baja California Peninsula from the USA border to Cabo San Lucas, Baja California Sur; 2) the Golfo de California from the Río Colorado mouth to Cabo Corrientes, Jalisco; 3) the Mexican Tropical Pacific, from south of Jalisco to Chiapas (De la Lanza, 1991); 4) the Golfo de México, from north of Tamaulipas to Yucatán; 5) the Mexican Caribbean, including the coasts and islands of Quintana Roo State (Briggs, 1974). Their distribution is associated with two zones: the Coastal Zone, for those species living within the range of 0-100 m, and the Deep Zone, for species living deeper than 100 m. The endemic species and those with a wide range of distribution are also discussed.

Results

Table 1 shows the list of chiton species in Mexican waters. A total of 127 species belonging to three suborders, five families, 10 subfamilies, 21 genera and 11 subgenera, have been recorded.

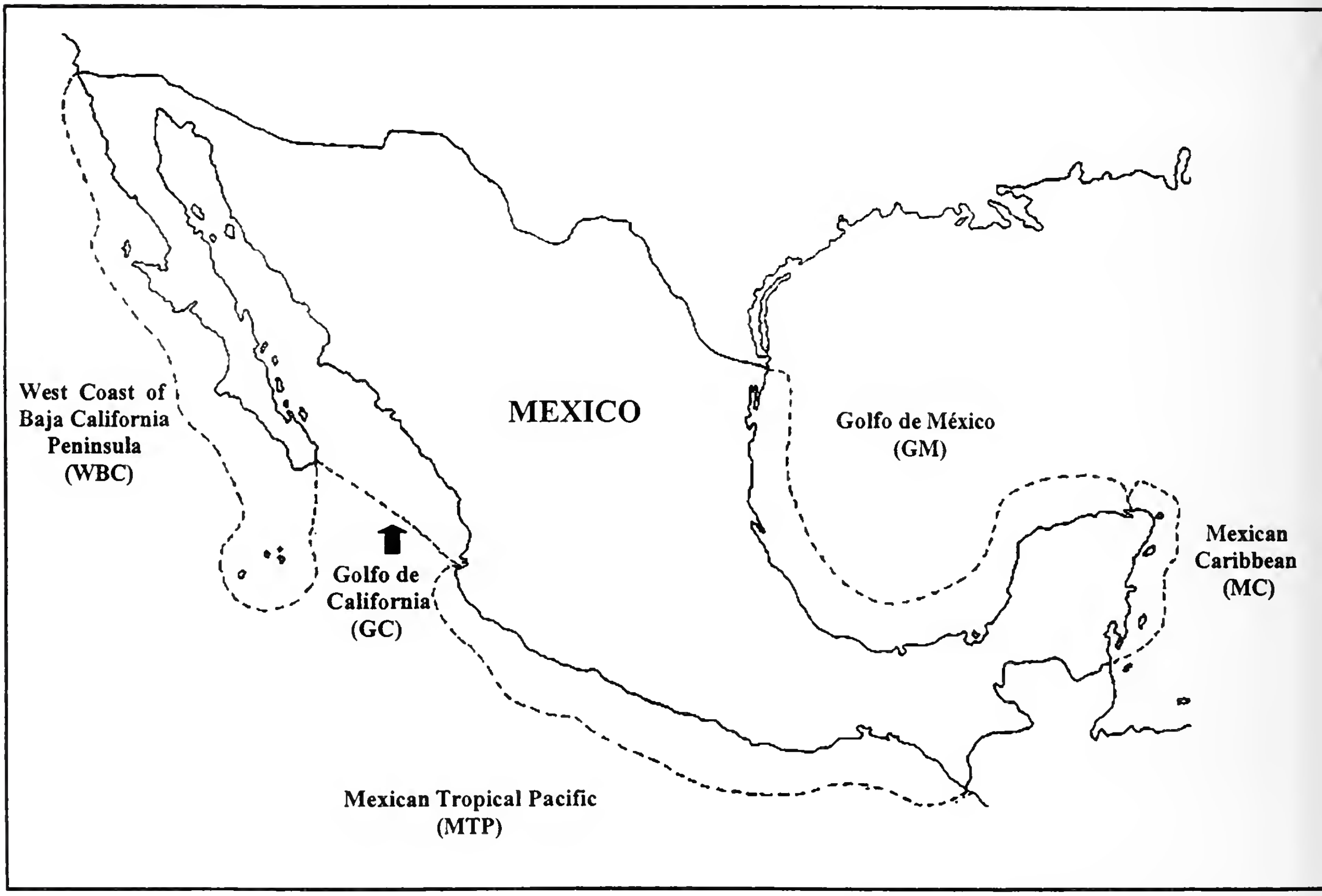

Figure 1. The five regions of the Mexican littoral: the west coast of the Baja California Peninsula (WBC), the Golfo de California (GC), the Mexican Tropical Pacific (MTP), the Golfo de México (GM) and the Mexican Caribbean (MC).

Table 1. Checklist of the chiton species recorded in Mexican waters.

Geographical distribution is as follows: **WBC** (west coast of Baja California Peninsula); **GC** (Golfo de California); **MTP** (Mexican Tropical Pacific); **GM** (Golfo de México); **MC** (Mexican Caribbean); **CZ** (coastal zone, 0-100 m); **DZ** (deep zone, more than 100 m); E (endemic species); **W** (species with wide range of distribution); * (only known for that locality); ■ (new record for the area); ● (species described in Reyes-Gómez, 1999).

Species	Geographical Distribution								
	Region					Zone			
	WBC	GC	MTP	GM	MC	CZ	DZ	E	W
Order NEOLORICATA Bergenhayn, 1955 Suborder LEPIDOPLEURINA Thiele, 1910 Family LEPTOCHITONIDAE Dall, 1889 Subfamily LEPTOCHITONINAE Kaas & Van Belle, 1994									
1. *Leptochiton (Leptochiton) alveolus* (Lovén, 1846, ex M. Sars)	x	x	x	-	-	-	x	-	x
2. *Leptochiton (Leptochiton) nexus* Carpenter, 1864	x	x	-	-	-	-	x	-	x
3. **Leptochiton belknapi* Dall, 1878	-	-	x	-	-	-	x	-	x
4. *Leptochiton (Leptochiton) rugatus* Carpenter *in* Pilsbry, 1892	x	x	-	-	-	-	x	-	x
5. **Leptochiton incongruus* Dall, 1908	-	-	x	-	-	-	x	-	x
6. **Lepidopleurus scrippsianus* Ferreira, 1980	x	-	-	-	-	-	x	x	-
7. *Oldroydia percrassa* Dall, 1894	x	x	-	-	-	-	x	-	x
8. *Hanleyella oldroydi* (Dall, 1919, ex Bartsch MS)	x	-	-	-	-	-	x	-	x
Suborder ISCHNOCHITONINA Bergenhayn, 1930 Family ISCHNOCHITONIDAE Dall, 1899 Subfamily LEPIDOCHITONINAE Iredale, 1914									
9. *Lepidochitona (Lepidochitona) dentiens* Gould, 1846	x	-	-	-	-	x	-	-	x
10. *Lepidochitona (Lepidochitona) hartwegii* (Carpenter, 1855)	x	-	-	-	-	x	-	-	x
11. *Lepidochitona (Lepidochitona) beanii* Carpenter, 1857	x	x	x	-	-	x	-	-	x
12. *Lepidochitona (Lepidochitona) gothica* Carpenter, 1864	x	-	-	-	-	x	-	-	x
13. *Lepidochitona (Lepidochitona) keepiana* Berry, 1948	x	-	-	-	-	x	-	-	x
14. ■*Lepidochitona (Lepidochitona) berryana* Eernisse, 1986	x	x	-	-	-	x	-	x	-
15. *Lepidochitona (Lepidochitona) corteziana* Clark, 2000	-	x	-	-	-	x	-	x	-

Species	WBC	GC	MTP	GM	MC	CZ	DZ	E	W
16. *Lepidochitona (Dendrochiton) lirulata* (Berry, 1963)	x	x	-	-	-	x	-	x	-
17. *Lepidochitona (Dendrochiton) flectens* (Carpenter, 1864)	x	-	-	-	-	x	-	-	x
18. *Lepidochitona (Dendrochiton) thamnopora* (Berry, 1911)	x	-	-	-	-	x	-	-	x
19. *Nuttalina californica* Reeve, 1847, ex Nuttall MS	x	-	-	-	-	x	-	-	x
20. *Nuttalina crossata* (Berry, 1956)	-	x	-	-	-	x	-	x	-
Subfamily TONICIINAE									
21. *Tonicia forbesii* Carpenter, 1857	-	x	x	-	-	x	-	-	x
Subfamily CHAETOPLEURINAE Plate, 1899									
22. *Chaetopleura (Chaetopleura) lurida* Sowerby, 1832	-	x	x	-	-	x	-	-	x
23. *Chaetopleura (Chaetopleura) apiculata* (Conrad, 1834)	-	-	-	x	-	x	-	-	x
24. *Chaetopleura (Pallochiton) gemma* Dall, 1879	x	-	-	-	-	x	-	-	x
25. *Chaetopleura mixta* Dall, 1919	-	x	-	-	-	x	-	x	-
26. *Chaetopleura (Pallochiton) lanuginosa* (Dall, 1879, ex Carpenter MS)	x	x	-	-	-	-	x	-	x
27. *Chaetopleura (Pallochiton) lanuginosa mixta* (Dall, 1919)	x	x	-	-	-	x	-	x	-
28. *Chaetopleura (Chaetopleura) unilineata* Leloup, 1954	-	x	x	-	-	x	-	-	x
29. *Chaetopleura (Chaetopleura) hanselmani* (Ferreira, 1982)	-	x	x	-	-	x	-	-	x
30. **Chaetopleura (Chaetopleura) shyana* Ferreira, 1983	-	x	-	-	-	x	-	x	-
Subfamily ISCHNOCHITONINAE Dall, 1889									
31. *Ischnochiton striolatus* Gray, 1828	-	-	-	x	x	x	-	-	x
32. *Ischnochiton (Ischnochiton) erythronotus* C.B. Adams, 1845	-	-	-	-	x	x	-	-	x
33. *Ischnochiton (Ischnochiton) petaloides* Gould, 1846	x	x	-	-	-	x	-	-	x
34. *Ischnochiton (Ischnochiton) muscarius* Reeve, 1847	-	x	x	-	-	x	-	x	-
35. *Ischnochiton (Ischnochiton) newcombi* Pilsbry, 1892	-	x	-	-	-	x	-	x	-
36. *Ischnochiton (Ischnochiton) tridentatus* Pilsbry, 1893	-	x	-	-	-	x	-	x	-
37. **Ischnochiton (Ischnochiton) guatemalensis* Thiele, 1910	x	x	-	-	-	x	-	-	x
38. *Ischnochiton (Ischnochiton) carolianus* Ferreira, 1984	-	x	-	-	-	-	x	x	-
39. *Ischnochiton (Ischnochiton) chaceorum* Kaas & Van Belle, 1990	-	x	-	-	-	x	-	x	-
40. **Ischnochiton mexicanus* Kaas, 1993	-	-	-	x	-	x	-	x	-
41. *Ischnochiton rhodolithophilus* Clark, 2000, ex Putman MS	-	x	-	-	-	x	-	x	-

Species	WBC	GC	MTP	GM	MC	CZ	DZ	E	W
42. *Ischnochiton tomhalei* Clark, 2000	-	x	-	-	-	x	-	x	-
43. *Stenoplax (Stenoplax) limaciformis* (Sowerby, 1832)	-	x	x	-	-	x	-	-	x
44. *Stenoplax (Stenoradsia) magdalenensis* (Hinds, 1845)	x	x	-	-	-	x	-	x	-
45. *Stenoplax (Stenoplax) boogii* (Haddon, 1886)	-	x	x	-	-	x	-	-	x
46. *Stenoplax (Stenoradsia) conspicua* (Pilsbry, 1892, ex Carpenter MS)	x	-	-	-	-	x	-	-	x
47. *Stenoplax (Stenoplax) fallax* (Carpenter *in* Pilsbry, 1892)	x	-	-	-	-	x	-	-	x
48. *Stenoplax (Stenoplax) corrugata* (Carpenter *in* Pilsbry, 1892))	x	x	-	-	-	x	-	x	-
49. *Stenoplax (Stenoplax) mariposa* Dall, 1919, ex Bartsch MS	-	x	-	-	-	x	-	x	-
50. *Stenoplax (Stenoradsia) heathiana* Berry, 1946	x	-	-	-	-	x	-	-	x
51. *Stenoplax (Stenoradsia) sonorana* (Berry, 1956)	-	x	-	-	-	x	-	x	-
52. *Stenoplax (Stenoplax) circumsenta* (Berry, 1956)	x	x	-	-	-	x	-	x	-
53. *Stenoplax (Stenoplax) bahamensis* Kaas & Van Belle, 1987	-	-	-	-	x	x	-	-	x
54.*●*Stenoplax* sp. Reyes-Gómez, 1999	-	x	-	-	-	x	-	x	-
55. *Lepidozona (Lepidozona) mertensii* (von Middendorff, 1847)	x	-	-	-	-	-	x	-	x
56. *Lepidozona (Lepidozona) clathrata* (Reeve, 1847)	x	-	x	-	-	x	-	x	-
57. *Lepidozona (Lepidozona) interstincta* (Gould, 1852)	x	-	-	-	-	x	-	-	x
58. *Lepidozona (Lepidozona) retiporosa* (Carpenter, 1864)	x	-	-	-	-	x	-	-	x
59. *Lepidozona (Lepidozona) serrata* (Carpenter, 1864)	x	x	-	-	-	x	-	-	x
60. *Lepidozona (Lepidozona) scabricostata* (Carpenter, 1864)	x	-	-	-	-	x	-	-	x
61. *Lepidozona (Lepidozona) cooperi* (Dall, 1879, ex Carpenter MS)	x	-	-	-	-	x	-	-	x
62. *Lepidozona (Lepidozona) sinudentata* (Carpenter *in* Pilsbry, 1892)	x	-	-	-	-	-	x	-	x
63. *Lepidozona (Lepidozona) pectinulata* (Pilsbry, 1893, ex Carpenter MS)	x	x	-	-	-	x	-	-	x
64. *Lepidozona (Lepidozona) willetti* (Berry, 1917)	x	-	-	-	-	-	x	-	x
65. *Lepidozona californiensis* Berry, 1931	x	-	-	-	-	x	-	-	x
66. *Lepidozona (Lepidozona) crockeri* (Willett *in* Hertlein & Strong, 1951)	x	-	-	-	-	-	x	x	-
67. *Lepidozona (Lepidozona) subtilis* Berry, 1956	-	x	-	-	-	x	-	x	-
68. **Lepidozona (Lepidozona) formosa* Ferreira, 1974	-	x	x	-	-	x	-	x	-
69. *Lepidozona (Lepidozona) allynsmithi* Ferreira, 1974	-	x	-	-	-	x	-	-	x
70. **Lepidozona* sp. Smith 1977	-	x	-	-	-	x	-	x	-
71. *Lepidozona allyni* Ferreira, 1977									

Species	WBC	GC	MTP	GM	MC	CZ	DZ	E	W
72. *Lepidozona (Lepidozona) guadalupensis* Ferreira, 1978	x	-	-	-	-	x	-	x	-
73. *Lepidozona (Lepidozona) rothi* Ferreira, 1983	x	x	x	-	-	-	x	-	x
74. *Lepidozona (Lepidozona) clarionensis* Ferreira, 1983	x	-	-	-	-	x	-	x	-
75. **Lepidozona (Lepidozona) laurae* Ferreira, 1985	-	x	-	-	-	x	x	x	-
76. **Lepidozona (Lepidozona) macleaniana* Ferreira, 1985	-	x	-	-	-	-	x	x	-
77. *Lepidozona (Lepidozona) stohleri* Ferreira, 1985	-	x	-	-	-	x	-	x	-
78. **Lepidozona (Lepidozona) skoglundi* (Ferreira, 1986)	-	x	x	-	-	x	-	x	-
79. **Lepidozona (Lepidozona) sirenkoi* Kaas & Van Belle, 1990	-	x	-	-	-	x	-	x	-
80. **Lepidozona (Lepidozona) tenuicostata* Kaas & Van Belle, 1990	-	x	-	-	-	x	-	x	-
Subfamily CALLISTOPLACINAE Pilsbry, 1893									
81. *Callistochiton elenensis* (Sowerby, 1832)	-	x	x	-	-	x	-	-	x
82. *Callistochiton expressus* (Carpenter, 1865)	-	x	x	-	-	x	-	-	x
83. *Callistochiton palmulatus* Dall, 1879, ex Carpenter MS	x	-	-	-	-	x	-	-	x
84. *Callistochiton crassicostatus* Pilsbry, 1893	x	-	-	-	-	x	-	-	x
85. *Callistochiton decoratus* Carpenter *in* Pilsbry, 1893	x	-	-	-	-	x	-	-	x
86. *Callistochiton asthenes* (Berry, 1919)	x	-	-	-	-	x	-	x	-
87. *Callistochiton colimensis* (Smith, 1961)	x	-	x	-	-	-	x	-	x
88. **Callistochiton leei* Ferreira, 1979	x	-	-	-	-	x	-	x	-
89. *Callistoplax retusa* (Sowerby *in* Broderip & Sowerby, 1832)	-	-	x	-	-	x	-	-	x
90, *Calloplax janeirensis* (Gray, 1828)	-	-	-	-	x	x	-	-	x
91. *Ceratozona squalida* (C.B. Adams, 1845)	-	-	-	-	x	x	-	-	x
Family MOPALIIDAE **Subfamily MOPALIINAE**									
92. *Mopalia ciliata* (Sowerby, 1840)	x	-	-	-	-	x	-	-	x
93. *Mopalia lignosa* (Gould, 1846)	x	-	-	-	-	x	-	-	x
94. *Mopalia muscosa* (Gould, 1846)	x	-	-	-	-	x	-	-	x
95. *Mopalia acuta* Carpenter, 1855	x	-	-	-	-	x	-	-	x
96. *Mopalia porifera* Pilsbry, 1893	x	-	-	-	-	x	-	-	x
97. **Mopalia allantophora* Dall, 1919	x	-	-	-	-	x	-	x	-
98. *Mopalia ferreirai* Clark, 1991	x	-	-	-	-	x	-	x	-
99. *Placiphorella velata* Dall, 1879, ex Carpenter MS	x	-	-	-	-	x	-	-	x

Species	WBC	GC	MTP	GM	MC	CZ	DZ	E	W
100. *Placiphorella atlantica* Verrill & Smith, 1882	-	x	-	-	-	-	x	-	x
101. *Placiphorella pacifica* Berry, 1919	-	x	-	-	-	-	x	-	x
102. *Placiphorella hanselmani* Clark, 1994	-	x	-	-	-	x	-	x	-
103. *Placiphorella mirabilis* Clark, 1994	x	-	-	-	-	x	-	-	x
Family CHITONIDAE Dall, 1889 **Subfamily CHITONINAE**									
104. *Chiton tuberculatus* Linnaeus, 1758	-	-	-	-	x	x	-	-	x
105. *Chiton squamosus* Linneaus, 1764	-	-	-	x	x	x	-	-	x
106. *Chiton marmoratus* Gmelin, 1791	-	-	-	x	x	x	-	-	x
107. *Chiton viridis* Spengler, 1797	-	-	-	-	x	x	-	-	x
108. *Chiton (Chiton) albolineatus* Broderip & Sowerby, 1829	-	x	x	-	-	x	-	x	-
109.■ *Chiton (Chiton) stokesii* Sowerby, 1832	-	-	x	-	-	x	-	-	x
110. *Chiton (Chiton) articulatus* Sowerby, 1832	-	x	x	-	-	x	-	x	-
111. *Chiton (Chiton) virgulatus* Sowerby, 1840	x	x	-	-	-	x	-	x	-
Subfamily ACANTHOPLEURINAE Dall, 1889									
112. *Acanthopleura granulata* Gmelin, 1791	-	-	-	-	x	x	-	-	x
Suborder ACANTHOCHITONINA Bergenhayn, 1930 **Family ACANTHOCHITONIDAE Pilsbry, 1893** **Subfamily ACANTHOCHITONINAE Pilsbry, 1893**									
113.■ *Cryptoconchus floridanus* (Dall, 1889)	-	-	-	-	x	x	-	-	x
114. *Acanthochitona (Hirudiniformis) hirudiniformis* Sowerby, 1832	-	x	-	-	-	x	-	-	x
115. *Acanthochitona arragonites* (Carpenter, 1857)	-	x	-	-	-	x	-	x	-
116. *Acanthochitona avicula* Carpenter, 1864	-	x	-	-	-	x	-	x	-
117. *Acanthochitona exquisita* Pilsbry, 1893	-	x	-	-	-	x	-	-	x
118. *Acanthochitona hemphilli* Pilsbry, 1893	-	-	-	-	x	x	-	-	x
119. *Acanthochitona pygmaea* Pilsbry, 1893	-	-	-	x	x	x	-	-	x
120. *Acanthochitona rhodea* (Pilsbry, 1893)	-	x	-	-	-	x	-	-	x
121. *Acanthochitona angelica* Dall, 1919	-	x	x	-	-	x	-	-	x
122. *Acanthochitona imperatrix* Watters, 1981	-	x	-	-	-	x	-	-	x
123. *Acanthochitona andersoni* Watters, 1981	-	-	-	-	x	x	-	-	x
124. *Acanthochitona ferreirai* Lyons, 1988	-	x	-	-	-	x	-	-	x
125. *Acanthochitona roseojugum* Lyons, 1988	-	-	-	x	-	x	-	-	x
126.● *Acanthochitona* sp. Reyes-Gómez, 1999	-	x	-	-	-	x	-	x	-
127 *Acanthochitona burghardtae* Clark, 2000	-	x	-	-	-	x	-	x	-

Most of the species in Table 1 are clearly defined in one specific region. There are some species that may be present in two or even three regions, mainly those from the west coast of Baja California and the Golfo de California. In each case the distribution is indicated.

The West Coast of the Baja California Peninsula

Forty-four species have been reported for this region and there are 33 species with a wide range of distribution ranging from Alaska and Canada to the southern limit of the peninsula. Of these, 11 species are endemic, mainly inhabitants of Isla Guadalupe, Baja California, and Bahía Magdalena. Some of these species also may be present in the Revillagigedo Archipiélago and seasonally in the entrance to the Golfo de California on the east coast of the peninsula.

The Golfo de California and the Mexican Tropical Pacific

In the Golfo de California 53 species have been reported, of which 32 are endemic. This area is considered to have a very high level of endemic marine fauna and flora and the number of endemic chitons is just a sample of the richness of this region. In the Mexican Tropical Pacific 12 species can be found, of which six have a wide distribution through Central America or even as far as Perú and the north of Chile. Six species seem to be endemic to the Mexican coasts, and more studies on their distribution will clarify their status. This is the case of *Chiton (Chiton) stokesii* reported from Guatemala to Ecuador (Bullock, 1988), but recently this species has been found from the Golfo de Tehuantepec, México, to Ecuador (Fischer et al, 1995). It is important to mention that the coasts around Mazatlán, Sinaloa, and Nayarit, in which the waters of the Golfo de California and the Eastern Tropical Pacific overlap, species of both marine provinces are present, as this area is the southern limit for the species of the Golfo de California and the northern limit of the ones from the Eastern Tropical Pacific.

The Golfo de México and the Mexican Caribbean

In the Golfo de México only four species have been reported, and of these only *Ischnochiton mexicanus* is endemic to the area. The other species have a wide range of distribution in Florida and the West Indies. However, more sampling efforts are needed in the Golfo de México in order to make an updated list of species. From the Mexican Caribbean, 14 species are known. Of these none is endemic, due to the fact that the coast of Quintana Roo is a small part of the Great Caribbean, and all the species have been recorded along Central American coasts and the Greater Antilles.

Cryptoconchus floridanus is known to be found throughout the Dry Tortugas, Florida Keys, Bahama Islands to Puerto Rico, Cuba, Jamaica, the Cayman Islands, Aruba and Bonaire, and its distributional range has not been extended since Dall's original description (Lyons, 1988). We here record the extension of the range of this species to the Mexican Caribbean coasts, after our personal review of specimens corroborating the existence of this species in the region.

Finally, it is possible that some other species from the Caribbean may be found in waters of Yucatán and even Campeche due to seasonal movements.

Coastal Zone

The best known chitons are in the coastal zone (0-100 m) where 107 species have been recorded. Most of them have a distribution range of 0-30 m deep. Some species live at 30-60 m and the species between 60-100 m are occasional.

Deep Zone

There are 20 species of chitons in this zone, belonging mostly to the subfamily Leptochitoninae (eight species), with a distribution between 100-5000 m. Some species with a deep-sea distribution have been reported, such as *Lepidopleurus scrippsianus* (2800 m); *Leptochiton incongruus* (3500 m) and *Leptochiton (Leptochiton) alveolus* (4500 m). The genus *Lepidozona* has seven species with a distribution between 100-1500 m, and *Callistochiton colimensis* has been reported at 340 m.

Endemic species

There is a total of 50 endemic chitons in Mexican waters. Due to the geographical characteristics of the Golfo de California, endemism is typical, there being 32 species known only from that region. This corresponds to 25% of the total number of species. Endemism in other regions is limited to a few species, of which not all have been properly studied.

Species with a wide range of distribution

The west coast of the Baja California peninsula is the region with the highest number of species with a wide distribution, having 33 species. The distribution of these species ranges mainly along the North American west coast including Canada and Alaska. A full 50% of the Eastern Tropical Pacific species have a distribution that extends as far as the Islas Galápagos, Ecuador, and along the northern coast of Perú.

Insular chitons have been studied by Ferreira (1983a, 1983b), especially those from the Islas Revillagigedo, as well other islands in the eastern Pacific. Ferreira found that the species from these islands belong to the subspecies group of the west coast of Baja California and the Eastern Tropical Pacific.

The species of the Mexican coast of the Golfo de México are poorly known. It cannot even be said that the number of nominal species are all known, and the distribution limits of the species that belong to the Caribbean region within the Golfo de México have not been properly defined. All the species found in the Caribbean are distributed throughout the islands and the coasts of Florida, the Greater Antilles and the eastern coasts of Central America.

Potential Resources

Only a single species from the Eastern Tropical Pacific, *Chiton (Chiton) articulatus*, known locally as "marine cockroach" or "dog's tongue", is considered as a potential food resource due to its large size of up to 70 mm in length, and because it is easily accessible. Although there is neither a proper fishery nor statistics, this species is highly consumed along the Pacific coast of México. Studies on its biology, ecology and culture need to be done in order to prevent the drastic declination of its population due to over-exploitation.

DISCUSSION

A total of 127 chiton species have been recorded in Mexican waters. The most abundant chiton family is Ischnochitonidae with 11 genera reported. The genus *Stenoplax* (12 species), *Acanthochitona* (14 species) and *Lepidozona* (26 species) are the most diverse groups. Eighty-four percent of the chiton fauna in Mexican waters are distributed from 0 to 100 m. Endemic species make up 37% of the total number of recorded species.

The fact that the number of species from the west coast of Baja California and the Golfo de California are the most abundant and the best known of all the regions dealt with in this paper, is probably due to their closeness and easy access; since the Nineteenth Century they have been studied by prestigious foreign researchers, foundations, institutions and universities. In the cases of other regions, the degree of exploration, the number of new chiton species described and the time in which studies were undertaken is clearly evident in the literature (Ferreira, 1974, 1976, 1978a, 1978b, 1979a, 1979b, 1980, 1982a, 1982b, 1983a, 1983b, 1984, 1985, 1986, 1987; Smith, A., 1960, 1977; Bullock, 1985, 1988; Watters, 1981, 1990; Kaas, 1993; Kaas & Van Belle, 1985a, 1985b, 1987, 1990, 1994, 1998 and Clark, 1994, 2000).

The efforts made by Mexican scientists have been very limited due to the lack of experts. Thus, malacological studies in México have unfortunately been dependent on the works of non-Mexican researchers. The present paper is an effort to increase interest in the study of the chitons in México and its southern neighboring countries in order to contribute to the knowledge of the marine biodiversity in the region.

In conclusion, the knowledge of the chiton fauna in Mexican waters is very limited. A national mollusc research project is badly needed in order to continue with more detailed studies on their systematics, biodiversity, biology and ecology. Information is necessary for their conservation in one of the most diverse coasts of the world.

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BARWICK, KELVIN L., Environmental Monitoring & Technical Services Division, Metropolitan Wastewater, 4918 North Harbor Dr., Suite 201, San Diego, CA 92106-2359, (619) 758-2337, FAX (619) 758-2350, E-mail: K2B@SDCITY.SANNET.GOV
BELLER, PATRICIA, c/o Department of Marine Invertebrates, San Diego Natural History Museum, P.O. Box 121390, San Diego, CA 92112-1390, (619) 232-3821, ext 188 (work), (619) 482-4889 (home), E-mail: pbeller@sdnhm.org
BERSCHAUER, DAVID & FELICIA, 25461 Barents St., Laguna Hills, CA 92653, (949) 457-9210, FAX (949) 457-9450, E-mail: trophon@thegrid.net
BIELER, RÜDIGER, Field Museum of Natural History, Dept. of Zoology, 1400 S. Lake Shore Dr., Chicago, IL 60605-2496, (312) 665-7720, E-mail: bieler@fieldmuseum.org
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BRATCHER-CRITCHLOW, TWILA & TOM, 939 Coast Blvd. #15H, La Jolla, CA 92037, (858) 456-7241
BROWN, CHRIS, 4575 N. Ave. del Cazador, Tucson, AZ 85718, (520) 299-1890, E-mail: flashcove@mindspring.com
BURCH, TOM & BEATRICE, P. O. Box 309, Kailua, HI 96734, (808) 261-7465 and (808) 263-6408, FAX (808) 261-7465, E-mail: taburch@gte.net
CADIEN, DONALD B., 2425 E. 5th Street No. 10, Long Beach, CA 90814, (562) 433-4116, E-mail: dcadien@lacsd.org
CARR, WALTER E. JR, 2043 Mohawk Dr., Pleasant Hill, CA 94523, (925) 938-2251, FAX (925) 934-4683, E-mail: terrycarr@home.com
CHANEY, BARBARA, 1633 Posilipo Lane, Santa Barbara, CA 93108, (805) 969-1434
CHANEY, HENRY W., 170 La Vista Grande, Santa Barbara, CA 93103, (805) 682-4711 ext. 334 (work), FAX (805) 963-9679 (home), E-mail: hchaney@sbnature2.org (work)
CHIPPEAUX, EDITH & HARRY, 1308 Biltmore Dr., Fort Myers, FL 33901-8710, (941) 936-4058
CLARK, ROGER, 1839 Arthur St., Klamath Falls, OR 97603-4617, (541) 883-7582, E-mail: insignis@cdsnet.net
CLOVER, PHILLIP W., P.O. Box 339, Glen Ellen, CA 95442, Phone/FAX (707) 996-6960
COAN, EUGENE V., 891 San Jude Ave., Palo Alto, CA 94306-2640, (650) 493-8242 (home), (415) 977-5681 (work), FAX (415) 977-5790, E-mail: gene.coan@sierraclub.org
COOK, BUNNIE & GEORGE, 1120 Makaiwa St., Honolulu, HI 96816, (808) 737-8050, E-mail: g.-b.cook@juno.com
DAUGHENBAUGH, JOHN, 203 N. Wilton Pl., Los Angeles, CA 90004-4025, (323) 465-3718, E-mail: shoduffy@mediaone.net
DESCHAINE, LEWIS, 3029 Silver Lake Rd., St. Anthony, MN 55418-2435, (612) 789-4070
DOI, MATTHEW S., 16209 Taylor Ct., Torrance, CA 90504-1902, (310) 329-3201
DONEDDU, MAURO, via Palau, 5, 07029 Tempio (ss), Italy, E-mail: maurodo@tiscalinet.it
DULLAS, NORMA M. & WILLIAM, 13231 North 65th Dr., Glendale, AZ 85304, (623) 979-8758, E-mail: normadullas@mymailstation.com
EERNISSE, DOUGLAS J., Dept. of Biological Science, MH 282, California State University, Fullerton, CA 92834-6850, (714) 278-3749, FAX (714) 278-3426, E-mail: deernisse@fullerton.edu
EMERSON, WILLIAM K., 10 E. End Ave. Apt. 18E, New York, NY 10021-1184, (212) 879-7645 (home), (212) 769-5714 (work), FAX (212) 769-5783, E-mail: emerson @AMNH.org
EVERSON, GENE, 500 Nottingham Pkwy., Louisville, KY 40222-5026, (502) 429-5788
FARMER, WES, 3591 Ruffin Rd. #226, San Diego, CA 92123-2561, (858) 576-2143, E-mail: wmfarmer@adnc.com
FLENTZ, MARY & JOHN B., 4541 Lambeth Court, Carlsbad, CA 92008-6407, (619) 434-2522
FORNER, MONIKA M., 575 Otay Lakes #32, Chula Vista, CA 91913, (619) 397-0970, E-mail: mforner@lhsl.com
FORSYTH ROBERT, 2574 Graham St., Victoria, British Columbia, V8T 3Y7, Canada E-mail: robert_forsyth@telus.net
FRANK, WILLIAM M., 1865 Debutante Dr., Jacksonville, FL 32246-8645, Phone/FAX (904) 724-5326, E-mail:

strombus@mindspring.com
GARCÍA, EMILIO F., 115 Oak Crest Dr., Lafayette, LA 70503, (337) 232-2662, E-mail: efg2112@louisiana.edu
GERRODETTE, BILLEE L. & GEORGE, 6333 La Jolla Blvd. #171, La Jolla, CA 92037, (858) 454-5788
GORI, SANDRO, Via Sernesi 7, 57123 Livorno, Italy
GREEN, DAVE, LUCILLE & KRISTEN, 6610 Baker Ct., Colleyville, TX 76034, (817) 421-6887, E-mail: dgreen@comwerx.net
HERRMANN, RICHARD & GINNY, 12545 Mustang Dr., Poway, CA 92064, (858) 679-7017, FAX (858) 679-3346, E-mail: rbherrmann@aol.com
HERTZ, JULES & CAROLE M., 3883 Mt. Blackburn Ave., San Diego, CA 92111, Phone (858) 277-6259, E-mail: cmhertz@pacbell.net
HICKMAN, CAROLE S., PT05, Museum of Paleontology, University of California, Berkeley, CA 94720-4780, (510) 642-3429, FAX (510) 642-1822, E-mail: caroleh@socrates.berkeley.edu
HOLLMANN, MICHAEL, Stockumer Heide 44, D-58454 Witten, Germany, Phone 01149-2302-944-255, FAX 01149-234-230-4225, E-mail: Michael.Hollmann@ruhr-uni-bochum.de
HOUSTON, ROY S., Dept. of Biology, Loyola Marymount University, Loyola Blvd. at West 80th St., Los Angeles, CA 90045, (213) 642-3126 (work), (310) 329-6444 (home), E-mail: rhouston@lmu.edu
HUTSELL, KIM & LINDA, 5804 Lauretta St. #2, San Diego, CA 92110, (619) 294-3914, E-mail: khutsell@ix.netcom.com
JACKSON, JOHN A., 11558 Rolling Hills Dr., El Cajon, CA 92020, (619) 579-8405, FAX (619) 579-7901, E-mail: odyssey@adnc.com
JOFFEE, ANNE, 1157 Periwinkle Way, Sanibel Island, FL 33957, (941) 472-3151, FAX (941) 472-3153, E-mail: sanibelchiton@aol.com
JORDAN, SCOTT, 1620 El Travesia Dr., La Habra Hts., CA 90631, (562) 903-0287, FAX (562) 697-1268, E-mail: sjordan2@prodigy.net
KAISER, KIRSTIE L., Paseo de las Conchas Chinas #115 Depto. 4, Fracc. Conchas Chinas C.P. 48390, Puerto Vallarta, Jalisco, Mexico, 011-52 (322) 221 5041, FAX 011-52 (322) 221 5042, E-mail: klkaiser@pvnet.Com.Mx
KALOHI, KATHY & JOSEPH, 13901 Wilkie Ave., Gardena, CA 90249, (310) 719-1816, E-mail: wreckdiver77@yahoo.com
KANNER, PAUL, 10609 Esther Ave., Los Angeles, CA 90064, Phone/FAX (310) 559-7140, E-mail: pkann@mediaone.net
KEMP, BRUCE & EMI, 9420D Carlton Oaks Dr., Santee, CA 92071, (619) 449-7610, FAX (619) 553-6391, E-mail: bkemp@nosc.mil
KENNEDY, GEORGE, 8997 Moisan Way, La Mesa, CA 91941, (619) 667-1030, FAX (619) 594-4372 (work), E-mail: gkennedy@geology.sdsu.edu
KOSUGE, SADAO, Institute of Malacology, 6-36 Midoricho 3 Chome, Nishi-Tokyo City, Tokyo 188-0002, Japan E-mail: I.M.T.KOSUGE@excite.co.jp
KRONENBERG, GIJS C., Den Bult 98, NL-5616 GJ Eindhoven, the Netherlands, E-mail: gijsckro@worldonline.nl
LANCE, JAMES R., 746 Agate St., San Diego, CA 92109, (858) 488-2132
LAVALEYE, MARC, De Ruyterstraat 58, 1792 AK Oudeschild, The Netherlands, E-mail: lava@nioz.nl
LEVIN, DEBRA J.,1848 Rust Ridge Pl. #202, Corona, CA 92881, (909) 898-3945, E-mail: levinj@att.net
LEWIS, JUDITH A., 2117 Via Estrada, Carrollton, TX 75006, (972) 416-4712, E-mail: judylewis@earthlink.net
LONHART, STEVE, Department of Biology, EMS A316, University of California, Santa Cruz, CA 95064, (831) 459-5063, FAX (831) 459-4882, E-mail: lonhart@biology.ucsc.edu
LOVELL, LARRY, Benthic Invertebrate Collection, SIO/UCSD/Mail Stop 0244, 9500 Gilman Drive, La Jolla, CA 92093-0244, (858) 822-2818, FAX (858) 822-3310, E-mail: llovell@ucsd.edu
LUTHER, DOUG & MARY, 1535 Ipukula St., Honolulu, HI 96821-1419, (808) 377-5173, E-mail: dluther@soest.hawaii.edu
MARR, LAURETTA, 4428 Lanham St., Midland TX 79705, (915) 683-1901, E-mail: RLMMID@aol.com
MCCLINCY, RICHARD J., 809 St. George Rd., Danville, CA 94526-6235, (925) 838-3217, E-mail: richard.mcclincy@kvaerner.com
MCLEAN, JAMES H., Malacology, Los Angeles County Museum of Natural History, 900 Exposition Blvd., Los Angeles, CA 90007, (213) 763-3377, FAX (213) 746-2999, E-mail: jmclean@bcf.usc.edu
MCPEAK, RONALD H., P.O. Box 2136, Battle Ground, WA 98604-2136, (360) 687-1972, FAX (360) 687-1791, E-mail: rmcpeak@worldaccessnet.com
METZ, GEORGE E., 121 Wild Horse Valley Dr., Novato, CA 94947-3615, (415) 892-4960, E-mail: romageometz@earthlink.net
MICHEL, JOHN & NOLA, 4758 Mt. Cervin Dr., San Diego, CA 92117, Phone/FAX (858) 278-9088, E-mail: ejmco@san.rr.com
MULLINER, DAVID K. & MARGARET, 5283 Vickie Dr., San Diego, CA 92109, (858) 488-2701, E-mail: mulliner1@juno.com
MUSEUM OF COMPARATIVE ZOOLOGY, Dept. of Malacology, Harvard University, 26 Oxford St., Cambridge, MA 02138, (617) 495-2468, E-mail: ckenaley@OEB.Harvard.edu

MUSEUM OF NEW ZEALAND, Library Manager, Te Papa Library, P.O. Box 467, Wellington, New Zealand
MYERS, JOHN & BARBARA W., 3761 Mt. Augustus Ave., San Diego, CA 92111, (858) 279-9806
NATURALIS, BIBLIOTHEEK, Postbus 9517, 2300 RA Leiden, The Netherlands
NELSON, LOIS, 7222 N. 15th Ave., Phoenix, AZ 85021-8658, (602) 997-9196
NORRID, CHARLOTTE, 233 E. Cairo Dr., Tempe, AZ 85282-3607, (480) 967-4957, E-mail: hcnorrid2@aol.com
NORTHROP, MARILYN, 81-B Carriage Hill, Twin Lakes Apt., Clifton Park, NY 12065, (518) 383-6624, E-mail: mjnorth@nycap.rr.com
PASQUA, ROBERT A., 2236 Via Chalupa, San Clemente, CA 92673-3634, (949) 492-6855, E-mail: iampasqua@aol.com
PAYNE, TRAVIS L., 2703 Wayne Circle SE, Decatur, AL 35603-9392, E-mail: tlpayne@hiwaay.net
PERDUE, ROBERT E., 78-715 Maracas Ct., La Quinta, CA 92253-2420, (760) 564-1980 (home), (760) 776-8938 (work), E-mail: REPerdue@aol.com
PERRIN, MARILYN, 10960 Via Abaca, San Diego, CA 92126, (858) 586-0175, E-mail: mimiperrin@aol.com
PIERCE, ROSEMARY & FRANK, 43099 Tenaja Road, Murrieta, CA 92562, (909) 674-9370
PISOR, DON & JEANNE, 10373 El Honcho Pl., San Diego, CA 92124, (858) 279-9342 (home), (619) 234-0249 (warehouse), FAX (619) 234-0250, E-mail: dpisor@earthlink.com
PRAS, STEPHANE, 15 Rue Marbeau, 75116 Paris, France, E-mail: stephane.pras@noos.fr
RICE, TOM, P.O. Box 219, Port Gamble, WA 98364, Phone/FAX (360) 297-2426, E-mail: ofseashr@sinclair.net
ROBERTS, DALE L. & KIMBERLY, 28402 Harvest View Lane, Trabuco Canyon, CA 92679, (949) 459-8886, FAX (949) 888-2786, E-mail: robertdl@war.wyeth.com
ROMER, BILL & CAROL, 3249 Towser, San Diego, CA 92123, (858) 278-2389, E-mail: wromerl@san.rr.com
RUTKAS, TERRY, 13311 B Meyer Rd., Whittier, CA 90605, (562) 941-5439
SANTA BARBARA MUSEUM OF NATURAL HISTORY, Department of Invertebrate Zoology, 2559 Puesta del Sol Rd., Santa Barbara, CA 93105-2936, (805) 682-4711
SCHNEIDER, WILLIAM & NANCY, 12829 Carriage Rd., Poway, CA 92064-6045, Phone/FAX (858) 748-2822, E-mail: jtkcmom@msn.com
SCHOENING, ROBERT C., 10607 Norman Ave., Fairfax, VA 22030, (703) 273-9755, FAX (703) 352-7124, E-mail: rschoening@aol.com
SCOTT, PAUL VALENTICH, Santa Barbara Museum (NH), 2559 Puesta del Sol Rd., Santa Barbara, CA 93105, (805) 682-4711 ext. 319, FAX (805) 569-3170, E-mail: pvscott@sbnature2.org
SENCKENBERGISCHE BIBLIOTHEK, Zeitschriftenabteilung/DFG, Bockenheimer Landstr. 134-138, D-60325, Frankfurt am Main, Germany
SKOGLUND, CAROL, 3846 E. Highland Ave., Phoenix, AZ 85018, Phone/FAX (602) 955-2072, E-mail: carolskoglund@msn.com
SMALL, MICHAEL, P.O. Box 500 (HAVAN), Station D, Ottawa, Ontario KIN 8T7, Canada, 537-24-25-16/17 (work), FAX 537-
337725 (home), E-mail: michael.small@dfait-maeci.gc.ca
THE NATURAL HISTORY MUSEUM, Acquisitions Section, Dept. of Library & Information Services, Cromwell Rd., London SW7 5BD, England
TUPEN, JEFF W., Morro Group Inc., 1422 Monterey St., Suite C-200, San Luis Obispo, CA 93401, (805) 543-7095 and (805) 459-0111, FAX (805) 543-2367, E-mail: jtupen@morrogroup.com
UNDERWOOD, DORIS K., 698 Sheridan Woods Dr., West Melbourne, FL 32904, (321) 724-2449, E-mail: dunderwood1@cfl.rr.com
VAWTER, DORIS, 3208 Bonita Mesa Rd., Bonita, CA 91902, (619) 479-7687, E-mail: vevawter@worldnet.att.net
VELARDE, RON, Marine Biology Lab., 4918 N. Harbor Dr. Suite 101, San Diego, CA 92106, (619) 758-2331, FAX (619) 758-2350, E-mail: RVELARDE@SANDIEGO.GOV
VOLLERO, SILVANA & BOB PETROSKI, 5613 Carnegie St., San Diego, CA 92122, (858) 625-0756, FAX (858) 535-1810 (work), E-mail: gluckchildcare@sd.znet.com (work)
VON KRIEGELSTEIN, DOUG, 11288-A San Juan, Loma Linda, CA 92354, (909) 825-7207, FAX (909) 796-9658, E-mail: dougvon@hotmail.com
VOSO, ED & HELEN, 1815-134 Sweetwater Rd., Spring Valley, CA 91977, (858) 469-8308
WEBER, GLADYS, 3607 Sylvan Meadows Court, Modesto, CA 95356-2011, (209) 549-1071, E-mail: gladweber@aol.com
WEBSTER, HERB & MELLA, 34021-A Ruby Lantern, Dana Point, CA 92629-2513, (949) 240-1606, E-mail: mellamella@cox.net
WHITE, JACKIE, 886 Mountridge Ct., Las Vegas, NV 89110-2911, (702) 452-9651, E-mail: jcwshells@aol.com
WISE, JOHN, Dept. of Malacology, Houston Museum of Natural History, One Hermann Circle Dr., Houston, TX 77030-1799, (713) 639-4677, FAX (713) 523-4125, E-mail: jwise@hmns.org
WOOLSEY, JODY, 3717 Bagley Ave. Apt. 206, Los Angeles, CA 90034-4148, (310) 839-1604, E-mail: mjwoolsey@earthlink.net
WU, SHI-KUEI, 4175 Amber St., Boulder, CO 80304, Phone/FAX (303) 444-2306, E-mail: skwu@spot.colorado.edu
WUYTS, JEAN, Koningsarendlaan 82, B-2100 Deurne, Belgium, E-mail: wuyts.jean@jri.be
YIN, BOB, 1275 Torrey Pines Rd., La Jolla, CA 92037, (858) 454-2342, E-mail: ryinl@san.rr.com
YOUNG, HERB, 14550 Stone Ave. North, Shoreline, WA 98133-6218, (206) 364-8327

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E-mail: cmhertz@pacbell.net Website at: http://www.users.cts.com/crash/t/tarnold/SDSC/index.html

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

PROGRAM

AROUND THE WORLD IN 80 DIVES

Steve Drogin, a 62 year old La Jolla resident who was certified by old San Diego Divers in the Mission Beach Plunge in 1958, roams the globe diving and photographing creatures in the natural world both above and below water. He'll show slides from the Northwest Territories to Antarctica, Vanuatu and Tuvalu.

Meeting date: 21 March 2002

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CLUB NEWS

Minutes of the February 21st Meeting of the San Diego Shell Club

Vice President Terry Arnold welcomed everyone to the meeting in the absence of President Jules Hertz. He called for the approval of the minutes of the January meeting as published in *The Festivus*. The motion passed. Treasurer/ Librarian Linda Hutsell said the Club would be getting the new Olive book soon. Terry reminded everyone of the auction on April 20th. Next month the signup sheet will be passed around for the potluck dinner. Donations for the auction may be made to any of the Board members or brought to the March meeting.

Terry then introduced the speaker for the evening, Dr. Allen Collins of UCSD. Allen described the CBRISC Project in which he is involved. He began with the premise that humans are having a negative impact on the environment. The project will attempt to measure how vast this impact actually is. The goals of the project are threefold: (1) to establish an historical baseline (2) to identify local extinctions and (3) to build a website to share the information with other interested parties. They are focusing on three sites of study - Cabrillo National Monument, Scripps Institution of Oceanography, and Birdrock (La Jolla).

Preliminary findings show that there is a decline in the largest of the species. The biggest specimens are no longer found. The question is,"What does this mean for a species?" There is much more information to be gathered to put together a good picture of what is happening over time.

The drawing winner was Patricia Beller. Thanks to Larry Lovell and Monika Forner for the delicious treats. The meeting was adjourned at 8:45 p.m.

Silvana Vollero

Additions and Changes to the Roster

<u>New Member</u>

Library, Hatfield Marine Science Center, Oregon State University, 2030 S. Marine Science Dr., Newport, Or 97365

<u>Too Late for the Roster</u>

John and Linda LaGrange, 533 N. Rios, Solana Beach, CA 92075-1245. Phone/FAX 858-755-7215. E-mail: lagrange@adnc.com

Ed and Jean Womack, 2126 S. Arroyo Vista Dr., Cottonwood AZ 86326. Phone: 928-639-2112

<u>Change of Address</u>

Marilyn Perrin and Jim Goldammer, 10051 Sheba Way, San Diego, CA 92129. Phone: 858-484-0575. E-mail: mimiperrin@aol.com

John Bishop (new e-mail): jandebishop@cox.net

Come to the Auction/Potluck!!

The Auction/Potluck, to be held on Saturday evening April 20th, will begin at 5 p.m. with "Dave's Punch" and soft drinks while members browse the auction table and silent auction. Dinner will be at 6 p.m. and the auction will begin promptly at 7 p.m.

Several marvelous donations have already been received. It is the Club's unbelievable good fortune to have received a magnificent D'Attilio drawing of *Latiaxis fruticosus* Kosuge, 1979, long after it was believed that there would never be another one available. Also a specimen of the abyssal *Alvinoconcha hessleri* collected from 3500 m from hydrothermal vents and the rare *Lambis violacea* (Swainson, 1821) will be on the auction table. Two books, a still-boxed, autographed copy of Radwin & D'Attilio's (1976) *Murex Shells of the World* and a new copy of Keen's (1971) *Sea Shells of Tropical West America* have been donated.

But the auction needs the donations of its members and friends to make this event a success. Please check your collections, be generous and bring your donation to the March meeting or contact a board member to arrange for pickup. Remember that the proceeds from the auction make *The Festivus* (and its supplements) possible, provide funds to support donations to student grants, the Greater San Diego Science Fair, the Club's fine circulating library, and other Club expenses which benefit its members

But most of all — plan to attend. Without the presence of our members and friends, the auction would not be the great party it always is!

DOES THE MORPHOLOGY OF PLEISTOCENE SPECIMENS OF *CROSSATA CALIFORNICA* (HINDS, 1843) ELUCIDATE EVOLUTIONARY PATTERNS?

YVONNE ALBI

P.O. Box 45828, Los Angeles, California 90045, USA
E-mail: holaster@aol.com

Near Playa del Rey, Los Angeles County, California, is a locality that yields fossils whose age is about 125,000 BP (Kennedy, 1973). Among this fauna are many "frog shells" formerly referred to the genus *Bursa* but now known as *Crossata californica* (Hinds, 1843). These shells display considerable variability of shape and sculpture. Especially notable is the variability among the smaller, less mature shells which is greater than among equivalent size and growth stage of Recent specimens. Relationship of *Crossata* to other bursids has been variously inferred by other workers (e.g., Vokes, 1973; Beu, 1988). Do these variations help unravel the phylogeny of *Crossata californica*, an eastern Pacific bursid?

Materials:

The locality is richly fossiliferous and in addition to the approximately 300 mollusk species reported by Willett (1937), crabs, bryozoans, barnacles, echinoids, fish and birds have been found. The frog shells are mostly complete and well preserved. The whole growth series from juveniles to adults is represented with a majority of specimens being of medium size (55-80 mm). Some specimens of *Crossata californica* display small round holes, doubtlessly drilled by naticid predators. A few frog shells had barnacles attached, and a very few were deformed. One hundred and fifty specimens were chosen for this study. Shells were selected for their similarity to geologically earlier species of bursids and ranellids. Many Pleistocene specimens repeat the morphological characteristics of Eocene through Recent species.

Ecology:

The Playa del Rey site (Figure 1) is about two miles inland from the present coast. The fossils are from lenticular beds of the Palos Verdes Sand of Woodring (1946). In addition to quartz grains the deposit includes sand-sized particles of broken shell and is typical of a deposit in an embayment (Fitch, 1964). The substrate consists of sand with a medium-sized cobble base, that was deposited on the outer periphery of an inland Pleistocene bay occupying part of the Los Angeles Basin. Completeness and fine preservation of the shells indicates lack of post-mortem transport. Analysis of the whole fauna has suggested that *Crossata californica* lived in warm water during an interglacial time at a depth of about 20-40 fm (Willett,1937; Valentine & Meade,1961). Ability of the bursids to lay abundant eggs and a long larval stage for the hatchlings may have helped to distribute the veligers throughout warm temperate and tropical seas (MacGinitie & MacGinitie, 1968). This gastropod feeds on echinoderms, ascidians, bivalves and also eats carrion.

The geologic range is from Pliocene to Recent. Grant & Gale (1931) reported a Pliocene specimen from the Puente Hills, "Fernando Formation", but Yerkes (1972) noted that *C. californica* of Puente Hills was in the Pleistocene, San Pedro Formation. Davis (1998) found a *C. crossata* specimen in the upper Pliocene "Fernando Formation" of Los Angeles, California (ARCO Towers area). Stadum (1984) reported *C. californica* from the Pliocene Niguel Formation, Laguna Hills, Orange County, California. Several San Diego Formation (Pliocene) Tijuana River border area localities, (LACMIP 305, 318 and 319), have yielded a number of *C. californica*. These are smaller than most Recent specimens and do not show much variation in shape but are similar to some of the Pleistocene Playa del Rey specimens (Figure 2). Also, from the San Diego Formation in Arroyo Drive Quarry, Balboa Park, San Diego (LACMIP locality 107), is a Pliocene *C.*

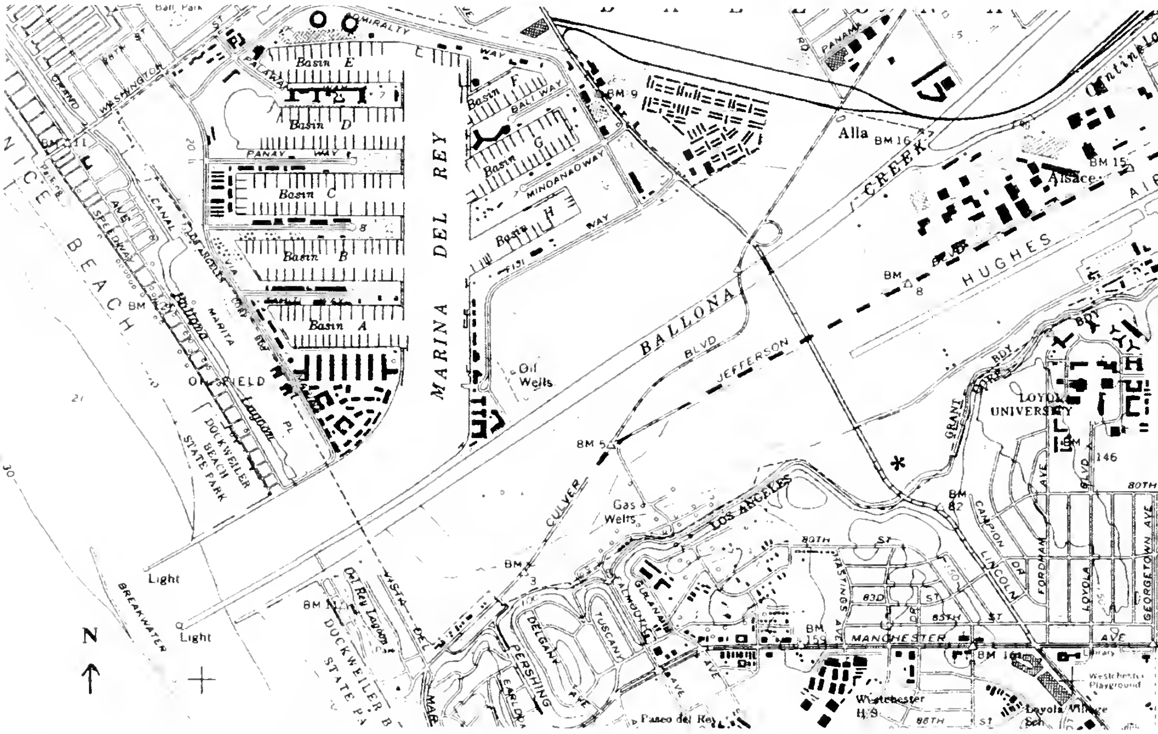


Figure 1. Map of site in Playa del Rey, Los Angeles County, California. Fossil site shown with an asterisk*.

Figure 2. *Crossata californica* (Hinds, 1844). Palos Verdes Sand, Pleistocene, Playa del Rey, Los Angeles County, California. Figures 70% of actual size. Albi Collection.

californica.

Abbreviations used in this paper are LACMIP = Natural History Museum of Los Angeles County, Invertebrate Paleontology; BMNH = The Natural History Museum, London; USNM = National Museum of Natural History, Washington, DC; CAS = California Academy of Sciences, Menlo Park.

Systematics:

Phylum Mollusca Cuvier, 1797
Class Gastropoda Cuvier, 1797
Order Neotaenioglossa Haller, 1888
Superfamily Tonnoidea Suter, 1913
Family Bursidae Thiele, 1925

Genus *Crossata* Jousseaume, 1881
Type-species *Ranella ventricosa* Broderip, 1833, by original designation.

Crossata californica (Hinds, 1843)
Ranella californica Hinds, 1843: 255-256; Hinds, 1844:12, pl. 2, fig. 4; Gabb, 1869: 73; Keep, 1888: 44, fig. 24; Keep, 1892: 44; Williamson, 1892: 211; Arnold, 1903: 287; Rogers, 1908: 54, pl. 12.
Bursa (Lampas) californica (Hinds). Tryon, 1881: 40, pl. 22, fig. 42.
Bursa (Bufonaria) californica (Hinds). Dall, 1921: 141; Oldroyd, 1927: 241, pl. 33, figs.7, 8; Smith, 1948: 30, pl.10.
Bursa californica (Hinds). Jordan, 1924: 149; Jordan, 1926: 246; Grant & Gale, 1931: 731; Keen, 1958: 348; Dance, 1974: 115; McLean, 1978: 41, fig. 21.1.
Bursa (Crossata) californica (Hinds). Abbott, 1974: 167, color pl.7, fig. 1783.
Crossata californica (Hinds). Kaicher, 1982: 3260; Beu, 1988: 74; Parth, 1996: 133; Beu, 2001: 707.

Type Material: The holotype is apparently missing and Beu (personal communication, 2001) intends to designate a neotype from an authentic Hinds specimen at the BMNH.

Hypotype: USNM # 209567 collected 1904, 8.6 miles (13.8 km) north of Point Loma, San Diego, California. Recent.

Description:

Recent shells of *Crossata californica* (Figure 3) are commonly of medium size; a few are quite large. The shell has six whorls and is thick and heavy. The body whorl is corpulent with spiral bands of tubercles and with several blunt peripheral knobs (McLean, 1978). The spire is short and the protoconch is made up of 2½ smooth whorls. The aperture is longer than the spire and has well developed anterior and posterior siphonal canals that are similar in length. The outer lip is bedecked with a protruding varix that is not aligned with varices of previous whorls. Varices bear ridges and pointed or round nodes. Internally the outer lip displays grouped denticles. The inner lip is expanded and commonly stands out clearly from the whorl, its inner portion and the columella made plicate by the 10-16 lirae that cross the inner lip. Some specimens have fewer and less distinct plications. A large parietal plication borders the inner end of the posterior canal. The entire shell is commonly covered with a white chalky substance termed intriticalx. The shell is cream colored with tan lines, and a white aperture. On a few specimens a muddy, dark green borders the outer and inner lip. *Crossata californica* has a thin chitinous operculum (for terminology, see Figure 4).

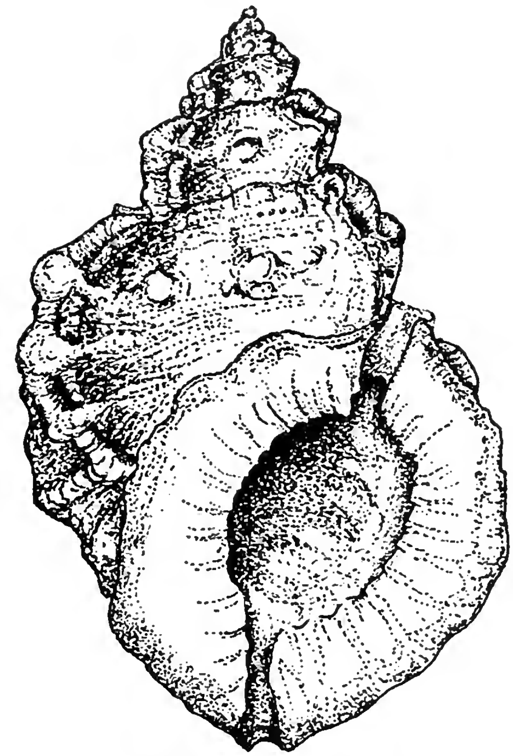


Figure 3. *Crossata californica* (Hinds, 1844). Recent. Palos Verdes, Los Angeles County, California. Figure 70% of actual size. Albi Collection.

Discussion:

Recent *C. californica* are epifuanal, now living on rocky substrates at depths of 20-91 m on rubble or reefs in outer harbors or, in some places, closer to shore (McConnaughey & McConnaughey, 1988). The shells of *C. californica* are less dorsoventrally compressed than many others in their family. The species has been

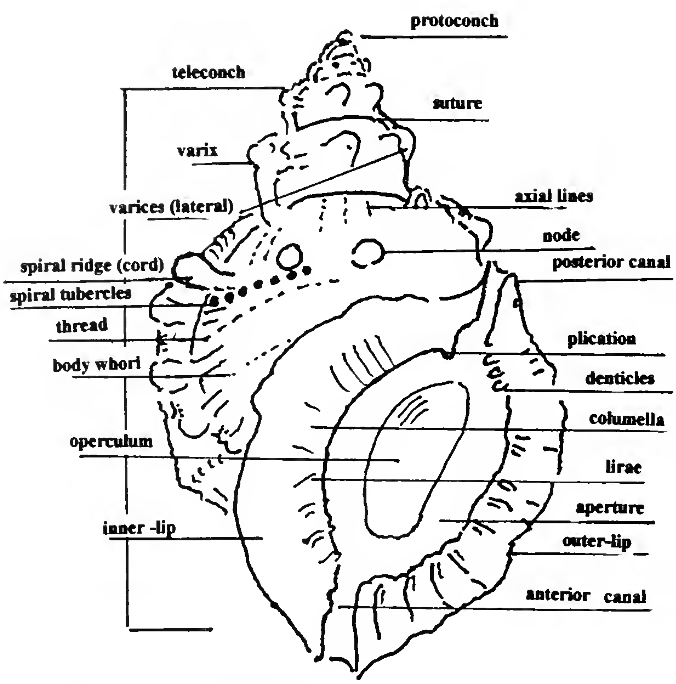


Figure 4. *Crossata* terminology.

reported from Monterey, California to the Golfo de California, México (Grant & Gale, 1931).

Pleistocene specimens of *Crossata californica* from Playa del Rey are commonly smaller and sturdier than Recent specimens and have greater variation in shell thickness. A few Pleistocene specimens are more flattened than Recent specimens (compressed anterior to posterior, a characteristic of many bursids) and have the anterior canal longer than the posterior canal. Some specimens have a smooth columella, others are very plicate, and in some the parietal plication is not prominent. The columella of some Pleistocene specimens is nearly straight; the outer lip of some patulous and frilled. Varices are moderately thick, and in most specimens slightly offset from those of the previous whorl. But in some few specimens varices are continuous with those of the previous whorl. Several specimens have varices with extremely sharp pointed nodes. The body whorl is large with dominant spiral sculpture consisting of moderately wide cords, beaded cords, and finer beaded threads, with spirally aligned nodes, and tubercles. The strength of these sculptural elements differs between specimens. Spire length varies slightly, and the total whorl number is six. The aperture is commonly longer than in Recent specimens. Some tan color is preserved on the fossil specimens, and a chalky intritacalx is often noticeable.

Crossata ventricosa (Broderip, 1833), the type species for *Crossata*, ranges from Perú to Chile and is moderately common. Cossignani (1994) discussed that *C. californica* could be a sub-species of *C. ventricosa*. Many characteristics of *C. ventricosa* are similar to those of Pleistocene specimens from Playa del Rey, but most *C. ventricosa* have a smooth columella, less prominent but broader varices, cords from the varices to the body whorl that are less obvious, a smaller shell overall and a body whorl that is more expanded anteriorly. *Crossata ventricosa* and Pleistocene *C. californica* (Figure 5), have similar sculpture and similar color patterns.

According to Beu (2001) and Parth (1996) *Crossata californica* and *Crossata ventricosa* belong to one intergrading species and *Bursa calcipicta* may be a deep-water link to the northern *C. californica* and southern *C. ventricosa* species.

Crossata californica sonorana Berry, 1960, from Sonora, México, is so similar to *C. californica* that discriminating the subspecies from the species is very difficult. Additionally, their geographic ranges are not disjunct and the two may occur together. This Sonoran form is more often found in the Golfo de California. *Crossata californica sonorana*, according to Berry (1960), differs in having a broader spire, being smaller, and having a thinner shell with sharper nodules, but these characteristics are not adequately different to make the species and its subspecies readily separable. Any large assemblage of *C. californica* from a specific locality (e.g. near Guaymas, Sonora, México) may have morphological variations displaying the *C. sonorana* characteristics.

Early Tertiary bursids:

Many fossil bursids are known, but the origins of the family and of the genera are unclear (Beu, 1988). Among possible progenitors of *Crossata californica* is *Olequahia domenginica* (Vokes, 1939). This bursid had a geographic range from near San Diego to central California during the late early through early middle Eocene "Domengine" stage (Squires, 1984). A specimen from the Eocene Llajas Formation, on Runckle Ranch, Simi Valley, Ventura County, California, has well defined shoulders, two entire small varices per whorl, a row of small tubercles axially elongated on the body whorl, many spiral ridges and nodes, and a plication on the columella (Figure 6a).

Olequahia hornii (Gabb, 1864) of the late early

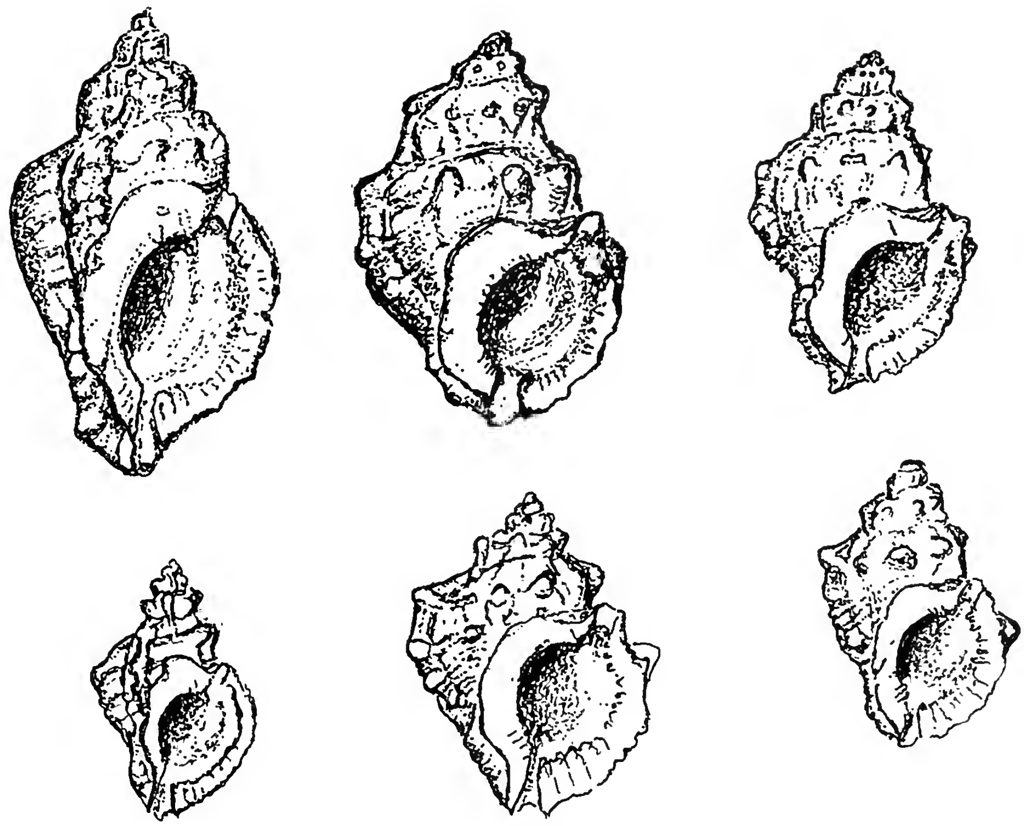


Figure 5 (top row). *Crossata ventricosa* (Broderip, 1833). Recent. Perú. Figures 70% of actual size. Albi collection. Figure 5 (bottom row). *Crossata californica* Pleistocene, Playa del Rey, a comparison. Figures 70% of actual size. Albi Collection.

through middle Eocene ("Tejon" stage); described originally from the Tejon Formation near, Fort Tejón, Tehachapi Mountains, Kern County, California, has been reported from other North Pacific deposits including some in easternmost Russia (Givens, 1974). Stewart (1926) indicated that *O. domenginica* might be a synonym of *O. hornii*, but Beu (1988) considered *O. hornii* to be more like *Olequahia washingtoniana* (Weaver, 1912). The shell of *O. hornii* is of medium size, and has a posterior canal and a straight columella. Whorls are faintly shouldered. The body whorl has noded spiral ribs and one varix. Two varices are present on the second whorl of the spire and minute axial ribs are on the third whorl. Specimens may appear to have had fewer varices as they are easily abraded.

The type species of *Olequahia* is *Cassidaria washingtoniana* Weaver, 1912, which was described from the Cowlitz Formation of early late Eocene age along Cowlitz River, Washington. *Olequahia washingtoniana* looks somewhat like a *Crossata* but lacks its strong varices. In *O. washingtoniana* varices are low and are present only on the first two or three whorls of the teleoconch (Beu, 1988). *Olequahia washingtoniana* has a medium-sized, thick shell, with strongly ornamented whorls that have an angulated profile and a short spire. The whorls are ornamented with spiral ribs, nodes and tubercles. The body whorl has nine axial ribs. The posterior canal is small, the outer lip crenulated, the columella straight, and the anterior canal straight. The protoconch is small, turban-like of 3.5 whorls. Beu (1988) considered *Olequahia* a possible direct ancestor of *Crossata*, or if not direct, that *Olequahia* branched from a lineage directly ancestral to *Crossata*.

Olequahia domenginica appears more similar to *Crossata* than do later *Olequahia* because its whorls consistently have varices, the varices are thicker and have a more rounded profile. *Olequahia washingtoniana* (Figure 6b) has more nodes on the central area of the body whorl, spiral and axial ridges are more prominent

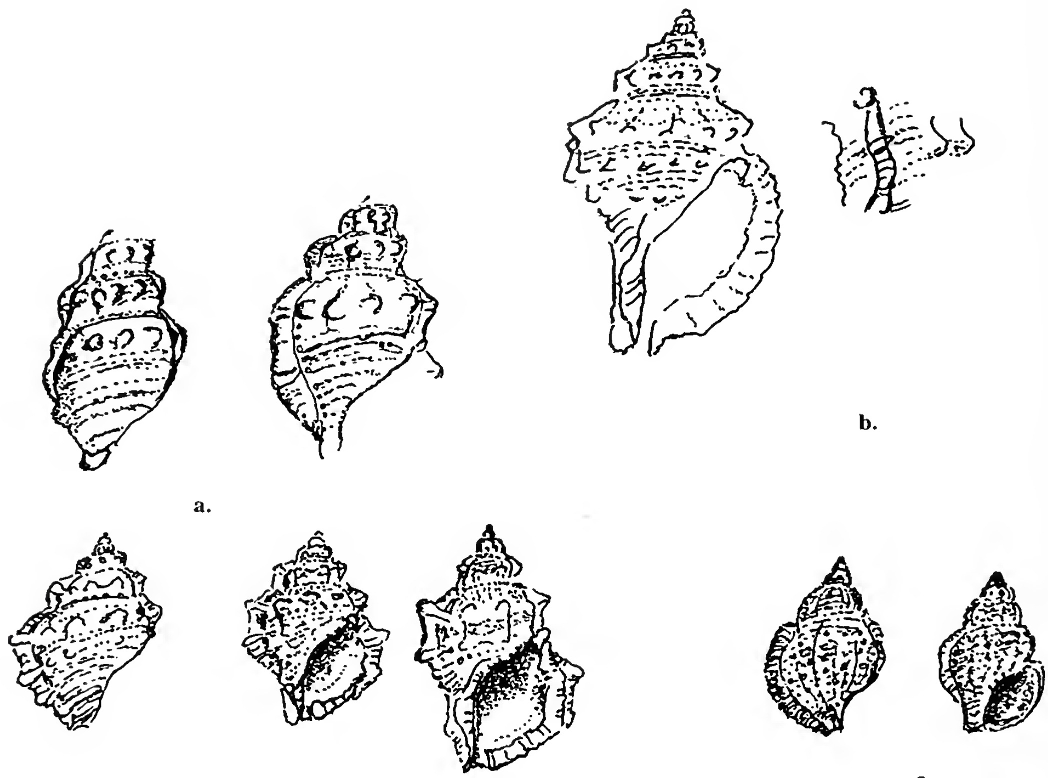


Figure 6a-c. (6a, top left) *Olequahia domenginica* (Vokes, 1939). Simi Valley, Ventura County, California. Early Middle Eocene, x 1.05. (6a, bottom left) Pleistocene *Crossata californica*. Playa del Rey, a comparison. Figures 70% of actual size. Albi Collection. (6b, top right) *Olequahia washingtoniana* (Weaver, 1912). Cowlitz Formation, Cowlitz River, Lewis County, Washington. Late Eocene (after Weaver, 1942). Reprint 1958, pl. 84, fig. 6, paratype (CAS 314). Compare with Pleistocene *Crossata californica*, Playa del Rey, bottom left. (6c bottom right) *"Mayena" kewi* (Dickerson, 1915). California Late Eocene, Tejon Formation, Grapevine Canyon, Kern County, California. (LACMIP 22340). Figures 70% of actual size.

than on *O. domenginica* and *Crossata*.

Olequahia schencki Durham, 1944, was described from specimens of late Eocene age from the Keasey Formation of Oregon. This specimen has no varices, but some specimens have a thickened outer lip. *Olequahia schencki* is most similar to *O. washingtoniana*.

Despite the cooler climate of the Oligocene, *Olequahia lorenzana* (Wagner & Schilling, 1923), originally described under the genus *Strepsidura*, occurs in considerable abundance at localities in the San Emigdio Formation in San Emigdio Canyon, southern San Joaquin Valley, Kern County, California. As with *O. schencki*, varices, an important characteristic of bursids, appear to be lacking in *O. lorenzana*. Shells are large; many incomplete specimens are 80 mm high and sturdy, sturdier than *O. washingtoniana*. *Olequahia lorenzana* has a small posterior canal, straight columella, and many nodes and cords on the whorls. It is the largest known *Olequahia* and differs by its more rotund body whorl.

Among other California early Tertiary species having some resemblance to *Crossata* is *"Mayena"(Nyctilocus) kewi* (Dickerson, 1915) (Figure 6c) from the late middle Eocene Tejon Formation on the west side of Grapevine Canyon, Kern County, California (Smith, 1970). Specimens are quite small, consist of 5½ whorls, and have two lateral varices per whorl. The suture is appressed, the earliest volutions have reticulate sculpture and the body whorl has spiral rows of coarse tubercles. Lirae are on the columella. *"Mayena" (Nyctilocus) kewi* resembles cymatiids in lacking the posterior siphon of bursids. *"Fusitriton"* *terrysmithae* Hickman, 1980, also resembles *Bursa* somewhat and differs from most cymatiids, among which it has been classed, in having a posterior siphonal canal. The aperture of *"F." terrysmithae* has a denticulate outer lip and the columella is recurved. The shell is of medium size, and its sculpture is, unlike that of *Crossata,* predominantly axial. These specimens are of late Eocene age from the Keasey Formation of Oregon.

Peruvian and Ecuadorian Eocene and Oligocene bursids are, according to Vokes (1973) similar in ornamentation to *Bursa (Colubrellina) amphitrites* (Maury, 1917) (Figure 7), but a specimen (USNM 644042) from the late Pliocene age Esmeraldas beds of the Onzole Formation, Punta Gorda, Ecuador, that was referred to *Bursa (Colubrellina)* sp. by Olsson (1930; 1964) strongly resembles a small *C. californica*. *Bursa (C)*. sp. of Olsson is larger than *B. (C.) amphitrites*, its lateral varices are slightly offset at the sutures, and it has two large medially placed nodes on the back of its body whorl, a similar more anteriorly placed set, and beaded spiral cordlets.

Bursa (Colubrellina) amphitrites Maury, 1917, has been recognized at a number of middle to late Miocene localities in the Caribbean faunal province. Middle Miocene occurrences include the type area of the Shoal River Formation of northwestern Florida, the Cerado and Gurabo Formations of the Dominican Republic, the Gatun Formation of Panamá and the late Miocene Gavilán Formation of Venezuela (Vokes, 1973). The shell of this species is small with finely beaded spiral sculpture and has about two stronger, more nodose cords. The anterior portion of the inner lip has thick raised lirae. Varices are virtually aligned on the spire whorls but to a varied extent offset on the body whorl (Woodring, 1959).

Bursa (C.) amphitrites has some resemblance to Recent *Bursa (Colubrellina) scrobilator* (Linnaeus, 1758) (= *Murex scrobilator* Linnaeus, 1758) of the Mediterranean and northwest Africa (Vokes, 1973). *Bursa scrobilator,* known as *B. scrobiculata* in some older texts, is sub-littoral and accepts lower water temperatures than most bursids.

Beu proposed in 1988 that the absence of Bursidae from the Tethyan warm-water faunas in which Ranellidae (notably *Sassia*, a cymatiid which is found in the Eocene of France and England) are so diverse, indicates that the Bursidae appeared first in the early Eocene, and probably first appeared in the eastern Pacific during the late early Eocene. The fossil record of *B. (C.) scrobilator* is unknown. With a long veliger stage *B. (C.) amphitrites*, which displays many similar characteristics with *Bursa (C.) scrobilator*, may have crossed the Atlantic eastward from the Caribbean to northwest Africa, on the nutrient rich surface current of the Tethys Sea (Ramsay, 1973).

The early Miocene fauna from the Chipola Formation yields *Bursa (Tutufa) pelouatensis* (Cossmann & Peyrot, 1923) (Figure 8), a species that is larger than *B. (C.) amphitrites* and has more ornate sculpture. The non-aligned varices of *B. (T.) pelouatensis* are similar to those of *Crossata*. Vokes (1973) indicated that this early appearance of non-aligned varices might be a random development and lacking in taxonomic significance. Conversely, these varices may be of greater specific importance. All bursids have varices, and bursid identification is facilitated by descriptions of placement and shape of the varices. *Bursa (T.) pelouatensis* is related to *Bursa (Colubrellina) caelata* Broderip, 1833 [now known as *Bursa (Colubrellina) corrugata corrugata* (Perry, 1811)] and is close to *Bursa (Bursa) rugosa* (Sowerby, 1835) (sometimes known as *Bursa (Bursa) calcipicta* Dall, 1908). *Bursa (T.) pelouatensis* was likened by Vokes (1973) to a common Recent Indo-Pacific bursid species *Tutufa (Tutufa) rubeta* (Linnaeus, 1758). *Tutufa (T.) rubeta* has a taller spire, lirae that extend into the aperture from the outer lip and more ornate sculpture.

Concurrent with the Pleistocene *Crossata californica* is a southern species of bursid, *Gyrineum strongi* Jordan, 1936, from the Mulegé Formation near Mulegé, Baja California Sur, México. There is some resemblance to *C. crossata* but it differs in that it is smaller, less wide, with two lateral varices that are narrower, ornamented with tiny ribs and rows of small tubercles, one spiral row of larger nodes on each whorl, and sutures not very indented. Shell shape as in *Marsupina* Dall, 1904, a subgenus in the bursids, but narrower than most. *G. strongi* is extinct. Beu (2001) has placed this bursid in *Marsupina.*

The western Atlantic analog of Recent *Bursa (Bursa) calcipicta* Dall, 1908, is *Bursa (Bursa) rugosa* (G. B. Sowerby, 1835), which some malacologists consider to be a separate species. *B. calcipicta* (often covered with intritacalx) ranges from Jalisco, México, to Ecuador and the Islas Galápagos (Figure 9). It is in *Bursa* because of the consistent lateral parallel varices. It is small, with a pair of varices on each of five whorls, nearly continuous on the spire, and four large nodules on each varix. An angled anterior canal is observed

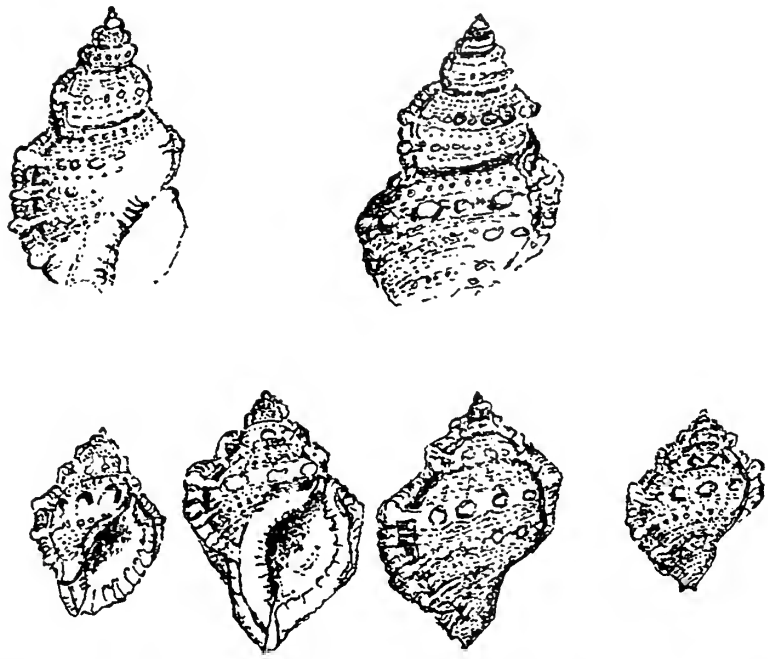
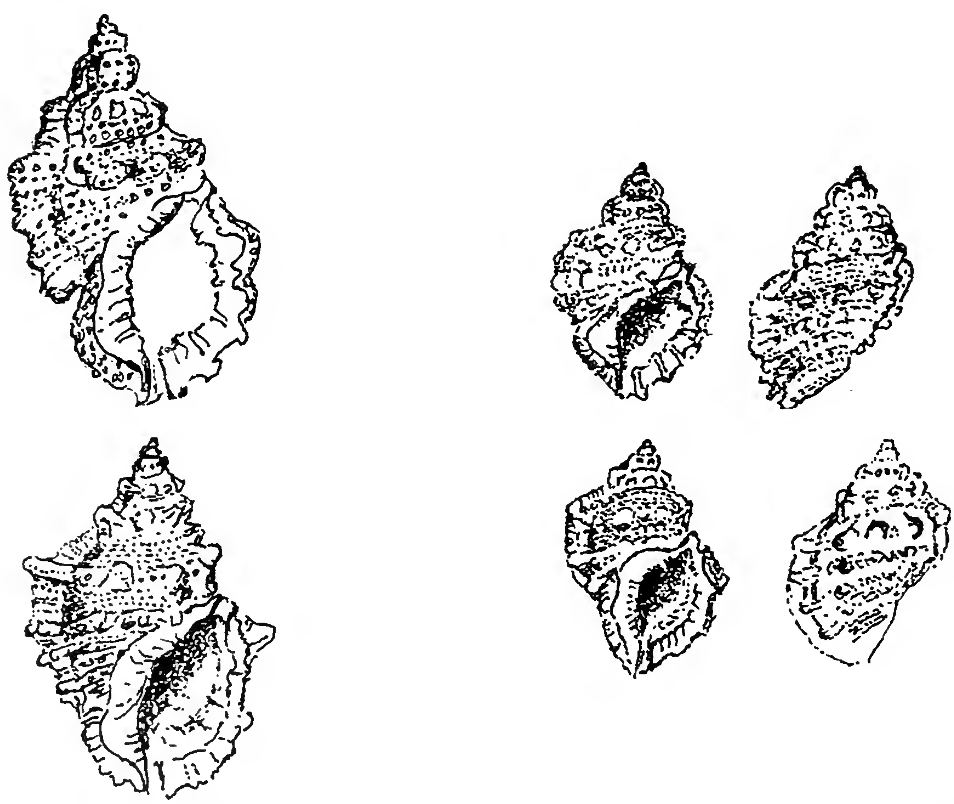


Figure 7. *Bursa amphitrites* Maury, 1917. (top row) Canal Zone, Pacific Panamá, Miocene, Gatun formation (LACMIP 17006), x 1.05. (Bottom row) Pleistocene *Crossata californica*. Playa del Rey, a comparison. Figures 70% of actual size.



Figures 8, 9. (8 top left)) *Bursa pelouatensis* (Cossmann & Peyrot, 1923), after E.H.Vokes (1973, Chipola Formation, Florida, Miocene (1973, fig. 2, USNM 647108). (8 bottom left) Pleistocene *Crossata californica*, Playa del Rey, a comparison.(9 top right) *Bursa calcipicta* Dall, 1908. Recent, México. (9 lower right) Pleistocene *Crossata californica*, Playa del Rey, a comparison. Albi Collection. All figures 70% of actual size.

dorsally, and is similar in shape to some of the small Pleistocene specimens of *Crossata* from Playa del Rey.

Conclusion:

Are morphological traits from ancestral species recognizable in descendant species? The many specimens of *C. californica* from the Pleistocene of Playa del Rey provide an opportunity to check for apparent atavism in the species. Characteristics of three distinct middle Eocene and Miocene species are as follows: 1) *O. domenginica* — large nodes, paired lateral varices on all whorls, and small tubercles 2) *B. (C.) amphitrites* — cords from the varices to whorls, fine spiral tubercles, and node placement 3) *B. (T.) pelouatensis* — large shell and nonaligned varices — may be considered atavistic in *C. californica* specimens (Figures 6a, 7, and 8). The difficulty in deciding which characteristics are most important is apparent in the efforts of Vokes (1973) and Beu (1988). Both thoroughly explored available facets of the ancestry of *Crossata* and *Bursa*. Beu tended to view as most reasonable, an ancestral lineage for *Crossata* that passed through*Olequahia washingtoniana* but Vokes considered *Bursa (C.) amphitrites* a more likely progenitor.

The Oligocene species *O. lorenzana* attains the largest size for the genus. Its large size is suggestive of *Crossata*, but it lacks varices, and a Miocene descendant is not known. A ranellid from the Imperial Formation of late Miocene to early Pliocene age in Imperial County, California, tentatively referred to *Charonia* sp., is large and flattened, has nodes and disconnected varices, and may be derived from the Tethyan fauna (Figure 10).

Though Willett (1937) stated all Pleistocene fossils from Playa del Rey were exactly the same as their Recent counterparts, variations are apparent. These *C. californica* are polymorphic with respect to strength of nodes, whorl profile, strength of lirae about the aperture and varix placement; all of these corroborate their Pleistocene diversity.

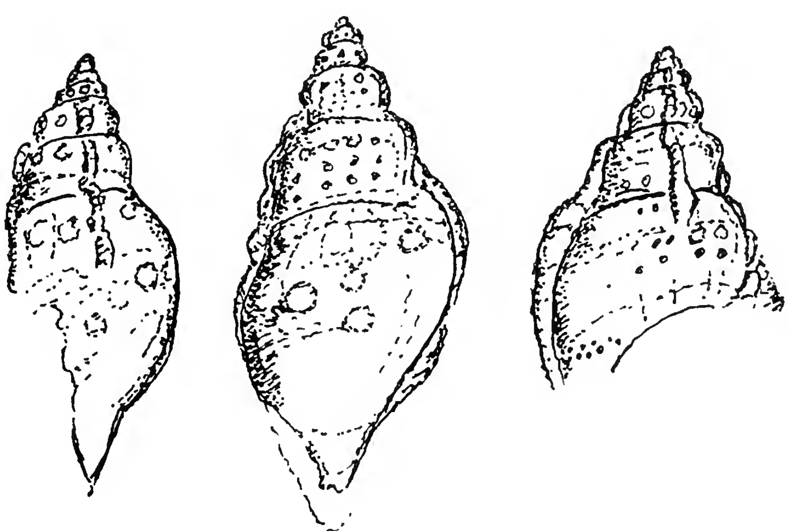


Figure 10. Ranellid, possibly *Charonia* sp. Imperial Formation, Imperial County, California, late Miocene. Figures 70% of actual size. June Maxwell Collection.

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THE 35th ANNUAL WESTERN SOCIETY OF MALACOLOGISTS CONFERENCE

During July 20-24, 2002, the 35th annual Western Society of Malacologists Conference will return to the Asilomar Conference Center on the Monterey Peninsula, California, USA, as in years past. It is a pleasant 3-minute walk to rocky and sandy shores and each dawn will offer a negative 0.3-m low tide there! Cal State University Hayward and San Francisco Bay Wildlife Society are hosting the conference.

WSM conferences feature molluscan ecology, behavior, physiology, genetics, systematics, paleontology, and close-up/underwater photography. This will be one of only two North American, international molluscan meetings for 2002 (following the Vienna Conference during 2001), with the American Malacological Society (AMS) in the midwest this year.

Dr. Cynthia Trowbridge (trowbric@ucs.orst.edu) has organized a symposium on community and population ecology of mollusks for this meeting. There are many exciting ecological topics being investigated by west-coast researchers. This ecology symposium will include talks on consumer-prey interactions, interspecific competition, recruitment, larval biology, environmental stress topics, and invasion ecology.

Other molluscan symposia are also planned — on Biogeography and Photographic Documentation or Paleontology.

At Asilomar, only rooms with meals will be available, or participants can arrange on their own to stay off site. An evening is planned at the Monterey Bay Aquarium, hosted largely by them. Members registered for the whole conference receive free Aquarium admission to the Monterey Bay Aquarium.

For those interested in presenting a paper, a 250-word abstract will be due by April 10, 2002.

For further information, contact either Treasurer Cynthia D. Trowbridge" <trowbric@onid.orst.edu> or, WSM President Chris Kitting <ckitting@csuhayward.edu>

SIXTH ANNUAL SCUM MEETING

The sixth annual meeting of the Southern California Unified Malacologists (SCUM) was held on 26 January 2002 at the Santa Barbara Museum of Natural History. The meeting began at 10:00 a.m. and early arrivals enjoyed coffee/tea with Danish pastry, bagels and other goodies. There were 29 in attendance from as far away as San Diego and San Luis Obispo.

Eric Hochberg opened the meeting by welcoming the attendees and he co-hosted the remainder of the meeting with Henry Chaney and Paul Valentich Scott. The format of the meeting was more formal than previous SCUM meetings with the morning featuring a pre-set program of speakers and topics, each limited to ten minutes.

Jeff Goddard spoke on the different kinds of development in opisthobranchs and the various proportions of those types of development in various parts of the world. His data indicated a dependency based on whether the animals were on the eastern or western boundaries of the oceans and on the strength of the local currents.

Doug Eernissee gave an overview of his work on chitons during the past year starting with a worldwide conference he attended in Sicily. He showed slides of remarkable chiton fossils recently discovered and discussed his web site and his work on relationships within chitons. His use of 16S and DNA analysis shows closer agreement to Sirenko's work than that of Kass & Van Belle.

Daniel Geiger talked of his travels to the South Pacific and Australia. Now that he has finished his monograph on the *Haliotis*, he has turned his attention to the Scissurellidae. He has a large number of unnamed species that require work and he will probably do a monograph of Australian scissurellids before doing a monograph of worldwide scissurellids. After that his plans are to start working on limpets and fissurellids. He is also starting to do histological studies of the scissurellid species.

Jeff Tupen gave a slide presentation on his on-going project on prey selection in *Rumina decollata*. This is a continuation of his efforts to protect the endangered species *Helminthoglypta walkeriana*. The new experiment is being conducted in a controlled container with approximately 30 specimens of *Rumina* and approximately the same number of specimens of two other snail species of differing size, one of which normally stays on ground level and the other which usually climbs on plants. All were being eaten by the *Rumina*, with the larger specimens of the climbing species (which climbed up the sides of the container) having more success in surviving.

Kelvin Barwick discussed and showed slides of new and unusual mollusks from deep water off San Diego found as part of his work with the city of San Diego's ocean monitoring program. These consisted of an unnamed *Mysella*, an *Akera* species (none previously found in the easterm Pacific) and two naticids, one a Panamic species. The second species came with an interesting story. Michael Hollmann, a specialist in naticids currently living in Germany, had seen the shell when he was in San Diego at a San Diego Shell Club meeting but couldn't identify it. He later sent Kelvin a photograph he'd taken of a specimen from the United States National Museum, Smithsonian Institution (USNM) which he thought might be the species and which had a Dall manuscript name, *Euspira laxus*. Michael had also photographed a card that Jim McLean had written which had been placed with the shell. This caused Jim, who was at the meeting, to recall that he thought he had specimens at the Natural History Museum of Los Angeles County, California (LACM) which had been tentatively identified. Correspondence since the meeting continues on what may be another Panamic species.

Paul Valentich Scott gave a slide presentation on his recent visit to Hong Kong and the bivalve project he was engaged in there. The bivalves he was collecting and studying live in burrows of echiuran worms. The burrows each contained 1 to 3 specimens of the bivalve, *Pseudopythina ochetoastomae*. He showed photographs of the worms, burrows and bivalves.

Don Cadien gave a brief summary on the monitoring projects of the Los Angeles County Sanitation District. He mentioned the great quantities of material which can be available through these long term monitoring projects.

Phil Liff-Grieff talked of remnant populations of Hawaiian landsnails. He had recently been to Oahu and showed slides of an area north of Honolulu where he had hiked and photographed the habitats of some landsnail populations. He also brought to the meeting a display of some Hawaiian landsnails.

Eric Hochberg talked of a project that he and Mike Sweeney, of the USNM, have been working on. They have been visiting various institutions to study preserved octopus species collected from México to Panamá. They have found approximately 22 species, three of which appear to be unnamed. He showed photographs of many of the species.

After this, the group broke for a marvelous lunch provided by our hosts. This consisted of an assortment of sandwiches, salad, pasta, cookies, and drinks. We gathered around large tables either inside or outside in a separate area of the Museum, in beautiful surroundings. This gave all the attendees time to socialize and discuss various aspects of the projects presented in the morning session directly with the individual investigators. This is always one of the highlights of the SCUM meetings.

We reconvened after lunch for a brief session during which other attendees could give brief reviews of what they had been doing during the past year.

Jim McLean discussed his new status at LACM and the funding he has recently received for finishing his book(s) on the gastropods from the Arctic to Magdalena Bay, Mexico. He has gotten equipment and help so that it really looks like the project can be completed. Ángel Valdés, the new curator of marine invertebrates at LACM, gave an overview of the many opisthobranch projects that he is working on and the new funding he has been able to obtain. Carole Hertz discussed the new supplements that are being published by *The Festivus*, a publication of The San Diego Shell Club. She also had a display of recent supplements, the latest being, "The Recent Molluscan Marine Fauna of Isla de Malpelo, Colombia" by Kaiser and Bryce.

This concluded the regular SCUM meeting and attendees were invited to visit the Dept. of Invertebrate Zoology and view and utilize the collections. The meetings seem to improve each year and I urge people to attend next year's meeting which will most likely be held in January 2003 in San Pedro or San Diego.

Jules Hertz

IN MEMORIAM

DONALD ROBERT SHASKY
1925 - 2002

HELEN JOYCE HOKE VOSO
1920 - 2002

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E-mail: cmhertz@pacbell.net *Website at: http://www.users.cts.com/crash/t/tarnold/SDSC/index.html*

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

COME TO THE AUCTION/POTLUCK!

Saturday evening, April 20th
5:00 - ? p.m.

There will be no regular meeting this month.
See map with instructions included with this issue.

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CLUB NEWS

Minutes of the March 21st Meeting of the San Diego Shell Club

President Jules Hertz opened the evening's meeting by welcoming everyone. He called for the approval of the Minutes of the February meeting as published in *The Festivus*. In the absence of Linda Hutsell, there was no treasurer's report. Terry Arnold mentioned that Monika Forner will be the speaker in May and Carole Hertz discussed the upcoming auction. The signup sheet for the potluck dinner was passed around. It is not too late to make a donation. Don't miss this great event!

Jules said that Terry was the chair for the recent Science Fair. A 12th grade girl was the winner of our prize.

Terry then introduced our speaker, Steve Drogin, a long-time San Diego resident, diver, and underwater photographer. Many of the photos in Steve's presentation were published in a recent issue of *Nature's Best* magazine.

He began his presentation with a question for the audience, "Where are the two Christmas Islands of the world located?"—and offered a shell prize to the one who knew the answer. John LaGrange knew the answer immediately and won a miter shell.

Steve then took us on a whirlwind tour highlighting some of the fantastic places he has traveled to including Midway Isand, Antarctica, Sardinia, the Marquesas, and Tuvalu to name a few. He mentioned that cuttlefish are among the most intelligent sea creatures. Also, the numbers of great white sharks off Guadalupe Island are growing. His favorite place is the Marquesas. It is remote but he saw octopuses everywhere. His talk and photography were enjoyed by all.

The drawing winner was John Bishop. Thanks to Margaret and Dave Mulliner and Silvana Vollero for the evening's refreshments. The meeting was adjourned at 8:40 p.m.

Silvana Vollero

The Auction/Potluck!!

The Auction/Potluck will again be at Wes Farmer's Clubhouse [see map included with this issue]. The festivities will be on Saturday evening April 20th, beginning at 5 p.m. with "Dave's Punch" and soft drinks while members browse the auction table and silent auction.

Dinner will be at 6 p.m. and the auction will begin promptly at 7 p.m [This year the Dollar Table will be open from dinner time to the close of the Silent Auction, giving members more time to leisurely search the good buys on that table.]

And if you have a donation(s), it is not too late. Just contact Carole Hertz at 858-277-6259 or e-mail her at: cmhertz@pacbell.net and arrange for pickup of any donations.

This is the Club's biggest social event of the year. Don't miss it!!

The 48th Annual Greater San Diego Science and Engineering Fair

For its 30th consecutive year, the Club has participated in the Science Fair. The Club's three judges, Terry Arnold (Chair) and Carole and Jules Hertz selected a Club award winner in Riza Laraya, a twelfth grader at Mt. Miguel High School whose project in the senior zoology category concerned "The Role of Odors in the Shell Selection of *Pagurus samuelis.*"

Riza also won a first place in the senior zoology division and received the Sea World award.

Of the three book choices offered by the Club, Riza has selected Ricketts, Calvin & Hedgpeth's *Between Pacific Tides*. She will attend the May meeting at which time she will present an overview of her project to the membership and will receive her Club award.

Additions and Changes to the Roster

Too late for the roster

Mogollón Avila, Valentín, Roma 340, Lima 18, Perú. E-mail: svmogollon@yahoo.com

New Member

William J. Ritter, 1005 Exchange Apt. 13, Astoria, OR 97103-0900. E-mail: bulwinkl@pacifier.com

Change of address

Linda Hutsell, lhutsell@ix.netcom.com (new e-mail)

Marilyn Northrop, 1528 Education Court, Lehigh Acres, FL 33971

KODIAK — ALASKA'S EMERALD ISLAND

RICHARD HERRMANN

12545 Mustang Drive, Poway, California 92064, USA
E-mail: rbherrmann@aol.com

At 3,588 square miles, Alaska's Kodiak Island is the second largest island in the United States. Situated in the Gulf of Alaska, 250 miles southwest of Anchorage, Kodiak Island, with only 14,000 residents, is home to Alaska's largest commercial fishing fleet and is the base for the nation's largest Coast Guard Station. Because of Kodiak's irregular shape with many bays and inlets, the total length of its coastline exceeds that of both coasts of the continental United States combined. Most travel is by floatplane, but the traveler interested in viewing marine life and natural beauty need not leave the 40-mile road system that extends from the city of Kodiak.

Figure 1. Kodiak Harbor, Kodiak Island, Alaska.

Surrounded by natural beauty, the city of Kodiak is a small town tucked away in America's last frontier (Figure 1). Kodiak's population of huge brown bears, or grizzlies, is the most dense in the world and the size of these animals is greater here than in any other area. In contrast with the declining fish stocks of the Pacific Northwest, imagine a place where even the smallest tributaries and creeks are loaded with salmon during the spawning season.

I went to Kodiak during two consecutive summers, 1999 and 2000, the first with Ron McPeak, a noted marine biologist and author, collecting marine biological specimens for a large pharmaceutical firm, and the second strictly for photography. As a result of the second trip, a photo essay "At Water's Edge" was published in Alaska Airlines Magazine (Nov. 2000).

The topography of the bays of Kodiak Island varies from very rocky to coarse gravel and sand and the tidal changes can be extreme in some areas. The highest diversity of marine life, however, is found on the open coast. Wherever there is fresh water from streams and tributaries, the diversity is diminished. Generally invertebrates such as sea stars and nudibranchs (Figures 2, 3) were larger here than their counterparts on the central and southern coast of California. While we were at Kodiak, Ron and I collected more than 230 different species of invertebrates. We were both surprised to observe that while the invertebrate diversity was high, the diversity of fishes was low.

Intertidally the most common gastropods were *Nucella lamellosa* (Gmelin, 1791) and *Fusitriton oregonensis* (Redfield, 1848). The *Nucella lamellosa* (Figure 4) were found in the high rocky intertidal zone and the *Fusitriton oregonensis* (Figure 5) seen from the lowest intertidal zone down to 100 feet. We found aggregations of many individuals of *F. oregonensis* with eggs subtidally. Less common in the intertidal zone was *Searlesia dira* (Reeve, 1846).

Diving beneath Kodiak's cold waters (in the summer) reveals a wide range of colorful invertebrates and fishes. However, the sea temperatures are not much colder than San Diego's are in winter! A popular misconception would have Kodiak under ice and snow for much of the year, but the climate is actually mild for this part of the world. For diving here, however, a dry suit is a necessity, especially for longer immersions. Having dry suits enabled Ron and me to make two 50-60 minute back-to-back dives a day in water temperatures that varied between 48-52°F. In the winter, though, a diver would be facing temperatures low enough that ice crystals would begin to form on the sea surface.

Most noticeable diving here is that there are large kelp forests composed of bull kelp *(Nereocystis)*. In the forests are schools of black rockfish (*Sebastes*), numerous species of gelatinous zooplankton, and the bane of commercial fishermen, the lion's mane jelly (*Cyanea*) with its very long stinging tentacles. Within that forest we found *Calliostoma ligatum* (Gould, 1849) (Figure 6) and we saw many beautiful nudibranch species, some examples extremely large. In these protected subtidal zones we found some *Janolus fuscus* O'Donoghue, 1924 (Figure 7) and *Archidorus montereyensis* (Cooper, 1863) (Figure 2). In open waters we saw the very large *Tochuina tetraquetra* (Pallas, 1788) (Figure 3) among other colorful invertebrates.

Although we worked hard, the long daylight hours allowed us recreation time. In Kodiak the fishing was spectacular, we hooked and released up to fifty salmon a day in some streams. We photographed and did sightseeing. We visited the Kodiak Fisheries Research Center which maintains an aquarium open to the public, we saw gun emplacements from World War II at Fort Abercrombie, and watched salmon spawn at Lake Rose Tead, a shallow lake within a stunning setting. Kodiak has good facilities for tourism like restaurants and hotels but for those who wish to go to remote areas for bear viewing or fishing, it is easy to get there by floatplane.

I love Kodiak Island for the diversity of photographic opportunities it offers -- spawning salmon, excellent tidepool areas and some wonderfully rich areas to dive.

THE FESTIVUS ANNOUNCES A NEW SUPPLEMENT

Carol Skoglund's *Panamic Province Molluscan Literature. Additions and Changes from 1971 through 2001. III Gastropoda* has just been published and is now available for purchase. This almost 300-page work has an 11-page Table of Contents, a 28-page Literature Cited and a 28-page Index.

The supplement, an update to Keen's 1971 opus, *Sea Shells of Tropical West America,* includes the information in Skoglund's 1991 and 1992 revisions and its purpose "is to draw together as many of these [new] citations as possible for easy reference at the species level." Records of occurrences in the major offshore islands and information on deep water hydrothermal vents and seeps are also included. The book costs $35 (domestic, postpaid) and $50 (overseas airmail, postpaid).

To order, make your check (on a US bank) payable to The San Diego Shell Club and send it to:

The San Diego Shell Club
c/o 3883 Mt. Blackburn Ave.
San Diego, CA 92111, USA.

Orders will be sent as soon as payment is received.

Figures 2-7. (2) Archidoris montereyensis found subtidally in 30 ft under a floatplane dock at Kodiak Harbor. (3) Tochuina tetraquetra found on Outer Humpback Rock, off the city of Kodiak in 25 ft, also found in 10 to 80 ft of water in this area. [Possibly the largest nudibranch on the west coast of North America.] (4) *Nucella lamellosa* found in the rocky high to mid intertidal zones at Kalsin Bay. (5) *Fusitriton oregonensis*, found on rocks in the lowest intertidal zone near the main floatplane docks at Kodiak Harbor. They were also seen down to 100 ft in many areas off Kodiak Island. (6) *Calliostoma ligatum* found at Humpback Rock. (7) *Janolus fuscus* found in the protected subtidal zone.

OCTOPUSES IN SHELLS

ROLAND C. ANDERSON

The Seattle Aquarium
1483 Alaskan Way, Seattle, WA 98101-2059, USA.
E-mail: roland.anderson@ci.seattle.wa.us

Humans have known for millenia that octopuses refuge in dens and have taken advantage of that fact. Cousteau and Diolé (1973) report that Egyptians 4000 years ago fished for octopuses using artificial dens (clay pots). They lowered the jars on strings, then drew them up after a period of time to harvest the octopuses that had taken refuge in them (Figure 1).

In the wild, octopuses naturally make their dens in a variety of places. They are very adaptable. Dens have been found in rock crevices or holes in rocks (Lane, 1957; Cousteau & Diolé, 1973; Haaker, 1985; Norman, 2000), in shells (Mather, 1982; Voight, 1988), in kelp holdfasts (Lang, 1997) and even in self-constructed holes in sand or mud (Hanlon & Messenger, 1996). In addition, being adaptable, intelligent animals, they have made dens in unusual places, such as ancient wine amphorae (Cousteau & Diolé, 1973), beer bottles (Voight, 1988; Anderson, et al., 1999), and even cast-off shoes (Anderson, 1994). But small, shallow-water octopuses seem to have a penchant for living in empty mollusk shells. For example, many shell collectors and malacologists have had to evict an octopus before taking home a prize shell found on the seashore or while diving (Carol Skoglund, pers. comm.). When given a choice the Atlantic pygmy octopus, *Octopus joubini* Robson, 1929, much preferred to live in gastropod shells over bivalve shells, but the gastropod shells were limited at the study site and bivalve shells weren't, so they made do with the clam shells (Mather, 1982).

Some years ago, while studying *Humilaria kennerleyi* (Reeve, 1863), I had occasion to collect some live specimens and take them back to the Seattle Aquarium (Anderson, 1985). These were collected by scuba diving 10-20 m deep near Three Tree Point, some 20 km south of Seattle (Washington State). While *H. kennerleyi* are normally found buried in shallow gravel and sand, many live clams were found lying on top of the substrate, having been dug up by sea stars who were

Figure 1. An old clay octopus pot from Greece, ca. 2000 years old. Photo: Tim Carpenter, the Seattle Aquarium.

then unable to open this thick-shelled clam (Anderson, 1985). While diving, we judged whether a clam sitting on the gravel was alive or not by attempting to pull the valves apart. Confidant that we had live clams, we transferred them to holding facilities of the Seattle Aquarium. On examining the clams the next day I was surprised to find that five of 12 were inhabited by octopuses, four red octopus, *Octopus rubescens* Berry, 1953, and one giant Pacific octopus, *Enteroctopus dofleini* (Wülker, 1910). They had been holding the shells tightly shut with their "suckered" arms.

More recently, I found a 15 g *E. dofleini* under a rock at low tide along the Strait of Juan de Fuca (Washington State), and after taking it back to the Aquarium, I offered it a variety of possible den sites. I gave it shells of the Oregon triton, *Fusitriton oregonensis* (Redfield, 1848), Lewis' moon snail, *Polinices lewisii* (Gould, 1847), the butter clam,


Figures 2, 3. (2) A small (15 g) giant Pacific octopus, *Enteroctopus dofleini*, takes refuge in a *Humilaria kennerleyi* shell. Due to the shell's thickness, it may be avoided by clam predators, affording the octopus more protection than in other shells. (3) A small giant Pacific octopus sitting outside its *Humilaria kennerleyi* shell home. Photos: Rob Bingham, the Seattle Aquarium.

Saxidomus gigantea (Deshayes, 1839), Kennerley's venus, *Humilaria kennerleyi*, and two beer bottles — one stubby and one long neck (Anderson, et al., 1999). It chose the *H. kennerleyi* and has remained in this den for more than four months at this writing (Figures 2, 3).

As cephalopods, octopuses are related to the ancient, shelled ammonites and belemnites but lost their shells at least as far back as the Cretaceous Period (Donovan, 1977). It seems ironic to me that since octopuses have given up their heavy, ancestral shells and hence have become faster and more intelligent (O'Dor & Webber, 1986), they still take refuge in shells and their sinewy arms with suckers hold the shells tightly closed, like clam adductor muscles. It is also interesting to think that since *E. dofleini* prey on clams (Hartwick, 1983; Anderson, 1996), it must occasionally encounter a small octopus inside the shell it is attempting to eat. But it may be that there is active choice by small octopuses for *H. kennerleyi*, since it is so difficult to open that even octopuses have difficulty opening them (Anderson, 1985). Large octopuses and other predators may realize this and may avoid attempting to feed on this species, hence affording the small octopuses inside a further measure of protection.

I thank Rob Bingham and Tim Carpenter of the Seattle Aquarium for their excellent photographs and technical support.

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2002 SUMMER & FALL SHELL SHOWS AND MEETINGS

Prepared by Donald Dan, Chairman, COA Awards Committee
E-mail: donaldan@aol.com

Jul. 23-28 Oregon Shell Show, Portland, OR, Oregon Museum of Science & Industry, Portland. Maxine Hale, 347 N.E. 136 Ave., Portland, OR 97230-3308. 503-253-5379.

Jul. 6-7 Jacksonville Shell Show, Jacksonville Beach, FL, Brampton Inn, 1201 N. First Street, Jacksonville Beach. Carol Rishel, 2115 Beach Ave., Atlantic Beach, FL 32233. 904-247-7876. E-mail:rrishel@earthlink.net

Jul. 13-14 Keppel Bay Shell Show, Yeppoon, Queensland, Australia. Jean M. Offord, 277 McDougall St., N. Rockhampton, Qld. 4701, Australia. 7-4928-3509.

Jul. 13-17 Conchologists of America Annual Convention, Sarasota, FL, The Hyatt Hotel, 1000 Boulevard of the Arts. Peggy Williams, PO Box 575, Tallevast, FL 34270. 941-355-2291. E-mail: shellelegant@mindspring.com

Jul. 20-21 Townsville Shell Show, Townsville, Queensland, Australia. Cutharinga Bowls Club on Harold Street, West End. Glenda Rowse, 19 Farrell Street, Kirwan 4814, Qld., Australia. 7- 47 73 28 17.

Jul. 20-24 Western Society of Malacologists Annual Conference, Asilomar Conference Center on Monterey Peninsula, California. Treas. Dr. Cynthia Trowbridge. E-mail: trowbric@onid.orst.edu or Pres. Dr. Chris Kitting. E-mail: ckitting @csuhayward.edu

Aug. 3-7 American Malacological Society, Charleston, S. Carolina, College of Charleston's Lightsey Conference Center. Dr. Robert T. Dillon, Jr., AMS President, Dept. of Biology, College of Charleston. Charleston, SC 29424. 843-953-8087. E-mail: dillonr@cofc.edu

Aug. 16-18 Jersey Cape Shell Show, Stone Harbor, NJ Wetlands Institute, Stone Harbor. Jersey Cape Shell Club, PO Box 124, Stone Harbor, NJ 08247. 609-653-8017.

Sept. 13-15 North Carolina Shell Show, Pine Knoll Shores, NC, North Carolina Aquarium at Pine Knoll Shores. Ann Buddenhagen, 804 Westwood Drive, Raleigh, NC 27607. 919-787-7103. E-mail: pabjetster@aol.com

Sept. 14-15 International Shells & Fossils Bourse, Ottmarsheim, France. Salle Polyvalente, Rue de la Priscine; Michel Rioual, 2 Rue des Vergers, 68490 Ottmarsheim, France. 3-89-26-16-43.

Oct. 4-6 Annual German Shell Fair, Lohr, Germany Klaus Kittel, Sonnenrain 10, D-97859 Wiesthal, Germany. Phone & fax: 6020-2353. E-mail: Klaus kittel@hotmail.com

Oct. 26 British Shell Collectors' Club Shell Show, London, England, Napier Hall, Hyde Place & Vincent Street. Kevin Brown, 12 Grainger Road, Isleworth, Middlesex TW7 6PQ. England. 181-568-8333.

Oct. 26-27 Sea Shell Searchers Shell Show, Lake Jackson, TX, The Lake Jackson Civic Center. Wanda Coker, 332 Banyan, Lake Jackson, Texas 77566. 979-297-0852. E-mail: sdcoker@brazosport.cc.tx.us

Nov. 2-3 Philadelphia Shell Show, Philadelphia, PA, Academy of Natural Sciences, Parkway & 19th Street Al Schilling, 419 Linden Ave. Glenside, PA 19038. 215-886-5807. E-mail: alsch@bellatlantic.net

ISSN 0738-9388

THE FESTIVUS

A publication of the San Diego Shell Club

Volume: XXXIV May 9, 2002 Number: 5

MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club.
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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.

E-mail: cmhertz@pacbell.net *Website at: http://www.users.cts.com/crash/t/tarnold/SDSC/index.html*

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

SOUTH AFRICA -- A TRAVELOGUE

Monika Forner will present this slide program on South Africa including a display of some its fabulous shells. She will show images of some of the overwhelming scenery and exotic fauna and flora. We also will visit Kruger National Park and Blyde River Canyon, travel along the Garden Route from Port Elizabeth to Cape Town, and explore the Cape Peninsula, getting to know at least a small part of this fascinating country.

Also

The Club's Science Fair award winner, Riza Laraya, a twelfth grader at Mt. Miguel High School will present an overview of her winning project "The Role of Odors in the Shell Selection of *Pagurus samuelis.*"

Meeting date: 16 May 2002
Shells of the month: South African shells

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Four species of eastern Pacific Columbellidae (Mollusca) with egg masses covering their shells
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CLUB NEWS

The Auction/Potluck— 2002!!

The almost 50 people, members and guests, began arriving at Wes Farmer's Clubhouse soon after the 5 p.m. starting time. Bill Romer had prepared "Dave's Punch" and had coolers of soft drinks ready, the Hutsells, Hertzes and Monika Forner had set up the shell displays and the party began. There were shells everywhere — the voice auction table, the silent auction tables and the long dollar table. Socializing and browsing of the shell displays made for a busy and exciting time until 6 p.m. when it was the dinner hour. The potluck donations were outstanding — wonderful homemade dishes in abundance. No one went hungry at the auction/ potluck.

The voice auction began at the stroke of seven, with auctioneer Carole Hertz welcoming everyone to the party and explaining the auction rules. It was hard to know where to start - art work, books, a dredge and tools, tapa cloth and an outstanding assortment of specimen quality shells. Special offerings were a framed D'Attilio drawing of *Latiaxis fruticosus,* Roger Steene's book *Coral Seas*, a specimen of *Zoila marginata albanyensis,* a *Zoila venusta roseopunctata,* a *Calliostoma titanium*, a *C. platinum* and a *Cancellaria centrota* to name just a few. The bidding was spirited, often unexpected, and full of fun.

It was a great party — and the Club's genuine gratitude goes to Wes Farmer who has so very generously hosted this affair for the last many years.

The Club greatly appreciates the donations of those who made the auction the success it was. They are: Ed Boyd, Henry Chaney, Jules & Carole Hertz, Kim & Linda Hutsell, John Jackson, Kirstie Kaiser, Paul Kanner, John LaGrange, Larry Lovell, Nola and John Michel, Margaret and Dave Mulliner, Rosemary & Frank Pierce, Don & Jeanne Pisor, Carol Skoglund, Kent Trego, Charlie Waters, Gladys Weber, Ed Womack and Joan Wong (Hanselman Estate).

Additions to the Roster

Lindahl, Marge and Ken, 202 Grand Canal, Balboa Island, CA 92662. 714-675-5858.

Waters, Charles, 2703 Hutchison St., Vista, CA 92084. 760-941-2067.

Tom Rice Announces

Tom Rice announces that the 2002 edition of *A Catalog of Dealers' Prices for Shells: Marine, Land & Freshwater* is now available for $19.50 plus postage ($3 in USA or overseas surface).

He also adds that *Of Sea and Shore* magazine is now 64 pages quarterly. Subscription are $20 US, $25 elsewhere, airmail outside the US is $35 per volume (four issues).

Contact Of Sea and Shore Publications, P.O. Box 219, Port Gamble, WA, USA 98364-0219 or e-mail: ofseashr@sinclair.net

Seventh International Symposium on Littorinid Biology — and Call for Papers

The Seventh International Symposium on Littorinid Biology will be held at the Shoals Marine Laboratory (Cornell University and the University of New Hampshire) from August 23rd to 28th 2002.

"The Isles of Shoals offer a superb unspoiled environment, with sheltered and very exposed rocky shores, and colonies of gulls, herons, egrets, ibis, and terns. Marine mammals observed from the Lab may include humpback whales and Atlantic white-sided dolphins."

The symposium is planned to allow ample time for paper and poster presentations, local excursions, and informal discussion among participants. Please visit http://www.sml.cornell.edu/visit_acad/pv-litbio.htm, where you can learn more about the Shoals Marine Lab, and download the complete "Second Notice and Call for Papers" and a registration form. The deadline for abstracts and registration is June 1, 2002. For further information contact Robin Hadlock Seeley, Cornell University, Symposium organizer and see the website: http://www.sml.cornell.edu/visit_acad/pv-litbio.htm

The Southwestern Malacological Society Announces its Shell Auction

The Southwestern Malacological Society in Phoenix, Arizona, announces a big auction/potluck this summer. The affair will be held on the evening of June 9th, starting at 5 p.m., at the home of Carol Skoglund.

For further information, either e-mail Carol Skoglund at: carolskoglund@msn.com or phone at 602-955-2072.

HYBRIDIZATION IN *EUPROTOMUS* (GASTROPODA, STROMBIDAE): A NEW RECORD

VIRGILIO LIVERANI

via Testi 7, I-48018 Faenza Ra., Italy
E-mail: virliv@tin.it

Abstract: Another possible hybrid between two species of Strombidae (Gastropoda) was recently found in the Philippines. Judging from conchological characters, the parental species are *Euprotomus bulla* (Röding, 1798) and *E. chrysostomus* (Kuroda, 1942).

Introduction

In recent years a number of hybrid specimens of Strombidae have turned up, especially from the western Pacific Ocean. Most of them belong to the genus *Lambis* Röding, 1798, and many were illustrated by Poppe & Groh (1999). The most common hybrid is often sold with the names *Lambis arachnoides* Shikama, 1971, or *L.weelwrighti* Greene, 1978 (see Kronenberg, 1993), and is actually the hybrid *L. truncata* (Humphrey, 1786) x *L. millepeda* Linnaeus, 1758. It generally comes from the Philiippines but was recently found in Vietnam.

Sometimes seen at shell shows are the hybrid *L. crocata* Link, 1807, x *L. scorpius* Linnaeus, 1798, and the hybrid *L. lambis* Linnaeus, 1758, x *L. millepeda*. These also mostly originated from the Philippines. Another possible hybrid that turned up recently has been described as a species, viz. *Lambis cristinae* Bozzetti, 1999 (probably *L. lambis* x *L. scorpio indomaris* Abbott, 1962) from southwest Madagascar .

Among the other genera in Strombidae, *incertae-sedis* specimens are very rare or unknown. In *Euprotomus*, Kronenberg (1999) studied the only two existing specimens of *Strombus hirasei* (Kuroda, 1942) and considers them to be a hybrid of *Euprotomus vomer* (Röding, 1798) *x E. bulla*.

In the spring of 200,1 I bought, from a well known shell dealer, two shells from the Philippines that I consider of hybrid origin between *Euprotomus bulla* and *E. chrysostomus* (Figures 1-4).

Description

General shape as *Euprotomus chrysostomus* but dorsum smoother, with low, rounded spiral cords. Dorsum of a medium chestnut color mottled by hundreds of small, white-cream dots. Interior of lip colored with a rich orange-red, paler on the abapertural border. Columellar callus extended on the spire, cream colored. A pair of light lirae are present in the posterior canal. The siphonal canal is not as erect as the normal 90 degrees of average *E. bulla* specimens.

Discussion

The two shells were among a small lot of typical *E. chrysostomus* and were said to come from Sogod, Cebu, Philippines, collected by tangle nets. I noticed them because of the darker dorsal color in comparison to typical specimens, and the unusual color of the apertural side. The usually coarse spiral sculpture of *E. chrysostomus* is smoother in these two shells, but the dorsum is not as smooth and shiny as in *E. bulla*. The dorsal color seems to have mixed the mottling of *E. chrysostomus* (that is normally a light grey-green color) with the chestnut color of *E. bulla*. The apertural side is even more revealing: the color of the inner lip is more reddish than the pale orange of average *E. chrysostomus* and is a little bi-colored (*E. bulla* is bi-colored white and red whereas *E. chrysostomus* is uniformly colored). The columellar callus is a cream color reminiscent of the white of *E. bulla*, while in typical *E. chrysostomus* it is the same shade as the outer lip. The lirae at the posterior end of the aperture are absent in *E. bulla*, number four to eight in *E. chrysostomus* and number two in the probable hybrid shells. The angle formed by the shell axis and the siphonal canal is intermediate between the 90 degrees of *E. bulla* and the 75-80 degrees of *E. chrysostomus*. With these intermediate characters, it is probable that these two *Euprotomus* specimens are hybrids between *E. chrysostomus* and *E. bulla*.

Remarks

As already noted by Kronenberg (1999), the prime condition for hybridization is that the two parental species are present in the same locality. This is true for *E. bulla* and *E. chrysostomus* in the Philippines, where they probably also share the same habitat, a bit deeper than the habitat of *E. aurisdianae* (Linnaeus, 1758).

In most cases, a hybrid is remarkable because its characters are intermediate between two species. In this case, it is assumed that one of the parental species is either *E. chrysostomus* or *E. aratrum* (Röding, 1798), the only two species that have an orange color in the aperture. However, it is unlikely that *E. aratrum* is involved, as it is absent from the central Philippines and it would have expressed its presence probably with a pale brown spot on the posterior part of columella. The other one of the parental species, could be either *E. bulla* or *E. aurisdianae* because of the bicoloring of the aperture and the reddish color inside the aperture. It is unlikely that it is *E. aurisdianae* because the red of its aperture is not as dark, rather pinkish, and the dorsum of *E. aurisdianae* is about the same color as *E. chrysostomus* and would, therefore, not result in that particular chestnut shade.

Acknowledgments

I would like to thank Mr. Gijs Kronenberg from Eindhoven, the Netherlands, for critically reading a draft of this paper and for valuable suggestions as well for his encouragement to publish this note and I would also like to thank the author of the beautiful images, Mr. Pasquale Fazzini of Forlì, Italy.

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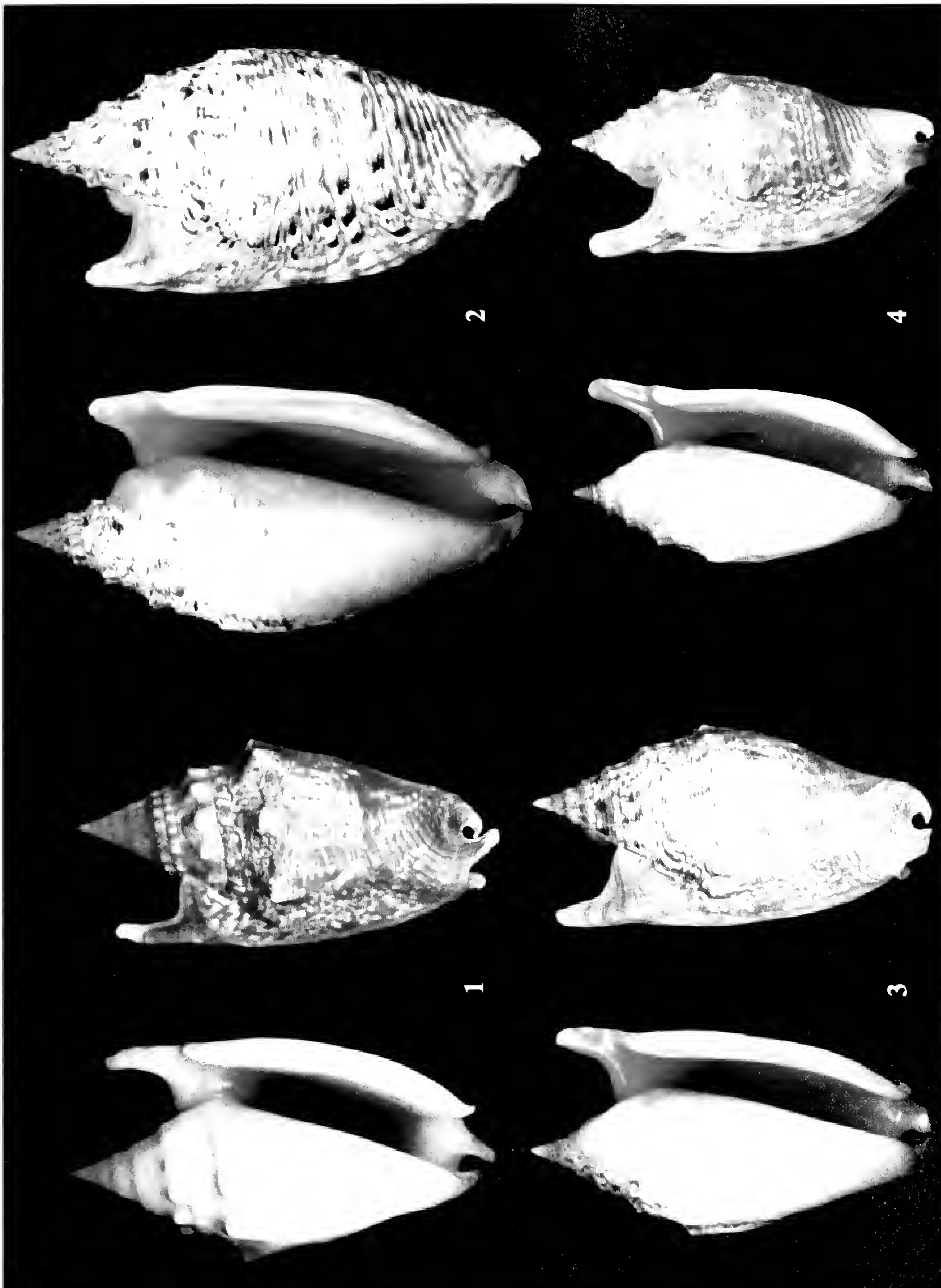


Figures 1-4. (1) *Euprotomus bulla*, 70 mm, 2 views, from Nha Trang, central Vietnam (2) *E. chrysostomus*, 85 mm, two views, from Sogod, Cebu, Philippines (3) Hybrid 1, 74 mm, two views, from Sogod, Cebu, Philippines (4) Hybrid 2, 66 mm, two views, same locality as Hybrid 1.

FOUR SPECIES OF EASTERN PACIFIC COLUMBELLIDAE (MOLLUSCA) WITH EGG MASSES COVERING THEIR SHELLS

CAROLE M. HERTZ[1]

Department of Invertebrate Zoology, Santa Barbara Museum of Natural History,
2559 Puesta del Sol Road, Santa Barbara 931105-2946, USA
E-mail: cmhertz@pacbell.net

KIRSTIE L. KAISER[2]

Department of Invertebrate Zoology, Santa Barbara Museum of Natural History,
2559 Puesta del Sol Road, Santa Barbara 931105-2946, USA
E-mail: KLKaiser@pvnet.com.mx

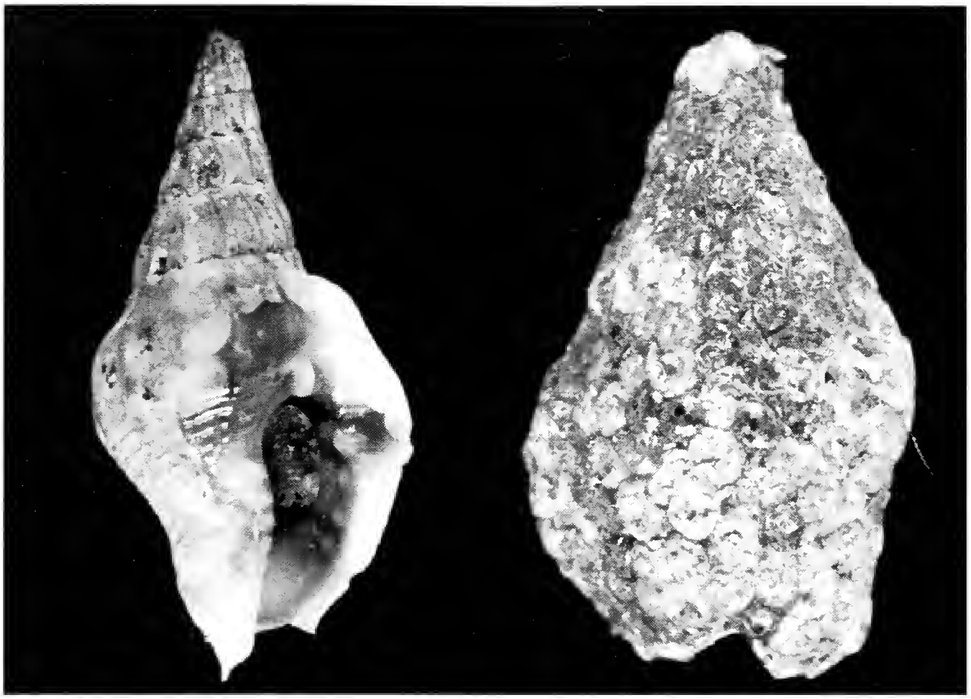
Several researchers have written about species of eastern Pacific Buccinidae which deposit their egg masses on the exterior of adult shells of their own species (Keen, 1971; Gemmell, 1973; and J. Hertz, 2001). The same is true for the Columbellidae. Jung (1989:fig. 82) figured a specimen of *Strombina (S.) lanceolata* (G.B. Sowerby I, 1832) from the Islas Galápagos, Ecuador, encrusted with egg capsules, and Fortunato et al. (1998) did an extensive report in regard to this behavior on *Bifurcium bicanaliferum* (Sowerby, 1832) collected in the intertidal zone at Panamá. We witnessed the same phenomenon on specimens of *Bifurcium bicanaliferum* collected from the Golfo de Fonseca, El Salvador, and in dredged material of 20 specimens of *B. bicanaliferum* in 6-11 m off Playa Jolotemba, Nayarit, México on 15 February 1999.

Reported here are four additional species of eastern Pacific Columbellidae which we have found to exhibit the same behavior: *Sincola (Sinuina) sinuata* (Sowerby, 1875); *Cosmioconcha palmeri* (Dall, 1913); *C. modesta* (Powys, 1835) and *Mazatlania fulgurata* (Philippi, 1846).

Three of the species figured herein were collected by Kaiser during a 16-day Smithsonian Tropical Research Institute (STRI) Expedition aboard the R/V *Urracá* to El Salvador. In working together on sorting and identifying material from the Expedition, specimens of *Sincola (S.) sinuata* (Figures 1, 2), *Cosmioconcha palmeri* (Figures 3-5), and *C. modesta* (Figures 6, 7) were found with compact egg masses attached to the exterior of living adult shells.

Sincola (S.) sinuata were collected at Metalio, Departamento Sonsonate, El Salvador (13°34.86'N, 89°54.16'W to 13°36.20'N, 89°53.56'W) by trawling from the R/V *Urracá* in 21-26 m in mud on 7 March 2001. Ten specimens were found. Most individuals had successive egg mass layers deposited in clusters which completely covered the shell except for the aperture and the opening of the siphonal canal. The transparent, fawn-colored egg capsules are connected by a continuous basal membrane which gives them the "mass" appearance. Each unhatched egg capsule (1.2 mm diameter) contained about 25 gray to white

[1]Mailing address: 3883 Mt. Blackburn Ave., San Diego, CA 92111, USA.
[2]Mailing address: Paseo de las Conchas Chinas #115, Depto. 4, Fracc. Conchas Chinas, Puerto Vallarta, Jalisco, C.P. 48390, México.



Figures 1, 2. *Sincola (S.) sinuata* (Sowerby, 1875), 17.3 mm, (1) apertural view of egg-encrusted specimen (2) dorsal view of same specimen covered by egg mass. Trawled from the R/V *Urracá* in 7 to 9.5 m in mud off the Golfo de Fonseca, El Salvador (13°12.89'N, 87°51.29'W to 13°13.74'N, 87°49.81'W) on 17 March 2001. Leg. K.L. Kaiser (Kaiser Coll.). Photos: D.K. Mulliner.

semispherical eggs, some with embryos developed to the hatching stage.

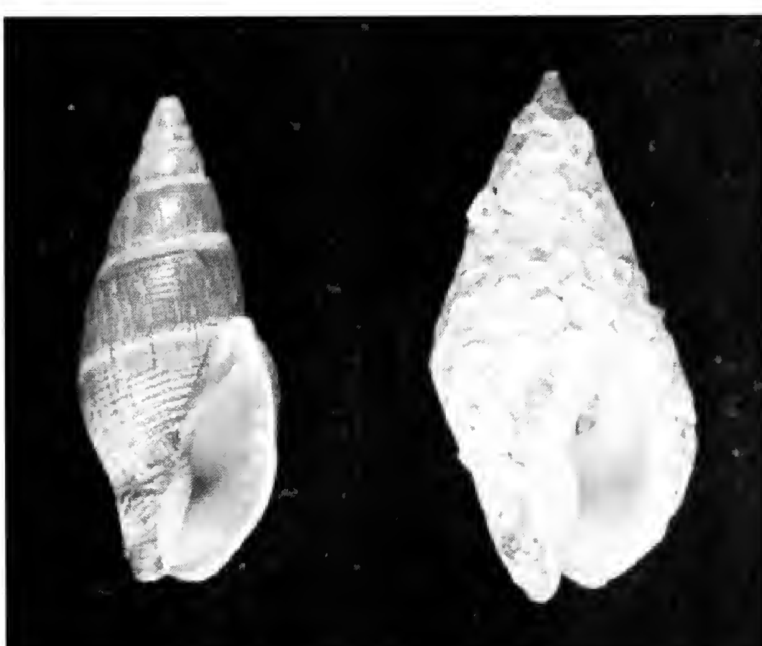
Four lots containing a total of sixty-four specimens of *Cosmioconcha palmeri* were trawled in 20 to 52 m off the El Salvador coast. On those individuals covered with egg masses, each unhatched, transparent egg capsule had approximately 40 tan, flattened, near round eggs in various stages of development. A central, nearly circular exit hole was observed in those egg capsules from which the veligers had previously hatched. This species has a distribution from the Golfo de California, México, to Manabí Province, Perú.

Three lots with a total of 14 individuals of *Cosmioconcha modesta* were collected from the intertidal to 30 m in mud. Four of the individuals were collected live with egg masses. An egg capsule of 1.4 mm contains approximately 33 embryos. This species differs from *C. palmeri* by having a more slender outline and fine spiral lines are evident on all but the early teleoconch whorls and the protoconch. The coloring is a rich brown, shading to white on the spire with a white spiral band below the suture and on the middle part of the body whorl. El Salvador is the northern limit of distribution of this species.

Mazatlania fulgurata (Figure 8) with egg encrusted shells were collected by Jules and Carole Hertz at two different localities. Many live individuals were found at Platanitos, Nayarit, México, in the intertidal zone. They were both on and among turnable rocks and at the edge of the waterline, emerging from the sand at a 0.33 m low tide on 16 February 1999. These specimens differ in that the egg capsules are not connected by a membrane as in the three species mentioned above. A single capsule showed approximately 30 rounded, whitish eggs per unhatched capsule. Other specimens of *M. fulgurata* with egg capsules on the exterior of the shells were collected at Playa Jacó, Puntarenas, Costa Rica, in the intertidal zone in sand at low tide from 26-30 March 1986. The egg cases in the lot from Costa Rica had dried to the point that it was impossible to count the eggs. Penchaszadeh et al. (1983) discussed similar egg laying behavior in *Mazatlania aciculata* (Lamarck, 1822) along the Venezuelan coast.

In studies of reproduction in western Atlantic columbellids, Cipriani & Penchaszadeh (1993) have observed the same egg laying behavior in two Venezuelan species of *Strombina,* describing the spawn of *Strombina pumilio* (Reeve, 1859) and *S. francesae* (J. Gibson-Smith *in* J. Gibson-Smith & W. Gibson-Smith,

Figures 3-5. *Cosmioconcha palmeri* (Dall, 1913), (3) apertural view of 27.4 mm shell without egg capsules (4) dorsal view of 25.6 mm shell covered by the egg mass, leg. K.L. Kaiser. Photos: D.K. Mulliner. (5) apertural view of 26 mm specimen with egg mass. Trawled from the R/V *Urracá* in 40 m, in mud at Costa Azul, Departamento Sonsonate, El Salvador (13°33.25'N, 89°57.83'W to 13°32.28'N, 89°55.82'W) on 21 March 2001. Leg. K.L. Kaiser (Kaiser Coll.). Photos: K.L. Kaiser.



Figures 6,7. *Cosmioconcha modesta* (Powys, 1835), (6) apertural view of 19.3 mm specimen without egg capsules, (7) apertural view of 21.2 mm specimen covered by egg mass. All trawled from the R/V *Urracá* in 12 to 14 m of mud in Golfo de Fonseca, El Salvador (13°09.99'N, 87°50.75'W to 13°11.01'N, 87°49.56'W) on 17 March 2001. Leg. K.L. Kaiser (Kaiser Coll.).

Figure 8. *Mazatlania fulgurata* (Philippi, 1846), 11.1 mm, apertural view of specimen with egg capsules. Platanitos, Nayarit, México, intertidal zone, 16 February 1999. Leg. K.L.Kaiser (Kaiser Coll.). Photo: K.L. Kaiser.

1974). Their paper lists additional researchers on columbellid spawning.

To date it appears that no one has witnessed the actual egg-laying strategy of these species of Columbellidae. Do the individuals lay their eggs on their own shells or on those of other members of the same species — an intriguing question.

ACKNOWLEDGMENTS

We would like to acknowledge D. Ross Robertson of STRI (Smithsonian Institution Johnson Fund grant no. 610 49210000), the captain and crew of the R/V *Urracá*, and the Ministerio de Medio Ambiente y Recursos Naturales of El Salvador. Our thanks to Carol Skoglund for help with species identifications and to David K. Mulliner for photographing two of the species.

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E-mail: cmhertz@pacbell.net *Website at:*
http://www.users.cts.com/crash/t/tarnold/SDSC/index.html

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

PROGRAM

THE LA JOLLA UNDERWATER PARK — UNDERWATER

Meeting will start promptly at 7:30 p.m.

Judith Garfield will be the speaker for the evening. Judith is a San Diego based author and illustrator who has published two illustrated books on the La Jolla Underwater Park.

Also
A mini-auction of books

Meeting date: 20 June 2002
Shells of the month: local shells

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting May 16, 2002

President Jules Hertz opened the meeting at 8:45 p.m. The minutes of the March meeting were accepted as published in *The Festivus* and the treasurer's report by Linda Hutsell assured members that the Club was solvent. Linda then showed the members two new books ready for circulation in the Club library, the *Monograph of the Living Zoila* by Lorenz and the new *Oliva Shells, the Genus Oliva and the Species Problem* by Tursch & Greifeneder. Also, she announced that COA membership flyers were available. Vice President Terry Arnold announced upcoming speakers and Jules Hertz told that the September party will be held at the Mulliner's home and will be a luau.

Terry Arnold then introduced the Club's Science Fair winner, Riza Laraya, a senior at Mt. Miguel High School. Her winning project, "The Role of Odors in the Shell Selection of *Pagurus samuelis*" also won the Sea World award and a first place in the Senior Zoology division. She will go on to UCLA to present her project at the next level.

Riza gave an overview of her project, and was presented with her choice of book award (*Between Pacific Tides* by Ricketts, Calvin & Hedgpeth) by Carole Hertz, a member of the judging team along with Terry Arnold and Jules Hertz.

Terry then introduced the speaker for the evening, member Monika Forner, who gave the audience an extensive slide tour of South Africa from the north on the Atlantic coast, round the Cape to the north on the Indian Ocean coast, including a trip through Kruger National Park. Monika had many slides of animals, plants and vistas in this beautiful country. Her shots of Weaver Bird nests, rarely seen animals and expanses of coastline from the sandy shores to the wave-washed rocky beaches were exquisite. Monika also brought in a display of lovely South African shells to accompany her program.

Following the program, the shell drawing was won by Terry Arnold. The meeting was adjourned at 9:15 p.m., affording members time for socializing and enjoying the refreshments provided by Nancy Schneider, the Hutsells and Terry Arnold.

Additions and Changes to the Roster

Too late for the roster

Deems, Ron, 1768 Hermes, San Diego, CA 92154-2814. 619-424-3750.

New Members

Howard, Margaret, 4603 Shoalwood Avenue, Austin, TX 78756-2918. 512-453-4348.

Sunderland, Walter A., 7610 NE Earlwood Road, Newberg, OR 97132. 503-625-6840. E-mail: wallens@earthlink.net

Changes of address

Burch, Beatrice & Tom, 3599 Sylvan Pines Circle, Bremerton, WA 98310-6841.

Jordan, Scott, 1528 La Riata Drive, La Habra Heights, CA 90631.

IN MEMORIAM

HELEN DUSHANE
1907 - 2002

AN INTERVIEW ON OCTOPUSES WITH CECIL A. BROSSEAU (1919-1992)

ROLAND C. ANDERSON

The Seattle Aquarium, 1483 Alaskan Way, Seattle, Washington 98101, USA
roland.anderson@ci.seattle.wa.us

ARTHUR W. MARTIN[1]

Department of Zoology, The University of Washington, Seattle, Washington 98195, USA

INTRODUCTION

ROLAND C. ANDERSON

After cleaning out his office at the University of Washington, the late Dr. Arthur W. Martin gave me a number of references about octopuses, including this interview with Cecil Brosseau, then Director of the Point Defiance Aquarium (Figure 1). The interview is dated 1975. It is hand-typed on thin onion skin paper, probably transcribed from a tape recorder. It is presented here as originally written, with the exception that I have cleaned up some of the typographical errors and I have inserted several editorial comments in brackets.

References in the transcript to the "Narrows" refer to the Tacoma Narrows, a geographical constriction and sill in Puget Sound, a large estuary off the northeastern Pacific Ocean in Washington State (USA). The Point Defiance Aquarium is located near the Narrows. This area has long been known for its abundance of giant Pacific octopuses and was once the site of the world octopus wrestling contest (High, 1963).

Arthur Martin was a Professor in the Department of Zoology at the University of Washington (Figure 2). He specialized in physiology and he was an early expert on the local giant Pacific octopus, *Enteroctopus dofleini* (Wülker, 1910) (Figure 3). He was a member of the faculty of the U.W. for 44 years, from 1937 to 1991, the last 10 as Professor Emeritus. He was chairman of the Department of Zoology from 1951 to 1964. During his latter years at the University he worked with Dr. Ingrith Deyrup-Olsen of the Department of Zoology and collaborated with her on the physiology of the banana slug, *Ariolimax columbianus* (Luchtel, et al., 1984; Martin, et al., 1990).

According to his entry in *American Malacologists* (Abbott, 1987), Martin published more than 130 scientific papers, of which about 50 concerned molluscan physiology. According to the Internet cephalopod reference databases at SIRIS and CephBase, Martin published at least 25 articles on cephalopods, mostly on their physiology. In 1964, he had the honor of having a subspecies of octopus named after him, *Octopus dofleini martini* (Pickford, 1964), although it has since been placed in the genus *Enteroctopus* by

[1] deceased

Hochberg (1998) and the subspecies nomenclature is now rarely used (Norman, 2000). In older literature, the name *Octopus apollyon* was often used in reference to the giant Pacific octopus. Dr. Martin died in 2000 at the age of 89.

I attended the University of Washington and received a degree in zoology there in 1970. Dr. Martin helped teach my physiology class. He delighted in using the giant Pacific octopus as examples, showing how their blue blood (containing haemocyanin as the pigment) lost its color when deoxygenated, or the mechanism of the eversion of their meter-long spermatophores.

When I took over the Invertebrate Department at the Seattle Aquarium in 1982, I grew to know Dr. Martin better. I was in charge of the Aquarium's octopuses and I provided several to him for his research on octopus blood. I remember collecting a fairly large specimen (25 kg) to give to him. He drove to the Aquarium to transport it back to the University in an old Ford pickup truck. We put the octopus in a wash tub and carried it up to his truck together. I asked him how he was going to manage getting the octopus off the truck and into his lab, worried about his age. He replied that it wouldn't be a problem: he would slide it off at the loading dock onto a cart. He was then 80 years old and remarkably fit and sharp.

Cecil A.Brosseau dropped out of school at age 14 and went to work for the Point Defiance Zoo in Tacoma, Washington selling peanuts. At that time there was only a zoo and no aquarium. A year after, in 1936, the Point Defiance Aquarium opened and Brosseau got a job there as an aquarist, working for 25 cents an hour. He became Director in 1941 but shortly afterward, he entered the armed services to serve in World War II. He returned as Director in 1947 and held that position until his retirement in 1974.

He spearheaded and designed the current aquarium exhibit on the North Pacific which opened in 1963. He was the local expert on octopuses during that time period, having observed them in the wild. He captured and kept many at the aquarium where he made observations on them. With John Prescott, longtime Director of the New England Aquarium (Boston, Massachusetts), then at Marineland of California, Brosseau published an informative article on octopus aquarium husbandry and transport methods (Prescott & Brosseau, 1962).

Figure 1. Cecil Brosseau, former director of the Point Defiance Aquarium (Tacoma, WA), with one of his favorite animals, circa 1975. From a postcard contributed by John Rupp, Point Defiance Zoo and Aquarium.

By all accounts, Mr. Brosseau was a quiet, unassuming man who preferred to work behind the scenes and eschewed publicity. He had "an easy-going nature coupled with long working hours" (Corbett, 1979). Former Washington Governor Dr. Dixie Lee Ray, a marine biologist who was director of the Pacific Science Center (Seattle, Washington) in the 1960s said of Brosseau "I think he was a real pioneer in getting

Figure 2 (top). Arthur Martin (right) with his graduate students Doris Stewart and Florence Harrison and NOAA oceanographer Gunter Seckel at the Dole pineapple stand, Wahiawa, Oahu, HI, 1954. Photo by Alan Kohn.
Figure 3 (bottom). A giant Pacific octopus *Enteroctopus dofleini* (Wülker, 1910) at the Seattle Aquarium. This is the largest octopus species in the world and is the species most exhibited by public aquariums. Photo by Rob Bingham, the Seattle Aquarium.

people to realize the importance of marine life. Brosseau had a talent for getting fish and marine mammals to thrive in captivity. Brosseau ran a simple but very good, well-organized marine aquarium, focused on the rich sea life of Puget Sound" (Anon., 1992). Mr. Brosseau died in 1992 at the age of 73.

I feel that publishing this interview is important for several reasons. As a malacologist who studies cephalopod behavior, I know that there are many valuable observations in this interview that should be available for citation. There is much archival information here about *Enteroctopus dofleini* in the northeastern Pacific, specifically in Puget Sound. Brosseau tells us about how they were historically captured by subsistence fishermen and gives us an idea of the abundance and habitat of these octopuses. There are numerous observations on the natural history of the octopus as observed *in situ*, which are rarely documented elsewhere. There are observations on octopus personalities, human recognition, begging behavior, growth, reproduction, collection of animals for aquarium display, shipping and transportation of live animals, and aquarium husbandry, all based on Brosseau's extensive personal experience at the Point Defiance Aquarium. Hanlon and Messenger (1996) say that "we know so little about most cephalopods that almost any information is worth listening to." I believe this interview adds extensively to our knowledge of *E. dofleini* and gives us a better idea of the life of the giant Pacific octopus.

Alan Kohn, Ingrith Deyrup-Olsen and Wendy Bastin from the Department of Zoology at the University of Washington helped me learn more about Arthur Martin. John Rupp and Jan Sweaten of the Point Defiance Zoo and Aquarium provided valuable information on Cecil Brosseau. Alan Kohn provided the photograph of Dr. Martin and John Rupp provided the photograph of Cecil Brosseau. My thanks go to Jeff Krause for transcribing the original interview to a computer file. The interview is published with the kind permission of Arthur Martin's widow, Effie Martin.

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INTERVIEW WITH CECIL A. BROSSEAU OF THE POINT DEFIANCE AQUARIUM ABOUT OCTOPUSES, 1975

ARTHUR W. MARTIN

Department of Zoology, The University of Washington, Seattle, Washington

Q. Let's talk about keeping octopus at the Point Defiance Aquarium, and first of all, what was the main way in which you caught octopus right after World War II? Was it by going out in boats as some commercial octopus fisherman do, or how did you get all these animals?
A. We would try to get them ourselves. We would row along and when we spotted an animal we would lower a dip net at the end of a long pole, and with another pole placed on the mantle side of the animal guide it into the net.

Q. And this was from boats?
A. Yes, this was from a boat.

Q. Where was the best place to spot them?
A. The area in the Narrows along the railroad tracks, but the animals can get away from you there because of the loose rock.

Q. What about areas where they would blend in? Would a dark bottom or a lighter bottom make it easier to spot an octopus?
A. Lighter rather than darker, they blend in with the background when algae are present, and you have a difficult time spotting them in an area like that. The best time to get them is when the tide is out about a third, and in an area where there is no algae on the bottom and where there is some rock so the animal is feeding where there are crabs.

Q. So this would be in the intertidal zone?
A. Yes, this is from a boat and they'll run themselves right in to the shore.

Q. Have you ever had an octopus try to leave the area after they see you?
A. Yes, they'll move away. They see the net down there and if the net is not in the proper position they scoot away.

Q. So they swim rather quickly, and for deep water?
A. Oh yes, always for deep water.

Q. I have heard you say before that octopus will come up to feed amongst the kelp at night, at extremely low tide looking for crabs?
A. Oh yes, they will do that during the middle of the day, during the winter and also at night; and then they will come out of the water all the way, but usually under the rocks.

Q. Would this be at low tide?
A. Yes, always at low tide; there are three foot minus tides [-3 ft] in some locations, but not around here (sic).

Q. Will an animal out of the water be subject to dehydration, how long do you think one could stay out and feed?
A. Oh, I would think about ten minutes and during most of this time they would be under the kelp and between the rocks. The kelp is the large type with leaves 12 inches wide and will cover the whole beach with crabs all over and under the rocks.

Q. So you think in this area the octopus is eating mostly little shore crabs?
A. Yes.

Q. How about larger crabs like spider crabs [*Pugettia producta*]?
A. They pick them up but they are not as abundant in the Narrows as they are on this side, so I don't think they are getting so many.

Q. Well, how does an octopus go about getting clams?
A. Most of the clams they take are horse clams [*Tresus capax*] with a large siphon and are very shallow, and I have observed them doing this, they stick one arm down and get it around the neck, then fill the body with water and blow away some of the dirt holding on the clam all the time. So I have seen them move away taking the clam along (Note: this is how commercial geoduck diggers dig *Panopea abrupta*; scuba divers use water jets).

Q. And the clam is still intact?
A. Oh yes, the clam wasn't harmed at all.

Q. Horse clams often occur in real hard, clay-type areas, an octopus couldn't get one out of that?
A. No, they get them out of the sand, on the East side of the Narrows.

Q. What else do you think they eat in their natural habitat?
A. Oh they scavenge, you've seen them do that right at the boathouse, dead fish or remains of the fish.

Q. How about actively pursuing fish like sculpins or slower bottom fish?
A. I've never taken one with a sculpin, and they don't let go of what they have when you catch them.

Q. How about octopus in the wild, when they fight do they ever eat each other, or chew an arm off another octopus?
A. I don't think so, when they see another in the wild they withdraw instead of advancing and the only time they get together is in the mating season.

Q. Do males fight over a single female?
A. I have never seen it happen but it might occur, it does in captivity.

Q. Once you get an octopus in the boat what do you do with him?
A. In winter weather I just put him in a gunnysack and if it is warm weather I have to keep him in the water and keep changing the water on him to keep the temperature down.

Q. In the summer the water may be at 50 or 55 degrees if it was pretty shallow, at what highest temperature would you want to keep him.
A. At 50 [°F].

Q. And how long could they stand a temperature of 60 degrees?
A. If you had a good turnover they could stand that for two or three months.

Q. Now when you get them to the aquarium I imagine you put them into a holding tank instead of on public display. What kind of tank would you keep them in?
A. The tanks we have in the aquarium are about 300 gallon holding tanks and after the animal is in we have to make sure the lid is on properly and weighted down so the animal can't escape from it, which he will do the first night.

Q. What are the animals' reactions on introducing them to the tank, will they release ink or hide in the corners?
A. I would say that about one out of seven will release ink, it all depends on how you handle them, if you treat them roughly they will do it every time, but if you treat them gently they are very nice.

Q. How about the animals that divers bring in to you?
A. Usually they are badly bruised, in fact I have gotten out of the habit of taking them from divers because they are in such bad shape.

Q. That would be the case even if they were careful with them because they have brought them out with chemicals, so the animals wouldn't live anyway, is that right?
A. There are a few divers who have taken instruction in what to do and they bring them in good shape, but a diver without any experience always roughs up the animal.

Q. How about the animals' adjustment to the tank, especially to a hand in the tank? I've seen them go to a corner and crouch there as though trying to hide, is that normal?
A. Yes, that is normal. It takes a good week to get over that. So when they first come in I pay no attention for the first seven days, don't do a thing but just leave them alone. Then after that time the animal is getting hungry and I remove the lid and hold out a herring and move it to and fro gently until they reach out the tip of an arm for it and then give it to them.

Q. By giving it to them do you mean touching them on the end of a tentacle [arm] with it or actually putting it up to his mouth?
A. No, putting it on the tentacle itself.

Q. I imagine a young animal might make a quicker adjustment so you could feed them within two or three days?
A. Yes, a three, four or five pound animal will feed within two days time.

Q. How old would a five-pound animal be?
A. About two years old.

Q. How about giving us a little information on their life cycle, especially their first year of development because not too much is known about that.
A. When the small animal hatches in the summer he comes to the surface and remains free floating for six or seven weeks then settles.

Q. At that time they have a little bit of pigment, how about when they settle down to the bottom?
A. They are opaque then, but difficult to see. After about three months on the bottom they lose the pigment spots and become brown.

Q. How big would they be then?

A. A spread of maybe three inches.

Q. What do you think they eat at that time?
A. They live in the gravel, gravel of about an inch, and there are a lot of crustaceans in that area and that is what they are feeding on.

Q. So this would be in the winter or the fall?
A. In the fall about October.

Q. OK, and then what happens?
A. They start putting on color again and move into rocky areas and start using dens. They only need a rock and they will crawl under to take cover.

Q. They move out when they are seven or eight months old?
A. Yes, at about six or seven months they are ready to use dens.

Q. And how big would they be?
A. Weight wise they would be about 7 ounces and maybe 10 inches in [arm] spread.

Q. That is about the smallest I've ever seen. Is that when they become available by dragging [trawling]?
A. They are available even earlier in that transparent stage because I have collected them in that stage.

Q. What kind of bottom would they be on and how deep?
A. Gravel bottom and about forty to sixty feet.

Q. Then they are becoming more like adults because they have dens. Then do they just keep growing and keep the same habit as the adult?
A. Yes.

Q. Well how big would a one-year-old animal be?
A. About 20 ounces.

Q. How about a two-year-old animal?
A. About 34 ounces, but it all depends on the individual.

Q. I suppose after they get past the transparent stage their individual feeding habits make a great deal of difference. How do you explain the great size variation in the adult, is it because of aggressive feeding behavior or the area they are in?
A. It depends on the area they are in and also their aggressiveness. Some animals will go out to feed almost every other day, others will go out only once a week. The aggressive ones grow more rapidly than the shy ones.

Q. Are you basing your answer of how these animals act by watching them once they are in the aquarium, do you have anything else to go on?
A. Yes, I've watched them many a time in the wild, I've waited in shallow water to see them. An octopus will come to a rock, maybe one sticking up a foot higher than the surrounding material and I could watch him run his arms around the rock picking up crabs, then at low tide I came back and turned the rock over there were no crabs [*Hemigrapsus* spp] where ordinarily there would be lots of them.

Q. That sounds like an aggressive one.

A. Yes, not a single crab would escape that had been underneath that rock.

Q. You might think an octopus in that area might visit that rock again, in two weeks when there might be more crabs there.
A. Oh yes, he will visit that rock the very next day. The little beach crabs move around to feed all the time and when the tide starts out they have to find a rock to hide under.

Q. At this time do you think each octopus has a specific den he returns to?
A. Yes, they do.

Q. You don't think they migrate around?
A. If they are in an area with plenty of food available they will stay right there and use the same den, I have seen them use the same den for five to six months at a time.

Q. Let's get back to the aquarium. How about some individual variation as far as color goes. Some of them look paler all the time.
A. They are relaxed when they are paled out, if they are excited they turn a dark red.

Q. Then the color is more related to the nervous state than to genetic differences?
A. That is right.

Q. Now suppose you had an animal in a holding tank for a number of weeks, what do you do to get him ready to go on display? How are you feeding him and so on?
A. Well, we always feed him by hand. We give him what is appropriate by hand, especially the ones we use upstairs and are demonstrating. In this way when a hand is put into the tank the animal responds and comes right to you.

Q. Could you describe how you feed them downstairs, how much would you feed a fifteen-pound animal and how long would you work with him?
A. We work at least five minutes a day with each animal that is to keep them in a good working condition. If you feed them right away they don't respond and can't be demonstrated because they get lazy and won't come out.

Q. You said you introduce your hand in the water, could you describe what follows in each step? And you have a herring, do they see the herring or the hand, and how do you signal them?
A. Oh I always show them the herring first, and then I remove the herring and use a finger motion.

Q. So it's mostly a visual thing with the octopus. What about smelling, or somehow picking up the fact that it's a herring rather than a hand?
A. Well, they're accustomed to being fed with herring and they have keen sight.

Q. I've had the experience that they are much more interested in a hand that just had a herring in it than in a clean hand. In fact I'm sure they would try to take a bite out of the hand if you give them a chance.
A. I don't know of any work that has been done on this but I think they do their tasting with the suction cups; I've given them both hands, one of which had herring on it, and they let go of the clean hand and the other one they hold on to.

Q. I've noticed that some animals will do their darndest to work the hand along the tentacles [arms] to the mouth and practically pull themselves out of the water to try to get to your hand and some will hold onto your hands for ten minutes or so if you let them, why would one animal enjoy the contact for that long?

A. I don't know what makes the difference when one animal tries so hard to reach your hand while another will just hold on for fifteen minutes at a time. This varies with the age of the animal too. The younger animals have to be conditioned to this.

Q. I know there is another problem with the upper tanks, the animals getting injured or mistreated by the public. What are some of the ways they are mistreated and how do they respond to this?
A. An individual will come up to the tank and he will let the octopus hold onto him and then the animal will get two or three arms on him and since the individual does not know how to get away he will roughly jerk him away.

Q. Why would that injure the animal?
A. There is no bone structure so there is no protection for the nerves and the animal might be in pain and to relieve the pain the animal may sever its own arm. This I have seen happen many times in the aquarium. In the course of thirty years or so we have had this happen quite often and we ourselves were responsible for it because we did not know that we were being rough on the animal.

Q. So the animal is confined to a small space and in the course of time it may be damaged?
A. Yes, and the animal does not consume the arm, just severs it.

Q. We are talking about losing an arm, in the natural state will the animal regenerate it, and how long might it take?
A. We brought in an octopus one day that weighted [weighed] about 8 pounds and it had three of its arms missing and they were cut off close to the body, maybe three or four inches.

Q. How do you think the octopus lost the arms?
A. Oh, to a lingcod or dogfish. We had that one in the tanks for two years, and when we finally lost him the arms were fully regenerated, just about the same length as the rest of the arms.

Q. But it took two years to do it?
A. Yes.

Q. So if I were a diver and I were to go out and get hold of a thirty pound animal and cut off two arms it would seem that the animal would have to have time to regenerate before it died.
A. Yes, you would have to use a smaller animal, the big animal would have time to regenerate to maybe ten inches.

Q. Would you think that arms like that would be a handicap to him?
A. No, I've seen them with only four arms and they moved and seemed to get along and to start to regenerate.

Q. Let's get back to the responses [of the octopus], after being in the aquarium on exhibit for a while?
A. I've seen them so badly treated that they would just sit in a corner without feeding for six or seven weeks and just die.

Q. Have you had any evidence that an animal would learn to recognize a person?
A. Oh sure, we've had an animal in the aquarium for five or six years and there would be a complete crowd around the aquarium tank, maybe thirty people, and I would work my way in to the tank and the animal would come to me right away.

Q. Even without your putting your hand into the water?
A. Right, I always wore a light coverall and the animal might use that as a visual cue.

Q. What about the large animal you had at the old aquarium on the waterfront, would you tell us about a few of the tricks you did with him?
A. I had a large animal that weighed about 40 pounds and I would feed him every day, and I kept the herring in a can while I was making my rounds to feed the animals, and this particular animal I had had for over a year and he would reach out for his food all the time and one day it dawned on me that I should test him, and I touched the end of his arm with my finger and led it in the can and let him take some herring out and the very next day while I was feeding I just stood at the tank and the animal reached over to the can on my right side and helped himself.

Q. And you were standing next to the tank?
A. Yes, right next to the tank and it took him about a minute to get his arm around.

Q. And eventually you got the animal to do this while you sat next to the tank?
A. Yes, the animal would come clear out of the tank and get his arm in the can and help himself to whatever was available and then return to the tank.

Q. How long would an animal remember to do this?
A. Oh, about six weeks and then the animal would seem to forget. You would have to feed the animal this way every other week to keep him conditioned.

Q. So how often would you do this with the animal?
A. Oh, about every other day.

Q. Now I'd like to get into the breeding of the animals in captivity. How did you do this in the aquarium?
A. We always kept the animals separated because when there were two in a tank they didn't always get along together, unless it was a large tank where they could get away from one another. But, in order to breed, we would put a male in with a female and they would never fight, and we would wait for the proper season for this and when the female is ready we would breed her.

Q. How can you tell when she is ready?
A. Primarily by the male, when the hectocotylized arm enlarged we would know the season had arrived.

Q. And can you tell when a female is ready to be fertilized [ready to mate]?
A. Yes, the body firms up.

Q. What happens when the male is introduced into the tank?
A. The male will usually approach the female, and the female will sometimes back off, but after awhile she will come to him.

Q. OK, so she does accept him, what happens? Will there be an alignment of the tentacles [arms] or will she have all her tentacles curled up?
A. There might be one or two [arms] stretched out but the male engulfs the rest of her and when the opportunity arises he will insert the hectocotylus into the mantle cavity, on the right side through the gill.

Q. And how long do they stay like this?
A. Oh, I have seen them stay in position for an hour and sometimes two or three hours.

Q. And during this time is the male releasing from one to three spermatophores?
A. Oh, he may release everything he has, five or six or seven. (Martin comment – No, he need only use two, one for each oviduct.)

Q. But if he were to release all he had on the one female then he would be through?
A. Well, he will form new ones, four to five or seven to eight.

Q. Does it depend on size much?
A. Yes, it usually does, the big animal makes more.

Q. And which animal decides when to quit?
A. Oh, usually the female.

Q. And once they part do they become aggressive again?
A. Yes, if you leave them together the female will become aggressive towards the male and eventually she will tear him apart.

Q. Well, how can you tell when a female has been fertilized [mated], if you try it once and then you try it again?
A. She won't accept him a second time and will fight him off.

Q. And have you tried to introduce a male and had her strangle the male?
A. Well, that happens because she had been fertilized [mated] when she was brought in.

Q. That reminds me of the mysterious animal in the New York Aquarium, she had been in the aquarium seven months and laid eggs that hatched, and they didn't know who the father was. Evidently the spermatophore doesn't break down spontaneously and the female can control when she breaks it down?
A. Yes. (Martin comment – This is not true, the spermatophore breaks down in the process of sperm transfer into the female oviduct.)

Q. What happens to the male animal after he has fertilized [mated with] the female, and has no more spermatophores left?
A. He will feed for a short period, and then he goes off his feed and a couple of months later he dies.

Q. You mentioned that seven months after the fertilization [mating] there were eggs laid, but how soon can it begin?
A. Well, it can begin within about six weeks.

Q. Can you describe the way they lay their eggs and take care of them?
A. It is difficult to observe the female depositing her eggs, in fact there is no way to watch it unless you had a tank developed for it, but I assume they are using their arms and the suction cups to get them out and attach them. The egg strands themselves are enormous, three or four inches long in fact and I have seen them stretch eleven or twelve inches and keep this up until they cover an area too big to work with.

Q. What kind of area would they choose in the wild?
A. In the wild I have seen them in only a few of the dens and they like to lay them on the side walls, the small ones will lay them on the ceiling but the large ones here deposit them on the side walls.

Q. How long does the egg laying process take?
A. Oh a good four or five or six weeks, it all depends on the holding tank she is in. And if she is not bothered it will go on for four to six weeks, but in a display tank where the public is, it may take two or three months, but they won't take care of them so they cut them off [egg strands] and eat them.

Q. Can a female lay eggs that have not been fertilized?

A. Yes, very often, and broods them, and broods them until she dies.

Q. What things does the female do when she is taking care of the eggs?
A. She brushed them off with her arms and also blows water on them all the time, not constantly but from time to time, and blows off any debris that settle on them.

Q. And she keeps algae and so on from growing on them?
A. They never lay them out in the open where the algae can get sunlight.

Q. I was thinking of the brown alga that will grow on the tank walls.
A. Yes, she keeps it off, she works on the eggs with her arms and keeps them clean.

Q. And how long will this go on, until the eggs are ready to hatch?
A. You mean the time it takes for the eggs to hatch? Oh, five months to ten months in this area, depending on the water temperature. If it is a hot season they will hatch out in five months, and in the winter months, when the temperature is down, it takes them even seven or eight months.

Q. At what time of the year are the eggs normally laid?
A. Later summer and fall.

Q. So the eggs that are laid in the fall would take quite a bit longer, two or three months?
A. Yes, two months longer.

Q. So they are timed to hatch ideally some time in late winter when food is available; and you have had females that would eat once the eggs were laid?
A. They are rare, but some would feed until about halfway through the brooding, but then go off their feed and that is it.

Q. That is in captivity isn't it? Do you think that in the wild they would eat?
A. No, I think they eat nothing at all

Q. What about the breakdown of the female, does this happen pretty quickly?
A. From my observations of a 50 pound female, by the time the eggs were hatching she was down to half her [body] weight.

Q. Well then, when does the female die? Does she always make it until the eggs hatch?
A. I've seen the time when the female would go about a week before the eggs hatched, but in the wild I think they make it until the eggs hatch, probably die about a week or two weeks after that.

Q. Do you know of any animal that would eat the unhatched eggs?
A. I imagine quite a number, the crabs would probably feed on them.

Q. So it's pretty important that the female make it until the eggs hatch?
A. Yes.

Q. OK, what kind of number of eggs are we talking about, what is the range?
A. It depends on the size of the female and a large female, say of 50 pounds, could produce over 200,000 eggs (Note: this high a number of eggs in this species has never been documented.)

Q. And take care of them all?

A. And take care of all of them, well maybe not all, the ones she could reach, and the others she would just let go.

Q. How about a small female?
A. A 20 pound female would probably lay about 50,000 eggs or even down to 25,000.

Q. From what you have seen of the care given by the female what percent of the eggs do you think might hatch?
A. Oh, 80 – 90% will hatch if the female has the strength to carry on through. And I have seen cases where 90% of the eggs hatched.

Q. And then the young animals [hatchlings] go right to the top where they are susceptible to quite a few predators?
A. Yes, very much so of the fishes, so that about a half dozen might survive out of the whole batch.

Q. There are quite a few mollusks are there not, where the young go right to the surface after hatching?
A. Yes, almost all the animals do it in the pluteus [veliger] stage.

Q. How would a film of oil on the surface affect these animals? Do they swim just below the surface?
A. The small octopuses swim below the surface.

Q. I'd like to ask you now a little bit about your experiences in shipping octopuses, when did you first try shipping for any distance?
A. In the early days we tried shipping only short distances, say from here to Oregon, and at first we did it ourselves, we would just use a large container of water and on the trip down, in hot weather, we might lose the animal, and there really wasn't much demand for octopus until Marineland of the Pacific [California] came into existence. They were having trouble collecting themselves down there, and they had to go to deep water so there would be a trip of four to five days with a crew, which made it quite expensive. I think it was Ken Norris that was in charge at the time and he thought of a way of shipping animals down, which was then in a prop [propeller] plane, which took about five times the time it does now. The first ones we shipped were with about a hundred gallons of water, which made it quite expensive. Finally one day it dawned on me that from my experience in collecting these animals in various seasons that the winter months with the animals in burlap bags and the temperature between 35 and 40 [^{0}F] the animals would survive the entire day, though on a summer day the animal would die in an hour or less. So it was about the late fifties, after Marineland got going, that we did some experimental work on refrigerating them, cooling the animals.

Q. Who did the experimental work on that?
A. We did ourselves. We cooled them in a plastic sack, and that was when plastic sacs were new too, and by placing ice over the animal in the evening, why the next day when we put them in a tank of water and worked over them a few minutes we could get them going again. The animal was not in contact with the ice, but was in the plastic sac, and there would be no water in the sac except what might have been in the mantle cavity.

Q. You said in the morning you had to work on them a little, what do you mean?
A. We'd have to get them breathing, we'd open the mantle cavity and fill it with water and keep this up for fifteen or twenty minutes.

Q. This was a form of artificial respiration?
A. Yes.

Q. When did you start using oxygen?
A. This came about when we had been shipping for a year or so, where [when] there was a long trip we would fill the bag with oxygen and if there was enough ice this would take care of the animal for thirty hours or more, and during the time the animal would be completely out.

Q. What do you think the body temperature of the animal would get down to, nearly freezing?
A. Close to it, let's say 33 or 34 [^{0}F], and instead of using ice we could use sea ice, which would give us another degree to work with.

Q. What do you think the oxygen consumption could be?
A. Well, the charge of oxygen would just take care of him before he went into a state of suspended animation.

Q. Have you ever tried to keep him longer than 30 hours at the aquarium?
A. In the early days I kept one for 15 hours, then I increased the time to 20 hours, and that one I lost.

Q. With or without oxygen?
A. That was without oxygen, but another factor turned up and that was the size of the animal. If the animal was under 25 pounds he couldn't take the chilling, he would cool down too far and wouldn't come out of it, where with the larger animals it wouldn't affect them so much and during a run of eight hours they might be thoroughly chilled only three hours of the time.

Q. Could it be that the small animal would cool down much more rapidly?
A. Yes, the animal would cool down too fast.

Q. Have you ever tried to do this with one of the small species of octopus?
A. It just doesn't work, we could never bring them out of it.

Q. What was the greatest distance you ever shipped an octopus and the longest time?
A. Back to the aquarium in Washington D.C., and the one we shipped was about a 40 pound, young, animal, and the flight was about 12 hours, but we shipped on a day when they had a blackout on the East Coast and the flight that the animal was on had to pull into Chicago and lay over there, and from there they went to one of the airports south of D.C. and in traveling around it took about 28 hours before the animal reached the tank at the aquarium. Having received the instructions beforehand they worked on the animal for about three hours straight, giving it artificial respiration to get the blood flowing again, but the animal died. It breathed for a while in the artificial seawater but they were not able to keep it alive.

Q. Didn't you ship an interesting female a few years ago to the New York Aquarium?
A. Yes, she laid her eggs in the aquarium after several months there, and they were puzzled that she should lay fertile eggs without a male being present, but she had conceived [mated] before leaving here, and there was an interval of several months before she laid the eggs.

Q. With this particular animal do you remember whether she had conceived by [mated with] a male at the aquarium or whether she had been fertilized [mated] in nature?
A. She was probably fertile [mated] when we got her, we held her only about a week before shipping. We normally hold them a few days to be sure the entire digestive tract is empty before shipping.

Q. Now we'd like to talk a little more about octopus behavior in the aquarium, especially about the octopuses in the upper level of the aquarium. What are some of the responses that octopus have to people?
A. After being on public display for three or four months instead of people touching the animal they would blow at them, and the people would be blowing and the animal would respond by blowing, and the animal

would blow water back at them, so the stronger the person would blow the more water the octopus would blow back and I have seen an animal drench people, sometimes several at a time.

Q. What about behavior when hungry, I suppose you would get a lot more responses out of a hungry animal, would this include leaving the tank at any time?
A. You mean an animal leaving the tank by itself? If they have been in the tank for three or four weeks they don't want to leave the tank and when we first put them in they generally stay at the bottom, and the tank is treated to keep them in by the edges of the tank being draped with burlap.

Q. What is it about the burlap that discourages them from climbing out?
A. They can't get hold of it, it's too porous.

Q. Have there been cases of janitors in the morning finding the octopuses crawling around on the floor that got out at night?
A. This has happened about three times that I know of.

Q. What do you think the reason for that would be?
A. As I recall those were animals that had only been here for a couple of weeks, fresh animals.

Q. How long could an animal live out of the water?
A. The temperature on the upper deck was about 65 [^{0}F] and the animals would last three to four hours at that temperature.

Q. Would you think that dehydration was the biggest problem then?
A. It's quite a problem because when the animal is out of water it will secrete an excessive amount of mucus and this will help to dehydrate them.

Q. I would like to go now into some of the specific animals you have had in the aquarium. I can remember a few years ago an octopus that was named Charlie that was in the large tank and worked with the diver, and it seemed to me that was one of the largest animals I have seen in the aquarium.
A. That particular animal was a male and we removed him from the tank and he weighed 109 pounds, drained weight. That particular animal I am sure we kept in the large tank for a year.

Q. You say 109 lbs but the animal was removed from the tank about a month after he had stopped eating, couldn't he have lost some weight in that time? What do you estimate his weight and arm span were at the maximum?
A. Oh, he had a span of 14 to 15 feet, and a total weight of about 125 pounds.

Q. Would you describe an octopus fight that you have seen from time to time when you have more than one male in the tank?
A. When they do fight they do not go at each other right away, but sort of size each other up and it is some time before they fight, but when they do they try to cover the other one and fight suction cup to suction cup and beak to beak, and with the suction cups aligned right down all eight arms, and then one will try to get away.

Q. And have there been cases of one animal actually tearing the other's beak out?
A. The females will do that.

Q. But the males don't usually do that when they are fighting?
A. Not when they are about the same size, but when one male is twice as large as the other he may kill him.

Q. Would this be a case where the female is rejecting the male?
A. Yes, after she has received a male she wants to be alone, and if another male comes along she has to fight him off.

Q. While we are on the subject of large octopuses, what are some of the largest ones that, in your experience, you have seen come out of the bay in this area?
A. You are speaking of the Narrows, and in the 1930s one was taken by a Japanese that had a spread, of course they were stretching him out a bit, of about 24 feet. They were carrying him up the hill in gunnysacks and they put the arms into one sac, and then had to put the body into another sack to get him up the hill, but there was no scale available there so they couldn't weight him. I would think it ran about 200 pounds.

Q. What was the method the fishermen were using, were they fishing commercially or for their own use?
A. They were fishing commercially and for their own use, in fact there were several people working the Narrows for their livelihood.

Q. And how would they catch an octopus?
A. They would use a long pole about a 12 foot pole with quite a large hook, like a shepherd's crook, and when they spotted an octopus they would get him right around the head and pull him in.

Q. I imagine it would take quite a bit of pulling to get them in with just one man?
A. The large ones? Well about four people hauled that big one in, they had four hooks in him, and it was quite a problem. I watched them take that animal right in front of the old store at Salmon Beach [on the Tacoma Narrows].

Q. Well, that one was about 200 pounds and the largest in the aquarium was about 125 pounds you said; have you seen any between those sizes?
A. Oh, I've seen a lot of them at 80 to 100 pounds, and one year there were a lot of them running between 60 and 90 pounds.

Q. Do you remember any reason for that occurrence: was the water warmer that year?
A. That could have been it or it could have been that the food was in abundance because the predators were down.

Q. I remember that one time you mentioned that you had an idea of how some of the males got so large, now why do you think that could be?
A. They were probably more aggressive than other males.

Q. Could they have been sterile males that lived an extra year?
A. That could very easily be, that does occur in salmon, that they get to be 125 lbs or so.

Q. How about some of the interesting stories you have told me? That one that had the Park Department plumber confused for quite a while?
A. When we were in the old aquarium building the outfalls would not be exposed until we had about a two foot minus tide, and an animal of about four pounds made a den and was crawling into the tube and blocked off the flow of discharge water from the rest rooms. And toilets in the rest rooms would overflow, and the plumber worked on that for a week or two. He would ream it out and all he would do was push the little octopus out the end of the tube and then he would leave. In an hour or two the little octopus would come back and plug the tube again. This went on for about a week and then I caught on to it [Note: obviously this was in a time when untreated sewage went directly into Puget Sound].

Q. Would the octopus stay in the tube at low tide?
A. No, he would move out when it was a minus tide.

Q. How did you spot the octopus then?
A. From the pile of crab shells in front of the tube, scattered around the opening. It is well known that octopuses feed in the den and then eject the shells.

Q. You told me of one other incident when you were collecting them from boats.
A. Well, we were drifting along with the current and spotted this red colored octopus, but we were carried past and had to come back. But by this time he had changed color and was blending into the background, and sometimes all you could see were the eyes, and if he spotted you they might close their eyes and you wouldn't be able to see him at all.

Q. Would there be anything you could do to make them move, could you drop something into the water?
A. No, that doesn't seem to make them move, only putting a net or hook down close to the animal, or prodding them with a long pole.

Q. Now often there has been an octopus brought into the aquarium collected by fisherman catching salmon or bottom fish, how do they catch them?
A. Well, usually the bait is near the bottom and the octopus spreads the mantle [arms and web] over the bait and since the boat was drifting along the octopus was hooked and once you hook them there is a lot of dead weight and as you pull in the octopus may swim up to prevent pain from the hook and so slowly you draw them in and can get them into the boat.

Q. Most people wouldn't have anything big enough to get them in.
A. Well many people carry a dip net and with that and grabbing the animal they can get them into the boat.

Q. What happens when the animal grabs on to the side of the bottom of the boat?
A. In that case about all you can do, since their grip is very strong, is to go over to the beach and tear them off.

Q. Now, when you have animals brought in that have been ripped by hooks are they damaged a great deal?
A. Usually they are in pretty good shape and we take the hook out by cutting its eye off and drawing the shank through the wound.

Q. Have you noticed healing, how long would a cut or hook mark take to heal in an octopus?
A. Take the case where the arm is severed. The skin around it will constrict and cover the wound, it all depends on how high up the arm it is, but if the would (sic) is in the body it will take only a few days to heal. But an arm stump, once covered by skin takes a long time; I would say about three months before it starts to regenerate.

Q. I know you have had some experience in doing repair work on the mantle of an animal that had gotten a rip in the skin from being confined in a small tank.
A. I have had some animals so badly torn that they had trouble with respiration and had to be sewed up.

Q. What would you sew it up with?
A. Oh, regular surgical nylon.

Q. Well then the stitches would have to be taken out, how long would it take them to heal?
A. About three months.

Q. I know over the years, from time to time, you have had animals escape from the holding tanks that had been brought in, and the screen was not on straight, or one had forgotten to weight the screen with rocks. Where do these animals go?
A. They go into the trough that carries the outflow and they would go either to one end or the other and each end had a screen over the outflow from the diversion boxes, so they would stay in the sewer pipe during the day and come out at night to feed with whatever they could obtain, and when the lights were turned on in the day they would go back. We had one that lived for several months out of the tanks.

Q. Well, if it got out the drain it would get into one of the seal tanks?
A. Yes, and the seals would tear him apart; they never got that far.

Q. How did you get them out of the tube?
A. We would just keep checking the diversion boxes and if we found them there we could get them out. We had one that came close to the end of the tube to pick up scraps at feeding time and one day he came far enough out while the food was being prepared that one of the fellows gave him a herring and the next day he was back and in four or five days he got in the habit of coming out of the trough and up on the floor and so the animal was actually up on the floor begging for food from him.

Q. How does an octopus beg for food?
A. They just come up to you.

Q. You mean they come up to the top of the tank without being teased?
A. Yes, they come up on their own. One particular animal we had in one of the large tanks and he was fed on Sunday just one day a week, about a 25 pound animal. And after being in the tank for eight or nine months he realized the day of the week, since he was fed by the diver one day a week, and he would pester the diver every day, and he used to get on his back. Come Sunday the diver would check and the octopus was ready, he was sitting waiting for the diver to go in.

Q. What did the octopus do the rest of the week?
A. He would be out in the tank; the only day in the week he would show up in the proper spot was Sunday.

Q. What do you think the octopus had to go on?
A. Hard to tell. He looked like he was counting the days, the only thing I could figure out.

Q. Weren't the animals fed from the top twice a week at that time?
A. Yes, but the octopus got very little of that, he was fed by the diver, which would probably correspond to the natural habit.

Q. That might show that in the wild a good deal of their food might be scavenged?
A. Yes, I should think a good deal.

Q. What are some of the predators that octopus have in the wild, I know that in the large tank a wolf eel [*Anarrichthys ocellatus*] tried to get an octopus once.
A. Yes, and ratfish [*Hydrolagus colliei*] and lingcod [*Ophiodon elongatus*]. A female lingcod will eat an entire 20 to 25 pound animal. I have taken an entire octopus out of the stomach of a lingcod, eaten two or three hours before.

Q. I don't think a dogfish [*Squalus acanthias*] would actively pursue an octopus, wouldn't it attack if it saw a tentacle sticking out of a den?
A. I think the only time the dogfish get after an octopus is when it is moving, and the dogfish is traveling quite

fast and will take an arm off.

Q. How hard are the sea lions [*Zalophus californianus*] on the octopus?
A. They will feed on them but I would say it is way down on the sea lion list. The sea lion has to find the octopus out in the open; they just couldn't get to them in the crevices.

Q. So about the only time the predators would bother them is when they are swimming?
A. Yes, when they are swimming.

Q. What other kinds of predators do they have, or parasites?
A. I have seen marine leeches on them.

Q. Where would the leeches be?
A. On the underside of the body, but usually not more than one or two on the whole animal.

Q. Well, do they get into the mantle cavity and on the gills?
A. No, the animals do a pretty good job of keeping themselves clean both on the outside and on the gills.

Q. Have you seen them do that?
A. Yes, I have commonly seen them poking in the mantle cavity with an arm and even bringing a gill part way out, caught by the suckers.

Q. How about the roaches [this probably refers to amphipods] they have on their suction cups?
A. You will see an octopus gather all the arms up into balls and spin them and the dead skin come flying off the suction cups.

Q. How often will they do this?
A. Oh at least twice a week, and sometimes three or four times, and of course maybe at night when you are not watching them.

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E-mail: cmhertz@pacbell.net *Website at: http://www.users.cts.com/crash/t/tarnold/SDSC/index.html*

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

PROGRAM

THE HUNT FOR THE RARE AND ELUSIVE *ZOILA, Z. KETYANA BATAVIENSIS*

Member Dale Roberts will speak about his 2001 trip to the Abrohlos Islands, his second trip to that part of Australia. Dale has been interested in marine biology and entomology since living in south Florida as a young boy. Formally educated in biology and chemistry, "bugs and slugs" nevertheless remained strong interests. An avid scuba diver and self collector for nearly 30 years, Dale has dived and collected shells locally, as well as the West Indies, Mexico, Guam, Fiji, Western Australia and Hawaii.

Meeting date: 18 July 2002
Shells of the month: Cowries

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting June 20, 2002

President Jules Hertz opened the meeting at 7:35 p.m. The minutes were approved as published in *The Festivus* and the treasurer's brief report assured the membership of the club's solvency. Vice President Terry Arnold announced the speakers for July through August and Jules told members that the September party would be a luau to be held on Saturday evening the 14th in the Mulliner's garden.

Kelvin Barwick, SCAMIT president announced that they have an Internet Listserver site. Further information can be found at SCAMIT.org (see col. 2).

Terry then introduced the speaker for the evening, Judith Garfield, who gave a program on the La Jolla Underwater Park. She discussed the four areas in the park — rocky, kelp, sandy and canyon showing beautiful slides of each area and the life in each with views of pipefish, grasses, *Tylodina fungina* on its host sponge and so on. The program was greatly enjoyed by all.

Following the program, there was a mini-auction of three books. Dave Mulliner was the winner of the door prize and the Hertzes provided the refreshments.

The meeting was adjourned at 8:45 p.m. and people remained to chat and enjoy the refreshments.

The Club Christmas Dinner Party

Arrangements for the Club's annual Christmas party to be held on Saturday evening December 7th have now been completed.

By popular request, the affair will again be held in the Lisbon Room at the Ramada Inn & Conference Center on Clairmont Mesa Blvd. The menu choices (the same as last year) will be announced later as well as other news concerning the party.

Save the date. It will be a great party!!

News From the Southern California Association of Marine Invertebrate Taxonomists (SCAMIT)

The Southern California Association of Marine Invertebrate Taxonomists (SCAMIT) is pleased to announce a new e-mail discussion list. This list is intended to enhance communication between marine invertebrate biologists, in particular, on topics of California invertebrate taxonomy and ecology. All individuals or organizations interested in California marine invertebrate taxonomy are invited to join and participate in this new email discussion.

To subscribe to the list: 1) Send an e-mail to: scamit-request@lserve.sbnature2.org
2) In the body of the e-mail only include the word "subscribe" (not in quotes).
3) You will receive an e-mail verification of your intent to subscribe.
4) Simply open the verification request e-mail, click on "reply" then "send" and you will be subscribed to the discussion list.

Make sure your e-mail is sent in "plain text" format, not in "MIME" or "HTML" format. Remember you must go through the above procedure to receive any messages posted on the list server. This system is separate from the monthly e-mail notificaton about the publication of the newsletter. If you have questions or problems, please send an e-mail to: pvscott@sbnature2.org

Kelvin Barwick, President, SCAMIT
kbarwick@sandiego.gov

Additions and Changes to the Roster

Too late for the roster
Museum National d'Histoire Naturelle, Biologie des Invertebres et Malacologie, 55, Rue de Buffon, 75005, Paris, France.
Change of e-mail Pasqua, Robert A., pasqua@cox.net

CRASSOSTREA GIGAS (THUNBERG, 1793) IN SAN DIEGO BAY, CALIFORNIA

JOHN LAGRANGE

533 North Rios Avenue, Solana Beach, California 92075-1245, USA
E-mail: lagrange@adnc.com

Having a boat docked at the G street Mole in San Diego Bay, I have casually observed the organisms that grow on the pilings and rocks in that area for many years. There has always been a good population of small oysters in the area, which I have assumed were *Ostrea lurida* Carpenter, 1864, the native oyster of the Pacific Coast. Around the end of the year 2000, I started to notice some oysters that were exceptionally large for *O. lurida*. By the summer of 2001 these individuals had continued to grow and it was becoming obvious that they were something new to the area, as they were considerably larger than any oysters I had previously seen in San Diego Bay. They also were usually found singly and high in the intertidal zone, away from the clumps of smaller oysters in the lower intertidal and subtidal zones.

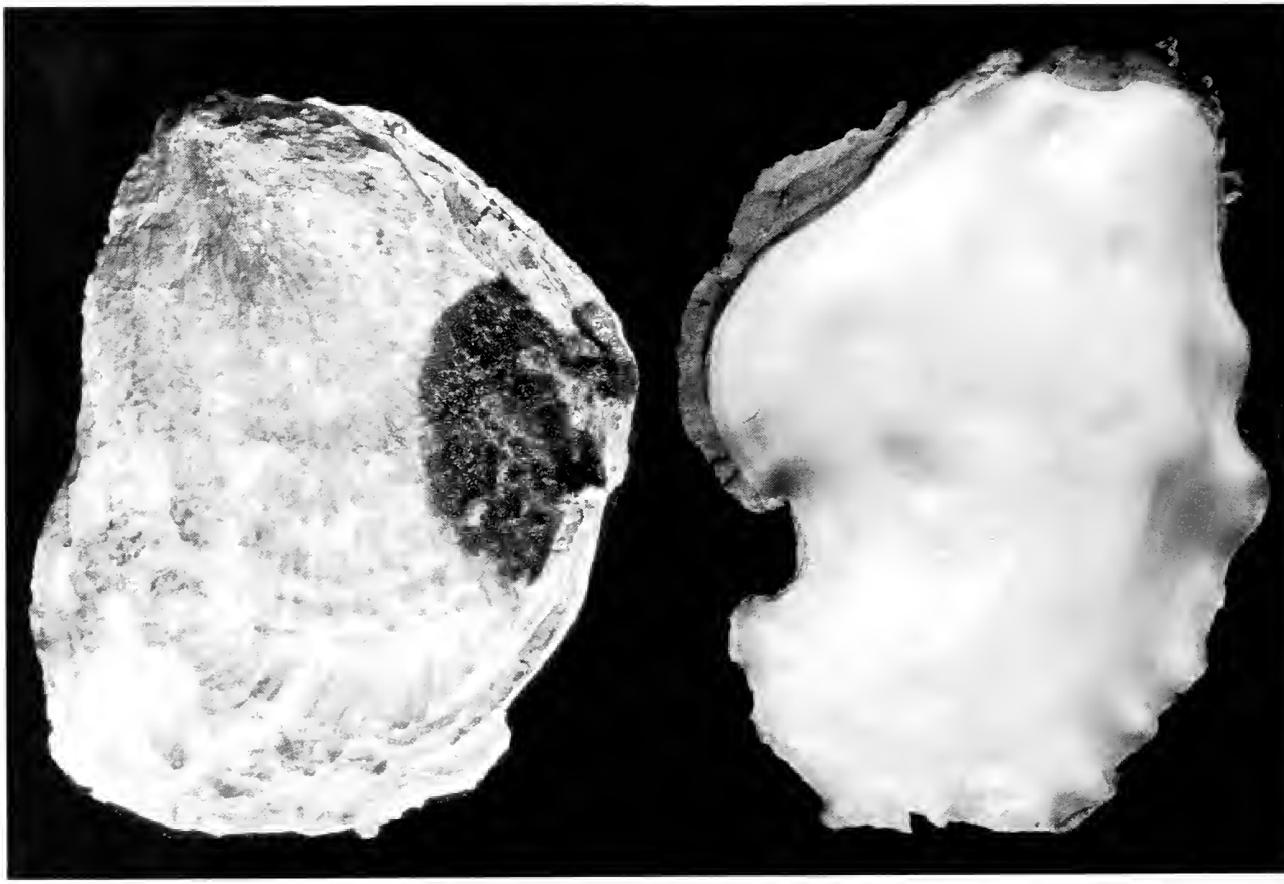
Suspecting that these large oysters were *Crassostrea gigas*, the Japanese oyster cultivated extensively on the West Coast, I collected a few and set out to identify them. That proved rather difficult. Oysters have extremely variable shell forms depending on the environmental conditions in which they grow. The differences between species, and even genera, on the other hand, can be quite subtle. The specimens I had collected were sent first to Paul Valentich Scott at the Santa Barbara Museum of Natural History (SBMNH), then to Scripps Institution of Oceanography (SIO) where they were identified by Michael Kirby. They are now in the collections of the SBMNH (#345669).

Some of the smaller oysters I had collected were identified as *Ostrea conchaphila* Carpenter, 1857, of which *O. lurida* is now considered a synonym. The larger shells were confirmed to be *Crassostrea gigas*. These two species can generally be separated by the presence of chomata, small teeth on the edge of the valve near the hinge. These are present on *Ostrea conchaphila* and absent on *Crassostrea gigas*. The fact that these oysters were growing attached to rocks indicates that they were the result of natural settlement and that this species is spawning in our area.

I revisited the same area in March of 2002 and looked for the individuals I had not collected previously. I was able to find one quite large (est.125 mm+) live individual that I believe has been growing on a piling there since I first noticed them in 2000. I also found large left valves of dead oysters attached to rocks in the area. In addition to these large individuals, I found several oysters in the 80 mm range that I believe represent a more recent year class and indicate continued successful spawning.

I have looked for oysters in similar habitats at both Chula Vista in the south bay and at Harbor Island, closer to the mouth of San Diego Bay. Small oysters were present at both areas, but I saw none that resembled the large *C. gigas* found at the G Street area. On April 11, 2002, I examined some rocks adjacent to the boat launching ramp on Shelter Island. There I did find several large oysters and identified them as *Crassostrea gigas* by their lack of chomata. There were no very large individuals at Shelter Island, the specimens there being in the 80 mm size range.

From what I have seen I conclude that there is an established population of *Crassostrea gigas* in San Diego Bay and that they have spawned successfully at least twice in recent years. These oysters have also appeared recently in the Los Angeles-Long Beach area, (personal communication, Paul Valentich Scott), so they seem widely established in southern California . It is noteworthy that it has taken so long for *C. gigas* to become established in southern California, since



Figures 1 and 2, *Crassostrea gigas* (Thunberg, 1793). (1) Top valve: height, 90 mm; width, 69 mm. (2) Bottom valve: height, 94 mm; width, 27 mm. Collected at G Street Mole, San Diego Bay, California. The specimen was collected from a rock in the upper intertidal zone, May 2001.

spat has been imported for the commercial oyster growers on the West Coast for many years. It will be interesting to see if *C. gigas* can permanently add southern California to the long list of places in the world where it has become established.

I would like to thank Michael Kirby (SIO) for identifying the oysters and Paul Valentich Scott (SBMNH) for distribution information on *C. gigas* and for photographing the specimen figured here.

THE FAMILY DIALIDAE (GASTROPODA: CERITHIOIDEA) IN THE EASTERN PACIFIC

JAMES H. McLEAN

Los Angeles County Museum of Natural History
900 Exposition Blvd., Los Angeles, California 90007, USA

ABSTRACT: The small-shelled family Dialidae has been thought by current workers to be limited to the Indo-Pacific faunal region. Two species of the family are here recognized in the eastern Pacific: *Diala exilis* (Tryon, 1866), from San Diego and subsequently from San Francisco Bay, but now probably extinct in California, and *D. stephensae* (Baker, Hanna & Strong, 1930), living off southern Baja California and in the Gulf of California, Mexico.

INTRODUCTION

Until recently, minute cerithioidean shells in the genus *Diala* A. Adams, 1861, were poorly understood. Papers by Ponder (1991) and Ponder & de Keyzer (1992), with a summation (Healy & Wells, 1998), have clarified the anatomy, taxonomy and systematic position of this widespread Indo-Pacific genus, the sole member of the family Dialidae. Japanese species were illustrated by Hasegawa *in* Okutani (2000) and by Higo et al. (2001).

Dall (1921: 156) listed three species of *Diala* in the northeastern Pacific: *D. marmorea* Carpenter, 1864, *D. acuta* Carpenter, 1864, and *D. exilis* (Tryon, 1866). Ponder (1967: 219) proposed *Pseudodiala* (as a subgenus of *Barleeia* Clark, 1853), for *D. acuta*, but later (Ponder, 1983: 242) placed it in the synonymy of *Barleeia*. The species *marmorea* is a synonym of *B. acuta*. Little has been written about *D. exilis*, which is here considered to be a true member of the genus. Another species in the tropical eastern Pacific is here transferred to the genus *Diala*.

Museum abbreviations: ANSP, Academy of Natural Sciences, Philadelphia; CASIZ, California Academy of Sciences (Invertebrate Zoology), San Francisco; LACM, Los Angeles County Museum of Natural History; USNM, National Museum of National History, Washington, D. C.

SYSTEMATICS

Superfamily **CERITHIOIDEA** Ferrusac, 1819
Family **DIALIDAE** Ponder, 1991
Genus ***Diala*** A. Adams, 1861

Diala A. Adams, 1861: 242. Type species (by subsequent designation of Dall, 1922: 84): *Diala varia* A. Adams, 1861 [= *Rissoa semistriata* Philippi, 1849].

Shell small, slender, whorls weakly rounded, base subangulate; sculpture of incised spirals on body whorl and base; axial sculpture lacking; aperture unmodified, not with thickened lip; color patterns of axial flammules, often with lighter markings in subsutural area.

See Ponder (1991), Ponder & de Keyzer (1992), Healy & Wells (1998), Hasegawa *in* Okutani (2000), and Higo et al. (2001) for illustrations of the type species and other species.

Diala exilis (Tryon, 1866)
Figures 1-3

Rissoa exilis Tryon, 1866: 12, pl. 2, fig. 18.
Diala exilis.—Dall, 1921: 156.—Oldroyd, 1927: 659.—Keen, 1937: 35.
Barleeia exilis.—Burch, 1945 [1944-46], no. 55: 21.

Shell small, brown, with lighter and darker subsutural markings; whorls weakly inflated, suture moderately impressed; umbilical chink narrow; sculpture of weakly incised spiral grooves. Protoconch unknown (apex eroded in all specimens examined). Height 3.3 mm (holotype).

Type material: holotype, ANSP 14190. Type locality: "San Diego, California, on salt water grass." The original description is repeated here:

"Shell subulate, light brown, consisting of six convex volutions, with well-marked suture; aperture oval, proportionally very small; surface covered with slight revolving striae? Length .135 inch, diameter .07 inch, length of aperture .04 inch, breadth .03 inch. San Diego, Cal., on salt water grass, (Dr. J. G. Cooper). I find only a single specimen of this very distinct Rissoid among a lot of *R. Cooperi*, nob. There appear to be traces of revolving striae on this specimen, which is unfortunately, not in good condition, being a dead shell."

The species mentioned in comparison, *Rissoa cooperi* Tryon, 1865, is a synonym of *Barleeia subtenuis* Carpenter, 1864, which occurs in lagoons in Southern California.

Dall (1921), Oldroyd (1927) and Keen (1931) correctly assigned the species to *Diala*, but this was doubted by Burch (1945), who assigned it to *Barleeia*. An allocation to *Barleeia* is ruled out because species with spiral sculpture are unknown in that genus.

Dall in *Bulletin 112* (1921) gave the distribution as San Francisco Bay to San Diego, California, which was a significant northern extension of the distribution. Except for Oldroyd (1927), who copied the original description, Keen (1937), who listed it, and Burch (1945), who noted that there were no current records, this species has not been further reported in the literature.

Specimens examined are the holotype (ANSP 14190, Figure 1) and three USNM lots, of which one lot of two shells (USNM 56417, Figures 2, 3) is labeled "California, Holden", and 2 other lots from the Stearns collection: USNM 23736, 1 specimen, and USNM 32361, 3 specimens, both labeled "San Francisco Bay." There are no live-collected specimens. The examined specimens do not have the appearance of fossils.

Although the holotype is worn to the point of not showing the color pattern, there are traces of spiral sculpture showing on my photo of the holotype (Figure 1), which allows the assumption that the holotype is conspecific with specimens in better condition shown in Figures 2 and 3. Differences in shell proportion and whorl count among the three specimens (as exemplified by the narrow proportions and additional whorl of the specimen in Figure 2) are considered to be within the range of possible variation. All specimens were examined and photographed in the early 1960s, while I was still a graduate student.

The three illustrated specimens are clearly indicative of *Diala*. No other genus lacking a modified lip among cerithiiform or rissoiform families has similar incised sculpture. The color pattern is unlike that of any of the species illustrated by Ponder & de Keyzer (1992) in their revision of the family, or by Hasegawa *in* Okutani (2001) or Higo et al. (2001), which rules out the possibility that all of the material in old collections represents locality errors for one of the common Indo-Pacific or Japanese species.

It has to be concluded that *Diala exilis* should be recognized as a good species. It was evidently an extremely uncommon species, as indicated by its scarcity in old collections. It is either now extinct, considering the extent of collecting in California subsequent to the description of the species, or it remains rare with the possibility that it eventually may be rediscovered. Evidence that it occurred in the lagoons of Central and Southern California comes from the original account and the indication of San Francisco Bay in the USNM specimens cited above.

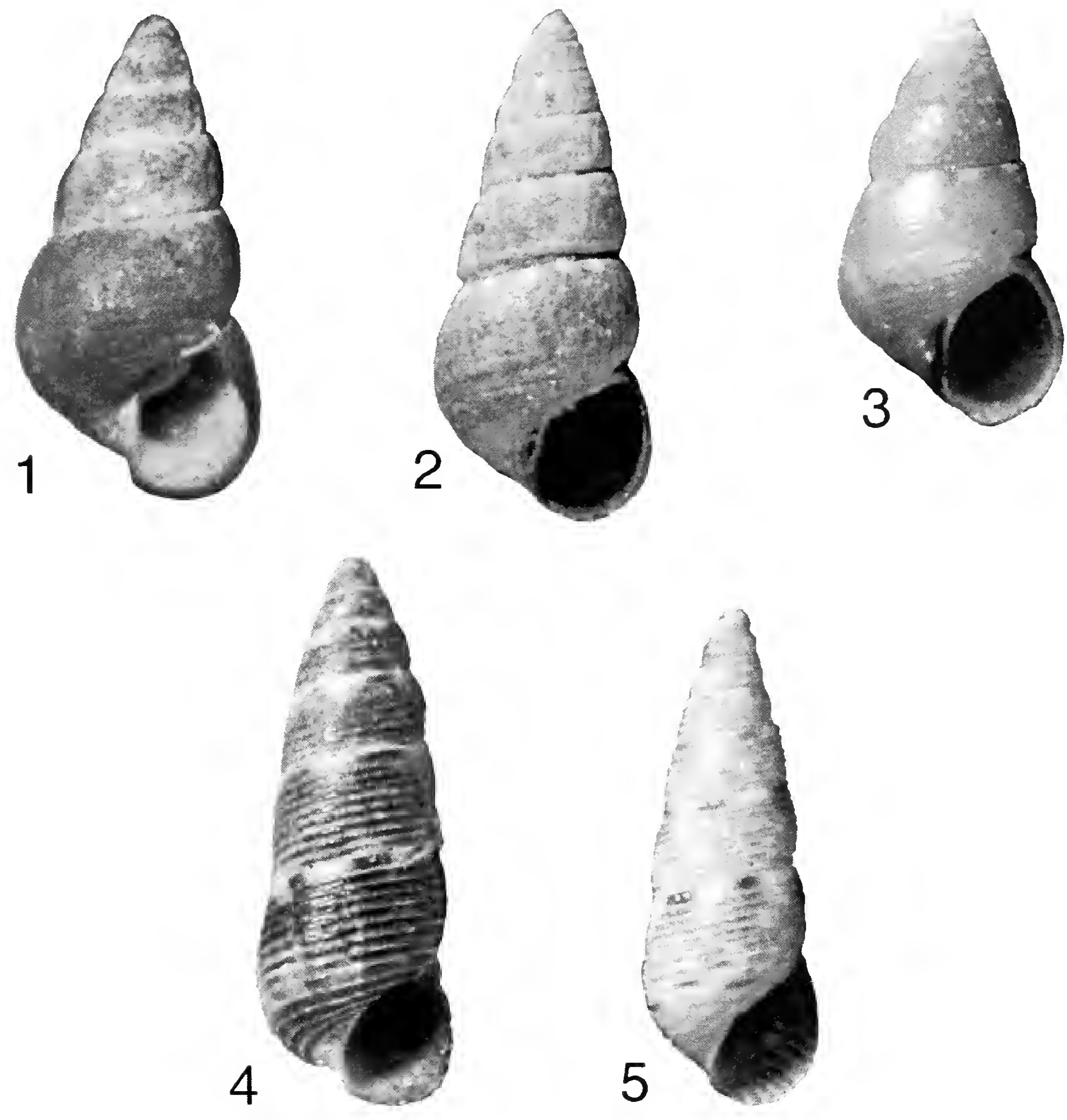
Many of the native mollusks of San Francisco Bay are now locally extinct and have been replaced by invasive species (Cohen & Carlton, 1998); this may be the case for *Diala exilis* in San Francisco Bay. Invasive species are less prevalent in San Diego Bay; however, Carlton (1993) reported the extinction of *Cerithidea fuscata* Gould, 1845, in San Diego Bay. The case of *Diala exilis* may be another comparable example for San Diego Bay.

Diala stephensae (Baker, Hanna & Strong, 1930)
Figures 4, 5

Rissoina stephensae Baker, Hanna & Strong, 1930: 33, pl. 1, fig. 14.
Rissoina (? Sulcorissoina) stephensae.—Keen, 1971: 375.

Slender, whorls nearly flat-sided; spiral cords strong, about eight per whorl; color pattern of darker flammules on a gray ground, subsutural cord with light and dark markings. First whorl of protoconch bulbous; two spiral cords emerge in second whorl (based on LACM material). Height 4, diameter 1.5 mm (original measurements).

The early emergence of adult sculpture and absence of a sinusigeral notch is indicative of a non-



Figures 1-5. (1) *Diala exilis* (Tryon, 1866). Holotype, ANSP 14190, "Salt water grass, San Diego, California." Height 3.3 mm. (2) *Diala exilis*. USNM 56417, "California, Holden." Height 3.6 mm. (3) *Diala exilis*. USNM 56417, "California, Holden." Height 2.9 mm. (4) *Diala stephensae* (Baker, Hanna & Strong, 1930). Holotype, CASIZ 66056, "Cape San Lucas, Lower California." Height 4.0 mm. (5) *Diala stephensae*. LACM 34-259.1, 31 m, Bahia Sulphur, Isla Clarion, Islas Revillagigedo, Mexico. Height 3.1 mm.

planktotrophic protoconch. This is in contrast to most of the Indo-Pacific species in which Ponder and de Keyzer (1992) found protoconchs indicative of a planktotrophic larval stage.

Type material. Holotype: CASIZ 66056 (Figure 4). "Seven additional specimens were taken at the same place." Type locality: "Cape San Lucas, Lower California."

There are 13 lots and numerous specimens in the LACM collection, mostly from the vicinity of the type locality at the southern tip of Baja California, but including specimens from the Gulf of California north to Guaymas, and south to Clarion Island, Revillagigedo Islands, Mexico (Figure 5).

This species is here first assigned to *Diala* because it has all the diagnostic features of the genus and is certainly not applicable to the genus *Sulcorissoina* Kosuge, 1965, in which it was placed (as a subgenus of *Rissoina*) with a query by Keen (1971). The genus *Diala* had been suggested to me by Winston Ponder, when he examined specimens at the LACM during a visit in the 1980s.

Among the Indo-Pacific and Japanese species of the genus, *Diala stephensae* most resembles *D. sulcifera* (A. Adams, 1862), as illustrated by Hasegawa *in* Okutani (2000: 125, fig. 3), from which it differs in its less inflated whorls, shorter aperture and non-planktotrophic protoconch.

ACKNOWLEDGMENTS

I thank Ángel Valdés for the digital preparation of the illustrations from my negatives. Ángel Valdés and Lindsey Groves of the LACM staff and Winston Ponder of the Australian Museum, Sydney, are thanked for their comments on the manuscript. Curators and staff at the ANSP, CAS, and USNM are thanked for access to collections.

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THE FESTIVUS

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E-mail: cmhertz@pacbell.net *Website at: http://www.users.cts.com/crash/t/tarnold/SDSC/index.html*

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

PROGRAM

BIG NEWS ON TINY SNAILS: A NEW LOOK AT CHARACTERS USED FOR THE GENERIC CLASSIFICATION OF SCISSURELLIDAE (GASTROPODA: VETIGASTROPODA)

Daniel Geiger, Research Associate of the Santa Barbara Museum of Natural History, and part time lecturer at the University of Southern California will be the speaker for this evening's presentation. Daniel has written the Conchological Iconography volume on Haliotidae and his new research focus is on the evolution of Scissurellidae and Fissurellidae. He will give a slide program highlighted with images of the tiny scissurellids and discuss how their shell characters and radula are evaluated.

Meeting date: August 15, 2002

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting July 18, 2002

President Jules Hertz called the meeting to order at 7:40 p.m. He welcomed the guests for the evening, Allen and Jennifer Collins. The minutes of the June meeting were approved as published in *The Festivus*. Treasurer Linda Hutsell reported that the Club raised about $4,000 from this year's Auction. As Librarian she reported that the library has purchased no new books but has a few recently arrived newsletters. Editor Carole Hertz said she is interested in receiving more articles.

Jules said that the September Party will be on the 14th at the Mulliners' house. It will have a luau theme and will start earlier than usual. Further details will follow [see column 2, this page].

Patricia Beller, Collection Manager of Marine Invertebrates at the San Diego Natural History Museum, thanked the Club for selling them their much-needed book, Abbott's *American Seashells*, 2nd edition. John Jackson mentioned that a new book on the endemic *Zoila* cowries of Australia will be published by the end of next year. John brought in sample pages of a section of the book to display.

Vice President Terry Arnold then introduced our speaker for the evening, Dale Roberts. Dale talked about his 17-day boat/diving trip in Western Australia in the spring of last year. It involved solo diving in deep 150-foot waters. He said they were looking for particular species of sponges since the *Zoila* cowries hide under them. He was fortunate to find a *Zoila friendi* in a three-foot cup sponge. Very few of the rare *Zoila* cowries were found on this trip. He also reported finding and holding in his hand a blue-ringed octopus, not realizing that it had a deadly bite. Luckily, he was not bitten by it. He said they caught fish and ate sushi frequently. He said the trip was a real treat. He had some of his beautiful finds on display for members to take a look at. Dale's talk gave members an idea of the difficulties and thrills of such a dive trip and it was enjoyed by all.

The drawing winner was Joanne Romer. Thanks to Ron Deems and John Bishop for the evening's refreshments. The meeting was adjourned at 8:45 p.m.

Silvana Vollero

The Club's Hawaiian Luau Saturday September 14th

This year the Club's September party will be a grand Hawaiian Luau to be held on Saturday, September 14th in Margaret and Dave Mulliner's garden (see map inserted with this issue). The starting time will be earlier than usual (4:00 p.m.) so that those attending can enjoy more sunshine while socializing. Everyone is URGED to come in island attire — it will be more fun.

The dinner will be a potluck with choices of main dishes, fruit and vegetable salads, rice and desserts — each to serve 12 people. A signup sheet will be passed at the August meeting. If you can't attend, contact Carole Hertz (858-277-6259) to sign up for your potluck contribution.

And make sure to attend!!!

Writing for *The Festivus*

The Festivus publishes papers on all aspects of malacology [descriptions of new species are not accepted at this time] as well as more popular articles related to mollusks. Book reviews, meeting announcements etc. are also included. All papers received are acknowledged and sent out for critical evaluation. All those accepted are published completely free of charge and authors receive five complimentary copies. For those wishing additional reprints, orders can be submitted to the editor before publication and the author is charged only actual costs.

Authors should send manuscripts in duplicate, double spaced, pages numbered consecutively, with literature citations and figure legends, where applicable. In addition to two hard copies, manuscripts on disk are welcomed. *The Festivus* uses a PC with Windows 95 and WordPerfect 7 and can utilize diskettes with compatible format. Line drawings, color prints, slides and b&w photographs as well as electronic photos are gladly received, and specimens can also be photographed by *The Festivus* by prior arrangement. Photographs need not be mounted.

Manuscripts should be sent to Carole M. Hertz, editor, at 3883 Mt. Blackburn Avenue, San Diego, CA 92111, USA. For further information, contact editor Carole Hertz <cmhertz@pacbell.net>.

CORALLIOPHILA NERITOIDEA (LAMARCK, 1816) (GASTROPODA: MURICIDAE) REPORTED AT PANAMÁ AND COSTA RICA

KIRSTIE L. KAISER[1]

Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road,
Santa Barbara, California 93105, USA
E-mail: KLKaiser@pvnet.com.mx

The common, coral-dwelling Indo-Pacific species *Coralliophila neritoidea* (Lamarck, 1816) has been recognized from all five of the tropical eastern Pacific oceanic island groups: Islas Revillagigedo, México (Strong & Hanna, 1930); Île Clipperton, French possession (Keen, 1971, Kaiser, 2001); Isla del Coco, Costa Rica (Shasky, 1983); Isla de Malpelo, Colombia (Kaiser & Bryce, 2001) and Islas Galápagos, Ecuador (Keen, 1971, Kaiser, 2001). This is the first report of *C. neritoidea* reaching the eastern Pacific mainland (at Panamá and Costa Rica) (Figure 1).

A prerequisite for the Coralliophilidae habitat is sustained coral development. All of the aforementioned oceanic islands have varying degrees of coral reef

Figure 1. *Coralliophila neritoidea* (Lamarck, 1816), 2 views. Isla Montuosa, Golfo de Chiriquí, Panamá (07°28.60'N, 82°13.80'W); leg. K.L. Kaiser (K.L. Kaiser Collection), collected live, with SCUBA from the R/V *URRACÁ*, 5-19 December 1998. Size: H 36.6 mm, W 28.2 mm. Specimen is encrusted with coralline algae and vermetid spp.

[1]Paseo de las Conchas Chinas #115, Dept. 4, Fracc. Conchas Chinas, Puerto Vallarta, Jalisco, C.P. 48300, México.

accumulations. Within the Golfo de Chiriquí is a fringing coral reef present along the eastern shore of Isla Coiba and it is the second largest eastern Pacific coral reef in terms of area, covering 160 ha. Île Clipperton, with a total reef area of approximately 370 ha, has the distinction of being the largest coral reef in the eastern Pacific (Glynn et al., 1996). It is not surprising that Clipperton has the largest populations of *C. neritoidea* in the eastern Pacific Ocean (personal observation).

In checking the collections of the California Academy of Sciences (CASIZ); the Natural History Museum of Los Angeles County (LACM); the San Diego Natural History Museum (SDNHM); the Santa Barbara Museum of Natural History (SBMNH) and the Smithsonian Tropical Research Institute (STRI), I found that only the LACM reports one lot of *C. neritoidea* (LACM 72-60.60) containing three worn specimens from Isla del Caño, Costa Rica, collected by J.H. McLean in March of 1972. In April 1993 I was a member of the Santa Barbara Museum of Natural History Expedition to the Golfo de Chiriquí, Panamá, which visited several islands including Isla Montuosa. No specimens of *C. neritoidea* were collected during the 10 days by expedition members, diving from the M/V *Undersea Hunter*.

Figured here is one of nine individuals collected during the 1998 Isla Montuosa Expedition at Isla Montuosa, Golfo de Chiriquí, Panamá, aboard the Smithsonian Institution's R/V *URRACÁ*. Eight of the nine specimens were found living on the exterior of healthy *Pocillopora* spp. colonies in 4.5 to 14 m. The largest specimen measures 36.6 mm in length and the smallest is 14.5 mm.

My appreciation goes to H.W. Chaney (SBMNH), M.H. Fortunato (STRI), L.T. Groves (LACM), C.M. Hertz (SDNHM),Julio Magaña (INBio), and to G.E. Metz (CASIZ) for searching their respective collections. My thanks to H.W. Chaney and the SBMNH for help in organizing the 1993 Expedition and to D.R. Robertson and STRI for the opportunity to participate in the 1998 Expedition.

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NOTICE AND COMMENTS ON A PAPER ABOUT S. C. T. HANLEY

EUGENE V. COAN[1]

Department of Invertebrate Zoology and Paleontology, California Academy of Sciences, Golden Gate Park
San Francisco, California 94118-4599, USA

ALAN R. KABAT

2401 Calvert Street, Washington D.C. 20008-2669, USA

NORRIS, ADRIAN & S. PETER DANCE
2002. Sylvanus Charles Thorp Hanley (1819-1899), a Nineteenth-Century dilettante of the shell world. Journal of Conchology 37(4): 363-382.

An important paper for bivalve systematists was recently published in the *Journal of Conchology* (Norris & Dance, 2002). This paper is a biography and analysis of the scientific contributions of Sylvanus Charles Thorp Hanley (1819-1899), who contributed to malacology through more than 50 papers and books published between 1840 and 1885. Hanley is particularly renowned for the four-volume work, *History of British Mollusca*, co-authored with Edward Forbes (Forbes & Hanley, 1848-1853). While Hanley described several gastropods, he is perhaps best known to readers of *The Festivus* for describing more than 220 species of bivalves, including a number from the eastern Pacific.

Norris & Dance are to be commended for their interesting account of Hanley's life, gleaned from the scattered and meager extant sources. It is disheartening to read of Hanley's careless approach towards the curation of historically important collections, i.e., those of Linnaeus and William Benson. No portrait of Hanley has yet been located. Tracking down his type specimens among the remnants of his collection is proving to be a daunting task that was not undertaken as part of their paper.

There are, however, significant problems with the bibliography of Hanley's papers and the list of his new taxa, and caution must be exercised in relying on them. In the first instance, Norris & Dance evidently did not use the collation of the *Proceedings of the Zoological Society of London* (PZSL) (Duncan, 1937); as a result, a number of Hanley's papers published in that journal are erroneously dated a year earlier than their actual publication date. Instead, Norris & Dance apparently relied on the dates on the volume covers, which are known to be unreliable. One PZSL paper was omitted from their bibliography (Hanley, 1843), although the new taxon described therein was included in their species list. Conversely, at least one paper in the *Proceedings of the Linnean Society, Zoology*, was dated later than its actual publication date (should be: Hanley, 1882). Most significantly, several new species contained in Hanley's *Lamarck's Species of Shells* (Hanley, 1842-1843) and his *An Illustrated and Descriptive Catalogue of Recent Bivalve Species* (Hanley, 1842-1856) (Figure 1), which were issued in parts over a several-year period, were omitted from the list of taxa. Determining the first description of these species requires care, because some were made available in these monographs before being published in the *Proceedings of the Zoological Society*, or vice versa. In other cases, new taxa described in these monographs were not published elsewhere. Yet other

[1] Mailing address: 891 San Jude Avenue, Palo Alto, California 94306-2640, USA.

AN

ILLUSTRATED AND DESCRIPTIVE

CATALOGUE

OF

RECENT BIVALVE SHELLS.

BY

SYLVANUS HANLEY,

B.A. OXFORD, F.L.S., ETC.

AUTHOR OF 'IPSA LINNÆI CONCHYLIA,' 'BRITISH MOLLUSCA' (SHELL PORTION), 'MONOGRAPH OF TELLINA,' ETC., ETC.

WITH 960 FIGURES BY WOOD AND SOWERBY,

FORMING AN

APPENDIX

TO THE

INDEX TESTACEOLOGICUS.

LONDON:
WILLIAMS AND NORGATE, HENRIETTA STREET,
COVENT GARDEN.

1842 TO 1856.

Figure 1. Copy of title page from Hanley (1842-1856).

new Hanley taxa in these monographs were described as manuscript names attributed to other authors, easily distinguishable by lacking a page reference to publications by those authors, and hence Hanley was the first to describe those species.

For example, the eastern Pacific *Lithophaga plumula* (Hanley, 1843) [as *Lithodomus*] was first described in the *Descriptive Catalogue* in late 1843, prior to its description in the *Proceedings of the Zoological Society* in 1844. *Periploma obtusa* Hanley, 1842, has its only appearance in one of the plates of *Lamarck's Species*; this taxon has been regarded as a junior synonym of the eastern Pacific *Periploma planiusculum* (G.B. Sowerby, 1834) but was omitted from the species list in Norris & Dance. In a brief survey, we found that the following Hanley bivalve taxa were omitted (with page numbers from the *Descriptive Catalogue*): *Crassina latisulcata* (87), *Cytherea nivea* (97), *Arca deshayesii* (157), *Modiola patagonica* (236), *M. cuneiformis* (237) and *Pteria listeri* (259).

Another important publication for which Norris & Dance omitted a number of new species, and provided inaccurate data on the publication dates, is the *Conchologia Indica* by Hanley & Theobald (1870-1876). This monograph, described as the "most comprehensive illustrated work on the land and freshwater molluscs of India" (Prashad, 1927: 129), was published over a six-year period, as evidenced by the contemporaneous citations in the *Zoological Record* and as subsequently determined by Prashad (1927: 129-130). Although Prashad's paper was published in an obscure journal, it was duly recorded in the definitive compendium of references on publication dates of natural history books (Griffin et al., 1936: 14). Instead, Norris & Dance used only "1876" for this monograph and those few species that they did list.

Norris & Dance (2002: 369) wrote that: "we have ignored many other scientific names associated with illustrations in the *Conchologia Indica* because they are not validly proposed." In fact, the overlooked names are all properly associated with illustrations. ICZN *Code* Article 12.2.7 expressly provides, for species names published before 1931, that "the proposal of ... a new species-group name in association with an illustration of the taxon being named" suffices to make such names available, assuming that they meet the linguistic requirements of ICZN Article 11.9. Further, many of these overlooked Indian species were properly attributed to Hanley & Theobald in the four-volume *The Fauna of British India, Including Ceylon and Burma: Mollusca* (Blanford & Godwin-Austin, 1908; Gude, 1914, 1921; Preston, 1915), such as *Succinea collina*, *Melania jugicostis*, *Cyclophorus phayrei*, and *Helix vidua*, among others.

Before a careful search for Hanley's types can be undertaken, the publication dates in the Norris & Dance bibliography will need to be re-checked and the aforementioned monographs carefully surveyed for additional missing taxa.

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

COME TO THE HAWAIIAN LUAU
SATURDAY, SEPTEMBER 14TH
4:00 P.M. — ?
IN THE MULLINER'S GARDEN

[THERE IS NO REGULAR MEETING THIS MONTH]

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting August 15, 2002

President Jules Hertz called the meeting to order at 7:45 p.m. and called for the approval of the minutes as published in *The Festivus*. Terry Arnold made the motion and it passed unanimously. There was no Treasurer's report. Terry mentioned that the party in September will be at the Mulliner's. The October program is not yet planned but Eric Hochberg will do a presentation on shell and nature printing in November and Dave Mulliner will speak in January.

Jules reminded everyone about the September Luau and passed around the sign-up sheet for food contributions with a Hawaii/Pacific Island theme [see second column, this page].

Terry then introduced the speaker for the evening, Dr. Daniel Geiger. Daniel spoke on his latest area of study - the Scissurellidae, a family of small shells and a sister group to the Haliotidae [abalone].

These little slit shells (though some are slitless) grow to a maximum of 6 mm but the usual size is 1-2 mm. They are found intertidally as well as in deep-sea waters and hydrothermal vents. Daniel reviewed the characters of the sub-families and genera and he found that the length of the selenizone (the slit band behind the slit) is not a useful character. There seem to be three distinct, somewhat consistent groups. He stated that the keel on the base is a strong diagnostic character and the umbilicus possesses some value. The slit, the foramen, was produced for anatomy purposes and it is a "driven trend", that is, the character change is not random. There is a lot of unavailable data from the radulae. There is a question remaining about three of the genera that could be another family based on radulae similarity.

The shell drawing winner was Twila. Thanks to Twila and Tom and Billee and George for the delicious homemade brownies and cookies. The meeting was adjourned at 8:45 p.m. and members enjoyed the refreshments and the social time.

Silvana Vollero

The Club's September Luau Saturday September 14th

On Saturday September 14th the Club's annual fall party will be held in Margaret and Dave Mulliner's garden. This year the party will have a Pacific Island theme. Festivities will begin at 4 p.m. and there will be island music, island food goodies and it is hoped that attendees will wear island type attire.

It has been awhile since the Club has had a "theme" party. It should be lots of fun, so plan on attending. If you have any questions or need directions, contact Carole and Jules Hertz (858-277-6259) and plan on attending!

Changes of Address

E-mail address changes

Forner, Monika, mforner@aol.com
Norrid, Charlotte, charnorrid@aol.com

A New Videotape for the Club Library

A videotape made during the 13th Annual MACNA meeting (aquarists) in August 2001 in Baltimore, Maryland, was donated to the Club library by John Jackson. The tape (tape 1 of the meeting) features the keynote address by J.E.N. (Charlie) Veron, PhD, world-renowned specialist on corals. His entertaining talk, "What are they, Where are they, Why?" gives a fascinating look at the state of the knowledge on corals and cutting-edge thoughts on evolution. It will be available for checking out at the October meeting.

IN MEMORIAM

Catherine (Rosemary) Adams

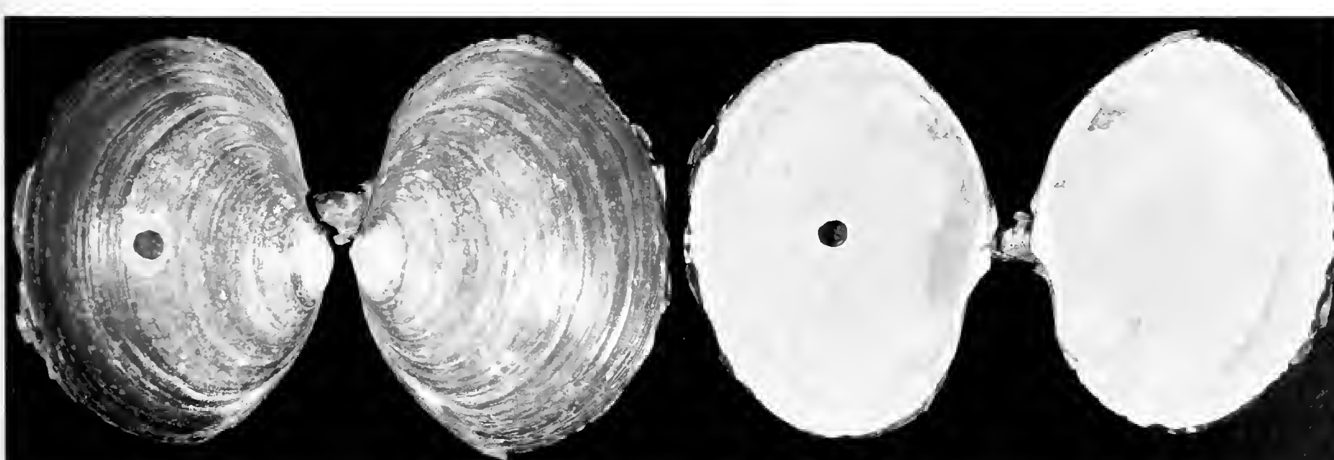
THE SEARCH FOR *NUTTALLIA OBSCURATA* IN PUGET SOUND (WASHINGTON STATE)

ROLAND C. ANDERSON

The Seattle Aquarium, 1483 Alaskan Way, Seattle, Washington 98101, USA
E-mail: roland.anderson@ci.seattle.wa.us

The dark mahogany clam, *Nuttallia obscurata* (Reeve, 1857), is also known locally as the purple varnish clam, a name claimed to be more descriptive (Mills, 2000). It appears to have been introduced into British Columbia waters in the late 1980s, as its first documented appearance in the Northeast Pacific was in 1991 (Forsyth, 1997) at Semiahmoo Bay (this date was erroneously reported in Forsyth (1997) as 1990 (Mills, 2000)). The clam is native to Japan and Korea (Coan, et al., 2000). It probably arrived in a ship's ballast water, a method known to disperse other alien organisms (Mills, 2000). Since then, it has spread throughout much of coastal British Columbia, being reported in Georgia Strait, Nanaimo, Victoria, and Barkley Sound (Gillespie, et al., 1999). It is now found all along the Oregon Coast (Monroe, 2001), but we don't know if it is spreading northward or southward. In Washington State, it has been reported at Pillar Point (Rice, 1999), the San Juan Islands (Mills, 2000) where it sometimes occurs in quantities of 700 per m^2(!), Chuckanut Bay (Mark Plunkett, pers. comm.), Jetty Island off Everett (ibid.) and the mouth of Hood Canal (Mills, 2000).

The clam is up to 55 mm long (Mills, 2000). It has a brown, shiny periostracum, reminiscent of the shells of *Solen sicarius* or a *Siliqua patula*. It is thin laterally and the inside of the shell is a distinctive, uniform, light-colored purple. The shiny periostracum, coupled with the uniform purple inside the shell make it distinctive from any other clam shell in the Northeastern Pacific (Figures 1, 2), so it is easy to spot on a clam beach. It lives fairly high in intertidal mud/sand or gravel that has considerable freshwater seepage (Harbo, 1999); Forsyth (1997) stated it prefers "copious freshwater run-off." It is frequently found above areas of the native littleneck *Protothaca staminea* (Conrad, 1837) and the manila clam *Venerupis philippinarum* (Adams & Reeve, 1850), another highly successful introduced species (Gillespie, et al., 1999). It is an edible clam (Gillespie, et al., 1999; Monroe, 2001) and it is possible it may be harvested in the future for human consumption. However, Mills (2000) warns that it is susceptible to paralytic shellfish poisoning, as are other clams of the area.



Figures 1, 2. *Nuttallia obscurata* (Reeve, 1857). (1) exterior view (2) interior view.

Mills (2001) asked the question, "Does anyone care?" about the dispersal of the purple varnish clam into Puget Sound. Maybe we can't do anything in response to its invasion, but I initiated a series of beach walks on Puget Sound beaches, surveying the clam shells present and specifically looking for the purple varnish clam. The surveys took place during the spring and summer of 2001. Each survey consisted of at least two participants looking for the clam (and others). The surveys were conducted on local Puget Sound beaches, from Whidbey Island south to the Purdy Spit in the southern end of Puget Sound. I decided to look for it on the east side of Puget Sound, primarily, for several reasons: ease of access, availability of public beaches, availability of volunteers to help, and because the clam's presence was already on the west side of Puget Sound (Mills, 2000). Most sites surveyed coincided with public parks, as many of Washington's tidelands are privately owned with no trespassing. The surveys occurred during minus low tides (tide levels below mean lower low water, arbitrarily set at the 0.0 foot level; tides lower than this are thus "minus tides"). Each survey noted the clam species present, mostly as shells on the substrate surface, but some horse clams, *Tresus capax* (Gould, 1850), and piddocks, *Zirfaea pilsbryi* Lowe, 1931, were noted as siphon shows on the surface of the sand, per Harbo (1997) - he euphemistically described such shows as "eyes looking out" after Native American usage. Each beach survey covered at least 2 km of beach at each site, with the exception of Shilshole Bay, which was a "pocket beach" approximately 200 m wide between two apartment buildings; though small, it was quite rich and diverse (see Table 1). Most of the beaches in this area of Puget Sound contained revetment at the high tide level as a result of a railroad right-of-way. Several aspects of the presence or absence of shells on these beaches were interesting. The shipworm, *Bankia setacea* (Tyron, 1863), was probably present on all beaches surveyed, in driftwood and pilings but was not noted as such. Geoduck shells, *Panopea abrupta* (Conrad, 1849), were rarely present, in fact, only seen on one beach. Geoducks are common subtidally in Puget Sound (Gordon, 1996) but rarer in the low intertidal zone and as the world's deepest digging clam, their shells may rarely be unearthed. Several bivalves were ubiquitous, occurring at all, or nearly all sites surveyed, notably *Mytilus trossulus* Gould, 1850, *Clinocardium nuttallii* (Conrad, 1837), and *Tresus capax* (Gould, 1850) (see Table 1).

The various species of clams present on an intertidal beach may reflect several important environmental factors of the beach, including substrate composition, presence or absence of freshwater run-off, the slope of the beach, the location of the beach in relation to offshore currents during high tides, the presence/absence of natural predators, the presence/absence of human clam digging efforts (although Discovery Park North and South, which is a preserve, did not seem to vary from other sites, such as Edmonds or the Purdy Spit, where numerous clam diggers were present) and the presence/absence of human-caused pollution. In fact, human clam digging efforts should expose buried clam species and damage or kill small or thin-shelled clams, which are thus not harvested and left to die and later to be seen by beach surveyors.

This survey as conducted cannot be considered to be thorough or exhaustive. Clams were not dug up from the beaches – their presence or absence was merely noted by their dead shells on the substrate. As such, this survey can only tell what animals were present at some time in the recent past, not what animals were present when the survey was conducted. Additionally, a beach might have only one *Solen sicarius* Gould, 1850, shell but might have hundreds or thousands of *Saxidomus giganteus* (Deshayes, 1839) shells; yet, each was just recorded as "present" (see Table 1). Clams bury themselves in the substrate (for the most part) and if an invasive species is dispersing into a new area, just looking for it by looking for its shells may not be conclusive, as the clams may be small, and they may remain buried, even when dead, but clams may be unearthed by human clam diggers harvesting for consumption and also may be eaten by natural predators. The two *N. obscurata* found at Double Bluff (see Table 1) were both drilled and eaten by the moon snail, *Polinices lewisii* (Gould, 1847) (Figure 1).

On the basis of this survey, it does not appear that *N. obscurata* has yet penetrated very far into Puget Sound. Its invasion southward appears to have slowed somewhat (Mills, 2000), for unknown reasons. However, on the basis of this survey, which found rich (abundant), diverse clam beds at Edmonds and at Shilshole Bay, these sites will be monitored in the future as places that *N. obscurata* are likely to be found.

Based on the number of references to this clam in the last 10 years, people are noticing its presence, an indication that they do care. At this time we can't do anything about its dispersal into Puget Sound. But we are watching for it.

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TABLE 1. Intertidal bivalves found on East Puget Sound beaches.

	DOUBLE BLUFF	MUKILTEO	EDMONDS	RICHMOND BEACH	CARKEEK NORTH	CARKEEK SOUTH	MEADOW POINT	SHILSHOLE BAY	DISCOVERY PARK N.	DISCOVERY PARK S.	DASH POINT	PURDY
Clincardium nuttallii	X	X	X	X	X	X	X	X	X	X	X	X
Crassostrea gigas	X		X	X			X	X				X
Macoma balthica	X				X	X		X	X		X	
M. inquinata	X	X	X	X	X	X	X	X	X	X		
M. nasuta		X		X		X	X	X	X	X	X	X
M. secta	X		X	X	X	X	X	X	X	X	X	
Mya arenaria	X	X	X	X		X	X	X	X	X		X
Mytilus cf. galloprovincialis			X					X				
M. trossulus	X	X	X	X	X	X	X	X	X	X	X	X
Nuttallia obscurata	X											
Panopea abrupta							X					
Pododesmus macrochisma	X	X	X		X		X	X		X		
Protothaca staminea	X	X	X	X	X	X	X	X	X	X		X
Saxidomus giganteus	X	X	X	X	X	X	X	X	X	X		X
Solen sicarius					X							
Tresus capax	X	X	X	X	X	X	X	X	X	X	X	X
T. nuttallii	X	X	X	X	X	X			X	X		
Venerupis philippinarum	X		X			X		X	X		X	X
Zirfaea pilsbryi							X					

ADDENDUM TO A REVISION OF *EUPROTOMUS* GILL, 1870 2. ON THE IDENTITY OF *STROMBUS HIRASEI* KURODA, 1942 (GASTROPODA: PROSOBRANCHIA: STROMBIDAE)

GIJS C. KRONENBERG

c/o Milieu Educatie Centrum, P.O. Box 435, NL-5600 AK Eindhoven, the Netherlands
E-mail: gijsckro@worldonline.nl

In my 1999 paper I stated that there were only two specimens of the hybrid *Euprotomus bulla* x *Euprotomus vomer* known to me., viz. the holotype (NSMT 60925) and a paratype also present in NSMT.

Only recently I found out about the existence of a third specimen, from a somewhat suprising locality, viz. Fiji. That specimen had been collected by Mr. and Mrs. W. Erich, and was first reported as early as 1966 by Cernohorsky as *Strombus vomer vomer*. The specimen reported was described by Cernohorsky (1966: 7) as follows:

> "The smaller specimen from Galoa-Korolevu [southern Viti Levu, GCK] is 65 mm long, has 11 whorls and 9 denticles on the lower part of the columella. The aperture is reddish-orange, sculptured with 12 white lirae posteriorly (central area is smooth) and 14 lirae anteriorly; the latter are short and do not continue inside the aperture. The edge of the outer lip is light pink, M[m]argins of the projection, stromboid notch and neighboring flange are lavender in color."

Cernohorsky also reports and illustrates (1966: 6, figs. 4, 4a; 7) a specimen of *E. vomer* from Fiji. Comparison of the description by Cernohorky, the original description by Kuroda (1942: 8) of *E. hirasei*, and the table presented by Kronenberg (1999: 65) as well as the illustrations by Cernohorsky (1966: 6, figs. 5, 5a) and the illustration of the holotype of *E. hirasei*, re-illustrated by Kronenberg (1999: 67, figs. 2, 5, 8) show that the specimen found between Galoa and Korolevu, Fiji, and *Strombus hirasei* Kuroda, are the same.

As both *E. vomer* and *E. bulla* occur in Fiji, the specimen described by Cernohorsky confirms the possibility of *E. hirasei* being a hybrid of *E. vomer* and *E. bulla*. The present whereabouts of the specimen reported by Cernohorsky are unknown to me, but it might be present in a museum in New Zealand.

Many thanks are due to Mr. Virgilio Liverani, Faenza, Italy, who brought the paper by Cernohorsky to my attention.

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REPORT OF THE WSM MEETING — 2002

JULES HERTZ[1]

Santa Barbara Museum of Natural History
2559 Puesta del Sol Road, Santa Barbara, California 93105-2936, USA

The 35th annual meeting of the Western Society of Malacologists took place at the Asilomar Conference Center, Pacific Grove, California, on 20-24 July 2002. There were 95-100 attendees (Figure 1), a significant increase over the previous year's attendance. This can be attributed to the beautiful setting at Asilomar and the very extensive program assembled by WSM's president Chris Kitting and treasurer Cynthia Trowbridge. The meeting began on the 20th with registration and an informal mixer after dinner. Chris Kitting welcomed the attendees and there was a special presentation, entitled "Seasons in the sun: a year in the Hong Kong intertidal" by Gray A. Williams from the University of Hong Kong. He had a marvelous slide presention showing the area around The Swire Institute of Marine Science and the general Hong Kong area and discussing the effect of the strongly seasonal climate on the rocky shore assemblages.

On July 21, the meeting began in earnest with a complete day of papers as part of the Ecology

Figure 1. A group picture of some of the attendees at the WSM — 2002 annual meeting. Photo: George Metz

[1] 3883 Mt. Blackburn Ave., San Diego, CA 92111, USA.

Symposium convened by Cynthia Trowbridge. All of the papers were of interest, but the two I enjoyed the most were "To drill or not to drill? Ecology and evolution of latitudinally variable predator-prey interaction" by Eric Sanford et al. and Kathryn L. Van Alstyne's paper, "Why life isn't always hotter, south of the border: latitudinal patterns in *Mytilus californianus* body temperature along the west coast of the U.S." In the first paper the authors investigated the predation of the whelk *Nucella canaliculata* on the mussel *Mytilus californianus* at 16 wave-exposed sites along the coasts of California, Oregon and Washington. The predation "changes from intense (south of Mendocino, CA), to weak (Northern CA), to nearly or entirely absent (Central Oregon coast), to stronger again (Northern WA)." An identical pattern was found in the laboratory using whelks from the 16 sites over a period greater than 300 days. They also found this behavior on whelks from different sites, hatched and reared on a common laboratory diet. DNA sequencing suggests "that the latitudinal variation in the whelk-mussel interaction may be driven in part by low gene flow among whelk populations, and spatially varying selection on drilling behavior."

The major social event took place on the evening of the 21st with a private wine and cheese reception at the Monterey Bay Aquarium's New "Outer Bay" Wing. This wing houses a fantastic jellyfish exhibit which is artistically accompanied by beautiful glass sculptures of jellyfish and other sea life, creative educational exhibits and of course magnificent tanks of many species of the live animals. Also in this wing is a huge tank containing large tuna, sharks, barracuda, a large turtle, a large sun fish and many other species. Many of us were sitting at tables around the tank eating our hors d'oeuvres and contemplating the quiet beauty of nature when a large tuna swam into the plexiglas wall. It sounded like an explosion; we were all stunned and all the fish in the tank swam wildly in all directions.

Carole Hickman and Carol Tang were co-convenors of the Paleoecology Symposium held on the 22nd from 8:20 am to 5:40 pm followed by contributed papers on ecology in the evening chaired by Roger Seapy. My favorite of the day was David H. Goodwin's paper, "Stable isotope and sclerochronologic analysis of environmental resolution in bivalve mollusk shells: A new approach for environmental reconstruction." He discussed isotopic and sclerochronologic variability in bivalve shells which provides an archive of the environmental conditions experienced during the lifetime of the animal. "These variables reflect numerous environmental parameters, including temperature, salinity, and seasonality." He analyzed stable isotope "variability from two live-collected specimens of *Chione cortezi* in conjunction with profiles of daily growth-increments and temperature records from the same site", but the analysis of the shells do not contain a complete record. He concluded that several species, specimens and years might be required to reconstruct the complete range of environmental conditions at a given locality.

Geerat J. Vermeij gave two interesting papers, one on the 22nd and one on the 23rd entitled "The paleoecology of extinction" and "Barriers: where are they, how do they work and what do they mean?" They were both philosophic and expounded his thoughts on the respective topics based on his vast knowledge of the subjects. It was fascinating to listen to his presentations and to his comments and questions throughout the meeting.

A Molecular Biogeography Symposium was convened by Jonathan Geller on the 23rd and was followed in the afternoon by a session of contributed papers on biogeography chaired by Ángel Valdés. There were many papers of interest to me. David R. Lindberg's talk, "Dangerous radicals and unsafe guides: a phylogenetic view of of rocky shore communities" was particularly humorous and interesting. He talked about some eastern Pacific limpets and gave a history of how he kept changing their genera during the last 30 years. Recent molecular and morphological phylogenetic analysis is changing his view of their relationships and consequently a reevaluation of rocky shore community composition, interactions, and history. "These reevaluations indicate that patellogastropod faunas are comprised of local radiations, invasions, and relicts, and that these different histories bring different sorts of evolutionary baggage with them." The Presidential Banquet was held on the evening of the 23rd with James Nybakken speaking on "Deep Observations." He related his feelings when diving in a deep submersible a number of years ago. The things that went wrong were many and the entire experience was scary. It was a very good talk but one left without a desire to repeat the adventure.

On the 24th, the last day of the conference, there was a special session on the History of Malacology. The most interesting was the "History of the classification of mollusks" by Benoit Dayrat. He covered all the thoughts on classification from Aristotle to the present day, including the major literature on the subject. Unfortunately, the time limit for his paper did not adequately allow him to cover the recent changes. James McLean concluded the session with “Images and research of diverse malacologists from meetings between 1969 and 1982.” This was an interesting trip and a nostalgic one for many of the older WSM members.

The 2003 meeting of WSM is scheduled for early June in Los Angeles and will be hosted by Ángel Valdés. The 2004 meeting is tentatively scheduled for Ensenada, Baja California, México.

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THE FESTIVUS

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MEMBERSHIP AND SUBSCRIPTION
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E-mail: cmhertz@pacbell.net *Website at: http://www.users.cts.com/crash/t/tarnold/SDSC/index.html*

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

PROGRAM

The Coral Reefs of Panama: Past, Present and Future

Dr. Nancy Knowlton, professor of marine biology at the Scripps Institution of Oceanography and director of the Scripps Center for Marine Biodiversity and Conservation, will speak on the geological history of Panama and its imprint on the characteristics of the organisms that live there today. She will then address the threats that these reefs currently face and prospects for solutions in the future.

Meeting date: 17 October 2002

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CLUB NEWS

The Club Luau
Saturday September 14th

On a beautiful Saturday afternoon/evening the Club's annual fall party was held in Margaret and Dave Mulliner's lovely garden. The party, with a Pacific Island theme, was a great success. Festivities began at 4 p.m. with island music, island food goodies and thirty people, many in "islandish" attire in attendance.

Wine, beer and soft drinks were available and the appetizers were mouth-watering — sushi, mango salsa (in a half pineapple) with chips and fresh fruit for a start — a great accompaniment to the happy conversations with old friends and new.

At about 6 p.m., a sumptuous buffet of luscious fruit salad, green salad, Chinese chicken salad, barbecued ribs, Hawaiian chicken, rice and more decorated the table. No one went away hungry. There was even an array of desserts and a big pot of coffee to end the meal.

Our thanks to our gracious hosts, Margaret and Dave Mulliner for making this party a special one.

Preliminary Notice of SCUM VII
(Annual Meeting of the
Southern California Unified Malacologists)

Saturday January 25, 2003, City of Laguna Hills Community Center, Heritage Room, 25555 Alicia Parkway Laguna Hills, (949) 707-2610; (949) 707-2680

General Program 8:30 - Noon

Continental Breakfast, Welcome and Introductions and Informal Presentations

Noon - 1:30 p.m.

No Host Lunch in Meeting Room, Special Art Show of Mollusk X-Rays, Tour Fossil Displays and Prehistoric Playground, Specimen Swap

(If you have specimens, publications, or photos to share with other Scummers, please bring them.)

1:30 p.m. till 3:30 p.m.

Afternoon Presentations will feature information on the large squid strandings of July 2002. Round Table Discussions, Announcements, and Photo Op will conclude the day.

Slide Projector, Easels, and Powerpoint facilities will be available; Questions or special audio visual requests, please contact Carol Stadum at (760) 944-6943 <cjstar1@earthlink.net>

News of the
WSM Student Grant Awards — 2002

The WSM Student Grants Committee has selected three projects for funding this year:

Christine L. Huffard (U.C. Berkeley)
The behavior and ecology of an undescribed member of the octopus (*Abdopus*) sub-genus from Sulawesi, Indonesia

Lisa Kirkendale (Univ. Florida)
Windows of opportunity: molecular phylogenetics and character trait evolution in the cardiid subfamily *Fraginae*

Reuben Paul (Cal. State Univ.)
DNA sequence test of the lined chiton (*Tonicella*) species complex

These grants were made possible by the generous contributions of WSM (individual members as well as the Society), the Santa Barbara Malacological Society, the Southwest Shell Club, the San Diego Shell Club, and the Northern California Malacological Club.

On behalf of WSM, I thank all the donors for their important contributions to the 2002 Student Grant Fund as well as Hank Chaney (Chair, Grant Committee) and the committee members for their consideration of proposals.

Cordially,
Cynthia Trowbridge, WSM Treasurer

IN MEMORIAM

FRANK PIERCE

NEW DISTRIBUTIONAL RECORDS FOR OPISTHOBRANCH MOLLUSKS FROM THE G0LFO DE CALIFORNIA, MÉXICO

ORSO ANGULO-CAMPILLO

Depto. de Biología Marina; Centro Interdisciplinario de Ciencias Marinas; Instituto Politécnico Nacional; Av. I.P.N. s/n, Col. Playa Palo de Sta. Rita, C.P. 23096, A.P. 592, La Paz, B.C.S., México
E-mail: mol@cromwell.com.mx

Although there have been a number of papers on the opisthobranch fauna of the Golfo de California in the past 35 years (Marcus & Marcus, 1967; Keen, 1971; Bertsch, 1970, 1971, 1972, 1980; Bertsch & Smith, 1970, 1973), they have provided little information on the large biodiversity present in the areas near Bahía de La Paz, Baja California Sur, México.

This paper reports significant range extensions for twelve opisthobranch species to the coast of southern Baja California, mainly in the Golfo de California. Voucher specimens of these species have been deposited in the Museo de Historia Natural de la Universidad Autónoma de Baja California Sur (MHNUABCS-INV), located in La Paz, B.C.S., and in the Department of Invertebrate Zoology and Geology of the California Academy of Sciences (CASIZ) in San Francisco, and the Natural History Museum of Los Angeles County (LACM), California.

ORDER SACOGLOSSA
FAMILY PLACOBRANCHIDAE

Elysia cornigera Nuttall, 1989
(Figure 1)

Material Examined: El Faro, South Point of Isla Cerralvo (24°08'45"N; 109°49'33"W), one specimen, 8 mm in length, subtidal in 3 m, under rock, 24 October 2001 (MHNUABCS-INV 1921), leg. Orso Angulo-Campillo.
Description and Discussion: The body color is dirty white, very warty; rhinophores robust at base but tapering to a smooth point. On close examination small dark granules appear all over the body. This species has only been reported from its type locality on the southern Florida Keys (Nuttall, 1989). This specimen represents the first record for this species in the eastern Pacific.

Elysia pusilla (Bergh, 1905)
(Figure 2)

Material Examined: Playa El Malecón, La Paz, B.C.S. (24°08'29"N;110°17'54"W), one specimen, 3 mm in length, subtidal in 1 m, under rock, 8 March 2000 (LACM 153068), leg. Ángel Valdés & P. McDonough.
Description and Discussion: The body color is "live green"; the parapodia are thin and closed over the body. The distal portion of the body is flattened. This species has been reported from South Africa (Gosliner, 1987), and from Japan to Australia (Marshall & Willan, 1999). This specimen represents the first eastern Pacific record for this species. Other elysiids known to occur in the Golfo de California are *E. diomedea* (Bergh, 1894) and *E. hedgpethi* Marcus, 1961.

FAMILY HERMAEIDAE

Placida cremoniana (Trichese, 1892)
(Figure 3)

Material Examined: Coral de Los Frailes, (23°24'46"N; 109°25'01"W), one specimen, 4 mm in length, subtidal, under rock, 28 August 2001 (MHNUABCS-INV 1919), leg. Orso Angulo-Campillo.
Description and Discussion: The body color is translucent orange. The bottom half of the cerata are the same translucent orange, the top half of the cerata are solid black. The rhinophores are rolled, the upper part of the head is black. This species has been reported in the Western Pacific from Japan to eastern Australia, and

in the Mediterranean (Rudman, 2000). This specimen represents the first record from the eastern Pacific.

ORDER NUDIBRANCHIA
FAMILY DORIDIDAE

Doris pickensi Marcus & Marcus, 1967
(Figure 4)

Material Examined: Calerita (24°20'46"N; 110°14'29"W), one specimen, 4.6 mm total length, intertidal, under rock, 20 October 2000 (MHNUABCS-INV 1918), leg. Orso Angulo-Campillo; one specimen, 9 mm total length (dissected), intertidal, under rock, 10 December 2000 (CASIZ 157155), id. Sandra Millen; 2 specimens 7 mm and 8 mm total length, intertidal, under rock, 10 December 2000 (CASIZ 157154), id. Sandra Millen.

Description and Discussion: The body is covered with small papillae, each with a big spicule. The rhinophores have 10 leaves. The color is light yellow with tinges of brown in the notum (Marcus & Marcus, 1967). This species has been reported only from the type locality of Puerto Lobos, Sonora, México (Marcus & Marcus, 1967). These specimens represent a southward range extension of over 800 km.

FAMILY CHROMODORIDIDAE

Cadlina flavomaculata MacFarland, 1905
(Figure 5)

Material Examined: El Faro, south point of Isla Cerralvo (24°08'45"N; 109°49'33"W), one specimen, 2.5 mm in length, subtidal in 3 m, under rock, 21 November 2000, leg. Orso Angulo-Campillo. South of Punta Pericos (24°01'35"N; 109°48'21"W), one specimen, 8 mm in length, subtidal in 3.2 m, under rock, 9 August 2001 (MHNUABCS-INV 1917), leg. Orso Angulo-Campillo.

Description and Discussion: The black rhinophores and the yellow spots on each side of the mantle margin are diagnostic features of this species (Behrens, 1991). The previously known geographic range was from Vancouver Island, British Columbia, Canada, to Bahía Tortugas, B.C.S. (Behrens, 1991). The specimen represents a southern range extension of over 1,000 km, and the first record from the Golfo de California.

FAMILY POLYCERATIDAE

Polycera zosterae O'Donoghue, 1924
(Figure 6)

Material examined: Ensenada de Muertos, B.C.S. (23°59'05"N; 109°49'51"W), one specimen, 11 mm in length, found in a plastic box, subtidal 3 m depth, 23 March 2002 (MHNUABCS-INV 1920), leg. Orso Angulo-Campillo.

Description and Discussion: The body color is translucent grayish to brown with numerous small, brown to black dots. The body bears numerous low tubercles which are grayish-white, encrusted with yellow and dark brown dots. The previously known geographic range was from Vancouver Island, British Columbia, to Bodega Bay, Sonoma County, California (McDonald & Nybakken, 1980). This specimen represents a southern range extension of over 1,000 km, and the first record from the Golfo de California. Previously known *Polycera* species in the Golfo de California include *P. alabe* Collier & Farmer, 1964; *P. atra* MacFarland, 1905; and *P. hedgpethi* Marcus, 1964.

Tambja fusca Farmer, 1978
(Figure 7)

Material Examined: Laguna Ojo de Liebre, B.C.S. (27°47'10"N; 114°16'28"W), one specimen, 23 mm in total length, subtidal in 7 m on oyster, 15 November 2001 (MHNUABCS-INV 1918), leg. Liliana Hernández and Marcial Arellano.

Description and Discussion: The body color is green with mustard-colored bands along the edges of the body. The species was previously known only from the Golfo de California (Behrens, 1991). This specimen represents a northern range extension and the first record from the outer coast of Baja California Sur.

SUBORDER AEOLIDIINA
FAMILY TERGIPEDIDAE

Cuthona albocrusta (MacFarland, 1966)
(Figure 8)

Material Examined: Punta Pericos (24°01'28"N; 109°48'13"W), one specimen, 1.5 mm total length, intertidal, under rock; 23 November 2000 (MHNUABCS-INV 1914), leg. Orso Angulo-Campillo.

Description and Discussion: The white frosted markings on the body and the cerata are specific diagnostic characters (Bertsch et al., 2000). The previously known range of this species was from Cordova, Alaska (Goddard, 2000) to Bahía Tortugas, B.C.S. (Bertsch et al., 2000). This specimen represents a southward range extension of approximately 1,100 km, and the first record of this species from the Golfo de California.

FAMILY FLABELLINIDAE

Flabellina vansyoci Gosliner, 1994
(Figure 9)

Material Examined: North of Punta Pericos (24°08'08"N; 109°48'50"W), 3 specimens collected, 6, 7 and 22 mm in length, found on the ceiling of a small crevice, subtidal in 2.5 m, 7 August 2001 (MHNUABCS-INV 1916), leg. Orso Angulo-Campillo, and 2 observed specimens, 5 and 14 mm in length.
Description and Discussion: The body is thin, elongate and red-colored and the cerata are flecked with white. The previously known range of this species was from Punta Malarrimo, B.C.S. (Bertsch et al., 2000) to Panamá. The specimens represent the first reported presence of the species within the Golfo de California.

FAMILY EUBRANCHIDAE

Eubranchus steinbecki Behrens, 1987
(Figure 10)

Material examined: Ensenada de Muertos, B.C.S. (23°59'05"N; 109°49'51"W), one specimen, 6 mm in length, found in a plastic box, subtidal in 3 m, 1 March 2001 (CASIZ 157156), leg. Oscar Trujillo-Millan, id. Sandra Millen. Marina La Paz, B.C.S. (24°08'29"N;110°17'51"W), one specimen, 4 mm in length, found under dock, 29 June 2002, leg. Orso Angulo-Campillo (not collected).
Description and Discussion : The body is elongate, the color tan with dark olive-green mottling. The cerata are irregular, nodular and cream-colored (Behrens, 1987). This species has been reported only from Mission Bay, San Diego, and Palos Verdes, California (Behrens, 1987). These specimens represent a significant southward range extension of over 2,000 km, and the first record of this species from Mexican waters.

Eubranchus cucullus Behrens, 1985
(Figure 11)

Material Examined: Las Cruces (24°13'01"N; 110°05'08"W), one specimen, 9 mm total length, subtidal in 5 m on *Agalophenia* sp; 30 June 2001 (U.B.C., Invertebrate Museum #6-30-01-B), leg. Sandra Millen, Islas Marietas (20°42'42"N, 105°33'4.6"W), one specimen, 6 mm total length, subtidal in 9 m, same locality, 29 April 2002, leg. Alicia Hermosillo and Sandra Millen (not collected).
Description and Discussion: The body is elongate, the ground color is tan with light olive mottling. The cerata are cylindrical and irregularly inflated. The head and rhinophores are red-colored. The rhinophores are long, smooth, and tapering to a blunt tip. This species had been reported only from its type locality at Isla Ángel de La Guarda, B.C. (Behrens, 1985). These specimens represent a southward range extension of over 2,000 km, and only the second report since its original description.

FAMILY FACELINIDAE

Phidiana mariadelmarae García & Troncoso, 2000
(Figure 12)

Material Examined: Near Pichilingue (24°16'10"N, 110°19'25"W), 2 specimens, 18 and 24 mm total length; in plastic mesh, subtidal, 13 October 2000 (MHNUABCS-INV 1915), leg. Oscar Trujillo-Millan.
Description and Discussion: A fine, white longitudinal line extends mid-dorsally from the anterior end of the cardiac region to the level of the rhinophoral base, where it bifurcates and runs up each rhinophore (García & Troncoso, 2000), overall body coloration is pinkish. This species has been reported only from Panamá (García & Troncoso, 2000). This specimen represents a significant northward range extension of over 2,000 km, and is the first report of this species from Mexican waters.

ACKNOWLEDGMENTS

This paper is dedicated to all the people who gladly helped me during the field trips. I especially would like to extend my gratitude to Sandra Millen, Hans Bertsch, Ángel Valdés and Bill Rudman who corroborated the identifications and allowed me to use some of their photos. Carol Skoglund made contributions to the manuscript and Ali Hermosillo gave helpful comments.

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Figures 1-12. (1) *Elysia cornigera* Nutall, 1989 (2) *Elysia pusilla* (Bergh, 1905) (3) *Placida cremoniana* (Trichese, 1892) (4) *Doris pickensi* Marcus & Marcus, 1967 (5) *Cadlina flavomaculata* MacFarland, 1905 (6) Polycera zosterae O'Donoghue, 1924 (7) *Tambja fusca* Farmer, 1978 (8) *Cuthona albocrusta* (MacFarland, 1966) (9) *Flabellina vansyoci* Gosliner, 1994 (10) *Eubranchus steinbecki* Behrens, 1987 (11) *Eubranchus cucullus* Behrens, 1985 (12) *Phidiana mariadelmarae* García & Troncoso, 2000. →


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AMERICARDIA PLANICOSTATA (G. B. SOWERBY I, 1833), AN OLDER NAME RETURNS (BIVALVIA: CARDIIDAE)

EUGENE V. COAN[1]

Department of Invertebrate Zoology & Geology, California Academy of Sciences
Golden Gate Park, San Francisco, California 94118-4599, USA

Abstract The Panamic cardiid most recently known as *Americardia guanacastense* (Hertlein & Strong, 1947) should be called *Americardia planicostata* (G. B. Sowerby I, 1833), because it was unnecessarily renamed by Hertlein and Strong. *Cardium magnificum* Carpenter, which has also been used for this species, was published in the synonymy of *Americardia biangulata* and never subsequently made available, so it must continue to be listed as a synonym of that species.

This reasonably common Panamic cardiid was first described by G. B. Sowerby I, in Broderip & G. B. Sowerby I (1833: 83), as *Cardium planicostatum* (Figures 1, 2). Hertlein & Strong (1947: 140-141) proposed a new name, *Cardium* (*Americardia*) *guanacastense*, because they believed that Sowerby's name was a primary homonym, "*non Cardium planicostatum* Sedgwick & Murchison, 1829". Whereas Hertlein & Strong's treatment of the species begins as the description of a new species, with a new type specimen and type locality, they state that "a new name is required for *Cardium planicostatum* of Sowerby and the name of *Cardium guanacastense* ... based upon a type from Culebra Bay, Costa Rica, is here proposed". The matter of the type material is a further complication: pursuant to ICZN *Code* Art. 72.7, particularly because they expressly used the term "new name", their type material (now CASIZ 065550) has no type status, and the only type material would be that of Sowerby (BMNH 20020251).

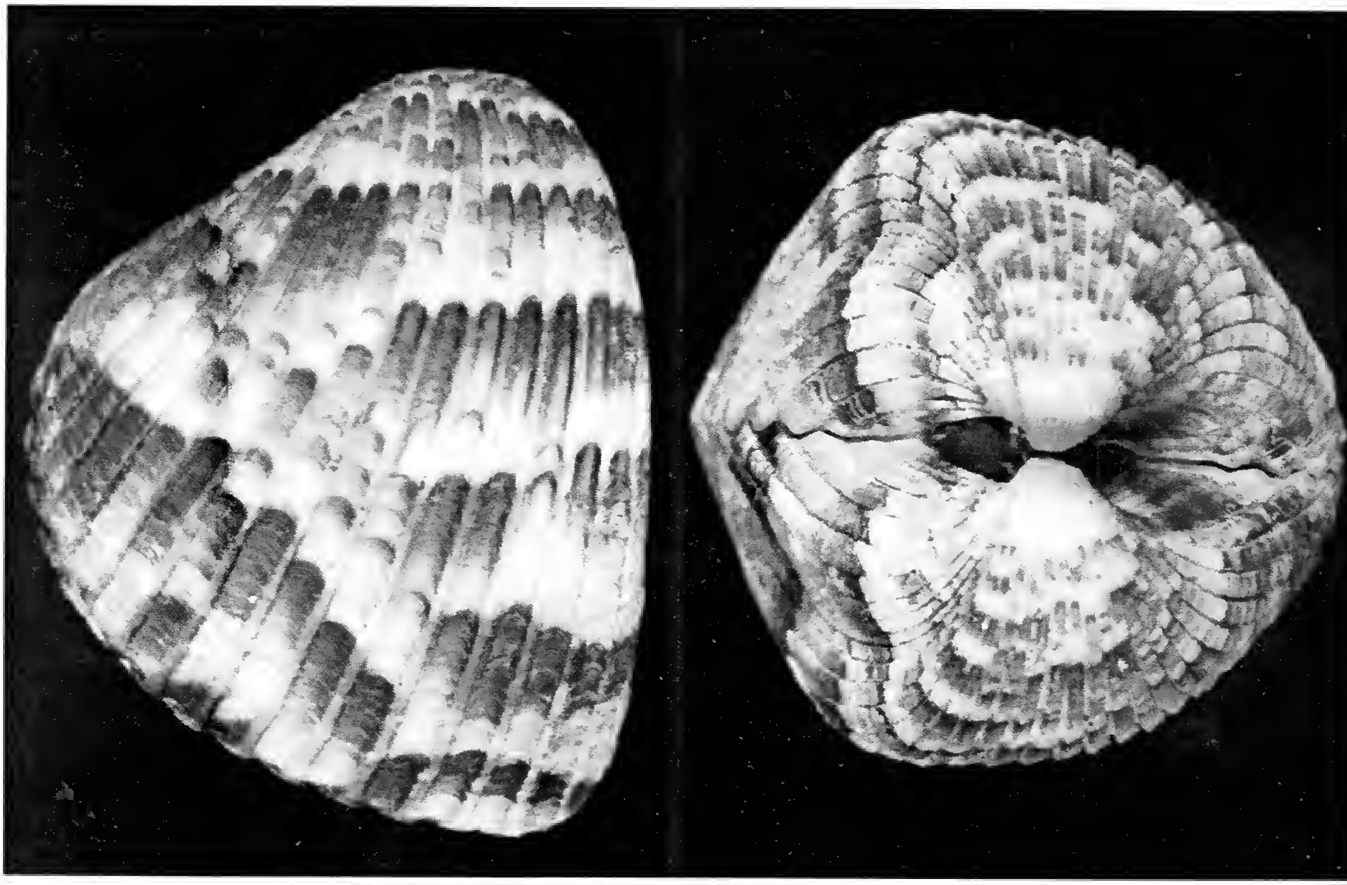
Uncharacteristically, Hertlein and Strong did not provide a citation for the supposed senior homonym, instead they quoted Dall (1901: 390), who referred the species to *Cardium* (*Trigoniocardia*) *magnificum* (Carpenter, 1857, *ex* Deshayes ms), with the words, "This is *Cardium planicostatum* Sowerby, 1833, not of Sedgwick and Murchison, 1829", but Dall also failed to provide a citation of the senior homonym.

Puzzled about the lack of information regarding the supposed senior homonym, I consulted Sherborn's (1902-1933) *Index Animalium*, but found no citation there. After a considerable search, the source of this earlier name was located. It was first included in a list of fossil species from the eastern Alps prepared by James de Carle Sowerby in a paper by Sedgwick and Murchison, evidently published in 1832, citing the article's plates. However, the plates seem not to have been published in 1832, so the name is here a *nomen nudum*, first becoming available only with the publication of the plates and plate explanations of the article in 1835 (ICZN *Code* Art. 12.2.7). It is, thus, a junior homonym of the Panamic species name.

In conclusion, because there never was a senior homonym of G. B. Sowerby I's name, and *Cardium guanacastense* was an unnecessary replacement, we can revert to the oldest available name. Whereas the name *Cardium planicostatum* has not been used as a valid name since 1900 (ICZN *Code* Art. 23.9.1.1), the junior, unjustified replacement, *Cardium guanacastense*, has not been used as extensively as called for by ICZN *Code* Art. 23.9.1.2, to require that prevailing usage be maintained.

Finally, a word of explanation is necessary about Dall's use of the name *Cardium magnificum* Carpenter, 1857. This name appears as a *nomen nudum* in Carpenter (1857: 187) in the synonymy of *Cardium biangulatum* (Broderip & G. B Sowerby I,

[1] Mailing address: 891 San Jude Ave., Palo Alto, CA 94306-2640, USA.



Figures 1, 2. *Americardia planicostata* (G.B. Sowerby I, 1833). H: 28.9 mm. Isla Pedro Gonzales, Islas las Perlas, Panamá. Leg. J. Ernest, April 1984. Skoglund Collection (1) exterior view of valve (2) view of exterior of hinge area. Photos: D.K. Mulliner.

1829, and was never subsequently made available. It must, therefore, be listed as a synonym of that separable species of *Americardia*.

ACKNOWLEDGMENTS

I appreciate the help of Alan R. Kabat in locating the J. de C. Sowerby species and of Gary Rosenberg for advice on the nomenclatural solution to this problem. I thank Carol Skoglund for providing the specimen for photography and to David K. Mulliner who took the photographs.

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2003 SHELL SHOWS & RELATED EVENTS

Compiled by Donald Dan, COA award chairman

6704 Overlook Drive, Ft. Myers, FL 33919, USA
E-mail: donaldan@aol.com

Jan. 17-19 SPACE COAST SHELL FESTIVAL, Melbourne, FL
The Melbourne Auditorium, 625 E. Hibiscus Blvd. Jim & Bobbi Cordy, 385 Needle Blvd. Merritt Is., FL 32953
E-mail: cordy@yourlink.net (321) 452-5736

Jan. 31-Feb. 2 BROWARD SHELL SHOW, Pompano Beach, FL
Pompano Beach Recreation Center, NE 18th Av. & NE 6th St.
Jim VunKannon, 2219 NE 16th Court Ft. Lauderdale, FL 3330
(954) 561-0120

Feb. 7-9 SARASOTA SHELL SHOW, Sarasota, FL
Sarasota Municipal Auditorium, Tamiami Trail, Lynn Gaulin, 3417 58th Ave., W. Bradenton, FL 34210
E-mail: ehgaulin@worldnet.att.net (941) 755-1270

Feb.14-16 NAPLES SHELL SHOW, Naples, FL
The Nature Conservancy, 14th Avenue N., Gary Schmelz, 5575 12th Ave. SW, Naples, FL 34116
E-mail: schmelz@att.net (941) 455-4984

Feb. 21-23 ST. PETERSBURG SHELL SHOW, Treasure Is., FL
Treasure Is. Community Center, 1 Park Place, Bob & Betty Lipe, 348 Corey Avenue, St. Petersburg Beach, FL 33706 (727) 360-0586; FAX: 360-3668, E-mail: rlipe1@tampabay.rr.com
Exhibit accepted at web site: http://web.tampabay.rr.com/shellclub

Mar. 7-9 SANIBEL SHELL SHOW, Sanibel, FL
Sanibel Community Center, Periwinkle Way, Anne Joffe, 1163 Kittiwake Circle, Sanibel, FL 33957
E-mail: Sanibel@aol.com (239) 472-3151

Mar. 13-15 MARCO ISLAND SHELL CLUB SHOW XXII, Marco Is., FL, Wesleyan United Methodist Church, Barfield Road, Jean Sungheim, P.O. Box 633 Marco Island, FL 34146
(941) 642-7247

Mar. 1-2 XVeme RECONTRES INTERNATIONALES DU COQUILLAGE
Espace de Blanc Manteaux, 48 rue Vieille-du-Temple, Paris, France, M. & D. Wantiez, 88, Rue du General Leclerc, 95210 Saint Gratien, France
E-mail: wantiez.mada@libertyserv.fr 33 (1) 34-17-00-39

May 3-4 XIII BELGIUM INTERNATIONAL SHELL SHOW, Antwerp, Belgium, Schijnpoort, Schijnpoort Straat
R. De Roover, Vorsterslaan 7, 2180 Ekeren-Donk, Belgium
E-mail: bvc.deroover@village.uunet.be 32 (3) 644-3429

May 3-4 CENTRAL FLORIDA SHELL SHOW, Orlando, FL
Central Florida Fairgrounds, Exhibition Hall A, 4603 W. Colonial Drive, Phyllis Gray, 1212 S. Eola Drive, Orlando, FL 32806
E-mail: pgray@kennesaw.lawco.com (407) 422-0253

May 24-25 SUNCOAST CONCHOLOGISTS SHELLERS' JAMBOREE, Largo, FL, Honeywell MinnReg Building, 6340 126th Ave. North, Largo, FL, Sharlene Totten, 2252 Springflower Drive, Clearwater, FL 33763
E-mail: CEShell@aol.com (727) 734-2029

Jun. 20-22 GULF COAST SHELL SHOW, Panama City, FL
(Date & location subject to confirmation)
Linda Brunner, P.O. Box 8188, Southport, FL 32409
E-mail: liji@earthlink.net (850) 265-5557

Jun. 26-29 AMERICAN MALACOLOGICAL SOCIETY MEETING, Ann Arbor, Michigan, Diarmaid Ó Foighil, Univ. of Michigan, Museum of Zoology, 1109 Geddes Avenue, Ann Arbor, MI 48109 E-mail: diarmaid@umich.edu (734) 647-2193

Jul. 12-13 KEPPEL BAY SHELL SHOW, Yeppoon, Queensland, Australia, Jean M. Offord, 277 McDougall St., N. Rockhampton, Qld. 4701, Australia 61 (7) 4928-3509

Jul. 17-21 CONCHOLOGISTS OF AMERICA ANNUAL CONVENTION, Tacoma, WA
Tacoma Sheraton Hotel, Tacoma, Tom Rice, P.O. Box 62, Port Gamble, WA 98364, E-mail: ofseashr@sinclair.net (360) 297-2426

Jul. 19-20 TOWNSVILLE SHELL SHOW, Townsville, QLD,
Cutharinga Bowls Club on Harold Street, West End, Glenda Rowse, 19 Farrell Street, Kirwan 4814, Queensland, Australia
61 (7) 47 73 28 17

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THE FESTIVUS

A publication of the San Diego Shell Club

Volume: XXXIV November 14, 2002 Number: 11

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The publication date appears on the masthead above.
Single copies of this issue: $5.00 plus postage.

E-mail: cmhertz@pacbell.net *Website at:*
http://www.users.cts.com/crash/t/tarnold/SDSC/index.html

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

PROGRAM

NATURE PRINTING WITH SHELLS.

Eric Hochberg, Curator of Invertebrate Zoology at the Santa Barbara Museum of Natural History and accomplished nature printer, will give a brief lecture on the history and techniques of nature printing which will be followed by hands-on exercise using scallop shells as templates for creating prints from nature.

All supplies will be provided: shells, inks, papers, brushes, etc.

Meeting date: 21 November 2002

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting October 17, 2002

President Jules Hertz welcomed everyone and called the meeting to order. He called for the approval of the minutes as published in *The Festivus*. There was no Treasurer's report. In Vice President Terry Arnold's absence, Jules mentioned that Eric Hochberg, an expert on octopus, is giving a presentation on nature printing at the November meeting and Dave Mulliner will speak in January. Editor Carole Hertz asked for articles and reminded everyone that dues for next year are now due. Margaret Mulliner notified the club that she is missing a cake server from the September Party.

Jules presented the proposed slate of officers for 2003. It is: Carole Hertz, President; Larry Lovell, Vice-President; Silvana Vollero, Treasurer; Marilyn Goldammer, Corresponding Secretary. Jules will be Past President and we still need a Recording Secretary. Nominations from the floor and election of officers will take place at the November meeting and the installation of officers will occur at the Christmas Party.

The Christmas Party will again be at the Ramada Inn and Conference Center on December 7th this year and cost $25.00/person. Richard Hermann will give a special slide presentation at the event [see col. 2].

Jules introduced the speaker for the evening, marine biologist, Nancy Knowlton. Dr. Knowlton began her talk by explaining a bit about the history of Panama, what occurred in the reef areas and the implications for the marine organisms. Geographic isolation of species occurred when the water stopped passing between the eastern Pacific and the Caribbean about three million years ago. New species formed though there are about twenty sister species. The waters are very different with the Caribbean being warm and conducive to coral reefs and the Pacific having variable temperatures.

Prior to 1980, about 50% of the bottom of the Caribbean was living coral. Then, in 1980 a hurricane destroyed much of the coral. In 1983, a disease wiped out 99% of the sea urchin population. As a result, the seaweed grew out of control. A third problem was coral bleaching, a stress reaction from global warming. Interestingly, bleaching is a bigger problem in deeper water. Coral is sensitive to warmth and light. The fourth problem was disease of the coral. Living coral went from 50% to 5% of the sea bottom.

With fewer coral, reproduction is more difficult. Coral spawning occurs only one time each year and at the same time all over. It is a fascinating process to watch. In conclusion, Nancy said that there are many factors destroying the reefs and that the ecosystem will not bounce back quickly. More is needed than just protected marine areas. On a positive note, the north coast of Jamaica is seeing a resurgence of sea urchins.

The shell drawing winner was Carole. Thanks to Silvana Vollero for the delicious cookies and Nancy and Bill Schneider for bringing in their fossil display. The meeting was adjourned at 8:45 p.m.

Silvana Vollero

The Club's Annual Christmas Party

The Club's Christmas Dinner Party will be held on Saturday evening December 7th in the Lisbon Room of the Ramada Inn & Conference Center [see enclosed sheet]. A social hour and no-host cocktails will begin at 6:00 p.m. Dinner will be served promptly at 7:00 p.m. and following dinner and the installation of officers, there will be a special slide program by award-winning photographer and member Richard Herrmann.

The dinner menu offers a choice of two entrees and two desserts and table wine will be provided by the Club, as always. The entree choices are: Blackened Mani Mahi or Chicken Italiano, each with garlic rosemary potatoes and vegetable medley. [Vegetarian entrees are available also.] Dessert choices are: Amaretto cheesecake or cherry pie. Dinners include bread and butter, salad, dessert and coffee or tea.

The total cost for the evening, including tax and gratuity is $25 per person. Reservations, with checks, are needed by Monday December 2nd at the latest. Please indicate on your check your choice of entree and dessert.

Remember, the Club's traditional gift exchange will, of course, be held. Bring your gift-wrapped shell with data inside only. Put just a very general locality (i.e. eastern Pacific, Caribbean, etc.) on the outside. (Only those who bring a gift can choose one from under the tree!) For further information contact Carole & Jules Hertz [858-277-6259] or e-mail: <cmhertz@pacbell .net>

The Club's party is a wonderful way to welcome the holiday season – don't miss it!

NOTES ON THE RARE BUCCINID *BERINGIUS CREBRICOSTATUS* (DALL, 1877)

ROGER N. CLARK[1]

Field Associate, Los Angeles County Museum of Natural History,
900 Exposition Blvd., Los Angeles, California 90007, USA
E-mail: insignis@charter.net

Beringius crebricostatus (Dall, 1877) (Figures 1-3) is one of the truly rare and magnificent shells of Alaska. Indeed, a search of the country's natural history museums as well as the University of Alaska Museum (UAM) in Fairbanks revealed just nine specimens (including the type), only two of which were live taken. The literature is also sparse concerning this species.

Described in 1877 as *Chrysodomus crebricostatus*, Dall (1886) later used this species as the type for a new genus, *Beringius*, and gave the distribution as Unalaska to the Shumagin Islands. Abbott (1974) gives the distribution as "Aleutian and Shumagin Is." at depths of "80-100 fms", undoubtedly following Dall. Kosuge (1972) illustrated the type; however, a very fine drawing of the species appeared in Dall (1902) and has been reproduced in numerous references since. Baxter (1987) records finding the species in the Aleutians. However, Baxter's specimen, now at the Los Angeles County Museum of Natural History (LACM) is, in fact, *Beringius undatus* Dall, 1919, a similar and quite variable species. Vermeij et al. (1990) does not list it, and nothing else on this species is recorded in the literature.

Over the past several years my work as a commercial fisherman (1981-1990) and fisheries biologist (invertebrate specialist) for the National Marine Fisheries Service (NMFS) since 1993, has afforded me several opportunities to search for this elusive species. On 5 May 1985, the fishing vessel F/V *La Fonte* brought up a small, living specimen taken in northern Umnak Pass, off the NW end of Unalaska Island at a depth of about 100-150 m.

On 21 June 1993, I had the opportunity to do some intertidal collecting in the protected cove inside of Eider Point, on the west side of the entrance to Unalaska Bay, Unalaska Island, Alaska. There I was surprised to find two dead specimens of this elusive species. Three years later, on 19 May 1996, I was again at Unalaska and chartered a boat out to Eider Point for a single SCUBA dive. On this dive, I collected a single living specimen of *B. crebricostatus* at 3 m depth on the side of a large cobble. In 1997, I made two more dives at Eider Point, one on 26 June and the other on 2 July at depths of 3-10 m, and observed more than two dozen live animals, many in the act of spawning. Eleven specimens ranging from 23-110 mm in length were collected (Figures 3, 8). Egg-laying individuals and egg capsules were not disturbed. One live taken and two dead shells (one a juvenile) are deposited as vouchers at the LACM (152709) and another small, live-taken specimen (in alcohol) is deposited in the National Museum of Natural History (USNM 892325). Two additional specimens, one 133.5 mm long (Figures 1, 2) were recovered that year on 13 June by the R/V *Dominator* (NOAA/ NMFS chartered fishing trawler) on the triennial Aleutian trawl survey north of Cape Cheerful, Unalaska Island, at a depth of 90 m. Another specimen was taken on 22 May 2000 by the same vessel at a depth of 91 m off the NE coast of Unalaska. A single specmen was observed at Eider Point on 9 May 1999 at a depth of 5 m. This specimen was in a growth phase and had a very thin lip. On 2 October 2001, two dives were made at Eider Point but only a single dead specimen was observed.

It may be that *Beringius crebricostatus* is a deeper-water species (>30 m) and that the animals come in to the shallow waters to spawn in the late spring and

[1]1839 Arthur Street, Klamath Falls, Oregon 97603, USA.

summer. This behavior has been noted in the related *B. kennicotti* (Dall, 1871) in southeastern Alaska as well (Clark, unpublished notes). Egg capsules are disc-shaped, about 2 cm^+ in diameter and attached at one edge to rocks in single, spaced rows. Each capsule contains a single juvenile.

The material studied indicates that *B. crebricostatus* is a short-range, endemic species with its distribution centered on the north (Bering Sea) side of Unalaska Island. A single dead specimen (USNM 1122716) was taken at 102 m in Unimak Pass, about 70 km east of Unalaska Island. Despite more than 2000 trawls made by NMFS in the Aleutian and Shumagin Islands from 1988-2000, and a small amount of intertidal and SCUBA exploration in the region, no additional specimens have been recovered. The distribution is here defined as Unimak Pass (165° W to 167°30'W). *Beringius crebricostatus* is one of many Aleutian short range, endemic buccinid species (Clark, unpublished notes). The habitat of *B. crebricostatus* in shallow water (3-10 m) is among large cobbles and boulders; in deeper waters (90-182 m) this animal lives on sand and cobble bottoms.

Beringius crebricostatus is often confused in collections with the similar and rather variable *B. undatus* Dall, 1919 (Figures 4-7). However, it may be distinguished from all the forms of *B. undatus* by (1) the lack of prominent axial ribs or undulations and (2) the fewer (3-4, rarely 5 on spire whorls) very heavy spiral ribs, which are relatively flat-topped and T-shaped in cross section.

Dall described *B. undatus* as a subspecies of *B. crebricostatus*. However, based on the present concept of a species, this cannot be the case, since the range of *B. undatus* completely overlaps that of *B. crebricostatus* extending from Washington to Kamchatka at depths of 50-250 m, where it is found on both soft and hard bottoms.

ACKNOWLEDGMENTS

I am grateful to the following people for their help in researching this project: Dr. James H. McLean and Mr. Lindsey Groves (LACM); Mr. Paul Valentich Scott and Dr. Henry W. Chaney (SBMNH); Mr James Cordeiro (AMNH); Mr. Mark Kitson (ANSP); Dr. M.G. Harasewych and Mr. William Geoff Keel (USNM) and Mrs. Nora Foster (UAM). I also thank Jennifer Butikofer (Klamath Falls, Oregon) for help with the figures.

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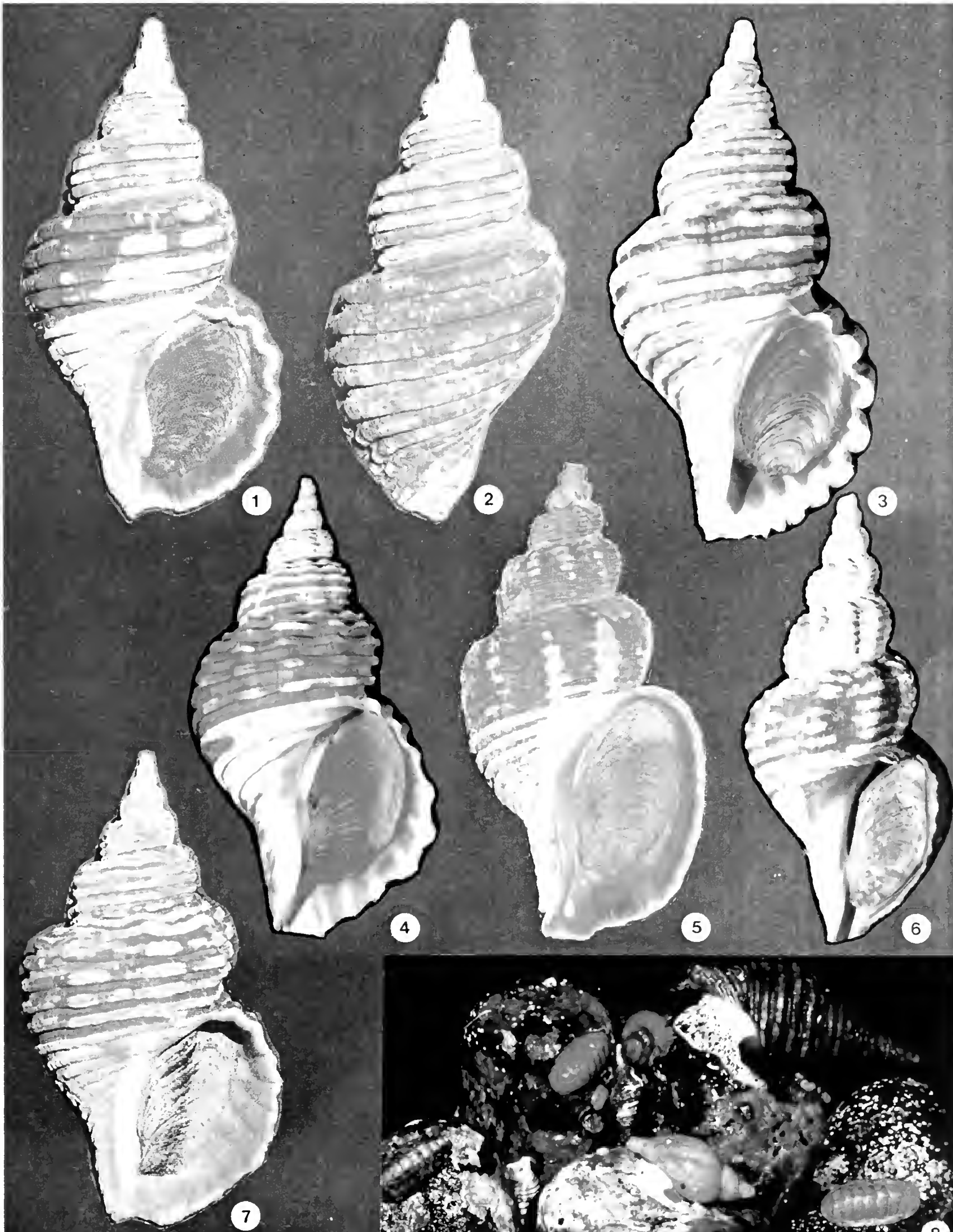
Figures 1-3, 8. *Beringius crebricostatus* (Dall, 1877). (All specimens in R.N. Clark Collection). **[1, 2]** Cape Cheerful, Unalaska Id., Aleutians (Bering Sea side), trawled 90 m, R/V *Dominator*. Leg. R. Harrison, 13 June, 1997, 133.5 mm, RNC/G 383 (23-971-10) **[3]** Eider Point, Unalaska Id., SCUBA in 3 m. Leg. R.N. Clark, 26 June 1997, 90.8 mm, RNC/ G 399 **[8]** An above-water photograph of living specimens taken on rocks from the Eider Point, Unalaska, locality illustrating some of the animals associated with *B. crebricostatus* (large animal about 100 mm). Others illustrated: *Volutopsius regularis* Dall, 1873 (center); *Scabrotrophon maltzani* (Kobelt & Kuster, 1878) (upper left); *Boreotrophon pacificus* Dall, 1902) (upper left); *Boreochition beringensis* (Yakovleva, 1952) (lower left) and *Lepidozona baxteri* Clark, 2000 (upper left and lower right).

Figures 4-7. *Beringius undatus* Dall, 1919. **[4]** Umnak Pass, Aleutians, trawled 103 m, R.V *Golden Dawn*. Leg. J. Orr, 23 May 1996, 99.3 mm, RNC/G280 (NMFS 100-961-5) **[5]** Near Forrester Id., SE Alaska, trawled 119 m, R/V *Golden Dawn*. Leg. R.N. Clark, 30 July 1996, 128.7 mm, RNC/ G287 (NMFS 100-961-285) **[6]** Stalemate Bank (west of Attu Id.) Aleutians, trawled 219 m, R.V. *Dominator*. Leg. R.N. Clark, 3 August 1997, 103.6 mm, RNC/G 441 (233-971-211) **[7]** Umnak Pass, Aleutians, trawled 93 m, R/V *Vesteraalen*. Leg. W. Flerx, 24 May 1996, 124.7 mm, RNC/G279 (NMFS 94-961-8).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OBSERVATIONS ON A EULIMID-HOLOTHURIAN HOST RELATIONSHIP

GEORGE E. METZ

121 Wild Horse Valley Dr., Novato, California 94947, USA
E-mail: romageometz@earthlink.net

Anders Warén (1983) reaffirmed the parasitic association of numerous eulimid genera with specific classes of the Phylum Echinodermata and the nature of their parasitism. Eulimids may be partial or obligate exoparasites, or obligate endoparasites, some of which are without shells. Most eulimids penetrate the surface of their host to feed on the coelomic fluids, while some species appear to feed on the surface epithelial cells. Some genera such as *Thyca* are permanently attached to their prey species of asteroid and cannot reattach if removed. They may occupy the surface or orifices of their host holothurians. In the discussions of the various genera in this supplement, Warén pointed out that most of the hosts of the various eulimid genera and species were not known.

Holothurians are amply represented in the shallow benthic communities in the Gulf of California, and their lack of speed makes them easy to collect and examine. Brusca (1980) lists thirteen common species, although he states that this is not a complete list. Kerstich (1989) illustrates five species in his guide.

The underside of a holothurian is very "sticky", due to its tube feet. This causes small shells and debris to adhere to its surface, making it difficult to see the eulimids. The small size of most eulimids is also a deterrent to finding them. Numerous snorkeling trips to many sites in the Gulf of California have allowed me to examine many species of the common holothurians. Sampling of holothurians was sporadic on most occasions as mollusks were my main interest, but on three occasions, holothurians were examined extensively and exclusively. Only a single species, *Isostichopus fuscus* (Ludwig) revealed an eulimid. The specimen was collected in Bahía Candelero, Baja California Sur, México. *Isostichopus fuscus* is usually found on the surface of rocks, unlike other members of this class which are usually sand dwellers. Illustrations of *I. fusca* may be found in both Brusca (1980) and Kerstich (1989).

The eulimid I first found was attached to the ventral surface of the holothurian (Figures 1, 2). It is very small and slender (2-3 mm) with about 10 flat-sided whorls. In the lateral view the outer lip is sinusoid with a shallow sinus where the outer lip joins the shell apically. The color is a very polished white, almost translucent, with the light yellow color of the animal shining through. Later examination of the same holothurian when it was more relaxed revealed numerous eulimids in the mouth (Figure 3). Collection of other specimens of *I. fuscus* have revealed about a one in twenty infestation rate, and usually only one to four eulimids per holothurian.

Warén (1983) associates several genera as parasitizing holothurians, but lists only the genera *Melanella* and *Vitreolina* as being slender-shelled ectoparasites, other genera associated with holothurians are described as globular shells, or located in galls or being totally endoparasites. Metz (1994) reported on the globular *Sabinella shaskyi* on the spine of the pencil urchin in the Gulf of California. While the identity of the shell figured here remains in question, it appears to belong to the genus *Melanella*.

Fishing is the one of the major economic and subsistence resources of the Gulf of California. With the decline in shrimp and fish production, the collection of holothurians for economic trade has prospered. Unfortunately, *I. fuscus* is a commercial variety of holothurian, and has been fished extensively in the past few years. Over-fishing has resulted in the virtual disappearance of *I. fusca* from the habitat.

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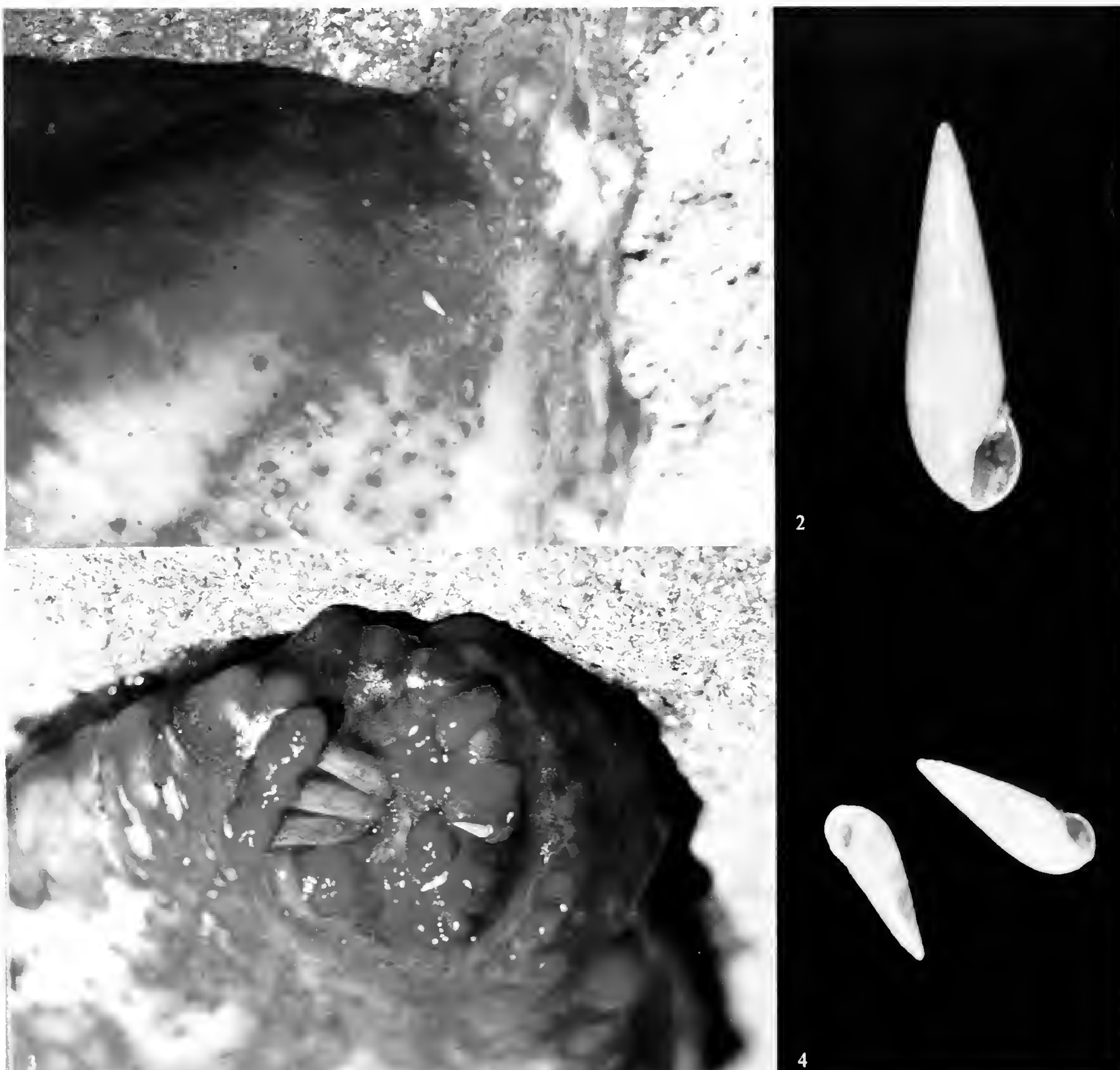

Figures 1-4. (1) Holothurian *Isostichopus fuscus* with eulimid attached to its ventral surface (2) view of 2-3 mm eulimid shown in Figure 1 (3) two eulimids on mouth of same holothurian (4) view of eulimids shown in Figure 2.

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http://www.users.cts.com/crash/t/tarnold/SDSC/index.html

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

PROGRAM

SOLOMON ISLANDS REVISITED

David K. Mulliner, Club member and *The Festivus* staff photographer, will present a slide program on the Solomon Islands which will include images taken on land, underwater and also show shell collecting there.

Meeting date: 16 January 2003
Shells of the month: Solomon Island shells

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting November 21, 2002

President Jules Hertz welcomed everyone and called the meeting to order at 7:45 p.m. He called for the approval of the minutes as published in *The Festivus*. The Treasurer reported that the Club is solvent and also that dues to the Botanical Garden Foundation had been paid for the following year.

Jules then presented the slate of officers for 2003 and asked for nominations from the floor. There being none, the voting was held and the slate was elected unanimously. The officers for 2003 are as follows: President: Carole Hertz; Vice President: Larry Lovell; Treasurer: Silvana Vollero; Corres. Sec'y: Marilyn Goldammer; Past President: Jules Hertz and Editor: Carole Hertz. A volunteer is needed to fill the position of Recording Secretary.

Editor Carole Hertz asked for articles and reminded everyone that dues for next year are now due.

Kelvin Barwick announced that the SCAMIT meeting in April will feature eulimids and asked to borrow any eulimids (especially with host information) that anyone has from southern California.

Vice President Terry Arnold introduced Eric Hochberg, of the Santa Barbara Museum of Natural History, who gave a presentation on nature printing. He opened his program by giving an illustrated history of nature printing beginning with rock prints in which early people marked their being with hand prints etc., much as a baby today is identified by a footprint. He traced the history of printing, touching on the different types of nature printing, to the present time.

Then in the second part of his program he set up stations for attendees to try some shell printing. He gave a demonstration of the method of imprinting a shell and then members eagerly tried the art for themselves. Eric supplied all paper, inks, brushes and shells. The approximately 30 people all had a great time.

The shell drawing winner was Bill Romer. Thanks to John Bishop and Carole and Jules Hertz for the delicious refreshments.

Members and guests were still enjoying socializing and shell printing at 10:00 p.m.

The Club's Annual Christmas Party

The Club's Christmas Dinner Party, celebrating the 41st year of the Club, was held on Saturday evening December 7th in the Lisbon Room of the Ramada Inn & Conference Center. Master of Ceremonies Carole Hertz welcomed the 25 attendees who enjoyed the social hour amid the finery of the room with a ceiling- high, decorated tree (with Club gifts beneath) and tables with poinsettia centerpieces by Kim and Linda Hutsell in *Strombus gigas* shells provided by Don Pisor.

Dinner was served at 7:00 p.m. and wine generously provided by John Jackson was placed on each table. After lovely dinners, topped with marvelous Amaretto cheesecake or cherry pie, Carole continued the program with amusing anecdotes and reviewed some of the accomplishments of the Club. President Jules Hertz then introduced and thanked the 2002 board and installed the incoming board [see front page].

The program continued with Richard Herrmann's "Potpourri" taking members and guests on a wonderful slide tour from our coastal waters to Washington State and down to Mexico. Drawings for the centerpieces and bottles of wine followed, with the traditional gift exchange the last and exciting event of the evening. Friends remained for awhile, not really wanting the evening to end. It was a great party.

Dues are Overdue

Dues are now payable for the year 2003 and the rate remains the same as the current year – $15.00 domestic; overseas (air mail) $30.00; México/Canada (air mail) $20.00.

Either mail your check to the Club address (on the masthead) or bring your renewal to the Club meeting. This will be the last issue for those who have not paid their dues.

Board Member and Volunteer Needed

At this time, the Club does not have a recording secretary. Anyone who attends meetings regularly qualifies and his/her services are needed. Also needed is a Host, a person willing to set up the table for refreshments, remind those who are to bring the refreshments and welcome visitors. Anyone willing to help in these areas, please contact Carole Hertz at 858-277-6259 or e-mail: <cmhertz@pacbell.net>.

THE CURIOUS HISTORY OF *DERMOMUREX ALABASTRUM* (A. ADAMS, 1864) (MURICIDAE: GASTROPODA) AND A NEW GEOGRAPHICAL LOCALITY FOR THE SPECIES: NEVIS, WEST INDIES

SUSAN HEWITT

435 E 77th Street # 3G, New York, NY 10021, USA
E-mail: hewsub@earthlink.net

Introduction

I recently encountered *Dermomurex alabastrum* (A. Adams, 1864) while working to create a faunal list of shelled marine mollusks from the island of Nevis, Leeward Islands, West Indies. Finding *D. alabastrum* on Nevis is a new locality record for a very uncommon species, and in the process of tracking down the identity of the shell, I learned about the convoluted history of this interesting taxon, discovered some additional type material in the American Museum of Natural History (AMNH), and uncovered some errors in the scientific literature.

The history of *D. alabastrum* includes its early dismissal and recent reinstatement as a valid Caribbean species by Vokes (1976, 1992). I found some parallels between the changing historical and nomenclatural status of the taxon and my own struggle to identify the shell from Nevis. In both cases there was an attempt to identify it as *D. indentata* (Carpenter, 1857) from west Mexico, then recognizing that it was the same as *Aspella paupercula varians* Usticke, 1969, and finally placing it correctly as *Dermomurex alabastrum* (A. Adams, 1864).

Discussion

Synonymy: *Murex alabastrum* A. Adams, 1864.
Murex adamsii Kobelt, 1877, unnecessary new name for *M. alabastrum* A. Adams, not *M. alabastrum* Reeve (Vokes 1992: 64).
Trophon (Aspella) engonatus Dall, 1892.
Aspella paupercula "var." *varians* Usticke, 1969: 15, pl. 3, fig. 692 [lot 695].
Aspella cantrainei Récluz of Usticke, 1971, not Récluz, 1853.

Original Description:

"MUREX ALABASTRUM A. AD.
Testa ovato-fusiformi, alba; spira elata, quam apertura longiore;
anfractibus convexis, varicibus validis rotundatis squamosis, squamulis incrassatis imbricatis postice productis et spiniformibus instructis, interspatiis nodoso-plicatis, squama lobiformi erecta ad suturas ornatus, transversim in toto striatis et lirulis transversis ad plicas nodulosis instructis: apertura parva, ovata; labio levi, arcuato, canali mediocri angusto recurvato; labro extus late varicoso.
Long. 14 lines, lat. 3 lines.
Hab. Martinique (Coll. Cuming).
There is a large, rounded, ascending scale on the whorls between the solid buttress-like varices, which latter are spiny at the hinder part."

Translation:
Shell ovate-fusiform, dull white; spire tall, longer than aperture; whorls convex, varices strong, rounded, scaly, furnished with thickened imbricate squamules drawn out and spiniform posteriorly, the intervals [between varices] nodose-plicate, adorned with a lobiform erect scale at the sutures, entirely transversely striate and furnished with transverse nodulose ridgelets at the plicae: aperture small, ovate; columellar surface smooth, arcuate, canal moderate, narrow, recurved; lip broadly ribbed without.
Note: Vokes (1992, p. 6) states the measurements in the original description are obviously an error for 6 lines. Translated into millimeters, this would be height = 29.5 mm, width, 12.7 mm.

In December 2001 a Nevis resident sent me a packet of small beach-drift shells that had been collected just after the storm season of 2001 from two localities on the northern coast of the island. One shell was a beach-worn "*Aspella*" (Figures 1,2 [left]) but it did not seem to resemble *Dermomurex pauperculus* (C.B. Adams, 1850) (Figures 3,4), the most common Caribbean species and the only one illustrated in the popular literature. In the Nevis shell the proportions were different, the siphonal canal was longer, and although the siphonal canal and the apex were white as in *pauperculus*, the rest of the shell, in its shiny beach-worn state, was tinted with an orangey-brown color, especially on the varices.

Looking through the Aspellinae section of the Muricidae in Keen's 1971 book on the tropical west American fauna, the shell from Nevis seemed to closely resemble *Dermomurex indentata* (Carpenter, 1857) recorded by Keen (p.527) as from Mazatlán "exact range uncertain, possibly south to Panama." Because the resemblance was so strong, I began to wonder if the shell could be that species. But it seemed unreasonable that a rather small and very uncommon eastern Pacific muricid could somehow have ended up on a beach in Nevis, West Indies.

Fortunately, I was able to examine the *Dermomurex* in the general collection of the AMNH, where I am currently a volunteer in the mollusk section of the Division of Invertebrate Zoology. The AMNH has, within its holdings of Caribbean material, what was a large private collection made in the 1950s and 60s by Gordon W. Nowell-Usticke (referred to as Usticke, even by himself). He was a dedicated amateur who lived on St. Croix, Virgin Islands, and who self-published four papers including A Check List of Marine Shells of St. Croix ... (Usticke, 1959) and two lists of additions and changes (Usticke, 1969, 1971). Confusingly, these two Supplementary Listings ... include species, some new, that Usticke found not on St. Croix, but on other islands in the Caribbean. In all three publications Usticke named well over 100 species, subspecies and varieties without following ICZN rules. Most of the new names he created turned out to be synonyms for already-named species or inappropriate attempts to put subspecific status on shells that were merely color forms or morphological varieties. But since he was a very thorough collector, he did come up with a number of species that were new, and those names are still in use. M.J. Faber (1988) reviewed Usticke's type material in the AMNH.

The AMNH appears to have most, if not all, of the Usticke type material. Usticke illustrated his new taxa, but only in his first publication did he designate the illustrated shells as holotypes. However, the photographic reproductions vary in quality. Despite the limitations of the Usticke publications, his material in the AMNH general collection is useful to me because Nevis is not very far from St. Croix (140 miles), because Usticke was a very thorough collector who was able to find shells of many uncommon and rare species, and because much of Usticke's material is beach worn and in similar condition to the material I found from Nevis.

Within the muricid genera *Aspella* and *Dermomurex,* shells which are live-collected have a distinctive, chalky-looking outer shell layer called intritacalx, which is rather soft, porous, easily damaged, and often beautifully textured microscopically, the details of this texture varying in characteristic ways from species to species (D'Attilio, 1971; Vokes, 1992). But in beach drift shells of *Aspella* and *Dermomurex* the intritacalx is almost entirely abraded by the action of the sand and waves, exposing the underlying shell layer, which is hard and shiny (Figures 3,4).

Searching the AMNH general collection I confirmed that the Nevis *Aspella* shell did not resemble *D. pauperculus.* The beach-drift shells of *D. pauperculus* were entirely white, a feature of the species that has also been corroborated by Colin Redfern (personal communication) from his own material collected on Abaco, Bahamas. Although the *pauperculus* shells illustrated in his book (Redfern, 2001, pl. 41) are live-collected, the author mentions beach-worn glossy shells on p. 86.

In the AMNH drawer which contained the *D. pauperculus*, I found one lot of eight beach-worn specimens, ranging in size from 8.5 mm to 22 mm (AMNH 191702) from the Usticke collection, which in shell morphology and in their orangey-brown tinted color very closely resembled the shell from Nevis. The material was described on the original hand-written label as being "*Aspella paup.* var. *varians* U." from Maid Island, Antigua, dated February 1961, and also had Usticke's original lot number label, 695 (Figure 5). A hand-written notation on the back of one of the two AMNH museum labels mentioned that there were types in the type collection.

I looked up *Aspella paupercula* "var." *varians* in the Catalog of Recent Type Specimens . . . Mollusca, Part 2, p. 19 (Boyko & Cordeiro, 2001), and saw that the AMNH has the type material for Usticke's *A. p. varians*, first described and rather poorly illustrated in Usticke (1969, p. 15, fig. 692). This taxon is now considered to have been described at the subspecific level (Boyko & Cordeiro, 2001). The type locality given is Maid Island, Antigua. Usticke (1969) also claimed to have found other shells of the same species in St. Thomas (Virgin Islands) and in Aruba. In his 1971 paper (p. 12) Usticke changed the identification of his illustrated shell to *Aspella cantrainei* Récluz, 1853, a synomyn of *D. pauperculus* (Vokes, 1975: 138).

At that point in my research the shell from Nevis appeared likely to be the same species as Usticke's *A. p. varians*. However, Vokes (1992: 64) concluded that *A. p. varians* is a synonym for *Dermomurex alabastrum* (A. Adams, 1864). Fortunately for me, I was able to examine Usticke's type material for *A. p. varians* (AMNH 186114 & 186115 (Figure 6). Vokes (1992, pl. 14 a,b.) also illustrated the paratype (AMNH 186115). The shell from Nevis matched the Usticke type material, and that was when I realized I did, in fact, have *D. alabastrum*.

A. Adams (1864, pp. 508-509) described this species as *Murex alabastrum*, giving a type locality of Martinique, West Indies, and Sowerby (1879, sp. 90, pl. 21, fig. 191) subsequently re-described and illustrated it (Figure 7). Because the shell is rare or easily overlooked, it appears to have been absent in collections for most of the next 100 years, and was not recognized as a Caribbean species at all - it became a "lost species". The creation by A. Adams of a supposedly non-existent Caribbean species was attributed either to a mistaken identification or to grossly incorrect locality data, since Adams had a reputation for confused locality data (Vokes, 1992: 64). Clench and Pérez Farfante (1945: 31) thought the shell that Sowerby had illustrated was "a very young *Murex brevifrons* with poorly developed spines". Vokes (1975) still considered that *Dermomurex indentata* from west Mexico must be the true identity of the shell Adams had called *alabastrum* because, as she stated, "Unfortunately no examples comparable to it have ever been taken in the waters of the western Atlantic."

Figure 7. *Murex alabastrum*, original illustration from Sowerby (1864, pl. 21, fig. 191)

In 1892, less than thirty years after Adams described *alabastrum*, Dall described and illustrated what he thought was a new (fossil) species, *Trophon (Aspella) engonatus* from Pliocene deposits in Florida. This would eventually prove to be *Dermomurex alabastrum*, once again demonstrating the species' true Caribbean origin by its presence there in the fossil record - something which would not be fully understood until 100 years later.

Vokes (1975: February) struggled to make sense of the fact that while it seemed clear that the western Atlantic fossil species *D. engonatus* had given rise to the eastern Pacific *D. indentata*, there appeared to be no direct western Atlantic descendant of *engonatus*, since *alabastrum*, which resembled *engonatus* very strongly, had not been found since its description and was considered not to be a Caribbean shell. But in June 1975, Vokes visited Gordon Nowell-Usticke in St. Croix, to look through his muricid material and, as she commented in her 1992 paper, "imagine my surprise" when she saw that Usticke's *Aspella p. varians* specimens were shells of the lost species, *Dermomurex alabastrum* A. Adams, 1864. As a result of the St. Croix trip, Vokes (1976), in an addendum to her 1975 paper, explained the implications of this new discovery, finally putting *alabastrum* back in the Caribbean where it belonged. But the news came too late for Radwin and D'Attilio's (1976), *Murex Shells of the World*, in which the taxon *D. alabastrum* is still described as being of uncertain identity (p. 217). In order to be certain of the identity of Dall's fossil species *engonatus* in relation to *alabastrum*, Vokes examined as much material as she could, and it became very clear to her (Vokes, 1992) that *engonatus* was also *alabastrum*. Thus, the species *D. alabastrum* has been stable in the Caribbean area since at least the Pliocene. *Dermomurex indentata* from west Mexico could, perhaps, be the sister species, having changed somewhat after the Panamanian land bridge formed.

In Vokes (1992) and in her 1976 addendum to the 1975 paper, Vokes lists St. Croix as the type locality for *varians*, a not unreasonable assumption, but Usticke's type locality for *varians* is, and was, Maid Island, Antigua, 200 miles to the southeast. This very small island off the north coast of Antigua lies in the North Sound area, which is still considered to be a rich and largely unspoiled marine habitat. Also known as Maiden Island or Maiden Islet, the island is one mile northwest of North Sound Point, and just southwest of Long Island, Antigua.

Usticke's type descriptions are problematic (Boyko & Cordeiro 2001, p. 4) Since Usticke did not designate holotypes in his 1969 paper, Boyko and Cordero (p. 19) designated Usticke's two previously known types for *varians*, (AMNH 186114 and 186115) as lectotype and paralectotype respectively. They also comment, "the repository of additional paralectotypes (if any) is unknown". The existence of additional material is, nonetheless, indicated by Usticke's given size range of 15-27 mm (Usticke 1969).

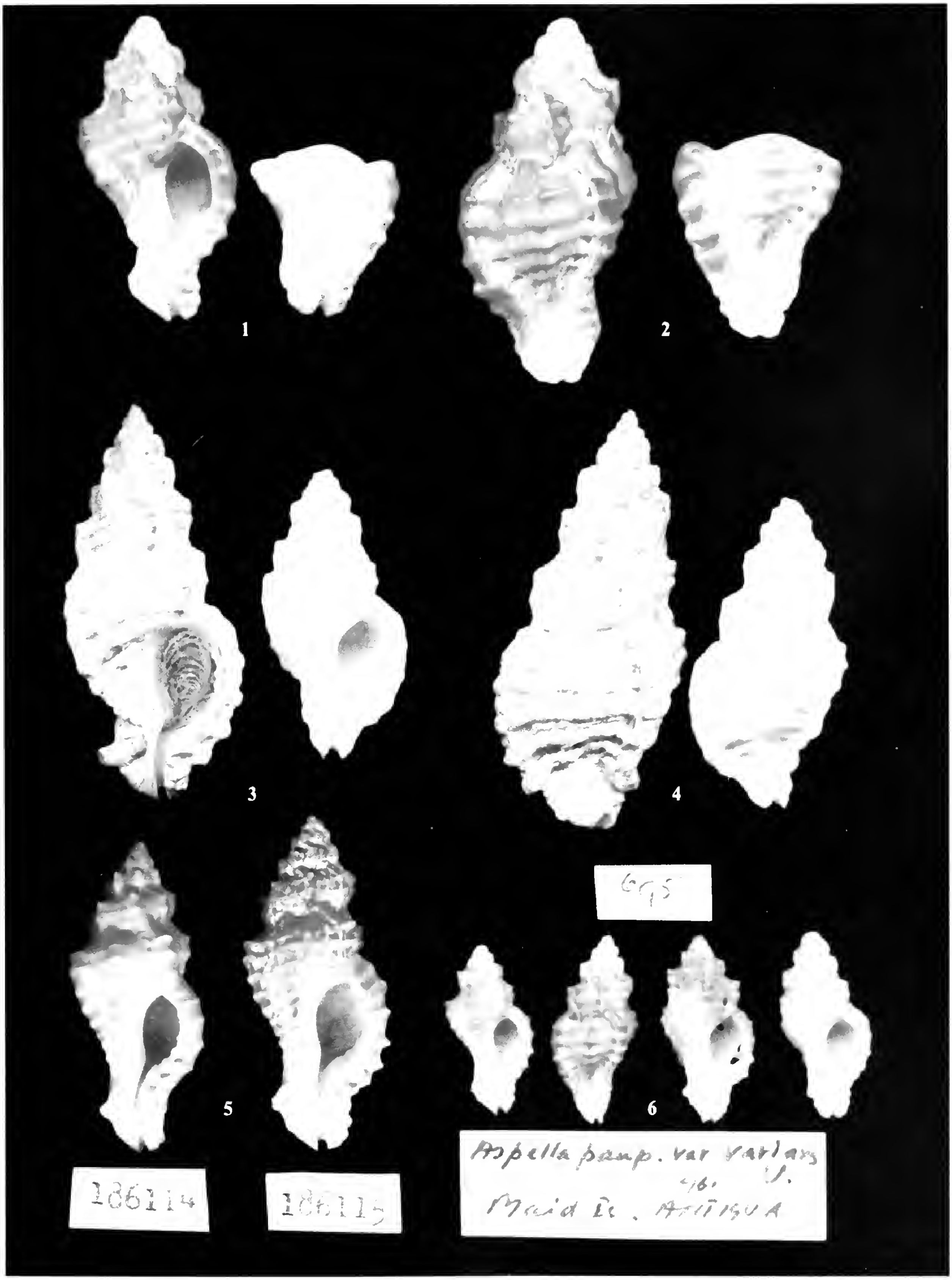
The lot of eight shells mentioned and partly illustrated above (AMNH 191702), appeared likely to be the additional type material for this taxon. The lot was discovered in the general collection, but contained Usticke's original lot (#695) and identification labels, which were missing from the two type lots in the type collection. And when the lot numbers in the AMNH catalogue were checked, it became clear that lot 191702 had originally been received and catalogued as a lot of ten shells of "*Aspella paupercula*", having been accessioned by the AMNH as part of the Usticke collection in 1978. Usticke's "holotype" for *A. p. varians* and a large "paratype" were subsequently segregated from lot 191702 and catalogued as 186114 and 186115. Although the AMNH catalogue numbers for these two Usticke types might seem to represent an earlier entry, it is quite clear that they were catalogued sometime after lot 191702, but were entered on an earlier page of the catalogue in order to fill in blank spaces which had previously been reserved for another purpose and not used. The catalogue entries for 186114 and 186115 specifically say, "Segregated from 191702" and give the literature references for both shells. As a result of this discovery, AMNH lot 191702 has now been moved from the general collection into the type collection since the eight remaining shells in the lot do appear to be the additional paralectotypes for *varians*.

Usticke's publications, taxa and types frequently present difficulties. Three caveats need to be applied to Usticke's size information. Firstly, Usticke's measurements are often rough estimates, especially where his type descriptions are based on lots containing several shells, such as his lot #695 of *varians* (see legend for Figure 6.) Secondly, and more surprisingly, the apparent size ranges Usticke quotes (such as 15-27 mm) are not measurements of the largest and smallest shell in the lot, as would normally be the case, but were intended as "an indication of average to maximum size" (Usticke, 1959, p. iv; 1969, p. 3; 1971, p. 2.) This information appears to have been overlooked by Boyko and Cordeiro (2001). Thirdly, the "average" sizes Usticke gives for his taxa (including the figure of 15 mm for *varians*) are not the arithmetical mean sizes of his lots, but are skewed in favor of the adult shells.

Dermomurex alabastrum is not yet known from many localities. Gary Rosenberg, of the Philadelphia Academy of Natural Sciences in his Western Atlantic Gastropod Database, Malacolog 3.1.3 (May 2002) lists *D. alabastrum* as recorded on the mainland from: Belize, Costa Rica, Panama, Colombia and Venezuela, and in the West Indies only from: St. Croix (which should be Antigua -- the Usticke type locality) and Martinique (the original A. Adams type locality). It may be true that Usticke did also collect specimens of this species in St. Thomas (Virgin Islands) and in Aruba, as he claimed in his 1969 publication, but if so, that material does not appear to be in the AMNH collection.

Because there is, as yet, so little available information on the biogeographic distribution of this species, especially in the West Indies, it is interesting but perhaps not very surprising, to find it on Nevis, 60 miles west of Antigua, Usticke's type locality, and 200 miles north of Martinique which is A. Adams' type locality. On my visit to Nevis in late April of 2002 I was very pleased to find a small but unmistakable fragment of a second shell of the species (Figures 1, 2 [right]) at a locality on the northwest part of the coastline, thus confirming its presence on Nevis from my own observations.

Figures 1-6. (1) *Dermomurex alabastrum*, apertural views of two specimens from Nevis: (left) shell collected by Jim and Nikki Johnson, 2001, height: 21 mm, (right) fragment from beach drift north of Cades Point, N.W. coast of Nevis, 17 April 2002. Leg. S. Hewitt, Hewitt Collection. (2) *D. alabastrum*, dorsal views of specimens in Figure 1. (3) *D. pauperculus*, apertural views of two specimens from Florida: (left) fresh specimen, live collected but appears to have been deliberately scraped, height: 29 mm, Key West, Florida, AMNH 191700, (right) beach-worn specimen, height: 21 mm, Grassy Key, Florida, AMNH 209858. (4) *D. pauperculus*, dorsal views of the specimens in Figure 3. (5) *D. alabastrum*. Part of Usticke's lot #695 (AMNH 186114 & 186115) of *Aspella paupercula varians* [AMNH 186115 with his original labels]. These are the four adult shells from AMNH 191702, for which the current lot size is eight. (6) *Dermomurex. alabastrum*. Lectotype (AMNH 186114) [left] height: 22 mm (not 25 mm as in Usticke 1969). Paralectotype (AMNH 186115) [right] height: 29 mm (not 27 mm as indicated by size range "15-27 mm" in Usticke, 1969). →


1
2
3
4
5
6
186114
186115
Aspella pamp. var varians
Maid Is. ANTIGUA

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LOW TIDES FOR 2003 AT SAN FELIPE, BAJA CALIFORNIA, MÉXICO

The entries below show periods of low tides of -3.90 feet and below. The times of low tides are given in Pacific Standard Time, except those dates marked with an asterisk are in Pacific Daylight Time. To correct for Puerto Peñasco add one hour to listed times when they are in Pacific Standard Time. Tides below the midriff of the Gulf cannot be estimated using these entries. All entries are approximate times and tides.

Feb. 15	7:43 pm	-4.04	May 14*	7:56 am	-4.40	Sept. 27*	9:49 am	-3.92
Feb. 16	8:18 pm	-4.88	May 15*	8:34 am	-5.27	Sept. 27*	10:05 pm	-4.26
Feb. 17	8:54 pm	-5.02	May 16*	9:12 am	-5.38	Oct. 24*	8:32 pm	-4.98
Feb. 18	9:31 pm	-4.35	May 17*	9:51 am	-4.37	Oct. 25*	9:06 pm	-5.51
Mar. 16	7:25 pm	-4.33	June 12*	7:33 am	-3.92	Oct. 26	8:42 pm	-5.25
Mar. 17	8:02 pm	-5.15	June 13*	8:16 am	-4.66	Oct. 27	9:19 pm	-4.20
Mar. 18	8:38 pm	-5.10	June 14*	8:59 am	-4.77	Nov. 21	6:31 pm	-4.11
Mar. 19	9:00 am	-4.36	June 15*	9:41 am	-4.27	Nov. 22	7:08 pm	-5.27
Mar. 19	9:16 pm	-4:09	July 13*	8:54 am	-4.12	Nov. 23	7:47 pm	-5.73
Apr. 15	8:25 am*	-4:03	July 14*	9:36 am	-3.95	Nov. 24	8:27 pm	-5.41
Apr. 15	8:41 pm*	-4.30	Aug. 27*	8:59 am	-4.09	Nov. 25	9:08 pm	-4.35
Apr. 16	8:59 am*	-5.07	Aug. 28*	9:32 am	-4.40	Dec. 21	6:54 pm	-4.66
Apr. 16	9:20 pm*	-4.02	Aug. 29*	10:08 am	-4.02	Dec. 22	7:38 pm	-5.24
Apr. 17	9:34 am*	-5.35	Sept. 26*	9:13 am	-4.58	Dec. 23	8:21 pm	-5.16
Apr. 18	10:10 am*	-4.84	Sept. 26*	9:32 pm	-4.31	Dec. 24	9:05 pm	-4.42

SCUM VII - SATURDAY, 25 JANUARY 2003

The Annual Meeting of the Southern California Unified Malacologists will be in the city of Laguna Hills in the Community Center at 25555 Alicia Parkway. The meeting will be in the Heritage Room.

The Center is centrally located in southern Orange County 1.5 miles west off the I-5 Freeway on Alicia Parkway and Paseo de Valencia across from Ralph's. Turn into the Center at the light on Community Center Drive. There are ample parking places and handicapped accessibility. Phone: (949) 707-2610/(949) 707-2680

General Program
9:30 a.m. Continental Breakfast
What have you been doing over the last year?
News and Updates

Noon
No Host Lunch in Meeting Room
Special Art Show of Mollusk X-Rays
Fossil Displays and Prehistoric Playground
If you have duplicate/extra specimens that need "good homes," please bring them.

1:30 p.m.

Afternoon presentations will feature information on the large squid strandings of July 2002. Informal discussions, announcements, and photo-op will conclude the day.

Slide projector, easels, and PowerPoint facilities will be available. Questions or special audio visual requests, please contact Carol Stadum at (760) 944-6943 or e-mail at: <cjstar1@earthlink.net>.

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THE FESTIVUS

A publication of the San Diego Shell Club

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MEMBERSHIP AND SUBSCRIPTION
Annual dues are payable to San Diego Shell Club.
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Overseas (air mail):$30.00; Mexico/Canada (air mail):$20.00.

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

E-mail: cmhertz@pacbell.net *Website at: http://www.users.cts.com/crash/t/tarnold/SDSC/index.html*

PROGRAM

UNDESCRIBED SPECIES OF SCALLOPS FROM TROPICAL AMERICA BIG OR SMALL, COMMON OR RARE?

Travis Smith, a doctoral student at Scripps Institution of Oceanography, will give a slide presentation on size and abundance patterns of undescribed species of pectens from tropical America.

Meeting date: 20 February 2003

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting January 16, 2003

President Carole Hertz welcomed the 25 attendees, introduced guests and called the meeting to order at 7:40 p.m. The November minutes were accepted as published in *The Festivus*. There were no reports from the Treasurer, Vice-President, and Librarian since the Hutsells and Larry Lovell were absent. Carole passed around a sign-up sheet for refreshments for future meetings, and she announced the members of the various committees for 2003. She asked for volunteers for Recording Secretary and Host (for setting up the refreshment table at the meetings).

Carole announced that Wes Farmer agreed to host the Auction/Potluck on April 26th. The Club needs donations. She also said that the Club needs a place for the September Party. Jules Hertz introduced the speakers for the evening: Dave Mulliner speaking on an expedition to the Solomon Islands in 1978 and Phil & Heidrun Faulconer on more Recent trips there.

Dave started with an overall map of the Solomon Islands which focused mainly on Guadalcanal. He pointed out the location of Iron Bottom Sound where more than 1000 ships went down during World War II. Their expedition included 11 people, mostly from the San Diego Shell Club, and many of them were in the audience. He showed beautiful slides of large shells and opisthobranchs, many collected right off wharf pilings and in mud. He had some pictures of beautiful art work produced by the local people, including some of wood carvings with inlaid shell material. He had some interesting pictures of other areas they visited like the Florida Islands and Santa Isabel.

Phil's slides from more recent trips concentrâted on a lot of the hardware, such as pieces of airplanes and cannons, scattered over the islands as a result of the war. He also compared the old carved wooden boats and the new molded plastic boats used by some of the locals. He had many fascinating pictures of the natives and overall views of some of the islands.

The shell drawing was won by Silvana Vollero. Cookies for the evening were provided by the Hertzes and Goldammers. The meeting was adjourned at 8:35 p.m., at which time the attendees could partake of the refreshments, socialize, and view the display provided by the Mulliners.

Announcing Two New Members of *The Festivus* Scientific Review Board

The Festivus is proud to welcome two researchers to the Scientific Review Board, Mrs. Carol Skoglund and Dr. Ángel Valdés.

Carol Skoglund, a specialist in mollusks of the Panamic Province, has published extensively on the Panamic molluscan fauna and Ángel Valdés, Assistant Curator of Mollusks at the Natural History Museum of Los Angeles County, is a specialist in the Opisthobranchia and has written on the group worldwide.

The Festivus is, indeed, fortunate to have the additional expertise of these two new reviewers and we thank them for accepting our invitation.

Board Member and Volunteer Needed

At this time, the Club does not have a recording secretary. Anyone who attends meetings regularly qualifies and his/her services are needed. Also needed is a Host, a person(s) willing to set up the table for refreshments, remind those who are to bring the refreshments and welcome visitors. Anyone willing to help in these areas, please contact Carole Hertz at 858-277-6259 or e-mail: <cmhertz@pacbell.net>.

The Annual Auction/Potluck

The Club's annual auction/potluck will be held on Saturday, April 26th. Once again, Wes Farmer has generously offered to host the Club's biggest social event - and only fund-raiser. The festivities will begin at 5:00 p.m. with Dave's Punch and non-alcoholic beverages while attendees enjoy each other's company and browse the auction table and silent auction items. Dinner will start at 6:00 p.m. and the auction will begin promptly at 7:00 p.m. Members and friends are asked to be generous and donate quality shells and/or shell-related items to this event. Exciting items on the auction table make for a lively, fun auction.

Please bring your donations to a regular club meeting, send them to the Club address or contact a board member and arrange for pickup.

For further information, contact Carole Hertz at 858-277-6259 or e-mail at <cmhertz@pacbell.net>.

CRUCIBULUM CASTELLUM BERRY, 1963, (MOLLUSCA: CALYPTRAEIDAE) A VALID SPECIES

CAROL SKOGLUND[1]

Santa Barbara Museum of Natural History,
2559 Puesta del Sol Road, Santa Barbara, California 93105, USA
E-mail: carolskoglund@msn.com

CAROLE M. HERTZ[2]

Santa Barbara Museum of Natural History,
2559 Puesta del Sol Road, Santa Barbara, California 93105, USA
E-mail: cmhertz@pacbell.com

Introduction

While working on Kirstie L. Kaiser's material from the Smithsonian Tropical Research Expedition along the coast of El Salvador, we came across a shell that brought to mind a long standing problem with a synonomy within the genus *Crucibulum*. Both Keen (1971) and Abbott (1974) deemed *Crucibulum castellum* Berry, 1963, a synonym of *Crucibulum concameratum* Reeve, 1859. Based on shell characters, we here consider *Crucibulum castellum* a valid species.

Collections studied: California Academy of Sciences, San Francisco, California (CASIZ); Santa Barbara Museum of Natural History, Santa Barbara, California (SBMNH); San Diego Natural History Museum, San Diego, California (SDMNH); Joyce Gemmell Collection, currently housed at SDMNH (JG); Jules & Carole Hertz Collection, San Diego, California (JCH); Kirstie Kaiser Collection, Puerto Vallarta, Jalisco, Mexico (KK); Carol Skoglund Collection, Phoenix, Arizona (CS).

Crucibulum concameratum Reeve, 1859

(Figures 1-3)

Reeve, 1859, species 23, figs. a,b.
Keen, 1971: fig. 828, bottom right.
Peña Gonzáles & Mogollón Avila, 2002, figs. 8-10.

Original description: "Species 23. (Fig. a,b, Mus. Cuming). *CRUCIBULUM CONCAMERATUM. Cruc. testá pileiformi, vertice acuto, valdé incurvo, albidá, radiatim costatá, costis prominentibus, interstitiis undique profundè concameratis; appendice interná subcyathiformi, amplá, ad latus affixá.*
THE VAULTED CRUCIBULUM. Shell cap-shaped, top sharp, very much incurved, whitish, radiately ribbed, ribs prominent, with the interstices everywhere deeply vaulted; internal appendage somewhat cup-shaped, large, affixed to the side.
Hab. ------- ?

This remarkable shell, collected by Sir Edward Belcher in the Samarang, but omitted in the 'Zoology' of the voyage, is curiously chambered into deep vaults. The ribs are very prominent, and the interstices between them are crossed throughout by broad septa."

---

[1] 3846 E. Highland Avenue, Phoenix, AZ 85018, USA.

[2] 3883 Mt. Blackburn Avenue, San Diego, CA 92111, USA.

Material Studied

Crucibulum concameratum -- **JCH**: 14 spec., 6.5 mm max. diam. x 3.3 mm H to 20.9 mm max. diam. x 10.8 mm H [5 with soft parts], dredged 30-46 m S and W of Isla Danzante, Golfo de California, México, 13 Oct. 1991; 1 spec., 7.5 mm max. diam. x 4.1 mm H, dredged in 90-130 m, off Islas Marietas, Nayarit, México, 28 Feb. 1995. **KK**: 1 spec., 14.5 mm max. diam. x 7.1 mm H, trawled off Ahuachapán, El Salvador in 121-125 m, 15 Mar. 2001. **CS**: 6 spec., 9 mm max. diam. x 5 mm H to 19 mm max. diam. x 13 mm H, dredged 30-45 m, off Bahía San Carlos, Sonora, México, Nov. 1981; 3 spec., 7 mm max. diam x 4 mm H to 17.5 mm x 9 mm H, dredged 30 - 45 m, south of Bahía Chamela, Jalisco, México, Aug. 1975,

Diagnosis: *C. concameratum* is an elegant off-white shell, delicately sculptured with continuous sharp, radiating ribs. These ribs are crossed by spiral cords the intersections of which create deep, even, regularly spaced pits. The apex has smooth nuclear whorls that tilt to one side and enlarge rapidly. The somewhat rounded, open cup is attached to a side of the shell.

Distribution: Isla Danzante, Golfo de California and Bahía San Carlos, Sonora, México, and Ahuachapán, El Salvador. From the study of the illustrations in Peña Gonzáles & Mogollón Avila (2002) we add Caleta la Cruz, Tumbes, Perú to the distribution.

Crucibulum castellum Berry (1963: 143-144)
Figures 4-7

Berry, 1963. Holotype not figured.
Keen (1971: fig. 828, two left and top right), holotype.
Hertz (1984: fig. 92), holotype.

Original description: "Shell small, conic, usually fairly high; larval coil minute, smooth, subplanorboid, with rapidly enlarging whorls, the last widely flaring before entering the next stage from which it is set off by a weakly defined sulcus; succeeding stage calyptraeiform, smooth or faintly radially rugose, and once again set off from the mature stage, which shows a characteristic granose sculpture overlain by rude radial ridges; resting marks of this final stage one or two, each overlapping the portion below like a cap, the ribs coarsely crenating the eaves, under which is usually found a series of

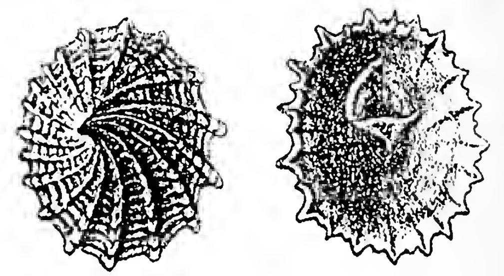
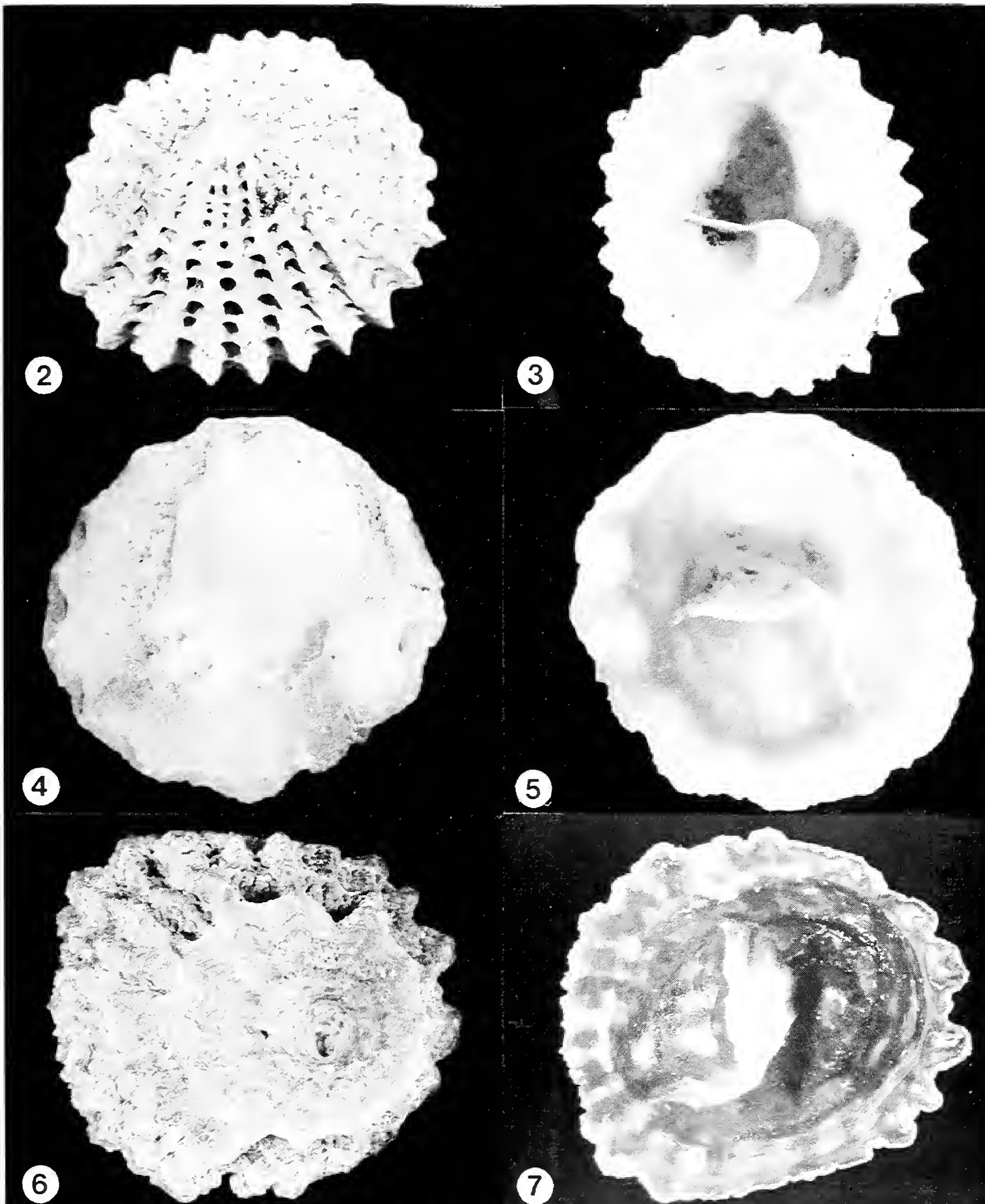


Figure 1. *Crucibulum concameratum* Reeve, 1859. Holotype, from Reeve, pl. 7, 23 a,b. No known locality given.

larger cavernous pits, about the most conspicuous feature of the shell; outer margin crenated. Cup constricted, crescentic, its short inner segment crushed into the nearly obsolete parietal section which may form little more than a glaze over the shell-wall, only a small angular remnant remaining free; deeper portion of the cup often filled with massive sloping pad of callus. Major diam. of the holotype 8.6, lesser diam. 7.8, alt. 4.6 mm. Type locality: 6-10 fms, off Acapulco, Guerrero."

Material studied

Crucibulum castellum - **CASIZ** 043996: holotype, 8.5 max. diam. x 4.6 mm H. **SBMNH** 34615: 26 paratypes, largest 12.0 mm max. diam. x 5.0 mm H, same locality as holotype. **SDNHM** 47503: 3 nominal paratypes, 9.2 mm max. diam. x 6.4 mm H; 6.1 mm max. diam. x 3.9 mm H; 5.3 mm max. diam. x 2.5 mm H, same locality as holotype. **GC**: 2 spec., 3.1 mm max. diam x ± 1.5 mm H and 3.5 mm max. diam. x ± 1.5 mm H, Puertecitos, Baja California in drift; 5 spec., 7.9 mm max. diam. x 2.9 mm H to 10.5 mm max. diam. x 6.0 mm H, dredged by Chamizal II fishing boat, out of Puertecitos, Baja California, México, 1 mi. N of Huerfanito, ½ mi. offshore (30°08'30"N, 114.35'30"W) in fine gravel and clay in 22 m, 8-10 July, 1969. **JCH**: 1 spec., W of Isla Danzante, Golfo de California, México, dredged 31-46 m, 12 Oct. 1991. **KK**: a 10.1 mm specimen from Golfo de Chiriquí, Panamá (as *C. concameratum*, fig. 8) in Kaiser (2001) is *C. castellum*. **CS**: 4 spec., 12.5 max. diam. x 5 mm H to 6 mm max. diam. x 2.5 mm H, dredged, 8-20 m, Bahía Concepción, Baja California Sur, Nov. 1990; 4 spec., 13 mm max. diam. x 7 mm H to 6.5 mm max. diam.



Figures 2-3. (2) *Crucibulum concameratum* Reeve, 1859, dorsal view of Kaiser specimen. Height: 7.2 mm, maximum diameter: 14.5 mm. Trawled off Ahuachapán, El Salvador, in 121-125 m, K.L. Kaiser Collection. (3) Interior view of Kaiser specimen. Figures 4-7. *Crucibulum castellum* Berry, 1963. (4) Holotype. Height: 4.6 mm, maximum diameter: 8.5 mm. Off Acapulco, Guerrero, México, in 11-18 m, spire view. (5) Interior view of holotype. (6) Dorsal view of Skoglund specimen. Height: 5.5 mm, maximum diameter: 11.4 mm. Venado Beach, Isla Venado, Canal Zone, Panamá, -2.5 ft night low tide.(7) Interior view of specimen in Figure 6, C. Skoglund Collection. Photos: D.K. Mulliner.

x 3 mm H, dredged 60-90 m, off Punta San Antonio, Sonora, México, Nov. 1981, and 2 spec., 11 mm max. diam. x 6.5 mm H, and 9 mm max. diam. x 4 mm H, dredged 15 to 30 m, off Bahía San Carlos, Sonora, México, Nov. 1978; 12 spec., 6 mm max. diam. x 2.5 mm H to 3.5 mm max. diam. x 2 mm H, dredged, 7 - 20 m, La Cruz de Huanacaxtle, Bahía de Banderas, Nayarit, México, Dec. 1972 - Dec. 1979; 3 spec., 11.5 mm max. diam. x 8 mm H to 4 mm max. diam. x 3.5 mm H, dredged 6 - 20 m, Caleta de Los Angeles, Bahía Tenacatita, Jalisco, México, Nov. 1975; 2 spec., 8 mm max. diam. x 3.5 mm H and 7.7 max. diam. x 4 mm H, dredged 10 to 30 m, Manzanillo, Colima, México, 5 Aug. 1973; 1 spec., 10 mm max. diam. x 4 mm H, dredged 24 - 37 m, Playas del Coco, Guanacaste Province, Costa Rica, Apr. 1986; 1 spec. 11.5 mm max. diam. x 5 mm H, at -2.5 ft night low tide, Isla Venado, Canal Zone, Panamá, Mar. 1974.

Diagnosis: *C. castellum* color varies from white with some brown to a deep brown both inside and out in some fresh specimens. The protoconch, which rapidly expands as in *C. concameratum*, is set off by a sulcus which does not appear in *C. concameratum*. The granulose shell has rugose ribs with heavy radial cords. The resting stage creates a few large pits, before growth continues to the next stage. The severely flattened cup is attached to a side of the shell.

Discussion

As can be seen in the descriptions and figures of *C. concameratum* (Figures 1-3) and *C. castellum* (Figures 4-6), there are major differences between the two species. Both species agree with their original descriptions, but not with each other. *Crucibulum castellum* has a granulose texture with rougher ribs, a resting stage and a flattened cup. Its color varies from white to deep brown. *Crucibulum concameratum* is a white shell with sharp, delicate radial ribs, crossed by spiral cords forming deep pits. It does not show the resting stages in *C. castellum*, , and has a more rounded, open cup. We consider *C. castellum* a valid species. Based on comparison with the holotype and other paratypes, we determined that the SDNHM paratype material for *C. castellum,* is not that species.

Distribution: *Crucibulum castellum* is found from the northern Golfo de California at Puertecitos, Baja California to Bahía Concepción, Baja California Sur, and from SE of Punta San Antonio (north of Guaymas), Sonora, México, to Isla Venado, Canal Zone, Panamá. The distribution of *C. concameratum* is from W of Isla Danzante, Golfo de California, and from Bahía San Carlos, Sonora, México, to Ahuachapán, El Salvador.

Acknowledgments

Our appreciation to the following for arranging for the loans of type material: Elizabeth Kools, Department of Invertebrate Zoology, CASIZ; Paul Valentich Scott and Patricia Sadeghian, Department of Invertebrate Zoology, SBMNH; Patricia Beller, Department of Marine Invertebrates, SDNHM. Our thanks to Joyce Gemmell for permission to study specimens of *C. castellum* in her collection, to David K. Mulliner for photographing the holotype and Skoglund specimen of *C. castellum* and the Kaiser specimen of *C. concameratum* and to Kirstie L. Kaiser for letting us have the fun of working on her collection and finding her specimen of *C. concameratum*.

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NORTHERN RANGE EXTENSION FOR *ASSIMINEA TRANSLUCENS* (CARPENTER, 1864)

ROBERT G. FORSYTH[1]

Research Associate, Royal British Columbia Museum,
675 Belleville Street, Victoria, British Columbia, Canada V8W 9W2
E-mail: robert_forsyth@telus.net

Assiminea translucens (Carpenter, 1864), better known by its junior synonym *A. californica* (Tryon, 1865), is a minute semi-marine gastropod (Rissooidea: Assimineidae) previously recorded along the west coast of North America from Vancouver Island, British Columbia, Canada (Oldroyd, 1927; Keen, 1971; McLean, 1978) to Puerto Lobos, Cabo Tepoca, México (Skoglund & Koch, 1995). Baxter (1987) did not record this species from Alaska, but included it his list as a species with potential to be found in Alaska. According to J.H. McLean (personal communication, 2002), there is a northern record of *A. translucens* in the Smithsonian Institution from "Granges Harbor, Vancouver Island" (USNM 150953), but this locality is likely Ganges Harbour, Saltspring Island, since there is no locality by the other name. (The California Academy of Sciences does not have any holdings of this species from British Columbia; E. Kools, personal communication, 2002).

A. translucens has been recorded from this and other localities (based on Royal British Columbia Museum and Forsyth collections) around the southern Strait of Georgia, including Vancouver Island, north to Union Bay, Vancouver Island, B.C. (49°35'N, 124°53'W; Forsyth collection). It is locally common in salt marshes at the heads of bays and inlets. In these situations, the dominant plant is American glasswort, *Salicornia virginica*. The gastropod usually associated with *A. translucens* is *Myosotella myosotis* (Draparnaud, 1801), but in some places, *Littorina subrotundata* (Carpenter, 1864) and *Cecina manchurica* A. Adams, 1861, also occur with it. On one occasion, I have encountered *A. translucens* on a rocky shore in Howe Sound, near Vancouver, British Columbia living among mussels (*Mytilus trossulus* Gould, 1850), and the acorn barnacle (*Balanus glandula* Darwin, 1854).

On 26 June 2002, *Assiminea translucens* was found on a cobble and gravel beach on the east side of Larcom Island, Observatory Inlet, British Columbia, Canada (55°23.39'N, 129°43.6'W) (Figures 1, 2). In Observatory Inlet, *Assiminea translucens* was living on the undersides of cobbles and small stones along with *Littorina sitkana* (Philippi, 1846), *Tectura persona* (Rathke *in* Eschscholtz, 1833), and acorn barnacles (*Balanus glandula*). Associated plants included seaside plantain (*Plantago maritima juncoides*), sea milk-wort (*Glaux maritima obtusifolia*), sedges, and several other

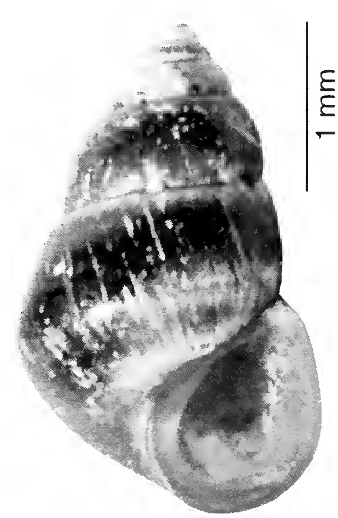

Figure 1. *Assiminea translucens*. Larcom Island, Observatory Inlet, B.C., Canada. RBCM 002-175-004.

[1] Mailing address: 2574 Graham Street, Victoria, British Columbia, Canada V8T 3Y7.

brackish-water plants. *Assiminea translucens* extended down the gently sloping beach to the upper limit of the *Mytilus trossulus* and rockweed (*Fucus* sp.) zone. It was absent higher on the beach, where the dominant vegetation consisted of sedges (*Carex* sp.), grasses, and arrow grass (*Triglochina maritimum*).

This new record on the north coast of British Columbia, near the southern end of the Alaskan Panhandle and at about the same latitude as Ketchikan, Alaska, represents a range extension northward from the Strait of Georgia, B.C.

All specimens have been deposited in the invertebrate collection of the Royal British Columbia Museum (RBCM 002-175-004; 26 specimens, dry). The largest specimen (Figure 1) measures 2.9 mm high.

I thank Dr. James H. McLean (Natural History Museum of Los Angeles County) for advising me of the correct name to use for this species and for bringing the "Granges Harbor" record to my attention, and Elizabeth Kools (California Academy of Sciences) for checking the California Academy of Sciences collection.

Figure 2. Larcom Island, Observatory Inlet, B.C., Canada. Left foreground: cobble beach occupied by *Assiminea translucens*.

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ERRATA: Corrections for errors in Hewitt (2003) [*The Festivus* 35(1): 3-8]. Unfortunately this paper went to press with some errors undetected. The corrections slip included, with this issue of *The Festivus*, may be used to cover the incorrect captions section at the bottom of page 6.

Synonymy, page 3

The second line of the synonymy should read: ***Murex adamsii* Kobelt, 1877, unnecessary new name for *M. alabastrum* A. Adams, *non M. alabaster* Reeve (Vokes 1992: 64).**

Translation, page 3

The note at the end of the translation should read: **Note: Vokes (1992, p. 6) states that the "lat." measurement in the original description is "obviously an error for 6 lines". Translated into millimeters, this would be "height = 29.5 mm, diameter, 12.7 mm".**

Captions appearing on page 6 (for figures in plate on page 7)

Captions for figures 5 and 6 were reversed, and 5 had additional errors. The captions should read: **(5) *D. alabastrum*. Usticke's *Aspella paupercula varians*. Left: lectotype, AMNH 186114, height 22 mm, not "25 mm" as in Usticke, 1969. Right: paralectotype, AMNH 186115, height 29 mm, not "27 mm" as indicated by size range "15-27 mm" in Usticke, 1969. (6) *D. alabastrum*. Four adult shells, heights 20-23 mm, additional paralectotypes of *A. varians*, from Usticke's lot # 695 with his labels (now AMNH 191702, current lot size = 8) .**

Please also note that: Where "Figure 5" appears in the main text (page 4, second column, 4th paragraph) this should read **Figure 6**. Likewise, where "Figure 6" is indicated (page 5, 1st column, 2nd paragraph, and page 6, 2nd column, 1st paragraph) this should be corrected to **Figure 5**.

SAN DIEGO SHELL CLUB
Membership List - 2003

ALBI, YVONNE, P.O. Box 45828, Los Angeles, CA 90045, (310) 823-3345, E-mail: holaster@aol.com
AMERICAN MUSEUM OF NATURAL HISTORY, Serials Unit, Library, Central Park West at 79th St., New York, NY 10024, (212) 769-5714
ANDERSON, ROLAND, 2000 Minor E. #8, Seattle, WA 98102, (206) 329-5815, E-mail: roland.anderson@ci.seattle.wa.us
ARNOLD, TERRY, 2975 B St., San Diego, CA 92102, (619) 235-8181, FAX (619) 235-0016, E-mail: tarnold@computer.org
BARWICK, KELVIN L., Environmental Monitoring & Technical Services Division, Metropolitan Wastewater, 4918 North Harbor Dr., Suite 201, San Diego, CA 92106-2359, (619) 758-2337, FAX (619) 758-2350, E-mail: K2B@SDCITY.SANNET.GOV
BELLER, PATRICIA, c/o Department of Marine Invertebrates, San Diego Natural History Museum, P.O. Box 121390, San Diego, CA 92112-1390, (619) 232-3821, ext 188 (work), (619) 482-4889 (home), E-mail: pbeller@sdnhm.org
BERSCHAUER, DAVID & FELICIA, 25461 Barents St., Laguna Hills, CA 92653, (949) 457-9210, FAX (949) 457-9450, E-mail: dpb@berschauerlaw.com
BIELER, RÜDIGER, Field Museum of Natural History, Dept. of Zoology, 1400 S. Lake Shore Dr., Chicago, IL 60605-2496, (312) 665-7720, E-mail: bieler@fieldmuseum.org
BISHOP, JOHN A., 3026 Freeman, San Diego, CA 92106, (619) 223-6038, E-mail: jandebishop@cox.net
BISHOP MUSEUM LIBRARY, 1525 Bernice St., Honolulu, HI 96817-2704, (808) 848-4148, E-mail: bjshort@bishopmuseum.org
BOYD, EDWARD & PATRICIA, 18218 Paradise Mountain no. 197, Valley Center, CA 92082-7000, (760) 749-9033, E-mail: patsyboyd@webtv.net
BRADNER, HUGH & MARGE, La Jolla Village Towers, 8515 Costa Verde Blvd. #110, San Diego, CA 92122, (858) 646-7525, FAX (858) 646-7524, E-mail: hbradner@ucsd.edu
BRATCHER-CRITCHLOW, TWILA & TOM, 939 Coast Blvd. #15H, La Jolla, CA 92037, (858) 456-7241
BROWN, CHRIS, 4575 N. Ave. del Cazador, Tucson, AZ 85718, (520) 299-1890, E-mail: flashcove@mindspring.com
BURCH, TOM & BEATRICE, 3599 Sylvan Pines Circle, Bremerton, WA 98310-6841, (360) 273-1299, FAX (360) 373-1323, E-mail: taburch@attbi.com
CALIFORNIA ACADEMY OF SCIENCES, J.W. MAILLAIARD, Librarian, Golden Gate Park, San Francisco, CA 94118
CARR, WALTER E. JR, 2043 Mohawk Dr., Pleasant Hill, CA 94523, (925) 938-2251, FAX (925) 934-4683, E-mail: terrycarr@attbi.com
CHANEY, BARBARA, 1633 Posilipo Lane, Santa Barbara, CA 93108, (805) 969-1434
CHANEY, HENRY W., 170 La Vista Grande, Santa Barbara, CA 93103, (805) 682-4711 ext. 334 (work), FAX (805) 963-9679 (home), E-mail: hchaney@sbnature2.org (work)
CHIPPEAUX, EDITH & HARRY, 1308 Biltmore Dr., Fort Myers, FL 33901-8710, (239) 936-4058
CLOVER, PHILLIP W., P.O. Box 339, Glen Ellen, CA 95442, Phone/FAX (707) 996-6960
COAN, EUGENE V., 891 San Jude Ave., Palo Alto, CA 94306-2640, (650) 493-8242 (home), (415) 977-5681 (work), FAX (415) 977-5790, E-mail: gene.coan@sierraclub.org
COOK, BUNNIE & GEORGE, 1120 Makaiwa St., Honolulu, HI 96816, (808) 737-8050, E-mail: g.-b.cook@juno.com
DAUGHENBAUGH, JOHN, 203 N. Wilton Pl., Los Angeles, CA 90004-4025, (323) 465-3718, FAX (213) 614-4566, E-mail: shoduffy@attbi.com
DEEMS, RON, 1768 Hermes, San Diego, CA 92154-2814, (619) 424-3750
DEFOORT, SABINE, Bookstore Justus Lipsius, BVBA, Belgicalaan 35, 1080 Brussels, Belgium, 32 2 425 05 20, FAX 32 2 425 50 33, E-mail: bookstorejustuslipsius@planetinternet.be
DESCHAINE, LEWIS, 3029 Silver Lake Rd., St. Anthony, MN 55418-2435, (612) 789-4070
DOI, MATTHEW S., 16209 Taylor Ct., Torrance, CA 90504-1902, (310) 329-3201
DULLAS, NORMA M. & WILLIAM, 13231 North 65th Dr., Glendale, AZ 85304, (623) 979-8758, E-mail: normadullas@mymailstation.com
EERNISSE, DOUGLAS J., Dept. of Biological Science, MH 282, California State University, Fullerton, CA 92834-6850, (714) 278-3749, FAX (714) 278-3426, E-mail: deernisse@fullerton.edu
EMERSON, WILLIAM K., 10 E. End Ave. Apt. 18E, New York, NY 10021-1184, (212) 879-7645 (home), (212) 769-5714 (work), FAX (212) 769-5783, E-mail: emerson @AMNH.org
EVERSON, GENE, 500 Nottingham Pkwy., Louisville, KY 40222-5026, (502) 429-5788
FARMER, WES, 3591 Ruffin Rd. #226, San Diego, CA 92123-2561, (858) 576-2143, E-mail: wmfarmer@adnc.com
FLENTZ, MARY & JOHN B., 4541 Lambeth Court, Carlsbad, CA 92008-6407, (619) 434-2522
FORSYTH ROBERT, 2574 Graham St., Victoria, British Columbia, V8T 3Y7, Canada E-mail: robert_forsyth@telus.net
FRANK, WILLIAM M., 1865 Debutante Dr., Jacksonville, FL 32246-8645, Phone/FAX (904) 724-5326, E-mail: strombus@mindspring.com
GARCÍA, EMILIO F., 115 Oak Crest Dr., Lafayette, LA 70503, (337) 232-2662, E-mail: efg2112@louisiana.edu

GERRODETTE, BILLEE L. & GEORGE, 6333 La Jolla Blvd. #171, La Jolla, CA 92037, (858) 454-5788
GOLDAMMER, MARILYN & JIM, 10051 Sheba Way, San Diego, CA 92129, (858) 484-0575, E-mail: mimiperrin@aol.com
GORI, SANDRO, Via Sernesi 7, 57123 Livorno, Italy
GREEN, DAVE, LUCILLE & KRISTEN, 6610 Baker Ct., Colleyville, TX 76034, (817) 421-6887, E-mail: dgreen@comwerx.net
HATFIELD MARINE SCIIENCE CENTER, Marilyn Potts Guin Lib., Oregon State University, 2030 S. Marine Science Dr., Newport, OR 97365
HERRMANN, RICHARD & GINNY, 12545 Mustang Dr., Poway, CA 92064, (858) 679-7017, FAX (858) 679-3346, E-mail: rbherrmann@cox.net
HERTZ, JULES & CAROLE M., 3883 Mt. Blackburn Ave., San Diego, CA 92111, Phone (858) 277-6259, E-mail: cmhertz@pacbell.net
HEWITT, SUSAN & EDWARD SUBITSKY, 435 E. 77th St., Apt. 3G, New York, NY 10021, E-mail: hewsub@earthlink.net
HICKMAN, CAROLE S., Z001, University of California, Dept. of Integrative Biology, Berkeley, CA 94720-3140, (510) 642-3429, FAX (510) 642-1822, E-mail: caroleh@socrates.berkeley.edu
HOLLMANN, MICHAEL, Stockumer Heide 44, D-58454 Witten, Germany, Phone 02302-944-255, FAX 0234-230-4225, E-mail: Michael.Hollmann@ruhr-uni-bochum.de
HOUSTON, ROY S., Dept. of Biology, Loyola Marymount University, Loyola Blvd. at West 80th St., Los Angeles, CA 90045, (213) 642-3126 (work), (310) 329-6444 (home), E-mail: rhouston@lmu.edu
HOWARD, MARGARET, 4603 Shoalwood Ave., Austin, TX 78756-2918, (512) 453-4348
HUMBIRD, WAYNE & PATTY, 54 Tamarind Ct., Lake Jackson, TX 77566, (979) 265-1320
HUTSELL, KIM & LINDA, 5804 Lauretta St. #2, San Diego, CA 92110, (619) 294-3914, E-mail: khutsell@ix.netcom.com and lhutsell@ix.netcom.com
JACKSON, JOHN A., 11558 Rolling Hills Dr., El Cajon, CA 92020, (619) 579-8405, FAX (619) 579-7901, E-mail: odyssey@adnc.com
JOFFE, ANNE, 1157 Periwinkle Way, Sanibel Island, FL 33957, (941) 472-3151, FAX (941) 472-3153, E-mail: sanibelchiton@aol.com
JORDAN, SCOTT, 1528 La Riata Dr., La Habra Hts., CA 90631, (562) 903-0287, FAX (562) 697-1268, E-mail: sjordan2@prodigy.net
KAISER, KIRSTIE L., Paseo de las Conchas Chinas #115 Depto. 4, Fracc. Conchas Chinas C.P. 48390, Puerto Vallarta, Jalisco, Mexico, 011-52 (322) 221 5041, FAX 011-52 (322) 221 5042, E-mail: klkaiser@pvnet.Com.Mx
KALOHI, KATHY & JOSEPH, 13901 Wilkie Ave., Gardena, CA 90249, (310) 719-1816, E-mail: wreckdiver77@yahoo.com
KANNER, PAUL, 10609 Esther Ave., Los Angeles, CA 90064, Phone (310) 559-7140, FAX (310) 559-9423, E-mail: pkann@attbi.com
KEMP, BRUCE & EMI, 9420D Carlton Oaks Dr., Santee, CA 92071, (619) 449-7610, FAX (619) 553-6391, E-mail: bkemp@spawar.navy.mil
KENNEDY, GEORGE, 8997 Moisan Way, La Mesa, CA 91941, (619) 667-1030, FAX (619) 594-4372 (work), E-mail: gkennedy@geology.sdsu.edu
KOSUGE, SADAO, Institute of Malacology, 6-36 Midoricho 3 Chome, Nishi-Tokyo City, Tokyo 188-0002, Japan , 81-424-63-0851, FAX 81-424-61-1752, E-mail: I.M.T.KOSUGE@excite.co.jp
KRONENBERG, GIJS C., Den Bult 98, NL-5616 GJ Eindhoven, the Netherlands, E-mail: gijsckro@worldonline.nl
LAGRANGE, JOHN & LINDA, 533 North Rios Ave., Solana Beach, CA 92075-1245, Phone/FAX (858) 755-7215, E-mail: lagrange@adnc.com
LANCE, JAMES R., 746 Agate St., San Diego, CA 92109, (858) 488-2132
LAVALEYE, MARC, De Ruyterstraat 58, 1792 AK Oudeschild, The Netherlands, E-mail: lava@nioz.nl
LEVIN, DEBRA J., 1848 Rust Ridge Pl. #202, Corona, CA 92881, (909) 898-3945, E-mail: levindj@att.net
LILLY, MEGAN, City of San Diego Marine Biology Laboratory, 4918 N. Harbor Dr., Suite 101, San Diego, CA 92106, E-mail: Mlilly @sandiego.gov
LOVELL, LARRY, Benthic Invertebrate Collection, SIO/UCSD/Mail Stop 0244, 9500 Gilman Drive, La Jolla, CA 92093-0244, (858) 822-2818, (760) 720-9004(Home), FAX (858) 822-3310, E-mail: llovell@ucsd.edu
LUTHER, DOUG & MARY, 1535 Ipukula St., Honolulu, HI 96821-1419, (808) 377-5173, E-mail: dluther@soest.hawaii.edu
LYONS, WILLIAM G., 4227 Porpoise Dr. SE, St. Pertersburg, FL 33705
MARR, LAURETTA, 4428 Lanham St., Midland TX 79705, (915) 683-1901, E-mail: RLMMID@aol.com
MARTIN, MARIANA & PAT, 6385-10 Rancho Mission Rd., San Diego, CA 92108, (619) 283-2777, E-mail: tahiti4us@neteze.com
MCCLINCY, RICHARD J., 809 St. George Rd., Danville, CA 94526-6235, (925) 838-3217, E-mail: richard.mcclincy@kvaerner.com

MCLEAN, JAMES H., Malacology, Los Angeles County Museum of Natural History, 900 Exposition Blvd., Los Angeles, CA 90007, (213) 763-3377, FAX (213) 746-2999, E-mail: jmclean@bcf.usc.edu

MCPEAK, RONALD H., P.O. Box 2136, Battle Ground, WA 98604-2136, (360) 687-1972, FAX (360) 687-1791, E-mail: rmcpeak@worldaccess.com

METZ, GEORGE E., 121 Wild Horse Valley Dr., Novato, CA 94947-3615, (415) 892-4960, E-mail: romageometz@earthlink.net

MICHEL, JOHN & NOLA, 4758 Mt. Cervin Dr., San Diego, CA 92117, Phone/FAX (858) 278-9088, E-mail: ejmco@san.rr.com

MOGOLLÓN, VALENTIN, Roma 340, Lima 18, Perú, E-mail: svmogollon@yahoo.com

MULLINER, DAVID K. & MARGARET, 5283 Vickie Dr., San Diego, CA 92109, (858) 488-2701, E-mail: mulliner1@juno.com

MUSEUM OF NEW ZEALAND, Library Manager, Te Papa Library, P.O. Box 467, Wellington, New Zealand

MYERS, JOHN & BARBARA W., 3761 Mt. Augustus Ave., San Diego, CA 92111, (858) 279-9806

NATURALIS, BIBLIOTHEEK, Postbus 9517, 2300 RA Leiden, The Netherlands

NEGUS, RICHARD H., 3401 Woodland Way, Carlsbad, CA 92008, (760) 434-9808, FAX (760) 434-3141, E-mail: rnegus@cts.com

NELSON, LOIS, 7222 N. 15th Ave., Phoenix, AZ 85021-8658, (602) 347-9667

NORRID, CHARLOTTE, 233 E. Cairo Dr., Tempe, AZ 85282-3607, (480) 967-4957, E-mail: hcnorrid2@aol.com

NORTHROP, MARILYN, 1528 Education Court, Lehigh Acres, FL 33971, (518) 383-6624, E-mail: mjnorthrop@worldnet.att.net

PASQUA, ROBERT A., 2236 Via Chalupa, San Clemente, CA 92673-3634, (949) 492-6855, E-mail: pasqua@cox.com

PHILLIPS, JOHN, Tideline Inc, 640 so. Isis Ave., Inglewood, CA 90301

PIERCE, ROSEMARY, 43099 Tenaja Road, Murrieta, CA 92562, (909) 674-9370

PISOR, DON & JEANNE, 10373 El Honcho Pl., San Diego, CA 92124, (858) 279-9342 (home), (619) 234-0249 (warehouse), FAX (619) 234-0250, E-mail: dpisor@earthlink.net

POWELL, CHARLES L., U.S. Geological Survey, M/S 915, 345 Middlefield Rd., Menlo Park, CA 94025, E-Mail: cpowell@ucgs.gov

PRAS, STEPHANE, 15 Rue Marbeau, 75116 Paris, France, E-mail: stephane.pras@noos.fr

RICE, TOM, P.O. Box 219, Port Gamble, WA 98364, Phone/FAX (360) 297-2426, E-mail: ofseashr@sinclair.net

RITTER, WILLIAM J., 1005 Exchange Apt. 13, Astoria, OR 97103-0900, (503) 325-7948, E-mail: bulwinkl@pacifier.com

ROBERTS, DALE L. & KIMBERLY, 28402 Harvest View Lane, Trabuco Canyon, CA 92679, (949) 459-8886, FAX (949) 888-2786, E-mail: robertd1@war.wyeth.com

ROMER, BILL & CAROL, 3249 Towser, San Diego, CA 92123, (858) 278-2389, E-mail: wromer1@san.rr.com

RUTKAS, TERRY, 13311 B Meyer Rd., Whittier, CA 90605, (562) 941-5439, E-mail: tjrutkas@concentric.net

SANTA BARBARA MUSEUM OF NATURAL HISTORY, Department of Invertebrate Zoology, 2559 Puesta del Sol Rd., Santa Barbara, CA 93105-2936, (805) 682-4711

SCHNEIDER, WILLIAM & NANCY, 12829 Carriage Rd., Poway, CA 92064-6045, Phone/FAX (858) 748-2822, E-mail: jtkcmom@msn.com

SCHOENING, ROBERT C., 10607 Norman Ave., Fairfax, VA 22030-2928, (703) 273-9755, FAX (703) 352-7124, E-mail: rschoening@aol.com

SCOTT, PAUL VALENTICH, Santa Barbara Museum (NH), 2559 Puesta del Sol Rd., Santa Barbara, CA 93105, (805) 682-4711 ext. 319, FAX (805) 563-0574, E-mail: pvscott@sbnature2.org

SENCKENBERGISCHE BIBLIOTHEK, Zeitschriftenabteilung/DFG, Bockenheimer Landstr. 134-138, D-60325, Frankfurt am Main, Germany

SKOGLUND, CAROL, 3846 E. Highland Ave., Phoenix, AZ 85018, Phone/FAX (602) 955-2072, E-mail: carolskoglund@msn.com

SMALL, MICHAEL, P.O. Box 500 (HAVAN), Station D, Ottawa, Ontario KIN 8T7, Canada, 537-24-25-16/17 (work), FAX 537-337725 (home), E-mail: michael.small@dfait-maeci.gc.ca

SUNDERLAND, WALTER A., 7610 NE Earlwood Road, Newberg, OR 97132, (503) 625-6840, E-mail: wallens@earthlink.net

TREGO, KENT D., 441 Ravina St. Apt. 3, La Jolla, CA 92037, (858) 456-7655

TUPEN, JEFF W., Morro Group Inc., 5500 San Pedro Ave., Atascadero, CA 93422, (805) 543-7095 and (805) 459-0111, FAX (805) 543-2367, E-mail: jtupen@morrogroup.com

UNDERWOOD, DORIS K., 698 Sheridan Woods Dr., West Melbourne, FL 32904, (321) 724-2449, E-mail: dunderwood1@cfl.rr.com

VAWTER, DORIS, 3208 Bonita Mesa Rd., Bonita, CA 91902, (619) 479-7687, E-mail: vevawter@att.net

VELARDE, RON, Marine Biology Lab., 4918 N. Harbor Dr. Suite 101, San Diego, CA 92106, (619) 758-2331, FAX (619) 758-2350, E-mail: RVELARDE@SANDIEGO.GOV

VOLLERO, SILVANA & BOB PETROSKI, 5613 Carnegie St., San Diego, CA 92122, (858) 625-0756, FAX (858) 535-1810 (work), E-mail: rpetrosk@san.rr.com

VON KRIEGELSTEIN, DOUG, 11288-A San Juan, Loma Linda, CA 92354, (909) 825-7207, FAX (909) 796-9658, E-mail: dougvon@hotmail.com
VOSO, ED, 1815-134 Sweetwater Rd., Spring Valley, CA 91977, (858) 469-8308
WATERS, CHARLES, 2703 Hutchison, Vista, CA 92084, (760) 941-2067
WEBER, GLADYS, 3607 Sylvan Meadows Court, Modesto, CA 95356-2011, (209) 549-1071, E-mail: gladweber@aol.com
WEBSTER, HERB & MELLA, 4403 Sierra Morena Ave., Carlsbad, CA 92008, (760) 730-3648, E-mail: mellamella@adelphia.net
WHITE, JACKIE, 886 Mountridge Ct., Las Vegas, NV 89110-2911, (702) 452-9651, E-mail: jcwshells@aol.com
WISE, JOHN, Dept. of Malacology, Houston Museum of Natural History, One Hermann Circle Dr., Houston, TX 77030-1799, (713) 639-4677, FAX (713) 523-4125, E-mail: jwise@hmns.org
WU, SHI-KUEI, 4175 Amber St., Boulder, CO 80304, Phone/FAX (303) 444-2306, E-mail: skwu@spot.colorado.edu
WUYTS, JEAN, Koningsarendlaan 82, B-2100 Deurne, Belgium, E-mail: wuyts.jean@pi.be
YIN, BOB, 1275 Torrey Pines Rd., La Jolla, CA 92037, (858) 454-2342, E-mail: ryin1@san.rr.com
YOUNG, HERB, 14550 Stone Ave. North, Shoreline, WA 98133-6218, (206) 364-8327

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Room 104, Casa Del Prado, Balboa Park, San Diego

E-mail: cmhertz@pacbell.net *Website at: http://www.users.cts.com/crash/t/tarnold/SDSC/index.html*

PROGRAM

CLAMS AND THEIR LIVE-INS

Suzanne Dufour, a PhD candidate at Scripps Institution of Oceanography, will give an illustrated program on thyasirid bivalves and their bacterial symbionts.

BIG BOOK AND REPRINT SALE
Meeting date: 20 March 2003

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting 20 February 2003

The meeting, with 24 in attendance, was called to order at 7:45 p.m. by President Carole Hertz. Guests were introduced and the minutes of the January meeting as published in *The Festivus* were approved. There was no treasurer's report because Silvana Vollero was ill and could not attend. Carole announced that the Club's annual auction/potluck would be April 26th, once again at the clubhouse at Wes Farmer's condo. She requested attendees donate shells, books and shell-related materials for the auction as soon as possible by either bringing them to the March meeting or contacting one of the officers to arrange for pickup. The site for the September party has been set but no date is available at this time. Vice-President Larry Lovell announced that the speaker for March would be Suzanne Defour, a graduate student at Scripps Institution of Oceanography.

Larry introduced Travis Smith, the speaker for the evening. His presentation was entitled "Diversity, Species and Rarity of "New" Tropical American Scallops." Travis stated that it would be ideal if there were a set key so that all investigators could arrive at the same number of species. Right now it is easier to determine species of scallops than to arrive at generic placement. Recent molecular data work by Japanese researchers agrees well with the previous work by Waller based on shell morphology. Travis gave an historical summary of the number of pecten species cited in the eastern Pacific and Caribbean as noted by previous investigators.

Travis' work is based on dredged material from specific sites in the eastern Pacific and Caribbean. He arrived at a total of 11 pecten species in the eastern Pacific and 25 in the Caribbean. He studied the diversity and abundance of species at his collecting sites and showed photographs of some "sister" species found on both sides of the land mass. He is currently studying body size and larval ecology of the pectens that he has collected. The presentation was enjoyed by all.

The shell drawing was won by Terry Rutkas and the cookies were provided by John and Linda LaGrange. The meeting was adjourned at 8:50 p.m. so that attendees could partake of the refreshments and socialize.

Board Member and Volunteer Needed

The Club still does not have a Recording Secretary or Host. Anyone who attends meetings regularly qualifies and his/her services are needed. Anyone willing to help in these areas, please contact Carole Hertz at 858-277-6259 or e-mail: <cmhertz@pacbell.net>.

The Annual Auction/Potluck

Donations are needed for the upcoming Auction/Potluck. Please bring your donations to the March meeting, send them to the Club address or contact a board member and arrange for pickup.

For further information, contact Carole Hertz at 858-277-6259 or e-mail at <cmhertz@pacbell.net>.

Too Late for the Roster

Lonhart, Steve, Monterey Bay National Marine Sanctuary (SIMON), 299 Foam St., Monterey, CA 93940. Phone: 831-647-4222. E-mail: <stevelonhart@noaa.gov>.

Payne, Travis L., 608 Clift Dr., Madison, AL 35758, Phone/FAX: 256-345-5500. E-mail: <payn436@bellsouth.net>.

The Natural History Museum, London, Cromwell Rd. London SW7/5BD, England. E-mail: <e.jamieson@nhm.ac.uk>.

Whitman, Charles H., c/o Milton Werner, 70 Richmond St., Brooklyn, NY 11208. Phone: 212-861-8211. E-mail: <chwhit@nyc.rr.com>.

Woolsey, Mary Jo (Jody), 3717 Bagley Ave., #206, Los Angeles, CA 90034-4148. Phone: 310-839-1604. E-mail: <mjwoolsey@earthlink.net>.

Lance, James R., 3220 S. 8th St., Lebanon, OR 97355-1069 [change of address].

The Greater San Diego Science and Engineering Fair

Once again the Club will participate in the March 2003 Science Fair offering the Club's winner a choice of one of three books on marine science and inviting him/her to give an overview of the winning project at a regular Club meeting.

NEW DISTRIBUTIONAL RECORDS OF OPISTHOBRANCH MOLLUSKS FOR BAHÍA DE BANDERAS, MÉXICO (TROPICAL EASTERN PACIFIC)

ALICIA HERMOSILLO-GONZÁLEZ[1]

Universidad de Guadalajara
Centro Universitario de Ciencias Biológicas y Agropecuarias
Km 15.5 Carretera a Nogales, Zapopan, Jalisco, México
E-mail: alicia_titan@infosel.net.mx

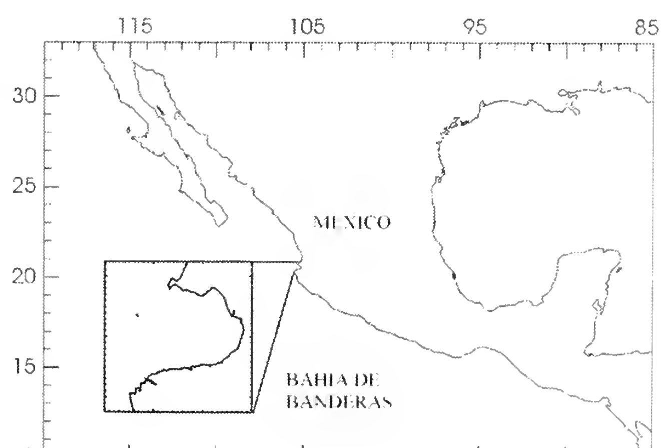
Abstract: A preliminary faunistic study of opisthobranchs was conducted in Bahía de Banderas from February to August of 2002. Twenty species previously known north of this area were collected by SCUBA diving: *Aplysiopsis enteromorphae* (Cockerell & Eliot, 1905); *Elysia hedgpethi* Marcus, 1961; *Placida cremoniana* (Trinchese, 1893); *Chromodoris marislae* Bertsch & Ferreira, 1973; *Corambe pacifica* MacFarland & O´Donoghue, 1929; *Polycera alabe* Collier & Farmer, 1964; *Sclerodoris tanya* (Marcus, 1971); *Tambja eliora* (Marcus & Marcus, 1967); *Tambja abdere* Farmer, 1978; *Taringa aivica timia* Marcus & Marcus, 1967; *Trapania goslineri* Millen & Bertsch, 2000; *Crosslandia daedali* Poorman & Mulliner, 1981; *Doto amyra* Marcus, 1961; *Doto lancei* Marcus & Marcus, 1967; *Hancockia californica* MacFarland, 1923; *Tritonia pickensi* Marcus & Marcus, 1967; *Janolus barbarensis* (Cooper, 1863); *Anetarca armata* Gosliner, 1991; *Flabellina cynara* (Marcus & Marcus, 1967) and *Noumeaella rubrofasciata* Gosliner, 1991. Color variations were observed for the following species: *Tritonia pickensi* Marcus & Marcus, 1967; *Taringa aivica timia* Marcus & Marcus, 1967; *Hancockia californica* MacFarland, 1923; and *Crosslandia daedali* Poorman & Mulliner, 1981. One *Chromodoris marislae* Bertsch & Ferreira, 1973, was found at 57 m which is the maximum depth recorded so far for this species.

Introduction

Bahía de Banderas is located on the west coast of México, in the states of Jalisco and Nayarit. Its large size, over 1000 km^2, makes the Bay the largest on the mainland Pacific coast of México. The northern tip is Punta Mita. Cabo Corrientes, 42 km away, delimits Bay to the south (Map 1).

The continental shelf of the southern section is extremely steep and narrow descending to a maximum depth of 1754 m (Carriquiry et al., 2001), producing rocky shores with sheer cliffs. Towards the north, the continental shelf becomes wider and slopes down gently, with a flat bottom and long sandy beaches.

Bahía de Banderas is characterized by complex hydrography and oceanography because it is the convergence point of three important current systems: the California Current, the Costa Rican Coastal Current and the Gulf of California Current. These water masses



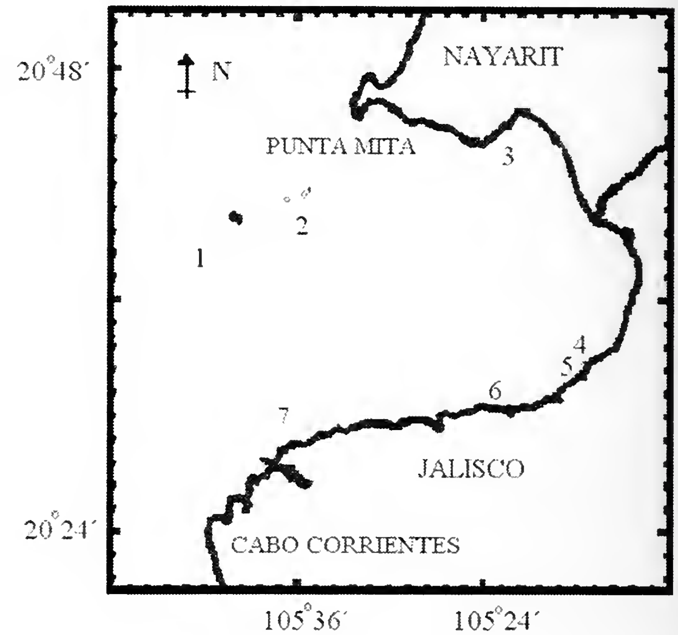
Map 1. Bahía de Banderas on the Pacific coast of México.

[1]Tenochtitlan #214 Cd. del Sol, Zapopan, Jalisco, México CP. 45050.

converge in Bahía de Banderas to join the North Equatorial Current (Wyrtki, 1965a).

The mean surface temperature in Bahía de Banderas is 26.4°C, varying from 23.3°C in March to 30°C in September. During winter and spring, surface temperatures may fall to 20°C mainly due to upwelling in the southern section of the Bay (Griffiths, 1968; Fielder, 1992) resulting in a shallow thermocline, between 20 and 40 m (Wyrtki, 1965b).

Its variable temperatures, hydrography and large size contribute to Bahía de Banderas' unique and poorly known opisthobranch faunal composition. Only a few researchers have published reports on the opisthobranch fauna of the northern coast of the Bay, in Nayarit (Sphon & Mulliner, 1972; Bertsch et. al., 1973; Ferreira & Bertsch, 1975; Bertsch, 1978, 1980; Bertsch & Kerstitch, 1984) and Isla Isabel (Ortea & Llera, 1981). Conversely no one has published on the opisthobranch fauna of the central and southern sections of the Bay, along the coast of Jalisco.



Map 2. Survey localities: (1) Anegados; (2) Islas Marietas; (3) Bajo de la Viuda; (4) Los Arcos; (5) Playa Mismaloya; (6) Majahuitas; (7) Chimo.

Materials and Methods

Specimens were collected (and complete data recorded) from February through August 2002 by SCUBA diving. Twenty-three locations were visited in order to characterize the opisthobranch communities most representative within the Bay. Out of the 23 locations, seven sites were chosen for the survey and are here described (Map 2).

Los Anegados (20°40.951′N, 105°36.944′W) is a sandy shallow area 3 km west of the Islas Marietas. The depths surveyed range from 9 to 20 m. It is characterized by large rock formations that break the surface and descend to small rocks on the sand.

Islas Marietas (20°42.042′N, 105°33.878′W) consists of three islands and surrounding rocky areas that encompass approximately 8 km. The depths surveyed range from 5 to 21 m. The islands are a series of rocks and ridges that continue below the surface to a shallow sandy bottom.

Bajo de la Viuda (20°43.973′N, 105°23.544′W) is a small seamount about 200 m from the northern shore of the Bay. The maximum depth to the sandy bottom is 15 m and the seamount is 5 m below the surface. It has multiple ridges and crevices, covered with zooanthids, hydroids and gorgonians.

Los Arcos (20°32.855′N, 105°17.340′W) are a series of small islets surfacing 300 m from shore. The most important features of the area are vertical walls and a canyon that drops down to more than 500 m depth west of the largest islet. The depths surveyed in the area range from 5 to 91 m.

Playa Mismaloya (20°31.937′N, 105°17.700′W) is a small bay within Bahía de Banderas. It is characterized by a steep slope with large rock boulders and small rocks down to the sandy bottom at a depth of about 18 m.

Majahuitas (20°29.111′N, 105°35.057′W) consists of large boulders and rock walls. The surveyed depths range from 3 to 25 m. Majahuitas is only accessible by boat and is well protected from wind and wave action.

Chimo (20°30.447′N, 105°23.544′W) is a fishermen's village located in southern Bahía de Banderas. The survey point is a seamount 2 km from shore, with abyssal depths to 5 m below the surface. Depths surveyed range from 5 to 25 m (Table 1).

Results

An underwater survey of 150 hours was conducted from February to August 2002. Over 4500 individual specimens belonging to 96 different species of opisthobranch mollusks were found, measured and recorded. Out of those 96 species, 20 have not previously been recorded as occurring within or south of Bahía de Banderas (Table 2).

TABLE 1: SURVEY LOCALITIES

Locality	Latitude	Longitude	Depth range (meters)	Substrate
Anegados	20°40.951′N	105°36.944′W	9 - 20	Sand-rock bottom
Islas Marietas	20°42.042′N	105°33.878′W	5 - 21	Rock walls, sandy bottom
Bajo de la Viuda	20°43.973′N	105°23.544′W	5 - 15	Rock walls, crevices
Los Arcos	20°32.855′N	105°17.340′W	5 - 91	Steep rock and deep walls, rocky bottom
Mismaloya	20°31.937′N	105°17.700′W	5 - 18	Boulders, sand-rocky bottom
Majahuitas	20°29.111′N	105°35.057′W	3 - 25	Rock walls, boulders, rocky bottom
Chimo	20°30.447′N	105°23.544′W	5 - 25	Rock walls, rocky bottom
Faro de Bucerías	18°21′N	103°32′W	5 - 25	Rocky bottom, ship wreck

* Faro de Bucerías, in Michoacán was visited during a two day survey trip. It is not located within Bahía de Banderas but it is mentioned here since three of the species discussed in this paper were found there.

The following list describes the previously published occurrences for the 20 species that are herein recorded for Bahía de Banderas, Jalisco; Nayarit and Faro de Bucerías, Michoacán, Pacific Coast of México.

SACOGLOSSA

Aplysiopsis enteromorphae (Cockerell & Eliot, 1905)
Millen (1989) recorded this species from Alaska and the northern Golfo de California, at Bahía de los Angeles, Baja California, México.

Elysia hedgpethi Marcus, 1961
Known from the northeastern Pacific, Bamfield, Vancouver Island, British Columbia, Canada (Millen, 1980) to Bahía San Quintín, outer coast of Baja California, México. In the northern Golfo de California, a gap in the distribution from Puertecitos and Bahía de los Angeles, Baja California and Bahía San Carlos, Sonora, México (Williams & Gosliner, 1973).

Placida cremoniana (Trinchese, 1893)
Type locality is in the Mediterranean (Trinchese, 1893); in the western Pacific this species has been reported from Japan (Baba, 1959), Guam (Hoff, 1974) and eastern Australia (Coleman, 2001). In the eastern Pacific it is present in the Golfo de California, at Coral de los Frailes, La Paz, Baja California Sur, México (Angulo-Campillo, 2002).

NUDIBRANCHIA

DORIDINA

Chromodoris marislae Bertsch & Ferreira, 1973
Known from the Golfo de California from Isla Santa Catalina to south of La Paz, Baja California Sur (Bertsch, et al., 1973) and Guaymas, Sonora, México (Bertsch, 1978). One specimen of *Chromodoris marislae* was found at El Faro de Bucerías, Michoacán during a two-day survey on June 22 and 23, 2002. One specimen was collected at 57 m at Los Arcos which is the maximum depth recorded for this species.

Corambe pacifica MacFarland & O'Donoghue, 1929
Reported from Sitka, Alaska (Lee & Foster, 1985) to Estero del Coyote on the outer coast of Baja California, México (Behrens, 1991). This small, cryptic species lives and feeds on the bryozoan *Membranipora* sp.

Polycera alabe Collier & Farmer, 1964
Known throughout the Golfo de California, from Puerto Peñasco, Sonora, to Isla Espiritu Santo, Baja California Sur, México (Bertsch, 1973); on the Pacific coast of the Baja California Península, from Isla Cedros, Baja California Sur, México and north to Anacapa Island, California (Lonhart & Tupen, 2001). It is found feeding on *Bugula* sp. (Bryozoa). It was also observed at El Faro de Bucerías, Michoacán, during a two-day survey on 22 and 23 June 2002.

Sclerodoris tanya (Marcus, 1971)

Previously reported from Newport Bay to San Diego, California, and from Ensenada on the outer coast of Baja California, México (Bertsch, 1981). Bertsch (1983) extended the range from the upper Golfo de California to Isla San José, Baja California Sur, México.

Tambja eliora (Marcus & Marcus, 1967)
Known on the Pacific side of the Baja California Peninsula, from Bahía Magdalena, Baja California Sur, and the northern Golfo de California, from Isla Ángel de la Guarda, Baja California and Puerto Lobos and Guaymas, Sonora, México (Farmer, 1978).

Tambja abdere Farmer, 1978
Known throughout the Golfo de California, from Isla San Pedro Nolasco, north of Guaymas, Sonora, and Isla San Francisco, to La Paz, Baja California Sur, México (Farmer, 1978) and Bahía Magdalena, Baja California Sur (Behrens, 1991). *Tambja abdere* is one of the most frequently observed species of nudibranch in Bahía de Banderas, but so far within the Bay it is found on rocky walls in the south (Chimo and Majahuitas) and Islas Marietas to the north, but has not been found at any of the survey localities in-between.

Taringa aivica timia Marcus & Marcus, 1967
The known distribution is from Paradise Cove, Los Angeles County, California (Behrens & Henderson, 1982) and within the Golfo de California it is reported from Puerto Peñasco, Sonora to Bahía San Luis Gonzaga, Baja California, México (Mulliner, 1984). Two different color variations have been recorded in Bahía de Banderas: orange and dark pink.

Trapania goslineri Millen & Bertsch, 2000
Previously reported distributions are from Isla Cedros, Bahía Vizcaino, on the outer coast of Baja California; inside the Gulf from Bahía de los Angeles, Baja California; Cabo San Lucas, Baja California Sur (Bertsch & Kerstitch, 1984) and Sonora, México (Millen & Bertsch, 2000).

DENDRONOTINA

Crosslandia daedali Poorman & Mulliner, 1981
Previously reported inside the Golfo de California from north of Guaymas, Sonora, México (Poorman & Mulliner, 1981); and from Punta Eugenia, outer coast of Baja California Sur, México, (Bertsch, et al., 2000). Other than the usual greenish-brown color described in the original description (Poorman & Mulliner, 1981), one red specimen was observed living on a red alga *Prionitis* sp. This is the first report of such coloration for this species.

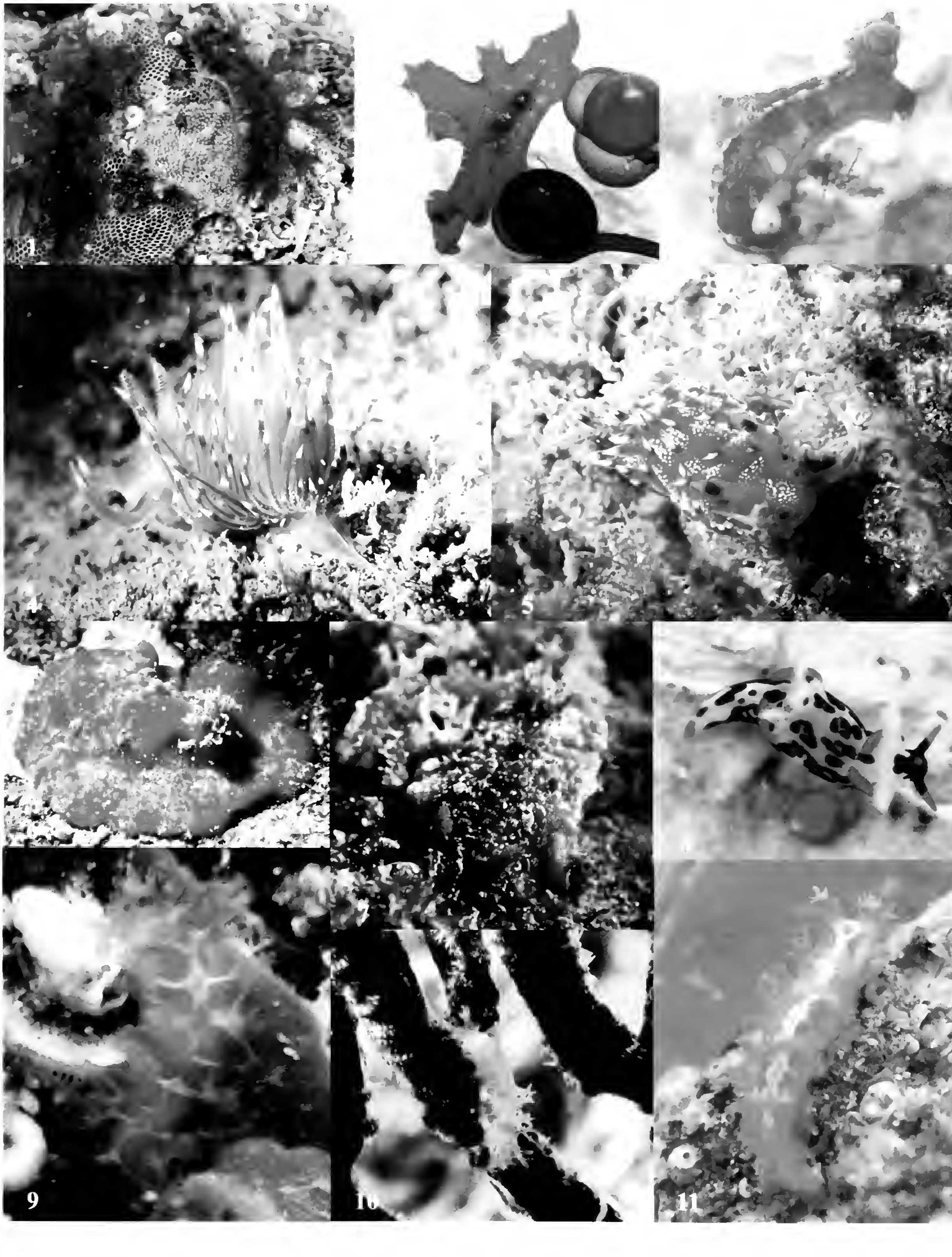
Doto amyra Marcus, 1961
Known in the northern Pacific from Blank Island, Ketchikan, Alaska (Millen, 1989) to Estero del Coyote, outer coast of Baja California, México (McDonald & Nybakken, 1980).

Doto lancei Marcus & Marcus, 1967
Reported throughout the Golfo de California, from Puerto Peñasco Sonora, to Isla Cerralvo, Baja California Sur, México (Bertsch, 1973) and Mission Bay, San Diego, California (Behrens, 1991).

Hancockia californica MacFarland, 1923
The known range was from Dillon Beach, California to Punta Abreojos, outer coast of Baja California, México (Lance, 1961). This species has been observed in Bahía de Banderas in two different colors: brown and red.

Tritonia pickensi Marcus & Marcus, 1967
Reported by Bertsch and Gosliner (1984) to occur within the Golfo de California at Puerto Peñasco and Guaymas, Sonora; Bahía de los Angeles, Baja California and Cabo San Lucas, Baja California Sur, México. This species is very abundant in Bahía de Banderas. Most of the specimens observed are white in color as originally described in Marcus & Marcus (1967), living on *Lophogorgia* sp., a purple gorgonian with white polyps. However, one orange and three pink specimens have been found on similarly colored gorgonians. It was observed at El Faro de Bucerías, Michoacán, during a two-day survey trip on 22 and 23 June 2002.

Figures 1-11. (1) *Hancockia californica*, 2 spec., 13 & 15 mm L, Los Arcos in 15 m, under rock (together), 23 April 2002. (2) *Crosslandia daedali* (brown), 16 mm L, in 12 m on brown alga, Los Arcos, 4 May 2002. (3) *Crosslandia daedali* (red), 7 mm L, in 15 m on red alga, Los Arcos, 4 May 2002. (4) *Flabellina cynara* (solid), 9 mm L, in 8 m, El Bajo de la Viuda, 19 August 2002, in situ. (5) *Flabellina cynara* (spotted), 12 mm L, in 12 m, El Bajo de la Viuda, 19 August 2002, in situ. (6) *Taringa aivica* (orange), 32 mm L, in 8 m, Majahuitas, 25 July 2002, in situ. (7) *Taringa aivica* (pink), 12 mm L, in 5 m, Mismaloya, 23 July 2002, in situ. (8) *Trapania goslineri*, 7 mm L, in 14 m, Los Arcos, 3 May 2002. (9) *Tritonia pickensi* (orange), 3 mm L, in 16 m, Los Arcos, 27 April 2002. (10) *Tritonia pickensi* (white), 6 mm L, in 8 m, Majahuitas, 28 August 2002, in situ. (11) *Tritonia pickensi* (pink), 6 mm L, in 12 m on white gorgonian with pink polyps, Chimo, 29 May 2002. ➔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ARMININA

Janolus barbarensis (Cooper, 1863)
The northern range of this species is uncertain due to confusion with *Janolus fuscus* O'Donoghue, 1924. Known from Morro Bay, California (Gosliner, 1982) to Bahía San Quintín, outer coast of Baja California and the Golfo de California, México (McDonald, 1983).

AEOLIDINA

Anetarca armata Gosliner, 1991
Known from Punta Asunción on the outer coast of Baja California. Within the Gulf, it is reported in Bahía de los Angeles, Baja California, México (Gosliner, 1991).

Flabellina cynara (Marcus & Marcus, 1967)
The reported range for this species is from the northern Golfo de California (Bertsch & Kertsitch, 1984) to Mazatlán, Sinaloa, México (Hendricks, et al., 1994). Individuals of *Flabellina cynara* have been observed with both a solid color or with a heavily spotted dorsum and cerata. It is a common species in Bahía de Banderas, where it is observed more frequently at the north coast location of El Bajo de la Viuda.

Noumeaella rubrofasciata Gosliner, 1991
Gosliner (1991) reported this species from Santa Barbara and Santa Catalina Island, California; Isla San Benito, Baja California, and Punta Colorado, Baja California Sur, México. This species is very small and found most frequently at the north coast site El Bajo de la Viuda.

Conclusions

The species listed in Table 2, discussed in this paper, constitute records to the south of their previously published range. The species of several groups of opisthobranchs, such as cephalaspideans and pleurobranchids that have been observed within Bahía de Banderas are not mentioned herein as their published ranges encompass the present study area. They are not considered new distribution records, but instead constitute reports of intermediate locations. A future publication listing the opisthobranch fauna of the Bahía de Banderas region will present the over 70 additional species that have been observed in this area. Some of these species are undescribed and should also be introduced in separate papers.

The report of 20 new distributional records for this locality is not unusual. While others have studied this area for many years, this is the first published account of the opisthobranch fauna of Bahía de Banderas. I consider these results to be preliminary and anticipate that the species list will grow with further surveying which will continue to give information to increase our understanding of these organisms.

Acknowledgments

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TABLE 2. MATERIALS EXAMINED

Table 2 lists the specimens of the 20 species that represent new distribution records to the south, including data for the largest and smallest size measured and maximum and minimum depth in meters. The number in parenthesis next to the locality refers to the number of animals recorded in that particular site. Voucher specimens for most species were sent to the Natural History Museum of Los Angeles County. The catalog numbers for those species are listed herein. *Janolus barbarensis* (Cooper, 1863) was taken to the University of British Columbia, Department of Invertebrate Zoology, Vancouver, British Columbia, Canada. *Elysia hedgpethi* Marcus, 1961, *Trapania goslineri* Millen & Bertsch, 2000, and *Hancockia californica* MacFarland, 1923, were not collected but were photographed alive.

Species name	Size range in mm	Depth range in meters	Locality (Number of specimens observed)	Voucher specimens
Aplysiopsis enteromorphae (Cockerell & Eliot, 1905)	10	12	Mismaloya (1)	LACM 153163
Elysia hedgpethi Marcus, 1961	3	9	Islas Marietas (1)	Not collected
Placida cremoniana (Trinchese, 1893)	3 - 5	15	Bajo Viuda (2), Chimo (1)	LACM 153173
Chromodoris marislae Bertsch & Ferreira, 1973	4 - 59	10 - 57	Islas Marietas (6), Chimo (1), Majahuitas (1), Arcos (1)	LACM 153164
Corambe pacifica MacFarland & O'Donoghue, 1929	1 - 7	8 - 12	Los Arcos (13)	LACM 153165
Polycera alabe Collier & Farmer, 1964	2 - 16	9 - 17	Marietas (5), Chimo (5), Los Arcos (5), Majahuitas (2), Anegados (1)	LACM 153174
Sclerodoris tanya (Marcus, 1971)	18	4	Los Arcos (1)	LACM 153175
Tambja abdere Farmer, 1978	1 - 46	4 - 20	Chimo, Islas Marietas, Majahuitas (+1000)	LACM 153176
Tambja eliora (Marcus & Marcus, 1967)	18	10	Islas Marietas (1)	LACM 153177
Taringa aivica timia Marcus & Marcus, 1967	10 - 21	3 - 9	Mismaloya (3), Majahuitas (2)	LACM 153178
Trapania goslineri Millen & Bertsch, 2000	4 - 12	13 - 16	Los Arcos (3), Majahuitas (1) Islas Marietas (1)	Not collected
Crosslandia daedali Poorman & Mulliner, 1981	2 - 21	4 - 15	Los Arcos (4), Islas Marietas (4), Mismaloya (3), Majahuitas (1)	LACM 153166
Doto amyra Marcus, 1961	2 - 7	6 - 21	Los Arcos (13), Mismaloya (1), Islas Marietas (1)	LACM 153167
Doto lancei Marcus & Marcus, 1967	2 - 12	16 - 18	Los Arcos (13), Mismaloya (3), Bajo de la Viuda (3) Majahuitas (1)	LACM 153168
Hancockia californica MacFarland, 1923	3 - 15	6 - 17	Los Arcos (3), Islas Marietas (3), Mismaloya (1)	Not collected
Tritonia pickensi Marcus & Marcus, 1967	1 - 8	3 - 24	23 locations (+1000)	LACM 153180
Janolus barbarensis (Cooper, 1863)	16	17	Chimo (1)	UBC, IZD
Anetarca armata Gosliner, 1991	4 - 9	4 - 16	Los Arcos (1), Majahuitas (1)	LACM 153162
Flabellina cynara (Marcus & Marcus, 1967)	5 - 16	1.5 - 24	Bajo Viuda (47), Los Arcos (14) Chimo (4), Majahuitas (2) Mismaloya (1)	LACM 153170
Noumeaella rubrofasciata Gosliner, 1991	2 - 9	4 - 16	Bajo Viuda (18), Los Arcos (6), Majahuitas (2), Chimo (1)	LACM 153172

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SEVENTH ANNUAL SCUM MEETING

The seventh annual meeting of the Southern California Unified Malacologists (SCUM) was held on 25 January 2003 in the Heritage Room of the City of Laguna Hills Community Center, Laguna Hills, CA. The meeting was hosted by Carol Stadum and began at 9:30 a.m. with a continental breakfast of Danish pastry, donuts, tea and coffee. There were 34 in attendance, mainly from the Los Angeles and San Diego areas (Figure 1).

Figure 1. Most of the attendees at the SCUM 2003 meeting. Photo: Carol Stadum.

Carol Stadum welcomed the attendees and gave an overview of the meeting's agenda. Lindsey Groves reviewed the various malacological meetings scheduled for 2003. All the attendees introduced themselves and gave brief statements as to their malacological interests or their activities during the past year.

Jim McLean gave an update on the two books he is writing on the gastropods from Alaska to southern California. The first volume will cover the species from southern California to British Columbia. There will be 51 new genera and many new species. He has all the specimens needed for the first volume, which is the furthest along. The second volume covers the northern species, and he will probably have to spend some time in Russia to photograph type material.

Bob Stanton started the more formal talks with a review of mainly Pliocene material from 12 stations from Cape Blanco to San Diego from the outer bathyal, middle bathyal, inner bathyal, outer shelf and inner shelf. He discussed occurrences of species found alone and those found with more than one other species, and discussed reasons for the frequency of occurrences.

Scott Rugh gave a long presentation on the "Cool water mollusks from the Middle San Pedro Formation, Coyote Hills, Orange County, CA. Both northern and southern species were found, with the northern more common.

At this point in the program there was a delicious catered lunch that was available at a nominal charge. During the lunch break there was a special art display of X-rays of mollusks and plant material by Albert Kosier, a local artist. During this break, one could also look at displays of Recent and fossil species as well as posters brought in by the various attendees. The Community Center's fossil displays and the prehistoric playground could be enjoyed as well.

The afternoon session featured several additional speakers. Ron Velarde described a monitoring program off La Jolla and a survey at set stations from Mexico to Pt. Conception. He mentioned how important non-indigenous species are to the benthos of southern California embayments and how these species multiply and dominate local fauna and may alter natural habitat. He also discussed finding unusual species in the surveys off La Jolla. One was an *Okenia* species never reported before from southern California. This may be *Okenia vancouverensis* described from off Vancouver and not known since.

Daniel Geiger discussed his many projects but concentrated mainly on his work on the Scissurellidae, whose species vary in size from less than one millimeter to approximately five. He showed scissurellid diversity depicting various genera including one new genus. He is working on the one new genus and five new species from Easter Island. His intention is to write a book on the Scissurellidae similar to the one he wrote on the Haliotidae.

Doug Eernisse discussed phylogenetic relationships among selected chitons based on DNA sequence comparison. He is studying egg structure, sperm, gill structure and slitted shell extensions and looking at inter-relationships of different genera. The DNA comparisons are ongoing.

Phil Liff-Grief gave a presentation of land snails on Kauai. He showed collecting spots around the island and different species from different islands. He talked about Recent as well as fossil species.

The final presentation was by Judy Garfield who showed pictures of squid runs off San Diego. She also had pictures of the recent beaching of thousands of squid on the San Diego beaches.

The meeting was concluded at approximately 3:00 p.m. and then group photographs were taken. The next SCUM meeting is scheduled for January 2004 in San Diego and will be hosted by Ron Velarde.

Jules Hertz

UPCOMING MALACOLOGICAL MEETINGS

The 69th Annual Meeting of the American Malacological Society (AMS) and University of Michigan) will be held from June 25-29, 2003 at Ann Arbor, MI. Deadlines for registration and for abstract submission are both May 1, 2003. Registration and Abstract Submission forms are available at: <http://www.ummz.lsa.umich.edu/mollusks/ams/>.

The 2003 Convention of the Conchologists of America, Inc. (COA) will be held at the Sheraton Hotel, Tacoma, WA from July 17-21, 2003. Pre-convention field trips and early registration on July 16th. For further information contact Tom Rice at <ofseashr@sinclair.net>.

The Southern California Association of Invertebrate Taxonomists (SCAMIT), has a one day meeting, April 14, 2003 from 9:30 to 3 p.m. on Southern California Eulimidae at City of San Diego Marine Biology Lab., 4918 N. Harbor Dr., Suite 201. For further information visit the website at SCAMIT.ORG.

The Western Society of Malacologists (WSM) will hold its 36th Annual Meeting that will take place at the Natural History Museum of Los Angeles County, California, from June 6-10, 2003. For further information and registration please visit the web site at: <http://www.nhm.org/research/malacology/avaldes/wsm/losangeles.html>.

The World Congress of Malacology will be held in Perth, Western Australia from 11-16 July 2004. For further information, please visit Unitas Malacologica at <http://www.inter.nl.net/users/Meijer.T/UM/um.html> and the Malacological Society of Australasia at <http://www.amonline.net.au/malsoc>.

The 2nd International Chiton Symposium will be held in August 2003 at Tsukuba, Japan. If you are interested in the Symposium, please contact organizers <http://www.kobe-yamate.ac.jp/users/yoshioka/chiton/index.html>.

The Malacological Society of London, Limpets 2003, Evolution and Biology of Marine Limpets will be held from 28-30 March 2003 at Universities Marine Biological Station, Millport, Isle of Cumbrae, Scotland. Inquiries for contributions should be addressed to Alan Hodgson, Grahamstown, South Africa <a.hodgson@ru.ac.za>. Inquiries about booking and accommodation, expressions of interest and requests for further details should be addressed to Hugh Jones, Manchester, UK (hugh.jones@man.ac.uk). Meeting Website: http://www.ru.ac.z

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MEMBERSHIP AND SUBSCRIPTION
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Room 104, Casa Del Prado, Balboa Park, San Diego

E-mail: cmhertz@pacbell.net *Website at:*
http://www.users.cts.com/crash/t/tarnold/SDSC/index.html

PROGRAM

COME TO THE AUCTION/POTLUCK

There is no regular meeting this month – see enclosed map.

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting 20 March 2003

President Carole Hertz opened the March meeting of the San Diego Shell Club at 7:45 p.m. There were 22 in attendance and Carole started by introducing guests. The minutes of the Club's February meeting were approved as published in *The Festivus*. Treasurer Silvana Vollero stated that the Club was solvent. Carole announced that the Club would once again be judging upper division projects at the San Diego Science Fair on March 25th . The Club's judges are Terry Arnold, Larry Lovell and Carole Hertz. The upcoming auction/potluck was discussed and Carole passed around a sign-up sheet for potluck contributions. Several members brought donations for the auction and much more is needed.

Vice-President Larry Lovell introduced Suzanne Dufour, the speaker for the evening, and she spoke on "Thyasirid bivalves and their bacterial symbionts." She started with an introduction discussing adaptations in gill structure, variability in symbiont abundance, and behavioral adaptations. Some thyasirids use chemosymbiosis (bacterial farming), through the use of hydrogen sulfide that is available in pockets in the substrates in which they are found. The hydrogen sulfide is abundant in sediments near sewage outfalls and fjords, where there is lots of organic matter. She spoke of 21 thyasirid species belonging to a number of different genera and detailed their gill types. She discussed a number of experiments that she had conducted in Spain and Norway, and showed some remarkable x-rays of the tiny clams in a mud substrate and the very lengthy burrows that they make over a period of several weeks in their quest for food. The speaker displayed a fine talent for making a very technical subject understandable and enjoyable to a very diverse audience.

The shell drawing was won by Larry Lovell. Refreshments were provided by Margaret and Dave Mulliner and Silvana Vollero. The book and reprint sale was highly successful and the Club will hold some more sales later in the year.

Jules Hertz

The Annual Auction/Potluck

The annual Auction/Potluck will be held at the Community Room of Wes Farmer's condo on Saturday evening, April 26th. See enclosed map for instructions and details.

This is the Club's biggest social event and fundraiser, supporting activities such as *The Festivus*, student grants, participation in the Science Fair and Club library purchases. Donations are still needed for the upcoming Auction/Potluck. Please send your donations to the Club address or contact a board member and arrange for pickup. For further information, contact Carole Hertz at (858) 277-6259 or e-mail at <cmhertz@pacbell.net>.

Plan to attend the event and have a great time while supporting the Club and its activities. Hope to see you there.

A Change to the Roster

Pierce, Rosemary, P.O. Box 532, Wildomar, CA 92595-0532. Ph.: 909-609-9801 [change of address].

The Greater San Diego Science and Engineering Fair

Once again the Club has participated in the Greater San Diego Science and Engineering Fair. Club judges Terry Arnold (chair), Larry Lovell and Carole Hertz judged the Upper Division entries and chose as the Club's winner Emily Balmer, a tenth grader at Valhalla High School whose project was "Impact of Iron Concentration in Sea-water on Phytoplankton Health". She was offered a choice of one of three books on marine science and has been invited to give an overview of her winning project at a future Club meeting.

The Southwestern Malacological Society Announces its Shell Auction

The Southwestern Malacological Society in Phoenix, Arizona, announces a big auction/potluck on Saturday evening, May 10th at 5 p.m. at Carol Skoglund's home, 3846 E. Highland Avenue, Phoenix, AZ. All proceeds will go to support their student grant program.

If you plan to attend, or wish further information, contact Carol Skoglund at (602) 955-2072 or e-mail at: <carolskoglund@msn.com>.

RECORDS OF FIVE *NASSARIUS* SPECIES IN PERÚ

VALENTÍN MOGOLLÓN AVILA & JUAN KOSTELAC ROCA

Laboratorio de Invertebrados Acuáticos y Estación Marina de la Isla Pachacamac
Facultad de Oceanografía, Pesquería y Ciencias Alimentarias
Universidad Nacional Federico Villarreal
Roma 340, Lima 18, PERÚ.
E-mail: svmogollon@yahoo.com & juan_kostelac@yahoo.es

Abstract: Five species of *Nassarius* are recorded in Peruvian waters for the first time: *Nassarius gemmulosus* (C. B. Adams, 1852), *Nassarius nucleolus* (Philippi, 1846) and three other species here treated as *Nassarius* sp. 1, *Nassarius* sp. 2 and *Nassarius* sp. 3. Descriptions, new geographical distribution, and habitat data are given.

INTRODUCTION

Between summer 1994 and 21 April 2002, fourteen specimens of *Nassarius nucleolus* (Philippi, 1846), were collected from Puerto de Talara to Bahía de Sechura, both in Piura Departamento, and Isla Lobos de Tierra off Lambayeque Departamento. Recently, during 2-6 June 2002, four other species of *Nassarius* were dredged by the authors in northern Perú, from off "El Bendito", near the mouth of Río Zarumilla in Tumbes Departamento to off Caleta Máncora in Piura Departamento. One of these species, *N. gemmulosus* (C. B. Adams, 1852), is well known, and the other three, possibly undescribed, are treated here as "sp. 1", "sp. 2" and "sp. 3". Examples of all species studied are housed in the Mogollón Collection.

Abbreviations of collections
VM: Valentín Mogollón Avila Collection, Lima, Perú. GMPG: G. Mario Peña Gonzáles Collection, Lima, Perú. KLK: Kirstie L. Kaiser Collection, Puerto Vallarta, México. LACM: Museum of Natural History of Los Angeles County, California, USA. CS: Carol Skoglund Collection, Phoenix, Arizona, USA. Z-C: Zamora-Corcuera Collection, Lima, Perú.

SYSTEMATICS

Superfamily MURICOIDEA Rafinesque, 1815
Family NASSARIIDAE Iredale, 1916
Genus *Nassarius* Duméril, 1806

Nassarius gemmulosus (C. B. Adams, 1852)
(Figure 1)

Description: This small species with protoconch of 4 yellow whorls, first 3 smooth, last part of 4th whorl with widely spaced axial ribs. Teleoconch with distinctive spiral rows of beading shaped by intersection of axial and spiral ribs; 2-3 small denticles at the base of the columella and 5 denticles on outer lip. Color yellowish or cream colored, with brown bands below suture and on base of body whorl. Maximum size of our specimens is 6 mm.

Material Studied:
- Off El Bendito, one dead collected mature specimen, 7 m depth on mud, sand and mangrove detritus, 5.0 x 2.9 mm. June 2, 2002 (VM).
- Off Caleta La Cruz, one live collected mature specimen, 45-50 m depth on muddy bottom (clay), 5.0 x 3.1 mm. June 3, 2002 (VM).
- Off Caleta Máncora, 4 live collected mature specimens, 10-12 m depth on mud and some sand, size range: 4.2-6.0 x 2.5-3.4 mm. June 5, 2002. One specimen (CS), one (Z-C) and two (VM).

Distribution: Punta Piaxtla, Sinaloa, México, to Panamá (Keen, 1971; Cernohorsky, 1975), south to Manabí Province, Ecuador (Shasky, 1984). This is the first report of the species in Perú.

New localities: Off El Bendito (03°26'35"S, 80°20'05"W), near mouth of Río Zarumilla, and off Caleta La Cruz (03°37.8'S; 80°35.0'W), both in Tumbes Departamento, and off Caleta Máncora (04°06.1'S, 81°03.2'W), Piura Departamento.

Nassarius nucleolus (Philippi, 1846)
Synonym: *Nassarius taeniolatus* of authors, *non Buccinum taeniolatum* Philippi, 1845
(Figures 2-3)

Description: Shell size to 8.5 mm. Protoconch smooth, with cream convex whorls; early teleoconch whorls convex, slightly shouldered, sculptured with 9-10 rounded axial ribs, intercostal spaces wider. Shell solid, cream colored, with brown subsutural band, another on periphery of last whorl, another on base. Spiral sculpture of 11-12 cords on last whorl, 4-5 lines on earlier whorls; sutures deep, crenulate; aperture approximately 1/3 shell height, outer lip with 4-5 denticles, first and last stronger; inner lip smooth, with one fold on base; shallow anal canal; shallow fossa; siphonal canal narrow; moderate siphonal fasciole.

Material Studied:
- Puerto de Talara, 4 specimens, 8 m depth, collected by commercial divers on a bed of the pearl oyster *Pteria sterna* (Gould, 1851). Summer 1994 (GMPG).
- Bahía de Paita, one specimen, 10 m depth on muddy bottom. August 1996 (CS).
- Bahía de Sechura, 7 specimens, 10 m depth on muddy bottom, size range: 5.6-8.5 x 4.2-5.5 mm. October 1998. One specimen (CS), 6 specimens (VM).
- Isla Lobos de Tierra, 2 specimens, 10-15 m depth on sandy bottom and slime, sizes 6.9 x 4.3 and 6.4 x 3.8 mm April 21, 2002 (VM).

Distribution: Bahía La Cholla, Sonora México (as *N. taeniolatus*) and several other localities along the coast of México, south to Bahía Culebra, Costa Rica; Fort Amador Causeway, Panamá; and Punta Jacinto, Salinas (CS), and the Islas Galápagos, Ecuador (Finet, 1994). Galapagan locality cited in Finet (1994) confirmed by L. Groves (LACM) and examination of Galapagan specimen (KLK).
New localities: Puerto de Talara (04°34.4'S, 81°16.7'W), Bahía de Paita (05°02.0'S, 81°06.0'W) and Bahía de Sechura (05°38.0'S, 81°00.0'W), all localities in Piura Departamento; and Isla Lobos de Tierra (06°26.0'S, 80°51.0'W, off Lambayeque Departamento.

Remarks: Keen (1971: 609, fig. 1313) treated *N. nucleolus* as a synonym of *N. taeniolatus* (Philippi, 1845). Cernohorsky (1984) considered *N. nucleolus*, described from Mazatlán, México, a valid small species not to exceed 7 mm in length. He synonymized the larger *N. taeniolatus*, described from Patagonia, with *Nassarius gayii* (Kiener, 1834). Because the same shell has been known both as *N. taeniolatus* and *N. nucleolus* by various authors, it is impossible to tell which shell these authors had in hand when citing distribution. We have taken the conservative approach and list only those localities we can confirm. The specimen figured by Hickman and Finet (1999: 91, fig. 105) as *N. nucleolus* may not be this species. This is the first report of the species in Perú.

Nassarius sp. 1
(Figures 4-5)

Description: Shell size to 11.1 (Figure 4). Protoconch smooth, cream colored; early teleoconch whorls convex, slightly shouldered, sculptured with 9-10 rounded axial ribs, intercostal spaces wider. Shell solid, cream colored, with a brown subsutural band. Body whorl with a brown band at the periphery and on the base. Spiral sculpture of 7-8 striae on earlier whorls, 17-18 thin striae on body whorl, Sutures deep, crenulate; aperture approximately 1/3 shell height, outer lip with six large denticles, in some specimens only as lirae; inner lip smooth, with one or two folds on the base; shallow anal canal; shallow fossa; siphonal canal narrow; moderate siphonal fasciole.

Material Studied:
- Caleta Cabo Blanco, one mature beach specimen, 7.5 x 4.3 mm. October 11, 1992 (VM).
- Off Caleta Máncora, 19 specimens, 9 immature and 10 adults, 10-12 m depth on mud and some sand, size range: 2.0-9.4 x 1.3-5.8 mm. June 5, 2002 (VM).
- Off Caleta La Cruz, 2 immature specimens, 10 m depth on muddy bottom, sizes: 5.9 x 3.9, 7.0 x 4.9 mm. June 3, 2002 (VM).
- Off Caleta La Cruz, 12 specimens, 9 immature and 3 adults, 40-50 m depth on muddy bottom, size range: 4.1-8.0 x 2.9-4.8 mm. June 3, 2002. Two specimens (CS), 10 (VM).

- Off Punta Malpelo, 22 specimens, 15 juveniles and 7 adults, 32 m depth, on sand and ground shells, size range: 3.2-11.1 x 2.3-5.9 mm. June 2, 2002. Four specimens (CS), 18 (VM).

Distribution: Off Punta Malpelo (03°30.1'S, 80°30.0W) and off Caleta La Cruz (03°37.8'S, 80°35.0'W), Tumbes Departamento, to off Caleta Máncora 04°06.1'S, 81°03.2'W) and Caleta Cabo Blanco (04°15.1'S, 81°13.9'W), Piura Departamento.

Remarks: This species may be undescribed.

Nassarius **sp. 2**
(Figures 6-7)

Description: Shell to 10.2 mm. Protoconch of three convex whorls, smooth, yellowish. Teleoconch glossy, globose, solid, yellowish or olive green, with a brown subsutural band, and another band of brown blotches on body whorl; early teleoconch whorls almost flat, angulated below the suture, sculptured with somewhat oblique, smooth ribs, 14-15 on body whorl, 17-18 on earlier whorls; spiral sculpture of a subsutural row of white nodules, one for each rib, spaces between brown. This characteristic is distinctive of the species. Body whorl convex, with 4-5 flat ribs on base of body whorl, 6-7 flat ribs on conspicuous siphonal fasciole. Aperture 1/3 shell height, outer lip thick, with seven lirae; inner lip with 4 folds on base and a strong denticle delineating the deep anal canal; periostracum cream, fibrous, only apparent on juveniles.

Material Studied:
- Off El Bendito, 2 live, dredged, mature specimens, 7 m depth on mud, sand and mangrove detritus, June 2, 2002; one (Z-C), another measuring 8.1 x 5.2 mm (VM).
- Off Caleta La Cruz, 3 live, dredged, mature specimens, 10-15 m depth on mud and some sand, sizes: 10.2 x 6.5 mm (Figure 7), 8.0 x 5.6 mm, 9.4 x 6.3 mm (VM).
- Off Caleta Máncora, 3 live, dredged, mature specimens, 10-15 m depth on mud and some sand, 7.9 x 5.5 mm, June 5, 2002 (VM) (Figure 6); 2 specimens (CS).
- Off Caleta Máncora, 7 juveniles live, dredged, 10-15 m depth on mud and some sand; size range: 3.1-8.0 x 2.5-5.0 mm. June 5, 2002 (VM).

Distribution: Off El Bendito (03°26'35"S, 80°20'05"W), near the mouth of Río Zarumilla, and off Caleta La Cruz (03°37.8'S, 80°35.0'W), both Tumbes Departamento and off Caleta Máncora (04°06.1'S, 81°03.2'W), Piura Departamento.

Remarks: This is a distinctive species and may be unnamed. No other Panamic or Peruvian species are similar.

Nassarius **sp. 3**
(Figures 8-9)

Description: Shell globose to 19.0 mm in height; white. Protoconch light brown or pinkish, smooth, a bit eroded and in all specimens collected the apex is broken. Teleoconch with light brown blotches, mainly in intercostal spaces, in some specimens these brown blotches form a subsutural band; another band on periphery of body whorl; Sutures deep, slightly crenulated; whorls convex, slightly shouldered, sculpted by 12-13 rounded axial ribs, intercostal spaces almost the same width as ribs. Spiral sculpture of about 5-6 thin ribs on earlier whorls, more apparent between ribs, about 17-18 on last whorl, reflecting on interior of aperture, and more apparent in immature specimens. Aperture rounded, approximately 2/5 height of shell. In fully mature specimens outer lip strong, thick, with 8-10 large denticles, most as lirae, inner lip reflected; relatively deep anal notch, deep fossa, siphonal fasciole well developed, with about 6-7 spiral lines, siphonal canal relatively narrow.

Material Studied:
- Off Caleta La Cruz, 5 juvenile specimens, dredged dead, one broken, 40-50 m depth, muddy bottom, size range: 6.5-9.6 x 5.0-6.7 mm; one sub-adult live collected, 40-50 m, muddy bottom; 18.8 x 12.7 mm, June 3, 2002 (VM) (Figure 8).
- Off Puerto Zorritos (03°40.0'S, 80°39.5'W), 2 specimens, one juvenile dredged dead, 11.3 x 8.1 mm (CS), and 2 adults, live, 40-50 m depth, muddy bottom, 17.2 x 12.3 mm and 16.5 x 11.5 mm June 4, 2002 (VM).

_ Off Caleta Cancas, one specimen live collected, 60 m depth, muddy bottom, 19.0 x 13.2 mm, June 4, 2002 (VM) (Figure 9).

Distribution: Off Caleta La Cruz (03°37.8'S, 80°35.0'W), off Puerto Zorritos (03°40.0'S, 80°39.5'W), and off Caleta Cancas (03°56.5'S, 80°56.5' W), all Tumbes Departamento, Perú.

Remarks: This species may be undescribed.

ACKNOWLEDGMENTS

We thank Mrs. Carol Skoglund of Phoenix, Arizona for help in identification of species and information based on her collection. Mrs. Carol Skoglund and Mrs. Carole M. Hertz of San Diego, California, corrected the manuscript and offered valuable suggestions. Mr. Lindsey Groves of the LACM verified the identification of *N. nucleolus* specimens cited by Finet (1994) from the Galápagos and now in the LACM Collection. Our thanks to Mrs. Kirstie L. Kaiser of Puerto Vallarta, México, for the loan to Carol Skoglund of a specimen of *N. nucleolus* from the Galápagos for confirmation of distribution. We also thank Mr. Roberto Zamora for taking all photos, and Eng. Héctor Guevara Díaz, manager of GEOLAB S.R.L., who supported this study.

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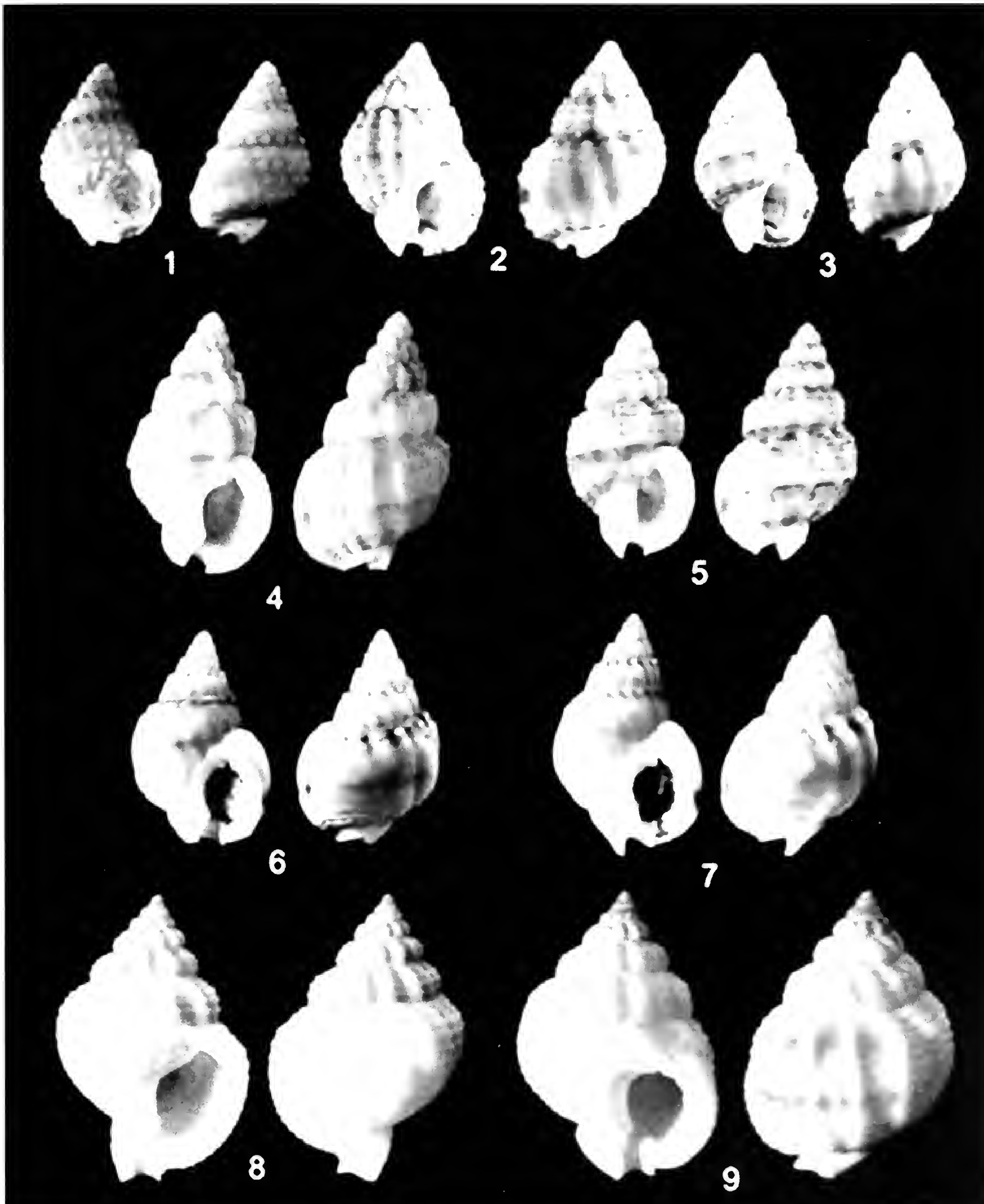
Figures 1-9. (1) *Nassarius gemmulosus* (C.B. Adams, 1852), live collected, off Caleta Máncora, Piura Departamento, 10-15 m depth on mud and some sand, 5.1 x 3.4 mm. June 5, 2002 (VM). (2). *Nassarius nucleolus* (Philippi, 1846), live collected, Bahía de Sechura, Piura Departamento, 10 m depth on mud, 7.5 x 5.3 mm, October 1998 (VM). (3) *Nassarius nucleolus* (Philippi, 1846), live collected, Bahía de Sechura, Piura Departamento, 10 m depth on mud, 6.3 x 4.4 mm, October 1998 (VM). (4) *Nassarius* sp. 1, live collected, off Punta Malpelo, Tumbes Departamento, 32 m depth on sand and ground shells, 11.1 x 5.9 mm, June 2, 2002 (VM). (5) *Nassarius* sp. 1, live collected, off Caleta Máncora, Piura Departamento, 10-15 m depth on mud and some sand, 9.1 x 5.1 mm, June 5, 2002 (VM). (6) *Nassarius* sp. 2, live collected, off Caleta Máncora, Piura Departamento, 10-15 m depth on mud and some sand, 7.9 x 5.5 mm, June 5, 2002 (VM). (7) *Nassarius* sp. 2, live collected, off Caleta La Cruz, Tumbes Departamento, 10-15 m depth on mud and some sand, 10.2 x 6.5 mm; June 3, 2002 (VM). (8) *Nassarius* sp. 3, live collected, off Caleta La Cruz, Tumbes Departamento, 40-50 m depth on muddy bottom, 18.8 x 12.7 mm, June 3, 2002 (VM). (9) *Nassarius* sp. 3, live collected, off Caleta Cancas, Tumbes Departamento, 50-60 m depth, muddy bottom, 19.0 x 13.2 mm, June 5, 2002 (VM). All photos: Mr. Roberto Zamora de Brito.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HELEN DUSHANE: WENTLETRAP AFICIONADO 1907-2002

LINDSEY T. GROVES

Natural History Museum of Los Angeles County, Malacology Section
900 Exposition Blvd., Los Angeles, CA 90007
E-mail: lgroves@nhm.org

Helen DuShane, noted authority on the gastropod family Epitoniidae (wentletraps), passed away on 18 May 2002, at the age of 95. She was born on 25 January 1907 in Mt. Pleasant, Iowa to Edward George and Hazel Dell (Neel) Schwartz. In November of 1945, Helen (Figure 1) married Joseph DuShane (Figure 2), who passed away in January of 1988. She is survived by her daughter Renee DuShane of Whittier, California.

Figure 1. Helen DuShane (ca. July, 1973) Western Society of Malacologists meeting, Asilomar Conference Center, Pacific Grove, California. Photo courtesy of Jim McLean.

Helen attended the Sargent School of Physical Education, Boston, Massachusetts from 1925 through 1928 and then earned a Bachelor of Science (1931) and a Masters in Science (1936) from the University of Southern California, Los Angeles. She taught Physical Education in the Los Angeles City School District from 1937 through 1965 and her professional affiliations included Delta Psi Kappa (life member), National Health, Physical Education and Recreation.

Helen first became interested in shell collecting during a family driving trip to Cabo San Lucas, Baja California Sur, México, in 1956. [Note: This was in the days **prior** to paved roads in much of Baja!] From La Paz they rode the ferry across the Golfo de California to Mazatlán and returned to Los Angeles. It was on a Sonoran beach where she collected numerous specimens of a strange, fragile-looking purple shell and wondered

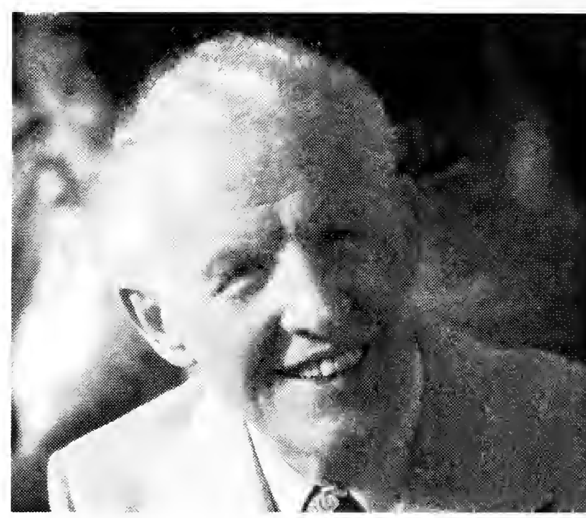

Figure 2. Joseph DuShane (ca. July, 1973) Western Society of Malacologists meeting, Asilomar Conference Center, Pacific Grove, California. Photo courtesy of Jim McLean.

what they were. Upon returning to Los Angeles, she visited the late George Kanakoff at the Los Angeles County Museum of Natural History who identified her specimens as *Janthina janthina* (the common Janthina). From then on she was hooked.

Soon thereafter in 1957 Helen joined the Conchological Club of Southern California (CCSC). This was prior to the publication of the first edition of Myra Keen's *Sea Shells of Tropical West America*

(1958), which had been eagerly awaited by the malacological community. She was CCSC secretary in 1959 and 1960; vice-President in 1962 and 1986; President in 1963 and 1987; and was also an honorary member.

In the early 1960s Helen realized that she could make significant scientific contributions to west coast malacology by specializing in a single family. For this she selected the Epitoniidae, in which numerous new species were then still undescribed. Her first description of a new epitoniid, *Scalina billeeana*, was co-authored with Twila Bratcher in 1965. Twenty-one additional epitoniid species were described by Helen and co-authors through 1988 [see page 41]. After her retirement in 1965, she and Joe made numerous short collecting trips to the Gulf of California, living out of their camper. They generously donated extra specimens from these trips to the Malacology Section of the Natural History Museum of Los Angeles County (LACM). In addition to her research Helen, as a volunteer, meticulously maintained the LACM Epitoniidae collection.

Helen was a member of several other local and national malacological organizations including the Pacific Division of the American Malacological Union (treasurer 1966 through 1968); the Western Society of Malacologists (charter member; treasurer in 1967 and 1968; vice-President in 1976; president in 1977; honorary member in 1978; and was conferred with the WSM *Award of Honor* in 1980). She was presented with a *Life Membership Award* from the Pacific Shell Club in 1998. Helen was also a member of the San Diego Shell Club from 1984 to 1999 and the now defunct Santa Barbara Malacological Society. Her affiliation with the aforementioned organizations and her dedicated interest in malacological research, helped Helen earn an appointment as a Research Associate at LACM in Invertebrate Zoology (now Malacology) in 1967 by Dr. James H. McLean.

Helen traveled extensively in the eastern Pacific collecting shells including Alaska, British Columbia, Panamá, and especially México and authored or co-authored over 50 papers on Panamic mollusks (especially the family Epitoniidae) [see page 42]. Her co-authors included a veritable "Who's Who" of eastern Pacific malacology including Jim McLean, Bert Draper, Twila Bratcher, Roy Poorman, Gale Sphon, and Ellen Brennan. Helen also had an interest in archaeology and was called upon to identify shell artifacts from the Casas Grandes site, Chihuahua, México, for the Amerind Foundation, Dragoon, Arizona, and from Chaco Canyon for the University of New Mexico.

From my own personal experiences with Helen, despite her sometimes gruff exterior, she was a caring person with a witty sense of humor who never turned down a question about mollusks, especially those that involved her beloved epitoniids. In fact during my thesis research on Pliocene/Pleistocene mollusks of the Santa Susana Mountains of Ventura and Los Angeles counties, southern California, I was having a particularly difficult time identifying a fragmented epitoniid specimen. I had initially identified it as *Nitidiscala tincta*, which Helen quickly confirmed and urged me to trust my instincts. This was a tremendous boost to my confidence. She will indeed be missed by all of us.

PERSONAL RECOLLECTIONS OF HELEN DUSHANE

Helen DuShane: My Friend, My Mentor

Kirstie L. Kaiser
Puerto Vallarta, Jalisco, México

It is with sadness that I write this note because I know that I have lost a dear friend. On the other hand, I feel privileged to have known and worked with Helen DuShane starting in my early years of "shell collecting."

It was in 1980 when I met Helen at my first meeting of the Conchological Club of Southern California. I remember being very intimidated by all those serious people talking about such weighty "shell science," of which I understood nothing. At the end of the evening's presentation and business meeting, Helen came over to introduce herself and welcomed me as a new member. We started chatting about what I collected and where I had collected. I confessed that I really had no idea what I had in my meager collection. With a big smile on her face, she asked me if I would like to come to her home on Sundays and we could start at one end of my collection and work to the other for as long as it took. I was thrilled!

There were two very memorable times during my Sundays with Helen. In one of the early visits, she asked me what was to be the focus of my collection. Not realizing that I needed a "focus" and what I could be getting into, I replied that I wanted to travel the world and build a world-wide collection that was totally self-collected! In her serious manner, she told me that it was very commendable and quite ambitious but that maybe it would be better if I focused on a particular family or better yet, a geographic area. That day I became a junior member of the "Panamic Mafia."

As time went by, we got through the biggest and prettiest shells and my next visit was with my little collection of tiny specimens that I was sure were "baby seashells." I was soon told that "babies" were called juveniles and that my shells were not juveniles but were fully adult species of various families. She set several of them under her modest microscope for me to view. That was it, I was hooked on micros!!

I think of Helen as a great teacher and mentor and remember all of our special times when I see her microscope standing proudly on my workroom shelf.

Knowing Helen in her Final Years... a Real Pleasure
Dan and Hiromi Yoshimoto
Eureka, California

Having only known Helen for the last nine years of her life, was in a way, a disappointment since we didn't know her during her vital years as a researcher. But in another way, it was a great pleasure spending time with her in her home with her daughter Renee. As we lived close to Helen and Renee, it was a simple thing to pick up the phone and ask Helen if she'd like a few cookies or nice French Cakes from our local French bakery. You could always get a "yes" if cakes were involved. Helen had a real sweet tooth.

When we first met Helen in 1993, she was still very healthy and could get around her home to the "office" where she kept her famous Epitoniidae collection. By then she had already donated her Panamic collection to the American Museum of Natural History, but was reluctant to give away "her babies," which she protected as much as she would a child.

As Hiromi, my wife, had a small collection of epitoniids, Helen was always ready to help identify and synonymize the specimens Hiromi brought. It was like two friends that had known each other for years. One day, after collecting fossil epitoniids in San Diego, we brought several to Helen and she said that she didn't have specimens of that particular species but that the American Museum had made her a cast of some that were in their collection. "I really don't need more specimens," she said, but a few days later she called and asked if we still had some that she could put in her "special drawers."

As time went by, Helen's health was getting poorer and poorer and before we left Whittier for Eureka, she was in a wheelchair, after having fallen. It was a most interesting sight to see Renee (also in a wheelchair) pushing Helen around the house -- as they both said, "like a train." That was Helen's and Renee's joke. They both had/have a great sense of humor.

In the past five years, we saw Helen five or six times, whenever we made the 750 mile trek to Southern California. Each time was a pleasure for all of us, as we ate our cookies and French pastries. Two years before she passed away, Helen donated her famous Epitoniidae collection to the Santa Barbara Museum of Natural History and to Hiromi and me, her "special drawers" and her shell cleaning tool box (made by Roy Poorman) both of which she signed, as if they were paintings.

Although we only knew Helen for the last nine years of her life, it brought us great pleasure to be in her company and to share her love for shells.

ACKNOWLEDGMENTS

Many thanks to Henry W. Chaney (Santa Barbara Museum of Natural History) who provided access to archival material donated by Helen DuShane. Special thanks to Dan & Hiromi Yoshimoto (Eureka, CA) and Kirstie Kaiser (Puerto Vallarta, México) for providing personal reflections and to Renee DuShane (Whittier, CA) and Forrest Poorman (Westminster, CA) for sharing personal memories of Helen. James H. McLean (LACM Malacology Section) reviewed the manuscript and kindly permitted the use of his slide collection for the illustrations.

MALACOLOGICAL PUBLICATIONS OF HELEN DUSHANE

DUSHANE, HELEN
1957. Marine treasures from the beach at Punta Penasco ... The Desert Magazine 20(10): 17-20, 2 unnumbered figs. [October].
1961. Range extension for *Tenaturris nereis* (Pilsbry & Lowe, 1932). The Veliger 4(1): 50 [July 1].
1962. A checklist of mollusks for Puertecitos, Baja California, Mexico. The Veliger 5(1): 39-50 [July 1].
1963. Range extensions for *Terebra robusta* Hinds, 1844 and for *Terebra formosa* Deshayes, 1857. The Veliger 5(4): 159 [April 1].
1966a. A rare *Epitonium* from the Gulf of California. The Veliger 8(4): 311-312, pl. 52 [April 1].
1966b. Range extension for *Tylodina fungina* Gabb, 1865 (Gastropoda). The Veliger 9(1): 86 [July 1].

1966c. Erroneous range extension for *Tivela stultorum* (Mawe, 1823). The Veliger 9(1): 86-87 [July 1].
1967. *Epitonium (Asperiscala) billeeana* (DuShane & Bratcher, 1965) *non Scalina billeeana* DuShane & Bratcher, 1965. The Veliger 10(1): 87-88 [July 1].
1969. A new genus and two new species of Typhinae from the Panamic Province (Gastropoda: Muricidae). The Veliger 11(4): 343-344, pl. 54 [April 1].
1970a. Two new Epitoniidae from the Galápagos Islands (Mollusca: Gastropoda). The Veliger 12(3): 330-332, pl. 51 [January 1].
1970b. Shallow water mollusks of the Gulf of California, Mexico: El Golfo, San Felipe, Puertecitos, and San Luis Gonzaga Bay [abstract]. Western Society of Malacologists, The Echo 2: 14 [March 9].
1970c. Five new epitoniid gastropods from the west coast of the Americas. Los Angeles County Museum of Natural History Contributions in Science 185: 1-6, figs. 1-5 [April 17].
1971a. The Baja travels of Charles Russell Orcutt: Baja California Travel Series, v. 23. Dawson's Book Shop: Los Angeles, California. 75 p., frontis. + 12 unnumbered figs.
1971b. "Springtime" is over in Baja California. The Tabulata 4(4): 9-10 [October 1].
1974. The Panamic-Galapagan Epitoniidae. The Veliger 16 [supplement]: 1-84, figs. 1-154 [May 31].
1977a. A new abyssal *Amaea* (Gastropoda: Epitoniidae) from the north eastern Pacific Ocean. The Nautilus 91(3): 87-88, figs. 1-2 [July 1].
1977b. *Epitonium textimattum*, a new gastropod from the west coast of Mexico. The Nautilus 91(3): 89-91, figs. 1-8 [July 1].
1977c. A new species of *Amaea (Scalina)* from the Pliocene of Baja California Sur, Mexico (Mollusca: Gastropoda). Journal of Paleontology 51(5): 953-958, fig. 1, pl. 1 [September].
1979a. Description of a previously misidentified species of *Epitonium* (Gastropoda: Epitoniidae). The Veliger 21(3): 379-380. figs. 1-2 [January 1].
1979b. The family Epitoniidae (Mollusca: Gastropoda) in the northeastern Pacific. The Veliger 22(2): 91-134, figs. 1-71 [October 1].
1981. Shell middens of El Requeson, Concepcion Bay, Baja California Sur, Mexico. Pacific Coast Archaeological Society Quarterly 17(1): 14-16 [January].
1982. Notes on living *Casmaria vibexmexicana* (Stearns, 1894). The Veliger 24(4): 336-338 [April 1].
1983a. New developments in the family Epitoniidae [abstract]. Western Society of Malacologists Annual Report 15: 10 [August 30].
1983b. Shell middens of El Requesón, Concepción Bay, Baja California Sur, Mexico. The Festivus 15(9): 94-96 [September 8].
1984a. Artifacts of the Pericues. Pacific Coast Archaeological Society Quarterly 20(1): 69-70 [January].
1984b. *Casmaria vibexmexicana* (Stearns, 1894). Opisthobranch 16(4): 48, 1 unnumbered fig. [April].
1984c. *Thyca (Bessomia) callista* Berry, 1959. The Festivus 16(11): 124-125 [November 8].
1985a. *Cyclothyca corrugata* Stearns, 1890. The Festivus 17(1): 11, fig. 1 [January 10].
1985b. The wandering wentletrap, *Epitonium (Asperiscala) billeeana* (DuShane & Bratcher, 1965). The Festivus 17(4): 38-39 [April 11].
1985c. The family Epitoniidae of Panama Bay. The Festivus 17(7): 68-75, figs. 1-5 [July 11].
1986a. Dredging at its primitive best or Rosemary's 40 hour dredging trip. The Festivus 18(1): 10-11 [January 9].
1986b. Aboriginal shell collectors. The Festivus 18(7): 96-97 [July 10].
1986c. A note on Cedros Island [excerpt from a letter from Helen DuShane to Jules Hertz]. The Festivus 18(10): 144 [October 9].
1987a. The synonymy of *Epitonium (Gyroscala) lamellosa* (Lamarck, 1822). The Festivus 19(2): 10-12, 1 unnumbered fig. [February 12].
1987b. Classification of three species of Epitoniidae found in Hawaiian waters. Hawaiian Shell News 35(6): 1, 4, figs. 1-5 [June].
1987c. The many synonymic names of *Gyroscala lamellosa* (Lamarck, 1822). Hawaiian Shell News 35(11): 12, 1 unnumbered fig. [November].
1988a. Hawaiian Epitoniidae. Hawaiian Shell News 36(2): 3-4, 2 unnumbered figs. [February]; 36(4): 1, 7, figs. 1-3 [April]; 36(5): 9-10, 2 unnumbered figs. + figs. 1-4 [May]; 36(7): 4-5, 7 unnumbered figs. [July]; 36(9): 4-5, 4 unnumbered figs. [September]; 36(10): 5, 1 unnumbered fig. [October]; 36(11): 7, 9, 6 unnumbered figs. [November]; and 36(12): 14, 3 unnumbered figs. [December].
1988b. Geographical distribution of some Epitoniidae (Mollusca: Gastropoda) associated with fungiid corals. The Nautilus 102(1): 30-35, figs. 1-10 [February 16].
1988c. Pliocene Epitoniidae of the Esmeraldas Beds northwestern Ecuador (Mollusca: Gastropoda). Tulane Studies in Geology and Paleontology 21(1/2): 51-58, figs. 1-12 [July 20].
1988d. Early conchologists in Baja California. The Festivus 20(8): 77-82 [August 11].
1988e. New Hawaiian species of Epitoniidae (Mollusca: Gastropoda). The Veliger 31(3/4): 267-271, figs. 1-7 [October 3].
1989a. Chichimeca, early shell traders and artisans. The Festivus 21(6): 52-55 [June 8].
1989b. The range for *Macron aethiops* (Reeve, 1847). The Festivus 21(7): 60-61, figs. 1-2 [July 13].
1990. Hawaiian Epitoniide. Hawaiian Shell News 38, Supplement 1: 1-16, figs. 1-45 [January].

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1965. A new *Scalina* from the Gulf of California. The Veliger 8(2): 160-161, pl. 24 [October 1].

DUSHANE, HELEN & ELLEN BRENNAN.
1969. A preliminary survey of mollusks for Consag Rock and adjacent areas, Gulf of California, Mexico. The Veliger 11(4): 351-363 [April 1].

DUSHANE, HELEN & BERTRAM C. DRAPER
1975. The genus *Seila* in the eastern Pacific (Mollusca: Gastropoda). The Veliger 17(4): 335-345, figs. 1-31 [April 1].

DUSHANE, HELEN & JAMES H. MCLEAN
1968. Three new epitoniid gastropods from the Panamic Province. Los Angeles County Museum of Natural History Contributions in Science 145: 1-6, figs. 1-6 [June 14].

DUSHANE, HELEN & ROY POORMAN

1967. A checklist of mollusks for Guaymas, Sonora, Mexico. The Veliger 9(4): 413-440 [April 1].

DUSHANE, HELEN & GALE G. SPHON
1968. A checklist of intertidal mollusks for Bahía Willard and the southwest portion of Bahía San Luis Gonzaga state of Baja California, Mexico. The Veliger 10(3): 233-246, pl. 35 [January 1].

BRADNER, HUGH & HELEN DUSHANE
1982. Optical and SEM comparison of *Casmaria erinaceus* (Linnaeus, 1758) and *C. vibexmexicana* (Stearns, 1894). The Veliger 24(4):339-341, figs. 1-10 [April 1].

MOLLUSCAN TAXA NAMED AFTER HELEN DUSHANE

Terebra dushaneae Campbell, 1964
Nassarina (Cigclirina) helenae Keen, 1971
Thelecythara dushaneae McLean & Poorman, 1971

MOLLUSCAN SPECIES DESCRIBED BY HELEN DUSHANE

CERITHIOPSIDAE

Seila pulmoensis DuShane & Draper, 1975

EPITONIIDAE

Scalina billeeana Dushane & Bratcher, 1965 [= *Epitonium (Asperiscala) billeeana*]
Epitonium (Asperiscala) huffmani DuShane & McLean, 1968
Epitonium (Epitonium) shyorum DuShane & McLean, 1968
Amaea (Scalina) tehuanarum DuShane & McLean, 1968
Amaea (Scalina) deroyae DuShane, 1970
Epitonium (Nitidiscala) hancocki DuShane, 1970
Epitonium (Asperiscala) longinosanum DuShane, 1970
Epitonium (Asperiscala) macleani DuShane, 1970
Epitonium (Acirsa) cerralvoensis DuShane, 1970
Epitonium (Acirsa) murrha DuShane, 1970
Amaea (s.l.) contexta DuShane, 1970
Epitonium (Nitidiscala) skoglundae DuShane, 1974
Opalia (Dentiscala) paulula DuShane, 1974
Epitonium (Asperiscala) textimattum DuShane, 1977
Amaea (Amaea) siapnoi DuShane, 1977
Amaea (Scalina) edwilsoni DuShane, 1977 [Pliocene]
Epitonium (Nitidiscala) arcanum DuShane, 1979
Epitonium (s.l.) hemmesi DuShane, 1988
Epitonium (s.l.) thorssoni DuShane, 1988
Asperiscala goldsmithi DuShane, 1988
Opalia (s.l.) burchorum DuShane, 1988
Laeviscala luceo DuShane, 1988

MURICIDAE

Cinclidotyphis DuShane, 1969
Cinclydotyphis myrae DuShane, 1969
Pterotyphis (Tripterotyphis) arcana DuShane, 1969

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THE FESTIVUS

A publication of the San Diego Shell Club

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

E-mail: cmhertz@pacbell.net *Website at: http://www.users.cts.com/crash/t/tarnold/SDSC/index.html*

PROGRAM

The Prevalence of Nonindigenous Species in Southern California and their Effects on Benthic Macroinvertebrate Communities

Ron Velarde, Marine Biologist III at the City of San Diego's Marine Biology Laboratory, will give an illustrated talk on the occurrence of nonindigenous species in southern California embayments and will compare these data to small embayments along the entire west coast of the United States.

The Club's Science Fair Winner, Emily Balmert, will give an overview of her winning project, "Impact of Iron Concentration in Sea-water on Phytoplankton Health."

Meeting date: 19 June 2003

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting 15 May 2003

President Carole Hertz opened the May meeting of the San Diego Shell Club at 7:45 p.m. Since there was no regular meeting in April, there were no minutes to approve. There was no Treasurer's report and no report from the Corresponding Secretary since both officers were on travel. Vice-President Larry Lovell reported that we now have speakers scheduled for the remainder of 2003. Newly obtained speakers are Bonnie Becker in August, Ángel Valdés in October and Phil Liff-Grief in November. Carole announced that in addition to our normally scheduled June speaker, our selected Science Fair winner will also give an overview of her project next month.

Carole stated that the Club had sent a letter earlier in the year to pertinent people at the Scripps Institution of Oceanography concerning their funding problems and the possible closing and/or transfer of their marine species' collection. The Club has received a very nice letter in response. Carole also stated that as a result of a large shortfall in funding at the San Diego Natural History Museum, they have made significant reductions in staff. Patricia Beller, Collection Manager of the Marine Invertebrates Department, has received her layoff notice effective 1 July. The Club has written a letter to Dr. Michael Hager, Executive Director of the Museum, with copies to many of the Trusteess voicing our concern about the importance of the mollusk collection and whether the collection will be available to local or visiting researchers. Larry stated that the Natural History Museum of Los Angeles County is also having funding problems and will also have cutbacks in staff.

Larry introduced the speaker for the evening, Jeffrey Crooks, Research Coordinator of the Tijuana River National Estuarine Research Reserve, who gave a slide program entitled, "Unnatural History: The Arrival, Establishment, and Integration of Exotic Species into California Marine Ecosystems." The world has noted some 50,000 biological invaders. Dr. Crooks showed photographs of most of the 57 marine invaders into the southern California area, mostly in San Diego and Mission Bays. These included various plants, algae, mollusks, barnacles, crustaceans, sea anemones, etc. He discussed the invasions in San Diego versus those in San Francisco Bay, and compared the 57 invaders in San Diego to the 157 invaders in San Francisco Bay. Thirty-five were common to both areas, 22 in San Diego were not found in San Francisco, and 122 in San Francisco were not in San Diego. He talked about where the invaders came from and possible modes of arrival. He also showed the marked increase of reported invasions in recent years and possible reasons for this phenomenon. He illustrated the spread of the small mussel, *Musculina senhousia,* from their original site to the Americas, Australia, etc. He discussed their abundance in Mission Bay and how they have become a major food source for some of the shore birds. He ended by stating that there are three lines of defense: (1) vector control, (2) providing eradication or control once invaders are discovered, and (3) improving environmental conditions. Many of the potential solutions are extremely costly and are very difficult to implement.

Larry Lovell won the door prize. Refreshments were provided by John Bishop and Ron Deems. The meeting was adjourned at 8:45 p.m.

Jules Hertz

Board Member and Club Host Still Needed

At this time, the Club is still lacking a Recording Secretary. Anyone who attends meetings regularly qualifies and his/her services are sorely needed.

Also needed is a Club host. This is not a difficult job and one greatly appreciated. The host reminds those scheduled to bring in refreshments, greets guests and sets up the refreshment table at meetings (with the help of attending members).

If you are willing to help in either capacity, please contact Carole Hertz (858-277-6259) or e-mail at <cmhertz@pacbell.net>.

The September Party

The Club's annual September party will be on Saturday September 20th. This year it will be held in the garden of Linda and John LaGrange's home.

Mark your calendars and save the date. Further details will be in the July issue.

ILLUSTRATED CATALOG OF SPECIES ASSIGNED TO THE GENUS *FAVARTIA* (MURICIDAE) FROM THE PANAMIC PROVINCE

BARBARA W. MYERS[1]

Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road
Santa Barbara, California 93105-2936, USA

Abstract: This catalog includes all nominate species of the genus *Favartia* s.s. Jousseaume, 1880, and the two subgenera *Caribiella* Perrilliat, 1972, and *Murexiella* Clench & Pérez-Farfante, 1945, as well as three species formerly assigned to *Favartia (dipsacus, jacquelinae* and *poormani*) found in the Panamic Province. This province encompasses the outer coast of Baja California throughout the Golfo de California, México, south along the Pacific coast to Perú and including the Islas Galápagos, Ecuador, and Isla del Coco, Costa Rica.

Background and Discussion

Previous worldwide studies of the Muricidae by Radwin & D'Attilio (1976), Fair (1976) and Houart (1994) included *Favartia* species from the Panamic region. Keen (1971) included the Muricidae [*Favartia*] in her study of Panamic Mollusca. Skoglund (2002), an update of Keen (1971), included names of species described after 1971 but has no illustrations.

There has been considerable difference of opinion in recent years concerning the placement of *Favartia* Jousseaume, 1880, and *Murexiella* Clench & Pérez-Farfante, 1945. Of historical interest, Jousseaume (1882) in his generic descriptions of the Muricidae which were supposed to accompany his 1880 list, noted that *Favartia* had very strong, projecting varices and squamous ribs connected by lamellae. The species assigned to *Favartia* herein have small, broad, fusiform shells. They have a small circular or sub-ovate aperture, smooth or lirate within and have a weak anal sulcus. Varices number up to eight on the body whorl with strong scabrous spiral cords which may develop short spines.

The species here assigned to *Favartia (Murexiella)* Clench & Pérez-Farfante, 1945, have foliated spines with webbing between, but otherwise differ little from *Favartia* s.s. The type species of both *Favartia* and *Murexiella* have medium-sized, fusiform shells, an ovate to round aperture, continuous peristome, weak anal sulcus and short, open canal. Both have 5 to 6 scabrous cords on the body whorl connected by scabrous lamellae. In *Murexiella* these cords often develop into longer foliated spines with elaborate webbing between.

Emerson and D'Attilio (1970) illustrated the radula of *Murexiella hidalgoi* (Crosse, 1869), type of *Murexiella*, and Ponder (1972) illustrated the radula and operculum of *Favartia (F.) brevicula (*Sowerby, 1834), type of *Favartia.* Ponder stated that on the basis of radula and operculum, "*Murexiella* can be regarded, at best, as being only subgenerically distinct from *Favartia.*" Radwin and D'Attilio (1971) placed both *Favartia* and *Murexiella* as genera in their new subfamily, Muricopsinae, noting sculptural, opercular and radular similarities. In 1976 they listed them separately because they did not consider subgenera in their world-wide study of the Muricidae. D'Attilio and Bertsch (1980) agreed with Ponder (1972) and accorded subgeneric rank to *Murexiella* placing *Murex hidalgoi* and other species previously in *Murexiella* within *Favartia.* Hertz and D'Attilio (1985) considered *Murexiella* a genus. D'Attilio and Myers (1985, 1987, 1988) and Houart (1991, 1993) assigned their new species to *Favartia (Murexiella)*. However, Vokes (1988) continued to consider them as distinct genera as did Houart (1994). Based on study of pertinent literature and specimens identified as both *Favartia* and *Murexiella*, I consider *Murexiella* to be a subgenus of *Favartia* distinguished only by the longer foliated

[1] Mailing address: 3761 Mt. Augustus Ave., San Diego, CA 92111, USA.

spines, webbed between.

Caribiella Perrilliat, 1972, was proposed as a subgenus of *Aspella* Mörch, 1877, in the subfamily Muricinae. Radwin and D'Attilio (1976) placed *Murex alveatus* Kiener, 1842, the type of *Caribiella* in the genus *Favartia* in their subfamily Muricopsinae. Vokes and D'Attilio (1980a) placed *Caribiella* as a subgenus of *Favartia*. *Caribiella* is distinguished from *Favartia* by an elongate spire, a dorso-ventral flattened shell and rounded varices which cross the shoulder of the preceding whorl. The radula indicates it is a *Favartia*.

A recent paper on muricid descriptive taxonomy (Merle, 2001) introduces a new protocol for describing spiral cords and dentition which Merle claims will be useful in the analysis of phylogenetic and taxonomic placement of muricids. He has included illustrations of cords and apertures for *Favartia (Favartia) brevicula*, *F. (Caribiella) alveata* and *F. (Murexiella) hidalgoi*. Although the illustrations do not show much difference in the arrangement of the cords between *Favartia* s.s. and *F. (Caribiella)*, *F. (C.)* has an elongate spire and a dorso-ventrally flattened shell. His illustration of *F. (Murexiella)* clearly demonstrates the elongate, webbed spines characteristic of the subgenus.

Also considered herein are three species formerly placed in *Favartia* by authors. Two are currently assigned to *Murexsul* and one to *Pygmaepterys*. Radwin and D'Attilio, 1971, included the genus *Murexsul* Iredale, 1915, in their new subfamily Muricopsinae. Previously it had been placed in Muricinae (Vokes, 1964) and then in Tritonaliinae (Ponder, 1968). Ponder (1972) compared the operculum and radula of *Murexsul octogonus* (Quoy & Gaimard, 1833), type of *Murexsul*, with *Muricopsis blainvillei* (Payraudeau, 1826), type of *Muricopsis* Bucquoy & Dautzenberg, 1882, and he concluded that *Murexsul* is a junior synonym of *Muricopsis*. Vokes (1988) recognized *Murexsul* as a separate genus mentioning denticles in the aperture of *Muricopsis*, absent in *Murexsul*. Ponder (1972) stated all Australian species of *Murexsul* have denticles in the aperture. Houart (1993, 1994) and Burch and Marshall (2000) agreed with Ponder. Both *Murexsul* and *Muricopsis* have fusiform shells with a high spire, numerous varices, strong cords and simple spines. The denticles in *Muricopsis* appear stronger than in *Murexsul* and some species have a broad, deep anal sulcus. There seems to be little evidence to separate *Murexsul* from *Muricopsis* except at the subgeneric level.

Pygmaepterys was named by Vokes (1978) as a subgenus of *Pterynotus* Swainson, 1833, and placed in the Muricinae. [*Pteronotus*, in the original description, was an "unjustified emendation" (Keen, 1971)]. Vokes and D'Attilio (1980b) raised *Pygmaepterys* to a full genus in the subfamily Muricopsinae based on the radula. D'Attilio and Myers (1985) discussed the generic characters of *Pygmaepterys*. Species assigned to *Pygmaepterys* are small, fusiform, usually with six-winged varices, strong spiral cords with scabrous lamellae, reverse tear-drop shaped aperture with strong denticles and a broad, sometimes deep, anal sulcus.

Format: The species are arranged alphabetically within and according to subgenera. Original citations, synonyms, holotype size and depository, and type locality are given, as well as current distribution. Species considered valid are in bold type. Remarks are included where appropriate. The following are the abbreviations used: AMNH = American Museum of Natural History; ANSP = Academy of Natural Sciences of Philadelphia; BMNH = The Natural History Museum, London; LACM = The Natural History Museum of Los Angeles County; MCZ = Museum of Comparative Zoology, Harvard; SBMNH = Santa Barbara Museum of Natural History; SDNHM = San Diego Natural History Museum; USNM = The National Museum of Natural History, Smithsonian Institution.

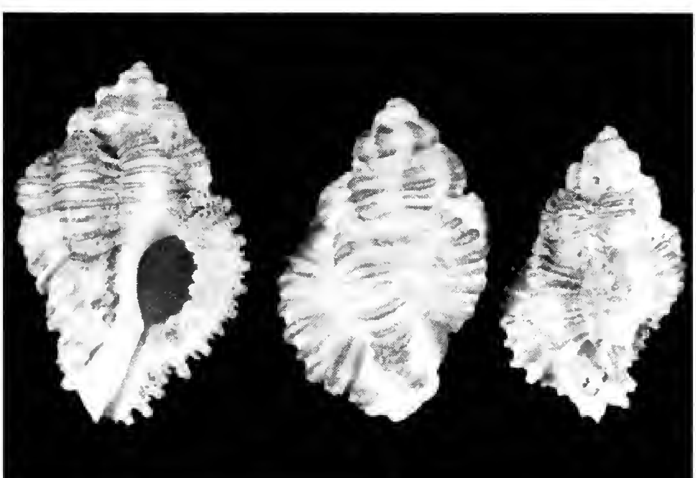
Taxonomic Arrangement

Genus *Favartia (Favartia)* Jousseaume, 1880
Type species: *Murex brevicula* Sowerby, 1834, O.D.

Favartia (Favartia) cocosensis Myers & D'Attilio, 1990
The Venus 49(4): 282-285, figs. 1-3.
(Figure 1)

Holotype: USNM 860015. Size: 8.7 x 4.6 mm.
Type locality: Victoria Seamount, Isla del Coco, Costa Rica, depth: 7-27 m.
Remarks: Donald R. Shasky collected a species at Isla del Coco, Costa Rica, which he identified as *Favartia garretti* (Pease, 1868), a species he said was known only from the Hawaiian Islands (Shasky, 1983a,b; 1984a,b; 1985, 1986). Hertz and D'Attilio (1979) and D'Attilio (1988) discussed *Favartia garretti*. Doubts were raised and Shasky brought the specimens to Myers and D'Attilio, who described it as *F. (F.) cocosensis*. Shasky (1991) agreed that his *F. garretti* was *F. cocosensis*. Everson (1984) also reported *F. garretti*

Figure 1. *Favartia (F.) cocosensis* Myers & D'Attilio, 1990. Holotype (USNM 860015), 8.7 x 4.6 mm, apertural and dorsal views. Photos: D.K. Mulliner.



Figures 2, 3. *Favartia (F.) incisa* (Broderip, 1833). **(2 above)** Illustration of the 3 syntypes (BMNH 1966647); sizes (left to right): 30.1 x 20.3, 26.7 x 17.5, 24.2 x 15.3 mm. **(3 right)** Lectotype, 30.1 x 20.3 mm, dorsal view of lectotype, left specimen in Figure 2. Photographed with the permission of the Trustees of The Natural History Museum, London. Photos: D.K. Mulliner.

from Isla del Coco.
Distribution: Sea mounts and islets surrounding Isla del Coco, Costa Rica (Myers & D'Attilio, 1990) and Isla de Malpelo, Colombia, 620 km ESE of Isla del Coco (Kaiser, 2001).

Favartia (Favartia) incisa (Broderip, 1833)

Proceedings of the Zoological Society of London for 1832: 176. Figured: Sowerby II (1834, pl. 59, fig. 13). (Figures 2, 3)

Syntypes: BMNH 1966647, 3 specimens. Sizes: 24.2 x 15.3, 26.7 x 17.5, and 30.1 x 20.3 mm.
Type locality: Sanctae Elenae [Santa Elena], Ecuador, in 8 fm (15 m).
Remarks: None of the three syntypes has a protoconch. I designate the largest specimen (30.1 x 20.3 mm) as the lectotype (2 left, 3).
Distribution: Bahía de Banderas, Nayarit, México, to Ecuador and the Islas Galápagos (Radwin & D'Attilio, 1976; Finet, 1985, 1991, 1994); Isla de Malpelo, Colombia; and Isla del Coco, Costa Rica (Kaiser & Bryce, 2001).

Favartia (Favartia) peasei (Tryon, 1880)
New name for *Murex foveolatus* Pease, 1869 (*non* Hinds, 1844).

Manual of Conchology, vol.2: 129, pl. 38, fig. 462. (Figures 4-6)

Lectotype of *M. foveolatus* Pease, 1869, ANSP 36144 (designated by Myers & D'Attilio, 1989). Size: 10.6 x 6.0 mm.
Type locality: La Paz, Baja California, México.
Remarks: *Favartia peasei* is a replacement name for *Murex foveolatus* Pease, 1869 (*non* Hinds, 1844). Tryon, who recognized the homonym, received a specimen of *M. foveolatus* from Pease and stated, "I copy his [Pease] figure (Figure 4) which does not agree at all with the specimen sent to me by him" (Figures 5, 6). That badly worn specimen is the only extant syntype and chosen as lectotype of *M. foveolatus* = *Favartia peasei* (Myers & D'Attilio, 1989). It is on deposit in the Academy of Natural Sciences of Philadelphia (ANSP 36144) (Figures 5, 6). Vokes (1995) reopened the *F. peasei* legend with the discovery of two possible syntypes at the Museum of Comparative Zoology, Harvard (MCZ 304068). The label found with the specimens was from the Smithsonian Institution and handwritten as follows: " Pease 47. *Muricidea nov. sp.* Teste H.C." Another note added, "I think = *alveata* ..." [and three additional illegible words]. There was no locality data with the specimens. I assume that the MCZ number had no further reference in the museum records.

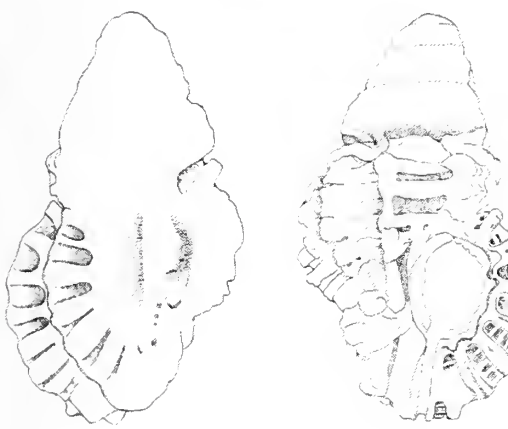
What we know is that Pease did leave much of his collection to the MCZ. Myers and D'Attilio (1989) contacted that institution in an effort to locate William Harper Pease's type for *Murex foveolatus* = *Favartia peasei* and were advised by them that "A search of Pease's material failed to turn up any syntype specimens of *M. foveolatus*." The Vokes (1995, figs 2a,b,c and 4 a,b) illustrations of the two possible syntypes she examined appear similar to the lectotype. However, I still have some reservations because the paper trail gives no solid evidence that the specimens were part of Pease's original material. The discovery by Vokes (1995, fig. 5a,b) of a specimen originally from Pease's collection (MCZ 304069) labeled "*Murex radicatus* Hinds" which she claims is also *Murex foveolatus*, does not add clarity to the problem because Pease, himself, thought the specimen was different enough to call it *M. radicatus*. I consider *F. radicatus* a synonym of *F. (Murexiella) lappa*.

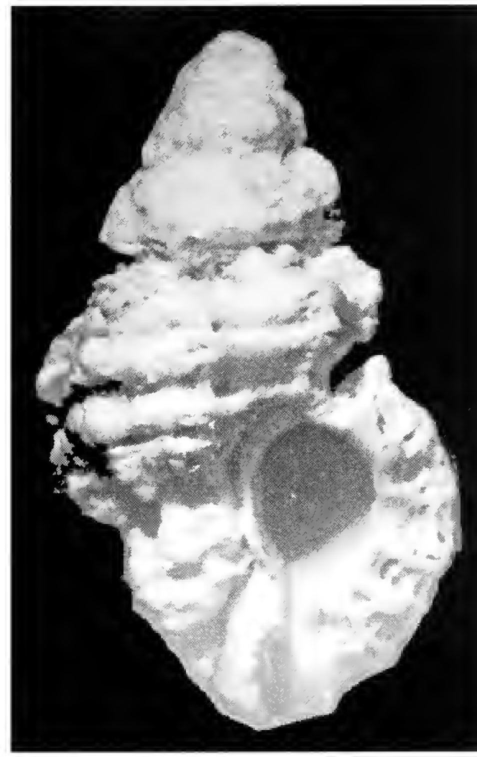
The species has not been found in the Panamic Province since named by Pease. For many years it was confused with *Pygmaepterys poormani* (Radwin & D'Attilio, 1976). See Vokes (1983, 1984, 1995). *Pygmaepterys poormani* is treated as a valid species in this catalog. Whether or not *F. peasei* is a Panamic species, only time will tell.
Distribution: not known.

Subgenus *Caribiella* Perrilliat, 1972
Type species: *Murex intermedius* C.B. Adams, 1850, synonym of *Murex alveatus* Kiener, 1842.

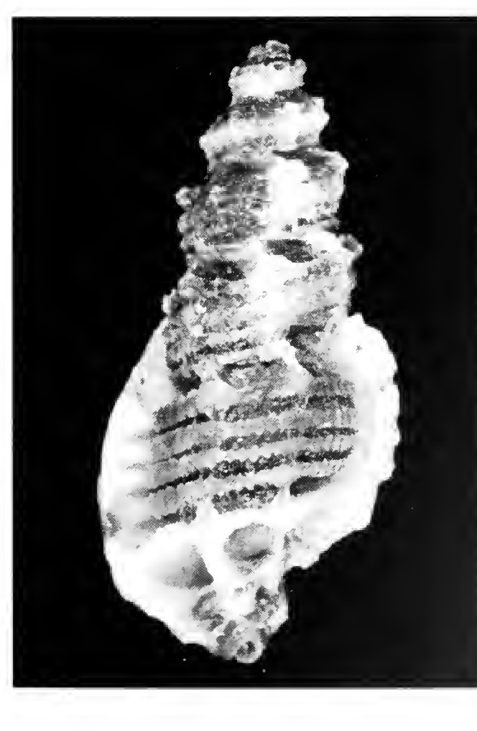
Favartia (Caribiella) erosa (Broderip, 1833)
Proceedings of the Zoological Society of London for 1832: 174-175. Figured: Sowerby II (1834, pl. 60, fig. 16). (Figures 7-9)

Syntypes: BMNH 1964444. Sizes: 15.0 x 6.3, 15.3 x 6.2, 18.6 x 8.8 mm.
Type locality: Panamá.
Remarks: None of the three syntypes has a protoconch. I designate the largest specimen (Figure 8) [left specimen in Figure 7] (18.6 x 8.8 mm) as lectotype. Shasky (1983a, b) identified a muricid from La Cruz de





Figures 4-6. *Favartia (F.) peasei* (Tryon, 1880). **(4)** Original figure by Pease, American Journal of Conchology, Figure 3. **(5)** Lectotype, apertural view, of *Murex foveolatus* (ANSP 36144) 10.6 x 6.0 mm. **(6)** Drawings of apertural and dorsal views of lectotype by A. D'Attilio in Myers & D'Attilio, 1989.



Figures 7, 8. *Favartia (Caribiella) erosa* (Broderip, 1833). **(7)** BMNH 1964444 (syntypes, l - r): 18.6 x 8.8, 15.3 x 6.2, 15.0 x 6.3 mm, apertural view. **(8)** Lectotype, 18.6 x 8.8 mm (left in syntypes), dorsal view. Photographed with permission of the Trustees of The Natural History Museum, London. Photos: D.K. Mulliner.

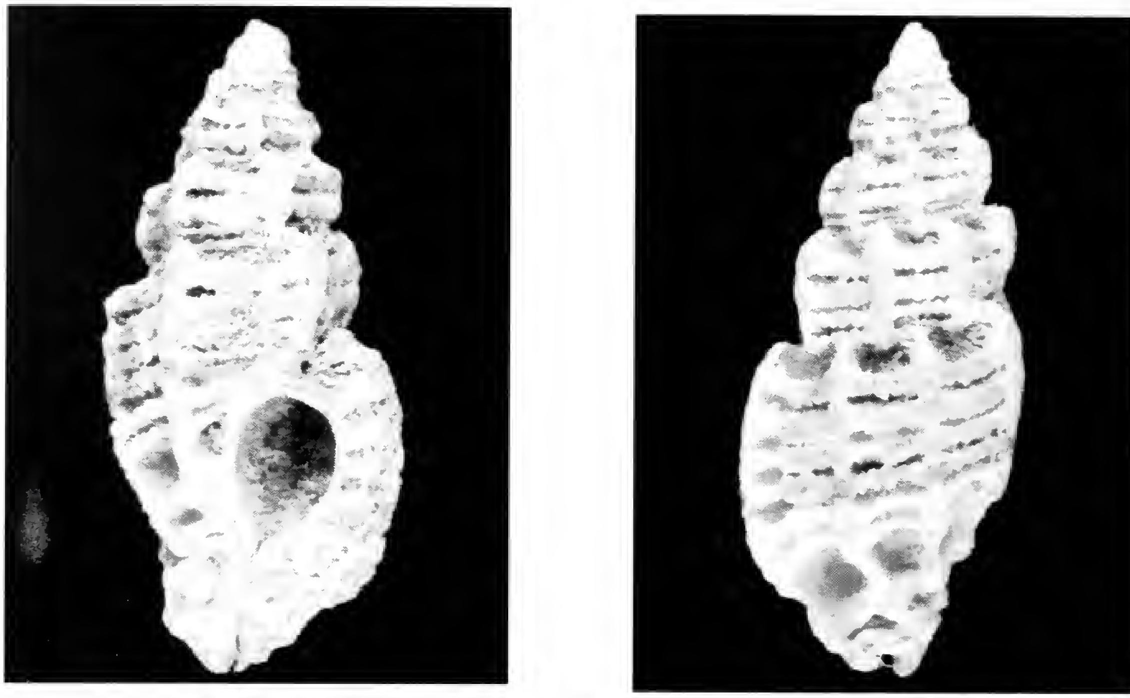


Figure 9. *Favartia erosa*. (SDNHM 23327), 13.3 mm, Mazatlán, Sinaloa, México, apertural and dorsal views. Photo: D.K. Mulliner.

Huanacaxtle, Nayarit, México, as *Favartia garretti* (Pease, 1868). He corrected the misidentification and re-identified it as *Favartia erosa* in 1991. Although Radwin and D'Attilio (1976) listed the species in the Galápagos, Finet (1994), Kaiser (1997) and Hickman and Finet (1999) do not.

Distribution: Mazatlán to Panamá (Keen, 1971); Isla Gorgona, Colombia (Cosel, 1984); Manabí Province, Ecuador (Shasky, 1984c); Islas Galapagos (Radwin & D'Attilio, 1976); rejected record (Finet, 1994; Kaiser, 1997).

Favartia (Caribiella) purdyae Vokes & D'Attilio, 1980

The Veliger 23(1): 16-18, figs. 1, 3.

(Figure 10)

Holotype: SDNHM TS 776 changed to SDNHM 78308. Size: 15.0 x 8.0 mm.

Type locality: Isla Plaza [off Isla Santa Cruz], Islas Galápagos, Ecuador.

Remarks: Named for the late Ruth Purdy, formerly of San Diego, California.

Distribution: Isla del Coco, Costa Rica (Shasky, 1989a); Islas Galápagos [type locality] (Finet, 1985, 1991, 1994; Kaiser, 1997; Hickman & Finet, 1999).

Subgenus *Murexiella* Clench & Pérez Farfante, 1945

Type species *Murex hidalgoi* Crosse, 1869, O.D.

Favartia (Murexiella) diomedaea (Dall, 1908)

Bulletin of Comparative Zoology, Harvard 43(6): 313, 314, pl. 12, figs. 4, 5.

(Figures 11, 12)

Holotype: USNM 123020. Size: 29.0 x 19.0 mm.

Type locality: Golfo de Panamá in 85 fm (155 m).

Remarks: See Hertz & D'Attilio (1985) for illustrations of the species.

Distribution: Golfo de Panamá (Dall, 1908); Isla Cedros, Baja California, México (Vokes, 1970); Punta Gorda, México, to Golfo de Panamá (Radwin & D'Attilio, 1976); Guaymas, Sonora, México

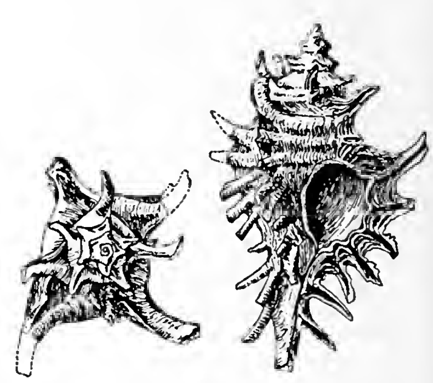


Figure 11. *Favartia (M.) diomedaea*. Holotype (USNM 123020) from Dall, 1908.

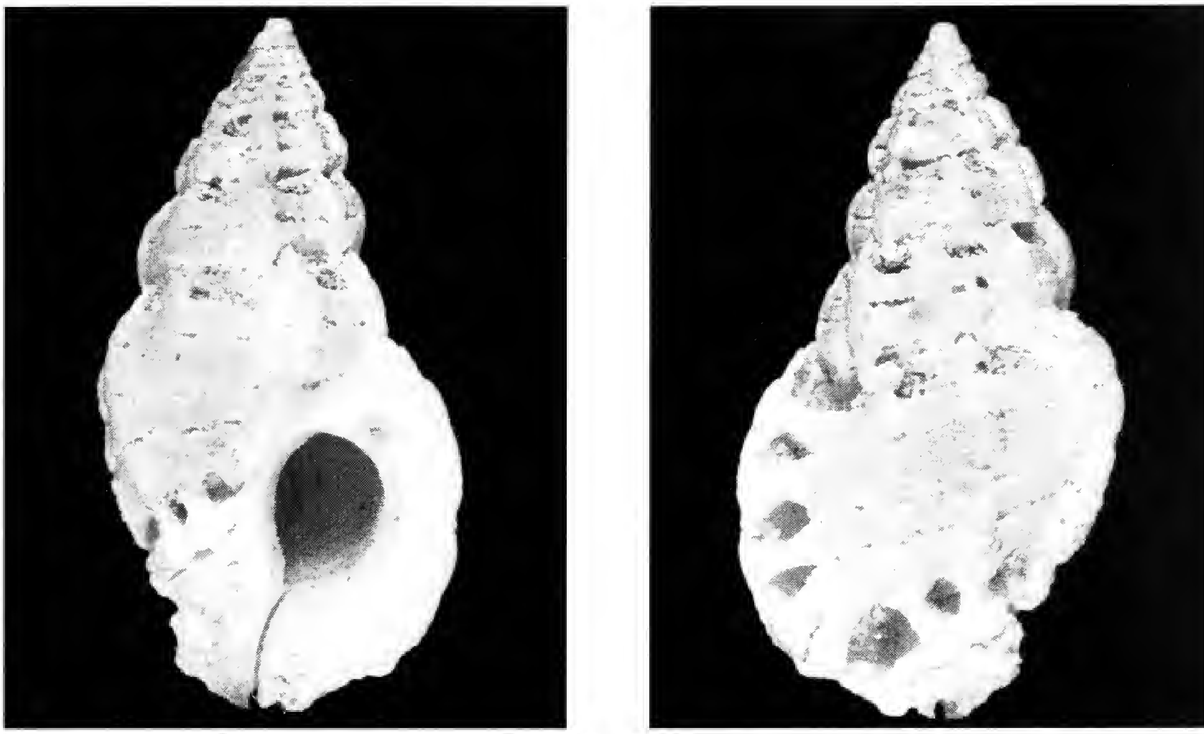


Figure 10. *Favartia (Caribiella) purdyae* Vokes & D'Attilio, 1980. Holotype (SDNHM 78308) 15.0 x 8.0 mm, apertural and dorsal views. Photos: D.K. Mulliner.

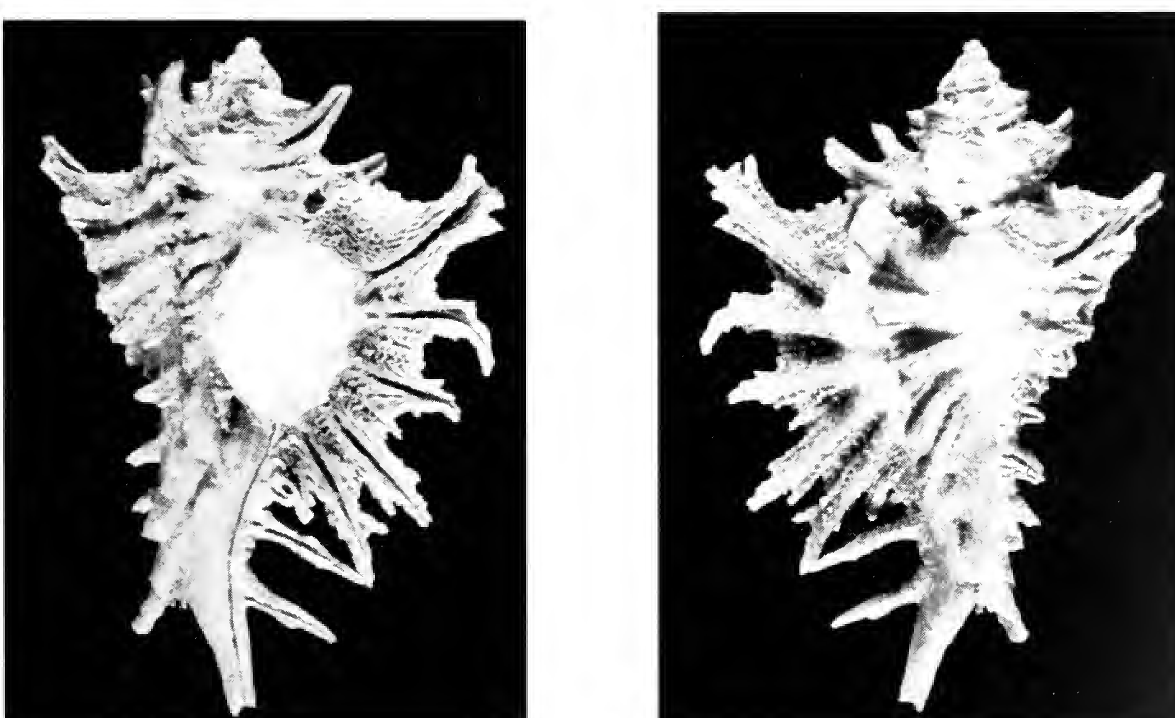


Figure 12. *Favartia (Murexiella) diomedaea* (Dall, 1908). Apertural and dorsal views of mature specimen (SDNHM 85903) 38 mm, off Pta. San Antonio, Guaymas, Sonora, México. Photos: D.K. Mulliner.

(Poorman & Poorman, 1981); Isla Danzante, Golfo de California (Hertz & D'Attilio, 1985); Isla del Coco, Costa Rica (Chaney, 1992).

Favartia (Murexiella) exigua (Broderip, 1833)
Proceedings of the Zoological Society of London for 1832: 175. Figured: Sowerby II (1834, pl. 60, fig. 17).
(Figure 13)

Synonym: *Murexiella venustula* Poorman, 1983.
Lectotype: BMNH 1984122 [designated by Hertz & Myers, 1998]. Size: 16.2 x 9.4 mm.
Type locality: Salango, Ecuador, in 10 fm (18 m).
Remarks: See as *F. (M.) venustula* in this catalogue.
Distribution: Salango, Ecuador [type locality]; Île Clipperton [France] (Kaiser, pers. comm.). [as *venustula*] Guaymas, Sonora, México (Poorman, 1983); Isla Santa Cruz, Islas Galápagos, Ecuador [type locality for *F. (M) venustula*].

Favartia (Murexiella) humilis (Broderip, 1833)
Proceedings of the Zoological Society of London for 1832: 175. Sowerby II (1834, pl. 65, figs. 46, 47).
(Figure 14)

Synonym: *Murexiella keenae* Vokes, 1970 (Radwin & D'Attilio, 1976).
Lectotype: BMNH 197482. Size: 33.9 x 22.2 mm.
Type locality: Sanctae Elenae, Ecuador.
Remarks: See D'Attilio & Myers (1987) for emended description and designation of lectotype.
Distribution: Northern Golfo de California, México, to Panamá, Islas Galápagos and Ecuador (Radwin & D'Attilio, 1976); Isla Perico, Bahía de Panamá (Dall, 1908); Isla del Coco, Costa Rica (Dall, 1908; Montoya, 1983); Isla Gorgona, Colombia (Cosel, 1984); Islas Galápagos, Ecuador (Finet, 1985, 1991, 1994; Kaiser, 1997); Isla Danzante, Golfo de California (M. Mulliner, 1996).

Favartia (Murexiella) keenae (Vokes, 1970)
The Veliger 12(3): 328, pl. 50, figs. 8-10.
(Figure 15)

Synonym of: *Murex humilis* Broderip, 1833.
Holotype: LACM 1259. Size: 34.3 x 22.5 mm.
Type locality: Isla Venado, Canal Zone, Bahía de Panamá.
Remarks: Named for A. Myra Keen. See as *F. (M.) humilis* in this catalogue.

Distribution: see *F. (M.) humilis.*

Favartia (Murexiella) lappa (Broderip, 1833)
Proceedings of the Zoological Society of London for 1832: 177. Figured: Sowerby II (1834, pl. 60, fig 15).
(Figures 16, 17)

Synonym: *Murex radicatus* Hinds, 1844.
Lectotype: BMNH 1964439/1 [designated by Vokes, 1988]. Size: 30.1 x 20.7 mm.
Type locality: Sanctae Elenae, Ecuador, in 12 fm (22 m).
Remarks: In 1971, Vokes stated that the type "was no longer to be found." In 1988, she designated the lectotype from the figure in Sowerby (1834, pl. 60, fig. 15).
Distribution: Bahía Magdalena, Baja California, México, southern Golfo de California south to Ecuador (Keen, 1971); As *F. radicata:* Guaymas, Sonora, México, to Panamá (Keen, 1971); Mazatlán, Sinaloa, México, Isla Socorro, Islas Revillagigedo, México, and to Ecuador (Radwin & D'Attilio, 1976); Bahía San Carlos, Sonora, México (Poorman & Poorman, 1988); Isla Socorro, (Emerson, 1995); Islas Galápagos (Finet, 1985, 1991, 1994; Kaiser, 1997).

Figure 16. *Favartia (Murexiella) lappa* (Broderip, 1833). Lectotype and paralectotypes (BMNH 1964439/1), 30.1 x 20.7 mm (formerly syntype lot). Used with permission of the Trustees of The Natural History Museum, London. Original photo by E.H. Vokes.

Favartia (Murexiella) laurae (E.H. Vokes, 1970)
The Veliger 12(3): 328, 329, pl. 50., figs. 4,5.
(Figure 18)

Holotype: LACM 1260. Size 20.5 x 13.5 mm.

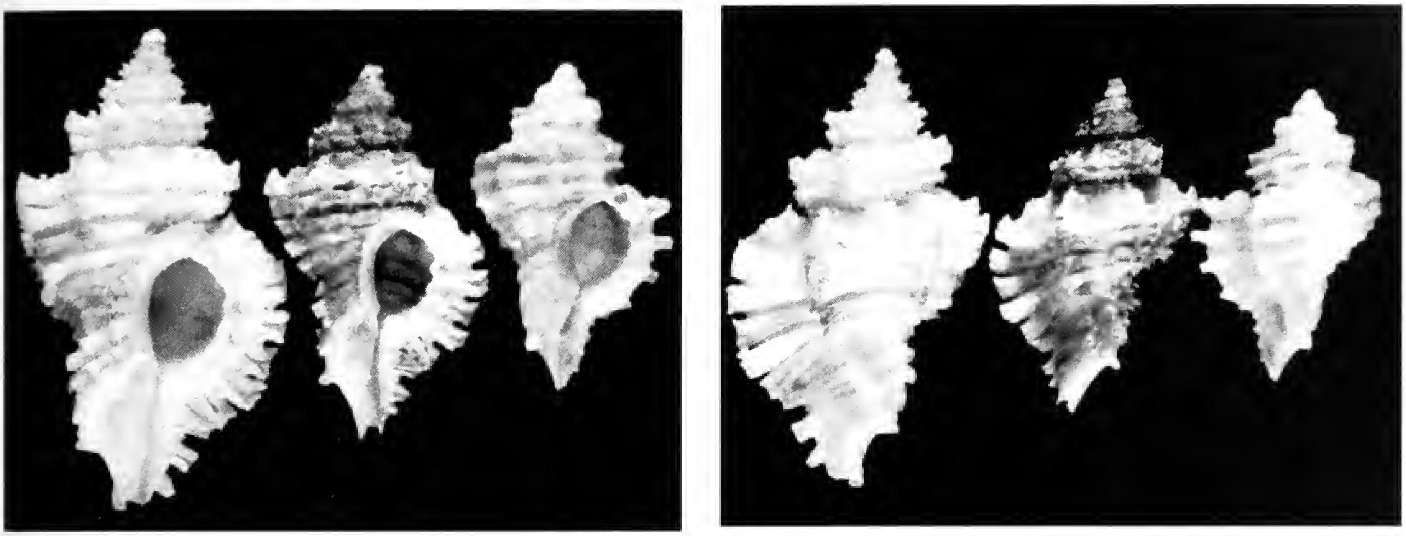


Figure 13. *Favartia (Murexiella) exigua* (Broderip, 1833). Lectotype and two paralectotypes, apertural and dorsal views, formerly syntype lot (BMNH 1984122). Lectotype (left specimen) 16.2 x 9.4 mm (Hertz & Myers, 1998). Reprinted with permission from *The Nautilus*. Original photos by D.K. Mulliner.

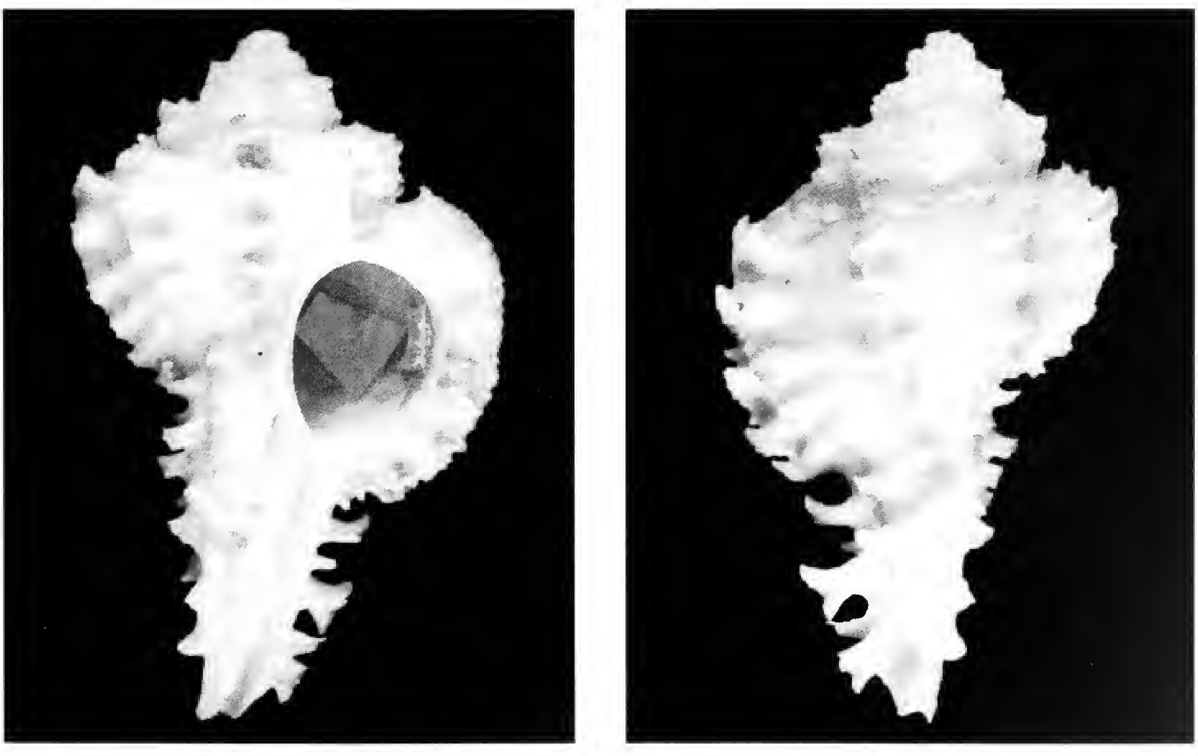


Figure 14. *Favartia (Murexiella) humilis* (Broderip, 1833). Lectotype (BMNH 197482), 33.9 x 22.2 mm, apertural and dorsal views (D'Attilio & Myers, 1987). Reprinted with permission from *The Festivus*. Original photos by D.K. Mulliner.

Figure 15. *Favartia (Murexiella) keenae* (Vokes, 1970). Holotype (LACM 1259), 34.3 x 22.5 mm, aperture, spire and dorsal views. Reprinted from *The Veliger*.

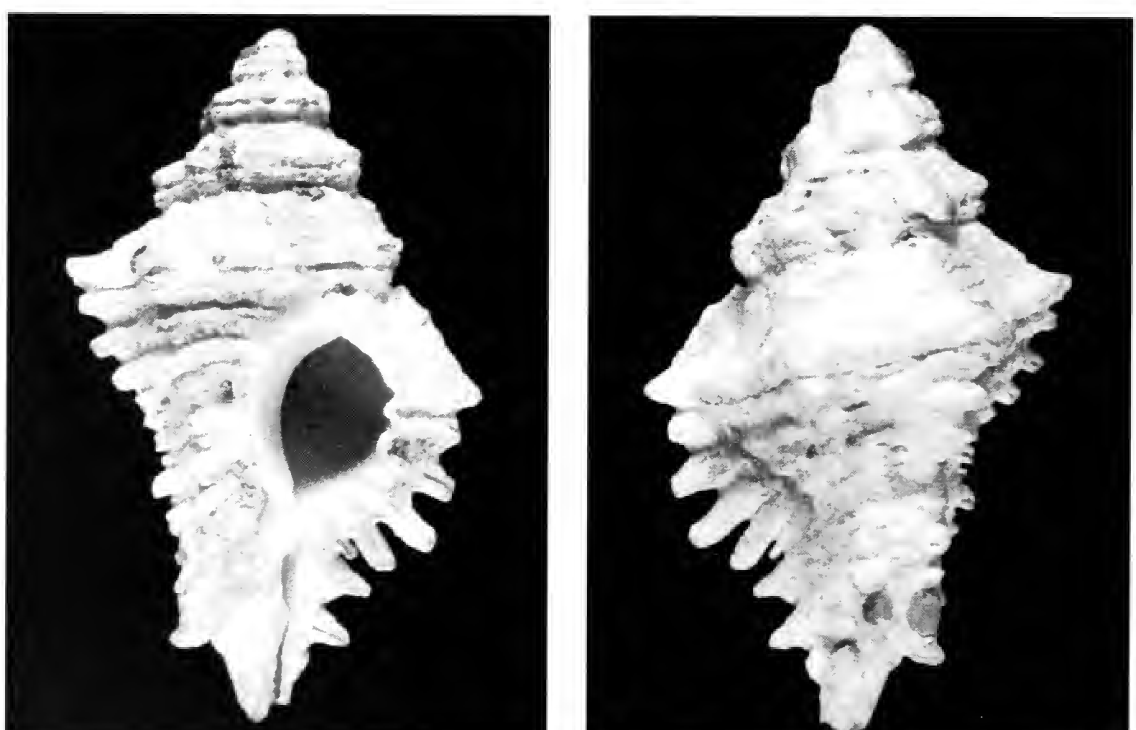


Figure 17. *Favartia (Murexiella) lappa*, 19.9 mm specimen from Islas Galápagos, Ecuador, Ameripagos Expedition (Hertz, 1996). Reprinted with permission from *The Festivus*. Original photos by D.K. Mulliner.

Type locality: Punta de Juluapan, Manzanillo, Colima, México, in 17 fm (31 m).
Remarks: See D'Attilio & Myers, 1987, for a discussion of this species.
Distribution: Guaymas, Sonora, to "White Friars," México (Poorman, 1980a); Playas del Coco, Guanacaste, Costa Rica; Isla La Plata and Isla Salango, Ecuador; Bahía Chatham, Isla del Coco, Costa Rica (D'Attilio & Myers, 1987).

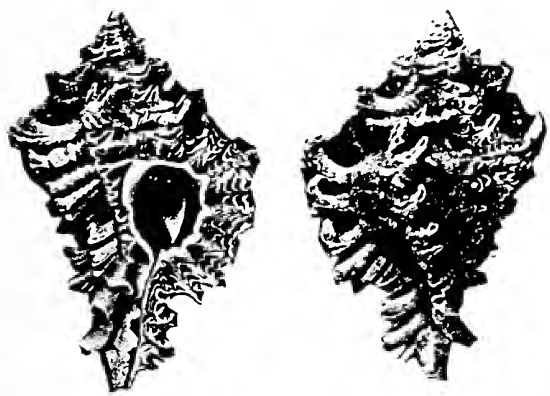


Figure 18. *Favartia (Murexiella) laurae* (Vokes, 1970). Holotype (LACM 1260), 20.5 x 13.5 mm, apertural and dorsal views. Reprinted with permission from *The Veliger*.

Favartia (Murexiella) lepidus (Reeve, 1845)
Conchologia Iconica, vol. 3, pl. 26, fig. 113.
(Figure 19)

Synonym of: *Murex vittatus* Broderip, 1833.
Holotype: Whereabouts unknown.
Remarks: There was no type locality or size given in the original description of *F. (M.) lepidus*. The species was placed in the synonymy of *F. (M.) vittata* by Radwin and D'Attilio (1976).
Distribution: See F. (M.) *vittata* in this catalogue.

Figure 19. *Favartia (M.) lepidus*. Holotype. Reprinted from Reeve, 1845, *Murex*. species 113, enlarged). No size given.

Favartia (Murexiella) mildredae (Poorman, 1980b)
The Veliger 22(4): 361-363, figs. 1, 2.
(Figure 20)

Holotype: LACM 1913. Size 19.7 x 10.8 mm.
Type locality: 5 km south of Tetas de Cabra, Bahía San Carlos, Sonora, México [27°54'N, 111°05'W] in 100 m.
Remarks: Houart (1993) placed the species in the genus *Murexsul*. However, the webbing between the cords on the frondose varices indicates it is a *Murexiella*.
Distribution: Bahía San Carlos, Sonora México; Isla Smith, Bahía de Los Angeles, México (Skoglund, 1983); Isla del Coco, Costa Rica (Myers, 2000).

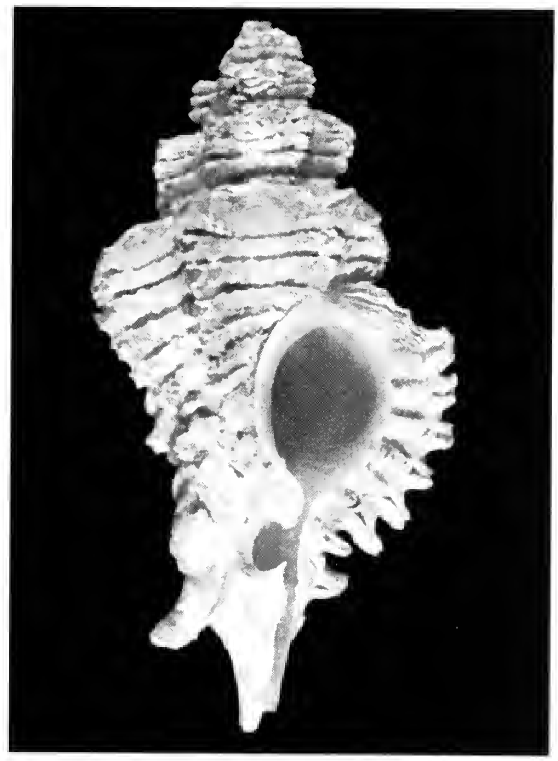


Figure 20. *Favartia (Murexiella) mildredae* (Poorman, 1980). Paratype (SDNHM 91454), 18.4 x 9.5 mm. (Myers, 2000). Orig. photo: D.K. Mulliner. Reprinted with permission from *The Festivus*.

Favartia (Murexiella) minuscula (Smith, 1947)
The Nautilus 61(2): 54,55, pl. 2, fig. 8.
(Figure 21)

Holotype: Originally in Maxwell Smith Collection. Repository unknown. Size: 18.5 x 11.5 mm.
Type locality: Islas Perlas, Panamá.

Remarks: Described as a subspecies of *F.(M.) vittata* (Broderip, 1833). Although Vokes (1970) and Fair (1976) claimed it was a synonym of *F.(M.) lappa* (Broderip, 1833), Keen (1971) gave it valid species status reproducing Smith's figure and stating it shows a "sturdy shell with a dark band across upper half of whorls, white below ...." Smith claimed the subspecies was smaller and more slender than *F. vittata* with a pinched appearance on the back. However, he showed only an apertural view of a rather robust shell which appears worn. Vokes (1983) reversed her opinion and called *F. minuscula* a valid species. I do not recognize Smith's figure as a synonym of either *F. lappa* or *F. vittata* and since the type is not available, I will let stand the opinion of Keen (1971) and Vokes (1983) that it is a valid species.
Distribution: Not reported in the literature.

Figure 21. *Favartia (Murexiella) minuscula* (Smith, 1947). Holotype (repository unknown), 18.5 x 11.5 mm. Reprinted with permission from *The Nautilus*.

Favartia (Murexiella) norrisii (Reeve, 1845)
Conchologia Iconica vol. 3 *Murex*, pl. 28, sp. 129a,b.
(Figure 22)

Lectotype: BMNH 1974064. Size: 32.8 x 20.7 mm (lectotype designated by D'Attilio & Myers, 1987).
Type locality: Designated as San Pedro, Ecuador [from 2 specimens in the C. Skoglund collection] (D'Attilio, 1986).
Remarks: *Favartia (Murexiella) norrisii* has long been confused with *F. (M.) humilis*. Keen (1971: 904) listed *Murex norrisii* as a rejected or indeterminate species. Vokes (1971: 75) listed it a valid species or possibly a synonym of *Favartia (M.) humilis*.

Radwin and D'Attilio (1976) considered *F. (M.) norrisii* a synonym of *F. (M.) humilis*. D'Attilio (1986) examined two specimens from San Pedro, Ecuador, in the collection of Carol Skoglund of Phoenix, Arizona; one specimen which was deposited in the SDNHM (90734) and the second retained in her collection. D'Attilio identified the specimens as *Favartia (Murexiella) norrisii* which he then considered a valid species. Carol Skoglund (pers. comm., 2003) advised me that she later received two additional specimens of *F. (M.) norrisii*. One was donated to the AMNH (283858) from the Kay Vaught Estate, and the other is retained in the Skoglund collection.

In 1987, the BMNH advised me that they had three syntypes of *Favartia norrisii* in their collection (1974064). D'Attilio and Myers (1987) examined these types and chose a lectotype (Figure 22), recognizing differences between *F. (M.) humilis* and *F. (M.) norrisii* and confirming the valid status of *F. (M.) norrisii*.

Favartia (M.) norrisii has a body whorl which gently tapers to the canal whereas *F. (M.) humilis* has a globose body whorl tightly constricted at the canal. The open spines on *norrisii* are frondose and branching while *humilis* has single spines at their termination. The protoconchs also differ with *norrisii* having a brown, broadly convex protoconch of 2¼ to 2½ whorls and *humilis* bearing a conical white protoconch of 3½ whorls.

Vokes (pers. comm, 2003) advised me that the specimen illustrated in Vokes (1970) as *Murexiella (M.) humilis* is that of *Favartia (M.) norrisii* from the Golfo de California, off Guaymas. Comparison of Vokes (1970) with the lectotype of *F. (M.) norrisii* and the Skoglund specimen (SDNHM 90734) reveal the Vokes figures are not *F. (M.) norrisii*.
Distribution: San Pedro, Ecuador.

Favartia (Murexiella) paulskoglundi Hertz & Myers, 1998
The Nautilus 112(3): 95-98, figs. 1-5.
(Figure 23)

Holotype: SDNHM 78066. Size: 17.1 x 11.2 mm.
Type locality: Isla Pedro Gonzáles, Islas las Perlas, Panamá [8°25'N, 79°05'W] in 5.5 m.
Distribution: Islas Tres Marietas, Nayarit, México, to Isla Salango, Ecuador, in 5.5 to 36.0 m (Hertz & Myers, 1998).

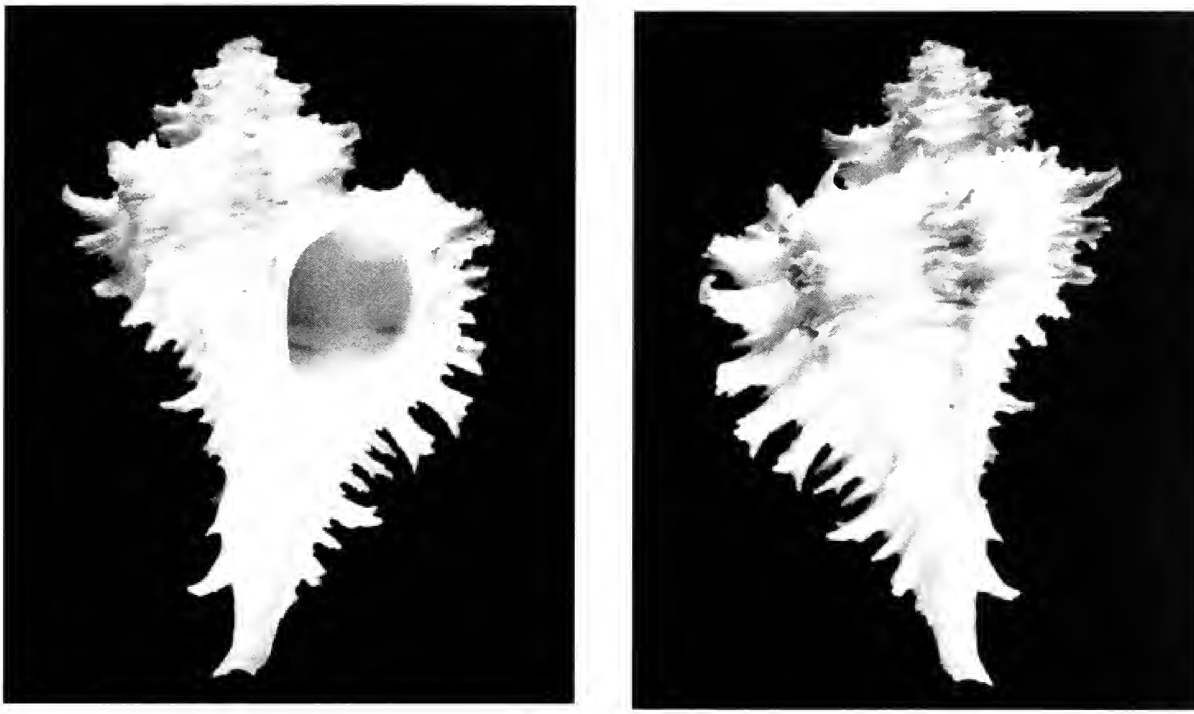


Figure 22. *Favartia (Murexiella) norrisii* (Reeve, 1845). Lectotype (BMNH 1974064), 32.8 x 20.7 mm, apertural and dorsal views (D'Attilio & Myers, 1987). Used with permission of the Trustees of The Natural History Museum, London. Original photos by D.K. Mulliner.

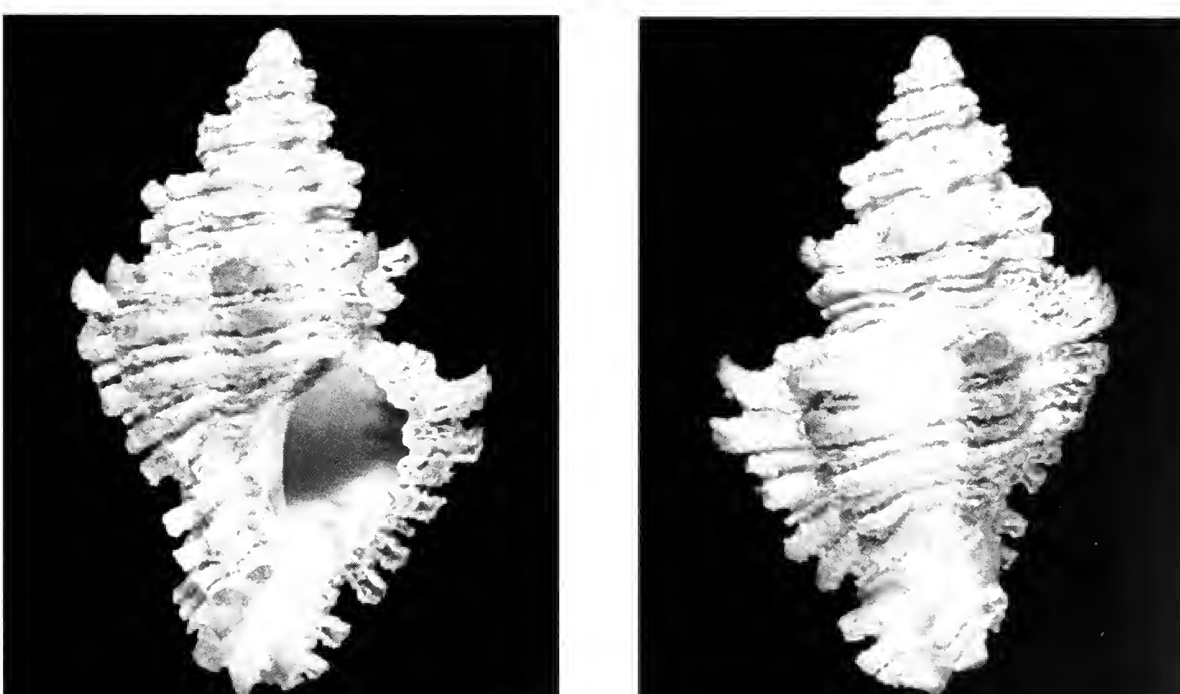


Figure 23. *Favartia (Murexiella) paulskoglundi* Hertz & Myers, 1998. Holotype (SDNHM 78066), 17.1 x 11.2 mm, apertural and dorsal views. Reprinted with permission from *The Nautilus*. Original photos by D.K. Mulliner.

Favartia (Murexiella) perita (Hinds, 1844)
Proceedings of the Zoological Society of London for 1843: 129. Figured: Hinds (1844b), The Zoology of the Voyage of the H.M.S. *Sulphur*, vol. 2, Mollusca, pl. 3, figs. 23, 24.
(Figures 24, 25)

"Probable" holotype: BMNH 1902.2.13.2. Size: 24 mm (D'Attilio, 1987).
Type locality: Bahía Magdalena, Baja California Sur, México.
Remarks: The label on the BMNH specimen says "probable holotype." See Fair (1976, pl. 19, fig. 261), D'Attilio (1987, fig. 1) and Hertz (1998, fig. 1) for other illustrations of the species.
Distribution: Bahía Magdalena, Baja California Sur to Manzanillo, Colima, México (Keen, 1971) to Golfo de Tehuantepec, México (Radwin & D'Attilio, 1976); Bahía Magdalena, to Guaymas, Sonora, México, to Panamá (D'Attilio, 1987); Islas Galápagos, Ecuador (Finet, 1985, 1991, 1994), Islas Las Tres Marietas, Nayarit, México (Hertz, 1998).

Figure 24. *Favartia (Murexiella) perita* (Hinds, 1844). "Probable holotype, BMNH 1902.2.13.2," 24 mm. Photo: E.H. Vokes.

Favartia (Murexiella) pumilus (Broderip, 1833)
Proceedings of the Zoological Society of London for 1832: 175.

Holotype: Lost (Emerson & D'Attilio, 1968:3).
Type locality: Islas Galápagos, Ecuador.
Remarks: This is listed as a rejected record in Keen, 1971: 904. She stated "... this was pronounced unrecognizable by Sowerby in 1841 and has remained un-figured. The name subsequently was used by A. Adams for a muricid from the Orient."

Favartia (Murexiella) radicata (Hinds, 1844a)
Proceedings of the Zoological Society of London for 1843: 128. Figured: The Zoology of the Voyage of *H.M.S. Sulphur*...Vol. II Mollusca: 1844b, pl. 3, figs. 21, 22.
(Figure 26)

Synonym of: *Favartia (Murexiella) lappa* (Broderip, 1833).
Holotype: BMNH 1907.10.28.136. Size: 19.8 x 11.7 mm.
Type locality: "...San Blas, west coast of Mexico. From 11 fms."
Remarks: Considered a junior synonym of *F. (M.) lappa* (Radwin & D'Attilio, 1976; Fair, 1976; Hertz & Myers, 1998).
Distribution: Same as for *F. (M.) lappa*.

Favartia (Murexiella) radwini (Emerson & D'Attilio, 1970)
The Veliger 12(3): 270-274, pls. 39, 40.
(Figure 27)

Holotype: AMNH 155903. Size: 33.5 x 16.8 mm.
Type locality: Tagus Cove, Isla Isabela, Islas Galápagos, Ecuador, in 100 m.
Remarks: Named for the late George E. Radwin.
Distribution: Islas Galápagos, Ecuador; Isla del Coco, Costa Rica (Shasky, 1989).

Favartia (Murexiella) shaskyi D'Attilio & Myers, 1988
The Nautilus 102(3): 106-109, 8 figs.
(Figure 28)

Holotype: USNM 860012. Size: 23.0 x 14.2 mm.
Type locality: Isla Cáscara, Isla del Coco, Costa Rica.
Remarks: Named for the late Donald R. Shasky.
Distribution: Endemic to Isla del Coco, Costa Rica.

Favartia (Murexiella) taeniata Sowerby, 1860
Proceedings of the Zoological Society of London for 1859: 428, pl. 49 fig. 3.

(Figure 29)

Synonym of: *Favartia (Murexiella) vittata* Broderip, 1833 (Radwin & D'Attilio, 1976; Fair, 1976).
Holotype: Repository unknown. Size: unknown.
Type locality: "Gulf of California".

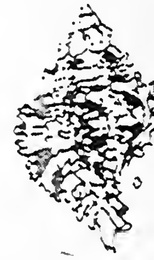


Figure 29. *Favartia (Murexiella) taeniata* (Sowerby, 1860). Holotype. From Sowerby, 1860. No size given.

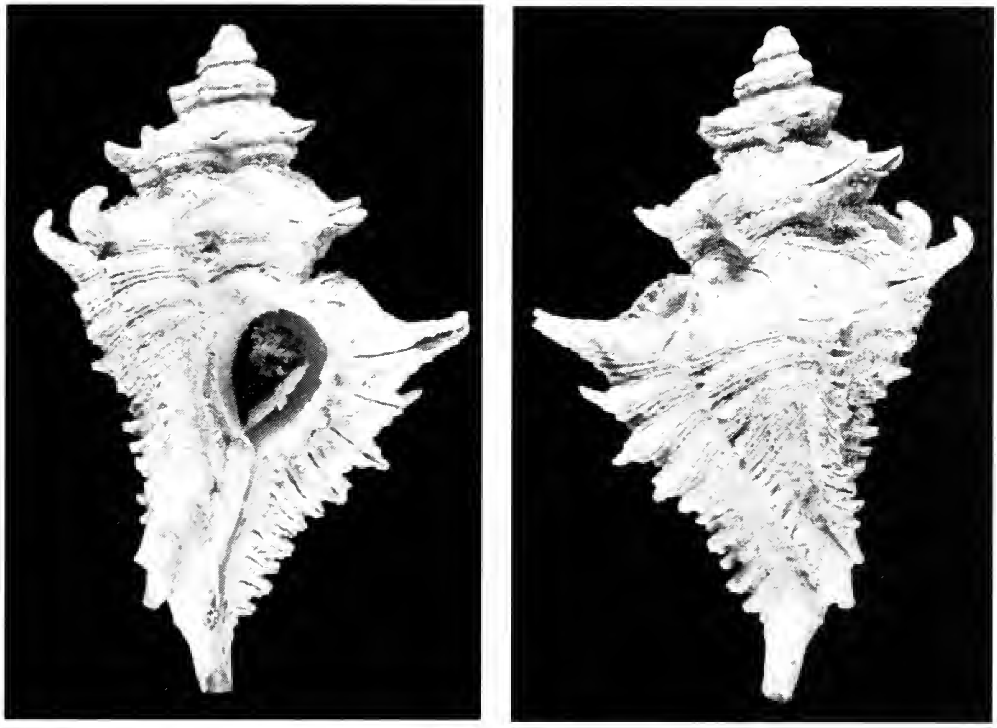


Figure 25. *Favartia (Murexiella) perita* (Hinds, 1844). Specimen ex Poorman Collection, 24.6 x 17.4 mm, San Carlos, Guaymas, México, apertural view in D'Attilio (1987). Photos: D.K. Mulliner. Reprinted with permission from *The Festivus*.

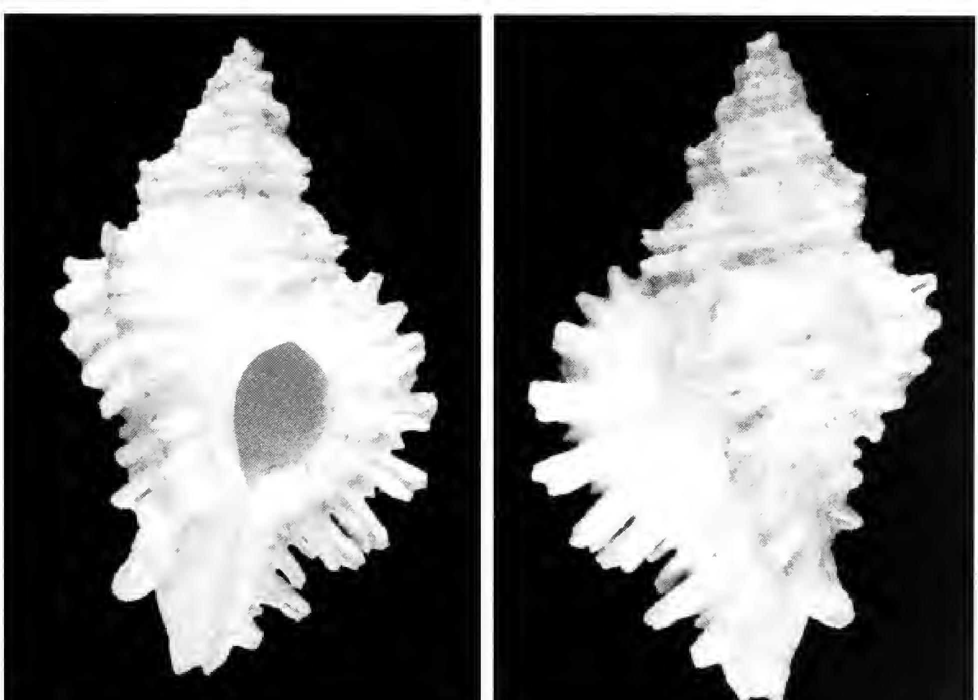


Figure 26. *Favartia (Murexiella) radicata* (Hinds, 1844). Holotype (BMNH 1907.10.28.136), 19.8 x 11.7 mm, apertural and dorsal views. Used with permission of the Trustees of The Natural History Museum, London. Photos: D.K. Mulliner.

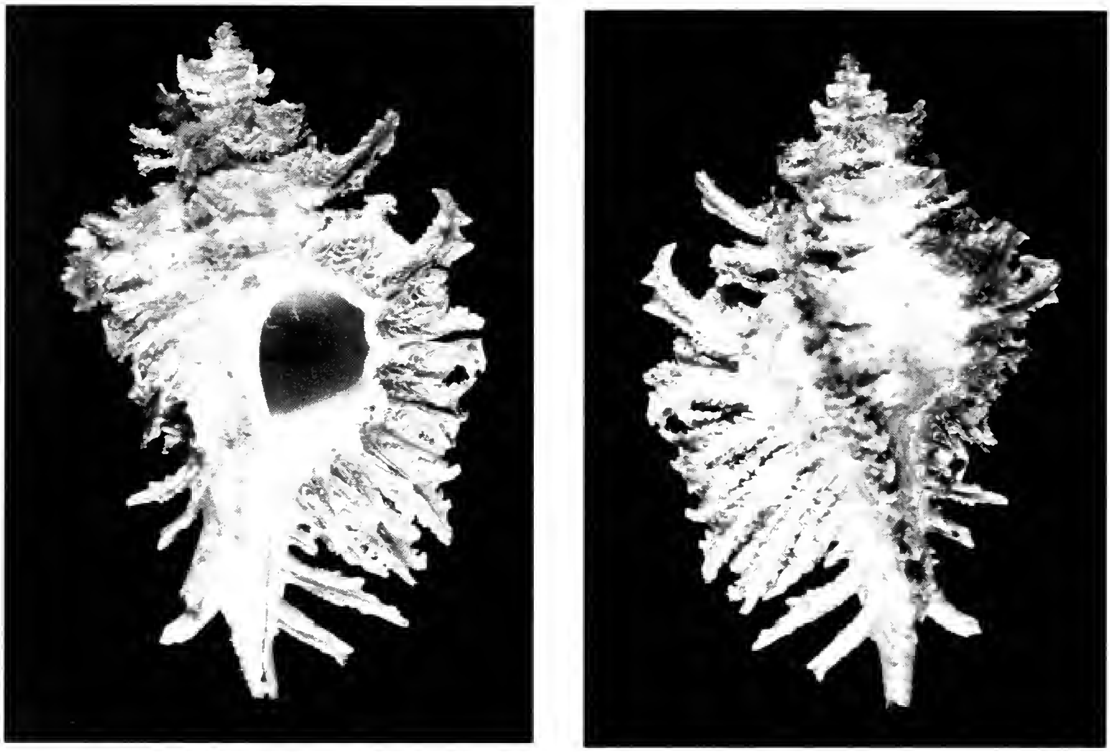


Figure 27. *Favartia (Murexiella) radwini* (Emerson & D'Attilio, 1970). Holotype (AMNH 155903), 33.5 x 16.8 mm, apertural and dorsal views. Originial photos: D.K. Mulliner. Reprinted with permission from *The Festivus* (George E. Radwin Memorial Issue).

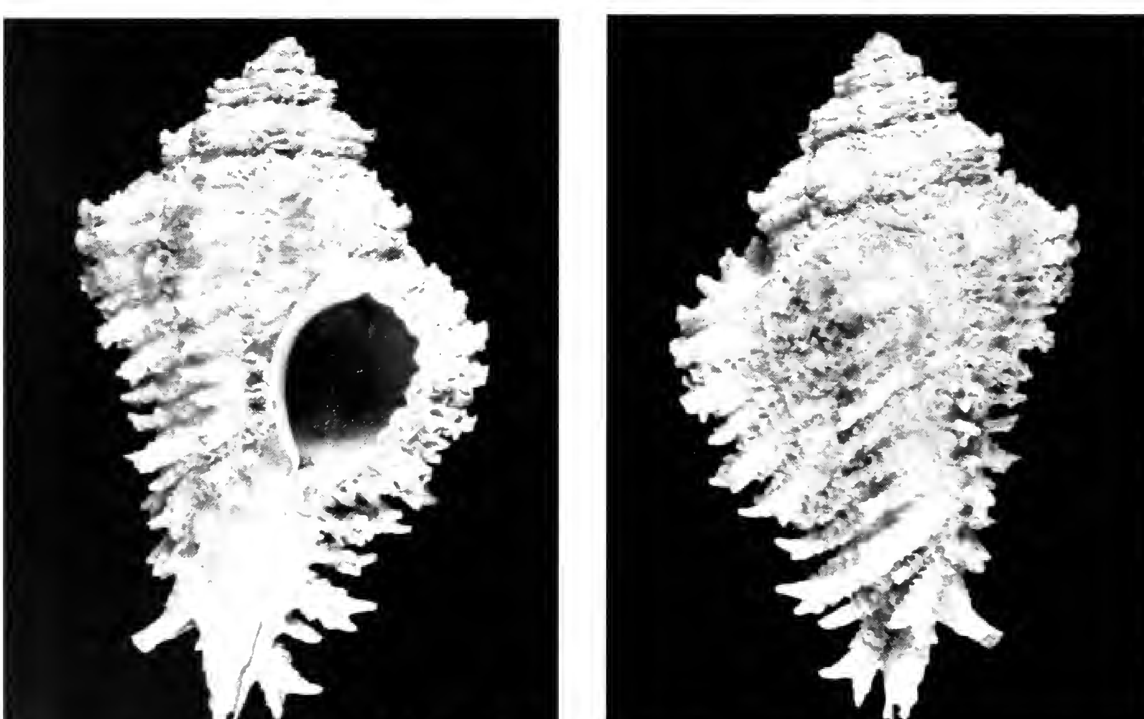


Figure 28. *Favartia (Murexiella) shaskyi* D'Attilio & Myers, 1988. Holotype (USNM 860012), 23.0 x 14.2 mm. Reprinted with permission from *The Nautilus*. Original photos by D.K. Mulliner.

Distribution: See *F. (M.) vittata.*
Remarks: Described from the H. Cuming Collection.

Favartia (Murexiella) venustula (Poorman, 1983)
The Veliger 26(1): 5-7, figs. 1, 2, 5.

(Figure 30)

Synonym of: *Favartia (Murexiella) exigua* (Broderip, 1833) (Hertz & Myers, 1998).
Holotype: SDNHM 81610. Size: 19.6 x 11.4 mm.
Type locality: Isla Santa Cruz, Islas Galápagos, Ecuador [0°49'S, 90°21'W] in 150-200 m.
Remarks: See Hertz (1996) for illustration of the protoconch and Hertz & Myers (1998) for a discussion of the species.
Distribution: Same as for *F. (M.) exigua.*

Favartia (Murexiella) vittata (Broderip, 1833)
Proceedings of the Zoological Society of London for 1832: 176. Figured: Sowerby II, (1834, Conch. Illus. *Murex* pl. 60, fig. 19.
(Figures 31-33)

Synonyms: *Murex taeniatus* Sowerby, 1860; *Murex lepidus* Reeve, 1845.
Syntypes: BMNH 1964436, 3 specimens, 21.5 x 13.5, 25.0 x 14.1, 26.3 x 16.5 mm.
Type locality: "Isle of Muerte Bay", Guayaquil, Ecuador.
Remarks: No protoconch on the 3 syntypes (Figure 31). Largest specimen (Figure 33) designated as lectotype [26.3 x 16.5 mm]. Another 3 specimens (BMNH 20020137) labeled *Murex vittatus* from H. Cuming Collection. Note indicates 3 specimens (21.4 x 14.0,

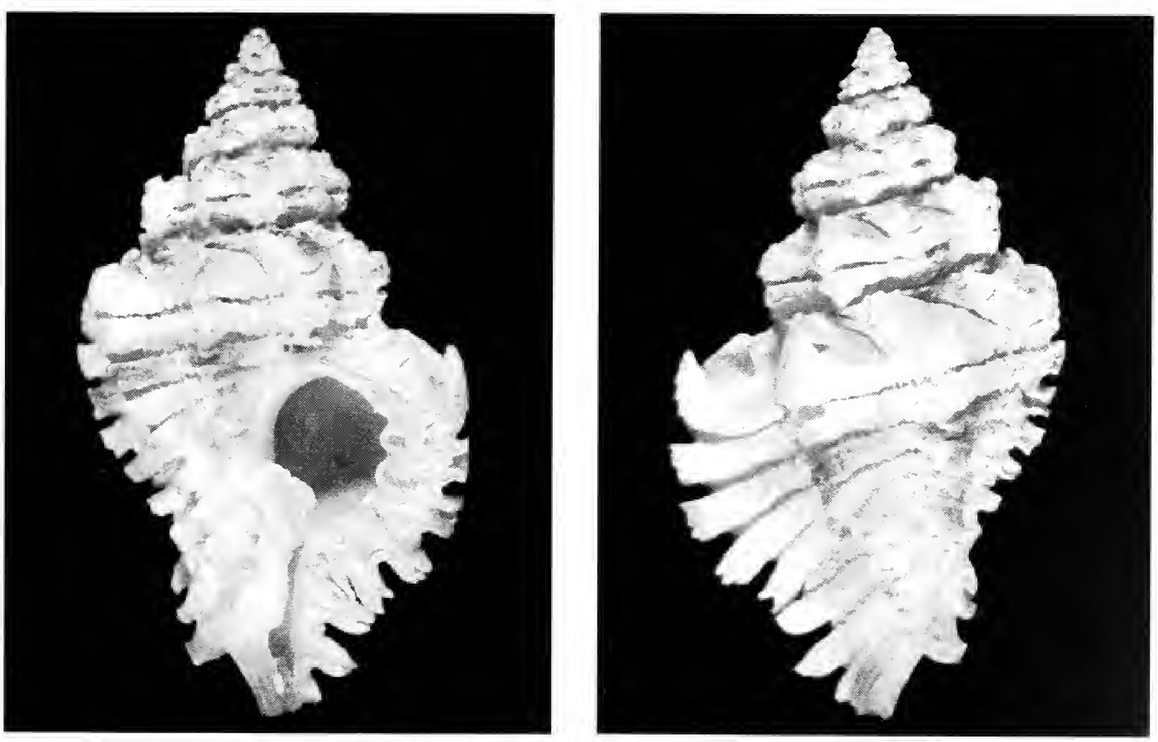
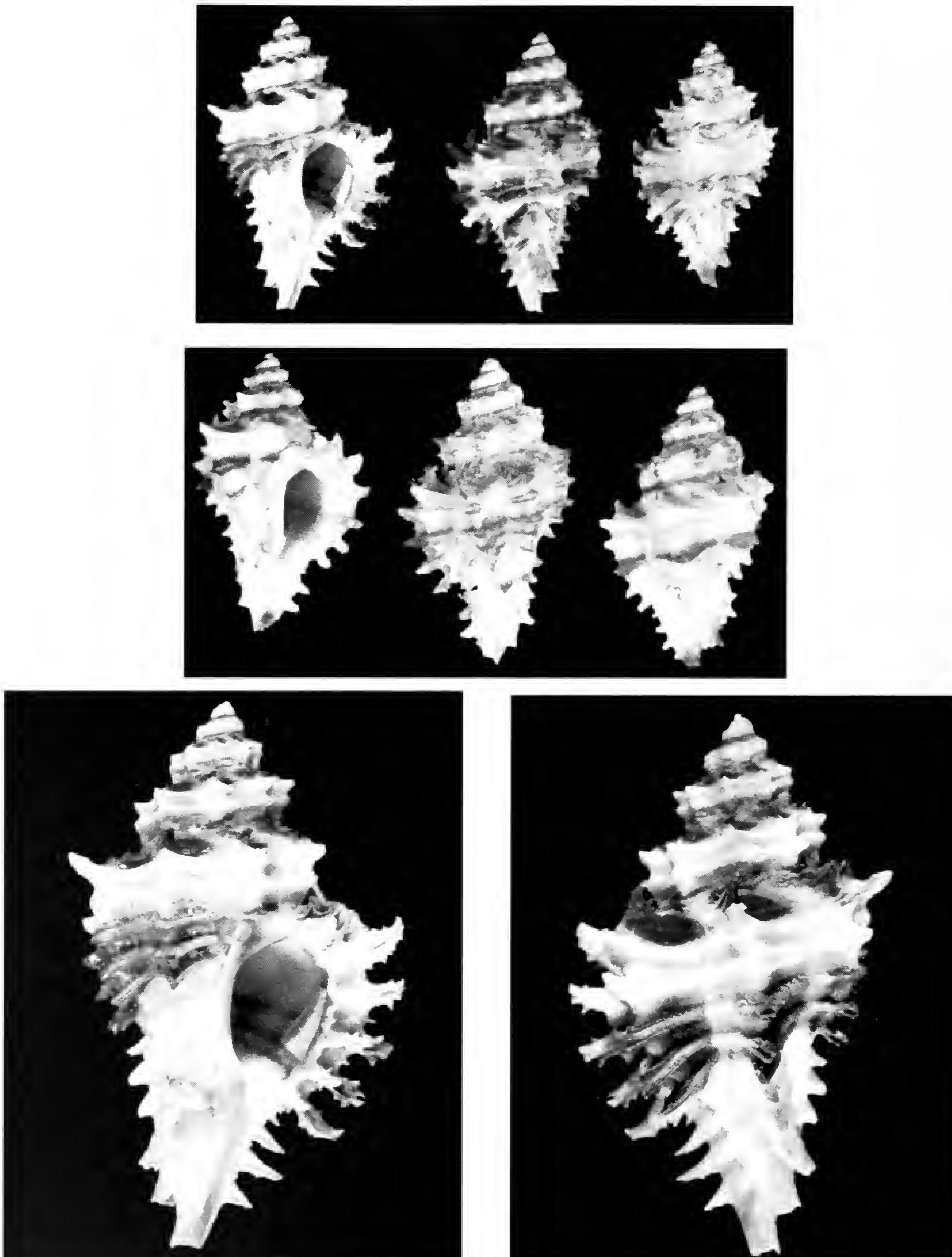


Figure 30. *Favartia (Murexiella) venustula* (Poorman, 1983). Holotype (SDNHM 81610), 19.6 x 11.4 mm, apertural and dorsal views. Reprinted with permission from *The Veliger.*



Figures 31-33. *Favartia (Murexiella) vittata* (Broderip, 1833). **(31 top)** Syntypes (BMNH 1964436) l-r: 26.3 x 16.5, 25.0 x 14.1, 21.5 x 13.5 mm. **(32 bottom)** Lectotype, 2 views [left, in syntype lot], 26.3 x 16.5 mm. **(33 center)** (BMNH 20020137) three specimens separated from syntype lot by Keen (1964); [l-r] 21.4 x 14.0, 23.5 x 13.9, 21.5 x 13.8. Used with permission of the Trustees of The Natural History Museum, London. Original photos by D.K. Mulliner.

21.5 x 13.8, 23.5 x 13.9 mm) separated from lot 1964436 by A. Myra Keen in 1964. In my opinion they also represent *F. (M.) vittata*. Keen (1971); Fair (1976 [as *taeniata*]) and Shasky (1989) added *F. M. vittata* to the fauna of the Islas Galápagos. Finet (1985, 1994) deleted the Galápagos from the records. Subsequently, Kaiser (1997) found specimens in the LACM (#11340, 11332, 34-25 and 34-189) from the Galápagos. Hickman and Finet (1999) stated specimens labeled *F. M. vittata* from the Galápagos are *F. (M.) venustula* Poorman, 1983 = *F. (M.) exigua* (Broderip, 1833).
Distribution: Bahía Magdalena, Baja California Sur and Golfo de California, México (Radwin & D'Attilio, 1976 [as *lepidus*]); Tumbes, Perú (Peña, 1970) and Islas Galápagos, Ecuador (Kaiser, 1997). Possible specimen noted by Hertlein and Allison (1966) at Île Clipperton.

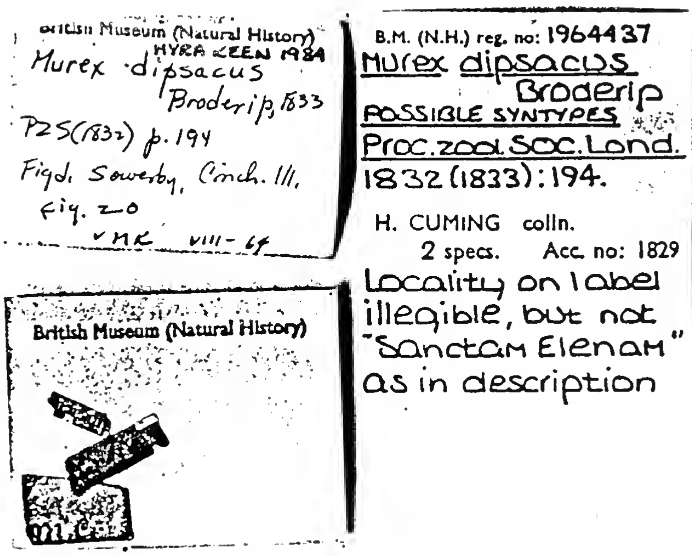


Figure 34. Labels accompanying *Murex dipsacus* Broderip (BMNH 1964437) stating "possible syntype". Used with permission of the trustees of The Natural History Museum, London.

SPECIES FORMERLY ASSIGNED TO *FAVARTIA*

Genus *Muricopsis* Bucquoy & Dautzenberg, 1882
Type species: *Murex blainvillei* Payraudeau, 1826, O.D.

Subgenus *Murexsul* Iredale, 1915
Type species: *Murex octogonus* Quoy & Gaimard, 1833, O.D.

Muricopsis (Murexsul) dipsacus (Broderip, 1833)
Proceedings of the Zoological Society of London for 1833, pt. 2: 194. Figured: Sowerby II, 1834, pl. 60, fig. 20.
(Figures 34, 35)

Syntypes: BMNH 1964437, 2 specimens. Sizes: larger 27.0 x 15.0 mm; smaller, 19 x 10.7 mm.
Type locality: Sanctam Eleanum [sic], Ecuador, at 12 fm (22 m) (Broderip).
Remarks: Vokes (1984b: 213-215, pl. 2, figs. 25a,b) stated she examined the types of *Murex dipsacus* and figured the larger specimen and confirmed the type locality as Santa Elena, Ecuador. (The label accompanying the syntypes (Figure 34) stated that there were two specimens and further noted that the locality on the label was illegible, but not Sanctam Elenam, as in the original description.) Vokes further placed *M. dipsacus* in the genus *Murexsul* not *Murexiella*. She stated, "I have not seen any specimens from west America that match it, but I assume it is valid." Marshall and Burch (2000) consider *Murexsul* a subgenus of *Muricopsis*.

Keen (1971) placed *Murex peruvianus* Sowerby, 1841 [not Lamarck, 1816], in the Panamic Province as a synonym of *Murexsul dipsacus*. Vokes (1971: 81) and Houart (1993: 7) stated that *M. peruvianus* is a synonym of *Murexsul octogonus* (Quoy & Gaimard, 1833), a New Zealand species.

Houart (1993: 6, 7, figs. 4, 5) illustrated a specimen from Arica, Chile, which he considers to be *Murexsul dipsacus*. This 20.3 mm specimen was collected under a rock in 1 m. His illustration shows a typical *Favartia (Murexiella)* with the characteristic webbing between the cords on the varices. It is also a broader shell without the elongate spire of *Murexsul*. Further specimens from Chile may prove this illustrated specimen to represent a new species of *Favartia (Murexiella)*.

Distribution: Bahía Santa Elena, Ecuador (type locality). Islas Galápagos, Ecuador (Pilsbry & Vanatta, 1902); spurious record from Islas Galápagos (Finet, 1994; Kaiser 1997).

Muricopsis (Murexsul) jacquelinae Emerson & D'Attilio, 1969
The Veliger 11(4): 324-325, pl. 50, 6 figs.
(Figure 36)

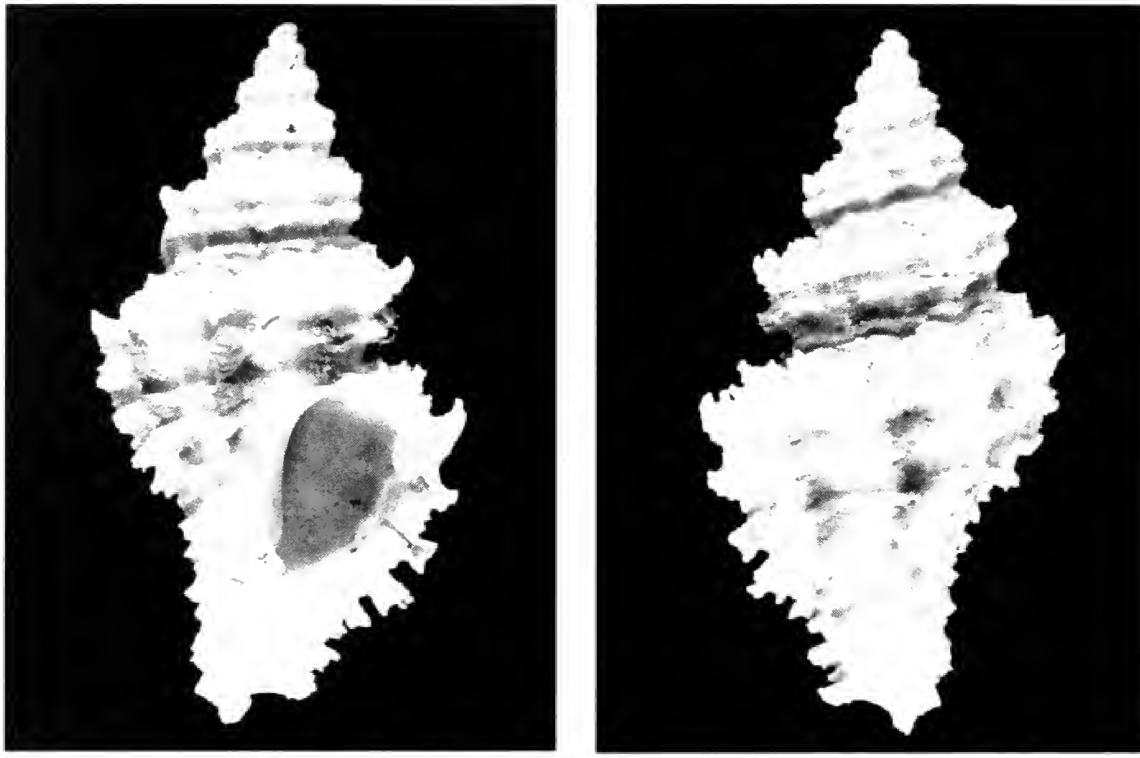


Figure 35. *Murexsul dipsacus* (Broderip, 1833). Syntype (BMNH 1964437), 27.0 x 15.0 mm, apertural and dorsal views. Used with permission of the trustees of The Natural History Museum, London. Original photos by D.K. Mulliner.

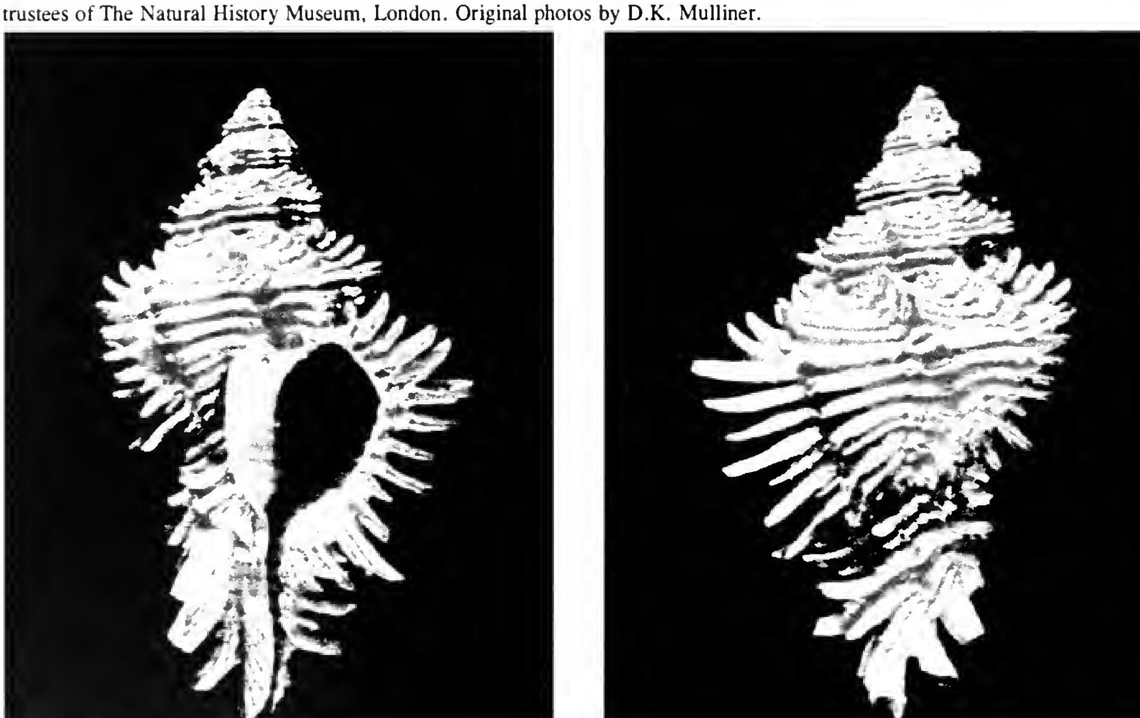


Figure 36. *Murexsul jacquelinae* Emerson & D'Attilio, 1969. Paratype, 26.3 x 15.6 mm. Off Jervis Is. Islas Galápagos, ex D'Attilio Collection, Repository unknown. Reprinted with permission from *The Veliger*.

Holotype: AMNH #147968. Size: 20.4 x 11.1 mm.
Type locality: Tagus Cove, Isla Isabela, Islas Galápagos, Ecuador, depth 100 m.
Remarks: Originally designated as *Murexsul* and changed to *Murexiella* by Radwin and D'Attilio (1976). It was later changed back to *Murexsul* by Vokes (1984). *Murexsul* is now considered a subgenus of *Muricopsis* by Marshall & Burch (2000).
Distribution: Islas Galápagos, Ecuador.

Genus *Pygmaepterys* Vokes, 1978
Type species: *Murex alfredensis* Bartsch, 1915, O.D.

Pygmaepterys poormani (Radwin & D'Attilio, 1976)
Murex Shells of the World: 231, figs. 180, 181.
(Figure 37)

Holotype: SDNHM 63080. Size: 19.2 x 11.5 mm.
Type locality: Off San Carlos, Sonora, México, dredged in 17 fm [31 m], March-May 1970.
Remarks: This species, originally placed in *Favartia*, was reassigned to *Pygmaepterys* by D'Attilio and Myers (1985). However, Vokes (1984) declared *P. poormani* a synonym of *Murex peasei* Tryon, 1880 (a replacement name for *M. foveolatus* Pease, 1869, not Hinds, 1844). The only extant syntype of *M. foveolatus* = *F. peasei* was illustrated by Myers and D'Attilio (1989) and showed a pear-shaped specimen with a truncate canal and smooth aperture whereas *Pygmaepterys poormani* is fusiform with sharply defined varical flanges, moderately long canal and an aperture with denticles on the columella and outer lip. See *Favartia (F.) peasei*, Figure 3 in this catalogue.
Distribution: Bahía San Carlos, Sonora, México, and Islas Perlas, Panamá (Radwin & D'Attilio, 1976). Several distributional records for this species are based on *M. peasei* and not valid.

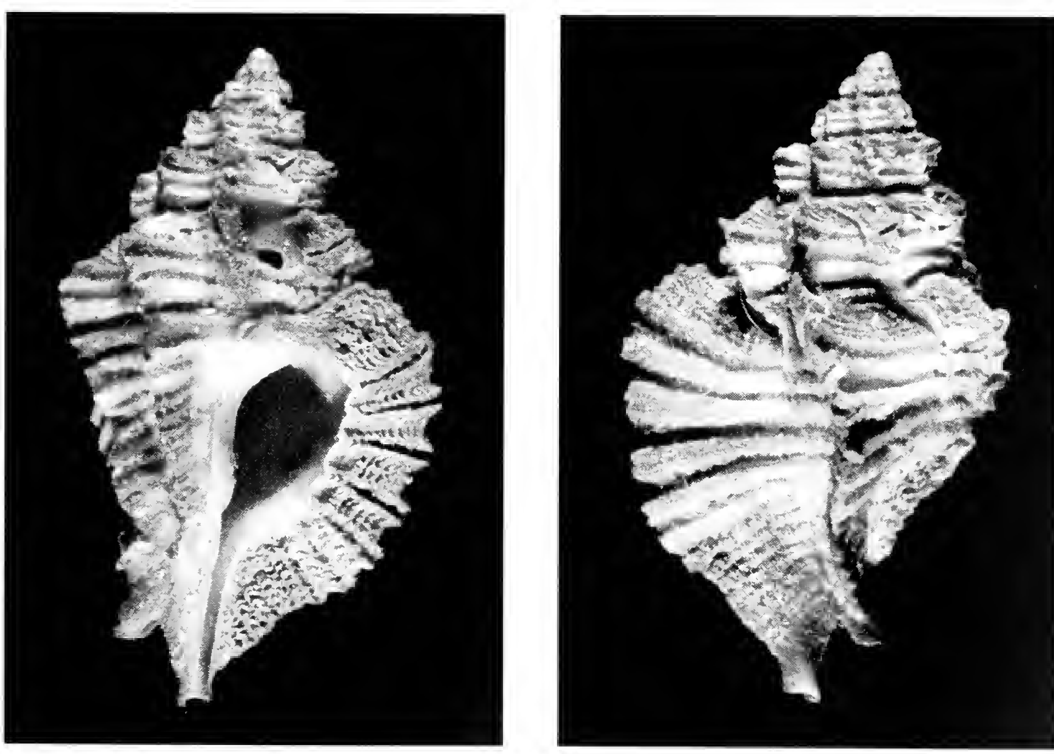


Figure 37. *Pygmaepterys poormani* (Radwin & D'Attilio, 1976). Holotype (SDNHM 63080), 19.2 x 11.5 mm, apertural and dorsal views. Photos: D.K. Mulliner.

Acknowledgments

I am indebted to my dear friend and colleague, the late Anthony D'Attilio, who shared his knowledge and enthusiasm for the study of the Mollusca, especially the Muricidae. Together we worked on several papers involving the genus *Favartia* and it was his ambition to do a world-wide study of this genus. This project, restricted to the Panamic region is my small contribution and salute to his memory.

I wish to acknowledge and am grateful to the following for their efforts in helping me complete this study: Ms. Kathie Way, Collection Manager of Invertebrates at The Natural History Museum, London, for searching the collection for types and arranging for the loan of specimens; Ms Patricia Beller, Collection Manager, San Diego Natural History Museum, for assisting me in arranging for the loan of type specimens; Dr. Henry Chaney, Curator, Department of Invertebrate Zoology, Santa Barbara Museum of Natural History for the loan of a paratype of *Murexsul jacquelinae*; Dr. Barry Roth, Editor, The Veliger; Dr. José Leal, Editor, The Nautilus; and Carole M. Hertz, Editor, The Festivus, for permission to use photographs of types previously published in their journals; Ms Margi Dykens, Research Librarian, San Diego Natural History Museum for her courtesy and assistance in locating needed literature; Ms Susan Bishop, Malacology Department, Division of Invertebrate Zoology, AMNH, for locating the AMNH accession number for *Favartia (M.) norrisii*; Mr. Donald Pisor for information on the figured paratype of *Murexsul jacquelinae;* Mr. David K. Mulliner for photographing types and permission to use many of his previously published photographs; and Carol Skoglund who read the manuscript and made helpful suggestions and gave information about the repositories of four specimens of *Favartia norrisii*. Lastly I owe a debt of gratitude to Carole M. Hertz, Editor of The Festivus, who worked above and beyond her normal role as editor and made suggestions I feel improved and completed the study. I also thank Jules Hertz for reviewing a draft of this paper. His precise attention to detail spotted many inconsistencies.

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E-mail: cmhertz@pacbell.net *Website at: http://www.users.cts.com/crash/t/tarnold/SDSC/index.html*

PROGRAM

Spineless Wonders of the Caribbean: The Guana Island Biodiversity Study

Leslie Harris, Collection Manager, Polychaete Section, at the Natural History Museum of Los Angeles County, will present an illustrated program on the creatures found during this biodiversity study.

Meeting date: 17 July 2003

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting 19 June 2003

The meeting, with 16 in attendance, was called to order at 7:45 p.m. by President Carole Hertz. Guests were introduced and the minutes of the January meeting, as published in *The Festivus*, were approved. Carole announced that the September party at the La Grange's home will be on Saturday September 20th. A sign-up sheet for potluck contributions for the party was circulated. Vice-President Larry Lovell reported that he had speakers for the remainder of 2003 and they will be listed in *The Festivus* [see col. 2].

Larry introduced Emily Balmert, a tenth grader at Valhalla High School, the Club's winner of the 2003 Science Fair award, who had also won three other Science Fair prizes. She gave a brief overview of her project, " Impact of Iron Concentration in Sea-Water on Phytoplankton Health." She used filtered sea water with trace metals and other nutrients filtered out. She measured the health of phytoplankton in this water with no addition of iron, with iron added to normal concentration in sea water and iron added to a much higher level. The effect on the phytoplankton was measured by fluorescence and showed that the phytoplankton flourished at high iron levels. Emily's chosen book award, Barnes' *Invertebrate Zoology*, was not yet available since a new edition is being readied and will not be out until August. It will be sent to her as soon as it is available.

Larry then introduced the speaker for the evening, Ron Velarde, who spoke on "The Prevalence of Nonindigenous Species in Southern California and their Effects on Benthic Macroinvertebrate Communities." He distinguished the difference between nonindigenous species (NIS) caused by natural phenomena such as El Niño versus those introduced by human components. He discussed the results of two large sampling programs, Bight 98 and WEMAP 1999. In the first, 121 of 123 samples from nine embayments from San Diego to Ventura had NIS. On average 23% of the abundance was NIS and 10% of the species were NIS. Overall only 27 of 633 bay taxa were nonindigenous. The three most consistent species among the sampled bays were *Pseudoplydora paucibranchiata* (a tube-building worm) and two bivalves, *Theora lubrica* and *Musculista senhousia*. The latter uses byssal threads to form dense mats which completely change the environment.

The second program evaluated NIS from 10 embayments and found NIS in all 24 samples taken. On average the results were similar to the earlier study. Twenty-one of 341 bay taxa were NIS. In conclusion, data were highly variable within bays and between bays. When comparing data from southern California to that from northern California, Washington and Oregon, southern California had the least number of nonindigenous species but the greatest abundance.

Billee Gerrodette brought in a display and shared information on the beautiful shells that she had received in a recent exchange.

Carole Hertz won the door prize, and Jules & Carole Hertz provided the refreshments. The meeting was adjourned at 8:45 p.m.

Jules Hertz

Schedule of San Diego Shell Club Speakers for the Rest of 2003-04.

July 17 - Leslie Harris, Collection Manager, the Natural History Museum of Los Angeles County.
Spineless Wonders of the Caribbean: The Guana Island Biodiversity Study.

August 21 - Bonnie Becker, Graduate Student, SIO.
Why we care about the chemistry of larval mussels.

September 20- September party -- no speaker

October 16 - Dr. Ángel Valdés, Curator of Mollusks, LACM.
The secret lives of naked mollusks.

November 20 - Phil Liff-Grieff, Pacific Shell Club.
The land snails of the Hawaiian Islands.

December 13 - Club Christmas Party - no speaker.

January 15, 2004 - tentatively ...Dr. Jeremy Jackson, SIO. Title to be announced.

Changes to the Roster

Beller, Patricia, 655 Mariposa Circle, Chula Vista, CA 91911. Phone: 619-482-4889. E-mail: <andreb@adnc.com>.

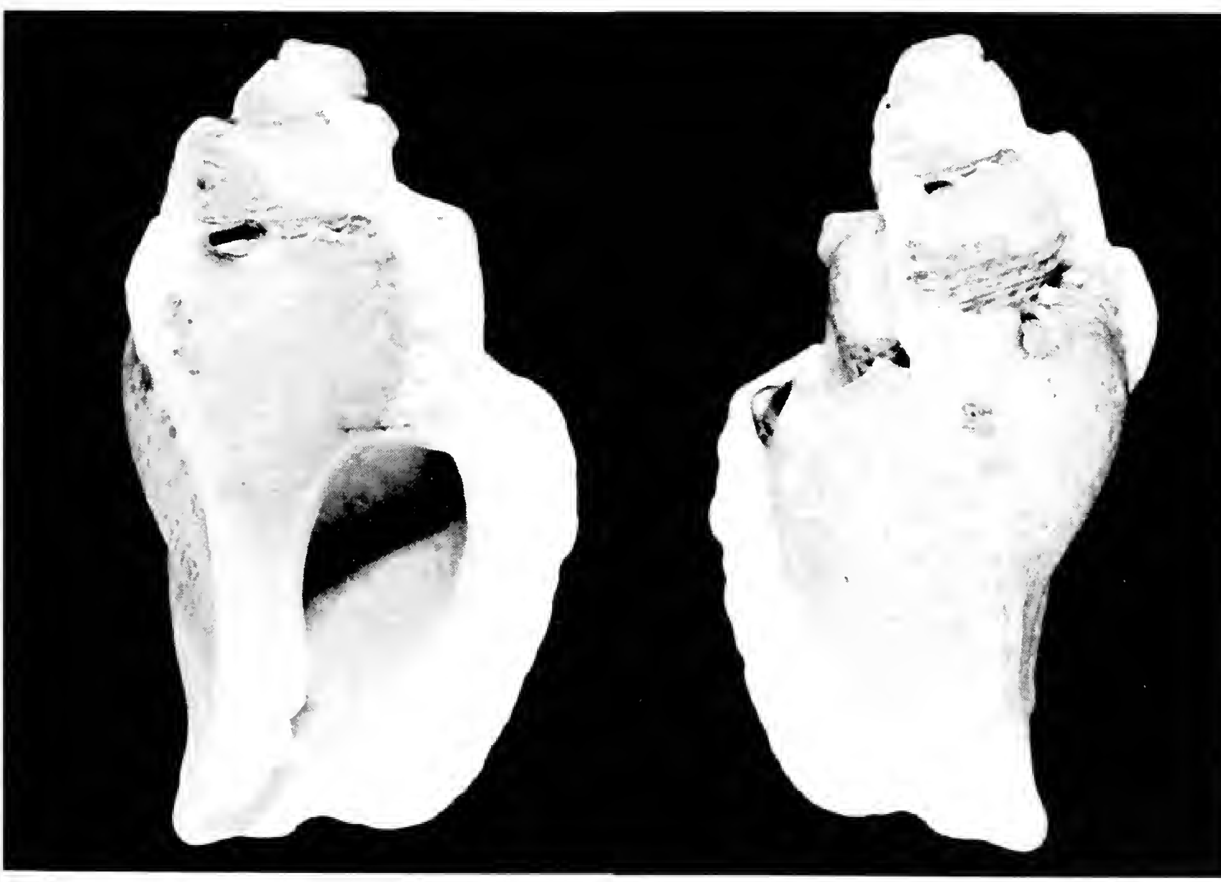
PTEROTYPHIS FIMBRIATUS (A. ADAMS, 1854)

JOHN A. BISHOP

3026 Freeman Steet, San Diego, Ca. 92106

In March of 2002 I went on a cruise with my wife, my daughter and her family. The trip originated in San Diego and went down the Mexican coast to Puerto Vallarta, Jalisco. The day the ship was in Puerto Vallarta I chose for my activity a snorkel trip that went to the Islas Marietas and stopped at a cove on the mainland on the return leg. The cove was located approximately 5 km south of the small town of La Cruz de Huanacaxtle in the state of Nayarit(2°48'N, 105° 3.5'W).

The cove had a beautiful sandy beach about 1 km in length below a wooded bluff 10 to 20 m high. On each end were rocky outcroppings, cliff-like to the south but on the north a rocky reef full of tidepools extended out into the bay. While the tour director provided a nature talk for the majority of the passengers, I spent my time looking for shells in the rocky pools. Among the 12 mostly crabbed shells that I found was a fluted, small white 21 mm shell that didn't look familiar to me (Figure 1). On returning home I still was not able to identify it and sought help from friends who were more expert in the field of malacology.



Figures 1, 2. *Pterotyphis fimbriatus* (A. Adams, 1854). Height: 21.5 mm. (1) apertural view (2) dorsal view. Photos: D.K. Mulliner.

It turned out that it is an uncommon species, although it was first described by Arthur Adams in 1854 with the type locality given as "Hab. Gulf of California. Mus. Cuming." Published material and personal communications indicate that it has been found at least 13 times. Below is a listing of the references that I was able to find in the literature The majority of specimens came from an area on the central West Mexican coast 220 km in length. One was from Costa Rica, three from Panamá and five were from the locality of La Cruz de Huanacaxtle where mine was found.

Institution abbreviations used: SBMNH – Santa Barbara Museum of Natural History; LACM – the Natural Museum of Los Angeles County.

1962. 1 specimen, Tenacatita, Jalisco, México. Leg. Faye Howard (Keen & Campbell, 1962: 46, figs. 38, 42).
1963. 1 specimen, Barra de Navidad, Jalisco, México in beach drift. Leg. Faye Howard (Keen, 1971: 542, fig. 1055).
1975. 2 specimens, La Cruz de Huanacaxtle, Nayarit, México. Leg. Margaret Cunningham, SBNMH Collection (pers. comm., H. Chaney).
1976. 1 specimen, La Cruz de Huanacaxtle, Nayarit, México. Leg. Laura Shy. SBNMH Collection (pers. comm., H. Chaney).
1976. 1 specimen, La Cruz de Huanacaxtle, Nayarit, México. Leg. Forrest & Roy Poorman (D'Attilio & Hertz, 1988: 41, fig. 29).
1976. 1 specimen, Punta de Juluapan, Colima, México, dredged. Leg. Laura Shy. SBNMH Collection (pers. comm., H. Chaney).
1976. 1 specimen, Bahía de Cuastecomate, Jalisco, México. LACM Collection #68-41 (Radwin & D'Attilio, 1976: 197, pl. 30, fig. 1).
1977. 1 specimen, La Cruz de Huanacaxtle, Nayarit, México, collected dead. Leg. Margaret Cunningham. Carol Skoglund Collection (pers. comm., Carol Skoglund).
1980. 1 specimen, Isla Gobernadora, Panamá, intertidal at night. Leg. Virginia Upton. SBNMH Collection (pers. comm., H. Chaney).
1996. 1 specimen, Islas Secas, West Panamá, dredged 600 ft. Ex Abbey Specimen Shells. SBNMH Collection (pers. comm., H. Chaney).
No date. 1 specimen, Golfo de Nicoya, Costa Rica. Ex Ruth Purdy Collection, whereabouts unknown (D'Attilio, 1982: 96, fig. 4; D'Attilio & Hertz, 1988:41, fig. 29).
No date. 1 specimen, Las Perlas, Panamá, intertidal. Ex Susan Stephens Collection. SBNMH Collection (pers. comm., H. Chaney).

ACKNOWLEDGMENTS

I am indebted to Carole and Jules Hertz for help in obtaining reference material and with the identification of the specimen. Thanks also to Henry Chaney, SBMNH, and Carol Skoglund of Phoenix, Arizona, who provided information about shells in their collections. Credit for the photos of the specimen goes to David K. Mulliner.

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REPORT OF THE WSM MEETING — 2003

JULES HERTZ[1]

Santa Barbara Museum of Natural History
2559 Puesta del Sol Road, Santa Barbara, California 93105-2936, USA

The 36th annual meeting of the Western Society of Malacologists took place at the Natural History Museum of Los Angeles County, Los Angeles, California, June 6-10, 2003. There were approximately 60 attendees. The meeting began on the 6th with registration and an evening reception at the historic rotunda at the museum. WSM President Ángel Valdés welcomed the attendees.

On the morning of June 7th, Jeff Goddard introduced the Ecology Symposium (Figure 1). There were two interesting papers, one by B.J. Becker, et al. and one by D.C. Zacherl, which discussed the use of trace elements in mollusk hard parts as a means of determining larval dispersion. The first paper discussed techniques to determine the chemical composition of larval mytilid shells and the second used these methods on statoliths and protoconchs of gastropods. C.L. Kitting & C.L. Davis presented a thought-provoking paper on restored marshes and tide pools in San Francisco Bay and the discovery of an unusual brackish water snail previously known only from fossils, *Hydrobia andersoni*, in great numbers. These shells are natives and sediment cores suggest they have been living there for approximately 200 years.

Figure 1. Ecology Symposium speakers: Bottom row, l-r: Christopher Kitting, Bonnie Becker, Danielle Zacherl, Cynthia Trowbridge. Top row, l-r: Paul Valentich Scott, Todd Huspeni, Jeff Goddard (convenor).

In the afternoon there was a general session, which included a number of papers by researchers from México and Colombia. Of particular interest to me was a paper by Jorge Cáceres-Martinez on the withering syndrome in abalone. He discussed the history of this phenomenon starting with the mass mortality (95-100%) of black abalone, *Haliotis cracherodii*, from the Channel Islands of southern California. This spread along the California coast and into México. "Clinical analysis of abalone showed weakness, lethargy, shrunken appearance of foot muscle, mantle retraction, poor gonadal development, the inability to tightly adhere to the substrate and death." A strong pathogen-disease association was suggested and the pathogen has been confirmed as *Candidatus Xenohaliotis californiensis*. There have been no records of mass mortality of abalone in México. The same parasite has been found in *H. fulgens* and *H. corrugata*. These are not affected to the same extent as the black abalone. It has been postulated that the increase in water temperature as a result of El Niño events reduces food supplies and increases stress. There is an active program in México to prevent the spread of the disease by eliminating the use of abalone viscera by fishermen.

[1] 3883 Mt. Blackburn Ave., San Diego, CA 92111, USA.

On the evening of the 7th, the Conchological Club of Southern California/Pacific Shell Club hosted an after dinner reception. In addition to the wine, cheese and chocolates, members of the Club set up beautiful displays of California marine shells, land snails, fossils, and worldwide gastropods. It was a fun evening with lots of conversations with old friends and new acquaintances.

The field trips were purposely scheduled for Sunday, June 8th, because Sunday is the only time in Los Angeles when one can ride the highways with a minimum of traffic. There was a field trip to collect Pleistocene marine fossils from the Santa Barbara Formation and native and non-native land snails near Rincon Pt. in Ventura County with co-leaders Lindsey Groves and Phil Liff-Grief. Ángel Valdés led a tide pooling trip and visit to Cabrillo Marine Aquarium. For those of us not interested in either trip, Jim McLean opened up the Los Angeles Museum's Malacology Section for researchers.

Lindsey Groves (Figure 2) led a Paleontology Session on the morning of June 9, and Hans Bertsch led an Opisthobranch Session that afternoon. Lindsey Groves presented two papers on fossil cypraeids, one dealing with new species from the Late Cretaceous from California and British Columbia and the second on a new Miocene *Zonaria* from central Chile. These were remarkable for their great preservation - not the usual difficult to recognize fossil lumps. Of the opisthobranch papers, I was fascinated by the paper presented by Sandra Millen on "The nudibranch family Eubranchidae from the eastern Pacific." The history of the taxonomy of this family was particularly interesting and the frustration experienced by the speaker when the cladistic analysis didn't correspond to her intuitive thoughts was very entertaining.

On the evening of June 9th, there was an auction and reprint sale with Hans Bertsch as the auctioneer and George Kennedy in charge of the reprints. There was a sparsity of quality material in the auction, but Hans did a fantastic job of selling the art work, photographs and books, as well as anything else he could get his hands on. He cajoled the audience to spend more!! It was a humorous as well as frustrating evening for the audience but it did make a lot of money for the WSM Student Grant Fund.

On the morning of June 11th, Doug Eernisse ran a Phylogenetics Symposium. There were two outstanding papers in this session: "Host choice and genetic divergence in sacoglossan populations" by P.J. Krug, and "So what is a species anyway? – A phylogenetic

Figure 2. Lindsey Groves, convenor of the Paleontology Symposium.

approach using cowries" by C.P. Meyer. Dr. Krug studied populations of *Alderia modesta* on its obligate adult host alga genus *Vaucheria*. He studied populations from Oregon to southern California. "Populations south of Morro Bay have small adults that express a reproductive polymorphism, producing either planktotrophic or lecithotrophic larvae; populations from northern California and Oregon have large adults that produce exclusively planktotrophic larvae." There is a lack of gene flow despite the potential for larval gene flow via along-shore currents. Preliminary data suggests that larvae from Californian parents do not settle on *Vaucheria* from Oregon.

Dr. Meyer's paper describes a molecular approach to answer the question: "What is a species?" He used a large comparative molecular database in the study of cowries to arrive at what he calls evolutionary significant units (ESUs) that may, or may not, be considered species. Included in his objective criteria for distinctive characters are geography, morphology and ecology. He stated that species determination is a continuous process in which changes are hard to determine without comprehensive sampling. The closer the divergence event, the more difficult it is to see change. To be a species there can be no effective exchange between units and distinction between species and subspecies are blurred and continuous. He tantalized us with some of his decisions considering, for example, that *isabellamexicana* is most likely a separate species from *isabella* and that *gilvella* is not a good species. He believes that direct developers are easier to sort and that *marginata* appears to have sorted and that the *friendii* complex is probably a young divergence.

The annual business meeting occurred that afternoon. Dr. Jorge Cáceres will be the WSM President for 2004, and the next annual meeting will be at the Centro Cultural Riviera, Ensenada, México, June 24-28, 2004. The 2005 WSM meeting will be in San Francisco, and the 2006 meeting will be a combined WSM/AMS event in Seattle with Roland Anderson President of both organizations. The best student paper award was given to Marta Pola who presented and co-authored the paper, "The systematics of *Roboastra* Bergh, 1877 (Nudibranchia, Polyceridae, Nembrothinae)." The 2003 Student Grant Committee announced that the WSM in conjunction with the Southwestern Malacological Society, the Santa Barbara Malacological Society, the San Diego Shell Club, and the Northern California Malacozoological Club awarded student grants totaling $2200 to four students: Diego Zelaya, Matthew Clapham, Brooke Miller and Alicia Hermosillo-Gonzalez.

The annual banquet, denoting the end of the meeting was held that evening. Attendees were bussed to the Long Beach Aquarium, where we had a great dinner in a delightful environment. The keynote speaker was John Heyning, Deputy Director of Research & Collections and Curator of Marine Mammals, Natural History Museum of Los Angeles County. He gave an informative and humorous talk on marine mammals.

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Room 104, Casa Del Prado, Balboa Park, San Diego

Website at: http://www.sandiegoshellclub@terryarnold.net
E-mail: cmhertz@pacbell.net

PROGRAM

Micromollusks of Cabrillo National Monument

Benjamin Pister, a graduate student at UCSD is working in the lab of his advisor, Kaustov Roy, and studying and comparing the occurrences of micromollusks in present day intertidal areas of southern California with their occurrences in historical museum collections. This study explores the impact of human intrusion on the molluscan fauna.

Meeting date: 21 August 2003

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting 17 July 2003

President Carole Hertz opened the July meeting of the San Diego Shell Club at 7:50 p.m. She welcomed the attendees and introduced the guests. The minutes of the June meeting as published in *The Festivus* were accepted. Treasurer Silvana Vollero reported that the Club was still solvent. Jules Hertz reported that the treasurer's files for the years 2001 and 2002 have been audited and found to be correct. Carole reported that Terry Arnold had repaired the Club website and it is now working very well. See the front page for the new URL. Carole spoke about the September party, a potluck at the LaGrange's home, and passed around a sign-up sheet for potluck contributions. She said a map to their home would be included with the September issue. Larry Lovell stated that our scheduled August speaker had a conflict and a substitute speaker, Benjamin Pister, has been scheduled; he will be speaking about micromollusks found at Cabrillo National Monument.

Larry introduced the guest speaker, Dr. Leslie Harris, of the Natural History Museum of Los Angeles County, a specialist in marine worms. Her topic was "Spineless Wonders of the Caribbean: the Guana Island Biodiversity Study."

Dr. Harris has spent four summers at Guana Island, which is in the British Virgin Islands, and one summer on Lee Stocking Island in the Bahamas. The two islands are 500 miles from each other and several of the same species studied were found on both islands.

Guana Island is privately owned and was originally a sugar plantation. The owners are very conservation oriented and they have set up a special floating dock for boats so that the coral around the island is not damaged by anchors from visiting boats. The researchers were allowed to stay on the island for two months a year without charge whereas tourists would normally pay $650 per night. The researchers set up a full running laboratory. An experimental reef was set up for their studies as well since it was not permitted to touch the corals in any way.

Dr. Harris' studies were primarily focused on the small animals from the study sites, mostly those that were less than one cm. She showed marvelous photographs of tiny worms, shrimps, crabs, copepods, amphipods, isopods, echinoderms, mollusks, etc. Most were undescribed organisms. It was amazing how colorful these animals are and how many and how diverse are the species in each group. She showed images of many mollusks including tiny gastropods, bivalves, chitons, opisthobranchs and cephalopods. She took all the animal photographs through a microscope and they were exquisite.

Dr. Harris also spoke about doing some cave diving in the Bahamas. She mentioned that this is one of the most dangerous kinds of diving and that special certification is necessary to be permitted to enter these caves. The species within the caves, all blind, are different than non-cave species.

Marilyn Goldammer won the door prize. Refreshments were provided by Tom and Twila Critchlow and Billee Gerrodette. The meeting was adjourned at 8:50 p.m.

Jules Hertz

The Club's Website - A New Address

For some time now, the Club's website has been "broken." Member Terry Arnold has now repaired and updated the site and even the "Guestbook" is functioning. Terry also added a new feature to the site. Viewers can now click on the Skoglund Dictionary based on Keen (1971) and download it to their computers. This will be a gift to those who work with Panamic mollusks.

Terry will now be the Club's webmaster and the Club is appreciative of his efforts in making the site viable once again - and adding the new feature.

The new address for the site is as follows:
http://www.sandiegoshellclub@terryarnold.net/

Addition to the Club Roster

University of California, San Diego,. Scripps Institution of Oceanography (SIO) Library 0219, 9500 Gilman Drive, La Jolla, CA 92093-0219.

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THE FESTIVUS

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Volume: XXXV August 14, 2003

Donald R. Shasky

MEMORIAL ISSUE

Figure 1 (cover). Don Shasky on the aft deck of the "*Undersea Hunter*" off Cocos Island, Costa Rica. April 1992. Things were going well.

DONALD R. SHASKY

(1925-2002)

ITINERANT MALACOLOGIST EXTRAORDINAIRE

HENRY W. CHANEY

Santa Barbara Museum of Natural History
2559 Puesta del Sol Road, Santa Barbara, California 93105
E-mail: hchaney@sbnature2.org

Inquisitive, Irascible, Irrepressible...

Each described Don Shasky (Figures 1, 2) in one way or another. They characterize the seemingly boundless energy and dedication he focused on the study of mollusks and the determination to continually seek new specimens, make new discoveries, explore new locales.

Born in Battle Creek, Michigan in 1925, Donald Robert Shasky made his profession as a dermatologist, receiving his M.D. from Loma Linda University in 1958. He and his family lived for many years in Redlands, California, interestingly on the same street as S. Stillman Berry, before moving to Oceanside, California only a few short years ago.

His interest in malacology began in the early 1950s and initially was fueled by frequent travels to Baja

Figure 2. Don with Kirstie Kaiser during the 1992 expedition to Cocos Island.

California and the Gulf. His serious collecting, as defined by his start of concise record-keeping, dated from a 1955 trip to San Felipe. His collection, which quickly became exhaustive, grew almost exclusively by way of his travels. Even late in his career, when he developed a penchant for cowries, the sources of the vast majority of specimens were from these repeated expeditions.

By the early 1960s Don had begun to specialize on Panamic mollusks, which would remain his main focus for over 20 years. In his exploration of the tropical eastern Pacific, Don traversed localities from the upper Gulf down to Peru and participated in several organized expeditions, on the vessels *Ariel* (1960) in the Gulf of California and the shrimp trawler *San Juan* (1963) to the Gulf of Tehuantepec. He also developed a fascination with the off shore and oceanic islands of the eastern Pacific, going first to the Tres Marias (1961) and then the Revillagigedos (1965).

As his interests grew he began to actively participate in the shell clubs, societies, and museums, starting with the Conchological Club of Southern California, where he first published collecting notes in the *Minutes* (1958) and served as President (1969). He became a Research Associate at the LACM in 1968, served on the AMU board (1968-1969), was a charter member of the Yucaipa Shell Club, president of the WSM in 1982 and was active in the San Diego Shell Club beginning in 1984. He began to describe species in 1961 and would continue to do so for 10 years as the second edition of Keen was being prepared. By 1972 he turned to writing accounts of his travels and his various molluscan discoveries.

More importantly, by this time he had formed an extensive network of contacts with professional malacologists, providing specimens and collecting information which greatly assisted their work on specific monographs, while they in turn provided him with much needed identifications for obscure taxa. As would often be the case, the sheer diversity of Don's discoveries as well as his "directed" energy frequently overwhelmed the hapless "professional."

Don's consuming interest in small mollusks (Figure 3) began by happenstance while on the *San Juan* in 1963 with his discovery of a spinose, undescribed *Macrarene* as he was washing a trawl haul. He would later describe this as *Macrarene spectabilospina* Shasky, 1970 (to give an idea how impressed he was with the

Figure 3. Making an initial sort of dried grunge while onboard the "*Undersea Hunter*" during an expedition to western Panama, April 1993.

Figure 4. Sieving for micro-mollusks after a dive. Cartier Island, off Western Australia, September 1994.

shell). Greatly intrigued with their diversity, Don began to collect the micro taxa by sorting grunge (Figure 4). He soon perfected a method of dislodging specimens from rocks and rubble by shaking these substrates into a canvas bag. The results could be astonishing in their yield and diversity and it became his principle method of collecting for the next 25 years (Figure 5).

In 1983 he began what would become a series of 10 trips to Cocos Island, Costa Rica, making it the main focus of his collecting for the rest of that decade. His last visit to Cocos was also his final expedition in 1997. Compiling the malacofauna of Cocos, by more than tripling the list of known taxa, not including the discovery of new species (Figure 6), comprises Don's greatest contribution to the study of eastern Pacific mollusks. The result of this work is still to be fully appreciated. In addition, he greatly influenced (and often exhausted) the collectors who accompanied him, myself included. As noted in the accompanying memoir from Kirstie Kaiser, Don's inspiration was a seminal influence on her continued work with eastern Pacific mollusks.

As a result of discoveries made at Cocos, where there is a notable percentage of species that originate from the Indo-Pacific, Don was compelled to intensify his exploration of localities in the tropical Pacific. Most noteworthy were repeated visits to French Polynesia, Hawaii, Marshall Islands, Australia and Southeast Asia. Some of his notable finds are shown in Figures 7-9. During this final decade of collecting, the perfection of his method of shaking rubble yielded an enormous number of mollusks, many which still await identification.

It would be an understatement to say that Don was quite a character. He was very, very enthusiastic, was able to easily get excited over the slightest collecting opportunity, could be single-minded to the point of being irritatingly stubborn, while at the same time being generous with his knowledge and experience. Of course, it was often best to agree with him, particularly if we were trapped on a boat at sea. On one memorable Memorial Day weekend I spent a couple days with Don at his home in Redlands. His wife Ursula was out of town visiting friends and so it was an opportunity for Don to unleash his collection into the dining room, the kitchen, wherever there was an open space. It was an immersive experience. No sooner would I be asked a question about one unidentified species, when it was time for another and another. It was a cascade of small buccinids, even smaller triphorids, cerithiopsids, the ever present turrids, and an endless supply of little white rissoaceans and pyrams. Enough to make one crave for a cone.

Ever the gourmet, Don punctuated the experience with rich zinfandels, cheeses of somewhat questionable character, Indian curries and other dishes that bordered on the radioactive.

After all this time I remember that experience clearly and fondly, as I do the travels. His legacy to malacology was not as a traditional teacher or mentor, but as an explorer, a collector and an enabler. By knowing him, in some cases tolerating him, our experiences were enriched and energized. With him on board it was always quite a ride.

Figure 5. A view of the Shasky Collection, showing the arrangement of triphorids collected by shaking coral rubble in a canvas bag. For micromollusks, Don used small plastic hinged boxes, with specimens encapsulated within. Relative readability of these tiny labels indicates that the quality of Don's handwriting, as a physician, may have been above average.

MOLLUSCAN TAXA DESCRIBED BY DONALD SHASKY

New Genera

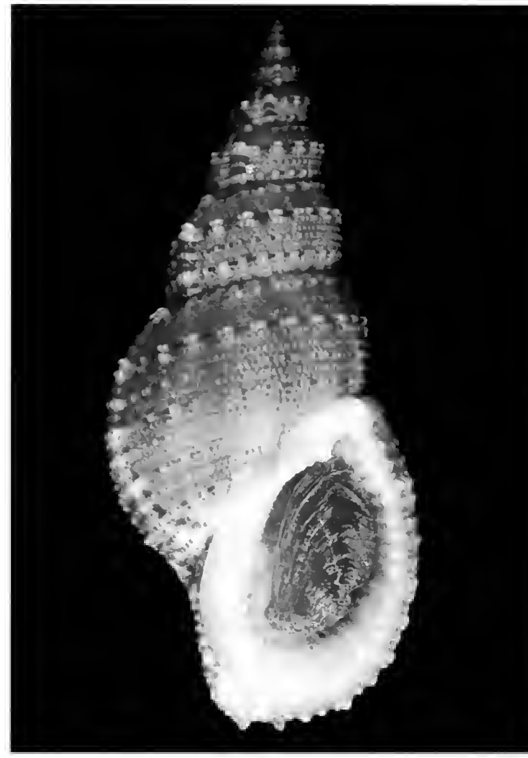
TURRIDAE
Ariela Shasky, 1961
Radwinia Shasky, 1970
Ruthia Shasky, 1970

New Species

BUCCINIDAE
Anachis berryi Shasky, 1970
Lapsigyrus myriosirissa Shasky, 1970
CANCELLARIIDAE
Cancellaria strongi Shasky, 1961
Trigonostoma campbelli Shasky, 1961
COLUMBELLIDAE
Columbella socorroensis Shasky, 1970
Strombina (Cotonopsis) mendozana Shasky, 1970
FISSURELLIDAE
Emarginula velascoensis Shasky, 1961
MITRIDAE
Mitra (Strigatella) sphoni Shasky & Campbell, 1964
MURICIDAE
Coralliophila macleani Shasky, 1970
Phyllonotus eversoni (D'Attilio, Myers & Shasky, 1987)
TROCHIDAE
Calliostoma mcleani Shasky & Campbell, 1964
Macrarene spectabilospina Shasky, 1970
TURRIDAE
Ariela mitriformis Shasky, 1961
Clathurella (Carinodrillia) bicarinata Shasky, 1961
Crassipira (Striospira) cortezi Shasky & Campbell, 1964
Clathurella (Lioglyphostoma) crebiforma Shasky & Campbell, 1964
Radwinia tehuantepecensis Shasky, 1970
Ruthia mazatlanica Shasky, 1970
Ruthia ecuadoriana Shasky, 1970
Doxospira hertleini Shasky, 1971
Miraclathurella mendozana Shasky, 1971
Strictispira stillmani Shasky, 1971
Zonulispira chrysochildosa Shasky, 1971
Pilsbryspira garciacubasi Shasky, 1971
Glyphosotoma (Glyphostoma) myrae Shasky, 1971
Kurtziella (Rubellatoma) powelli Shasky, 1971
Agathotoma (Vitricythara) klasmidia Shasky, 1971
Agathotoma (Vitricythara) secalis Shasky, 1971
Pyrgocythara emersoni Shasky, 1971

Figure 6. *Chicoreus (Phyllonotus) eversoni* (D'Attilio, Meyers and Shasky, 1987). Among the most spectacular discoveries from the Cocos Island expeditions occurred in March 1984, when Gene Everson found a crabbed specimen of this muricid with SCUBA. Living specimens were then found by using tangle nets in 100 meters off Chatham Bay. This specimen was the largest found by Don Shasky during the March 1989 expedition at 199.7 mm.

NOTABLE SPECIMENS



Figures 7, 8. (7, left) *Morum veleroae* Emerson, 1968. Originally described from specimens collected in the Galapagos, this species had been dredged from off Cocos Island by the Hancock Expeditions in the 1930s. Don finally found his own specimen with a tangle net in 1989. (8, right) *Bursa (Colubrellina) condita* (Gmelin, 1791). Relatively rare in Australia, this specimen was collected by Don during a diving trip to Michaelmas Reef, off Queensland in June 1981.

Figure 9. *Placiphorella blainvillii* (Broderip, 1832). An example of a first record of occurrence at Cocos Island, this species is known from the southern Panamic. Collected by tangle net in 1989 at 100 meters. Attached to substrates that also had *Haliotis roberti* Mclean, 1970. Length at 50 mm.

MOLLUSCAN TAXA NAMED AFTER DONALD SHASKY

ACANTHOCHITONIDAE
Acanthochitona shaskyi Ferreira, 1987
BUCCINIDAE
Cantharus shaskyi Berry, 1959
EULIMIDAE
Sabinella shaskyi Warén, 1992
MURICIDAE
Shaskyus n. gen. Burch & Campbell, 1963
Bizetiella shaskyi Radwin & D'Attilio, 1972
Favartia (Murexiella) shaskyi D'Attilio & Myers, 1988
NASSARIIDAE
Nassarius shaskyi McLean, 1970
TURRIDAE
Philbertia shaskyi McLean & Poorman, 1971

MALACOLOGICAL PUBLICATIONS OF DONALD R. SHASKY

D'ATTILIO, ANTHONY, BARBARA W. MYERS & DONALD R. SHASKY

1987. A new species of *Phyllonotus* (Muricidae: Muricianae) from Isla del Coco, Costa Rica. The Nautilus 101(4): 162-165, figs. 1-2 [November 6].

SHASKY, DONALD R.

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Notes on rare and little known Panamic mollusks. The Veliger 4(1): 22-24 [January 1].

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Pulmo Reef. The Echo (Abstracts and Proceedings of the Second Annual Meeting of the Western Society of Malacologists) 2: 36.

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Some Panamic-Caribbean muricid cognates. Annual Report Western Society of Malacologists 15: 18 [August 30].
New records of Indo-Pacific *Mollusca* from Cocos Island, Costa Rica. The Nautilus 97(4): 144-45 [October 28].
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A preliminary checklist of marine mollusks from Manabi Province, Ecuador. Annual Report Western Society of Malacologists 16: 25-32 [May 31].
Cocos Island Treasure. Shells and Sea Life 16(7): 99 [July].
A redescription of *Oliva foxi* Stingley, 1984. Shells and Sea Life 16(8): 128-29, 1 pl. [August].
Unwittingly did HSN push a best seller? Hawaiian Shell News 32(8): 4 [August].
Mollusks of Cocos Island - I: *Olivella cocosensis*. Shells and Sea Life 16(9): 151, 1 fig. [September].
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"Endemic" Hawaiian species taken at Cocos Island. Annual Report Western Society of Malacologists 18: 27 [January 31].

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The Family Omalogyridae in the tropical eastern Pacific. The Festivus 21(2): 17, fig. 1 [February 9].
Addition to "An update on the mollusks from the Galapagos Islands as listed in 'Preliminary faunal list of the marine mollusks of the Galapagos Islands' by Yves Finet". The Festivus 21(2): 18 [February 9].
Wanderings of an itinerant malacologist III: My highest high. American Conchologist 17(2): 6, 1 text fig [June].
My last seven years - at Cocos Island. The Festivus 21(8): 72-75, figs. 1-4 [August 10].
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SHASKY, MY "BUD"

KIRSTIE L. KAISER[1]

Santa Barbara Museum of Natural History
2559 Puesta del Sol Road, Santa Barbara, California 93105
E-mail: klkaiser@pvnet.Comm.Mx

My world is a sadder place since I lost my good dive buddy, mentor and friend. It was Dr. Shasky who invited me to join "the group"on my first Isla del Coco Expedition in 1985, his third trip to Costa Rica. I had known of Dr. Donald R. Shasky from his articles in malacological publications and I had met him briefly at WSM meetings, but on that first trip to Cocos, we bonded as great buddies! I was willing to learn and Donaldo, as I fondly called him, was certainly able to teach! I was always amazed at how much he maintained in that thick skull!!

The first years at Isla del Coco aboard the *Victoria af Karlstad* were quite an eye opener for me. Donaldo decided to teach me the art of "shake and bake" and lent me one of his canvas collecting bags. We would go down to 80 feet at Roca Sucia and I would imitate the great master as he skillfully picked up certain rocks and dead coral and vigorously shook them into his canvas bag. It didn't take me long to realize that it was the quality and not the quantity of the grunge that was so important! After going though my beginner's great bulk of grunge from that first trip, I was a much more discriminate "shaker and baker"! I never realized that this new collecting technique would literally take up half of my time and effort in working on my collection over the years!

Another fine collecting method that the "famoso Doctor Shasky" taught me almost got us all thrown off the boat. He had acquired some bottom nets and had decided that we should lace them with the meaty chicken bones from the previous night's dinner. After 24 hours on the bottom, we manually hauled the tangle net from 300 feet. Donaldo meticulously picked all the shells from the net, leaving the rest of the flora and fauna, including the chicken bones, to continue to rot in the equatorial sun! The stench was beyond belief. The best part was watching Shasky in his denial mode saying, "I don't smell anything"!! He was threatened by the ship's crew, more than once, that he would be the next bait to be wrapped and thrown overboard in the putrid tangle net!

Isla del Coco has been known for years for its schooling hammerhead sharks. Any normal human reaction to these creatures is one of caution and usually a bit of fear. Not Shasky!! His idea of dealing with sharks was-- if you don't see them, they're not there! I would remember him jumping into the water, heading straight down to his maximum depth, start turning rocks, and never looking up from his task at hand. Unfortunately, I have learned from that.... and it seems to work!!

Our last dive trip with Donaldo was to Isla del Coco in 1997. He was his usual self, but little did I know that it would be my last dive with the great master. It was fitting that it was a night dive and the place was teaming with silky sharks. I think they were the first sharks that Shasky ever saw at Isla del Coco! Here's to Donaldo!

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[1] Mailing address: Paseo de las Conchas Chinas #115 Depto. 4, Fracc. Conchas Chinas C.P. 48390, Puerto Vallarta, Jalisco, México.

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THE FESTIVUS

A publication of the 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@terryarnold.net
E-mail: cmhertz@pacbell.net

PROGRAM

Come to the Fall Party !!
Saturday September 20th. Festivities begin at 4:00 PM.
There is no regular meeting this month. (See map with this issue.)

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting 21 August 2003

President Carole Hertz opened the August meeting of the San Diego Shell Club at 7:50 p.m. She welcomed the attendees and asked that the Minutes of the July meeting as published in *The Festivus* be accepted. The motion was made, seconded and accepted. Carole spoke about the September party and passed a sign-up sheet around for the pot-luck. John LaGrange will provide a map to his home for inclusion with the September issue of *The Festivus*. With the absence of all other board members, the normal reports from the Vice-President, Secretary and Treasurer were omitted.

Jules Hertz introduced the speaker for the evening, Benjamin Pister a graduate student at UCSD. His talk was entitled, "Micromollusks of Cabrillo National Monument". His work covers the diversity of mollusks at Cabrillo, but he limited his discussion to the micromollusks. Forty-six of the 80 species he has collected fall in the range of micromollusks, which he defined as being less than 5 mm in size. He showed slides, taken by digital camera through a dissecting scope, of the live-collected species which live in algae and among sand grains. His material came from bench platforms in Zone 1 at Cabrillo. The slides represented 9000 individuals he has collected. He uses five sizes of screens to sift his material. The purpose of the project is to compare the material currently collected with material found in the past from that area. He showed beautiful pictures of these small species, starting with *Sinezona rimuloides* and *Fissurella volcano*. The juvenile of the latter has a very interesting nucleus which falls off as it matures. The most common of the species he collected was *Caecum californicum*. He showed it in its various stages of growth. He also showed a common pyramidellid that he collected, *Odostomia navissa*, which he said was usually collected in the apertures of *Tegula* species. He pictured minute bivalves as well as gastropods. It was a very informative and appreciated program.

Joe Piluso, a guest, won the door prize. Refreshments were provided by Jules and Carole Hertz. The meeting was adjourned at 8:50 p.m.

Jules Hertz

Additions to the Club Roster

Bedell, Harry, 23231 Palm Canyon Lane, Bungalow 8, Malibu, CA 90265. Phone: 310-456-0012. E-mail: malibuone@aol.com

Pister, Benjamin, 8538 Villa La Jolla Drive, #187, La Jolla, CA 92037. Phone: 858-453-7369. E-mail: bpister@biomail.ucsd.edu

Upcoming Meetings

An intensive course on molluscs will be running for the second time at the University of Wollongong (south of Sydney) from 8-21st Feb. 2004. The course is taught mainly by staff from the Australian Museum (Winston Ponder, Bill Rudman and Peter Middelfart) in conjunction with Assoc. Prof. Andy Davis from the University of Wollongong. It includes lectures, labs and field studies (the latter in Jervis Bay). Details can be found at http://www.uow.edu.au/science/biol/molluscs/

2003 Bay Area Malacologists (BAM) Gathering will be held on Saturday, October 18th in the Trustees Room at the California Academy of Sciences in Golden Gate Park in San Francisco. The meeting will start at 9:00 a.m. with coffee and doughnuts, and will conclude following all of the presentations, with a break for lunch, as needed. Our host at the Academy will be its Provost: Dr. Terrence M. Gosliner of the Department of Invertebrate Zoology and Geology. Mark your calendar and plan to give a presentation on any malacological topic, including current research or a discussion of an on-going research problem. Graduate students are particularly encouraged to participate. Informal discussions have proven very fruitful at BAM gatherings in the past.

Submit your name, title of presentation and length of time needed (usually 5 to 20 minutes), and any special equipment (VCR?). A standard slide projector, overhead projector, and data projector for PowerPoint presentations will be available.

For further information contact: Matthew J. James, 707-664-2301 voice; 707-664-3012 fax; e-mail: matt.james@sonoma.edu

MY LAST GREAT SHELLING TRIP

BILLEE GERRODETTE

6333 La Jolla Blvd. #171. La Jolla, California 92037, USA

A travel ad for a Hawaiian Island cruise that included Fanning Island, Republic of Kiribati, sounded interesting. Never having heard of the Island, I found it is about 1,000 miles due south of Hawaii. Dr. Hugh Bradner had been there on a Scripps Institution of Oceanography Expedition. He told me exactly where he had collected *Blasicrura goodallii* (Sowerby, 1832) (Figure 1). It was a new island for me with a shell I had never collected. I was ready to go. It could be one last trip to end my years of shelling. [It would also be my last trip involving airports since they are too much of a hassle now - electrical problems on the flight to Honolulu caused a stop in Los Angeles which made us the last people to board the ship - and missing the boat drill.] Then, on unpacking, we discovered that my husband George had failed to count luggage for the four of us and had left his suitcase at the airport. Luckily he had worn a dark suit, white shirt and tie on the plane so he had clothes appropriate for formal dinner and dancing - he danced in black socks since his rubber-soled sandals don't slide.

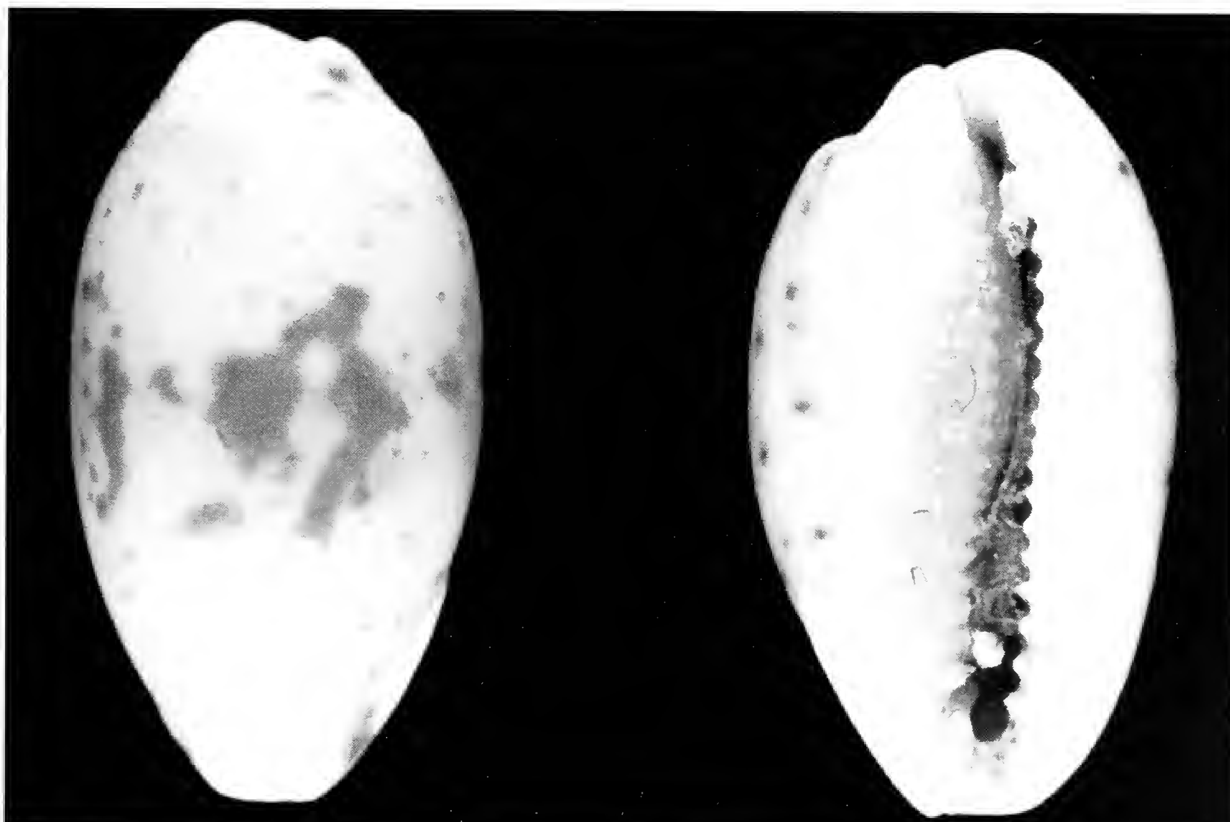


Figure 1. *Blasicrura goodalli* (Sowerby, 1832). Dorsal and apertural views of specimen from off Fanning Island. Photos: D.K. Mulliner.

Fanning Island day dawned sunny and clear. George had bought a Hawaiian type shirt and white shorts on board to wear to the island and I wore a nylon skin diving suit to protect from sun, insects or sea creatures. While others were to enjoy a ship-hosted barbecue on shore, I checked over any shells the natives were selling and finding nothing we started looking for transportation to take me across the swift flowing channel to the area Brad [Hugh Bradner] had indicated I search for the cowries. It took over 1½ hours to find a native who spoke English who had a friend with a boat and motor. The four of us piled in the boat and once across the channel, they dropped me off. George wanted to stay with me but was afraid something might happen to cause the boatman to forget to come get us after a couple of hours.

The water was warm, clear with only small waves. As Brad had directed, I was turning over small rocks in one or two feet of water. After about 1½ hours of seeing many small shells of different species laying eggs, lots of cute crabs, one colorful eel, many common small shells and finally one dead *Cypraea,* a storm suddenly appeared. The rain came down in sheets, the waves were knocking me into the small rocks and it was COLD! The weather went from hot to freezing in minutes. When George and the boat arrived, without our towels, he was every bit as wet as I was – his new shirt had green water running down on his white shorts. So much for expensive shipboard clothes.

George said, after paying the boatman his $20 plus $5 tip for each native, "That is a rather expensive, dead, half-inch shell." Unfortunately it wasn't even the *Blasicrura goodalli* I was searching for, but a more common *B. teres pellucens* (Melvill, 1888). For my last shelling trip, it was fun in spite of everything. [Five days later, George's suitcase was waiting for us in Hilo.]

My thanks to Dave Mulliner for the photography and to Terry Arnold and Kim Hutsell for the identification of my expensive, dead shell.

Figure 2. *Blasicrura teres pellucens* (Melvill, 1888). Dorsal and apertural views of empty specimen collected off Fanning Island, 23 January 2003. Leg. Billee Gerrodette. Photos: D.K. Mulliner.

FIRST RECORD OF *MITRA (MITRA) MITRA* (LINNAEUS, 1758) (GASTROPODA: MITRIDAE) ON THE PACIFIC COAST OF MAINLAND ECUADOR

VALENTÍN MOGOLLÓN AVILA

Laboratorio de Invertebrados Acuáticos, Facultad de Oceanografía, Pesquería y Ciencias Alimentarias,
Universidad Nacional Federico Villarreal, Roma 340, Lima 18, PERÚ
E-mail: svmogollon@yahoo.com

PHILIPPE BÉAREZ

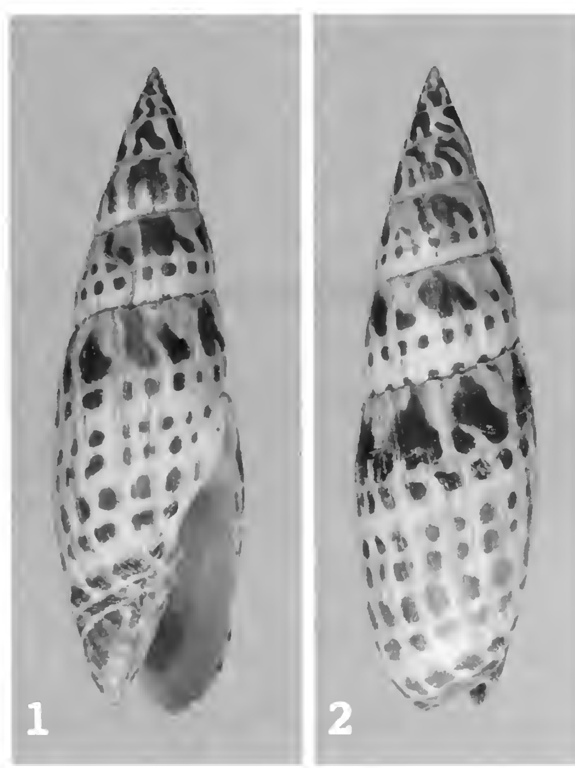
ESA 8045 CNRS Muséum National d'Histoire Naturelle (MNHN)
43 rue Buffon, 75005 Paris, FRANCE
E-mail: bearez@mnhn.fr

Mitra (Mitra) mitra (Linnaeus, 1758) is a solid shell, spindle-shaped, smooth, with white or cream background and spiral bands of red-brownish square blotches. Height to 172.9 mm (Hutsell et al., 2001). It is widely distributed in the Indo-Pacific, dwelling on sand in shallow waters (Abbott & Dance, 1986).

The known distribution is from east Africa to Polynesia and Hawaii, from the intertidal zone to 60 m depth (Cernohorsky, 1976), and in the Panamic Province it has been recorded in Costa Rica and Islas Galápagos, Ecuador (Sphon, 1976); Isla Gorgona, Colombia (Cosel, 1977); Panamá (Emerson, 1983) and Isla del Coco, Costa Rica (Emerson, 1991).

On 13 October 2002, a specimen of *Mitra mitra* was collected in 20 m depth by Mr. Enrique Toro, fisherman and diver of Salango, Ecuador, on a rocky rise over a sandy bottom with some slime. This area is known locally as "Bajo de Cantagallo," an area between the coast and Isla La Plata, in Manabí Province, Ecuador (1°18'S, 80°58'W). The shell was empty, lying on the edge of an octopus hole. The specimen measures 123.6 x 36.4 mm (Figures 1, 2), and is housed in the Philippe Béarez Collection (PB), Paris, France.

The species is recorded for the first time in Ecuadorian mainland waters, about 600 km southwest of Isla Gorgona. The presence of this Indo-Pacific migrant in Ecuador might be due to larval transport with the Cromwell Current, from the Galápagos or the central



Figures 1, 2. *Mitra (Mitra) mitra* (Linnaeus, 1758), two views of the same specimen. Collected at "Cantagallo", between the coast and Isla La Plata, Manabí Province, Ecuador in 20 m depth, 13 October 2002. Size: 123.6 x 36.4 mm. Photos: Philippe Béarez.

Pacific, and may be correlated with the 1997-98 ENSO event (Emerson, 1991; Béarez & Jiménez-Prado, 2003).

ACKNOWLEDGMENTS

We thank Mr. Enrique Toro of Salango, Manabí, Ecuador, for the donation of the specimen; also we thank Mr. Philippe Bouchet, MNHN, Paris, France, Mrs. Carol Skoglund of Phoenix, Arizona, and Mrs. Carole Hertz of San Diego, California who read the manuscript and offered valuable suggestions.

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IN MEMORIAM

Jean Cate

July 13, 1917 - September 11, 2001

BOOK NEWS

Checklist of the Land Snails and Slugs of California
By: Barry Roth and Patricia S. Sadeghian. Price: $29.00, softbound.
Order from: Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road, Santa Barbara, CA 93105.

The long-anticipated *Checklist of the Land Snails and Slugs of California* has arrived. The checklist is 81 pages in length, including an introduction, endnotes, bibliography and color plates. It is a scholarly, painstakingly detailed, up-to-the-minute systematic and distributional compilation of 397 known living and fossil taxa (20 new, unnamed) of this large and topographically varied state.

The checklist is much more than a simple itemized listing of species by genus. It is based on the principles of modern phylogenetic systematics "drawing heavily" on cladistic analysis by Wade et al. (2001). However, in his treatment, Dr. Roth has carefully blended this approach with aspects of classical Linnaean taxonomy. The result is a rather traditional appearing, hierarchal format without suprageneric formal rankings but retaining traditional names of described taxa. This approach will give a degree of comfort to those who are used to classical taxonomy and "provides continuity with previous literature." It is obvious, for example, that "HELMINTHOGLYPTIDAE Pilsbry, 1939" is, in fact, a family-level taxon even though the term "family" is omitted. Included are several suprageneric helminthoglyptid taxa without formal rank such as "Helminthoglyptaniki" as well as two genera and a subgenus that were coined relatively recently by the senior author (Roth, 1996). There are several nameless clades listed typically as "Unnamed clade comprising X-oidea + Y-oidea (etc.)." Taxonomic rearrangements including numerous new synonymies are briefly discussed in the rather extensive endnotes. In addition, the location(s) and catalogue number(s) of type material is/are listed.

The geographic location of each species/subspecies is listed by county from north to south. This arrangement, compared to an alphabetical listing of counties, allows the reader to rather easily paint a mental picture of its general distribution. Whenever a species is found as fossil outside California, it is so indicated, giving a sense of its distribution through time.

A five-page supraspecific taxonomy section that precedes the checklist provides a helpful overview. It allows one to determine where a particular taxon fits into the big picture systematically without having to flip backwards through numerous pages.

Thirteen highly attractive color plates give multiple views (usually 3) of the holotype or lectotype of 64 species of several genera from the S. Stillman Berry collection (housed at the SBMNH). They nicely complement the rest of the work, both artistically and scientifically. The digital photographs are very clear, well-focused and carefully arranged. They are shown in the same sequence as they appear in the checklist. All species (shells) are presented as being about the same size, with their actual diameter given in the figure caption. The reader should be aware that this size equalization gives an initial false visual impression of relative size.

The only other significant source of information regarding California land snails and slugs is Pilsbry's (1939-48) voluminous, 4-part monograph of North American land mollusks. Hence, this handy, local checklist is a welcome, much-needed addition to the literature. It is a "must-have" for anyone seriously interested in western land mollusks.

However, if you have been diagnosed as "Latin-challenged," you may prefer to skip the first 56 pages!

A more detailed handbook is on the horizon, so stay tuned..........

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LANCE GILBERTSON

MY FIRST COA CONVENTION

DEBBI LEVIN

1848 Rust Ridge Place #202, Corona, California, USA
E-mail: levindj@att.net

I attended the recent Conchologists Of America (COA) Convention in Tacoma, WA from July 17th to the 21st. I don't quite know what I expected but it was interesting. The convention kicked off with an Opening Ceremony in the Tacoma Sheraton. The programs were varied throughout the week. On Thursday, the programs featured shell related topics featuring the Pacific Northwest.

Dr. Hank Chaney spoke about Walter Eyerdam whom he described as the consummate Pacific Northwest collector. Walter Eyerdam lived in the Pacific Northwest but collected all over the world and all manner of things. He collected mollusks, birds, plants and ethnographic items and wrote many papers. He also kept a list of all his correspondence whether it was incoming or outgoing as well as the subject. He was a man of modest means who financed his own travels all over the world.

That afternoon, Dr. Roland Anderson presented information regarding cephalopods living in Puget Sound. It was fascinating to learn that one species of octopus, the red octopus *Octopus rubescens*, likes to live in stubby brown beer bottles with marine growth on them. Their middens are inside the bottles and not outside like other octopuses. The mollusk most often found in these beer-bottle middens is *Olivella baetica* which is eaten by the red octopus. Dr. Anderson also noted that very few of the mollusks eaten by the octopus are found by divers.

Dr. Terry Frest, of Deixis Consultants, spoke about work he and his team are doing regarding identifying land mollusks in the western US. The gist of his talk was that less is known about the land snails living in the western US than is known about the land snails living in Costa Rica. He presented maps to show where different species of land snails live and their distribution. It would be quite fair to say that there are tons of different species of land snails in the western US that live in very small areas. When talking about how they identified the snails, it seemed to me that he was more of a splitter than a lumper and that DNA identification of the animal world could set science upside down. Dr. Frest also presented an interesting statistic - 43% of all extinct species in the world are mollusks.

Scheduled next was Roger Clark to talk about chitons but he had a small problem with transportation — he was stuck in Alaska. Rick Harbo, of the Fisheries and Oceans in Nanaimo, Canada, spoke instead about the historical, commercial and recreational uses of Pacific Northwest marine mollusks. He discussed how the Native Americans hunted geoducks and why geoducks are not commercially sold in fish markets anymore. It was an interesting discussion.

The Welcoming Dinner that evening at the Tacoma Aquarium and Zoo was an appetizer-style meal. A bus transported those who needed rides. The bus driver took a little longer than expected to arrive at the Aquarium and return to the hotel so unfortunately some convention guests did not make the Welcoming Dinner. For those lucky enough to have caught the bus, dinner at the aquarium was a pleasant evening. The exhibits were open to peruse and I believe all enjoyed themselves.

Saturday provided a variety of talks. Peggy Williams was first to speak and she discussed what to see and look for around Guaymas, Sonora, Mexico. She explained how to identify when a shell was "popping" (coming up through the sand). It was a nice presentation.

Richard Goldberg followed with a narrated program that discussed where many land mollusks could be found. It was an elaborate program using video, still images, and sound to produce a single slide presentation. Richard lucked out. He did not have to speak to his slides; he let the program do all the talking.

Leslie Crnkovic presented a program regarding how the *Compendium of Seashells* was born and the various editions and publishers it has gone through. He discussed how S. Peter Dance and R. Tucker Abbott worked together to complete the book from both sides of the Atlantic Ocean.. It was interesting to learn that before the *Compendium* was published no one else had tried to list all the known mollusk species in a single volume. Leslie also noted that many of the common names listed in the book were made up for the book.

Charlie Waters presented his slides and video from his trip to Clipperton Island in the late 90s. I think all were pleased with some of the beautiful shots including the pictures of Charlie riding on a manta ray.

Hank Foglino talked about how the US Navy detects submarines and how sound moves through water. It was quite interesting. He mentioned that he worked on a machine that detected the sound of clams in the sand to assist in commercial harvesting. If I remember correctly it is not in wide use. Hank mentioned that sound travels around five times faster in water than air and that sound works a lot like optics when transmitting through air to water. He said that where you think the sound is coming from is probably not correct. He also mentioned that cephalopods react to sound.

Joyce Matthews presented a video she'd filmed over eight years titled *Molluscs in Action*. The video was designed for children and covers biology, eating, reproduction, and movement. It was entertaining for all. She filmed the video at Sanibel Island and every picture is live motion.

There was a small presentation on next year's COA convention which will be held in Tampa Bay at the Grand Hyatt and will run from June 27th through July 2nd .

During the business meeting the major topic of discussion was the election of the COA officers and the length of their terms of office. The existing slate of officers was re-elected. The term lengths to start in 2005 are to be for two years instead one. There was also discussion on the grant program and questions were raised about non-cash gifts - should they be accepted and if they were how should they be accounted for.

On Friday night, the auction was held. There were two auctioneers with two different styles. One was precise with the amounts he raised the bids. The other auctioneer had a more relaxed style and raised the amounts as he saw fit. It made for controlled confusion. No one seemed to have any problems with it and between the oral and the silent auctions about $10,000 was raised. There were shells from the Galapagos, Clipperton, and the Tregosse Reefs in the Coral Sea. A *Cypraea valentia* went for $650. A *Nodipecten magnificus* from the Galapagos went for $425 and a *Cymbiolacca perplicata* from the Lida Reef (Tregrosse Reefs) went for $420. A home accessories set was also auctioned off. The set included two rolls of toilet tissue in a shell pattern, one set of stove burner covers in what appeared to be the same shell pattern, and a shell mouse pad. The home accessories set went for $50. If people are interested, I have the complete listing of what was sold at auction and for what amounts.

The dealers' bourse was held on Saturday and Sunday. I went on Sunday and it reminded me of some time I'd spent in Riyadh, Saudi Arabia at the gold souks - shells everywhere you looked. There were around 40 dealers selling merchandise from shells to books to videos. It was quite entertaining.

I did not attend any program on Monday but I heard rave reviews about the presentation by Joan Rutherford who spoke about life on a tiny atoll. She spent five years living on an island 30 by 80 feet in the Marshall Islands.

David Gordon was scheduled to present a program about the oyster industry in Washington State. Bill Lyons was scheduled to present a program about tulip shells, and Fred Schroeder about shelling in Guam. In the afternoon, three workshops were held: on chitons, cones, and shellcraft.

The banquet was held on Monday evening in the Convention Center next door to the hotel. The food was delicious and the table decorations truly unique - a paper-mâché snail attached to a nautilus shell with a wire holding an umbrella was then attached and hung over the head of the snail. Dr. Barry Wilson, the banquet speaker, spoke on *Cowries of Southwest Australia*. It was informative and enjoyable. It was a discussion again on splitting vs. lumping. John Jackson donated the wine for the evening which was from Dr. Wilson's vineyard.

All in all, I enjoyed my first COA convention and will probably attend another in the future.

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THE FESTIVUS

A publication of the 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@terryarnold.net
E-mail: cmhertz@pacbell.net

PROGRAM

The Secret Lives of Naked Mollusks

Dr. Ángel Valdés, Curator of Malacology at the Natural History Museum of Los Angeles County, will give a slide presentation on the beautiful group of shell-less mollusks, the nudibranchs.

Meeting date: 16 October 2003

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CLUB NEWS

The September Party

The almost 30 members and guests that attended the Club party on the 20th of September had a wonderful time. The LaGrange's new beautiful home was a splendid and relaxed setting in which to enjoy all the friends that were present. The food was outstanding and it was a rare member who didn't indulge in all the goodies.

Our heartfelt thanks to Linda and John for opening their home to the Club and being such terrific hosts.

Additions and Changes to the Club Roster

Negus, Rick, [new e-mail] rnegus@adelphia.net
Small, Michael, 371 Harvard St., Apt 3D, Cambridge, MA 02138. E-mail: msmall@ucfia.harvard.edu

The Club's Annual Christmas Dinner Party

The Club's annual Christmas Party, to be held on Saturday evening, December 13th at The Butcher Shop in Kearny Mesa, San Diego is the Club's next social event. Festivities will begin at 6:00 p.m. The cost and menu will be published in the November issue.

This end-of-the-year party is always enjoyed by all and our hope is that you will save the date.

Shell Show Information for 2004

Courtesy of Donald Dan, COA Award Chairman, 6704 Overlook Drive, Ft. Myers, FL 33919, USA.
E-mail: donaldan@aol.com

Jan. 30 - Feb. 1 **BROWARD SHELL SHOW**, Pompano Beach, FL Pompano Beach Recreation Center, NE 18th Av. & NE 6th St., Jim VunKannon, 2219 NE 16th Court, Ft. Lauderdale, FL 33305, (954) 561-0120

Feb. 13-15 **SARASOTA SHELL SHOW**, Sarasota, FL, Sarasota Municipal Auditorium, Tamiami Trail, Lynn Gaulin, 4407 33rd Ct. East Bradenton, FL 34203, (941) 755-1270.
E-mail: shellhunter@att.net

Feb. 20-22 **NAPLES SHELL SHOW**, Naples, FL, The Nature Conservancy, 14th Av. N., Gary Schmelz, 5575 12th Av. SW, Naples, FL 34116, (941) 455-4984. E-mail: schmelz@att.net

Feb. 27-29 **ST. PETERSBURG SHELL SHOW**, Treasure Is., FL, Treasure Is. Community Center, 1 Park Place, Bob & Betty Lipe, 348 Corey Av., St. Petersburg Beach, FL 33706, (727) 360-0586; FAX: 360-3668. E-mail: rlipe1@tampabay.rr.com. Exhibits accepted at web site: http://web.tampabay.rr.com/shellclub

Feb. 28-29 **XVIéme RECONTRES INTERNATIONALES DU COQUILLAGE**, Paris, France, Bourse de Commerce, 2 rue des Viarmes, 75004 Paris. (Note: new venue for 2004), M. & D. Wantiez, 88, Rue du General Leclerc, 95210 Saint Gratien, France, 33 (1) 34-17-00-39. E-mail: wantiez.mada@libertyserv.fr

Mar. 4 - 6 **SANIBEL SHELL SHOW**, Sanibel, FL, Sanibel Community Center, Periwinkle Way, Anne Joffe, 1163 Kittiwake Circle, Sanibel, FL 33957, (239) 472-3151. E-mail: Sanibel@aol.com

Mar. 11-13 **MARCO ISLAND SHELL CLUB SHOW XXIII**, Marco Is., FL, Wesleyan United Methodist Church, Barfield Rd., Jean Sungheim, P.O. Box 633, Marco Island, FL 34146, (941) 642-7247

Mar. 20-21 **FIFTH AUSTRALIAN NATIONAL SHELL SHOW**, Morphettville, S. Australia, Morphettville Race Course, Wayne Rumball - (8) 8381-3987, fax: (8) 8387-4956 Peter Hunt -(8) 8387-6492. E-mail: hunt.trottpk@chariot.net.au

May 8 - 9 **XIV BELGIUM INTERNATIONAL SHELL SHOW**, Antwerp, Belgium, Sporthal Schijnpoort, Schijnpoortweg 55-57, Antwerpen, R. De Roover, Vorsterslaan 7, 2180 Ekeren-Donk, Belgium, 32 (3) 644-3429. E-mail: bvc.deroover@village.uunet.be

Jun. 27 - Jul. 2 **CONCHOLOGISTS OF AMERICA ANNUAL CONVENTION**, Tampa, FL, Grand Hyatt Tampa Bay, 6200 Courtney Campbell Causeway, Tampa, FL, Betty Lipe, 11771, 96th Pl., Seminole, FL 33772-2325, (813) 391-2197. E-mail: rlipe1@tampabay.rr.com

Jul. 11-16 **UNITAS MALACOLOGIA - World Congress of Malacology**, Perth, Australia, The University of Western Australia, Perth, W.A., Dr. Fred Wells, Western Australia Museum, Perth 6000, W.A. E-mail: wellsf@museum.wa.gov.au

Jul. 17-18 **Jacksonville Shell Show**, Jacksonville Beach, FL, Days Inn Oceanfront Resort, Jacksonville Beach, Charlotte Lloyd, 1010 N. 24th St., Jacksonville Beach, FL 32250, (904) 246-0874.
E-mail: challoyd@bellsouth.net

Jul. 17-18 **Keppel Bay Shell Show**, Yeppoon, Queensland, Australia Jean M. Offord, 277 McDougall St., N. Rockhampton, Qld. 4701, Australia, (7) 4928-3509

Jul. 24-25 **Townsville Shell Show**, Townsville, Queensland, Australia, Cutharinga Bowls Club on Harold St., West End, Glenda Rowse, 19 Farrell St., Kirwan 4814, Queensland, (7) 4773-2817.

Jul. 31- Aug. 4 **American Malacological Society Meeting**, Sanibel, Florida, Sun Dial Resort, W. Gulf Rd., Dr. Jose Leal, Bailey-Matthews Shell Museum, Sanibel-Captiva Road, Sanibel, FL 33957, (239) 395-2233. E-mail: jleal@shellmuseum.org

THE SCRIPPS INSTITUTION OF OCEANOGRAPHY BENTHIC INVERTEBRATE COLLECTION: A CENTENNIAL HISTORY AND REPORT ON ITS MOLLUSK HOLDINGS

LAWRENCE L. LOVELL

Collection Manager, Benthic Invertebrate Collection - Scripps Institution of Oceanography
9500 Gilman Dr. MS-0244 La Jolla, CA 92093-0244
E-mail: llovell@ucsd.edu

As *Homo sapiens*, it is our practice to mark the passage of time by celebrating significant anniversaries. An individual that reaches the grand old age of 100 can be said to have "stood the test of time" or "survived life's ups and downs". This is also true of governments and institutions of higher learning. This year San Diego area residents have reason to celebrate as the Scripps Institution of Oceanography (SIO) celebrated its centennial anniversary in September 2003. SIO has been a leader in scientific research in the United States and around the world during those 100 years. As the SIO physical campus has grown, so has the staff, from less than 10 in 1903 to over 1600 scientists and staff working in many areas of ocean and earth science today. The impacts made by SIO on the San Diego community go far beyond its contributions in oceanography. The presence of SIO in San Diego was an impetus in the University of California locating a campus here and the establishment of bio-medical and scientific research industries that are the envy of other cities.

One hundred years ago, during the summer of 1903, Dr. William E. Ritter of the University of California, Berkeley, conducted biological survey work from the Hotel Del Coronado boathouse in an effort to establish a location for a more permanent research facility. While in San Diego, Ritter met Dr. Fred Baker, a local physician and avid malacologist. Dr. Baker was very excited about the prospect of having University affiliated marine biologists working in the area. The resulting collaboration of these two men and two other San Diego area residents, E.W. Scripps and his sister Ellen B. Scripps, led to the formation of the Marine Biological Association of San Diego on May 13, 1904. The expressed purpose of the association, articulated in its bylaws, was "to carry on a biological and hydrographic survey of the waters of the Pacific Ocean adjacent to the coast of Southern California; to build and maintain a public aquarium and museum."

By June of 1905, the Association had opened its first facility at Alligator Head in La Jolla, known to locals as "The Little Green Lab" (Figure 1). From 1905 until 1910, the "Little Green Lab" supported the scientific work of the Association and presented museum and aquarium displays of preserved and living marine animals and plants to the general public. Before long, the Association realized that a larger more permanent facility would be needed. E.W. Scripps provided the money to purchase 170 acres of land at the present site for the sum of $1000.00. The first building, the G.W. Scripps building, designed by noted local architect Irving Gill, was opened in June of 1910. Two years later the Marine Biological Association deeded its holdings to the Regents of the University of California and the facility was renamed the Scripps Institution for Biological Research of the University of California. This name lasted until 1925 when it changed to its present name, Scripps Institution of Oceanography, reflecting the broader scope of ocean research interests.

Several prominent marine biologists have worked at the Institution over these 100 years, helping establish it as the premier oceanographic institution on the West Coast. The first director, Dr. Ritter worked on tunicates. His successor as director, Dr. T. Wayland Vaughan worked with corals. Dr. Myrtle E. Johnson was in invertebrate zoologist who worked at SIO from 1904 until 1921, when she left to teach at San Diego

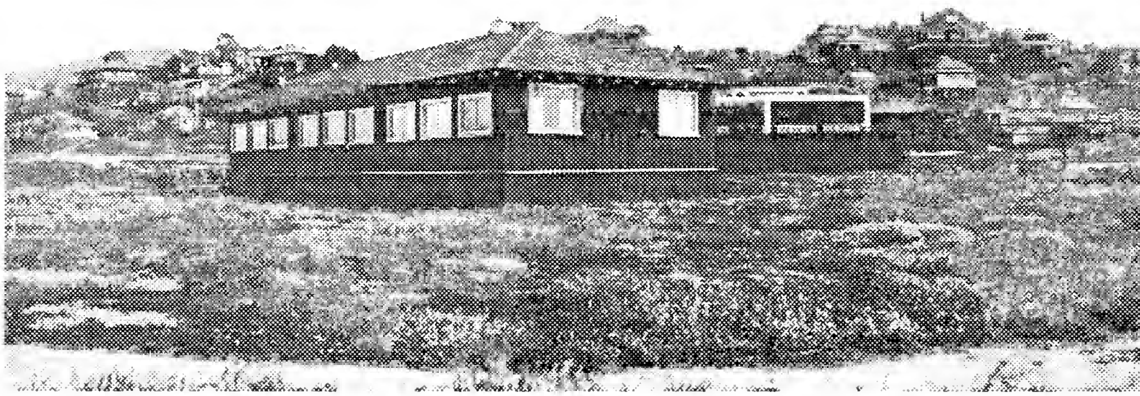

Figure 1. The Little Green Lab at Alligator Head, La Jolla, California, circa 1905. The laboratory is in the foreground. Scientists lived in the building behind the lab. Photo courtesy of Scripps Archives, UCSD.

College (now San Diego State University). She co-authored with Dr. H. J. Snook the early field guide, *Seashore Animals of the Pacific Coast*, in 1927. Dr. Martin W. Johnson worked at SIO from 1934-1984 on various aspects of crustacean biology. In 1942, he co-authored with two other SIO scientists Dr. Harold Sverdrup (then Director) and Dr. Richard Fleming, the groundbreaking oceanographic textbook *The Oceans, Their Physics, Chemistry and General Biology*. He helped establish the CalCOFI Program and the Marine Life Research Group in the late 1940s. After his retirement from the Yale Peabody Museum, Dr. Wesley Coe worked at SIO in the late 1940s and 1950s publishing on the population dynamics of marine invertebrates, including *Donax gouldii*. In recent years, Drs. R.R. Hessler and W.A. Newman have worked largely on deep and shallow-water crustacean fauna, respectively.

From the very beginning, those and other SIO scientists were collecting marine organisms for research and public display. In 1916 a library-museum building adjoining the G.W. Scripps building was added, which allowed for more museum display space (Figure 2). The number of collected specimens steadily grew, and in 1918, Dr. George McEwen was named the first Curator of the Oceanographic Musuem with Percy S. Barnhart listed as Curator of Aquarium and Collector. By 1926, Percy Barnhart was elevated to the position of Curator of the Biological Collections, a position he held until 1948. In 1948, Dr. Carl Hubbs arrived at SIO and fishes were separated from the Biological Collections as the Marine Vertebrate Collection. In 1951, the Vaughan Aquarium-Museum was constructed and the biological collections were moved into its basement. Sam Hinton was the curator of the Invertebrates Collection during the 1950s. Construction of new wings to Ritter Hall in the late 1950s provided the Marine Vertebrate and Pelagic Invertebrate Collections with new space and room to grow. The benthic component of the

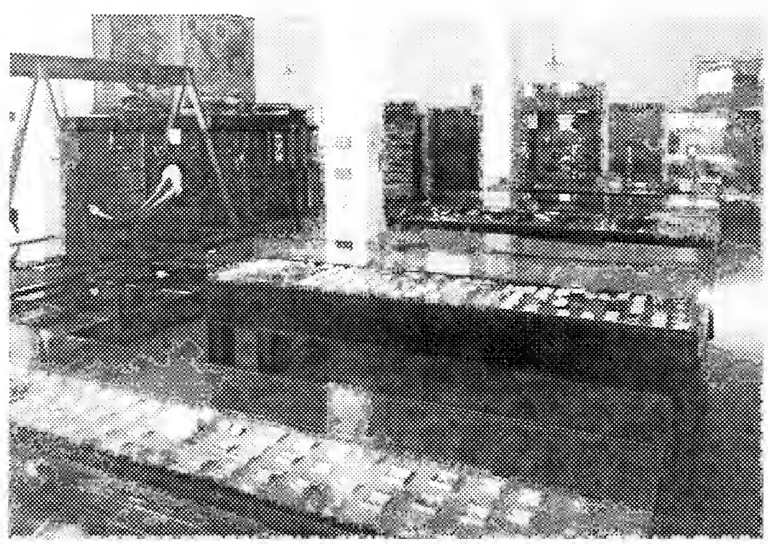

Figure 2. Museum display space in the Library-Museum building built in 1916. Two of the display cases on the left back wall are still in use in the Collection today. Photo courtesy of Scripps Archives, UCSD.

Invertebrates Collection remained in the basement of Vaughan Aquarium-Museum. The 1960s saw the separation of the Invertebrate Collections into Pelagic and Benthic Invertebrate Collections each with its own curator. In 1966, Dr. Abe Flemiger became the curator of the Pelagic Invertebrate Collection and Dr. William Newman, who had initially been hired as curator of the joint Invertebrate Collections, became the first and, to this date, only curator of the Benthic Invertebrate Collection (BIC). Tom Cukr was the first collection manager of the BIC. Following his untimely death in a recreational diving accident in 1969, Spencer Luke became the collection manager. Luke produced six catalogs on the holdings of the Collection and established an electronic database of the holdings. Following Luke's retirement in 1998, Larry Lovell became the collection manager.

Following passage of a California State earthquake building retrofit or replacement bond in 1994, the administration decided the Vaughan Hall Aquarium-Museum and those portions of Ritter Hall containing the bulk of the Planktonic and the Marine Vertebrate Collections would be torn down. A fully air conditioned replacement building, sufficiently large to include all biological collections as well as other facilities, was built in 1998 and named Vaughan Hall after the old Aquarium-Museum building. Grants from the National Science Foundation funded the installation of compactor shelving for the collections, greatly adding to their accessibility as well as the capacity of the new facilities (Figure 3). The new facilities of the Benthic Invertebrate Collection also include wet and photo labs, a systematic/taxonomy laboratory, data/library room, visiting scientist office, and office for the collection manager. The BIC moved into new facilities in 1999.

The BIC houses over 30,000 cataloged lots of marine invertebrates and several thousand lots of uncataloged material. This material represents the collecting efforts of many SIO scientists and the donations of private collectors over the years. These collections primarily come from the eastern Pacific and include shallow water as well as deep-water samples taken with a variety of devices from intertidal hand collecting and SCUBA to rock dredges and trawls. The collection has considerable holdings from deep-water (< 1000m) samples (including the Tonga and Mariannas Trenches), Antarctic samples, and material collected from hydrothermal vents and methane seeps.

Visit the Collection website at (http://collections.ucsd.edu/bi/index.cfm) for more database, loan policies, and contact information.

Figure 3. The author examines a specimen of deep-sea amphipod in the new collection room. Compactor shelving was provided through a grant from the national Science Foundation. Photo courtesy of Bill Newman.

The mollusk holdings are the largest group in the BIC comprising over one third of the lots (12,000+ of 31,000+) and date back to the earliest days of the institution. These holdings are the result of collecting efforts of SIO researchers and outside donations. Donations from private collectors have added considerably to the mollusk collection. Part of the large Baker-Kelsey Mollusk Collection was donated to SIO in 1921. The mollusk collections of Ralph and Mary Bormann (southern Californian fauna), Dr. John Fox (primarily Cypraeidae), and Robert Miller (primarily Pectinidae) were donated to the BIC. Recent additions include donations from the private collections of Dr. Hugh and Marge Bradner (many Cypraeidae), and Margaret and David Mulliner (Panamic Province gastropods). The Collection contains over 150 type lots of invertebrates, including 39 lots of mollusk types; however, some "type" lots from the Baker-Kelsey collection are noted as "co-types" on the original labels and are not listed in the original description under material examined. The mollusk collection currently has over 12,000 cataloged lots, of which nearly 8,000 are in an electronic database. The Collection also houses a systematic reference library covering mollusks and other invertebrate groups. A catalog of mollusk holdings published in 1995 by former collection manager, Spencer Luke, is available as a downloadable Word© document from the BIC website (Figure 4). The catalog lists 6,819 lots in 210 families.

It is truly ironic that as we celebrate its centennial year, SIO faces perhaps its greatest challenge yet. As the State of California continues to face a massive financial crisis and budgets are cut, SIO is charting a course through public outreach to raise funds to replace those research dollars lost from the State. The Oceanographic Collections, which represent the core of this institution, are threatened with closure if replacement for lost funding is not secured. To that end, the Friends of the Collections organization, was recently established to promote SIO Oceanographic Collections and their survival. The goal is two-fold (1) to annually raise funds to cover the yearly Oceanographic Collections operating budget and (2) to ultimately raise an endowment fund capable of supporting the Oceanographic Collections indefinitely. For information on the Friends of the Collection, please contact John Steinitz in the SIO Development Office at (858) 534-3522 or by e-mail at <jsteinitz@ucsd.edu>.

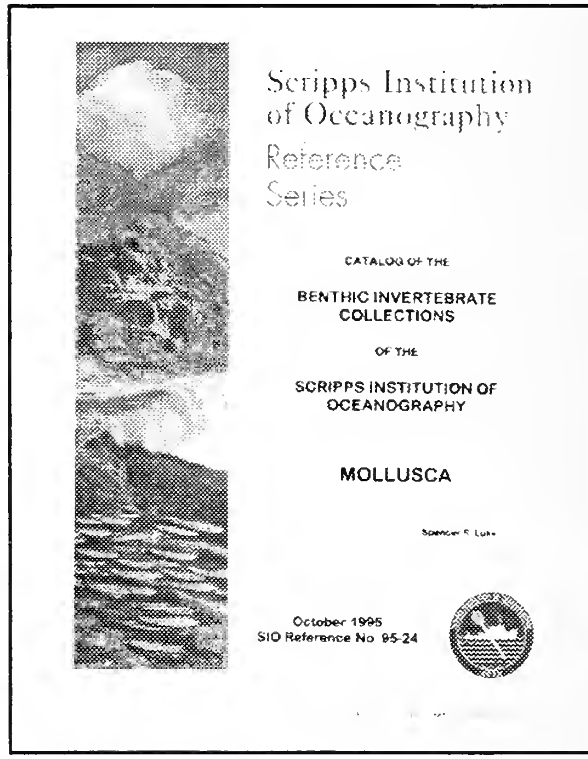

Figure 4. Mollusca catalog published in 1995 by Spencer Luke. Photo courtesy of Bill Newman.

Table 1. List of Mollusk Type Lots in the SIO Benthic Invertebrate Collection

Class Family	Genus species	Author, date	Catalog No.
BIVALVIA			
MYTILIDAE	*Brachidontus puntarenensis*	(Pilsbry & Lowe, 1932)	M 6102
THYASIRIDAE	*Axinulus redondoensis*	(T. Burch, 1941)	M 6580
VESICOMYIDAE	*Vesicomya (Calyptogena) magnifica*	(Boss & Turner, 1980)	M 3976
GASTROPODA			
CAPULIDAE	*Capulus sericeus*	J. & R. Burch, 1961	M 11260
COLUMBELLIDAE	*Aesopus petravis* = *A. subturritus* (Carpenter, 1864)	(Dall, 1908)	M 4913
LEPETIDAE	*Leptodrilus elevatus*	McLean, 1988	M 6245
	Leptodrilus elevatus	McLean, 1988	M 6246
	Leptodrilus elevatus	McLean, 1988	M 6247
	Leptodrilus elevatus galriftensis	McLean, 1988	M6248
	Leptodrilus fucensis	McLean, 1988	M 6251
	Leptodrilus ovalis	McLean, 1988	M 6249

LEPETIDAE	*Leptodrilus ovalis*	McLean, 1988	M 6250
	Leptodrilus pustulosus	McLean, 1988	M 6242
	Leptodrilus pustulosus	McLean, 1988	M 6243
	Leptodrilus pustulosus	McLean, 1988	M 6244
MURICIDAE	*Boreotrophon bentleyi*	Dall, 1908	M 5127
	Ocenebra keenae = O. beta (Dall, 1919)	Bormann, 1946	M 4227
NEOMPHALIDAE	*Neomphalus fretterae*	McLean, 1981	M 1637
OLIVIDAE	*Olivella porteri = O. baetica* (Carpenter, 1864)	Dall, 1910	M 2969
PELTOSPIRIDAE	*Rynchopelta concentrica*	McLean, 1989	M 6252
	Rynchopelta concentrica	McLean, 1989	M 6253
PYRAMIDELLIDAE	*Turbonilla cookeana*	Bartsch, 1912	M 10365
RISSOINIDAE	*Rissoina bakeri*	Bartsch, 1902	M 4519
TROCHIDAE	*Calliotropis abyssicola*	Rehder & Ladd, 1973	M 770
	Calliotropis abyssicola	Rehder & Ladd, 1973	M 771
	Calliotropis abyssicola	Rehder & Ladd, 1973	M 772
	Calliotropis abyssicola	Rehder & Ladd, 1973	M 773
	Calliotropis hataii	Rehder & Ladd, 1973	M 765
	Calliotropis hataii	Rehder & Ladd, 1973	M 766
	Calliotropis hataii	Rehder & Ladd, 1973	M 767
	Calliotropis hataii	Rehder & Ladd, 1973	M 768
	Calliotropis hataii	Rehder & Ladd, 1973	M 769
TURRIDAE	*Crassispira (Monilispira) pluto*	Pilsbry & Lowe, 1932	M 5408
	Pleurotomella allisoni	Rehder & Ladd, 1973	M 776
POLYPLACOPHORA			
ISCHNOCHITONIDAE	*Stenosemus chiversi*	Ferreira, 1981	M 1188
LEPTOCHITONIDAE	*Ferreiraella caribbensis*	Sirenko, 1980	M 8819
	Ferreiraella scrippsianus	(Ferreira, 1980)	M 1455
	Leptochiton americanus	Kaas & Van Belle, 1982	M 1392
	Leptochiton americanus	Kaas & Van Belle, 1982	M 1393

AMS MEETS IN ANN ARBOR

The 69th annual meeting of the American Malacological Society (AMS) was held 25-29 June 2003 on the campus of the University of Michigan in Ann Arbor. The meeting, convened by president Diarmaid Ó Foighil, had two symposia, one "Diversification in the Sea" and the other "Non-marine Molluscan Exotics." There were two workshops, one on PEET (the federal funding agency Partners for Enhancing Expertise in Taxonomy) and the second workshop was "J. B. Burch - His Students Speak." There were 116 abstracts submitted by 181 researchers representing 20 countries.

There were a number of papers that especially caught my interest, either because of the subject matter or the skill of the presenter, starting with the keynote speakers. Baldomero Olivera opened the meeting with a presentation on the biochemistry and genetics of conotoxin, the venom expressed by the cone snails. The genus *Conus* is the largest of any animal with more than 500 species described. Olivera's research showed that the conotoxin of each species is slightly different, depending on its usage: targeting its prey, defending against predators, or interacting with other cone snails. His studies seemed to confirm the number of species in the genus. Additional interesting talks on cone snails were given by Alan Kohn and Thomas Duda.

Geerat Vermeij was another interesting plenary speaker. He opened the symposium on non-marine alien mollusks with a talk that spoke of the evolution and dispersal of giant African land snails.

Several other talks stood out particularly. Janet Voight presented evidence for a new species of deep-sea octopus of the genus *Graneledone* based on her observations of its very large eggs and hatchlings, more than twice the size of any other octopod. These were seen on the Mendocino Escarpment off Monterey. Rüdiger Bieler gave an amusing and informative talk on how to be a monographer and still get tenure. And as usual, Amélie Scheltema gave one of her interesting talks on that strange class of mollusks, the Aplacophorans.

A number of students also gave interesting talks on such diverse subjects as whether snails follow mucus trails, the biodiversity of the beautiful chromodorid nudibranchs, or the evolutionary history of columellar folds. Ken Hayes won the best student paper for his work on the phylogeography of the Florida crown conch (*Melongena corona*). It's encouraging to see these young malacologists doing such good research.

In addition to the many fine talks presented, there were the usual opening reception, spirited auction, the poster session coupled with a "Show Shell and Tell" session, a business breakfast and several field trips.

Note that the next meeting of the AMS will be held in Sanibel, Florida, the 2005 meeting will probably be a joint meeting with the WSM in Asilomar, California and the 2006 meeting will be a joint meeting in Seattle, Washington.

Roland C. Anderson

JANTHINA EXIGUA AT TORREY PINES STATE BEACH, LA JOLLA, CALIFORNIA

WESLEY M. FARMER

3591 Ruffin Road #226, San Diego, California 92123-2561, USA
E-mail: wmfarmer@adnc.com

At the end of February [2003] with snow at Mt. Laguna, Cuyamaca and Julian, California, circumtropical critters were washing up on the beach. Halfway down to Flat Rock at Torrey Pines State Reserve, the Dwarf Janthina, *Janthina exigua* Lamarck, 1816, with their purple color were left on the beach by the incoming tide. Their sizes were approximately two millimeters to 11 mm and they were alive. Some still had their bubble floats present (Figure 1).

Along with the *Janthina exigua* and their bubble floats were the barnacles *Lepas* that also float at the surface with a bubble float. Another pelagic tropical species, the By-the-Wind-Sailor, *Velella velella*, was also seen. So there you have it -- animals representative of the warm tropics on our coast while our mountains were white with snow.

Figure 1. *Janthina exigua* Lamarck, 1816, at Torrey Pines State Beach on 28 February 2003. Photo: Wes Farmer.

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E-mail: cmhertz@pacbell.net

PROGRAM

The Land Snails of the Hawaiian Islands

Phil Liff-Grief, President of the Pacific Shell Club and a land snail afficionado, will present a slide show with display on the terrestrial shells he has found in the Hawaiian Islands. Bring your problem lands snails to show to Phil.

Also
A Giant Sale of Books, Reprints, Shirts and Sweatshirts
Meeting date: 20 November 2003

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting October 23, 2003

Vice President Larry Lovell called the meeting to order at 7:30 p.m. in the absence of Club President, Carole Hertz. Larry called for the approval of the minutes as published in *The Festivus*. Billee Gerodette made the motion and it passed unanimously. Larry read a lovely thank you note from the winner of the Science Fair. She had received her book award.

Larry presented the slate of officers for the next year: John LaGrange as President, Larry Lovell as Vice-president, Nancy Schneider as Recording Secretary, Marilyn Goldammer as Corresponding Secretary, and Silvana Vollero as Treasurer. Carole Hertz will serve as Past President and Linda Hutsell will continue as Librarian. The slate was accepted by the membership. Nominations from the floor and election of officers will take place at the November meeting.

The subject of the November meeting is Pacific land snails. The Christmas Party will be at the Butcher Shop in Kearny Mesa [see col. 2]. The SCUM meeting will be on January 22nd with the location to be determined. Contact Ron Velarde for details. Wes Farmer mentioned the issue of demoic acid [in the red tide] destroying ocean life. Larry said he will look into getting a speaker, perhaps from Fish and Game, to discuss this with us.

Next Larry introduced the speaker for the evening, Dr. Ángel Valdés. He discussed the beautiful nudibranchs which are part of the larger opisthobranch group. The word "nudibranch" means naked gill in Latin. Most specimens are small. He gave them some interesting attributes. He said they show off their beauty and some can produce light. Since 75% of their bodies are the digestive system, he described them as gluttonous. They feed on sponges, other invertebrates, and even each other. They can survive without eating for some time and some can keep chloroplasts alive in their bodies. They mimic the coloration of other animals and have a chemical defense system which is toxic to humans. They do not need a shell anymore. They are mostly found on a rocky bottom in the deep tropical waters and are predators feeding on other nudibranchs. They are hermaphroditic and can mate in a chain of 20 individuals. They are also potentially very valuable in biomedical research. One of the chemicals, for example, is now in clinical trials for treating lymphoma.

Ángel has obviously been taken in by the nudibranchs' beauty and he suggested there is more work to be done in describing new species.

Billee was the winner of the drawing and she gave her gift to a guest. Wes made the motion to adjourn the meeting for refreshments and conversation.

Silvana Vollero

Dues are Due

Dues for 2004 are payable now. Please send your check to the address on the front page and include the blue slip with your dues to help verify that the Club has your correct address, phone, FAX and e-mails. The return of the blue slips would be appreciated even if you have already paid your dues. This will help in verification of correct addresses, e-mails etc.

The Club's Annual Christmas Dinner Party

The Club's annual Christmas Dinner Party will be held on Saturday evening December 13th in The Boardroom of the Butcher Shop at 5255 Kearny Villa Road in San Diego. Festivities will begin with no host cocktails at 6:00 p.m. Dinner will be served promptly at 7:00 p.m. The cost for dinner including tax and gratuity is $25.00 per person.

The menu is: California Salad with Honey Mustard Dressing and dinner rolls and butter, a choice of either Prime Rib of Beef or Chicken Marsala with garlic mashed potatoes and fresh vegetables, coffee or tea and dessert. Wine and sparkling cider will be provided by the Club.

There will also be an after-dinner program as well as the traditional shell gift drawing. Bring your gift-wrapped shell with only very general data (i.e. eastern Pacific, Atlantic, Indo-Pacific) on the outside and place it under the tree for this traditional event.

It is requested that reservations (with check) be received no later than December 6th. Should you wish, you may make your check for the dinner combined with your dues renewal. Please list your choice of entree with your payment.

This is the Club's final social event of the year and one greatly enjoyed by the members. Save the date and come to the Club's Christmas party.

EXPLORING THE SOUTHERN SEA OF CORTEZ ON THE *AMBAR III*

MICHAEL SMALL

371 Harvard Street, Apt. 3D, Cambridge, MA 02138, USA
E-mail: wcfia.harvard.edu

In the early spring of 2002, John Jackson, Kirstie Kaiser and I began to plan a new "Sea of Cortez Odyssey" trip to the southern Gulf of California. John had organized two small group diving trips in 1992 and 1993 in this area and he was keen to put together another one. John suggested that we charter the *Ambar III*, which he had used for his earlier Odyssey trips. The *Ambar* is a diving and fishing yacht, owned by Mike McGettigan that has cruised the Sea of Cortez for the past 18 years. Mike has changed his focus in recent years, and now spends much of his time directing Sea Watch, a marine conservation "watch dog" group, that reports and publicizes threats to marine life in the Sea of Cortez and works with local Mexican interests to promote better enforcement of fishing and conservation regulations. Nevertheless, Mike does still take some charters to underwrite Sea Watch's work, and after various messages, we all managed to find a week at the start of October which fit our respective calendars.

At this time of the year, the water temperatures are at their highest, around 84°F, while the land temperatures are starting to cool to the low 90s during the day and the low 80s at night. This makes diving very comfortable and evenings a delightful time to watch the spectacular sunsets over the mountains of southern Baja. The colors cast over the water at sunset give the Gulf the nickname "The Vermillion Sea" - a concept John captured in the logo he designed for the trip, which he then had stitched on a variety of "cruising accessories".

Although we started the trip at the end of summer, by the time we returned to port, autumn had arrived. One morning while we were at sea, the prevailing wind swung around to the north, heralding the arrival of the first cold air mass from the north and the end of "chubasco" storms moving up from the south. These shifting breezes kept us to more protected anchorages on the western side of the chain of islands that run north of La Paz.

Most of our eight day trip concentrated on the islands about a day's sail north of the *Ambar*'s home port of La Paz. We dove around the high rocky islands of San Diego and Santa Cruz, and the much larger Isla San José, whose sweeping uplands were verdant with *cardón* cacti and other desert vegetation. Several nights, we tucked into small coves at the foot of the mountains that run along the mainland of the Baja Peninsula. This region is beyond the reach of *pangas* and day dive boats from either La Paz or Loreto, and there are no settlements along the coast. At midnight, when I finished packing up after a night dive, I would usually take a few minutes to admire the Milky Way, with no other lights on the horizon to obscure its pale light.

With three dedicated amateurs - John, Kirstie and I- and one professional biologist and underwater photographer, Clay Bryce, on board, we were able to accumulate a long list of records over the course of the trip. Armed with Myra Keen's indispensable 1971 book, and Carol Skoglund's magnificent new supplement 2002 to it, Kirstie and I would diligently record each day's records into the small Palm Pilot I had brought along for this purpose. The results of our efforts can be found in the *Preliminary Mollusk Species List* on page 132.

Most of our diving focused on three kinds of habitats. First were rocky shorelines, with large boulders extending down to a line of rubbly sand between 25 and 40 feet. Second were elevated rock ridges, often extending underwater from the tip of an island. These ridges provided more vertical relief, and had flat sand, usually covered with broken bivalve shells around their base. Third were fine silty bottoms in the coves where we anchored at night.

We were able to explore the rocky shorelines in the largest number of spots, and our most productive dives were on this habitat. The western side of tiny Isla Cayo, in the channel between the peninsula and the south end of Isla San José proved to be the most productive habitat and we found many small gastropod species here that occurred nowhere else on the trip. For example, I found an exceptionally large and perfect *Parametaria dupontii,* almost the size of a medium sized cone, under a small stone - and an equally large *Morum tuberculosum* (Figure 5). We spent a day at the site and could productively have spent longer. Also a rich area for gastropods was the equally small exposed rock Isla Habana, close to the mainland, roughly parallel to Isla San Diego. The eastern side of Isla Santa Cruz, marked by smooth basaltic boulders and fine gray silt, proved to be especially rich for bivalves. In one concentrated spot, I saw many *Nodipecten subnodosa*, *Spondylus princeps* and *Ostrea angelica* of different sizes.

The sandy bottoms, in comparison, were fairly poor in terms of mollusk life, probably due to the limited water flow in these spots. I tried diving at night in the sandy bottoms of bays in most of the spots we stopped and found very few shells on the open sand - at best, the occasional *Oliva spicata*, *Terebra robusta* or *T. ornata* and more commonly *Strombina maculosa*.

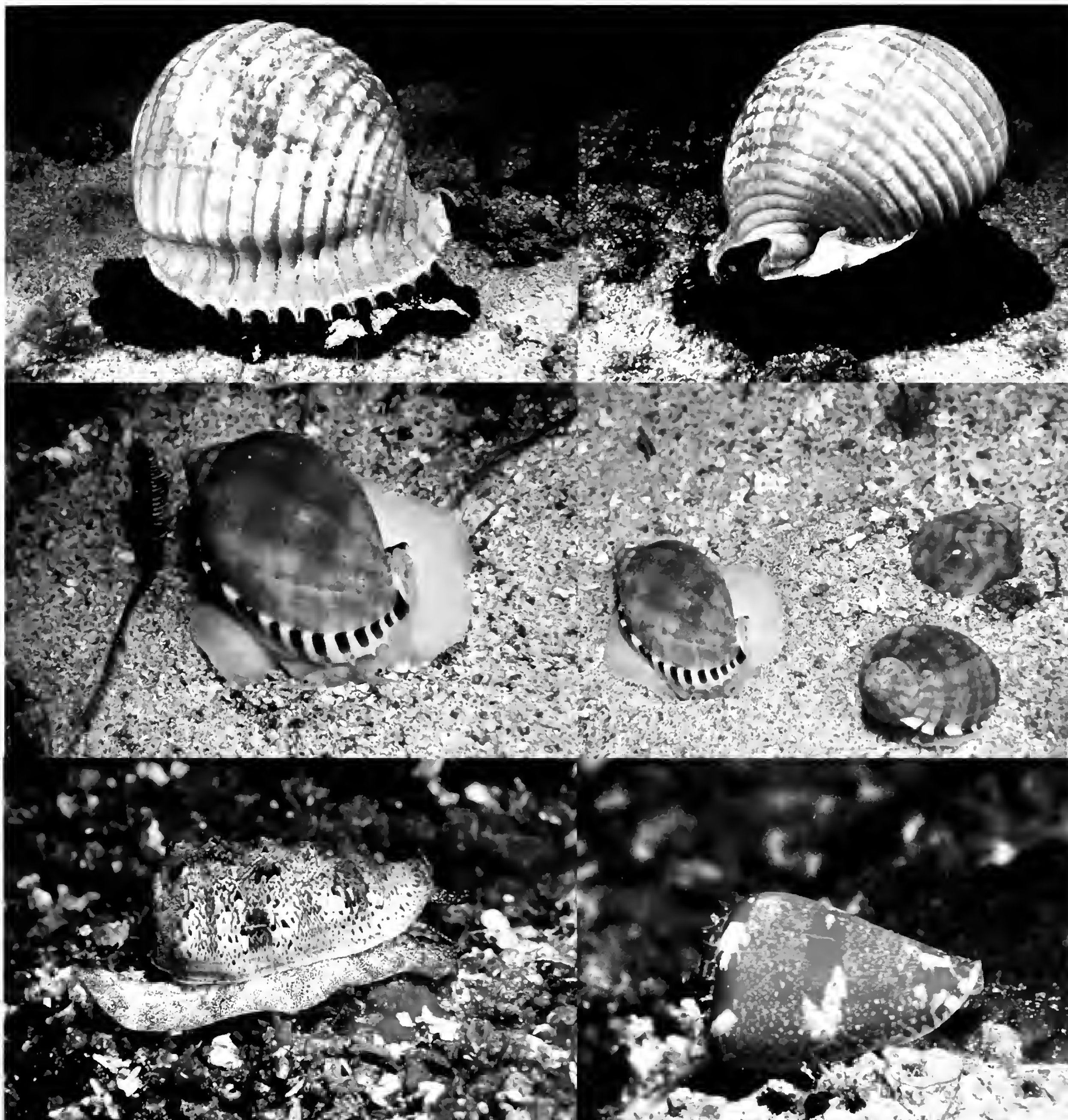
The ridges provided the most spectacular diving, and two of our best finds (described below). High water flow due to currents over the ridges produced a wealth of bivalves littered around sand at the base of the ridges - especially *Ostrea angelica* and *Pinctada mazatlanica.* Unfortunately, due to their exposed locations and shifting winds, it was not possible to anchor on these spots, so we could not also dive on them at night.

Different members on the trip had different objectives. Kirstie Kaiser was looking for micros; John Jackson was particularly interested in finding *Conus tessulatus* - which he had recorded before during earlier trips in the Gulf at Isla Cayo in 1992 and further north at Isla Santa Cruz in 1995. (See Jackson, 1994; Small, 1997). He brought a copy of Richard McClincy's 2002 article in *The Festivus* with him for reference which gives the most detailed account to date of diving for *C. tessulatus* around the La Paz region, between Isla Partida and Cabo Pulmo. As described by McClincy, I rapidly found that indeed *Conus tessulatus* liked gently sloping bottoms covered in rubbly coralline algae. The species seems to have boomed in the decade since John first found his specimens in the Gulf. I found large, live *Conus tessulatus* at virtually every dive spot we visited on this trip: from south to north, along the mainland opposite Cabo Pulmo, just north of Isla Cerralvo, the western side of Isla Partida, at Los Islotes, at Isla Cayo, around Isla Habana and around on the southern end of Isla San Diego. I found them either during the daytime, exposed on the rubbly bottom, and even more-so at night, emerging from the sand, especially within five meters of a line of boulders along a rocky shoreline. In fact, at night in the right habitat, they were by far the most abundant cone I encountered on the trip - some exceptionally colored (Figure 6). While they varied a bit in tone and the size of the tesselate squares on the body whorl, most of them were the lovely dark rust-orange color recorded before from the Gulf.

Finally, I had three gastropods in mind as my main objective - none of which I had found live in past trips in México. The first was *Malea ringens*. I had seen one other specimen before - but had never found one myself. I succeeded in finding my first one buried in gravel around the base of a ridge extending north from Isla San José, in about 20 m of water during the daytime. What gave it away was a small area of its ribbed dorsum exposed in the sand. It took a couple of minutes of careful digging around the gravel to excavate this deeply buried shell. We kept it alive for a day in the bait tank of the boat until Clay Bryce could spend a morning taking it back down to a sandy bottom and shooting an entire roll film of the live *Malea*, fully extending its black animal (Figures 1,2).

My second goal was even more elusive, *Casmaria vibexmexicana* - the very pretty thin cassid that, in fact, is illustrated on the spine of Keen's book. Although I had encountered broken pieces of this shell before, I had never seen anyone find a live one. A beautiful night dive at Isla Cayo proved to be especially rewarding. Working along the rock/sand interface, I saw no less than three live specimens (Figures 3,4), with their white animal extended, in narrow crevices where the rock face or a boulder left a gap between the rock and the sand between 24 and 35 feet. What a beautiful trio to observe!

Finally, I hoped to find that prize for Baja divers, *Cypraecassis tenuis*, which I had never found before in good condition. Our last night proved to be lucky, as we anchored in a deep inlet on the western side of Isla Partida. The terrain proved to be very familiar – a rocky shore line, with rubbly coralline algae covering the sloping sandy bottom. I cruised along the sand/rock interface – as I have learned in the past is a rich habitat for various gastropods. I scanned the open rubbly areas in front of the boulders from to 30-45 feet, with regular deviations out onto the rubble on the flat slope. About 50 minutes into the dive, during one of these forays onto the slope, I noticed a large, polished shape on top of the rubble at 54 feet, moving away from me – which proved to be my first *C. tenuis*.



Figures 1-6. **(1, 2)** *Malea ringens*, 2 views **(3, 4)** *Casmaria vibexmexicana* **(3)** specimen with foot extended **(4)** 3 specimens in process of burrowing into the substate **(5)** *Morum tuberculosum* **(6)** *Conus tessulatus*. All photos taken underwater by Clay Bryce.

I continued to follow a zig-zag pattern, swimming back to within sight of the boulder line over the rubble. A few minutes later, I encountered a second *C. tenuis* at a depth of 55 feet on the rubble - about 70 feet (beyond sight) of the boulder line. This specimen had clearly dug down into the sand under the rubble in one spot, spent the day beneath a medium stone on top of the rubble, and when I found it, it was digging its way out of the sand about a meter from where it had entered. What caught my attention was the crown of the shell, rather than the siphonal canal, which is the animal's head. This suggests that it may, in fact, have spotted my light and was reversing back into the sand when I saw it. In any event, it was an even greater thrill to find a second specimen. Both of these specimens appeared to be late risers; I found them after three hours of darkness, confirming a piece of wisdom from Alex Kerstitch that *Cassis* tend to come out later in the evening. With these finds, I completed my "hat trick", and it was a wonderful way to conclude the trip!

My thanks to Kirstie Kaiser for her incredibly hard work in compiling the species list attached to this article, to Clay Bryce for his excellent underwater photographs of a number of the live mollusks mentioned, and to John Jackson for organizing the expedition in the first place.

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2002. Panamic Province Molluscan Literature. Additions and Changes from 1971 through 2001. III Gastropoda. The Festivus 33 (Supplement): i-xi + 286 pp., 1 fig.

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130	*Arene lurida* (Dall, 1913)	
133	*Arene* cf. *stellata* McLean, 1970	
271	*Rissoina stricta* Menke, 1850	
----	*Turritella* sp.	
447	*Vermicularia frisbeyae* McLean, 1970	
449	*Vermicularia pellucida eburnea* (Reeve, 1842)	
491	*Modulus cerodes* (A. Adams, 1851)	
504	cf. *Serpulorbis oryzata* (Mörch, 1862)	
510	*Cerithium maculosum* Kiener, 1841	
515	*Cerithium stercusmuscarum* Valenciennes, 1833	
516	*Cerithium uncinatum* (Gmelin, 1791)	
506	*Rhinoclavis gemmata* (Hinds, 1844)	
608	*Strombus granulatus* Swainson, 1822	
609	*Strombus galeatus* Swainson, 1823	Depth record: 7-18 m
612	*Epitonium billeeanum* (DuShane & Bratcher, 1965)	
----	*Melanella* sp.	
835	*Thyca callista* Berry, 1959	Depth record: 1-15 m
766	*Hipponix antiquatus panamensis* C.B. Adams, 1852	
765	*Hipponix grayanus* Menke, 1853	Distribution record: to the north (live). Depth record: 12-20 m
----	*Hipponix* sp.	
797	*Vanikoro aperta* (Carpenter, 1864)	
806	*Cheilea cepacea* (Broderip, 1834)	
808	*Crepidula aculeata* (Gmelin, 1791)	Depth record: 12-18 m
810	*Crepidula excavata* (Broderip, 1834)	
817	*Crepidula striolata* Menke, 1851	Depth record: 1-7 m
822	*Crucibulum lignarium* (Broderip, 1834)	
825	*Crucibulum scutellatum* (Wood, 1828)	
826	*Crucibulum spinosum* (Sowerby, 1824)	
827	*Crucibulum umbrella* (Deshayes, 1830)	
873	*Polinices bifasciatus* (Griffith & Pidgeon, 1834)	
882	*Polinices uber* (Valenciennes, 1832)	
909	*Trivia* cf. *sanguinea* (Sowerby, 1832, *ex* Gray MS)	
910	*Trivia solandri* (Sowerby, 1832, *ex* Gray MS)	Depth record: 12-21 m
912	*Hespererato columbella* (Menke, 1847)	
919	*Erosaria albuginosa* (Gray, 1825)	
933	*Zonaria annettae* (Dall, 1909)	
936	*Neosimnia aequalis* (Sowerby, 1832)	
939	*Simnialena rufa* (Sowerby, 1832)	Depth record: 12-50 m (Isla de Malpelo, live)
940	*Jenneria pustulata* [Lightfoot, 1786], *ex* Solander MS	Depth record: 12-21 m (live)

942	*Malea ringens* (Swainson, 1822)	Depth record: intertidal to 26 m (live)
946	*Cypraecassis tenuis* (Wood, 1828)	Depth record: 7-12 m (live)
947	*Cypraecassis coarctata* (Sowerby, 1825)	Depth record: intertidal to 16 m (live)
948	*Semicassis centiquadrata* (Valenciennes, 1832)	Depth record: intertidal to 20 m (live)
949	*Casmaria erinacea vibexmexicana* (Stearns, 1894)	Depth record: intertidal to 14 m (live)
961	*Cymatium gibbosum* (Broderip, 1833)	
959	*Cymatium macrodon* (Valenciennes, 1832)	Depth record: 10-19 m. Distribution record: 102 km north of Isla Cerralvo
557	*Seila assimilata* (C.B. Adams, 1852)	
----	*Seila pulmoensis* DuShane & Draper, 1975	
577	*Triphora dalli* Bartsch, 1907	
1002	*Hexaplex princeps* (Broderip, 1833)	
980	*Chicoreus erythrostomus* (Swainson, 1831)	
1013	*Aspella pyramidalis* (Broderip, 1833)	
----	*Muricopsis tulensis* Radwin & D'Attilio, 1976	
1027	*Favartia erosa* (Broderip, 1833)	
990	*Favartia lappa* (Broderip, 1833)	
1058	*Pterotyphis lowei lowei* (Pilsbry, 1931)	
1022	*Pascula rufonotata* (Carpenter, 1864)	
1030	*Phyllocoma scalariformis* (Broderip, 1833)	
1040	*Vitularia salebrosa* (King & Broderip, 1832)	
1074	*Mancinella speciosa* (Valenciennes; 1832)	
1075	*Mancinella triangularis* (Blainville, 1832)	
1096	*Mancinella tuberculata* (Sowerby, 1835)	
1092	*Morula ferruginosa* (Reeve, 1846)	
1093	*Morula lugubris* (C.B. Adams, 1852)	
1095	*Neorapana muricata* (Broderip, 1832)	
1076	*Stramonita biserialis* (Blainville, 1832)	
1071	*Quoyula madreporarum* (Sowerby, 1834)	
1100	*Caducifer cinis* (Reeve, 1846)	
1115	*Cantharus sanguinolentus* (Duclos, 1833)	
1124	*Engina solida* (Dall, 1917)	
1138	*Antillophos veraguensis* (Hinds, 1843)	
1153	*Columbella aureomexicana* (Howard, 1963)	
1156	*Columbella haemastoma* Sowerby, 1832	
1175	*Costoanachis coronata* (Sowerby, 1832)	
1234	*Mitrella densilineata* (Carpenter, 1864)	
----	*Mitrella* cf. *millepunctata* (Carpenter, 1864)	
1261	*Parametaria dupontii* (Kiener, 1849-50)	Depth record: 1-7 m (live)
1265	*Strombina angularis* (Sowerby, 1832)	

1277	*Strombina maculosa* (Sowerby, 1832)	
1290	*Melongena patula* (Broderip & Sowerby, 1829)	
1324	*Pleuroploca princeps* (Sowerby, 1825)	
1330	*Latirus mediamericanus* Hertlein & Strong, 1951	Distribution record: to the north to Isla San Diego, 12°12'N
1331	*Latirus praestantior* Melvill, 1892	
1340	*Fusinus dupetitthouarsi* (Kiener, 1840)	
950	*Morum tuberculosum* (Reeve, 1842, *ex* Sowerby MS)	
1364	*Oliva porphyria* (Linnaeus, 1758)	
1365	*Oliva spicata* (Röding, 1798)	
1377	*Olivella dama* (Wood, 1828, *ex* Mawe MS)	Depth record: 3 m (live)
1379	*Olivella* cf. *gracilis* (Broderip & Sowerby, 1829)	
1385	*Olivella* cf. *walkeri* Berry, 1958	
1397	*Vasum caestus* (Broderip, 1833)	
1408	*Volvarina taeniolata taeniolata* Mörch, 1860	
1423	*Mitra crenata* Broderip, 1836	
1428	*Mitra sphoni* Shasky & Campbell, 1964	
1421	*Mitra swainsonii swainsonii* Broderip, 1836	
1429	*Mitra tristis* Broderip, 1836	
1445	*Thala gratiosa* (Reeve, 1845)	Depth record: 20 m (live)
1489	*Conus brunneus* Wood, 1828	
1502	*Conus dalli* Stearns, 1873	
1491	*Conus diadema* Sowerby, 1834	
----	*Conus dispar* Sowerby, 1833	
1493	*Conus gladiator* Broderip, 1833	
1514	*Conus nux* Broderip, 1833	
1494	*Conus princeps* Linnaeus, 1758	
1500	*Conus purpurascens* Sowerby, 1833, *ex* Broderip MS	
1512	*Conus tessulatus* Born, 1778	
1495	*Conus tiaratus* Sowerby, 1833, *ex* Broderip MS	
1554	*Terebra ornata* Gray, 1834	
1571	*Terebra variegata* Gray, 1834	
1581	*Calliclava jaliscoensis* McLean & Poorman, 1971	Distribution record: to the north
1662	*Knefastia walkeri* Berry, 1958	
1685	*Crassispira discors* (Sowerby, 1834)	
1756	*Pilsbryspira nymphia* (Pilsbry & Lowe, 1932)	
1770	*Mitromorpha carpenteri* Glibert, 1954	
1776	*Clathurella rigida* (Hinds, 1843)	
1816	*Agathotoma alcippe* (Dall, 1918)	
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67	*Arca pacifica* (Sowerby, 1833)	
71	*Acar gradata* (Broderip & Sowerby, 1829)	
69	*Barbatia lurida* (Sowerby, 1833)	
74	*Barbatia reeveana* (d'Orbigny, 1846)	
75	*Fugleria illota* (Sowerby, 1833)	
92	*Anadara formosa* (Sowerby, 1833)	
90	*Anadara multicostata* (Sowerby, 1833)	
110	*Glycymeris gigantea* (Reeve, 1843)	
116	*Tucetona multicostata* (Sowerby, 1833)	
122	cf. *Brachidontes semilaevis* (Menke, 1849)	
143	*Lithophaga aristata* (Dillwyn, 1817)	
138	*Lithophaga plumula* (Hanley, 1843)	
149	*Modiolus capax* (Conrad, 1837)	
129	*Septifer zeteki* Hertlein & Strong, 1946	
161	*Pteria sterna* (Gould, 1851)	
162	*Pinctada mazatlanica* (Hanley, 1856)	
163	*Isognomon janus* Carpenter, 1857	
164	*Isognomon recognitus* (Mabille, 1895)	
165	*Malleus regulus* Forskål, 1775	
156	*Pinna rugosa* Sowerby, 1835	
160	*Atrina tuberculosa* (Sowerby, 1835)	
214	*Lima tetrica* Gould, 1851	
217	*Limaria hemphilli* (Hertlein & Strong, 1946)	
167	*Ostrea angelica* Rochebrune, 1895	
171	*Hyotissa hyotis* (Linnaeus, 1758)	
181	*Euvola vogdesi* (Arnold, 1906)	
180	*Oppenheimopecten perulus* (Olsson, 1961)	
182	*Argopecten ventricosus* (G.B. Sowerby II, 1842)	
183	*Spathochlamys vestalis* (Reeve, 1853)	
202	*Nodipecten subnodosus* (Sowerby, 1835)	
210	*Spondylus calcifer* Carpenter, 1857	
211	*Spondylus princeps* Broderip, 1833, *non* Schreibers, 1793	
223	*Anomia peruviana* d'Orbigny, 1846	
279	*Codakia distinguenda* (Tryon, 1872)	
284	*Ctena mexicana* (Dall, 1901)	
288	*Pegophysema edentuloides* (Verrill, 1870)	
----	*Diplodonta* sp.	
----	*Phylctiderma* sp.	
229	*Eucrassatella antillarum* (Reeve, 1842)	
230	*Eucrassatella gibbosa* (Sowerby, 1832)	

239	*Cardites crassicostata* (Sowerby, 1825)	
244	*Strophocardia megastropha* (Gray, 1825)	
237	*Carditamera affinis* (Sowerby, 1833)	
----	*Basterotia panamica* Coan, 1999	
346	*Chama buddiana* C.B. Adams, 1852	Depth record: 1-7 m (live)
348	*Chama frondosa* Broderip, 1835	
350	*Chama sordida* Broderip, 1835	
351	*Chama squamuligera* Pilsbry & Lowe, 1932	Depth record: 18 m
352	*Chama venosa* Reeve, 1847	
353	*Arcinella californica* (Dall, 1903)	
358	*Pseudochama* cf. *panamensis* (Reeve, 1847)	
360	*Trachycardium consors* (Sowerby, 1833)	
362	*Trachycardium senticosum* (Sowerby, 1833)	
361	*Acrosterigma pristipleura* (Dall, 1901)	
366	*Papyridea aspersa* (Sowerby, 1833)	
370	*Americardia biangulata* (Broderip & Sowerby, 1829)	
371	*Americardia planicostata* (G.B. Sowerby I, 1833)	
369	*Trigoniocardia granifera* (Broderip & Sowerby, 1829)	
378	*Laevicardium elatum* (G.B. Sowerby I *in* Broderip & G.B. Sowerby I, 1833)	
379	*Laevicardium substriatum* (Conrad, 1837)	
440	*Chione californiensis* (Broderip, 1835)	
450	*Chione gnidia* (Broderip & Sowerby, 1829)	
455	*Chione pulicaria* (Broderip, 1835)	
444	*Chione tumens* (Verrill, 1870)	
445	*Chione undatella* (Sowerby, 1835)	
381	*Globivenus isocardia* (Verrill, 1870)	
382	*Globivenus magdalenae* (Dall, 1902)	
380	*Periglypta multicostata* (Sowerby, 1835)	
406	*Pitar pollicaris* (Carpenter, 1864)	
424	*Megapitaria aurantiaca* (Sowerby, 1831)	
425	*Megapitaria squalida* (Sowerby, 1835)	
551	*Tellina cumingii* Hanley, 1844	
523	*Tellina pacifica* Dall, 1900	
----	*Tellina* sp.	
557	*Leporimetis cognata* (Pilsbry & Vanatta, 1902)	
603	*Gari helenae* Olsson, 1961	
605	*Gari lata* (Deshayes, 1855)	Depth record: 1-7 m
606	*Gari maxima* (Deshayes, 1855)	
616	*Tagelus californianus* (Conrad, 1837)	

624	*Tagelus politus* (Carpenter, 1857)	
626	*Semele californica* (Reeve, 1853, *ex* A. Adams, MS)	
631	*Semele formosa* (Sowerby, 1833)	
----	*Semele jamesi* Coan, 1988	
636	*Semele lenticularis* (Sowerby, 1833)	
677	*Corbula nasuta* G.B. Sowerby I, 1833	
694	*Gastrochaena ovata* Sowerby, 1834	
761	*Thracia squamosa* Carpenter, 1856	
766	*Cyathodonta undulata* Conrad, 1849	

BOOK NEWS

Bivalve Molluscs: Biology, Ecology and Culture
By: Elizabeth Gosling. 2003.
Iowa State Press (a Blackwell Publishing Company)
456 pages, 6¾ x 9¾ inches, extensively illustrated in b/w photos and drawings
Price: $129.99 hardbound
Order information at: http://store.yahoo.com/isupress/0852382340.html

The initial goal of *Bivalve Molluscs: Biology, Ecology and Culture* was to provide "a single book covering all aspects of the biology, ecology and culture of bivalve molluscs" with a focus on species of "commercial importance," and being written "primarily for undergraduate students." As so often happens in the writing of a book of this nature, the author was boggled by the immense literature on bivalves, and the work began to take on a life of its own. It has certainly ranged beyond its initial goal of an undergraduate textbook, and in the end has become a holistic modern treatise on commercially important bivalves and their management and harvest.

Bivalve Molluscs comprises twelve chapters; 1) An Introduction to Bivalves, 2) Morphology of Bivalves 3) Ecology of Bivalves 4) How Bivalves Feed 5) Reproduction, Settlements and Recruitment 6) Bivalve Growth 7) Circulation, Respiration, Excretion and Osmoregulation 8) Fisheries Management of Natural Populations 9) Bivalve Culture 10) Genetics in Aquaculture 11) Diseases and Parasites and 12) Public Health. The first seven chapters (approximately ½ of the book) give an overview of the basic biology of important bivalve groups, namely mussels, scallops, oysters and "clams" (primarily members of the Cardiidae, Veneridae, Mactridae and Myidae). The final chapters are more specific to bivalve fisheries management and human health factors.

Chapter 1 seems to have been thrown in as an afterthought. It is an exceptionally brief outline of bivalve evolution, incorporating little of the recent literature of the last decade. By contrast, Chapter 2 carefully compares the shells and anatomical features of the commercially important bivalves listed above. After reading this chapter, an interested reader should have the basics on "how a bivalve is put together."

The discussion on bivalve ecology in Chapter 3, breaks new ground. Maps of selected species are presented, showing interesting trends in global bivalve distribution and, equally important, our lack of understanding of their distribution in many regions of the globe. Key details about habitat, substrate and salinity tolerances are provided for each group of bivalves. This will greatly help readers to understand that bivalves have specific requirements for survival. Similarly well covered in this chapter are the vast numbers of predators that love to dine on sumptuous clams.

If one wants to raise bivalves, one should certainly know how they eat. In that bivalves have no head, or real appendages, this can be quite a mystery to the uninitiated. Chapter 4, *How Bivalves Feed*, tackles this topic with gusto. A reader learns about the importance of filtration rate, simply stated, how much water a clam can process for food (and oxygen). Much detail is given to clam gills (ctenidia), which are the primary food strainers. At the end of the chapter, one learns about the amazing array of food found in clam stomachs (bacteria, plankton, detritus, dissolved organic material, etc.).

With the preface, "The reproductive system in bivalves is extremely simple," the author then takes thirty pages in Chapter 5 to explain this simplicity. This is actually a good thing, as Gosling carefully examines reproductive cycles, and gives an illustrated guide to determine the "ripeness" of bivalves. Beyond this she discusses larval development, growth, feeding, dispersal and recruitment.

In the commercial clam industry (as with all mariculture/agriculture) growth is good. Chapter 6 presents methods to measure bivalve growth (no, it's not just counting the "annual" rings), and the large variety of factors that affect growth. This is an effective introduction to Chapter 7, which provides technical details about bivalve circulation, respiration and excretion (a challenging read even after several cups of coffee).

With Chapter 8 the applied portion of the book begins, namely fisheries management, in this case of natural populations. An overview of past and current natural "stocks" is given, along with considerable detail on the many methods of bivalve stock assessment and harvest. In discussing the current state of bivalve management and regulation, Gosling states "in the majority of cases management measures are only applied when there is already evidence for overexploitation (overfishing)."

Few know that over 8.8 million tons of cultured bivalves are harvested each year, with an approximate value of $7.5 billion. Thus, over 80% of the global bivalve harvest is cultured (e.g. only 20% of harvested bivalves come from natural stocks). Chapter 9 presents the long history of culturing bivalves (since 500 B.C.), along with an overview of modern culture techniques. The genetic manipulation of these cultured bivalves is covered in Chapter 10, a procedure that has been done for thousands of years (e.g. hybrid oysters, mussels, etc.). This chapter even includes a short primer on DNA analysis, for the genetic identification of populations, species, and hybrids.

Owing to their economic importance, more is known about the diseases of bivalve mollusks than any other group of invertebrates. Thus, Chapter 11 outlines the amazing number of viruses, bacteria, fungi, trematodes, and other parasites that make life exceedingly difficult for bivalves. Possibly even more important is the potential effect of bivalves on public health. Even grade school children are now aware of the dangers of red and brown tides. As bivalves strain water at an amazingly efficient rate, they are also capable of capturing and storing large amounts of toxins. Chapter 12 covers the common public heath hazards, both natural and anthropogenic, associated with the consumption of bivalves.

Bivalve Molluscs far exceeds its modest goals of an undergraduate textbook. It provides concise and current information on bivalve ecology, fisheries, management, and their potential effect on public health. While the introductory chapter is sadly lacking (both in depth and current references), the remaining chapters far outweigh this small oversight. This book will indeed be exceedingly useful as a textbook, but should also be strongly considered by all with an interest in the Recent marine Bivalvia. It is a must-have for any serious bivalvologist.

Paul Valentich Scott, Curator of Malacology
Santa Barbara Museum of Natural History
2559 Puesta del Sol Road
Santa Barbara, CA 93105, USA
pvscott@sbnature2.org

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THE FESTIVUS

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Website at: http://www.sandiegoshellclub@terryarnold.net
E-mail: cmhertz@pacbell.net

PROGRAM

The Beginnings of a New book on the Bivalve Mollusks of Tropical West America

Paul Valentich Scott, Curator of Malacology at the Santa Barbara Museum of Natural History, will entertain us with the trials and travails of preparing this new book. A specialist on northeastern Pacific species, he will be happy to look at members' problem bivalves – particularly those from the eastern Pacific.

Meeting date: January 15, 2004

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting
20 November 2003

The meeting was opened by President Carole Hertz at 7:40 p.m. Guests were introduced. The minutes for the October meeting as published in *The Festivus* were corrected by Larry Lovell and approved as amended. The correction was that the SCUM meeting would be held on January 24th instead of January 22nd as published. Larry described the SCUM organization and meetings and stated that the January meeting would most likely be at the Cabrillo Marine Aquarium in San Pedro. There was no Treasurer's report because of the absence of Silvana Vollero. Larry announced the speakers for January and February, Paul Valentich Scott and Bonnie Becker respectively.

Carole discussed the Christmas Party which will be at the Butcher Shop on December 13. She read the menu and gave the price as $25 per person. All members were urged to attend and bring guests.

Carole asked for nominations from the floor for officers for 2004. There were none. The slate as recommended by the board was John LaGrange, President; Larry Lovell, Vice-President; Silvana Vollero, Treasurer; Marilyn Goldammer, Corresponding Secretary and Nancy Schneider, Recording Secretary. The slate was approved unanimously.

Larry introduced the speaker of the evening, Phil Liff-Grieff, who spoke on Hawaiian land snails. He started with a history of how he became interested in land snails after having collected fossils and marine shells. He had a marvelous power-point presentation augmented with a very fine display. Phil started with the evolution of the Hawaiian Islands and explained that a large percentage of the plants, insects and animals on the islands are endemic species. There are nine native families of land snails and 1461 species/subspecies. Phil discussed the endangered species and the causes for extinction of species in the past. The main causes are predation by rats, ants and introduced carnivorous snails, as well as loss of habitat caused by pigs and goats. Over-collecting and deforestation by humans also contributed greatly to the extinction of species. Phil discussed the distribution of species on the islands and their dispersal patterns. He said that there is still hope that some of the species may be found in various isolated pockets on the different islands. He showed the habitat of some current species and how difficult it is to find and observe them.

John Bishop brought in a beautiful display of Hawaiian land snails that his grandfather had collected in Hawaii in the late 1800s and gave a very interesting discussion on trying to get them identified at the Bishop Museum. Wes Farmer had a display and photographs of some fossils and minerals from Baja California.

The shell drawing was won by Marilyn Goldammer. Cookies were provided by the Hertzes. The meeting was adjourned at 8:40 p.m. There was a very brisk sale of books, papers and t-shirts both before and after the meeting.

Jules Hertz

Dues are due

To be included on the 2004 Club roster which will come out with the February issue of *The Festivus*, dues are due and payable now. See front page for membership rates. For those whose dues have not been paid, this will be their last issue.

The Club Christmas Party

Thirty-three people had a marvelous time! It was a lovely party in the warm, wood-paneled room complete with Christmas tree. The tables were decorated with poinsettias in large shells, the shells donated by Jeanne and Don Pisor. After visiting during cocktail time, MC Jules Hertz invited members to take their seats so that the dinner and evening's festivities could begin. Wine at each table was generously provided by John Jackson.

Before and after the dinner, the MC had some wildly funny stories to tell as well as the business of the evening which was to thank the year's board members and install those for 2004. After dinner, slides were shown by Wes Farmer, Richard Herrmann, Dave Mulliner and Carole Hertz. This enjoyable entertainment was followed by the always-popular gift exchange and the drawing for the table centerpieces.

Many attendees were enthusiastic to have next year's party at the same location because the food was very good and the room cozy and intimate – so mark your calendars early – the 2004 Christmas Dinner Party will be at the same location on Saturday December 4th 2004!!

OCTOPUS VELIGERO: PERMANENT RESIDENT OR FAIR-WEATHER FRIEND?[1]

MEGAN LILLY

City of San Diego Marine Biology Laboratory
4918 N. Harbor Drive, Suite 101, San Diego, California 92106
E-mail: MLilly@sandiego.gov

INTRODUCTION

During July/August 1994 the City of San Diego's Ocean Monitoring Laboratory participated in the Southern California Bight Pilot Project (SCBPP). This regional monitoring program was sponsored by the Environmental Protection Agency (EPA) and managed by the Southern California Coastal Water Research Project (SCCWRP). The SCBPP was a cooperative effort of several environmental monitoring and consulting agencies from Santa Barbara to San Diego. Parameters such as water quality and fish and invertebrate populations were assessed to determine the health of the Southern California Bight (SCB) as a whole.

The two common, offshore octopus species collected were *Octopus rubescens* Berry, 1953, and *O. californicus* (Berry, 1911). A third species, *O. veligero* Berry, 1953, similar in appearance to *O. rubescens*, was also found (Figures 2A,B). The discovery of *O. veligero* in the SCB represented a northern range extension from southern Baja California (Figure 1).

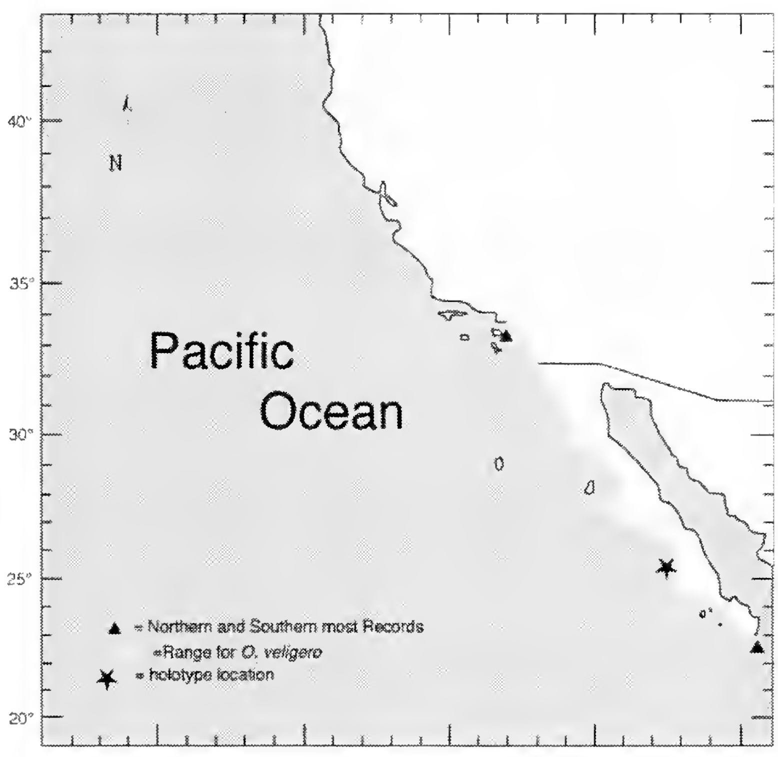


Figure 1. Map showing northern and southernmost records of *Octopus veligero*.

Octopus veligero and *O. rubescens* are difficult to distinguish when alive because of their similar sizes, color and papillae patterns. However, with gentle handling, *O. veligero* displays a dark spot on the web below each eye (i.e. in the same region as ocelli in "two-spot" species) and another dark spot antero-laterally on each side of the mantle (Figure 2A). The two species are easily separated on the basis of the number of gill lamellae per demibranch:

[1]Adapted from a poster presented in July 2000 at the WSM/AMS meeting at San Francisco State University.

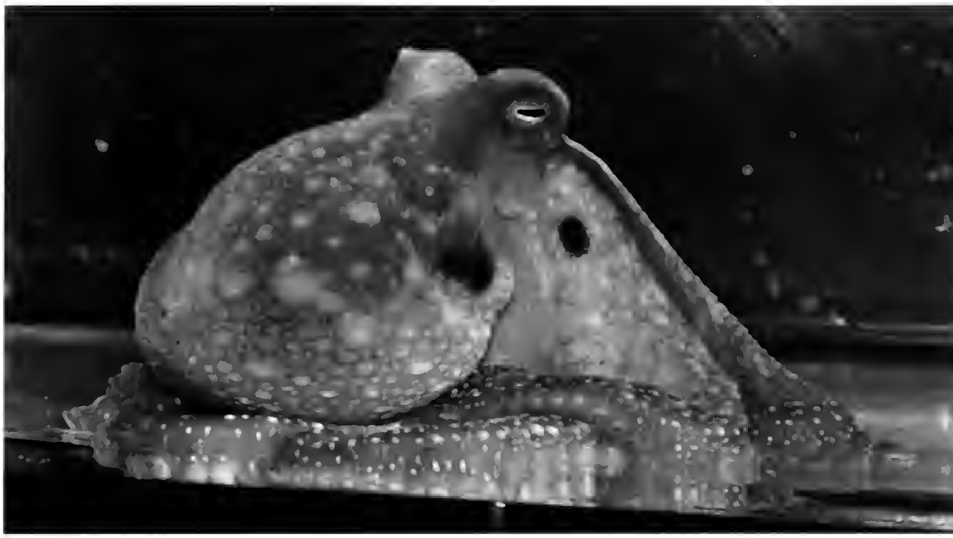
O. veligero has 15-17 lamellae per outer demibranch whereas *O. rubescens* has only 10-13.

Subsequent to the SCBPP program in 1994, *Octopus veligero* has been collected in the monitoring programs of the County Sanitation Districts of Los Angeles County (CSDLAC), the City of San Diego (CSD), and the City of Los Angeles Environmental Monitoring Division (CLAEMD). *Octopus veligero* was collected in a second regional monitoring program, Bight '98 (B'98) which was conducted in July and August 1998. The collection of *O. veligero* in these recent surveys (Table 1) prompted three questions: 1) Do historical records of *O. rubescens* include misidentifications of *O. veligero*? 2) Is the occurrence of *O. veligero* in the SCB related to fluctuating oceanographic conditions? 3) Is there a correlation in abundance between the two species?

Table 1. Collection information for *Octopus veligero* from July 1994 through August 1998.

Date	Station	Depth	No. & Sex		SBMNH Cat. No. (veligero)	Comments	Latitude/Longitude
		(m)	*veligero*	*rubescens*			
1994							
July 27	PLAFT 11750	210	1M	NR	348096	Immature; N flank of canyon, SCBPP, CSDLAC	33°49.3'N, 118°32.9'W
August 11	PHYFT 10280	128	1F	NR	348097 (dried)	Juvenile; SCBPP, CLAEMD	33°57.9'N, 118°35.4'W
1995							
July 20	(CSD) SD-11	92	1M	NR	143090	Juvenile	32°40.3'N, 117°19.2'W
August 28	(LA) T-5 200	61	2 M	0	348098	Immature; CSDLAC	33°41.4'N, 118°19.3'W
August 28	(LA) T-5 450	137	2 F	0	348095	Immature; CSDLAC	33°41.1'N, 118°19.6'W
August 28	(LA) T-4 200	61	1 M	0	348093	Immature; CSDLAC	33°42.3'N, 118°20.9'W
August 26	(LA) T-4 450	137	1 F	0	348091	CSDLAC	33°42.1'N, 118°21.0'W
August 28	(LA) T-1 200	61	1 F	0	348090	Immature; CSDLAC	33°44.1'N, 118°25.2'W
October	(CSD) SD-8	100	1	2			32°37.5'N, 117°19.4'W
November 7	(LA) T-0 200	61	1M	0	348094	Immature; CSDLAC	33°48.6'N, 118°25.8'W
1996							
February 12	(LA) T-1 200	61	1M	8	348092	Mature; CSDLAC	33°44.1'N, 118°25.2'W
August	Hyperion D1	77	1	NR		Gravelly, mixed bottom; pinnacles; CLAEMD`	33°54.8'N, 118°32'W
November	(LA) T-4 450	137	1 M	NR		CSDLAC	33°42.1'N, 118°21.0'W
1997							
January 17	(CSD) SD-7	100	1 F	3	348099	Submature; 45 mm ML, Photo voucher	32°35.1'N, 117°18.4'W
July	(CSD) SD-14	100	1F	0		ML=120-130 mm; 0.8 kg	32°44.3'N, 117°20.9'W
1998							
January	(CSD) SD-14	100	1 F	2		Juvenile; 2.7 cm	32°44.3'N, 117°20.9'W
August	(LA) T-0 450	137	1	NR		*O. californicus* present; <1.0 kg, CSDLAC	33°48.8'N, 118°26.4'W
August	2119	198	1 F	NR		ML=25 mm; Bight'98; collector = MEC	33°34.7'N, 117°55.0'W

M = male; F = female; ML = dorsal mantle length; NR = not recorded; MEC = Marine Ecological Consultants



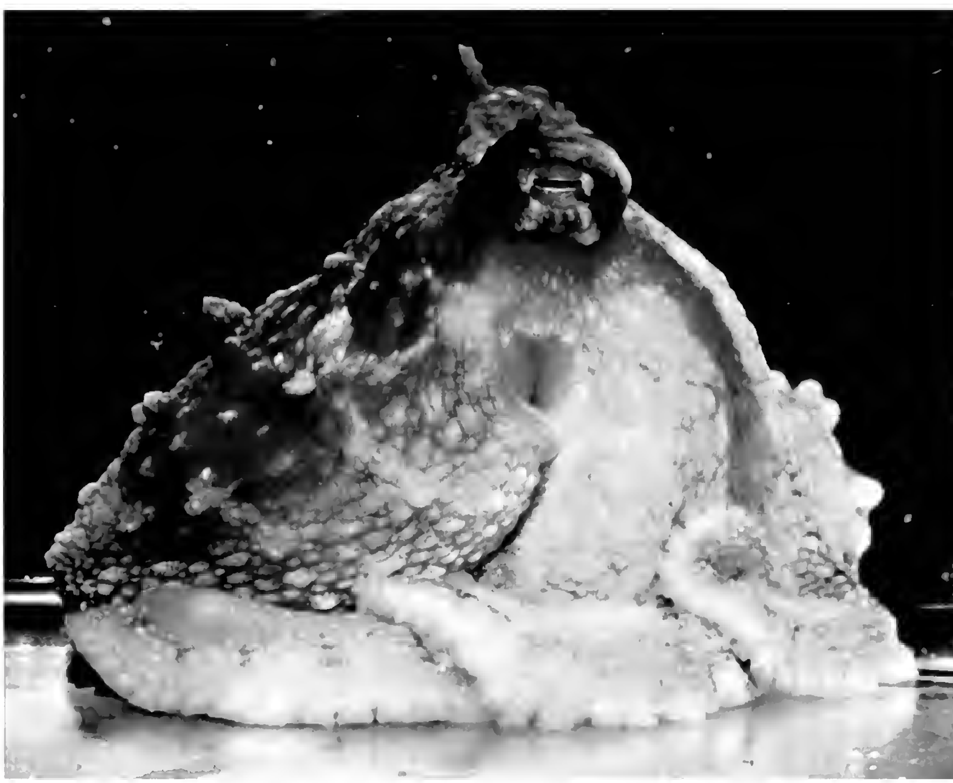


Figure 2 A,B. *Octopus veligero*: sub-mature female (45 mm ML) captured in 100 m off San Diego, California in January 1997. In Figure 2A, note the displayed dark spots. Photos: D. Norris.

MATERIALS AND METHODS

Collections at Scripps Institution of Oceanography (SIO) and the Santa Barbara Museum of Natural History (SBMNH) were surveyed for specimens of *Octopus veligero* misidentified as *O. rubescens*. Additionally, previously unidentified specimens of octopus from the SCB were identified. Specimens were examined and gill lamellae counted to verify a correct species identification.

To address the relationship between the occurrence of *Octopus veligero* and temperature fluctuations, the recorded collections of *O. veligero* from 1994 to August 1998 were gathered from the CSD, CSDLAC, and CLAEMD monitoring laboratories. Date and depth of collection, weight and sex (when possible) of each animal were tabulated (Table 1).

All three monitoring agencies conduct trawl surveys on a quarterly basis throughout the year. CSD conducts trawls in January, April, July and October, whereas CSDLAC and CLAEMD trawl in February, May, August and November. Due to the low number of animals, quarterly samples were combined as January/February, March/April, July/August and October/November.

Temperature data was obtained from each agency's water quality data. Mean bottom temperatures from stations along the same depth contour as the occurrence of *Octopus veligero* were plotted against abundance data. In this particular analysis, the two animals recorded during the SCBPP program and the one animal from the B'98 program were not considered due to a difference in sampling effort. Additionally, water quality and trawling efforts were not coordinated for the B'98 project, so comparative bottom temperatures were unavailable.

The potential for competitive exclusion of one species by the other was investigated by comparing the abundances of both species from July/August 1995 through January/February 2000. Again, the SCBPP and B'98 animals were not included in this analysis.

RESULTS

Initial examination of museum specimens did not reveal any errors in identification of *Octopus veligero* and *O. rubescens*. Additionally, dissections of previously unidentified specimens did not reveal any *O. veligero* from the SCB. However, during a recent re-examination of animals in the SBMNH collections, a previously unidentified specimen of *O. veligero* was discovered. It had been collected in August of 1983 off San Diego. All other historical specimens of *O. veligero* present in both collections were collected from Baja California or more southern locations.

The presence of *Octopus veligero* in the SCB did not appear to vary with temperature though the species was never observed during the second (April/May) quarter for any of the agencies (Figure 3). *Octopus rubescens* was significantly more abundant than *O.*

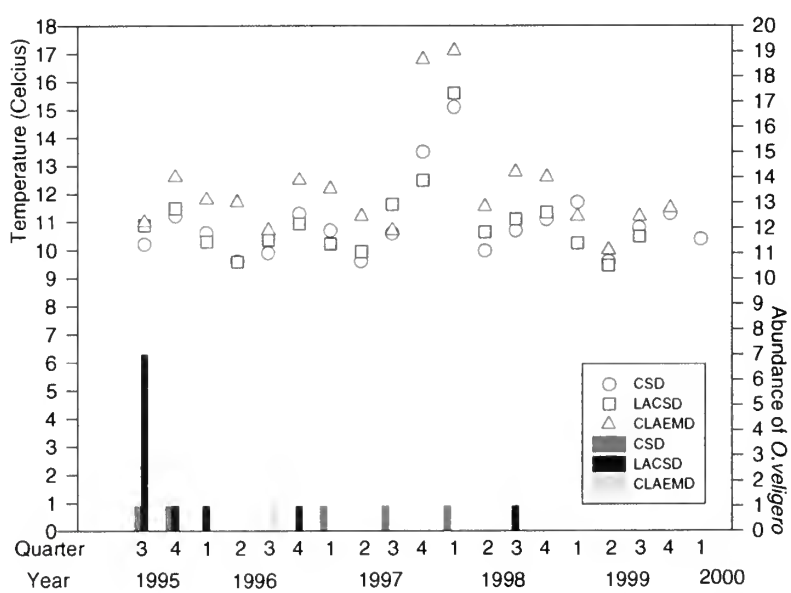


Figure 3. *Octopus veligero*: Temperature and abundance from July/August 1995 through August 1998.

veligero (Figure 4). However, there was no clear relationship between the abundances of the two species.

DISCUSSION

Trawl surveys conducted since 1994 have captured a total of 20 *Octopus veligero* in the SCB. Such low numbers make statistical analysis difficult, but general comparisons were made and patterns investigated.

It was speculated that the presence or absence of *O. veligero* in the SCB might be affected by temperature fluctuations. However, correlations were not obvious during the small time scale in which the species was encountered (1994-1998). *Octopus veligero* was collected in waters ranging in temperature from 10.2°C (July '95; CSD) to 15.1°C (Jan. '98; CSD). The species was last found in the July/August quarter of 1998 (2 animals), and to date evidence of further recruitment has not been observed.

The answer, however, is probably more complicated than a simple bottom temperature effect. Studies on invertebrate larval recruitment have shown that wind direction, in combination with current strength and duration, often plays a significant role in settlement patterns, and that temperature, when viewed alone, does not necessarily show a correlation (Lundquist et al, 2000). It goes without saying that ENSO events affect oceanic current direction and strength. The longest duration El Niño in the last 50 years occurred between 1991 and 1994, followed a few years later by a short-lived but intense El Niño in 1997/1998. As a southern species with planktonic paralarvae, *O. veligero* likely recruited to more northern waters during these southern oscillation events, possibly establishing temporary populations in the SCB. The recent discovery of the specimen from 1983, off San Diego, is consistent with the theory of recruitment during El Niño cycles as that year experienced a very strong ENSO event (Wolter & Timlin, 1993, 1998). A temperature effect was apparent on the *Octopus rubescens* population; their numbers dropped off in the latter half of 1997 through 1998 during the 97/98 El Niño. This decline was followed by a period of extremely high recruitment in the July/August quarter of 1999, after a year of cooler waters (Figure 4).

During the July/August quarter of 1995, a total of

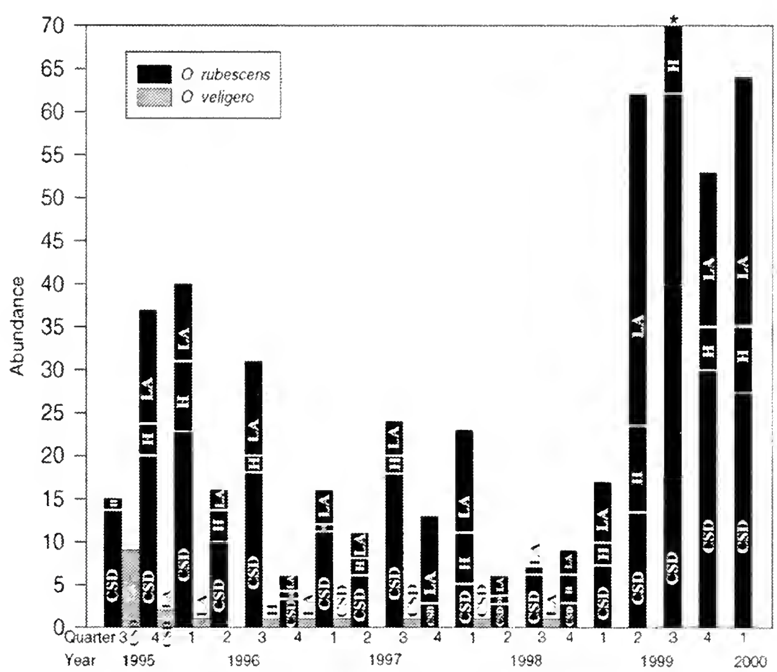


Figure 4. Abundance of *Octopus rubescens* and *O. veligero* from July/August 1995 through January/February 2000. *Abundance total of *O. rubescens* = 203.

seven *Octopus veligero* (a relatively high number) were trawled by CSDLAC and no *O. rubescens* were collected. The rapid intrusion and relatively high number of *O. veligero* combined with the low numbers (Bight-wide) of *O. rubescens* prompted the question of interspecific competition between the two species. Perhaps the presence of *O. veligero* was affecting *O. rubescens* abundances. This pattern did not hold, however, as there were later instances of the two species co-occurring, usually with *O. veligero* present in lower numbers. It seems more likely that if competitive exclusion were to occur, it would be *O. rubescens* excluding *O. veligero*, as it is normally more abundant and is indigenous to the area.

Little is known about the life history of *Octopus veligero*. Its presence and subsequent disappearance in the SCB during the course of this study could be due to a variety of oceanographic and ecological factors. *Octopus veligero* is a "small egg" species with planktonic paralarvae. Direction, strength and duration of ocean currents, as well as interspecific competition could be just a few of the possible explanations for its sporadic occurrence. Further studies must be done to determine whether *O. veligero* is simply a "fair-weather" friend or perhaps a rare resident in the SCB.

In summary, the known range for *Octopus veligero* is herein documented to extend approximately 500 miles north of the type locality (Figure 1).

ACKNOWLEDGMENTS

The author would like to thank the following people for their assistance: Dr. Eric Hochberg (SBMNH) for his invaluable advice and assistance, Adrienne M. Huber, Dean Pasko (CSD), Kathy Langan (CSD), Diane O'Donohue (CSD), Kelvin Barwick (CSD), Tim Stebbins (CSD), Alex Steele (CSDLAC), Don Cadien (CSDLAC), Ann Dalkey and Tony Phillips (CLAEMD).

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LOW TIDES FOR 2004 AT SAN FELIPE, BAJA CALIFORNIA, MÉXICO

The entries below show periods of low tides of -4.00 feet and below. The times of low tides are given in Pacific Standard Time, except those dates marked with an asterisk are in Pacific Daylight Time. To correct for Puerto Peñasco add one hour to listed times when they are in Pacific Standard Time. Tides below the midriff of the Gulf cannot be estimated using these entries. All entries are approximate times and tides.

Jan. 20	7:39 pm	-4.50 ft	May 5	9:21 am*	-5.11 ft	Aug. 28	8:10 am*	-4.00 ft
Jan. 21	8:21 pm	-4.84 ft	May 6	9:59 am*	-4.57 ft	Aug. 29	8:49 am*	-4.70 ft
Jan. 22	9:01 pm	-4.50 ft	June 1	7:43 am*	-4.03 ft	Aug. 30	9:26 am*	-4.63 ft
Feb. 18	7:37 pm	-4.11 ft	June 2	8:24 am*	-4.87 ft	Oct. 14	9:17 pm*	-4.63 ft
Feb. 19	8:13 pm	-4.56 ft	June 3	9:07 am*	-5.06 ft	Oct. 15	9:48 pm*	-4.20 ft
Feb. 20	8:46 pm	-4.33 ft	June 4	9:51 am*	-4.57 ft	Nov. 11	7:21 pm	-4.65 ft
Mar. 6	8:19 pm	-4.10 ft	July 1	8:15 am*	-4.46 ft	Nov. 12	7:56 pm	-5:08 ft
Mar. 7	8:49 pm	-4.03 ft	July 2	9:02 am*	-4.89 ft	Nov. 13	8:32 pm	-4.81 ft
Apr. 5	9:13 am*	-4.16 ft	July 3	9:49 am*	-4.70 ft	Dec. 10	7:03 pm	-4.58 ft
Apr. 6	9:43 am*	-4.50 ft	July 30	8:14 am*	-4.17 ft	Dec. 11	7:44 pm	-5.16 ft
Apr. 7	10:16 am*	-4.17 ft	July 31	8:59 am*	-4.89 ft	Dec. 12	8:27 pm	-5.08 ft
May 3	8:11 am*	-4.01 ft	Aug. 1	9:41 am*	-4.90 ft	Dec. 13	9:13 pm	-4.33 ft
May 4	8:45 am*	-4.90 ft	Aug. 2	10:21 am*	-4.17 ft			

Errata: Corrections to errors – in Small (2003) [*The Festivus* 35(11): 129-132] the species was identified correctly by the author and the photographer. The editor regrets inadvertently inserting the incorrect caption for Figure 6 on the plate [p.131]. The caption should read *Parametaria dupontii*. Also, the figure reference on page 130 should refer to *Parametaria dupontii* [p.130, paragraph 1, line 4] not to *Conus tessulatus*. – In Kaiser (2003) [*The Festivus* 35(11): 132B-138] the first page of her paper was omitted. It is included as a separate sheet with this issue. Please place it in its correct place in the November 2003 issue.

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THE FESTIVUS

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MEMBERSHIP AND SUBSCRIPTION

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Website at: http://www.sandiegoshellclub@terryarnold.net
E-mail: cmhertz@pacbell.net

PROGRAM

Why do we care about the chemistry of larval mussel shells?

Bonnie Becker, a PhD student of Scripps Institution of Oceanography and a marine biologist at Cabrillo National Monument, will give a slide presentation on the importance of knowledge on larval mussel shells.

Meeting date: February 19, 2004

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting
15 January 2004

The meeting was called to order at 7:45 p.m. by Past President Carole Hertz in the absence of incoming President John LaGrange. Several announcements were made: Marilyn Goldammer is the new Club Librarian and Publicity needs a chairperson. Speakers for the monthly meetings have been scheduled through May.

Dates for upcoming social events have been finalized: The Annual Shell Club Auction/Potluck will be on Saturday, April 17th again at Wes Farmer's condo and the Annual Christmas Party will be December 4th at the Butcher Shop in Kearny Mesa.

Lindsey Groves, president of the Pacific Conchological Club, wants to exchange speakers with the members of the San Diego Shell Club.

Scripps Institution of Oceanography is hosting a micro-bivalve workshop and a bivalve ID session this weekend with the club's speaker Paul Valentich Scott as leader.

Vice President Larry Lovell introduced the evening's speaker, Paul Valentich Scott, Curator of Malacology at the Santa Barbara Museum of Natural History. Paul related how he and Eugene Coan spent ten years preparing *Bivalve Seashells of Western North America* that described and illustrated 472 species from Alaska to Baja California. At the present time they are preparing a new book that will describe and illustrate all 850 species of bivalves presently known from the Panamic Province, extending from mid-Baja California to Peru. Credit was extended to many who had assisted in this area, including San Diego Shell Club members the late Don Shasky, Carol and the late Paul Skoglund, Carole and Jules Hertz, and Kirstie Kaiser. The new volume will serve as a companion piece to their first work and will feature digital color photos and SEM photos. Character tables, designed to compare species, will assist correct identification of species. The new book is expected to take at least five years to complete and will be published by the Santa Barbara Museum of Natural History. Financial assistance is welcomed. The speaker invited comments from the audience, some of whom expressed a desire for an electronic book while others preferred a hand-held volume.

Following Paul's entertaining and educational Powerpoint slide show, he described his newest project—that of creating a global information source on the marine Bivalvia. This would consist of an electronic global database for the identification of bivalves and biodiversity information. The primary goal includes producing a checklist of recognized bivalve species; secondarily, accurate biological documentation would be provided through voucher specimens, images, and descriptions. Additional information can be found at GloBiv.net. A bivalve workshop will be held at the annual meeting of the American Malacological Society in Sanibel, Florida on August 2, 2004.

Carole Hertz was the winner of the January shell door prize. The meeting was adjourned at 8:30 p.m., followed by a social hour, with cookies provided by the Goldammers and Schneiders.

Nancy Schneider

Library Donations Received

Our thanks to two members who generously donated to the Club library. Debra Levin contributed the video *Mollusks in Action* to the library. The video was filmed, narrated and produced by Joyce Matthys of Salem, Oregon and Sanibel Island, Florida. (Joyce used to be a Club member when she lived in San Diego.) The 30-minute video was first shown at the COA meeting in 2003 where Debbie saw it and bought a copy. It is an enjoyable and educational video and is for sale by Joyce Matthys. For purchase information you can contact Joyce at <joycematthys@aol.com>.

John Bishop donated the book *Hawaiian Seashells* by author and photographer Mike Severns. This 278 page book beautifully illustrates in color 380 species in 64 families and gives both scientific and common names for each with size, depth and habitat notes. The book is published by Island Heritage and is looseleaf bound in hardcover.

The 2004 Auction/Potluck

As was announced at the last meeting, this year's Auction/Potluck will again be held at the community room of Wes Farmer's condo on Saturday evening, April 17th.

This most exciting Club social event is also an important one for the financial health of the Club - with funds going to support Club activities. It is not too early to donate auction material. Please bring your donations of quality shell material to a regular meeting or contact a board member to arrange for pickup.

FIRST RECORD OF NINE SPECIES OF TEREBRA (MOLLUSCA, GASTROPODA) IN PERÚ, WITH NOTES ON FIVE OTHER SPECIES

VALENTÍN MOGOLLÓN AVILA & JUAN KOSTELAC ROCA

Laboratorio de Invertebrados Acuáticos y Estación, Marina de la Isla Pachacamac
Facultad de Oceanografía, Pesquería y Ciencias Alimentarias
Universidad Nacional Federico Villarreal
Roma 340, Lima 18, PERÚ
E-mail: svmogollon@yahoo.com

Abstract: Nine species of *Terebra* are recorded for the first time in Peruvian waters: *Terebra crenifera* Deshayes, 1859; *T. guayaquilensis* (E. A. Smith, 1880); *T. roperi* Pilsbry & Lowe, 1932; *T. sanjuanensis* Pilsbry & Lowe, 1932; *T. tuberculosa* Hinds, 1844, and four other species here treated as sp. 1, sp. 2, sp. 3 and sp. 4. Additionally, five other little known species in our waters are studied: *Terebra argosyia* Olsson, 1971; *T. formosa* Deshayes, 1857; *T. glauca* Hinds, 1844; *T. larvaeformis* Hinds, 1844; and *T. ninfae* Campbell, 1961. *Terebra peruviana* Peña, 1970, ex Weirauch MS is here considered a synonym of *T. larvaeformis* Hinds, 1844. Descriptions, new distribution records, and habitat data are given for all species.

INTRODUCTION

Peña (1970) recorded but did not figure, three species of *Terebra* in Peruvian waters: *T. larvaeformis* Hinds, 1844, and *T. variegata* Gray, 1834, from Piura, and *T. peruviana* Peña, 1970, ex Weyrauch MS from Puerto Pizarro. Bratcher & Burch *in* Keen (1971) added and figured five species from Perú without specific localities: *T. armillata* Hinds, 1844; *T. brandi* Bratcher & Burch, 1970; *T. lucana* Dall, 1908; *T. puncturosa* Berry, 1959; and *T. shyana* Bratcher & Burch, 1970 (as synonym *T. purdyae* also Bratcher & Burch, 1970). In 1987, Alamo and Valdivieso added *T. glauca* Hinds, 1844 (not figured), and *T. strigata* Sowerby, 1825 (p. 83, fig. 175). Bratcher and Cernohorsky (1987, figs. 138a,d; 144a-c) extended the southern distribution of *T. formosa* Deshayes, 1857, and *T. panamensis* Dall, 1908, to Perú. Peña (1989) recorded another species, *T. robusta* Hinds, 1844 (p. 74, fig. 18), from Puerto Pizarro and added three localities for *T. formosa*: Isla Lobos de Tierra and Isla Lobos de Afuera, Lambayeque; Caleta la Cruz, Tumbes. Rivadeneira (1993: 5-7, two unnumbered figures) added *T. argosyia* Olsson, 1971 (as *T. ornata* Gray, 1834), from off Puerto Pizarro. Paredes et al. (1999) in their checklist of the marine mollusks from Perú added, without figures or locality, *T. dislocata* (Say, 1822), and *T. ninfae* Campbell, 1961. Mogollón (2001:104, fig. 11) added Caleta Los Organos, Piura, as new locality for *T. formosa* Deshayes, 1857 (as *T. ornata* Gray, 1834) (Figure 3 herein). Study of the material of *T. peruviana* (G. Mario Peña Collection) from Puerto Pizarro, Tumbes (Peña, 1970), showed that it is really *T. larvaeformis*. With the nine new records added here and the elimination of *T. peruviana*, the count becomes 24 species of *Terebra* in Peruvian waters.

The material studied here was dredged in northern Perú, during June 2-6, 2002 between Punta Malpelo, Tumbes Departamento to Caleta Máncora, Piura Departamento. Only *T. crenifera, T. formosa* and *Terebra* sp.2 were not dredged during this collecting trip.

COLLECTIONS STUDIED

GMPG: Gregorio Mario Peña Gonzáles Collection, Lima, Perú.
Z-C: Roberto Zamora and Zoila Corcuera Collection, Lima, Perú.
VM: Valentín Mogollón Avila Collection, Lima, Perú.
CS: Carol Skoglund Collection, Phoenix, Arizona, USA

SYSTEMATICS

Superfamily CONOIDEA
Family TEREBRIDAE H. & A. Adams, 1854
Genus *Terebra* Bruguière, 1789

Terebra argosyia Olsson, 1971
(Figure 1)

Synonym: *Terebra ornata* of Rivadeneira (1993: 5, 2 unnumbered figures) *non* Gray, 1834.

Description: Shell large, size to 71.4 mm; color cream with 3 rows of brown spots per whorl, 4 on body whorl, in some specimens the spots are joined forming vertical blotches around the whorl; outline of whorls almost straight; protoconch of four whorls; subsutural band faintly noded, defined by a groove on early and middle whorls, becoming progressively weaker, followed by a second weaker band; axial ribs strong on early whorls, becoming progressively obsolete; mature whorls divided into 3 slightly convex bands separated by spiral grooves; aperture quadrate; columella recurved, with 2 plications; siphonal fasciole with heavy striations.

Material studied:

- Off Punta Malpelo (03°30.1'S, 80°30.0'W), Tumbes, 20 m depth on sand and mud, one dead specimen with first whorls broken (14 whorls remaining); 65.4 x 12.9 mm; August 27, 1997 (VM).
- Off Punta Malpelo (03°30.1'S, 80°30.0'W), Tumbes, 32 m depth, on sand and shell grit, one live dredged specimen, with first whorls broken (15 whorls remaining); 48.5 x 9.5 mm; June 2, 2002 (Z-C).
- Off Caleta Máncora, Piura, one live dredged specimen; 62.4 x 13.4 mm; June 4, 2002 (Figure 1) (CS).

Published distribution: San Felipe, Baja California, México (Myers, Hertz & Gemmell, 1998) to Puerto Pizarro (Rivadeneira, 1993, as *T. ornata*), and Punta Malpelo (Mogollón, 2001), both in Tumbes, Perú.

New locality: Off Caleta Máncora (04°06.1'S, 81°03.2'W), Piura Departamento, Perú.

Remarks: Material studied here was without protoconch. Olsson (1971) described this species from a single specimen from Isla La Plata, Ecuador. It remained a rare Panamic terebrid until 1991 when Bratcher (1991) dredged several specimens at Islas Cébaco and Gubernadora in Panamá. Koch (1992) showed the species as common between Baja California, México, and Panamá. Rivadeneira (1993: 5-7, two unnumbered figures) recorded this species for the first time in Perú as *T. ornata* Gray, 1834.

Terebra crenifera Deshayes, 1859
(Figure 2)

Synonym: *Terebra ligyrus* Pilsbry & Lowe, 1832.

Description: Shell size to 36.5 mm; whorls concave with 12-13 sharp axial ribs, widely spaced; intercostal spaces crossed by fine spiral lines; sutures impressed and slightly crenulate; subsutural band not defined by incised line; noded, one for each rib; color light brown with nodes and ribs lighter and a light band on periphery of body whorl; aperture quadrate; columella straight with no plication.

Material studied:

- Off Caleta Máncora, Piura, one dead dredged specimen, 19.9 x 5.1 mm; August 7, 2003 (Figure 2) (CS).

Published distribution: Southern California, USA, to Ecuador (Bratcher & Burch *in* Keen, 1971) and San Felipe, Baja California, México (Myers, Hertz & Gemmell, 1998).

New locality: off Caleta Máncora (04°06.2'S, 81°03.2'W), Piura Departamento, Perú.

Remarks: This species is recorded for the first time in Perú.

Terebra formosa Deshayes, 1857
(Figure 3)

Synonyms: *Terebra ornata* Gray of Mogollón, (2001: 104, fig. 11) = *T. formosa* Deshayes, 1857; *Terebra incomparabilis* Deshayes, 1844; *Terebra pachyzona* Mörch, 1861.

Description: Shell large, size to 123 mm; color white, with two spiral bands of brown spots on the whorls, three on body whorl; subsutural band in early whorls occupying almost ½ whorl and faintly noded; in later whorls band occupying ⅔ of whorl with nodes becoming progressively weaker and disappearing except on body whorl; aperture elongate and columella recurved, with faint plication.

Material studied:

- Off Puerto Pizarro, 1 live collected specimen, 5 m depth, on mud and sand, 113.6 x 21.4 mm,

February, 1981 (Z-C).
- Caleta Cabo Blanco, a mature, very eroded beach specimen, several early whorls and part of anterior canal lost, 63.3 x 16.5 mm, September, 1993 (VM).
- Off Caleta Los Organos, 1 dead collected specimen by diving, 4 m depth, on sand, 81 x 17.4 mm, Collector: Guillermo Díaz, August 2000 (Figure 3) (CS).

Published distribution: Guaymas, Sonora, México (Bratcher & Cernohorsky, 1987); Isla Socorro, Islas Revillagigedo, México (Reyes Bonilla, 1999); Isla Gorgona, Colombia (Cantera et al., 1979); to Islas Lobos de Tierra y Lobos de Afuera, Lambayeque Departamento, Perú (Peña, 1989).

New Localities: Off Puerto Pizarro (03°30.0'S, 80°23.0' W), Tumbes Departamento and off Caleta Los Organos (04°10.4'S, 81°08.0'W) and Caleta Cabo Blanco (4°14.9'S, 81°13.5'W), Piura Departamento, all in Perú.

Remarks: This species was recorded for the first time in Perú by Bratcher and Cernohorsky (1987). Peña (1989: 75, fig. 17) added new distributional data and figured it. Mogollón (2001: 114, fig. 11) mistakenly treated the specimen here figured (Figure 3) as *T. ornata* Gray, 1834, a species not yet recorded in Perú.

Terebra glauca Hinds, 1844
(Figure 4)

Synonyms: *Terebra radula* Hinds, 1844; *Terebra dorothyae* Bratcher & Burch, 1970.

Description: Shell size to 47 mm, variable in sculpture, outline and color; specimens here studied are grayish-brown with lighter or cream colored subsutural bands; sculpture shaped by 4-6 spiral lines intersected by 14-24 axial ribs giving a finely grained aspect; subsutural band noded, occupying almost ¼ of whorl; aperture elongate; anterior canal broad, columella almost straight with faint plications.

Material studied:
- Off Islilla Hueso de Ballena, 7-10 m depth, on muddy bottom and vegetal detritus, two live dredged specimens: 36.1 x 8.5 mm (Z-C); 29.4 x 6.5 mm, June 2, 2002 (Figure 4) (VM).
- Off Caleta La Cruz, 10 m depth, on muddy bottom, one live dredged, 32.6 x 7.3 mm, June 4, 2002 (VM).
- Off Islilla Hueso de Ballena, 7-10 m depth, on muddy bottom and vegetal detritus, one live dredged specimen, 30.2 x 6.9 mm, June 6, 2002 (CS).

Published distribution: Golfo de California, México, to Ecuador including the Islas Galápagos (Bratcher & Cernohorsky, 1987); Isla del Coco, Costa Rica (Montoya & Kaiser, 1988); Bahía de Paita, Piura Departamento, Perú (Alamo y Valdivieso, 1987).

New localities: Off Isllilla Hueso de Ballena (03°27'30" S, 80°20'20" W), near Puerto Pizarro, and off Caleta La Cruz (03°37.8'S, 80°35.0'W), both in Tumbes Departamento, Perú.

Remarks: Alamo and Valdivieso (1987) and Paredes et al. (1999) included this species in their Peruvian marine mollusks lists, but did not figure it.

Terebra guayaquilensis (E. A. Smith, 1880)
(Figure 5)

Synonyms: *Myurella belcheri* E.A. Smith (*non Terebra belcheri* Philippi, 1851); *Terebra ira* Pilsbry & Lowe, 1932.

Description: Shell size to 76 mm; white to light brown, sometimes with bands or blotches of brown or yellow; whorls with 11-12 slightly curved axial ribs, widely spaced, crossed by 6-7 spiral lines, but no conspicuous nodulation; aperture elongate; columella straight, without plications.

Material studied:
- Off Punta Malpelo, broken adult specimen, several early whorls and last whorl lost, 16.4 x 5.9 mm, June 2, 2002 (VM).
- Off Caleta Cancas, one very eroded and broken adult specimen, 40-50 m, muddy bottom, 24.7 x 6.7 mm, early and last whorls lost; June 5, 2002 (VM); off Punta Malpelo, 32 m, sand and shell grit, 31.5 x 7.1 mm, June 2, 2002 (Figure 5) (CS).

Published distribution: West coast of Baja California, México to Ecuador (Bratcher & Cernohorsky, 1987); Isla del Coco, Costa Rica (Montoya & Kaiser, 1988); Islas Galápagos, Ecuador (Finet, 1994).

New localities: Off Punta Malpelo (03°30.1' S, 80°30.0' W) and off Caleta Cancas (03°56.5'S, 80°56.5'W), both in Tumbes Departamento, Perú.

Remarks: Bratcher & Burch *in* Keen (1971, figure 1535, left,) is this species (Bratcher, 1979). This is the first record in Perú.

Terebra larvaeformis Hinds, 1844
(Figures 6, 7)

Synonyms: *Terebra varicosa* Hinds, 1844 (*non Buccinum varicosum* Gmelin, 1791); *Terebra isopleura* and *T. brunneocincta* both of Pilsbry & Lowe, 1932; *Terebra peruviana* Peña, 1970, ex Weirauch MS.

Description: Shell size to 94.4 mm; color varies from light brown to black, some specimens with a yellow spiral line on the base, others with lighter base; sculpture of 11-19 curved axial ribs extending from suture to suture, subsutural band delimited by an incised line; most specimens having 12-14 ribs; numerous spiral threads, only apparent in the interspaces; aperture elongate; columella straight, without plications.

Material studied:
- Off Playa El Bendito, 20 live collected specimens, 7-10 m depth, on mud, sand and vegetal detritus, 10.1-21.2 x 3.2-5.4 mm, June 2, 2002 (VM).
- Off Caleta La Cruz, 48 live specimens, 10 m depth, on muddy bottom, 8.9 x 3.1 to 46.5 x 10.4 mm, 40 specimens (VM), four (GMP), two (Z-C), two (CS). The figured specimen (Figure 6) measures 46.5 x 10.4 mm, June 4, 2002 (CS).
- Off Caleta Máncora, three live collected specimens, 10-15 m depth, on muddy bottom, 9.9 x 3.5, 11.8 x 3.6, 12.8 x 3.7 mm, June 5, 2002 (VM).
- Off Islilla Hueso de Ballena, four live collected specimens, 7-10 m depth, on mud, sand and vegetal detritus, 10.8-35.0 mm x 3.6-5.5 mm. Collector: G. Mario Peña, June 6, 2002 (VM).

Published distribution: Off Bahía San Carlos, Sonora, México (Poorman & Poorman, 1988) to Caleta Máncora, Piura, Perú (Peña, 1970).

New localities: Off Playa El Bendito (03°25.5'S, 80°18.0'W), off Caleta La Cruz (03°37.8'S, 80°35.0'W) and off Islilla Hueso de Ballena (03°27'30" S, 80°20'20" W) in Tumbes Departamento, Perú, and off Caleta Máncora (04°06.1'S, 81°03.2'W), Piura Departamento, Perú.

Remarks: *Terebra peruviana* Peña, 1970, ex Weyrauch MS (Figure 7), is here proposed as a synonym of *T. larvaeformis* Hinds, 1844. Dr. Wolfgang Weyrauch, professor of Zoology in the Universidad Nacional Mayor de San Marcos, Lima, Perú, proposed it in the classroom as a new species in 1963, but did not describe it. This species was later described and figured by Peña (1970: 53, fig. 29). Examination of the two specimens in the Peña Collection (not designated as type material) shows that the species is *T. larvaeformis* Hinds, 1844, but with a shorter anterior canal.

Terebra ninfae Campbell, 1961
(Figure 8)

Description: Shell small, size to 11 mm; color beige or yellow, with smooth protoconch and noded purplish-brown subsutural band; below subsutural band another brown band, and another below periphery of body whorl; whorls sculptured with 14-15 smooth, curved axial ribs; intercostal spaces crossed by numerous spiral threads, extending to spaces between nodes of subsutural band; aperture elongate; columella straight, without plications.

Material studied:
- Off Playa El Bendito, one live collected specimen, 7-10 m depth on mud, sand and vegetal detritus, 6.5 x 1.6 mm, June 2, 2002 (CS).
- Off Caleta Máncora, six specimens, five dead, one live, 10-15 m depth, on muddy bottom, live collected specimen measures 7.1 x 1.9 mm (Figure 8), June 5, 2002 (VM).

Published distribution: Bahía de Mazatlán, Sinaloa, México (Hendrickx & Toledano Granados, 1994) to Manabí Province, Ecuador (Shasky, 1984).

New localities: Off Playa El Bendito (03°25.5'S, 80°18.0'W), Tumbes Departamento, and off Caleta Máncora (04°06.1' S, 81°03.2'W), Piura Departamento, Perú.

Remarks: This species was included in the checklist of Peruvian marine mollusks by Paredes et al. (1999).

Terebra roperi Pilsbry & Lowe, 1932
(Figure 9)
Synonym: *Terebra adairensis* Campbell, 1964.

Description: Shell slender, size to 29.5 mm; greenish-gray or olive, cream base below periphery of body whorl, except for a brown spiral band; whorls sculptured with two spiral rows of nodes, one at subsutural band and another above suture and a spiral incised line between the rows of nodes; axial ribs obsolete; aperture elongate; columella curved, with two faint plications.

Material studied:
- Off Islilla Hueso de Ballena, two live collected specimens, 10 m depth, on mud, sand and vegetal detritus; 17.8 x 4.0 mm (VM), 18.7 x 3.9 mm, June 6, 2002 (Figure 9) (CS).

Published distribution: Bahía Santa María, Baja California Sur (as *T. adairensis*), and Bahía Concepción, Baja California Sur, México to Ecuador (Bratcher & Burch *in* Keen, 1971).

New locality: Off Islilla Hueso de Ballena (03°27'30"S, 80°20'20"W), near Puerto Pizarro, Tumbes Departamento, Perú.

Remarks: This species is recorded for the first time in Perú.

Terebra sanjuanensis Pilsbry & Lowe, 1932
(Figure 10)

Description: Shell size to 30 mm; brown, darker on subsutural band; suture impressed, with spiral groove marking subsutural band and another band posterior to suture continuing around periphery of body whorl; whorls with 13-14 axial ribs; aperture elongate; columella straight, without plications.

Material studied:
- Off Islilla Hueso de Ballena, one live collected specimen, 7-10 m depth, on mud, sand and vegetal detritus, 13.6 x 2.6 mm, June 6, 2002 (VM).
- Off Caleta La Cruz, one live collected specimen, 10-15 m depth, on muddy bottom; 16.5 x 3.0 mm, June 3, 2002 (VM).
- Off Caleta Máncora, one dead specimen, 10 m depth, muddy bottom, 18.6 x 4.2 mm (Figure 10) (Z-C); one live, 15.5 x 3.3 mm, June 5, 2002 (CS).

Published distribution: Sinaloa, México (Bratcher & Cernohorsky, 1987) to Manabí Province, Ecuador (Shasky, 1984).

New localities: Off Islilla Hueso de Ballena (03°27'30"S, 80°20'20"W), and off Caleta La Cruz (03°37.8'S, 80°35.0'W), both in Tumbes; off Caleta Máncora (04°06.1'S, 81°03.2'W) Piura Departmento, all Perú.

Remarks: This species is recorded for the first time in Perú.

Terebra tuberculosa Hinds, 1844
(Figure 11)
Synonyms: *Terebra cracilenta* and *Terebra tenuis* both of Li, 1930.

Description: Shell size to 73 mm; grayish-yellow to tan, suture impressed, subsutural band nodose, whorls with 19-20 axial ribs, crossed by 4-5 spiral ribs giving surface a finely tuberculate appearance; aperture elongate; columella straight with a faint plication.

Material studied:
- Off Caleta La Cruz, one live collected by shrimp fishermen, 15 m depth, on muddy bottom, 45.1 mm height, summer 1979 (Z-C).
- Off Playa El Bendito two live collected, 7-10 m, on mud, sand and vegetal detritus; 22 x 5.9 mm and 17.4 x 4.8 mm; June 2, 2002 (VM).
- Off Caleta La Cruz, one mature shell with body whorl broken, 10 m depth, on muddy bottom, height approximately 50 mm in complete specimen, June 4, 2002 (VM).
- Off Islilla Hueso de Ballena near Puerto Pizarro, one live, 7-10 m depth, on mud, sand and vegetal detritus, 48.0 x 10.7 mm, June 6, 2002 (Figure 11) (VM), one dead, 25 x 5.9 mm (CS).

Published distribution: San Felipe, Baja California, México (Myers, Hertz & Gemmell, 1998) to Ecuador (Bratcher & Cernohorsky, 1987).

New localities: Off Playa El Bendito (03°25.5'S, 80°18.0'W), off Islilla Hueso de Ballena (03°27'30"S, 80°20'20"W) and off Caleta La Cruz (03°37.8'S, 80°35.0'W), in Tumbes Departamento, Perú.

Remarks: This species is recorded for the first time in Perú.

Terebra **sp. 1**
(Figure 12)

Description: Shell slender to 15.1 mm in height; brown yellowish, slightly darker on subsutural band; suture deep, whorls about 14, moderately convex, sculpted by 14-15 rounded axial ribs, slightly oblique and curved with intercostal spaces almost same width as ribs; 16-17 axial ribs on body whorl; subsutural bands with nodes, one for each rib; spiral sculpture almost obsolete, shaped by very shallow grooves, more apparent on body whorl, mainly on base; aperture elongate; columella straight, with a faint plication.

Material studied:
- Off Caleta La Cruz, one live dredged specimen 15.1 x 3.0 mm, 10-15 m depth, on mud and some sand, June 3, 2002 (Figure 12) (CS).
- Off Caleta Máncora, Piura, one dead specimen 11.2 mm, 10-15 m depth, on mud and some sand, June 5, 2002(CS).

Distribution: Off Caleta La Cruz (03°37.8'S, 80° 35.0'W), Tumbes Departamento, and Caleta Máncora, Piura, Perú.

Remarks: This species may be undescribed.

Terebra **sp. 2**
(Figure 13)

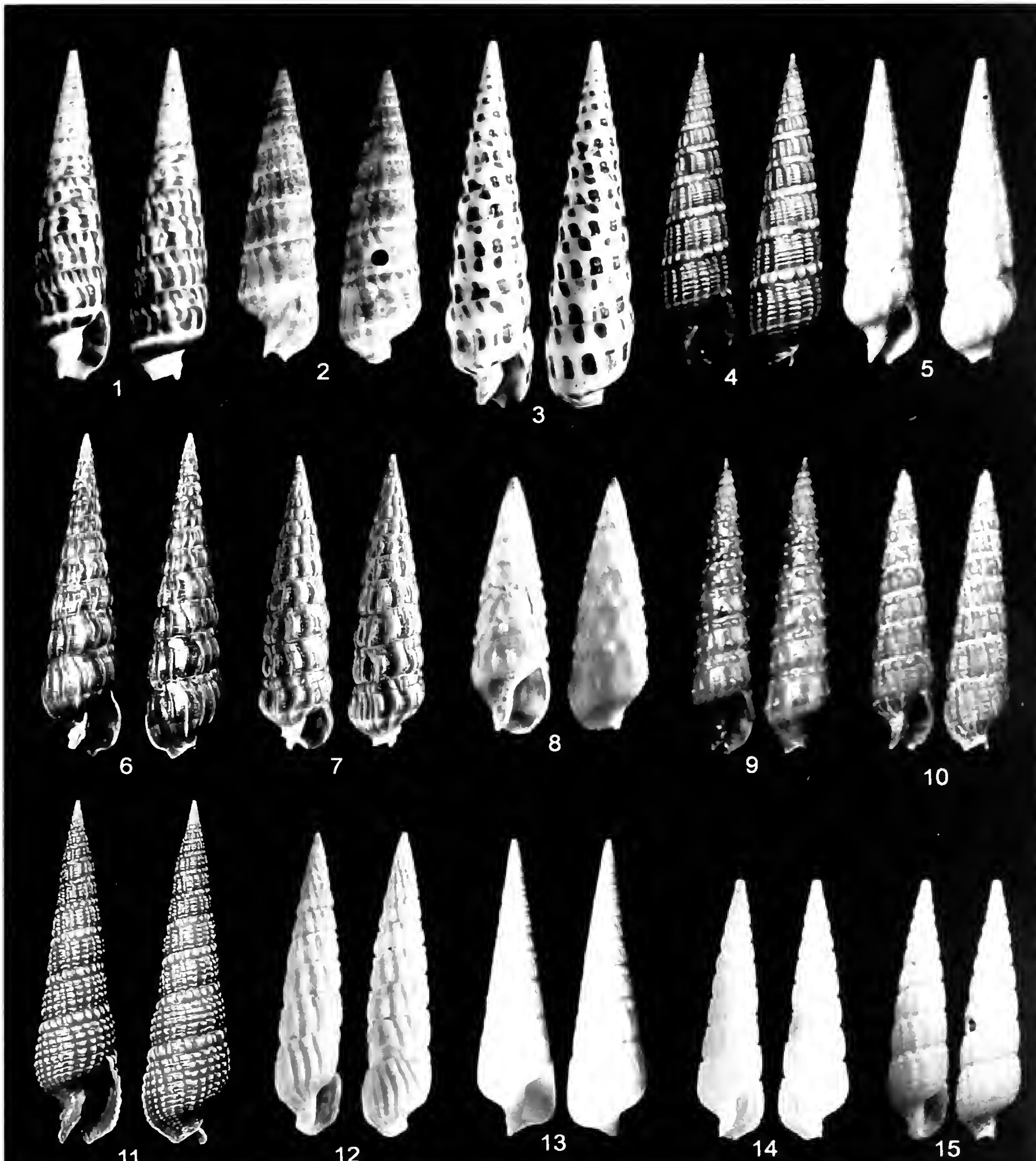
Description: Description: Shell size to 44.7 mm; white; with some 16 whorls; 23-24 slender, curved, close ribs per whorl extending from suture to suture; numerous spiral threads crossing the intercostal spaces; subsutural band prominent, faintly noded; aperture quadrate; columella straight, without plications.

Material studied:
- Off Caleta La Cruz, one live collected specimen, 50 m depth, muddy bottom, 44.7 x 9.8 mm, June 1988. Collector: Martín Valladares, shrimp fisherman (Figure 13) (Z-C).

Distribution: Off Caleta La Cruz (03°37.8'S, 80°35.0'W), Tumbes Departamento, Perú.

Remarks: This species is recorded for the first time in Perú and may be undescribed.

Figures 1-15. **(1)** *Terebra argosyia* Olsson, 1971, 62.4 x 13.4 mm, live, dredged, off Caleta Máncora, Piura Departamento, 10-15 m depth on muddy bottom, June 5, 2002 (CS). **(2)** *Terebra crenifera* Deshayes, 1859. 19.9 x 5.1 mm, dead, dredged off Caleta Máncora, Piura Departamento, 15-20 m depth on muddy bottom, August 7, 2003 (CS). (3) *Terebra formosa* Deshayes, 1857, 81.0 x 17.4 mm, dead, collected by diving, off Caleta Los Organos, Piura Departamento, 4 m depth, on sand, August 2000. (CS). **(4)** *Terebra glauca* Hinds, 1844, 29.4 x 6.5 mm, live dredged, off Islilla Hueso de Ballena, Tumbes Departamento, 7-10 m depth, on muddy bottom and vegetal detritus, June 2, 2002 (VM). **(5)** *Terebra guayaquilensis* (E. A. Smith, 1880), 31.5 x 7.1 mm, dead collected, off Punta Malpelo, Tumbes Departamento, 32 m depth, sand and shell grit, June 2, 2002 (CS). **(6)** *Terebra larvaeformis* Hinds, 1844, 46.5 x 10.4 mm, live collected, off Caleta La Cruz, Tumbes Departamento, 10 m depth, on muddy bottom, June 4, 2002 (CS). **(7)** *Terebra peruviana* Peña, 1970, ex Weyrauch MS, 35.0 x 7.8 mm, live collected, "La Bocana," between Isla del Amor and Islilla Hueso de Ballena, off Puerto Pizarro, Tumbes Departamento, intertidal on sand and mud banks near mangrove, Summer 1963 (CS). **(8)** *Terebra ninfae* Campbell, 1961, 7.1 x 1.9 mm, live collected, off Caleta Máncora, Piura Departamento, 10-15 m depth on muddy bottom, June 5, 2002 (VM). **(9)** *Terebra roperi* Pilsbry & Lowe, 1932, 18.7 x 3.9, live collected, off Islilla Hueso de Ballena, 7-10 m depth on mud, sand and vegetal detritus (mangrove), June 6, 2002 (CS). **(10)** *Terebra sanjuanensis* Pilsbry & Lowe, 1932, 18.6 x 4.2 mm, dead collected, off Caleta Máncora, Piura Departamento, 10 m depth, muddy bottom, June 5, 2002 (Z-C). **(11)** *Terebra tuberculosa* Hinds, 1844, 48.0 x 10.7 mm, live collected, off Islilla Hueso de Ballena, Tumbes Departamento, 7-10 m depth, on mud, sand and vegetal detritus (mangrove), June 6, 2002 (VM). **(12)** *Terebra* sp. 1, 15.1 x 3.0 mm, live collected, off Caleta La Cruz, Tumbes Departamento, 10-15 m depth, on mud and some sand, June 3, 2002 (CS). **(13)** *Terebra* sp. 2, 44.7 x 9.8 mm, live collected, off Caleta La Cruz, Tumbes Departamento, 50 m depth, muddy bottom, June 1988 (Z-C). **(14)** *Terebra* sp. 3, 12.0 x 2.6 mm, live collected, off Islilla Hueso de Ballena, Tumbes Departamento, 7-10 m depth, on mud, sand and vegetal detritus (mangrove), June 6, 2002 (CS). **(15)** Terebra sp. 4, 13.1 x 3.2 mm, dead collected, off Caleta Máncora, Piura Departamento, 10-15 m depth, on muddy bottom, June 5, 2002 (CS). All photos: Roberto Zamora.→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Terebra sp. 3
(Figure 14)

Description: Shell small, slender to 12.9 mm in height; pure white; protoconch of three convex, smooth, white whorls; teleoconch whorls about 12, convex; suture very impressed and crenulate, subsutural band well defined, with nodes shaped by prolongation of ribs; 14-15 axial narrow ribs per whorl, slightly curved, intercostal spaces wider than ribs; spiral sculpture absent, except for a groove in middle of the whorl giving it a tripartite appearance and numerous threads on base of body whorl; aperture elongate; columella recurved, with a faint plication.

Material studied:
- Off Islilla Hueso de Ballena, one live, dredged specimen, 12.0 x 2.6 mm, 7-10 m depth, on mud, sand and vegetal detritus, June 6, 2002 (Figure 14) (CS).

Distribution: Off Islilla Hueso de Ballena (03°27'30"S, 80°20'20"W), near Puerto Pizarro, Tumbes Departamento, Perú.

Remarks: This small species may be undescribed.

Terebra sp. 4
(Figure 15)

Description: Shell small, size to 13.1 mm; white to slightly cream; suture channeled, crenulate, subsutural band defined by an incised line; ribs slightly curved, strong on early whorls, becoming progressively obsolete on remaining whorls, including body whorl; spiral lines crenulate and faintly marked; aperture elongate; columella straight, without plications.

Material studied:
- Off Caleta Máncora, one dead collected specimen, 10-15 m depth, on muddy bottom, 13.1 x 3.2 mm, June 5, 2002 (Figure 15) (CS).

Distribution: Off Caleta Máncora (04°06.1'S, 81°03.2'W), Piura Departamento, Perú.

Remarks: This small species may be undescribed.

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UPCOMING MEETINGS AND A STUDENT GRANT ANNOUNCED

VI International Symposium Cephalopods - Present & Past

The VI International Cephalopod Symposium will be held at September 16.-19. 2004 in Fayetteville, Arkansas This is a first invitation out in the net: at <http://www.cephsym.org> .

World Congress of Malacology Perth, Western Australia

The World Congress of Malacology will meet in Perth, Western Australia from 11-16 July 2004. The registration brochure is attached here for further information, please visit Unitas Malacologica at–
http://www.inter.nl.net/users/Meijer.T/UM/um.html
...and the Malacological Society of Australasia...
<http://www.amonline.net.au/malsoc>.

Preliminary Information about the 2004 AMS Meeting (July 31-August 4)

Preliminary information on the 2004 meeting has been posted on the Society's Web site at – <http://www.shellmuseum.org/AMS>. Please check also my welcome letter in the same site at <http://www.shellmuseum.org/AMS/welcome.htm>. Make sure you bookmark the site; it will be gradually updated to include more detailed information (including full registration forms, etc.) as we get closer to the dates of the meeting. Be there; it will be a blast (oops)!

José H Leal, PhD

Conchologists of America (COA) Announces its 2004 Grant Program to Support Molluscan Research

Grants of up to $1,500 will be available to qualified persons undertaking field or laboratory research on Recent or fossil mollusks. Awards are made only to citizens or permanent residents of the Americas or to students attending graduate school in the United States. Awards are not made to high school students, and rarely to college students.

Although proposals of up to $1,500 will be entertained, grants rarely exceed $1,000, due to the large number of qualified applicants.

THE DEADLINE FOR APPLICATIONS is 28 February 2004. Applications must be postmarked by this date OR, if submitted electronically, e-mailed not later than 12:00 PM on 28 February 2004, US Eastern Standard Time. Instructions for application can be found at–
<http://coa.acnatsci.org/conchnet/coagrant.html>.

There is no official application form. Applications should not exceed six pages single spaced and should include the following items:

1) title of project;
2) summary of project, not to exceed 150 words;
3) body of the proposal including:
   a) background information necessary to understand the project and its significance;
   b) materials and methods, and proposed plan of research;
   c) itemized budget of estimated expenses;
   d) references cited.
4) a one page biography or resume including address, phone number and other means of contacting the applicant.

STUDENT APPLICANTS should also submit a letter of recommendation from an academic or professional source.

If funding is being requested from several sources, an overall budget for the project may be presented, with items and total amount requested from COA clearly indicated. Normal budget items include supplies, expendable equipment, and travel expenses. Grants will not cover salaries, overhead, permanent equipment, conferences or meeting costs.

Electronic applications in MS Word or PDF format (please avoid large image files) may be sent to shell@shellmuseum.org (do not reply directly to this list!) OR applications may be sent in TRIPLICATE via regular mail to:

José H Leal, PhD, Chair, COA Grants Committee
The Bailey-Matthews Shell Museum
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CHANEY, BARBARA, 1633 Posilipo Lane, Santa Barbara, CA 93108, (805) 969-1434
CHANEY, HENRY W., 170 La Vista Grande, Santa Barbara, CA 93103, (805) 682-4711 ext. 334 (work), FAX (805) 963-9679 (home), E-mail: hchaney@sbnature2.org (work)
CHIPPEAUX, EDITH & HARRY, 1308 Biltmore Dr., Fort Myers, FL 33901-8710, (239) 936-4058
CLOVER, PHILLIP W., P.O. Box 339, Glen Ellen, CA 95442, Phone/FAX (707) 996-6960
COAN, EUGENE V., 891 San Jude Ave., Palo Alto, CA 94306-2640, (650) 493-8242 (home), (415) 977-5681 (work), FAX (415) 977-5790, E-mail: gene.coan@sierraclub.org
COOK, BUNNIE & GEORGE, 1120 Makaiwa St., Honolulu, HI 96816, (808) 737-8050, E-mail: g.-b.cook@juno.com
DAUGHENBAUGH, JOHN, 203 N. Wilton Pl., Los Angeles, CA 90004-4025, (213) 614-4460, E-mail: shoduffy@attbi.com
DEEMS, RON, 1768 Hermes, San Diego, CA 92154-2814, (619) 424-3750
DESCHAINE, LEWIS, 3029 Silver Lake Rd., St. Anthony, MN 55418-2435, (612) 789-4070
DOI, MATTHEW S., 16209 Taylor Ct., Torrance, CA 90504-1902, (310) 329-3201
DULLAS, NORMA M. & WILLIAM, 13231 North 65th Dr., Glendale, AZ 85304, (623) 979-8758, E-mail: normadullas@mymailstation.com
EERNISSE, DOUGLAS J., Dept. of Biological Science, MH 282, California State University, Fullerton, CA 92834-6850, (714) 278-3749, FAX (714) 278-3426, E-mail: deernisse@fullerton.edu
EMERSON, WILLIAM K., 10 E. End Ave. Apt. 18E, New York, NY 10021-1184, (212) 879-7645 (home), (212) 769-5714 (work), FAX (212) 879-7645, E-mail: emerson @AMNH.org
EVERSON, GENE, 500 Nottingham Pkwy., Louisville, KY 40222-5026, (502) 429-5788, E-mail: supersheller@insight66.com
FARMER, WES, 3591 Ruffin Rd. #226, San Diego, CA 92123-2561, (858) 576-2143, E-mail: wmfarmer@adnc.com
FLENTZ, MARY & JOHN B., 4541 Lambeth Court, Carlsbad, CA 92008-6407, (619) 434-2522
FORSYTH ROBERT, P.O. Box 3804, Smithers, British Columbia, Canada VOJ 2NO, (250) 847-6699, E-mail: r.forsyth@telus.net
FRANK, WILLIAM M., 1865 Debutante Dr., Jacksonville, FL 32246-8645, Phone/FAX (904) 724-5326, E-mail: bill@jaxshells.org
GARCÍA, EMILIO F., 115 Oak Crest Dr., Lafayette, LA 70503, (337) 232-2662, E-mail: efg2112@louisiana.edu
GARFIELD, JUDY, P.O. Box 332, La Jolla, CA 92038-0332, (858) 483-1087, FAX (858) 483-8140, E-mail: jgarfield@ucsd.edu

GERRODETTE, BILLEE L. & GEORGE, 6333 La Jolla Blvd. #171, La Jolla, CA 92037, (858) 454-5788
GOLDAMMER, MARILYN & JIM, 10051 Sheba Way, San Diego, CA 92129, (858) 484-0575, E-mail: mimigold@earthlink.net
GORI, SANDRO, Via Semesi 7, 57123 Livorno, Italy
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HERTZ, JULES & CAROLE M., 3883 Mt. Blackburn Ave., San Diego, CA 92111, (858) 277-6259, E-mail: cmhertz@pacbell.net
HEWITT, SUSAN & EDWARD SUBITSKY, 435 E. 77th St. Apt. 3G, New York, NY 10021, (212) 628-6706, E-mail: hewsub@earthlink.net
HICKMAN, CAROLE S., Z001, University of California, Dept. of Integrative Biology, Berkeley, CA 94720-3140, (510) 642-3429, FAX (510) 642-1822, E-mail: caroleh@socrates.berkeley.edu
HOLLMANN, MICHAEL, Stockumer Heide 44, D-58454 Witten, Germany, 02302-944-255, FAX 0234-230-4225, E-mail: Michael.Hollmann@ruhr-uni-bochum.de
HOUSTON, ROY S., Dept. of Biology, Loyola Marymount University, Loyola Blvd. at West 80th St., Los Angeles, CA 90045, (213) 642-3126 (work), (310) 329-6444 (home), E-mail: rhouston@lmu.edu
HOWARD, MARGARET, 4603 Shoalwood Ave., Austin, TX 78756-2918, (512) 453-4348
HUFF, TONYA M., 1030 Hurstdale, Cardiff, CA 92007, E-mail: tohuff@ucsd.edu
HUMBIRD, WAYNE & PATTY, 54 Tamarind Ct., Lake Jackson, TX 77566, (979) 265-1320, E-mail: whumbird@csinternet.net
HUTSELL, KIM & LINDA, 5804 Lauretta St. #2, San Diego, CA 92110, (619) 294-3914, E-mail: khutsell@ix.netcom.com and lhutsell@ix.netcom.com
JACKSON, JOHN A., 11558 Rolling Hills Dr., El Cajon, CA 92020, (619) 579-8405, FAX (619) 579-7901, E-mail: odyssey@adnc.com
JOFFE, ANNE, 1157 Periwinkle Way, Sanibel Island, FL 33957, (941) 472-3151, FAX (941) 472-3153, E-mail: sanibelchiton@aol.com
JONES, SETH J., Merkel & Associates, Inc., 5434 Ruffin Rd., San Diego, CA 92123, E-mail: sjones@merkeline.com
JORDAN, SCOTT, 1528 La Riata Dr., La Habra Hts., CA 90631, (562) 903-0287, FAX (562) 903-1268, E-mail: sjordan2@prodigy.net
KAISER, KIRSTIE L., Paseo de las Conchas Chinas #115 Depto. 4, Fracc. Conchas Chinas C.P. 48390, Puerto Vallarta, Jalisco, Mexico, 011-52 (322) 221 5041, FAX 011-52 (322) 221 5042, E-mail: klkaiser@pvnet.Com.Mx
KALOHI, KATHY & JOSEPH, 13901 Wilkie Ave., Gardena, CA 90249, (310) 719-1816, FAX (310) 538-3889, E-mail: wreckdiver77@yahoo.com
KANNER, PAUL, 10609 Esther Ave., Los Angeles, CA 90064, Phone (310) 559-7140, FAX (310) 559-9423, E-mail: pkann@comcast.net
KEMP, BRUCE & EMI, 9420D Carlton Oaks Dr., Santee, CA 92071, (619) 449-7610, FAX (619) 553-6391, E-mail: bkemp@spawar.navy.mil
KENNEDY, GEORGE, 8997 Moisan Way, La Mesa, CA 91941, (619) 667-1030, FAX (858) 679-9896(work), E-mail: gkennedy@bfsa-ca.com
KOSUGE, SADAO, Institute of Malacology, 6-36 Midoricho 3 Chome, Nishi-Tokyo City, Tokyo 188-0002, Japan, 81-424-63-0851, FAX 81-424-61-1752, E-mail: I.M.T.KOSUGE@excite.co.jp
KRONENBERG, GIJS C., Den Bult 98, NL-5616 GJ Eindhoven, the Netherlands, E-mail: gijsckro@worldonline.nl
LAGRANGE, JOHN & LINDA, 533 North Rios Ave., Solana Beach, CA 92075-1245, Phone/FAX (858) 755-7215, E-mail: lagrange@adnc.com
LANCE, JAMES R., 3220 S. 8th St., Lebanon, OR 97355-1069, (541) 258-3709
LEVIN, DEBRA J., 1848 Rust Ridge Pl. #202, Corona, CA 92881, (909) 898-3945, E-mail: levindj@att.net also lvndj@netscape.net
LOVELL, LARRY, Benthic Invertebrate Collection, SIO/UCSD/Mail Stop 0244, 9500 Gilman Drive, La Jolla, CA 92093-0244, (858) 822-2818, (760) 945-1608 (home), FAX (858) 822-3310, E-mail: llovell@ucsd.edu
LUTHER, DOUG & MARY, 1535 Ipukula St., Honolulu, HI 96821-1419, (808) 377-5173, E-mail: dluther@soest.hawaii.edu
LYONS, WILLIAM G., 4227 Porpoise Dr. SE, St. Pertersburg, FL 33705, E-mail: w.lyons9@verizon.net
MARR, LAURETTA, 4428 Lanham St., Midland TX 79705, (432) 683-1901, E-mail: RLMMID@aol.com
MCCLINCY, RICHARD J., 809 St. George Rd., Danville, CA 94526-6235, (925) 838-3217, E-mail: richard.mcclincy@kvaerner.com

MCLEAN, JAMES H., Malacology, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, CA 90007, (213) 763-3377, FAX (213) 746-2999, E-mail: jmclean@bcf.usc.edu
MCMILLAN, PAT, 7539 Alonda Way, San Diego, CA 92126, (858) 232-7751, E-mail: KoalaPat@att.net
METZ, GEORGE E., 121 Wild Horse Valley Dr., Novato, CA 94947-3615, (415) 892-4960, E-mail: romageometz@earthlink.net
MICHEL, JOHN & NOLA, 4758 Mt. Cervin Dr., San Diego, CA 92117, Phone/FAX (858) 278-9088, E-mail: ejmco@san.rr.com
MOGOLLÓN, VALENTÍN, Roma 340, Lima 18, Perú, E-mail: svmogollon@yahoo.com
MULLINER, DAVID K. & MARGARET, 5283 Vickie Dr., San Diego, CA 92109, (858) 488-2701, E-mail: mulliner1@juno.com
MUSÉUM NATIONAL D'HISTOIRE NATURELLE, Bibliotheque BIMM, 55 Rue Buffon, 75005 Paris, France (EURO 1-334)
MUSEUM OF NEW ZEALAND, Library Manager, Te Papa Library, P.O. Box 467, Wellington, New Zealand
MYERS, JOHN & BARBARA W., 3761 Mt. Augustus Ave., San Diego, CA 92111, (858) 279-9806
NATURALIS, BIBLIOTHEEK, Postbus 9517, 2300 RA Leiden, The Netherlands
NEGUS, RICHARD H., 3401 Woodland Way, Carlsbad, CA 92008, (760) 434-9808, FAX (760) 434-3141, E-mail: rnegus@adelphia.com
NELSON, LOIS, 7222 N. 15th Ave., Phoenix, AZ 85021-8658, (602) 347-9667
NORRID, CHARLOTTE, 233 E. Cairo Dr., Tempe, AZ 85282-3607, (480) 967-4957, E-mail: charnorrid2@aol.com
NORTHROP, MARILYN, 1528 Education Court, Lehigh Acres, FL 33971, (518) 383-6624, E-mail: mjnorthrop@worldnet.att.net
PASQUA, ROBERT A., 2236 Via Chalupa, San Clemente, CA 92673-3634, (949) 492-6855, E-mail: pasqua@cox.com
PAYNE, TRAVIS, 608 Clift Dr., Madison, AL 35758, phone/FAX (256) 783-9504, E-mail: payyn436@bellsouth.net
PEÑA GONZÁLES, G. MARIO, Edificio Los Jazmines 206, Residencial San Felipe, Jesús María, Perú
PHILLIPS, JOHN, Abbey Specimen Shells, 214 Main St.#297, El Segundo, CA 90245, (310) 670-1155, FAX (310) 649-1131, E-mail: abbeyshells@msn.com
PHILLIPS, TONY, Hyperion Treatment Plant, Environmental Monitoring Division, 12000 Vista Del Mar, Playa del Rey, CA 90293, E-mail: CAP@SANLACITY.ORG and CUMACEA@Yahoo.com
PIERCE, ROSEMARY, P.O. Box 532, Wildomar, CA 92595-0532, (909) 609-9801 or (909) 674-9370, E-mail: kathypierce_realty@excite.com
PISOR, DON & JEANNE, 10373 El Honcho Pl., San Diego, CA 92124, (858) 279-9342 (home), (619) 234-0249 (warehouse), FAX (619) 234-0250, E-mail: dpisor@earthlink.net
PISTER, BENJAMIN A., 8538 Villa La Jolla Dr. #187, La Jolla, CA 92037, (858) 453-7369, E-mail: bpister@ucsd.edu
POWELL, CHARLES L., Western Earth Surface Processes Team, U.S. Geological Survey, M/S 975, 345 Middlefield Rd., Menlo Park, CA 94025, E-Mail: cpowell@ucgs.gov
PRAS, STEPHANE, 15 Rue Marbeau, 75116 Paris, France, E-mail: stephane.pras@noos.fr
REITZ, CHARLES K., 410 Orpheus Ave., Leucadia, CA 92024, (760) 943-1029 (home), (760) 471-8657 (work), FAX (760) 471-6894
RICE, TOM, P.O. Box 219, Port Gamble, WA 98364, Phone/FAX (360) 297-2426, E-mail: ofseashr@sinclair.net
RITTER, WILLIAM J., 1005 Exchange Apt. 13, Astoria, OR 97103-0900, (503) 325-7948, E-mail: bulwinkl@pacifier.com
ROBERTS, DALE L. & KIMBERLY, 28402 Harvest View Lane, Trabuco Canyon, CA 92679, (949) 459-8886, FAX (949) 888-2786, E-mail: dale_roberts@allergen.com
ROMER, BILL & CAROL, 3249 Towser, San Diego, CA 92123, (858) 278-2389, E-mail: wromer1@san.rr.com
RUTKAS, TERRY, 13311 B Meyer Rd., Whittier, CA 90605, (562) 941-5439, E-mail: tjrutkas@concentric.net
SANTA BARBARA MUSEUM OF NATURAL HISTORY, Department of Invertebrate Zoology, 2559 Puesta del Sol Rd., Santa Barbara, CA 93105-2936, (805) 682-4711
SCHNEIDER, WILLIAM & NANCY, 12829 Carriage Rd., Poway, CA 92064-6045, Phone/FAX (858) 748-2822, E-mail: jtkcmom@msn.com and mulegebill@aol.com
SCHOENING, ROBERT C., 10607 Norman Ave., Fairfax, VA 22030-2928, (703) 273-9755, FAX (703) 352-7124, E-mail: rschoening@aol.com
SCOTT, PAUL VALENTICH, Santa Barbara Museum (NH), 2559 Puesta del Sol Rd., Santa Barbara, CA 93105, (805) 682-4711 ext. 319, FAX (805) 563-0574, E-mail: pvscott@sbnature2.org
SENCKENBERGISCHE BIBLIOTHEEK, Zeitschriftenabteilung/DFG, Bockenheimer Landstr. 134-138, D-60325, Frankfurt am Main, Germany
SKOGLUND, CAROL, 3846 E. Highland Ave., Phoenix, AZ 85018, phone/FAX (602) 955-2072, E-mail: carolskoglund@msn.com
SMALL, MICHAEL, 371 Harvard St. Apt. 3D, Cambridge, MA 02138, E-mail: msmall@wcfia.harvard.edu
SUNDERLAND, WALTER A., 7610 NE Earlwood Road, Newberg, OR 97132, (503) 625-6840, E-mail: wallens@earthlink.net

THE NATURAL HISTORY MUSEUM, Acquisitions Section, Dept. of Library & Information Services, Cromwell Rd., London SW7 5BD, England, E-mail: e.jamieson@nhm.ac.uk

TREGO, KENT D., 441 Ravina St. Apt. 3, La Jolla, CA 92037, (858) 456-7655, E-mail: nautilusoceanic@yahoo.com

TUPEN, JEFF W., CH2M HILL, Inc., 2485 Natomas Park Dr. Suite 600, Sacramento, CA 95833, (916) 286-0273, FAX (916) 920-8463, E-mail: jtupen@ch2m.com

UNDERWOOD, DORIS K., 698 Sheridan Woods Dr., West Melbourne, FL 32904, (321) 724-2449, E-mail: dunderwood1@cfl.rr.com

VELARDE, RON, Marine Biology Lab., 4918 N. Harbor Dr. Suite 101, San Diego, CA 92106, (619) 758-2331, 758-2350, E-mail: RVELARDE@SANDIEGO.GOV

VOLLERO, SILVANA & BOB PETROSKI, 5613 Carnegie St., San Diego, CA 92122, (858) 625-0756, E-mail: rpetrosk@san.rr.com

VON KRIEGELSTEIN, DOUG, 11288-A San Juan, Loma Linda, CA 92354, (909) 825-7207, FAX (909) 796-9658, E-mail: dougvon@hotmail.com

VOSO, ED, 1815-134 Sweetwater Rd., Spring Valley, CA 91977, (858) 469-8308

WATERS, CHARLES, 2703 Hutchison, Vista, CA 92084, (760) 941-2067

WEBER, GLADYS, 3607 Sylvan Meadows Court, Modesto, CA 95356-2011, (209) 549-1071, E-mail: gladweber@aol.com

WEBSTER, HERB & MELLA, 4403 Sierra Morena Ave., Carlsbad, CA 92008, (760) 730-3648, E-mail: mellamella@adelphia.net

WHITE, JACKIE, 886 Mountridge Ct., Las Vegas, NV 89110-2911, (702) 452-9651, FAX (702) 454-1268, E-mail: jcwshells@aol.com

WHITMAN, CHARLES H., c/o Milton Werner, 70 Richmond St., Brooklyn, NY 11208, (212) 861-8211, E-mail: chwhit@nyc.rr.com

WOMACK, EDWIN B. & JEAN, 2126 S. Arroyo Vista, Cottonwood, AZ 86326, (928) 639-2112, E-mail: edjeanwomack@wildapache.net

WU, SHI-KUEI, 4175 Amber St., Boulder, CO 80304, Phone/FAX (303) 444-2306, E-mail: skwu@colorado.edu

WUYTS, JEAN, Koningsarendlaan 82, B-2100 Deurne, Belgium, E-mail: wuyts.jean@pi.be

YIN, BOB, 1275 Torrey Pines Rd., La Jolla, CA 92037, (858) 454-2342, E-mail: ryin1@san.rr.com

YOUNG, HERB, 14550 Stone Ave. North, Shoreline, WA 98133-6218, (206) 364-8327

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Website at: http://www.sandiegoshellclub@terryarnold.net
E-mail: cmhertz@pacbell.net

PROGRAM

Fossil Marine Mollusk Fauna of Downtown San Diego: Results of New Excavations

George Kennedy, paleontologist with Brian F. Smith Associates, will give an illustrated program discussing his finds during recent environmental work in the downtown San Diego area.

Meeting date: March 18, 2004

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting 19 February 2004

The meeting was called to order at 7:40 p.m. by President John LaGrange. The minutes of the last meeting, as published in *The Festivus*, were accepted. Items for the Club Auction/Potluck, to be held on April 19, were solicited from the membership. Wes Farmer, new Botanical Garden Foundation Representative, reported that our meeting site has been secured for the next two years. Treasurer Silvana Volero reported continued solvency. Next month George Kennedy will talk to us on fossil mollusks from San Diego. Jeremy Jackson is scheduled for the next meeting. Three guests were present and introduced themselves as associates of the evening's speaker.

Vice President Larry Lovell introduced Bonnie Becker, a PhD student of Scripps Institution of Oceanography and a marine biologist at Cabrillo National Monument. Her undergraduate work was done at Harvard, where she graduated cum laude. Her talk was entitled "Why do we care about the chemistry of larval mussel shells?" and incorporated a slide presentation on the importance of knowledge on larval mussel shells. Her work has been performed along 1½ km of shoreline located on the western and southwestern perimeter of Cabrillo National Monument in San Diego. There, along with 200 volunteers, she has supervised ecological monitoring of 13 key species. Two times a year "photo plots" are examined at the same locations, data is retrieved, and statistics are compiled. Mussel populations in two of the three zones monitored have crashed. The third and most heavily trafficked zone shows an increase in mussel population. In trying to find the cause of the mussel pattern she has considered pollution, invasion of *Acanthina lugubris*, natural variation, and lack of recruits. The lack of recruits has interested her the most.

She then described the life cycle of *Mytilus* species. Trace elements in the larval shell help track the journey of the *Mytilus* larvae. With this information she is trying to answer the questions concerning the loss of *Mytilus* from this area.

Much discussion generated from the audience, some of whom were longtime divers and familiar with local coasts. It was revealed that San Diego Bay today is not polluted as it was many years ago. Potential volunteers for the mussel monitoring project can reach Bonnie at bonnie_becker@nps.gov.

The meeting adjourned at 8:40 p.m. followed by a coffee hour with cookies provided by Larry Lovell.

Nancy Schneider

Additions and Changes to the 2004 Roster

Additions

Anderson, Roland, 2000 Minor E. #8, Seattle, WA 98102, e-mail: roland.anderson@ci.seattle.wa.us, Ph. 206-329-5815

Lonhart, Steve, Monterey Bay National Marine Sanctuary, Sanctuary Integrated Monitoring Network (SIMON), 299 Foam St., Monterey, CA 93940, Ph. 831-647-4222, e-mail: stevelonhart@noaa.gov

Smithsonian Institution Libraries, NHB 25 MRC 154, PO Box 37012, Washington, D.C. 20013-7012

Wise, John, Dept. of Malacology, Houston Museum of Natural History, One Hermann Circle Dr., Houston, TX 77030-1799, Ph. 713-639-4677, FAX 713-523-4125, e-mail: jwise@hmns.org

Woolsey, Mary Jo (Jody), 3717 Bagley Ave. #206, Los Angeles, CA 90034-4148, Ph. 310-839-1604, e-mail: mjwoolsey@earthlink.net

Changes of address

Barwick, Kelvin, City of San Diego, EMTS Laboratory, 2392 Kincaid Rd., San Diego, CA 92101-0811, Ph. 619-758-2337

Velarde, Ron, City of San Diego, EMTS Laboratory, 2392 Kincaid Rd., San Diego, CA 92101-0811, Ph. 619-758-2331 or 758-2350

Changes of e-mail

Goldammer, Marilyn, e-mail: mimigold@earthlink.net

Everson, Gene, e-mail: supersheller@insightbb.com

Jones, Seth, e-mail: sjones@merkelinc.com

McClincy, Richard, e-mail: richard.mcclincy@akerkvaerner.com

Change of area code

Voso, Ed, Ph. 619-469-8308

Greater San Diego Science & Engineering Fair

The San Diego Shell Club will again participate in the Science Fair on March 24th. The Club's judges will be Terry Arnold, Chairperson; Larry Lovell and John LaGrange. The Club's winner will be invited to share an overview of his/her project with the membership and receive the Club's book gift.

GROWTH SERIES OF *QUOYULA MONODONTA* (BLAINVILLE, 1832, *EX* QUOY & GAIMARD MS) (GASTROPODA: CORALLIOPHILIDAE), FROM THE GOLFO DE CALIFORNIA, MÉXICO

JUAN C. SOLIS-BAUTISTA,[1] LUIS E. CALDERÓN,[2*] & HECTOR REYES-BONILLA [3]

[1] Departamento de Biología Marina. Universidad Autónoma de Baja California Sur. Carretera al sur Km 5.5. Apartado Postal 19-B. La Paz, Baja California Sur, 23080 México. E-mail: solisjcb@hotmail.com
[2]CICESE. Departamento de Ecología. Carretera Tijuana-Ensenada Km 107. Ensenada, Baja California. Mexico. E-mail: leca@cicese.mx
[3]Universitv of Miami, Rosentiel School of Marine and Atmospheric Science. Division of Marine Biology and Fisheries, Miami, Florida, USA. E-mail: hreyes@rsmas.edu
[*]**Corresponding author.** Mailing address: P.O. Box 430222, San Ysidro, CA 92143-0222, USA.

The shell of most gastropods is taxonomically important given that it allows differentiation among species. It is also useful to understand evolutionary relationships among taxa. However, in many cases the juveniles of larger species vary in shape, color and markings from the adults, misleading proper identification (Kaiser, 1999; 2001).

Quoyula monodonta (Blainville, 1832, *ex* Quoy & Gaimard MS) is a corallivore widely distributed from the Indo-Pacific to the west coast of America (Natale, 1982). Guzmán (1988) estimated at Isla Caño, Costa Rica, that an individual of this species can consume up to 0.64 cm^2 of coral per day. The identification of this species is based on its globose shell, white outside, purple inside and usually more intense purple on the columella (Keen, 1971) (Figures 3, 4a-6a,b). There is a vivid controversy regarding the name of this species, since some authors claim that *madreporarum* is the name and *monodonta* is the synonym. However, that issue is out of the scope of this paper.

Study material was collected between 1997 and 1998 at Punta Arena de la Ventana, Golfo de California (24º02'41.1"N, 109º49'31.1"W). Live collected *Quoyula monodonta* are normally found associated with the hard coral *Pocillopora.* In order to find the smallest sub-juvenile specimens, the coral head had to be extracted from *in situ* and carefully checked under the stereoscope whereby all individuals of *Q. monodonta* were removed.

We found 847 specimens, ranging from 2.1 to 28 mm (mean ± standard error = 10.5 ± 0.14 mm) (Figure 1). We found no correlation between the size of the columellar tooth and total length of the shell (Figure 2). The purple color is very variable and independent of size too. Figure 3 shows that ornamentation is remarkable in juveniles, but Figures 4a,b - 6a,b demonstrate that it vanishes as the organisms get older. The first spiral is sharp in some organisms but blunt in others, with no correlation with size (Figures 5a & 6a; Table 1).

So far, there are very few published papers on growth series of mollusks from the eastern Pacific (Kaiser, 1999). Here we present a growth series comprised of individuals from 2.9 to 28.1 mm total length. This size range includes sub-juveniles to adults, keeping in mind that at first maturity the shell size is 15 mm (Solis-Bautista, 2003). In the growth series presented here we corroborate that neither the purple interior color nor the presence of the columellar tooth are consistent features. This may indicate that the species has a large genetic plasticity, but molecular studies must be conducted to prove it. It is noteworthy that individuals from the same coral head exhibited that variation.

All specimens figured herein have been placed in the molluscan collection of the Santa Barbara Museum of Natural History.

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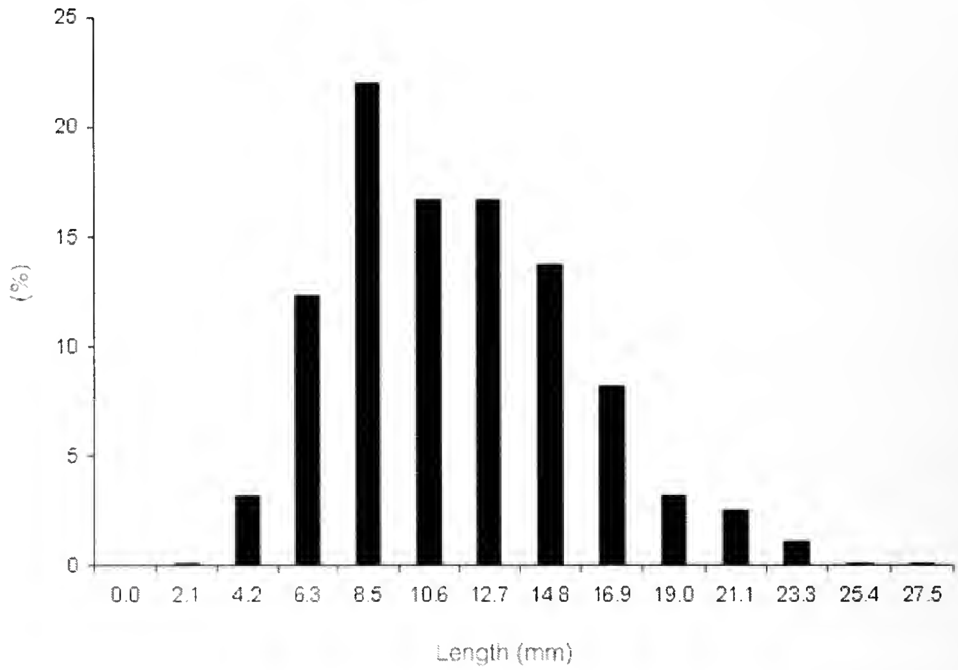

Figure 1. Relative frequency distribution of *Quoyula monodonta* collected at La Ventana, Golfo de California. N=847.

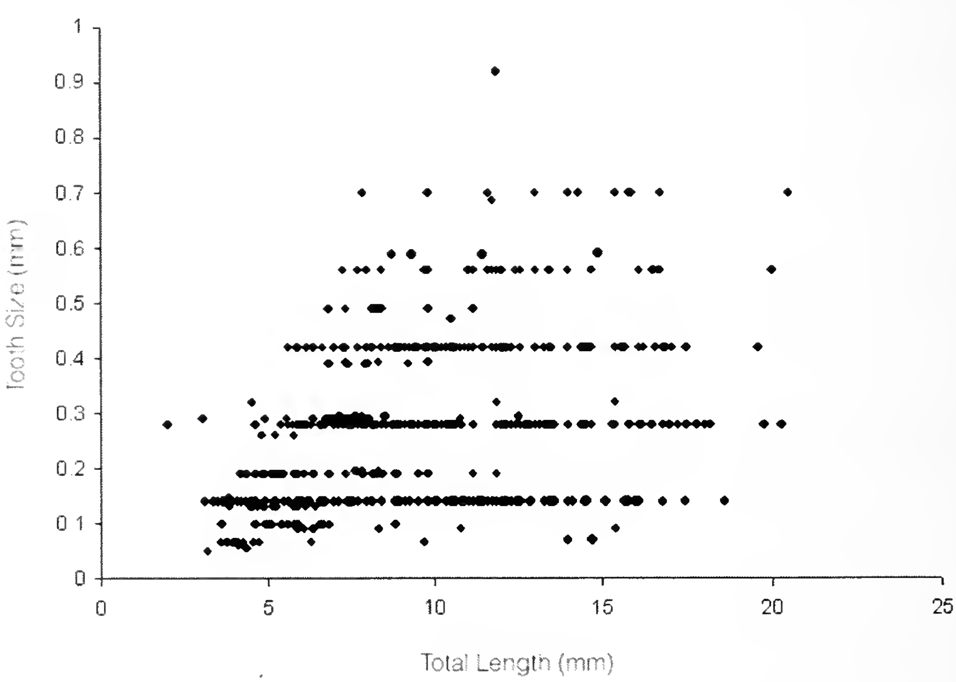

Figure 2. Colemellar tooth size vs total length of *Quoyula monodonta*. N=666.

Figures 4a,b-6a,b. Dorsal and ventral views of *Quoyula monodonta*. To check sizes refer to Table 1. **(4a,b)** Left most shell is individual number one in Table1, next is number 2 etc. **(5a,b)** Left most shell is individual number six in Table 1, next is number seven etc. **(6a,b)** Left most shell is individual number 10 in Table 1, next is number 11 etc. Photo: D.K. Mulliner.

improved earlier versions of this paper. All photos are by David K. Mulliner.

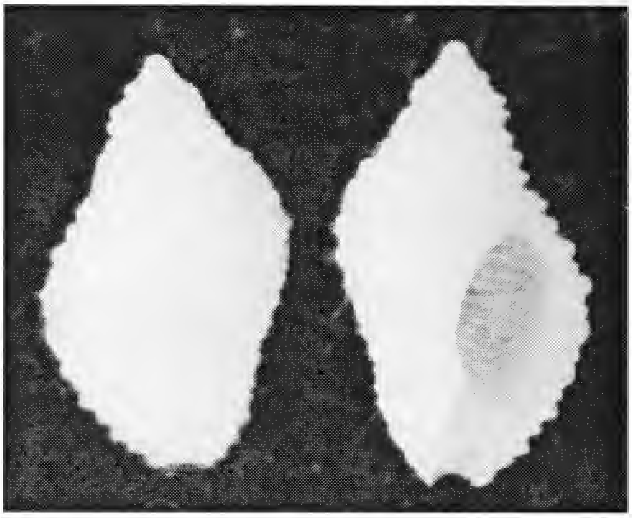

Figure 3. Dorsal and ventral views of the smallest specimen of *Quoyula monodonta* collected. This is individual number one in Table 1. Photo: D.K. Mulliner.

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Table 1. Characteristics of *Quoyula monodonta* shells.

Total Length, mm	Spine	Ornamentation	Color	Shell Shape
2.91	Present	Evident	Absent	Not clear
6	Reduced	Diffuse	Partial	Globose
7.26	Present	Diffuse	Absent	Globose
8.1	Reduced	Evident	Partial	Globose
12.8	Prominent	Absent	Absent	Globose
14.25	Present	Diffuse	Absent	Elongated
16.55	Reduced	Diffuse	Partial	Globose
17.9	Small	Diffuse	Partial	Globose
19.68	Absent	Absent	Partial	Elongated
22.9	Small	Absent	Two colors	Globose
22.4	Reduced	Absent	Two colors	Globose
26.19	Small	Absent	Total	Globose
28.1	Reduced	Absent	Partial	Elongated

NEW DISTRIBUTIONAL RECORDS FOR PANAMIC PROVINCE TURRIDAE (GASTROPODA)

CAROL SKOGLUND[1]

Santa Barbara Museum of Natural History
2559 Puesta del Sol Road, Santa Barbara, California, 93105-2936, USA

The many species of Panamic Turridae are frequently small, hard to identify, and can be found both intertidally and by dredging offshore. Among many workers on the family were Dall (1919), Pilsbry & Lowe (1932) and Hertlein & Strong (1951). A major revision of Panamic Province Turridae higher taxa was completed by McLean (1971). The same year, in preparation for the new book by Myra Keen, McLean and Poorman described 53 new species, while Shasky (1971) described an additional 10 species. McLean, *in* Keen (1971), treated a total of 300 species of Panamic Province turrids. Since 1971 there have been changes in genus allocation, species from other parts of the world have been discovered in the province, new synonyms have been discovered, old synonyms have been made valid species and new species have been described. In addition, several papers have added to our knowledge of distribution.

Turrids have always been of exceptional interest to me, partly because some species can be found in great numbers on sand flats and partly because so many species look so similar. Forty years of searching, both intertidally and by dredging, has resulted in the over 900 lots now in my collection. Some of these shells have yet to be described. The late Roy Poorman was a friend over these years, and we spent many hours together working on problem species. His help with identifications was of great value.

New distribution information is given herein for 52 species (Table 1).They were self collected except for the nine marked with asterisks. Keen (1971) and Skoglund (2002) were used for currently known distributions within the family.

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[1]Mailing address: 3846 E. Highland Avenue, Phoenix, AZ 85018, USA.

TABLE 1: New Distribution Information for 52 Panamic Turrid Species

Species	**New records**	**Depth**
**Calliclava aegina* (Dall, 1919)	Los Frailes, Baja California Sur, México	50 to 66 m
Calliclava alcmene (Dall, 1919)	Off Punta San Antonio, Sonora, México	60 to 90 m
Calliclava lucida McLean & Poorman, 1971	South of Los Frailes, Baja California Sur, México	8 to 23 m
Calliclava subtilis McLean & Poorman, 1971	Isla Saboga, Islas Las Perlas, Panamá	20 to 35 m
Kylix ianthe (Dall, 1919)	Off Punta San Felipe, Baja California, México	15 to 20 m
Kylix impressa (Hinds, 1843)	Punta Juluapan, Bahía Santiago, Colima, México	30 to 60 m
Kylix paziana (Dall, 1919)	Bahía de los Angeles, Baja California, México Off Bahía San Carlos, Sonora, México	20 to 40 m 15 to 30 m
**Kylix rugifera* (Sowerby, 1834)	Off Isla Coiba, Golfo de Chiriquí, Panamá	2 to 10 m
Kylix zacae Hertlein & Strong, 1951	Off Isla Smith, Bahía de los Angeles, Baja California, México	120 to 170 m
Imaclava asaedai (Hertlein & Strong, 1951)	Off Santispac, Bahía Concepción, Baja California Sur, México	8 to 15 m
Leptadrillia elissa (Dall, 1919)	Bahía Carazal, Colima, México	75 m
**Agladrillia gorgonensis* McLean & Poorman, 1971	Punta Juluapan, Bahía Santiago, Colima, México	30 m
Drillia acapulcana (Lowe, 1935)	Cabo Tepoca, Sonora, México	20 to 30 m
Drillia aerope (Dall, 1919)	South of Tetas de Cabras, Sonora, México	22 m
Drillia cunninghamae McLean & Poorman, 1971	Bahía Manzanillo, Colima, México	10 to 30 m
Globidrillia ferminiana (Dall, 1919)	Estero San Jose, Guerrero Negro, Baja California, México	intertidal
Splendrillia lalage (Dall, 1919)	Bahía de los Angeles, Baja California, México	20 to 40 m
Bellaspira acclivicosta McLean & Poorman, 1971	Bahía de los Angeles, Baja California, México Cabo Tepoca, Sonora, México	20 to 40 m 20 to 30 m
Bellaspira melea Dall, 1919	Off Isla Smith, Bahía de los Angeles, Baja California, México	120 to 170 m
Fusiturricula armilda (Dall, 1908)	Off Isla Smith, Bahía de los Angeles, Baja California, México	120 m
Cochlespira cedonulli (Reeve, 1843)	Off Isla Smith, Bahía de los Angeles, Baja California, México	183 m
Crassispira cortezi Shasky & Campbell, 1964	Cabo Tepoca, Sonora, México	20 to 30 m
Crassispira chacei Hertlein & Strong, 1951	Off Isla Smith, Bahía de los Angeles, Baja California, México	120 to 183 m
Crassispira rugitecta (Dall, 1918)	Off Isla Smith, Bahía de los Angeles, Baja California, México Southeast of Punta San Antonio, Sonora, México	120 to 183 m 60 to 90 m
Crassispira martiae McLean & Poorman, 1971	Playa Jacó, Puntarenas Province, Costa Rica	intertidal, dead
Crassispira currini McLean & Poorman, 1971	Punta de Mita, Nayarit, México	intertidal
**Doxospira hertleini* Shasky, 1971	Off Playas de Villamil, Guayas, Ecuador	no data
Lioglyphostoma ericea (Hinds, 1843)	Off Isla Smith, Bahía de los Angeles, Baja California, México	120 to 170 m
Lioglyphostoma rectilabrum McLean & Poorman, 1971	Off Isla Danzante, Golfo de California, México	60 to 90 m

Zonulispira zonulata (Reeve, 1843)	San Felipe, Baja California, México	intertidal
Compsodrillia albonodosa (Carpenter, 1857)	Bahía Tenacatita, Jalisco, México	6 to 20 m
Pilsbryspira albinodata (Reeve, 1843)	Punta de Mita, Nayarit, México	45 to 75 m
**Pilsbryspira arsinoe* (Dall, 1919)	Ensenada de los Muertos, Baja California Sur, México	15 m
Cymakra granata McLean & Poorman, 1971	Off Isla Smith, Bahía de los Angeles, Baja California, México	120 to 183 m
Diptychophlia occata (Hinds, 1843)	Off Isla Smith, Bahía de los Angeles, Baja California, México	120 to 170 m
Clathurella maryae Mclean & Poorman, 1971	Southeast of Punta San Antonio, Sonora, México	60 to 90 m
Clathurella rava (Hinds, 1843)	Off Isla Smith, Bahía de los Angeles, Baja California, México Santa Cruz, Nayarit, México San Vincente, Bahía Caraquez, Ecuador	20 to 183 m intertidal intertidal
Glyphostoma thalassoma (Dall, 1908)	Off Isla Smith, Bahía de los Angeles, Baja California, México Off Isla Danzante, Golfo de California, México	120 to 170 m 120 m
Kurtziella cymatias (Pilsbry & Lowe, 1932)	Off Bahía San Carlos, Sonora, México Bahía Tenacatita, Jalisco, México	15 to 30 m 6 to 20 m
**Tenaturris verdensis* (Dall, 1919)	Isla Danzante, Golfo de California, México Venado Beach, Canal Zone, Panamá	60 to 90 m intertidal
Cacodaphnella delgada Pilsbry & Lowe, 1932	Mazatlán, Sinaloa, México Bahía Panamá, Panamá	intertidal dredged
Euclathurella carissima (Pilsbry & Lowe, 1932)	Puerto Lobos, Cabo Tepoca, Sonora, México	intertidal
Thelecythara floridana Fargo, 1953	Off Bahía la Cholla, Sonora, México	6 to 16 m
**Pyrgocythara angulosa* Mclean & Poorman, 1971	San Felipe, Baja California, México Bahía la Cholla, Sonora, México Bahía La Paz, Baja California Sur, México Bahía de Cuastecomate, Jalisco, México	intertidal intertidal intertidal 12 to 30 m
Pyrgocythara danae (Dall, 1919)	Barra de Navidad, Jalisco, México	3 to 45 m
**Pyrgocythara helena* (Dall, 1919)	Bahía de los Angeles, Baja California, México Venado Beach, Canal Zone, Panamá	20 to 40 m intertidal?
Pyrgocythara melita (Dall, 1918)	Bahía de Cuastecomate, Jalisco, México	12 to 30 m
Pyrgocythara phaethusa (Dall, 1919)	Bahía la Cholla, Sonora, México Kobbe Beach, Canal Zone, Panamá	intertidal intertidal
Ithycythara penelope (Dall, 1919)	Bahía la Cholla, Sonora, México Bahía de los Angeles, Baja California, México	intertidal 20 to 40 m
Daphnella allemani (Bartsch, 1931)	Cabo San Lucas, Baja California Sur, México	intertidal
Daphnella levicallis Poorman, 1983	Ensenada de los Muertos, Baja California Sur, México	23 to 39 m
**Philbertia shaskyi* Mclean & Poorman, 1971	Bahía Magdalena, Baja California Sur, México Off Isla Smith, Bahía de los Angeles, Baja California, México	no data 120 to 183 m

EIGHTH ANNUAL SCUM MEETING

The eighth annual meeting of the Southern California Unified Malacologists (SCUM) was held on 24 January at the Cabrillo Marine Aquarium, San Pedro, California. The meeting was hosted by Ron Velarde of the Marine Biology Laboratory, Metropolitan Wastewater, San Diego. Originally scheduled for San Diego, the meeting was transferred to San Pedro because Ron's laboratory was moving to a new site. Refreshments were available at 8:30 a.m., and the meeting officially convened at 9:00 a.m. There were approximately 36 attendees (Figure 1).

Suzanne Lawrence-Miller of the Cabrillo Marine Aquarium welcomed the attendees, discussed the 70-year history of the aquarium and briefed us on the new expansion currently in progress. There followed a round of introductions by the attendees with each giving a brief discussion on their activities during the past year.

Ron Velarde mentioned that his group was involved in the third Bite survey which included sampling in deeper water (to 1000 feet) and comparing the data to that obtained in previous Bite surveys in '94 and '98. Mary Stetcheson of the Natural History Museum of Los Angeles County (LACM) reported inputting taxonomic identifications of Pleistocene fossils into a data base; 100,000 are currently entered. Lindsey Groves of LACM talked about his most recent papers on fossil cowries and his upcoming papers on Crawford Cate and Jean Cate to be published in *The Festivus*. George Davis of LACM has been busy inputting data on crustaceans to the data base, with approximately 27,000 entries to date. Jim McLean, also of LACM, gave an update on how his book on the gastropods from Alaska to Baja California is progressing. He has an assistant working on illustrations and he has received funding through a donation by Twila Bratcher-Critchlow. The book will be published in two volumes and will include descriptions of approximately 500 new species. Jim also mentioned that his work on an updated Light's Manual has been completed. Brett Raines, an environmental engineer and research associate at LACM, has been working on the Pectinidae and also on the micromollusks of Easter Island. To date, he has doubled the known species from Easter Island. Kelvin Barwick, City of San Diego, EMTS Laboratory, is in the process of describing a new *Akera* from off San Diego. Nancy and Bill Schneider discussed their collecting of fossils from a Pleistocene Mulegé Formation and their donations of such fossils to the Mulegé Community Museum. They would also like to donate similar material to the San Diego Natural History Museum but need help in obtaining a collecting permit. Carole and Jules Hertz discussed their work on *The Festivus* and on editing and proofreading a new book by Barry Wilson and Peter Clarkson on Australian cowries in the genera *Zoila* and *Umbilia*. Wes Farmer discussed a trip to Punta Cabras, Baja California and had a poster that he had made with pictures of fossils from that area. Yvonne Albi is currently working on rudists and has submitted a paper to *The Festivus*. Most of the other attendees just mentioned their areas of interest with some giving a preview of more extensive presentations they were prepared to make.

After a brief break, the meeting continued with illustrated presentations. Doug Eernisse of California State University, Fullerton, was the first presenter. He showed a slide of a new Ordovician spiny chiton, *Echinochiton dufoei*, that had been published in the Journal of Paleontology. He also published a paper in December on morphology versus molecules based on analysis of DNA sequences and showed some of the data. The paper, with coauthors, "Towards a phylogeny of chitons (Mollusca, Polyplacophora) based on combined analysis of five molecular loci," was published in Organisms Diversity & Evolution. He is back working on chiton brooders and is also looking for geologic evidence to support the hypothesis of a mid-Pacific seaway across what is now Baja California. Doug is also working with Roger Clark to revise the chiton chapter in Light's Manual.

The second presenter was Mary Jane Adams, a medical doctor, scuba diver and photographer. Because of her combined skills she was allowed to participate in an expedition to the Phoenix Islands. These Islands belong to Kiribati (Kiribas) and are 600 miles east of the Gilbert Islands. It was a five day trip from Fiji. She showed slides of the beautiful uninhabited islands and their beaches and many underwater photographs of unusual fish. One member of the expedition was Jerry Allen, world-renowned ichthyologist, who apparently can identify 2500 fish species by sight. Four new fish species were found on the expedition.

The last speaker of the day was Dave Jacobs from UCLA. He spoke about late Cenozoic phytogeography

Figure 1. Attendees at the SCUM annual meeting, 24 January 2004. Group at Cabrillo Marine Aquarium. Photo: George Davis.

and diversion. He discussed a late Miocene upwelling which occurred about 12 million years ago and also talked of Pliocene cooling and tectonics. He is working on two cryptic species, *Transennella tantilla* and *Transennella confusa*, that are estuary relics. The genus is now considered *Nutricola*.

The meeting was adjourned and attendees were allowed to tour the Cabrillo Aquarium. The attendees were also invited to participate in a tide pool trip later in the afternoon. Ron Velarde has volunteered to host the next SCUM meeting in their new facilities in San Diego, probably in January 2005.

Jules Hertz

THE SAN DIEGO SHELL CLUB'S ANNUAL AUCTION/POTLUCK - 2004

The Club's annual Auction/Potluck on the evening of April 17th is the Club's biggest, fun, social event of the year – and its only fund raising event as well!

It will again be held at the community room of Wes Farmer's condo and begin at 5:00 p.m. with Dave's Punch and viewing of the auction material, dinner at 6:00 p.m. and the voice auction beginning promptly at 7:00 p.m. (Details and map with the April issue.)

It is important for members to look hard at their collections and donate generously to the auction. Its success depends on the quality of the shells donated. Please either bring your donation to the March meeting or call Carole Hertz (858-277-6259) and arrange for its pickup.

And most important of all – mark your calendars and plan to attend!!

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Website at: http://www.sandiegoshellclub@terryarnold.net
E-mail: cmhertz@pacbell.net

COME TO THE ANNUAL AUCTION/POTLUCK
Saturday evening, April 17th
Festivities begin at 5 P.M.
(See map enclosed for directions and page 36 for further information.)

NO REGULAR MEETING THIS MONTH

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting 18 March 2004

The meeting was called to order at 7:40 PM by President John LaGrange. The minutes of the last meeting as published in *The Festivus* were corrected as follows: April 17th, not 19th, is the date of the Annual Shell Auction; Ron Velarde's Bight Survey was inadvertently spelled 'bite' in the article about the Eighth Annual SCUM Meeting. The minutes were approved as corrected.

The details of the Auction are: 5 PM, Dave's Punch will be served; 6 PM, Potluck Dinner; 7 PM, the Voice Auction. Shell donations are needed. The proceeds from the auction provide funding for club activities. Any board member can be notified for pickup of shell donations.

It was announced that Margaret "Peg" Mulliner has been hospitalized for three weeks and is now in rehab. Many know her and may wish to remember her with a card or phone call. Marilyn Goldammer, Librarian, noted new additions to the library.

Jules introduced the speaker of the evening, Dr. George Kennedy. His Bachelor's Degree is from San Diego State University, Master's and Doctorate from University of California at Davis. He has worked with the Geological Survey; the Paleontology Department of the Los Angeles County Museum; San Diego State University; and is currently associated with Brian F. Smith Associates, a private company that monitors building sites for environmental reasons. He explained how building contractors are required by law to have permits to build on archeologically or paleontologically sensitive sites. Most sites in San Diego are Pleistocene in age; others range from Pliocene through Eocene to Cretaceous time. Some coral fossils are now used for dating purposes because they contain uranium. Fossil shells can be dated by the extent of amino acid racemization whereby L-amino acids convert to a fifty-fifty ratio of D- and L-forms through time.

Marine terraces in San Diego may be identified because 120,000 years ago the sea level was 6 meters higher than the present. There have been two high-water sea stands in the San Diego Pleistocene; a cold-water fauna dominated that of 80,000 years ago and is represented by the Bird Rock Formation; a warm-water fauna occurred 120,000 years ago, represented by the Nestor Terrace and the Bay Point Formation whose type locality is at Crown Point. Straight-sided excavations for underground parking downtown often reveal very clear sediments, whose age may be determined by certain index fossils such as *Euvola vogdesi* or *Megapitaria squalida* for the Mid-Pleistocene. Excellent slides showed many of the local fossil species encountered in his paleo monitoring.

George's work is considered 'salvage' paleontology and notable finds are placed in the Natural History Museum of Los Angeles County.

The meeting was adjourned at 9 PM, followed by a coffee hour with cookies provided by the LaGranges and the Hertzes.

Nancy Schneider

Come to the Annual Auction/Potluck Saturday, 17 April 2004

There are wonderful treasures to be auctioned at the upcoming San Diego Shell Club Auction/Potluck. You will just have to come see and buy!! For the cowrie lovers there are exceptional specimens such as *Cypraea leucodon, C. marginata ketyana bataviensis, C. guttata* and *C. valentia*. There is a perfect 9-inch *Tonna variegata*, some gorgeous muricids, a *Lambis pilsbryi* from the Marquesas, shell paintings, and fantastic books such as Abbott's 1974 *American Seashells*, a must for anyone who doesn't have this out-of-print book. These are only a few of the choice offerings to be had.

The auction begins at 5 PM with "Dave's punch" and soft drinks as you meet with friends and view the voice auction specimens and the tables of silent auction material. The potluck dinner begins at 6 PM and the voice auction starts PROMPTLY at 7 PM.

Besides being a great, fun occasion enjoyed by all, it is an important fundraiser for the San Diego Shell Club, a non-profit organization. Funds from the auction support *The Festivus*, the Club's peer-reviewed publication, student grants in malacology, science fair prizes, and the Club's circulating library. If you can donate to the auction, contact Carole Hertz, auction chair, at <cmhertz@pacbell.net> or call 858-277-6259. Notify her of your donation so it can be included on the auction list which all participants receive.

The auction is being held at Wes Farmer's clubhouse (see the map included with this issue). We'll hope to see you there.

A FISHERMAN EXPLORES CLIPPERTON ISLAND

BILL SCHNEIDER

12829 Carriage Road, Poway, California 92064-6045, USA

Clipperton Island, believed to have been discovered in 1521 by Ferdinand Magellan, is approximately 10° north of the equator and 670 miles southwest of Acapulco, México. Its nearest neighboring atoll is 2600 miles away. It is a treacherous island with rough seas inhabited by seabirds and millions of land crabs (Skaggs, 1989). It is a unique place with an interesting history. The island was named after the English pirate Clipperton, who sighted it in 1705 without landing. Clipperton spent his time raiding the Spanish galleons crossing the Pacific from the Spice Islands. Numerous shipwrecks occurred at Clipperton during the passing of time.

Clipperton atoll was formed by the build-up of coral on the rim of an old volcano. The beach on the atoll is composed not of silica sand, but of sand created from the surrounding coral. This sand is extremely white and bright. It has been rounded by abrasion in the rough surf and then polished smooth. Clipperton is a roughly circular coral atoll 50 to 100 yards across (where we landed) and encloses a stagnant, brackish lagoon said to be 350 feet deep, formed from the crater of the volcano. In 1981, when Jacques Cousteau dove the lagoon to make a video, the hydrogen sulfide in the deep water near submerged vents burned the diver's skin and eyes.

Altitude of the island (where we landed) is about fifteen feet. Sixty-two foot high Clipperton Rock arises from the flatness of the atoll on the southeast side. It is composed of altered trachyte and is thought to be the remains of the original volcanic plug. The rock contains 54% silicon dioxide and is of igneous origin (Hertlein & Emerson, 1953).

During the late Nineteenth Century, a guano mining industry existed on Clipperton. For a period of thirty years, hundreds of American workers processed bird droppings for use as fertilizer. Many of these new residents became crazed from living and working in the tropical heat on a normally uninhabited island.

A Mexican garrison had been stationed on Clipperton in the early 1900s. They received their supplies from mainland México on a monthly basis. During the Mexican Revolution the supply boat was forgotten and the people had to survive on boobies, booby eggs and coconuts. One day, the soldier in charge thought he saw a ship approaching so he and his men attempted to take a skiff out to meet it. The women and children watched from shore as the rough surf toppled the skiff and all hands drowned. It was following this incident that the terrorizing of the marooned women occurred by the self-proclaimed "King of Clipperton." These women finally killed the man in July 1917 because of his domination and cruelty (Skaggs, 1989).

Before World War II, President Franklin Roosevelt made several trips to Clipperton for the purpose of fishing for tuna. During World War II, the U.S. Navy occupied the island and lost an LST there as a result of the rough surf conditions. Ammunition was offloaded and left on the beach and can still be seen today.

This remote atoll in the eastern Pacific is seldom visited. Being located on the open sea "results in heavy surf which usually beats upon the shores. Abrupt changes in the weather may give rise to sudden squalls with attendant low visibility. This condition together with lack of shelter and very poor anchorage, discourages the mariner from spending much time in that vicinity" (Anon., 1897). Long-range fishing boats from San Diego, California make yearly trips to Clipperton sportfishing for tuna. Because of hurricane season, these trips are made in the winter.

I signed up to make a trip to fish giant tuna at Clipperton atoll. It would be a once-in-a-lifetime trip. Our boat, the 105 ft. *Red Rooster III,* was scheduled to leave May 8, 2003, returning May 28th. We were hoping to catch yellowfin tuna, 200 pounds and up. I already had 200 pounders to my credit from previous trips to the Revillagigedo Islands and was now hoping for the elusive 300 pounder. We were told that we would have the opportunity to go ashore when we reached our destination – if conditions permitted.

May 15th at 2 a.m. was our arrival at Clipperton and we immediately began to fish. We had been en route for seven days, leaving from San Diego and traveling 1700 miles. At Hurricane Bank, on our way, we had caught 143 wahoo, called ono by the Hawaiians. Wahoo is a favorite of the restaurants and an excellent eating fish. But the big fish weren't biting at Clipperton - only small tuna up to 100 pounds appeared.

On Day 3 we went ashore. This was a real experience. The surf was down after lunch and we decided this was the time to try it. The crew lowered the 14-foot skiff and four anglers at a time donned life vests (a safety requirement) and climbed down the boarding ladder into the skiff. When we got within 25 yards of the beach we had to jump backward into the water and either wade or swim to shore. I am tall enough that I was able to wade in. After we arrived on the beach, a tall 6'6" fisherman took all the life vests back to the skiff for the next group of anglers. The projection was for a four-hour stay on the island.

Our landing site was near the old U.S. Navy LST landing craft left there during World War II. On shore was a munitions dump from the offloaded LST. Nearly sixty years later, rusted truck parts and forklifts were still in the area. Boobies nested amongst the shell casings and thousands of orange land crabs, four to five inches in size, crawled over everything. You could walk right up to the boobies, within a foot, before they would rise up and spread their wings in an effort to scare us away. They acted as though they were not afraid of us. Not many of the crabs cared enough to scurry away. They would put up their claws if we got close, but then would back up and return to what they were doing.

We came across a shipwreck on the atoll as we were walking around. Various flotsam and jetsam were found on the beach. A long bamboo pole with two floats had washed in, a plastic fuel can lay on the beach. I picked up a plastic cap from a child's doll, well abraded from the surf. Beach combing was great. The beach was literally covered with shells, perhaps ten beachworn shells per square foot. *Conus ebraeus* was most abundant at our landing site with *Conus chaldeus* the next most common. *Drupa ricinus ricinus* rounds out the most commonly seen shells - all white with dark brown spots. Altogether 21 different species of shells were picked up off the beach. Nineteen were gastropods, only two were bivalves (see list). The two smallest species found are shown in Figures 1 and 2.

Hertlein and Emerson (1953) noted, "The preponderance of gastropods, as compared to the bivalves, as well as the decided Indo-Pacific affinity of the mollusks from this island, are all in harmony with the results of studies made by Hertlein (1937). It would seem to indicate that groups such as the Cypraeidae, Conidae, Bursidae and Cymatiidae have exceptionally long pelagic larval stages, which can tolerate current transport of considerable duration. It seems probable that most of the Indo-Pacific gastropod species reached Clipperton in a larval state by way of the Equatorial Counter Current. Whatever the agent of transport, it is significant to note the predominance of gastropods over the pelecypods ... are all attaching types of Panamic faunal association. Obviously, this suggests that in the mollusks, the larval stages of the gastropods afford the most successful means for dispersal of littoral forms across a great expanse of deep water."

After almost two hours on the island, the second captain got word from the boat by marine radio that the surf was building. He was instructed to tell all the island's visitors, about twenty of us, to get ready to leave immediately. The skiff came for us and we waded or swam out, four at a time, and went back to the *Red Rooster III* that was anchored a few hundred yards out from the beach. All of us hoped to be able to go ashore again at another time.

On our fifth day at Clipperton, we saw a warship approaching. It turned out to be French. They radioed our boat and ordered us to stop fishing and to not pull anchor. A zodiac-type inflatable was sent over with seven armed French marines in the boarding party, accompanied by their helicopter. One of the French officers was a captain who proceeded to check the boat's papers and then each of our passports. They told our captain, who informed us, that they were based out of Tahiti. The problem seemed to be that our boat should have had written documents onboard authorizing it to fish there. All fishing stopped by 9 a.m. It was 8:30 p.m. before we received permission to resume fishing. It was a lost day.

On the next day we got word of Hurricane Andrea and that it would arrive at Clipperton Island the next morning by 11 a.m. with 55-mph winds. Everything was latched down and we left - two days early. No 300-pound fish were caught. The largest catch was 100 pounds - but this fisherman brought back shells from Clipperton!

ACKNOWLEDGMENTS

I wish to thank Dave Mulliner for his excellent photographs of the columbellid, *Sincola gibberula*, and of the tiny *Clathurella rigida* found by Jules Hertz in the vial of coral sand I brought back from the island. Jules and Carole Hertz assisted with identification of species

and urged me to report on this trip. Larry Lovell, Benthic Invertebrates Collection Manager, Scripps Institution of Oceanography, provided lots of similar species for confirmation of identifications as well as the use of his department's library. When Richard Herrmann lent me Jimmy Skaggs' excellent book on Clipperton, I knew that I wanted to travel there.

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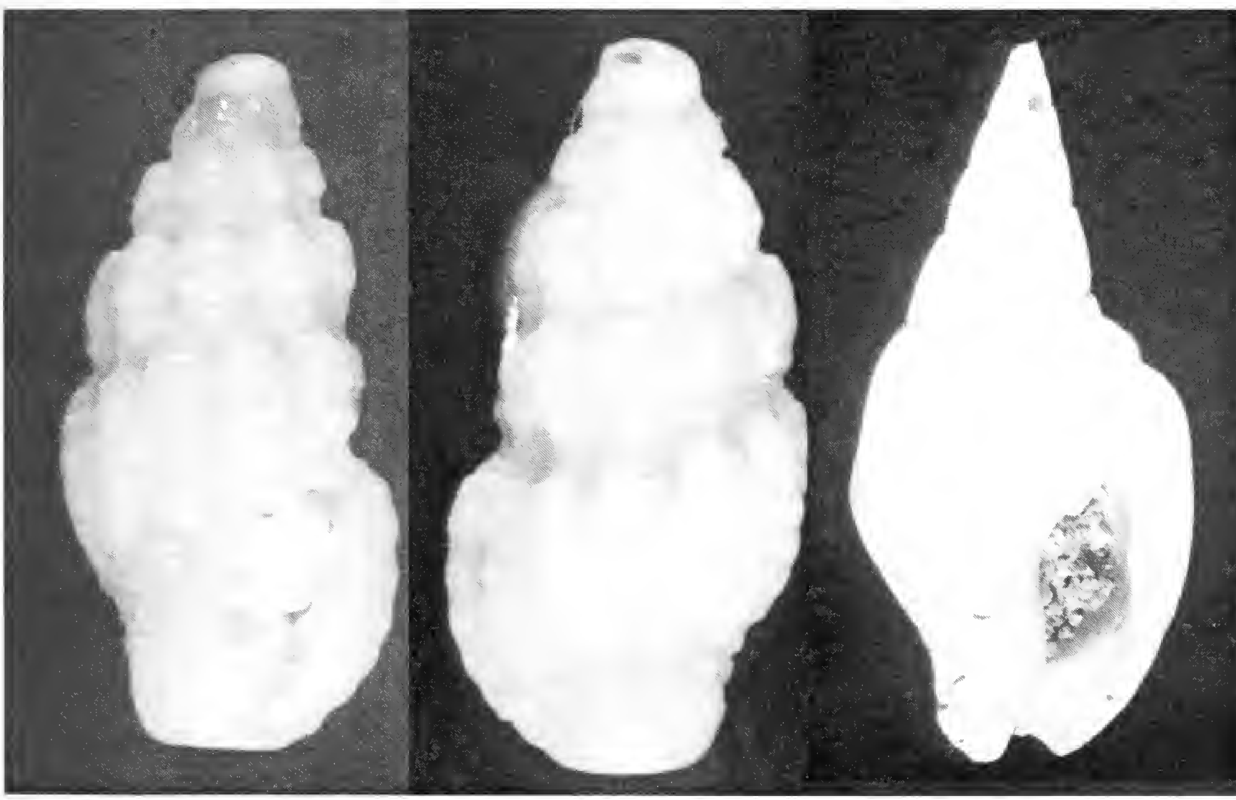

Figures 1-3 (left to right). (1,2) *Clathurella rigida* (Hinds, 1843), apertural and dorsal views of 3.8 mm shell collected empty in coral sand in intertidal zone. (3) Sincola gibberula (G.B. Sowerby I, 1832), apertural view of 13.1 mm shell collected empty in coral sand in intertidal zone. Photos: D.K. Mulliner.

MOLLUSK SPECIES FOUND ON CLIPPERTON ISLAND ON MAY 18, 2003 BY BILL SCHNEIDER

Note: With the exception of *Sincola gibberula* and the Ostreidae sp. each of the species named below has been reported by Emerson (1994) or Small (1994). All specimens collected were empty shells.

Keen no.	Species	Province
	GASTROPODA	
	LITTORINIDAE	
186	*Littoraria pintado pullata* (Carpenter, 1864)	Panamic
	VERMETIDAE	
	?*Petaloconchus* (*Macrophragma*) sp.	
	CYPRAEIDAE	
932	*Blasicrura teres* (Gmelin, 1791)	Indo-Pacific
919	*Erosaria albuginosa* (Gray, 1825)	Panamic
922	*Luria isabellamexicana* (Stearns, 1893)	Panamic
918	*Mauritia scurra* (Gmelin, 1791)	Indo-Pacific
926	*Monetaria moneta* (Linnaeus, 1758)	Indo-Pacific
	RANELLIDAE	
959	*Cymatium macrodon* (Valenciennes, 1832)	Panamic
	BURSIDAE	
—	*Bursa granularis* (Röding, 1798)	Caribbean, Indo-Pacific
	MURICIDAE	
1089	*Drupa ricinus ricinus* (Linnaeus, 1758)	Indo-Pacific
1091	*Morula uva* (Röding, 1798)	tropical western Pacific
1080	*Tribulus planospira* (Lamarck, 1822)	Panamic
	COLUMBELLIDAE	
1273	*Sincola gibberula* (Sowerby, 1832)	Panamic
	MITRIDAE	
1418	*Mitra papalis* (Linnaeus, 1758)	Indo-Pacific
	CONIDAE	
1490	*Conus chaldaeus* (Röding, 1798)	Indo-Pacific
1492	*Conus ebraeus* Linnaeus, 1758	Indo-Pacific
1500	*Conus purpurascens* Sowerby, 1833, ex Broderip MS	Panamic
1495	*Conus tiaratus* Sowerby, 1833, ex Broderip MS	Panamic
	TURRIDAE	
1776	*Clathurella rigida* (Hinds, 1843)	Panamic
	BIVALVIA	
	OSTREIDAE	
—	Ostreidae sp.	
	SPONDYLIDAE	
—	*Spondylus* cf. *linguaefelis* Sowerby, 1847	Indo-Pacific

OBSERVATIONS ON DIET AND MODE OF PREDATION IN *STRAMONITA BISERIALIS* (GASTROPODA: MURICIDAE) FROM THE NORTHERN GULF OF CALIFORNIA

GREGORY S. HERBERT

Department of Geology, University of California, Davis
Davis, CA 95616
E-mail: herbert@geology.ucdavis.edu

Stramonita biserialis (Blainville, 1832), also known in the literature as *Thais haemastoma biserialis*, is a large predatory gastropod of the muricid subfamily Rapaninae that inhabits the intertidal coastline from Baja California, México and the Gulf of California to Chile. Although this species is common, surprisingly little is known about its general biology. At present, there are few studies describing what kinds of organisms it consumes (e.g., Paine, 1966) and no studies describing how it subjugates its prey. This short note is an attempt to expand on our knowledge of the predation biology of this species based on new observations from the field and in the laboratory.

During a collecting trip to the northern Gulf of California in the summer of 2002, I was able to make some preliminary notes on *Stramonita biserialis* living along wave-swept rocky coastlines and in protected bays. I made my first observations at the CEDO (Intercultural Center for the Study of Deserts and Oceans) marine lab in Puerto Peñasco, Sonora, México, in the northeast corner of the Gulf of California, which was built adjacent to a rich intertidal shoreline made up of a heavily eroded coquina limestone (Figure B). *Stramonita* at this site were common in the large sand-filled pits and crevices of the limestone, and I documented at least 30 actively feeding adults. The most interesting discovery was of a single very large *S. biserialis* (Figure A, 81.6 mm shell length) with its aperture facing that of a turbinid gastropod, *Turbo fluctuosus* Wood, 1828. The *Stramonita* was drilling the *Turbo* not through the *Turbo's* external shell, as might be expected, but through the outer rim of the hard, calcareous operculum (Figure C), which is thinner than both the center of the operculum and the external shell of the *Turbo* (Taylor & Glover, 1999). Examination of the *Turbo* revealed evidence of chipping and chemical dissolution along the operculum's outer rim (Figure D). The hole was incomplete and rough. There was no evidence of purple or pink staining of the inside of the *Turbo*'s aperture (see Figure F), which would indicate use of anesthetizing secretions during the attack (Taylor & Glover, 1999). On the other hand, such secretions are probably not used until a drill-hole is complete and the toxins have a chance to affect the prey. The only other muricid that has been observed to drill through the calcareous operculum of gastropod prey is the rapanid *Dicathais orbita* (Gmelin, 1791) (Taylor & Glover, 1999).

Other feeding observations at CEDO included numerous groups of two to four individuals (50-60 mm in shell length) on a single bivalve, usually the venerid *Chione undatella* (Sowerby, 1835) or the arcid *Barbatia reeveana* (d'Orbigny, 1876). I collected one of these groups (including a prey *Chione*) and brought it back to the lab so that the predators' behavior could be better documented. As in the field, the animals gathered at the commissure, or bivalve lip, with the mantle cavity (site of the toxin secreting hypobranchial gland) of the snail in close proximity to the opening of the bivalve (Figure E). Overnight, the snails succeeded in penetrating and consuming the prey without drilling or other damage to the *Chione* shell. Clear mucous secretions were observed near the outer lip of the shell for each *Stramonita* during the attack, suggesting that toxins were being used (see Roseghini et al., 1996; West et al., 1994). Smaller *Stramonita* (20-50 mm shell length) at CEDO were observed feeding on barnacles, but I was not able to determine whether the barnacles were drilled, wedged open, or anesthetized.

At Estero Morúa, a mudflat embayment with several small "islands" of oysters several kilometers to the east of Puerto Peñasco, I observed a single large *Stramonita biserialis* attacking the oyster *Saccostrea palmula* Carpenter, 1857, at the commissure in a manner similar to the attacks on *Chione*. I separated predator and prey but did not see any evidence of drilling or toxins, and the prey's valves were still tightly closed. It is possible that prey subjugation was in its earliest stages.

The most recent observations were made in the laoratory. Several smaller *Stramonita*, each around 40 mm shell length, individually attacked and consumed three smaller muricids, all *Mexacanthina angelica* (Oldroyd, 1918), at the aperture using anesthetizing secretions. The secretion, a thick mucous blob that expanded in seawater to roughly 30-40 mm in diameter, was collected with a syringe and examined under a microscope revealing a clear base with streaks of blue, pink, and black (Figure F). Five other gastropod species (none belonging to the Muricidae) were present in the tank but were not attacked over a three-month period. Predation by *Stramonita* on *Mexacanthina*, a likely competitor for food resources in the rocky intertidal, thus appears to be highly selective.

DISCUSSION

What is most interesting about *Stramonita biserialis* is that this species rarely employs the tools and attack behaviors typically associated with the Muricidae, i.e., drilling predation by an individual snail through the prey's external shell (e.g., Carriker, 1961, 1981; Carriker & Gruber, 1999; Carriker et al., 1974). Drilling as a mode of predation poses two very serious problems for the average muricid. Both problems are related to the fact that drilling is extremely time consuming. Even large muricids, such as *Phyllonotus* Swainson, 1833, and *Chicoreus* Montfort, 1810, can take up to a week or more to complete a drill-hole and consume bivalve prey under ideal lab conditions (Dietl & Herbert, 2002). The muricid *Nucella lamellosa* (Gmelin, 1791) can take five days to drill a thin-shelled mussel (Carefoot, 1977). This large amount of time means that much of the animal's energy is devoted to work and maintenance instead of growth and reproduction. Animals that find ways to feed more rapidly and efficiently should, therefore, possess an edge over conspecifics in lifetime reproductive output. A potentially more lethal problem for drilling snails is exposure to other predators during drilling. Predatory crabs, fish, octopods, and other gastropods often abound in environments where muricids are found, and dead broken or drilled shells of muricids show that they are frequent targets of predation themselves (Vermeij, 1978, figs. 2.11, 2.12). Because drilling requires the driller to sit out in the open for up to a week (the entire time exposed to these predators), muricids take considerable risks every time they feed. Paine (1963) has also reported instances of *Fasciolaria tulipa* (Linnaeus, 1758) and *F. hunteria* (Perry, 1811) feeding on the bivalve *Chione elevata* (Say, 1822) that had been drilled by a muricid. Taking too long to drill and consume a prey may increase the odds that competitors will be attracted to the kill site and steal all the spoils.

If Geerat Vermeij's hypothesis of escalation is correct (Vermeij, 1987), faster and more lethal predator tactics and more potent anatomical weapons should evolve as the dangers of being a predator increase. The *Stramonita biserialis* example illustrates nicely the relatively new arsenal that muricids have evolved to speed up the predation process. Opercular drilling demonstrates that the animal is not "hard-wired" to drill through the external prey shell but can search for (and find) thinner drilling sites (see Taylor & Glover, 1999). *Stramonita biserialis*, like its cousin *S. haemastoma* (Linnaeus, 1767), also employs toxins during commissure attacks on bivalves and during aperture attacks on gastropods, which can result in death of the prey in a matter of hours rather than days (see Gunter, 1979). Although toxins are energetically costly to produce, the number of prey items a single predator could potentially take using toxins is so great that these costs are probably more than offset. Roller et al. (1995) also speculated that the toxins injected in and around the prey may deter

Figures A-E. **(A)** *Stramonita biserialis* from Puerto Peñasco, Sonora, México. Specimen is 81.6 mm in length. **(B)** Intertidal coquina limestone outside of CEDO (Intercultural Center for the Study of Deserts and Oceans) marine lab in Puerto Peñasco, Sonora, México. **(C)** *Stramonita biserialis* in intertidal limestone outside of CEDO drilling a turbinid gastropod, *Turbo (Callopoma) fluctuosus*, through the outer rim of the hard, calcareous operculum. The apertures of *Stramonita* and *Turbo* are facing one another. **(D)** Close-up of the *Turbo* operculum showing incomplete drilling (arrow) at opercular rim. **(E)** Three *Stramonita biserialis* (numbered) in a lab aquarium engaged in a "group" attack on bivalve *Chione undatella* using toxins. Photograph was taken from above. **(F)** Toxic mucous secretion produced by hypobranchial gland of *Stramonita biserialis* and collected following an aperture attack on another muricid, *Mexacanthina angelica*. *Stramonita* uses toxins to anesthetize or kill its prey so that soft parts become accessible for feeding without the predator having to drill a functional feeding hole. →


A
B
C
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F

opportunistic predators, such as *Fasciolaria*, from stealing the muricid's prey and usurping its meal. Last, *Stramonita biserialis* is capable of employing a strategy known as group foraging to take down large, difficult prey or smaller prey more quickly. Although the predator must "share" its food with others in group foraging, the ability to take larger prey or smaller prey more quickly should, again, result in higher net gains for each individual than if the same individuals had foraged separately (Brown & Alexander, 1994).

Other muricids employ additional tactics and weapons. *Muricanthus fulvescens* (Sowerby, 1834), the largest muricid in the western Atlantic, may apply brute force to pull apart the valves of clams with its foot (Wells, 1958). *Muricanthus nigritus* Philippi, 1845, a related species from the Gulf of California, grinds and chips the valve edges of clams until a hole is big enough to insert the proboscis and feed (Paine, 1966; Herbert, unpublished data). Several muricids use a labral spine on the shell to wedge or pry open bivalves, barnacles, and gastropod opercula (Dunkin & Hughes, 1984; Perry, 1985; Gutiérrez & Gallardo, 1999). Still others have forsaken time-consuming and risky attack behaviors altogether and feed on carrion (Wu, 1965; Morton, 1994) or gastropod ovocapsules (Philipps, 1969; Taylor, 1976; Abe, 1983). It will be fascinating to learn how many different tactics and weapons are actually employed by muricids, whether new behaviors are the result of learning, whether different behaviors are used at younger and older stages of development, and how many times and under what environmental and ecological circumstances innovative new behaviors and weapons are most likely to evolve. At present, we have only a basic understanding of this system.

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37TH ANNUAL MEETING OF THE WESTERN SOCIETY OF MALACOLOGISTS (WSM)

This year, for the first time, the annual meeting of the WSM will be held in México. It will be held 70 miles south of the international border in Ensenada, Baja California from 24-28 June. The meetings will take place at the Riviera Pacific Convention Center with hotels nearby. Ground transportation to the meeting can be arranged. It will be available from the international airports in San Diego and Tijuana for a fee of $12 US in each direction.

In addition to Contributed Papers and Poster Sessions, there will be sessions on Ecology, Paleontology, Phylogenetics, Aquaculture and Opisthobranchia, all held at the Convention Center.

A traditional Welcome Reception and Banquet are scheduled and two field trips are planned – one to an abalone aquaculture facility 75 miles south of Ensenada and a second trip to a winery in Valle de Guadalupe about 25 miles northeast of Ensenada.

It is requested that registration forms and abstracts be submitted no later than May 15th 2004.

For further information, go to the website for the meeting at <http://eventos.cicese.mx/wsa/index.php> or go to the Western Society of Malacologists and click on Conferences.

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THE FESTIVUS

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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 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@terryarnold.net
E-mail: cmhertz@pacbell.net

PROGRAM

Will your grandchildren be able to find seashells on the beach?

Jeremy Jackson, the William and Mary B. Ritter Professor of Oceanography at Scripps Institution of Oceanography and a Senior Scientist at the Smithsonian Tropical Research Institute in Panamá, will give a "state of the oceans" talk, rather than a traditional shell club talk, to stimulate general discussion on how current events are threatening the very existence of mollusks in the ocean.

Meeting date: May 20, 2004

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CLUB NEWS

The Annual Auction/Potluck

It was a great party! The over forty members and guests in attendance were a friendly bunch, happy to see and be with each other and view the marvelous shells awaiting the evening's bidding. Members arrived early (no one wanted to miss anything) and all browsed the auction table and the silent auction selections while waiting for the wine to be opened, punch to be ready, and the soft drinks to arrive.

Dinner was terrific, as usual, with many members bringing special entrees and salads as well as some marvelous desserts. No one lacked for food - even seconds and thirds.

Promptly at 7 P.M. auctioneer Carole Hertz explained the procedures at the Club's auctions and the bidding began. It quickly became exciting as some of the fantastic selections were on the block - *Cypraea leucodon, C. valentia, C. armeniaca, C. guttata, Lambis pilsbryi, Calliostoma titanium* and on and on. The auction table was piled high with shells and the side table with terrific books like Abbott's (1974) *American Seashells*, the *Baja Sea Guide* and the "hot off the presses" *Australia's Spectacular Cowries*. And around the edges were some lovely pieces of art - two wonderful watercolors of shells by Wes Farmer. What a time we had! The laughter came as fast as the bidding and all had fun.

At the break, there was more dessert and a piled-high dollar table crowded with buyers - a view that looked like the first day of a Nordstrom sale. The silent auction also got a considerable amount of action during this time.

The last shell item of the auction finally was sold at 10:10 P.M. All applauded the auction, the bidding fun and the very enjoyable party.

Many people donated shells and related items to make the auction the success it was: Larry Catarius, Phil Clover, Twila Bratcher-Critchlow, Wes Farmer, Billee Gerrodette, Richard & Ginny Herrmann, Carole & Jules Hertz, John Jackson, Kirstie Kaiser, Paul Kanner, Wendy Koch, Ray McKinsey, Rick Negus, Rosemary Pierce, Jeanne & Don Pisor, Nancy & Bill Schneider, Carol Skoglund, Gladys Weber, Joan Hanselman Wong and Bob Yin.

Others, besides the hardworking board, who gave of their time were Bill Romer who provided tables, lights, made the punch and took pictures of the party; Jim Goldammer, who was everywhere helping with distributing the silent auction purchases and vacuuming the place when all was done, and most of all, the Club owes a great debt of gratitude to Wes Farmer who hosted the event. He has generously welcomed the Club to the condo's clubhouse since 1988!! It's a perfect spot for the auction and he's been a magnificent host.

Giving a Talk to the Club

To all Shell Club members: If any of you have a presentation on your travels collecting mollusks or research on mollusks, there are speaking slots still available for the months of August and October this year. For those who live out of town, perhaps you would like to arrange to visit San Diego and speak at one of those meetings. Anyone interested, please contact me by e-mail at <llovell@ucsd.edu> or by phone at (858) 822-2818. Thanks.

Larry Lovell, Vice-President Programs

Announcement of Two New Books

From Winston Ponder–

"I have just seen a copy of an excellent new book *Molecular Systematics and Phylogeography of Mollusks* edited by Chuck Lydeard and David Lindberg..
Published December 2003 by Smithsonian Books
328 pages; 6 x 9 inches; 40 b/w photographs
Hardcover: $80.00s 1-58834-148-8
Rights: World Hardcover £62.00

It contains 10 chapters providing up-to-date information on the systematic relationships and phylogeography of molluscs each written by leading authorities and a forward by Geerat Vermeij. It can be ordered via the Smithsonian website at: <http://www.sipress.si.edu/books/titles_books/1-58834-148-8.html>. One of the best things to appear on molluscs in many years! Congratulations to all involved!"

From Jorge Cortés –

"I have the pleasure to inform you that the book I edited, *Latin American Coral Reefs*, has now been published hardbound by Elsevier ... Price: 130 EUR / 130 USD ... For a complete book description and ordering information of this 508 page book, please see the book's homepage at: <http://www.elsevier.com/locate/isbn/0444513884 >."

ON THE IDENTITY OF VON MIDDENDORFF'S *CHITON SITCHENSIS* AND *CHITON SCROBICULATUS*

ROGER N. CLARK[1]

Associate in Invertebrate Zoology, Museum of Natural History of Los Angeles County
900 Exposition Boulevard, Los Angeles, California 90007, USA
E-mail: insignis@charter.net

INTRODUCTION

Since their descriptions the identities of *Chiton sitchensis* Middendorff, 1847, and *Chiton scrobicultus* Middendorff, 1847, have remained enigmatic. Middendorff's descriptions and figures were rather poor, and in the case of *Chiton sitchensis* the description and figures do not agree on several points.

Pilsbry (1892) placed *C. sitchensis* in the genus *Tonicella* Carpenter, 1873, where it has remained to this day. Later Pilsbry (1893) suggested that it should be compared to *Tonicella saccharina* Dall, 1878, a species now placed in the genus *Juvenichiton* Sirenko, 1975. Ferreira (1982) regarded *C. sitchensis* as a *nomen dubium.* This conclusion was echoed by Kaas and Van Belle (1985). However, none of these authors examined the type, which is critical in such matters.

Pilsbry (1892) placed *Chiton scrobiculatus* in the genus *Ischnochiton* Gray, 1847 (section *Trachydermon* Carpenter, 1863). Thiele (1910) studied the type and placed it in the genus *Callistochiton* Dall, 1879, but remarked on its similarities to *Ischnochiton serratus* Carpenter, 1864, and *I. retiporosus* Carpenter, 1854, both of which are now placed in the genus *Lepidozona* Pilsbry, 1892. Ferreira does not mention *Chiton scrobiculatus* in his reviews of *Lepidozona* (1978) or *Callistochiton* (1979). Kaas and Van Belle (1990) illustrated Middendorff's figures and mentioned Thiele's comments, but did not examine the type, and regarded it as a *nomen inquirendum.*

Order: CHITONIDA Thiele, 1910
Suborder: ACANTHOCHITONINA Bergenhayn, 1930
Family: Tonicellidae Simroth, 1894
Genus: *Tonicella* Carpenter, 1873
Type species: *Chiton marmoreus* Linnaeus, 1780, by S. D., Dall, 1878.

Tonicella submarmorea (Middendorff, 1847)
[= *Chiton sitchensis* Middendorff, 1847]
(Figures 1-3, 7)

Tonicella submarmorea Middendorff, 1847.
Chiton submarmoreus von Middendorff, 1847: 98.
Chiton sitchensis von Middendorff, 1847: 121.
Tonicella sitkensis (Middendorff) Pilsbry, 1892: 44, pl. 11, figs. 29-31.
Tonicella sitchensis (Middendorff) Sirenko, 1974: 990; Ferreira, 1982: 114.

In 1980 I inquired of Dr. Boris I. Sirenko of the Zoological Institute of the Russian Academy of Sciences in Saint Petersburg (ZIAS) about the status of the type material of *Chiton sitchensis*, and his opinion of it. He replied that it might be a small specimen of *Tonicella insignis* (Reeve, 1847). Later, in 1982, I again inquired about *Chiton sitchensis* and also *C. scrobiculatus*, and in early 1983, I received from Dr. Sirenko, photos of the types of both nominate species. In May of 1990, Dr. Sirenko wrote me that he had compared the type of *C. sitchensis* with *Lepidochitona dentiens* (Gould, 1846), *Tonicella insignis,* and *T. submarmorea*, and found that the plates, radular teeth and girdle elements were very similar to or identical with *T. submarmorea* and it was his belief that *Chiton sitchensis* is a young specimen of that species. I concur with Dr. Sirenko's assessment, and herein regard *Chiton sitchensis* Middendorff, 1847,

[1]Mailing address: 1839 Arthur Street, Klamath Falls, Oregon 97603-4617, USA.

to be a junior synonym of *Tonicella submarmorea* (Middendorff, 1847).

The type of *C. sitchensis* was said to have come from Sitka, Alaska [actually Old Sitka, Starrigaven Bay, about 10 km north of present day Sitka (Clark, 1999)]. However, *Tonicella submarmorea* is not known to occur east of the Aleutian Islands, so the type is not likely to have come from Sitka, and probably did not even come from Alaskan waters. Most likely, the locality data on the specimen label is in error, and the specimen instead came from Kamchatka, or the Okhotsk Sea (the latter the type locality of *T. submarmorea*).

Type material: Holotype of *Chiton sitchensis* (Figures 1-3) consists of four badly eroded valves, dry (ZIAS 522) and the body, in alcohol (ZIAS 523).

Distribution: The recorded distribution of *Tonicella submarmorea* is throughout the northwestern Pacific Ocean, from Daikokujima, Akkeshi Bay, Japan (43°N, 144°50'E) (Saito, 1994), throughout the Okhotsk Sea, along the Kurile Islands and Kamchatka (Sirenko, 1974, 1979) to the Commander Islands (Sirenko & Agapova, 1997), and east to Amchitka Island (179°40'E) in the western Aleutian Islands [Ferreira (1982), as *Tonicella marmorea* (Fabricius, 1780)], from the intertidal to about 60 m.

Eighteen specimens of *Tonicella submarmorea* were taken at a depth of 10-12 m off the point at the east side of the entrance to Crescent Bay, NW end of Atka Island, Aleutian Islands (52°02.15'N, 174°14.00'W) (leg. RNC, 8 July 1997). Two of these are deposited as vouchers in the Natural History Museum of Los Angeles County (LACM 152584); others are in the Clark collection (RNC 3025) (Figure 7). The new record extends the known range of this species in the Aleutians about 375 km to the east.

Order: CHITONIDA Thiele, 1910
Suborder: CHITONINA Thiele, 1910
Family: Ischnochitonidae Dall, 1889
Genus: *Lepidozona* Pilsbry, 1892
Type species: *Chiton mertensii* Middendorff, 1847, by O.D.

Lepidozona scrobiculata (Middendorff, 1847)
(Figures 4-6, 8)

Chiton scrobiculatus von Middendorff, 1847: 121.
Ischnochiton (*Trachydermon*) *scrobiculatus* (Middendorff) Pilsbry, 1892: 76, pl. 14 figs. 4-7.
Ischnochiton (*Lepidozona*) *sinudentatus* Carpenter, *in* Pilsbry, 1892: 128.
Callistochiton scrobiculatus (Middendorff) Thiele, 1910: 87, plt. 9, figs. 11-12.
Lepidozona sinudentata (Middendorff) Ferreira, 1978: 28, figs, 15-19, 29 (bibliography and synonymy).

In March 1995, while working with Dr. Sirenko at the LACM, we again addressed the identity of *Chiton scrobiculatus*. In studying the type photos it seemed apparent that it was a specimen of the common Californian ischnochitonid *Lepidozona sinudentata* (Carpenter, *in* Pilsbry, 1892). We compared it to numerous specimens of this species, and found that it matched perfectly the "typical" northern California form of this rather variable species. To be certain, we compared the photos with the excellent illustrations of the type of *L. sinudentata* in Palmer (1958) and found them to be virtually identical. Thus, *Lepidozona sinudentata* becomes a junior synonym of *Lepidozona scrobiculata*.

The type locality of *C. scrobiculatus* was given as "California". The Russian presence in California in the early 1800s was a mission at Fort Ross. For that reason the type locality is here restricted to Fort Ross, Sonoma County, California (38°31'N, 123°14'W).

Type material: Holotype of *Chiton scrobiculatus* (Figures 4-6) consists of seven valves (head valve missing), dry (ZIAS 1109) and the body in alcohol (ZIAS 1110).

Distribution: *Lepidozona scrobiculata* is found from Salt Point, Mendocino County, California (38°39'N) (LACM 64-6) to Thurloe Head, Baja California (27°37'31"N) (LACM 71-170), from the intertidal to about 200 m. A "typical" specimen of *L. scrobiculata* is illustrated in Figure 8.

ACKNOWLEDGMENTS

I am grateful to Dr. Boris I. Sirenko, Zoological Institute, Academy of Sciences (ZIAS), Saint Petersburg, Russia, for photographs, note and discussion on the type specimens; Dr. James H. McLean and Mr. Lindsey Groves (LACM) and to Dr. Douglas J. Eernisse, California State University, Fullerton for reading the manuscript.

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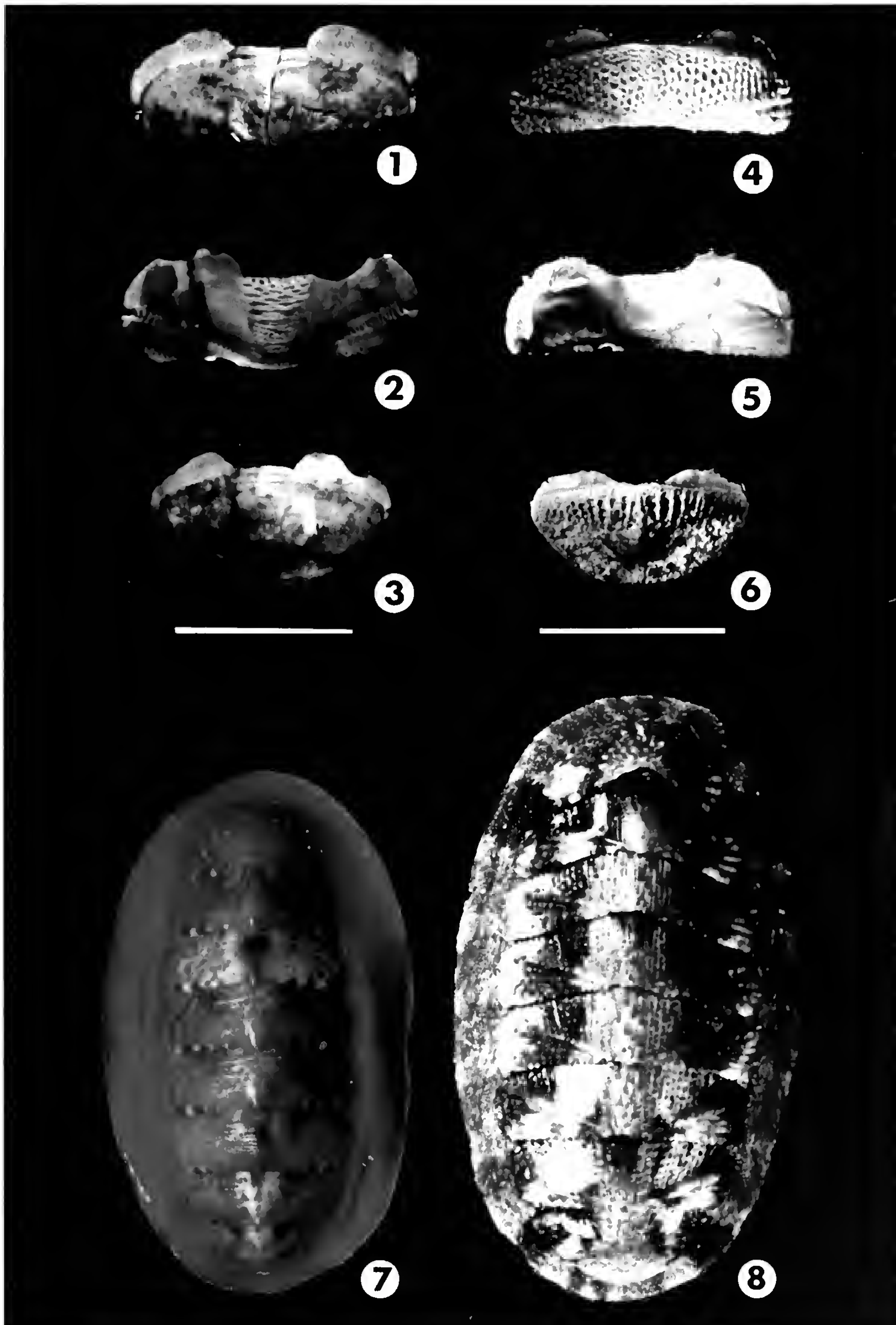

Figures 1-3. *Chiton sitchensis* Middendorff, 1847. Holotype, ZIAS 522 (= *Tonicella submarmorea* Middendorff, 1847). Bar = 3 mm. **Figures 4-6.** *Chiton scrobiculatus* Middendorff, 1847. Holotype, ZIAS 1109. Bar = 3 mm. **Figure 7.** *Tonicella submarmorea*, Crescent Bay, Atka Id., Aleutian Is., Alaska, 10 m on bottom of stone resting on sand. (RNC 3025), 27 mm x 16 mm. **Figure 8.** *Lepidozona scrobiculata*, Monterey Bay, California, 8 m on bottom of stone lightly buried in sand. (RNC 244), 21 mm x 11.5 mm.

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GASTROCOPTA IN BRITISH COLUMBIA (MOLLUSCA: PULMONATA: VERTIGINIDAE)

ROBERT G. FORSYTH[1]

Research Associate, Royal British Columbia Museum,
675 Belleville Street, Victoria, British Columbia, Canada V8W 9W2
E-mail: r.forsyth@telus.net

Abstract: *Gastrocopta holzingeri* (Sterki, 1889), previously known in British Columbia, Canada, by unpublished 40-year-old museum records, was rediscovered in southeastern B.C. in 2002, and its habitat is described. References in the literature to *G. pentodon* (Say, 1822) in British Columbia are thought to be in error.

In North America, the vertiginid genus *Gastrocopta* Wollaston, 1878, occurs mainly in the central or eastern United States (Pilsbry 1948; Hubricht 1985). A few species extend north into Canada from the Atlantic provinces, through southern Quebec, Ontario and the prairies to at least the Rocky Mountain foothills in Alberta (Oughton, 1948; La Rocque, 1953). From west of the continental divide in the northwestern United States and in British Columbia, records of *Gastrocopta* are very scarce.

La Rocque (1953) included British Columbia within the known range of *Gastrocopta pentodon*, likely because of Pilsbry (1898) who recorded it from "Laggan, B.C." Taylor (1893, 1895) wrote that this species was collected from "a few miles to the west of Laggan" and may be the basis of Pilsbry's data. This locality is now named Lake Louise and was not in British Columbia but rather was in what now is the province of Alberta, even if a "few miles" up the Bow River valley in a generally northwest direction are considered. (Harris [1978] also found *G. pentodon* in the Bow River valley.) The community of Lake Louise is only ca 7.5 km from the Alberta-British Columbia border (at the closest point), and although the actual site where the specimens were collected was west of here, there are no documented records for this species from British Columbia.

Another record of interest of *Gastrocopta pentodon* because of its proximity to the British Columbia border was noted by Berry (1948). He recorded a specimen from a small pond about 2 miles SE of Northport, along the Columbia River, Washington. Although he was describing the contents of pond marl, Berry (1948:772) remarked that "... the terrestrial specimens ... are quite fresh in appearance and evidently represent species now living on the surface of the deposit or on the slopes immediately surround it ...." The village of Northport is ca 9 km south of the British Columbia-Washington border.

Other than the spurious distribution for *Gastrocopta pentodon* brought on by an unfortunate misplacement of the Laggan locality, there are no published records of the genus in British Columbia. However, the close proximity of both Northport and Lake Louise to British Columbia suggests that *G. pentodon* could be also present in the southeastern part of the province. Another species, however, is confirmed for British Columbia.

During the preparation of a field guide to the land snails and slugs of this province (Forsyth, in press), two lots of *Gastrocopta holzingeri* (Sterki, 1889) were located in museum collections (Canadian Museum of Nature, Aylmer, Quebec [CMN] and Field Museum of Natural History, Chicago [FMNH]). Subsequently, based on these previous records' data, *G. holzingeri* was re-collected and confirmed for British Columbia (Royal B.C. Museum, Victoria [RBCM]). These records are the most western known occurrences of any species of *Gastrocopta* in Canada, and are among the scattered few localities for the genus in northwestern North America.

[1]Mailing address: PO Box 3804, Smithers, BC, Canada V0J 2N0.

British Columbia records of *Gastrocopta holzingeri*

- Canada: British Columbia: Kootenay Land District: east shore of Columbia Lake: Canal Flats Provincial Park, ca 2.25 km NNW of the community of Canal Flats (50°10.67′N, 115°49.112′W); leg. R. Forsyth, 20 August 2002 (RBCM 002-00169-002, 52 specimens).
- Canada: British Columbia: Kootenay Land District: Canal Flats (50°09′N, 115°49′W); leg. K.W. Reid, 16 June 1967 (CMN 43557, 2 specimens).
- Canal Flats SE [50°09′N, 115°49′W]; leg. K.W. Reid, 16 June 1967 (FMNH 157173, 15 specimens).

Discussion

The shell of *Gastrocopta holzingeri* is more or less cylindrical in form and has a large angulo-parietal tooth that is forked in front and well-developed palatal teeth and callus (Figure 1). It is among the smallest species of *Gastrocopta* in North America. Among adult shells studied, lengths range from 1.57 mm to 1.88 mm. The majority of snails are ca 1.7 mm long.

Pilsbry (1948) gave the range of *G. holzingeri* as Ontario and western New York, west to Montana and south to Illinois, Kansas and New Mexico. There is, however, an early western Canadian record mentioned by Taylor (1895) and subsequently by other authors (e.g., Dall 1905) from drift of the Red Deer River, Alberta. The species seems first recorded from Montana by Sterki (1890) and Squyer (1894; Mingusville, now Wibaux, eastern Montana). The species has a more scattered distribution in the eastern U.S and Ontario than in the prairies (Hubricht 1985; Grimm 1996).

Although the locality data is imprecise, the British Columbia records of *Gastrocopta holzingeri* collected in 1960 (CMN and FMNH) were likely derived from a single collection effort. These previous records were unpublished and the presence of this species in British Columbia has been overlooked for some time, and the new record for *G. holzingeri* in British Columbia was the result of an attempt to relocate this species.

In August 2002, under significant time restraints, one site was sampled on the shore of Columbia Lake. Canal Flats Provincial Park was chosen because of its relative easy accessibility. Once searching by hand through leaf litter confirmed presence of this species at the site, additional leaf litter was collected and bagged. A volume of ca 2 L was gathered, dried, coarse material removed by passing the sample through a series of wire mesh screens. The remaining fine material was then hand-sorted under a dissecting microscope for *G.*

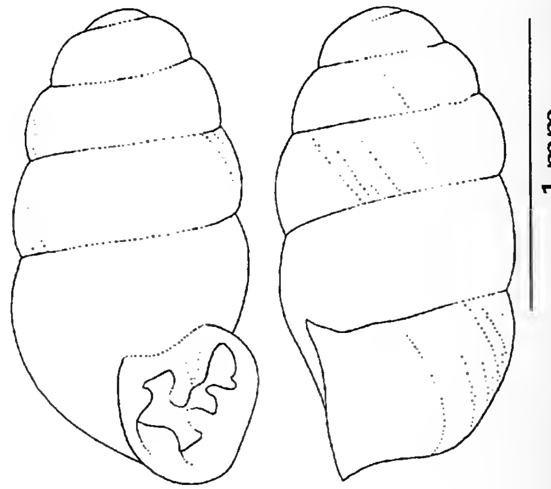

Figure 1. *Gastrocopta holzingeri*. Canal Flats, British Columbia, Canada; FMNH 157173.

holzingeri and other land snail species. The Canal Flats Park collection yielded 52 specimens, of which 29 had the adult condition of fully developed apertural dentition. (The smallest specimens were little over one whorl, or 0.05 mm in breadth; consequently, not all the litter was searched for specimens of this size.)

Gastrocopta holzingeri is a calciphile living in woodlands, limestone ledges, alvars, talus slopes and hill prairies (Oughton, 1948; Leonard, 1950; Hubricht, 1985; Grimm, 1996; Theler, 1997). Grimm (1996) characterizes it as xerothermic. The 1960 records of this species from British Columbia lack any ecological data, but the recent record offers more information.

At Canal Flats Provincial Park (elevation ca 810 m a.s.l.), *Gastrocopta holzingeri* was found on a slope adjacent to an in-filled area, developed for heavy recreational use as a picnic site and boat launch. Vegetation consisted of *Populus tremuloides*, *Betula papyrifera*, *Amelanchier alnifolia* and *Rosa* sp. Ca 5 m up-slope, the vegetation included *Pseudotsuga menziesii* var. *glauca*, *Symphoricarpos albus*, *Juniperus scopulorum* and *Shepherdia canadensis* and is more characteristically drier. Snails were found in litter sampled from a narrow, slightly wetter zone near the base of the otherwise dry slope. Other species of snails found with *Gastrocopta pentodon* at this site were *Euconulus fulvus* (Müller, 1774) and *Zonitoides arboreus* (Say, 1816).

The very small size of *Gastrocopta holzingeri* probably results in it often being overlooked during field surveys. But given the general scarcity of records for all species of *Gastrocopta* in British Columbia, Alberta and Washington, *G. holzingeri* may be rare in British Columbia and warrant conservation measures. In British Columbia, *G. holzingeri* may be relict from warmer times, as postulated by Harris (1978) for *G. pentodon* in Alberta. Further surveys, in the general area around the known locality, and farther afield in likely habitats, are desirable to determine the area occupied by *G. holzingeri* in British Columbia.

ACKNOWLEDGMENTS

I thank Jim Cosgrove (Manager of Natural History, RBCM) for the opportunity to participate in fieldwork funded by the Royal British Columbia Museum, Ken Marr (Curator of Botany, RBCM) for plant identifications, and Stuart Harris (Faculty of Social Sciences, University of Calgary) for his insights regarding *Gastrocopta* in Alberta.

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THE FESTIVUS

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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@terryarnold.net
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PROGRAM

Ecological Status of Coastal Habitats

Dr. Paul Dayton, Professor at Scripps Institution of Oceanography, Integrated Oceanography Division, will give a PowerPoint presentation discussing the condition of our coastal areas.

Effects of Ash from Local Wildfires on Phytoplankton Growth

Evelyn Chan, a 10th grader at Torrey Pines High School, was the Club's winner at the recent Greater San Diego Science and Engineering Fair. She will present an overview of her project and receive her award.

Meeting date: June 17, 2004

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On finding the small bivalve *Cooperella subdiaphana* (Carpenter, 1864) (Petricolidae) living in a "mud ball"
CAROLE M. HERTZ 60

CLUB NEWS

Minutes of the San Diego Shell Club Meeting May 20, 2004

The meeting was called to order by President John LaGrange at 7:45 PM. The Minutes of the March meeting were approved after corrections made by George Kennedy. Treasurer Silvana Vollero reported that the Annual Auction last month was a financial success. Wes Farmer stated that he had attended the Botanical Society Meeting and Vice President Larry Lovell announced that members Wes Farmer and Kent Trego will be filling upcoming slots on the program schedule. There was no New Business.

Next, Larry Lovell introduced the evening's speaker, Jeremy Jackson, Professor of Oceanography at Scripps Institution of Oceanography, also a Senior Scientist at the Smithsonian Tropical Research Institute in the Republic of Panamá. Dr. Jackson is the author of over 100 scientific publications and five books. His current research includes the long-term impacts of human activities on the oceans.

His "state of the oceans" address began with a slide show documenting the decline in the vitality of a Jamaican coral reef that he has personally witnessed. His photo from the 1960s showed living corals, big and small fish, sea urchins, and clear blue water. Forty years later the coral is dead, seaweed covers the sea bottom, the big fish are gone, and the water is murky.

Reference was made to Rachel Carson's landmark book, *Silent Spring*, that first called our collective attention to what was going on in our environment. Now every large estuary in the world is dying or dead, according to Dr. Jackson. Around the world, one hundred "dead zones" have only jellyfish and bacteria. In the Adriatic Sea there are diatoms and dinoflagellates extending for 20 to 30 kilometers: the "Rise of Slime." Inuit mothers' breast milk is toxic from their diet of seafood.

On the bright side, the Great Barrier Reef of Australia is afforded the best protection and is the least degraded. Historically, degradation has increased as population has increased.

His remarks and conclusions were documented from scientific publications, personal witness, and statistical analysis. The present issue, according to Dr. Jackson, is that of communication after gathering and interpreting data. He predicts the death of the ocean in another 25 to 50 years. Simple solutions require our willingness to change as needed: to fish less, trawl less, no longer burn coal, and stop farmers from using chemical fertilizer which makes its way into the ocean. For further information he recommended the website <shiftingbaselines.org>.

Dr. Jackson's excellent presentation elicited a lively discussion from those attending.

A book on oceanography was the evening's Door Prize, which was won by John Bishop. The meeting adjourned at 9 PM. Ron Deems supplied chocolate goodies and Kelvin Barwick brought fresh strawberries with real cream for Coffee Hour.

Nancy Schneider

Changes to the Roster

Change of phone number
Garfield, Judith, 858-643-1113
Change of e-mail
Burch, Beatrice & Tom <taburch@comcast.net>
Goldammer, Marilyn <mimigold4@earthlink.net>

The 37th Annual Meeting of the Western Society of Malacologists

From June 24-28, 2004, the annual WSM meeting will be held in Ensenada, Baja California, México. This will be the first time that the meeting has been held outside of the United States and an exciting program of events has been planned. Papers on ecology, paleontology, Opisthobranchia, phylogenetics and aquaculture will be presented as well as a poster session. There will also be a welcoming reception, a banquet and other special activities including a trip to Eréndira to an abalone farm and a visit to a winery.

There is still time to attend. For further information contact the president Dr. Jorge Cáceres by phone at 52 (646) 178-3473, or fax: 52 (66646) 175-0534 or e-mail: <jcaceres@cicese.mx> or <caceresi@isa-ac.org.mx>.

Transportation will be available in both directions. --on the 24th at the San Diego International Airport and at the Tijuana International Airport at $12.00 US, one way. Return trips will be available on the 28th or 29th also at $12.00 US.

NEW DISTRIBUTION RECORD FOR *BUSHIA (PSEUDOCYATHODONTA) DRAPERI* COAN, 1990 (MOLLUSCA: BIVALVIA)

KIRSTIE L. KAISER[1]

Associate, Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road
Santa Barbara, California 93105, USA
E-mail: klkaiser@pvnet.com.mx

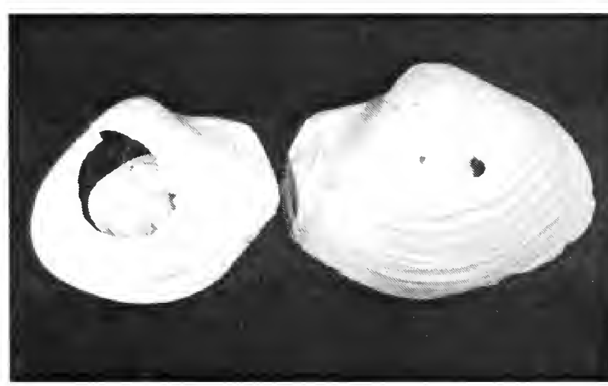
Bushia (Pseudocyathodonta) draperi was described by Coan (1990: 43, figs. 42, 42a) from a single specimen collected in the Golfo de California, off Isla Danzante, Baja California Sur, México (25°48'N, 111°16'W). The holotype, SBMNH 35098 (ex Skoglund Collection), has a length of 28.5 mm, height of 22.4 mm, and convexity of 12.2 mm. This fragile shell has one broken valve and is only known from the holotype.

On 15 May 2003, while surveying the Parque Nacional de Coiba with the Smithsonian Tropical Research Institute in the Golfo de Chiriquí, Panamá, two valves of this species were brought up from trawl hauls while aboard the R/V *Urracá*. The larger specimen has a length of 33.7 mm and was trawled from 07°41.61'N, 081°48.61'W to 07°41.22N, 081°46.66'W in mud at a depth of 62.5-70.5 m. The second valve (27.0 mm) was trawled from 07°52.99'N, 081°48.69'W to 07°53.02'N, 081°48.44'W in mud from 54.5-66.5 m.

The two valves are here shown as Figures 1 and 2. The smaller valve was broken accidently while photographing the delicate specimens which are housed in the K.L. Kaiser Collection.

This report represents a significant extension of the range of the species, from northern México to Panamá. The large valve also represents a size record for the species.

The author is indebted to Eugene V. Coan for identifying the specimens and David K. Mulliner for photographing the valves.



Figures 1, 2. *Bushia (Pseudocyathodonta) draperi*. Collected at Golfo de Chiriquí, Parque Nacional de Coiba, Panamá, trawled on the R/V *Urracá* in 70.5-62.5 m in mud. Leg. Kirstie L. Kaiser and Alicia Hermosillo, 15 May 2003. (**1-top**) interior views of two valves [right: 33.7 mm, left: 27.0 mm]. (**2-bottom**) exterior views of same valves. Photos: D.K. Mulliner.

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[1] Paseo de las Conchas Chinas #115, Depto. 4, Fracc. Conchas Chinas C.P. 48390, Puerto Vallarta, Jalisco, México.

ON FINDING THE SMALL BIVALVE *COOPERELLA SUBDIAPHANA* (CARPENTER, 1864) (PETRICOLIDAE) LIVING IN A "MUD BALL"

CAROLE M. HERTZ[1]

Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road,
Santa Barbara, California 93105-2936, USA
E-mail: cmhertz@pacbell.net

In February of this year Carole and Jules Hertz, Kirstie Kaiser and Carol Skoglund visited Barra de Navidad and surrounding areas, on the west coast of Jalisco, México. During those few days it was decided to arrange for a panguero (boatman) to take the three women small-boat dredging in Bahía Cuastecomate, Jalisco (19°30'00"N, 104°43'00"W), near Barra de Navidad and a location that Carol Skoglund had sampled many years ago. On 20 and 21 February we dredged in the early morning for several hours in the bay at depths from 40 to 100 ft (12-31 m). For information on this small boat dredge, designed and built by Paul Skoglund, see P. Skoglund (1990).

In depths between 40 and 60 ft (12-18 m), the dredge pulled up a variety of small mollusks and debris from the muddy substratum. In this debris, which we tossed over the side, were a number of what we called "mud balls." It wasn't until the second day of dredging that Kirstie squeezed some of the spongy-feeling "balls" and realized that a small, shiny, opaque-white bivalve was living inside (Figure 1). We then realized that we had thrown more than a few of these treasures overboard. We had never seen anything like this – we knew of the nests of *Diplodonta* but these were very different.

Back at Kirstie's home in Puerto Vallarta, the search of the literature began and a digital photo of the "mud balls" was sent to Gene Coan and Paul Valentich Scott. At just about the time that we received responses from them as to the likely generic position of the

Figure 1. Group of "mud balls" housing *Cooperella subdiaphana*. Approximate length of the mud balls 14-15 mm. Note the two holes in each mud ball for the siphons of the clam. Dredged in 12-18 m in mud at Bahía Cuastecomate, Jalisco, México, 21 Feb. 2004. K.L. Kaiser Collection (preserved wet). Photo: K.L. Kaiser.

bivalves, we had also discovered that what we had dredged were a *Cooperella* sp. We had examined the dentition of these 5 to 15 mm shells and compared them with the description in Keen (1971: 199-201) which mentioned the bifid cardinal teeth in both valves, and the nests of "agglutinated mud or sand" – our "mud balls." The literature citations in Coan, Valentich Scott & Bernard (2000: 393) led us to the in-depth study by

[1] Mailing address: 3883 Mt. Blackburn Ave., San Diego, CA 92111, USA.

Brian Morton (1995) of the biology and functional morphology of *Cooperella subdiaphana* with a schematic drawing of the mud-ball nest (Figure 2)

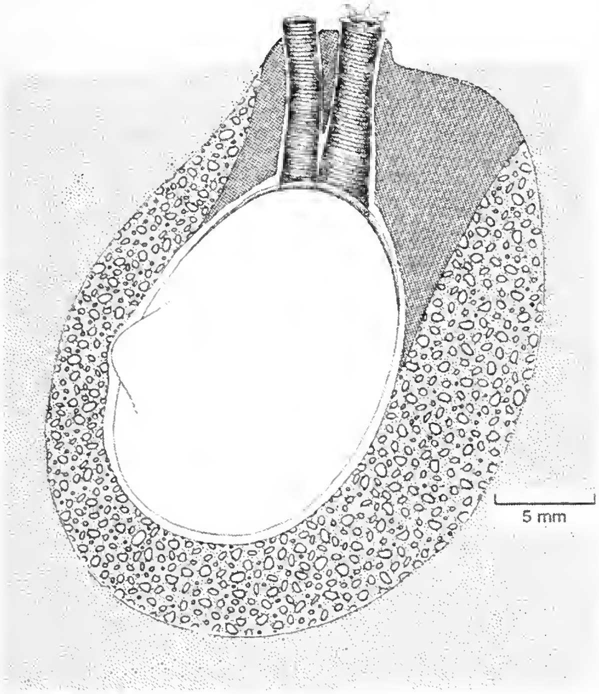

Figure 2. *Cooperella subdiaphana* schematic drawing showing the position of the embedded clam in its nest with its siphons protruding. From Morton (1995). Illustration used with the kind permission of *The Veliger*.

and detail drawings of the morphology of the species. Photos of the exterior and interior of these small bivalves, now in the collection of the Santa Barbara Museum of Natural History (SBMNH 351739), are shown in Figures 3 and 4. Coan, Valentich Scott & Bernard also note that *C. subdiaphana* is not only found in "mud balls" but has also been recorded on mud flats in bays and soft sediments offshore.

Morton (1995) noted that two other names had been assigned to this eastern Pacific *Cooperella*: *Oedalia scintillaeformis* (Carpenter, 1864: 639) and *Cooperella panamensis* Olsson, 1961. He stated that based on current material, he considered "it is impossible to determine whether *Cooperella subdiaphana* is a single, highly variable, widely ranging (in terms of depth) species, or is two variable species, one perhaps intertidal, the other subtidal...." However, in his paper Morton assumed that it is one variable species. Coan,

Figure 3. Exterior of right valve of an 8.5 mm specimen of *Cooperella subdiaphana* (SBMNH 351739). Same data as in Figure 1. Photo: P. Valentich Scott.

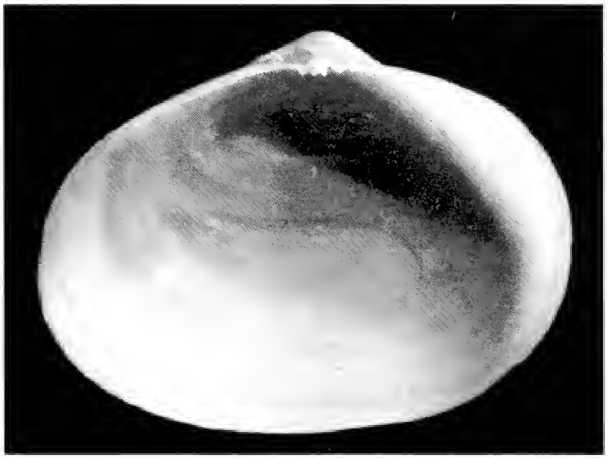

Figure 4. Interior of left valve of same *Cooperella subdiaphana* specimen showing the two cardinal teeth and the pallial sinus extending deeply toward the anterior of the shell. Same data as in Figure 1. Photo: P. Valentich Scott.

Valentich Scott & Bernard (2000) consider *C. subdiaphana* to be a single species in the eastern Pacific with a distribution from Comox, British Columbia (based on one specimen); Point Pinos, California and to Isla Cedros, Baja California, throughout the Golfo de California, México and south to Búcaro, Panamá. The specimens from Bahía Cuastecomate place the unusual bivalve in yet another locality within this distribution. To my knowledge this is the first known published photograph of freshly found "mud balls."

ACKNOWLEDGMENTS

My appreciation is extended to Eugene Coan and Paul Valentich Scott for confirmation of the identification of the *Cooperella*, to Kirstie Kaiser who took the photograph of the "mud balls" and additionally to Paul Valentich Scott for his generous assistance during a visit to the Santa Barbara Museum of Natural History and for taking the photographs of *Cooperella subdiaphana* (Figures 3 and 4). My thanks also to the *The Veliger* for permission to reproduce the figure of the "nest" of *C. subdiaphana*. And most of all my gratitude to my traveling companions and buddies, Kirstie Kaiser, Carol Skoglund and my husband Jules who made this all exciting and fun.

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KEEN, A. MYRA
1971. Sea Shells of Tropical West America: Marine Mollusks from Baja California to Peru. Stanford University Press, i-xiv+1064 pp., ca. 4000 figs.

MORTON, BRIAN
1995. The biology and functional morphology of *Cooperella subdiaphana* (Carpenter) (Bivalvia: Petricolidae). The Veliger 38(2): 162-170, figs. 1-7.

SKOGLUND, PAUL
1990. Small boat dredging. The Festivus 22(10): 106-109, figs. 1, 2.

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Website at: http://www.sandiegoshellclub@terryarnold.net
E-mail: cmhertz@pacbell.net

PROGRAM

The Mysterious Cowries of New Caledonia

Terry Rutkas, member of the Pacific Conchological Club and the San Diego Shell Club, will give a slide presentation on his trip to New Caledonia. This area has the second largest barrier reef in the world. Terry will talk about the rare cowries in New Caledonia that change color and shape for no apparent reason.

Also
Giant book and reprint sale

Meeting date: July 15, 2004

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting June 17, 2004

The meeting was called to order by President John LaGrange at 7:30 PM. The Minutes of the previous meeting were approved as published in *The Festivus*. Librarian Marilyn Goldammer reported on newly bound volumes of *The Veliger* and *The Nautilus*; also newly acquired is the autobiography by Geerat Vermeij, a highly respected blind malacologist.

Next, John introduced the Club's winner at the recent Greater San Diego Science and Engineering Fair, Evelyn Chan, a tenth grader at Torrey Pines High School. After presenting an overview of her winning project, directly related to last October's devastating fire, *Effects of Ash from Local Wildfires on Phytoplankton Growth*, she was awarded her choice of prize, a 7th Edition *Invertebrate Zoology* by Ruppert, Fox and Barnes.

Vice President Larry Lovell then introduced the evening's main speaker, Dr. Paul Dayton, Professor at Scripps Institution of Oceanography. Dr. Dayton arrived at Scripps in 1970 and has spent his career observing and studying the kelp beds and habitats of our local coast as well as marine projects in Antarctica.

Although admitting to being a lifelong fisherman himself, his message was directed toward conservation. His slides portrayed beaches from the 1970s and from the present day. He said the rocky habitats are visited by inquisitive minds and "loved to death." Three clams that were commonly seen in Mission Bay in the 1970s have now disappeared and Moray eels are gone along our coast. Within the San Diego Bight, the protected area on Point Loma, by the Cabrillo National Monument, is the only area that shows the representative habitat. Our kelp forests, he informed us, are among the largest in the world. However, the El Niño weather condition leads to the destruction of the kelp. Although San Diego and Mission Bays are polluted, there is no pollution impact on the kelp forest. Red sea urchins form important nurseries for abalone in the kelp. In the 1880s abalone divers brought up two tons of abalone per dive!

Paul Dayton's pitch was definitely for marine reserves, with data showing that reserves work but political will is needed to make it work. At issue is what species need to be protected. But protection is hard to implement. Many questions and comments from the audience indicated that his talk was well received.

Following his talk, Marilyn Goldammer won the door prize and the meeting was adjourned at 9 PM for social time and refreshments brought by Larry Lovell and Carole and Jules Hertz.

Nancy Schneider

Domestic Membership Dues to Increase in 2005

Membership dues for the San Diego Shell Club have remained at $15.00 per year since 1996 during which time postal rates have increased nine percent. Additionally, *The Festivus* has increased the use of color so that currently there is almost one color plate per issue. This makes the current cost of printing and mailing *The Festivus* approximately $50.00 per year per member. Five well-received supplements of *The Festivus* have also been issued since then which have been provided to members at no cost.

We have been able to maintain our low membership rates thus far as a result of very generous donations and successful auctions. We hope that these continue in the future. However, the Board of Directors has determined that it would be prudent to raise the dues for 2005 to $20.00 (domestic) in order to maintain the high quality of our publication and to provide for the occasional supplement while not depleting the reserves of the Club. Overseas membership dues will not be changed.

A Change to the Roster

California Academy of Sciences, JW MAILLAIRD Jr. Library, 875 Howard St., San Francisco, CA 94103

A New Publication on the AMS Website

"2,400 Years of Malacology," by Eugene V. Coan, Alan R. Kabat & Richard E. Petit (2004) is online at http://erato.acnatsci.org/ams/publications/epubs.html.

"This publication is a comprehensive catalog of biographical and bibliographical papers on malacologists, conchologists, paleontologists, and others with an interest in mollusks. At present, the catalog is over 600 pages and indexes over 5,000 individuals. This catalog is a work in progress, and we will be posting updated versions periodically. We encourage readers to explore and use this catalog, and we look forward to your comments."

Gene Coan, Alan Kabat and Richard Petit

THE CYPRAEOIDEAN AND TRIVIOIDEAN TAXA OF CRAWFORD NEILL CATE (1905-1981)

LINDSEY T. GROVES

Natural History Museum of Los Angeles County, Malacology Section
900 Exposition Boulevard, Los Angeles, California 90007
E-mail: lgroves@nhm.org

INTRODUCTION

Crawford Neill Cate (Figure 1) was born September 20, 1905 in Los Angeles, California and died on August 9, 1981 (Anonymous, 1981a,b, 1982) in San Diego, California. He graduated from Huntington Beach High School and Santa Ana Junior College, California but entered the business world rather than pursue higher education. Crawford first worked for the Los Angeles Downtown Shopping News in their press room. In 1928 he went to work for the Pacific Telephone and Telegraph Company and spent 12 years in the Los Angeles Exchange and the remainder of his 37 years with the company in the Beverly Hills Exchange before retiring in 1965. A noteworthy accomplishment of Crawford's was the establishment of an outdoor emergency switchboard at the Los Angeles headquarters immediately following the 1933 Long Beach earthquake.

In 1950, whilst visiting relatives in New England, Crawford received a specimen of *Trochus* from an aunt as a birthday gift, which had also been a keepsake of his grandmother's. Crawford and his wife Jean never dreamed that this specimen would lead to 30+ years of shell collecting and enjoyment. Later they met John Q. and Rose Burch and many other shell collectors in the Los Angeles area in the early 1950s. One of those collectors was Lloyd E. Berry of Los Angeles whose large collection of Cypraeidae (cowries) was acquired by Crawford and Jean following Lloyd's death. Crawford spent four or five evenings a week (and numerous weekends) studying molluscan literature with Lloyd. His fascination with the family Cypraeidae led to numerous publications particularly about their taxonomy and biogeography. When Lloyd passed away his collection of Cypraeidae was acquired by Crawford and Jean who eventually amassed a collection in excess of 20,000 specimens. Many of his cypraeoidean and trivioidean type specimens have been deposited at the Natural History Museum of Los Angeles County (LACM) along with many non-types. Crawford was an ardent admirer of German cowry specialists, Dr. Franz

Figure 1. Crawford Neill Cate (ca. 1968), photographer unknown (Anonymous, 1968).

A. Schilder and his wife Dr. Maria Schilder and co-authored the species *Erronea stohleri* with Franz in 1968. He also published numerous papers on the allied cowry groups Ovulidae (egg cowries), Triviidae (trivias), and Eratoinae (eratos), which Dr. Schilder referred to as the "forgotten groups" (Cate, 1973a).

Crawford and his wife Jean were members of numerous national and international malacological organizations including the Pacific Division of the American Malacological Union (twice Chairman), the Western Society of Malacologists (Charter members), the Malacological Society of London, the Malacological Society of Australia, the Sanibel-Captiva Shell Club, and the Hawaiian Malacological Society amongst others. In addition they were long-time members of local organizations including the Pacific Shell Club (President 1953-1957), the Conchological Club of Southern California (President 1960 & 1967) [bestowed with honorary membership in 1978], and the now defunct Santa Barbara Shell Club. Crawford and Jean, along with Rudolf Stohler, were instrumental in the formative years of *The Veliger* and its governing body, the California Malacozoological Society, Inc. (Crawford was a charter member and trustee) (J. M. Cate, 1989). In recognition of his malacological expertise he was granted Museum Associate status in the Section of Invertebrate Zoology (now Malacology) at LACM by curator Dr. James H. McLean (now emeritus) in 1974.

In 1977 Crawford suffered a stroke, which severely curtailed his research activities and he was a semi-invalid until his death in 1981 (J. M. Cate, 1989). Crawford had a sister Margaret Elliott, two children from a previous marriage, daughter Joanne Cate Stokes and son Crawford Neill Cate, Jr., and five grandchildren. His wife Jean passed away in 2001.

From a personal standpoint, although I never had the chance to meet Crawford, I feel a bond through our mutual appreciation for the cypraeform gastropods.

MOLLUSCAN TAXA NAMED BY CRAWFORD N. CATE

Over a 19-year span Crawford published descriptions of 249 cypraeoidean and trivioidean taxa. These taxa include 16 Cypraeidae (7 species, 9 subspecies), 181 Ovulidae (22 genera, 6 subgenera, 144 species, 9 subspecies), 47 Triviinae (5 genera, 40 species, 2 subspecies), and 5 Eratoinae (1 genus, 4 species). He also designated a neotype for *Jenneria pustulata* [Lightfoot, 1786]. These taxa are annotated herein with current taxonomic assignments and interpretations.

As is readily seen, particularly with the Ovulidae, Crawford was a "splitter" of species in a strict sense and many of these species are now considered invalid. Many of his species are based on a single specimen. However, in many instances his taxonomic interpretations were entirely correct for the ovulids and other difficult groups of cypraeiform gastropods. To this day many workers cannot agree on the validity of many of Crawford's species (see the remarks sections within the species list), which clearly demonstrates the need for further research into these groups of mollusks.

Species are arranged alphabetically within family and/or subfamily regardless of genus. Subgenera are noted within parentheses. Because it is readily apparent that many (and perhaps all) of the geographic coordinates may have been added to original locality data by Cate himself, those that are impossible combinations (ie., those that plot on land) and those that are obviously in error are noted and/or corrected here.

Abbreviations used herein: AM=Australian Museum, Sydney, Australia; ANSP= Academy of Natural Sciences of Philadelphia, Pennsylvania, USA; BMNH=The Natural History Museum, London, England; BPBM=Bernice P. Bishop Museum, Honolulu, Hawai'i, USA; CAS=California Academy of Sciences, San Francisco, California, USA; FMNH=Field Museum of Natural History, Chicago, Illinois, USA; GIY=Geological Institute, Yokohama National University, Japan; HNSM= Hirohito Collection (National Science Museum, Tokyo, Japan); IRSN=Institut Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium; LACM=Malacology Section, Natural History Museum of Los Angeles County, California, USA; MCZ=Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA; MNHN= Muséum National d'Histoire Naturelle, Paris, France; MRAC=Musée Royal de l'Afrique Central, Tervuren, Belgium; NM=Natal Museum, Pietermaritzburg, South Africa; NMP= National Museum of the Philippines, Manila, Philippine Islands; NMW=National Museum of Wales, Cardiff, Wales, United Kingdom; NSMT=National Science Museum, Tokyo, Japan; OBIS=Ocean Biogeographic Information System: Indo-Pacific Molluscan Database (compiled by ANSP, AM, MNHN, and CAS; see: http://data.acnatsci.org/obis/find_mollusk.html). OD=Original designation; RGM=Rijksmuseum van Geologie en Mineralogie, Leiden, Netherlands; SAM=South Australia Museum, Adelaide, Australia; SDNHM=San Diego Natural History Museum, San Diego, California, USA; SU=Stanford University, California (collections now at CAS), USA; USNM =National Museum of Natural History, Smithsonian Institution, Washington DC, USA; WAGD=Western Atlantic Gastropod Database (ANSP) [Malacolog version 3.2.3] (see: http://erato.acnatsci.org/wasp/findsnail.php). WAM= Western Australian Museum, Perth, Australia; ZMA= Zoologisch Museum, Universiteit Amsterdam, Netherlands.

Superfamily CYPRAEOIDEA Rafinesque, 1815
Family CYPRAEIDAE Rafinesque, 1815

brunnescens, Mauritia (Arabica) arabica, Cate, 1964b: 24-25, pl. 5, figs. 3a-3b.
Type Locality: Broome, Roebuck Bay, Western Australia, Australia.
Type Material: Holotype WAM no. 32-64, 12 paratypes: AMNH nos. 196001 (4), 203880a-b, 203881a-b, 203882a-b, 203883a-b (*ex* C.N. Cate Collection) (Boyko & Cordeiro, 2001).
Remarks: Considered a junior synonym of *Mauritia arabica* (Linnaeus, 1758) by Lorenz & Hubert, 2000, and Groves & Weil, 2003.

crakei, Palmadusta (Palmadusta) saulae, Cate, 1968a:230-231, pl. 34, figs. 73a-73c.
Type Locality: Quondong, north of Broome, Western Australia, Australia (17°59'S, 122°14'E).
Type Material: Holotype WAM no. 1321-67.
Remarks: Considered a junior synonym of *Palmadusta saulae* (Gaskoin, 1843) by Lorenz & Hubert, 2000, and Groves & Weil, 2003.

dayritiana, Cypraea (Blasicrura), Cate, 1963a:141-142, pl. 15, figs. 1-1a, 3-3a.
Type Locality: Demang Id., Coron Bay, Calamian Group, Palawan Prov., Philippines (11°55'N, 120°05'E).
Type Material: Holotype NMP no. NMCO-6766, 2 paratypes LACM no. 2025 (*ex* J.E. Norton collection), 2 paratypes in R. Lee collection, 3 paratypes NMP, 1 paratype MCZ no. 249640 (*ex* NMP), 1 paratype AMNH no. 203885 (*ex* C.N. Cate Collection) [additional paratypes cited in Cate, 1963a (= AMNH 203866-203867) do not match measurements and are not considered part of the type series] (Boyko & Cordeiro, 2001).
Remarks: Treated as a valid species currently in the genus *Blasicrura* by Lorenz & Hubert, 2000, and Groves & Weil, 2003.

eugeniae, Notadusta Cate, 1975a:260, fig. 5.
Type Locality: Hopetoun, Western Australia, Australia (38°07'S, 144°27'E).
Type Material: Holotype LACM no. 1704. Paratypes cited by Cate, 1975a, in collections of L. Kienle (Cherry Hill, New Jersey), E. Malone and E. Wright (both of Sanibel, Florida), repository unknown.
Remarks: Considered a junior synonym of *N. declivis* (Sowerby, 1870) by Groves & Weil, 2003, and a junior synonym of *Erronea xanthodon* (Sowerby, 1832) by Lorenz & Hubert, 2000. Incorrect coordinates cited by Cate, 1975a; correct coordinates = 33°57'S, 120°07'E.

fernandoi, Erronea, Cate, 1969b:256-257, pl. 46, figs. 1a-1d.
Type Locality: San Antonio, San Pedro Bay, Leyte Prov., Leyte Id., Philippines (11°03'N, 125°00'E).
Type Material: Holotype CAS no. 13158.
Remarks: Considered a subspecies of *Erronea xanthodon* (Sowerby, 1832) by Groves & Weil, 2003, and a valid species by Lorenz & Hubert, 2000.

gedlingae, Cypraea (Lyncina) leviathan, Cate, 1968a:227, pl. 26, fig. 28 (see also Cate, 1968b:80-81 for omitted diagnosis).
Type Locality: "Five Mile Beach," outer coast of North West Cape, Western Australia, Australia (22°06'S, 114°01'E).
Type Material: Holotype WAM no. 334-67, 3 paratypes AMNH 204451-204453 (*ex* C.N. Cate collection) (Boyko & Cordeiro, 2001).
Remarks: Considered a junior synonym of *Lyncina carneola* (Linnaeus, 1758) by Groves & Weil, 2003, and a junior synonym of *L. leviathan titan* Schilder & Schilder, 1962, by Lorenz & Hubert, 2000.

jeaniana, Zoila friendii, Cate, 1968a:222-224, pl. 24, fig. 13.
Type Locality: Koks Id., northwest of Carnarvon, Western Australia, Australia (Lorenz, 2001).
Type Material: Holotype WAM no. 1320-67, 1 paratype in N. Harold Collection (Perth, Western Australia), 1 paratype in A. Kalnins collection (Mayfields, Western Australia), 2 paratypes in T. Gurr collection (Carlisle, Western Australia).
Remarks: Considered a valid full species by Lorenz & Hubert, 2000, and Groves & Weil, 2003.

maricola, Pustularia, Cate, 1976a:383, fig. 3.
Type Locality: Santa Cruz, Marinduque Id., Marinduque Prov., Philippines (13°28'N, 122°01'E).
Type Material: Holotype LACM no. 1706.
Remarks: Considered a junior synonym of *Nesiocypraea lisetae* (Kilburn, 1975) by Lorenz & Hubert, 2000, and Groves & Weil, 2003.

marielae, Cypraea cernica, Cate, 1960a:4-7, figs. 1-1a, 2-2a.
Type Locality: Off Maui, Hawaiian Ids. (20°57'N, 156°47'W).
Type Material: Holotype BPBM no. 212711, 3 paratypes: AMNH nos. 203864 (*ex* C.N. Cate Colletcion), AMNH 203865a-b (*ex* C.S. Weaver Collection), 1 paratype in T. Richert Collection (Boyko

& Cordeiro, 2001).
Remarks: Considered a junior synonym of *Erosaria cernica* (Sowerby, 1870) by Lorenz & Hubert, 2000, and Groves & Weil, 2003.

porteri, Cypraea (Lyncina), Cate, 1966a:200, pl. 29, figs. 1-4.
Type Locality: Manubul Id., Tapul Group, just south of Lapac and Siasi Ids., Sulu Archipelago, Sulu Prov., Philippines (5°35'N, 120°47'E).
Type Material: Holotype CAS no. 12756.
Remarks: Treated as a valid species currently in the genus *Lyncina* by Lorenz & Hubert, 2000, and Groves & Weil, 2003.

schilderiana, Cypraea tigris, Cate, 1961c:108-109, pl. 19, figs. 1-3.
Type Locality: Koko Head, O'ahu, Hawaiian Ids. (21°15'N, 157°43'W).
Type Material: Holotype BPBM no. 212885, 4 paratypes in USNM, 1 paratype in F.A. Schilder Collection, 1 paratype in BM(NH), 1 paratype in MCZ, and 3 paratypes AMNH nos. 196004-196005, 203851 (*ex* C.N. Cate Collection) [additional paratypes cited in Cate, 1961c, repository unknown] (Boyko & Cordeiro, 2001).
Remarks: Considered a valid subspecies of *Cypraea tigris* (Linnaeus, 1758) by Groves & Weil, 2003, and a form of *C. tigris* by Lorenz & Hubert, 2000.

siasiensis, Cypraea saulae, Cate, 1960b:36-37, pl. 5, figs. 2-6.
Type Locality: Punnungan Id., east of Siasi Id., Tapul Group, Sulu Archipelago, Sulu Prov., Philippines (5°32'N, 120°52'E).
Type Material: Holotype BPBM no. 212719, 1 paratype AMNH no. 203889 (*ex* C.N. Cate Collection) [additional paratypes cited in Cate, 1960b, repository unknown] (Boyko & Cordeiro, 2001).
Remarks: Considered a junior synonym of *Palmadusta saulae* (Gaskoin, 1843) by Lorenz & Hubert, 2000, and Groves & Weil, 2003.

steineri, Erronea, Cate, 1969b:257-258, pl. 46, figs. 2a-2b.
Type Locality: Ufa, Russell Group, northwest of Guadalcanal, Solomon Ids. (9°08'S, 159°00'W).
Type Material: Holotype CAS no. 13157.
Remarks: Considered a valid subspecies of *Blasicrura coxeni* (Cox, 1873) by Groves & Weil, 2003, and a junior synonym of *B. coxeni* by Lorenz & Hubert, 2000. Incorrect longitude cited by Cate, 1969b: correct longitude = 159°00'E.

stohleri, Erronea, Cate & Schilder, 1968:382-383, pl. 54.
Type Locality: Off Laminusa Id., Sulu Archipelago, Sulu Prov., Philippines.
Type Material: Holotype CAS no. 13101.
Remarks: Considered a valid subspecies of *Erronea pallida* (Gray, 1824) by Groves & Weil, 2003, and a junior synonym of *E. pallida* by Lorenz & Hubert, 2000.

viridicolor, Cypraea (Erosaria) cernica, Cate, 1962b:175-177, pl. 40, figs. 1-9.
Type Locality: Vlaming Head, North West Cape, Western Australia, Australia (21°50'S, 114°10'E).
Type Material: Holotype CAS 64663 (ex SU no. 9506), 6 paratypes AMNH nos. 203866a-b, 203867a-b, 203868a-b (*ex* C.N. Cate Collection) [additional paratypes cited in Cate, 1962b, repository unknown] (Boyko & Cordeiro, 2001).
Remarks: Considered a valid subspecies of *Erosaria cernica* (Sowerby, 1870) by Lorenz & Hubert, 2000, and Groves & Weil, 2003.

whitworthi, Cribraria (Ovatipsa) chinensis, Cate, 1964b:20-21, figs. 2a-2b (not 1a-1b).
Type Locality: Vlaming Head, North West Cape, Western Australia, Australia (21°48'S, 114°07'E).
Type Material: Holotype WAM no. 33-64, 12 paratypes AMNH nos. 196003 (4), 203873 (1), 203874 (4), 203875 (3) (all paratypes *ex* C.N. Cate Collection) (Boyko & Cordeiro, 2001).
Remarks: Considered a junior synonym of *Ovatipsa chinensis* (Gmelin, 1791) by Groves & Weil, 2003, and junior synonym of *O. chinensis amiges* Melvill & Standen, 1915, February 1, 2004 by Lorenz & Hubert, 2000.

Family OVULIDAE Fleming, 1828
Genera and Subgenera

Aclyvolva Cate, 1973a:78.
Type Species: *Ovulum lanceolatum* Sowerby, 1848, by OD.
Remarks: Considered a valid genus by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003, a valid subgenus in the genus *Phenacovolva* by Okutani & Sasaki, 2000, but treated as a subjective synonym of *Phenacovolva* by Wilson, 1993.

(Adamantia) Cate, 1973a:44.
Type Species: *Ovulum concinnum* Adams & Reeve, 1848.
Remarks: Treated as a subjective synonym of *Primovula* by Wilson, 1993, and in OBIS, 2003, but considered a valid full genus by Fehse, 2001b, and a valid subgenus by Higo et al., 1999.

Aperiovula Cate, 1973a:36.
Type Species: *Ovulum adriaticum* Sowerby, 1828, by OD.
Remarks: Considered a valid genus by Higo et al., 1999, Fehse, 2001b; and in OBIS, 2003, and a subgenus of *Primovula* by Okutani & Sasaki, 2000.

(Calcaria) Cate, 1973a:106.
Type Species: *Ovulum longirostratum* Sowerby, 1828, by OD.
Remarks: Replaced by *Calcarovula* Cate, 1973b:239, not *Calcaria* Porat, 1878, preoccupied. Considered a valid genus by Fehse, 2001b, valid subgenus in the genus *Phenacovolva* by Azuma, 1987, 1988; Higo et al., 1999, and Okutani & Sasaki, 2000 [as *Calcaria*], but treated as a junior synonym of *Phenacovolva* by Wilson, 1993, and in OBIS, 2003.

Carpiscula Cate, 1973a:62.
Type Species: *Ovulum bullatum* Adams & Reeve, 1848, by OD.
Remarks: Considered a valid genus by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003, and treated as subgenus in the genus *Primovula* by Okutani & Sasaki, 2000.

Crenavolva Cate, 1973a:49.
Type Species: *Ovulum striatulum* Sowerby, 1828, by OD.
Remarks: Considered a subjective synonym of *Primovula* by Wilson, 1993, but considered a valid genus by Higo et al., 1999 [as *Crenovolva*], Liltved, 2000, Fehse, 2001b, and in OBIS, 2003.

(Cuspivolva) Cate, 1973a:54.
Type Species: *Crenavolva (Cuspivolva) cuspis* Cate, 1973a, by OD.
Remarks: Considered a valid subgenus by Higo et al., 1999, and a valid genus by Fehse, 2001b, and in OBIS, 2003.

Cymbula Cate, 1973a:80.
Type species: *Ovula acicularis* Lamarck, 1810, by OD.
Remarks: Replaced by *Cymbovula* Cate, 1973b:239, not *Cymbula* Adams & Adams, 1854, preoccupied. Considered a valid genus by Azuma, 1984; Wilson, 1993; Higo et al., 1999, Liltved, 2000, Fehse, 2001b, and in OBIS, 2003.

Delonovolva Cate, 1973a:58-59.
Type Species: *Ovulm formosum* Adams & Reeve, 1848.
Remarks: Treated as a valid genus by Higo et al., 1999, and as a subjective synonym of *Cuspivolva* by Fehse, 2001b, and in OBIS, 2003.

Dissona Cate, 1973a:84.
Type Species: *Primovula tosaensis* Azuma & Cate, 1971, by OD.
Remarks: Considered a valid genus by Azuma, 1984; Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

Galera, Cate, 1973a:5.
Type species: *Ovula hervieri* Hedley, 1899, by OD.
Remarks: Replaced by *Galeravolva* Cate, 1973b:238-239, not *Galera* Gray, 1842, preoccupied. Considered a subjective synonym of *Prionovolva* Iredale, 1930; Wilson, 1993, and in OBIS, 2003, a subjective synonym of *Habuprionovolva* by Higo et al., 1999, and Fehse, 2001b, but treated as a valid genus by Liltved, 2000.

Globovula Cate, 1973a:21.
Type Species: *Globovula spatiosa* Cate, 1973a, by OD.
Remarks: Treated as a valid genus by Higo et al., 1999, and Fehse, 2001b, but considered a subjective synonom of *Prionovolva* by Wilson, 1993, and in OBIS, 2003.

Hiata Cate, 1973a:86-87.
Type Species: *Ovulum depressum* Sowerby, 1875, by OD.
Remarks: Replaced by *Hiatavolva* Cate, 1973b:239, not *Hiata* Zitek & McLean, 1936, preoccupied. *Hiatavolva* is considered a valid subgenus of *Phenacovolva* by Okutani & Sasaki, 2000 (as *Hiata*), and a valid genus by Azuma, 1984; Wilson, 1993; Higo et al., 1999; Fehse, 2001b, and in OBIS, 2003 (all as *Hiatavolva*).

(Inflatovula) Cate, 1973a:30.
Type Species: *Ovulum marginatum* Sowerby, 1828, by OD.
Remarks: Introduced as a subgenus of *Pseudosimnia* and considered a valid subgenus by Higo et al., 1999, a valid genus by Fehse, 2001b, and a subjective synonym of *Margovula* by Wilson, 1993, and in OBIS, 2003.

Kuroshiovolva Azuma & Cate, 1971:266.
Type Species: *Kuroshiovolva shingoi* Azuma & Cate, 1971, by OD.
Remarks: Considered a valid genus by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003, but treated as a valid subgenus in the genus *Phenacovolva* by Okutani & Sasaki, 2000.

(Labiovolva), Cate, 1973a:33.
Type Species: *Ovulum nubeculatum* Adams & Reeve, 1848, by OD.
Remarks: Considered a valid subgenus by Higo et al., 1999, and a full genus by Fehse, 2001b, and in OBIS, 2003.

Lacrima Cate, 1973a:20
Type Species: *Lacrima lacrima* Cate, 1973a, by OD.

Remarks: Treated as a valid genus by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

Pseudocyphoma Cate, 1973a:69.
Type Species: *Ovulum intermedium* Sowerby, 1828, by OD.
Remarks: Considered a valid genus by Fehse, 2003a, 2003b, and in WAGD, 2003.

Rotaovula Cate & Azuma *in* Cate, 1973a:48.
Type Species: *Rotaovula hirohitoi* Cate & Azuma, 1973a, by OD.
Remarks: Treated as a valid genus by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

Sandalia Cate, 1973a:85.
Type Species: *Ovula triticea* Lamarck, 1810, by OD.
Remarks: Considered a valid genus by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003, but treated as a valid subgenus in the genus *Primovula* by Okutani & Sasaki, 2000.

(Serratovolva) Cate, 1973a:53.
Type Species: *Primovula (Diminovula) dondani* Cate, 1964, by OD.
Remarks: Considered a valid subgenus by Higo et al., 1999, but treated as a full genus by Liltved, 2000, Fehse, 2001b, and in OBIS, 2003.

Simnialena Cate, 1973a:75.
Type Species: *Simnialena marferula* Cate, 1973a, by OD.
Remarks: Considered a valid genus by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

Spiculata Cate, 1973a:82.
Type Species: *Ovula loebbeckeana* Weinkauff, 1881, by OD.
Remarks: Considered a valid genus by Fehse, 2001b, and in OBIS, 2003.

Stohleroma Cate, 1973a:47.
Type Species: *Stohleroma stohleri* Cate, 1973a:47-48, by OD.
Remarks: Considered a valid genus by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

Subsimnia Cate, 1973a:72.
Type Species: *Neosimnia bellamaris* Berry, 1946, by OD.
Remarks: Considered a valid genus in OBIS, 2003, but considered a subjective synonym of *Phenacovolva* by Liltved, 2000, and Fehse, 2001b.

Testudovolva Cate, 1973a:7.
Type Species: *Testudovula orientis* Cate, 1973a, by OD.
Remarks: Considered a subjective synonym of *Prionovolva* Iredale, 1930, by Wilson, 1993, but a valid genus by Higo et al., 1999, Liltved, 2000, Fehse, 2001b, and in OBIS, 2003.

(Turbovula) Cate, 1973a:102.
Type Species: *Radius brevirostris* Schumacher, 1817, by OD.
Remarks: Considered a valid subgenus in the genus *Phenacovolva* by Azuma, 1985; Higo et al., 1999, and Okutani & Sasaki, 2000, but treated as a subjective synonym of *Phenacovolva* by Wilson, 1993, and considered a full genus by Fehse, 2001b, and in OBIS, 2003.

Xandarovula Cate, 1973a:34.
Type Species: *Bulla patula* Pennant, 1777.
Remarks: Considered a valid genus by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

Species and Subspecies

abbotti, Aperiovula, Cate, 1973a:39, fig. 78.
Type Locality: Mustang Id., Gulf of Mexico, Nueces Co., Texas (27°45'N, 95°05'W).
Type Material: Holotype ANSP no. 301668.
Remarks: Considered a valid species in WAGD, 2003. Incorrect longitude cited by Cate, 1973a: correct longitude = 97°05'W.

aboriginea, Margovula, Cate, 1973a:20, fig. 34.
Type Locality: Geralia (= Giralia), Exmouth Gulf, Western Australia, Australia (22°00'S, 114°15'E).
Type Material: Holotype WAM no. 67-70, paratype LACM no. 1794.
Remarks: Considered a valid species by Wilson, 1993, Fehse, 2001b, and in OBIS, 2003. Incorrect latitude cited by Cate, 1973a: correct latitude = 22°19'S.

adamiana, Testudovolva, Cate, 1973a:10, fig. 13.
Type Locality: "Mer de Chine."
Type Material: Holotype IRSN unnumbered.
Remarks: Considered a valid species by Fehse, 2001b, and in OBIS, 2003.

advena, Spiculata, Cate, 1978a:164, fig. 6.
Type Locality: Off Sand Key, southwest of Key West, Monroe Co., Florida (24°33'N, 81°47'W).
Type Material: Holotype LACM no. 1794.
Remarks: Considered a valid species by Fehse, 2001b, and in WAGD, 2003.

aenigma, Prionovolva (Prionovolva), Azuma & Cate, 1971:261-262, fig. 1 (see also Cate, 1971:362 for omitted discussion).

Type Locality: Off Kirime-zaki, Kii-hanto, Wakayama Pref., Honshu, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 14826A.
Remarks: Considered a junior synonym of *Habuprionovolva hervieri* (Hedley, 1899) by Higo et al., 1999, but treated as valid species by Okutani & Sasaki, 2000, and Liltved, 2000, in the genus *Galeravolva*, and considered a valid species in the genus *Habuprionovula* by Fehse, 2001b, and in OBIS, 2003.

albomarginata, Pseudosimnia, Cate, 1978b:195-196, pl. 2, fig. 5.
Type Locality: Malaita Id., Solomon Ids. (09°00'S, 161°00'E).
Type Material: Holotype LACM no. 1841.
Remarks: Considered a valid species by Fehse, 2001b, and in OBIS, 2003, but possibly a geographic variant of *P. jeanae* (Cate, 1973) by Liltved, 2000.

alleneae, Cyphoma, Cate, 1973a:67-68, figs. 151, 151C.
Type Locality: Missouri Key, Monroe Co., Florida (24°40'N, 81°10'W).
Type Material: Holotype LACM no. 1292.
Remarks: Considered a valid species by Fehse, 2003a, but considered a junior synonym of *Cyphoma gibbosum* (Linnaeus, 1758) in WAGD, 2003.

allynsmithi, Aperiovula, Cate, 1978b:197-198, pl. 2, fig. 7.
Type Locality: Off Wakayama, Kii-suido, Wakayama Pref., Honshu, Japan (31°10'N, 135°15'E).
Type Material: Holotype LACM no. 1834.
Remarks: Considered a valid species by Higo et al., 1999; a valid species in the genus *Cuspivolva* by Fehse, 2001b, and in OBIS, 2003, and a junior synonym of *Primovula (Crenavolva) striatula* (Sowerby, 1828) by Okutani & Sasaki, 2000. Incorrect coordinates cited by Cate: correct coordinates = ca. 34°10'N, 135°05'E.

asiaticum, Stohleroma, Cate, 1973a:48, fig. 98.
Type Locality: Between Hayama and Kamakura, Sagami-wan, Japan (35°02'N, 139°20'E).
Type Material: Holotype ANSP no. 251993.
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

aurantiomacula, Pseudosimnia (Diminovolva), Cate & Azuma *in* Cate, 1973a:27, figs. 52, 52C.
Type Locality: Off Kirime-zaki, Kii-suido, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 15643, paratype LACM no. 2228.
Remarks: Considered a valid species by Higo et al., 1999, and a valid species in the genus *Diminovula* by Wilson, 1993, Fehse, 2001b, and in OBIS, 2003.

azumai, Primovula, Cate, 1970:181, fig. 1 (see also Cate, 1971:362 for omitted discussion).
Type Locality: Off Kirime-zaki, Kii-suido, Wakayama Pref., Honshu, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 14826, paratype LACM no. 1872.
Remarks: Considered a valid species by Mase, 1989, and in OBIS, 2003, a valid *Primovula* in the subgenus *Crenovolva* [*sic*] by Okutani & Sasaki, 2000, a valid species in the genus *Crenavolva* by Liltved, 2000, and a valid species in the genus/subgenus *Crenavolva (Cuspivolva)* by Higo et al., 1999, and Fehse, 2001b.

bahamaensis, Cymbula, Cate, 1973a:80-81, fig. 178.
Type Locality: Massan Marine Gardens, Long Id., Bahamas (23°30'N, 75°00'W).
Type Material: Holotype MCZ no. 276109.
Remarks: Considered a junior synonym of *Cymbula acicularis* (Lamarck, 1811) in WAGD, 2003 (as *C. bahamensis*), but treated as a valid species by Fehse, 2001b.

baltea, Crenavolva (Cuspivolva), Cate, 1973a:55, fig. 115.
Type Locality: Goa, India (15°15'N, 74°00'E).
Type Material: Holotype USNM no. 442947, paratype AMNH no. 204858 (*ex* C.N. Cate collection) [additional paratypes cited by Cate, 1973a, repository unknown] (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species by Fehse, 2001b, and in OBIS, 2003.

bartschi, Phenacovolva (Turbovula), Cate, 1973a:105, fig. 236.
Type Locality: Off the north coast of Puerto Rico (between 18°30'40" to 18°30'10"N & 66°13'20" to 66°13'50"W).
Type Material: Holotype USNM no. 492178.
Remarks: Considered a valid species in the genus *Turbovula* by Fehse, 2001b, and valid in the genus *Cyphoma* in WAGD, 2003.

basilia, Galeravolva, Cate, 1978b:191-192, pl. 1, fig. 1.
Type Locality: Off Wakayama, Kii-suido, Wakayama Pref., Honshu, Japan (31°10'N, 135°15'E).
Type Material: Holotype LACM no. 1829.
Remarks: Considered a junior synonym of *Habuprionovolva hervieri* (Hedley, 1899) by Higo et al., 1999 (as *basilica*), a junior synonym of *Prionovolva aenigma* Azuma & Cate, 1973, by Okutani & Sasaki,

2000, a valid species in the genus *Habuprionovolva* by Fehse, 2001b (as *basilica*), and a valid species in the genus *Prionovolva* in OBIS, 2003. Incorrect coordinates cited by Cate: correct coordinates = ca. 34°10'N, 135°05'E.

bellica, Primovula (Primovula), Cate, 1973a:41, fig. 83.
Type Locality: Bataan Peninsula, Manila Bay, Bataan Prov., Luzon Id., Philippines (14°40'N, 120°25'E).
Type Material: Holotype LACM no. 1189, paratype LACM no. 1863.
Remarks: Considered a possible junior synonym of *P. singularis* Cate, 1973, by Liltved, 2000, and a valid species by Fehse, 2001b, and in OBIS, 2003. Incorrect longitude cited by Cate: correct longitude = 120°35'E.

bijuri, Spiculata, Cate, 1976a:384, fig. 1.
Type Locality: Southeast of Key West, Monroe Co., Florida (24°33'N, 81°47'W).
Type Material: Holotype LACM no. 1708.
Remarks: Considered a valid species by Fehse, 2001b, and in WAGD, 2003.

boshuensis, Prosimnia semperi, Cate, 1973a:74, fig. 163.
Type Locality: Boshu, Japan.
Type Material: Holotype USNM no. 342917.
Remarks: Considered a valid species by Fehse, 2001b, a valid subspecies by Wilson, 1993; Liltved, 2000, and in OBIS, 2003, but treated as a junior synonym of *P. semperi* (Weinkauff, 1881) by Higo et al., 1999.

bratcherae, Cymbula, Cate, 1973a:81-82, fig. 180.
Type Locality: Pulmo Reef, Golfo de California, Baja California Sur, México (23°12'N, 109°32'W).
Type Material: Holotype LACM no. 1610.
Remarks: Considered a valid species by Fehse, 2001b.

brunneiterma, Volva (Phenacovolva), Cate, 1969c:366, pl. 56, fig. 1.
Type Locality: Off Siasi Id., Sulu Archipelago, Sulu Prov., Philippines (5°32'N, 120°52'E).
Type Material: Holotype CAS no. 13161.
Remarks: Considered a valid species in the genus *Hiatavolva* by Wilson, 1993; Fehse, 2001b, and in OBIS, 2003.

capitia, Neosimnia spelta, Cate, 1973a:91, fig. 206.
Type Locality: Off Sombrero Id., Anegada Pass, between Anegada, British Virgin Islands and Anguilla (18°13'N, 63°00'W).
Type Material: Holotype MCZ no. 7353.
Remarks: Considered a valid species by Fehse, 2001b, and in WAGD, 2003. Because these coordinates plot southeast of Anguilla and not between Anegeda (18°27'N, 64°14'W) and Anguilla, the cited coordinates are incorrect.

cardini, Dentiovula, Cate, 1978b:193-194, pl. 1, fig. 3.
Type Locality: Off Wakayama, Kii-suido, Wakayama Pref., Honshu, Japan (31°10'N, 135°15'E).
Type Material: Holotype LACM no. 1832.
Remarks: Considered a valid species by Fehse, 2001b, and in OBIS, 2003, but a junior synonym of *D. colobica* (Azuma & Cate, 1971) by Mase, 1989, and Higo et al., 1999. Incorrect coordinates cited by Cate: correct coordinates = ca. 34°10'N, 135°05'E.

castanea, Prionovolva, Cate, 1978a:160-161, fig. 1.
Type Locality: Gulf of Oran, Ouahran Dept., Algeria (35°45'N, 00°38'W).
Type Material: Holotype LACM no. 1789.
Remarks: Considered a valid species by Sabelli et al., 1990, and Fehse, 2001b.

choshiensis, Galera, Cate, 1973a:7, fig. 6.
Type Locality: Choshi, Chiba Pref., Honshu, Japan (35°40'N, 140°48'E).
Type Material: Holotype CAS no. 13320.
Remarks: Considered a valid species in the genus *Prionovolva* by Higo et al., 1999, and Okutani & Sasaki, 2000, but considered valid by Liltved, 2000, Fehse, 2001b, and in OBIS, 2003 in the genus *Habuprionovolva*.

clara, Aclyvolva, Cate, 1973a:79, fig. 176.
Type Locallity: Off Minabe, Kii-suido, Wakayama, Japan (34°00'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 15607.
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003, and valid in the genus/subgenus *Phenacovolva (Aclyvolva)* by Okutani & Sasaki, 2000.

clenchi, Phenacovolva (Pellasimnia), Cate, 1973a:99-100, fig. 225.
Type Locality: Linapacan Strait, off Observatory Id., Palawan Prov., Philippines (11°35'N, 119°50'E).
Type Material: Holotype USNM no. 282618.
Remarks: Considered a valid species by Fehse, 2001b, and in OBIS, 2003.

cobra, Dentiovula, Cate, 1975a:257, fig. 7.
Type Locality: Off Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma,

Takarazuka, Japan, no. 16338.
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

colobica, Primovula, Azuma & Cate, 1971:263, fig. 5 (see also Cate, 1971:362-363 for omitted discussion).
Type Locality: Off Kirime-zaki, Kii-hanto, Wakayama Pref., Honshu, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 14848.
Remarks: Considered a valid species by Mase, 1989, and valid in the genus *Dentiovula* by Higo et al., 1999, Okutani & Sasaki, 2000, Fehse, 2001b, and in OBIS, 2003.

conspicua, Crenavolva (Crenavolva), Cate, 1975a:258, fig. 9.
Type Locality: Off Nada, Kii-suido, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype LACM no. 1705.
Remarks: Considered a junior synonym of *Crenavolva septemmacula* (Azuma, 1974) by Higo et al., 1999, Liltved, 2000, and Fehse, 2001b, but treated as a valid species in OBIS, 2003.

coroniola, Pseudosimnia (Inflatovula), Cate, 1973a:31, fig. 60.
Type Locality: Off Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype ANSP no. 244834A (= ANSP no. 329959, Higo et al., 2001), paratype LACM no. 1866.
Remarks: Considered a valid species by Higo et al., 1999, a valid species in the genus *Inflatovula* by Fehse, 2001b, and valid in the genus *Margovula* in OBIS, 2003.

cottesloensis Globovula, Cate, 1973a:23, fig. 42.
Type Locality: One mile south of Cottesloe Beach, between Cottesloe and Leighton, Western Australia, Australia (31°47'S, 116°00'E).
Type Material: Holotype WAM no. 69-70.
Remarks: Considered a valid species in the genus *Prionovolva* by Wilson, 1993, and in OBIS, 2003. Incorrect coordinates cited by Cate, 1973a: correct coordinates = ca. 32°01'S, 115°45'E.

culmen, Pseudosimnia (Inflatovula), Cate, 1973a:33, fig. 64.
Type Locality: Off Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype ANSP no. 244834.
Remarks: Considered a valid species by Azuma, 1989, and Higo et al., 1999, a valid species in the genus *Inflatovula* by Fehse, 2001b, a valid species in the genus *Margovula* in OBIS, 2003, and a junior synonym of *Pseudosimnia (Diminovula) marginata* (Sowerby, 1828) by Okutani & Sasaki, 2000.

curiosum, Crenavolva (Cuspivolva), Cate, 1973a:56-57, fig. 118.
Type Locality: Bay of Bengal, southeast of Vizagapatnam (= Vishakhapatnam), India (17°35'N, 83°25'E).
Type Material: Holotype ANSP no. 294553.
Remarks: Considered valid species in the genus *Cuspivolva* by Fehse, 2001b, and in OBIS, 2003.

cuspis, Crenavolva (Cuspivolva), Cate, 1973a:54-55, fig. 113.
Type Locality: Off Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype ANSP no. 244835.
Remarks: Considered a valid species by Higo et al., 1999, a valid species in the genus *Cuspivolva* by Fehse, 2001b, and in OBIS, 2003, but treated as a junior synonym of *Primovula (Crenavolva) striatula* (Sowerby, 1828) by Okutani & Sasaki, 2000.

dancei, Phenacovolva (Turbovula), Cate, 1973a:103-104, fig. 233.
Type Locality: Singapore (1°14'N, 103°55'E).
Type Material: Holotype NMW no. 70.25.Z3, hypotype: ANSP no. 243105.
Remarks: Considered a valid species by Wilson, 1993, Fehse & Wiese, 1993; Higo & et al., 1999, Fehse, 2001b, and in OBIS, 2003, but treated as a subspecies of *Phenacovolva (Turbovula) fusula* Cate & Azuma *in* Cate, 1973a, by Azuma, 1986.

diadema, Dentiovula, Cate, 1978b:194-195, pl. 1, fig. 4.
Type Locality: Off Wakayama, Kii-suido, Wakayama Pref., Honshu, Japan (31°10'N, 135°15'E).
Type Material: Holotype LACM no. 1835.
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003, but treated as a junior synonym of *D. colobica* Azuma & Cate, 1971, by Mase, 1989. Incorrect coordinates cited by Cate: correct coordinates = ca. 34°10'N, 135°05'E.

diantha, Phenacovolva (Pellasimnia), Cate, 1973a:98-99, fig. 222.
Type Locality: Off Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype ANSP no. 278056 (= ANSP no. 287056 in Higo et al., 2001).

Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

dolabra, Delonovolva, Cate, 1974b:383-384, fig. 5.
Type Locality: Off Hinomi-saki, Kii-suido, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype LACM no. 1557.
Remarks: Considered a valid species by Higo et al., 1999, and valid in the genus *Dissona* by Fehse, 2001b, and in OBIS, 2003.

dondani, Primovula (Diminovula), Cate, 1964d:102, pl. 19, figs. 1-3.
Type Locality: Carigara Bay, Leyte Id., Leyte Prov., Philippines (11°20'N, 124°40'E).
Type Material: Holotype NMP no. 07287.
Remarks: Considered a valid species in the genus *Serratovolva* by Liltved, 2000;,Fehse, 2001b, and in OBIS, 2003.

draconis, Prosimnia semperi, Cate, 1973a:74-75, figs. 164-164a.
Type Locality: Palau (07°30'N, 134°35'E).
Type Material: Holotype USNM no. 636514, hypotype USNM no. 636515.
Remarks: Considered a valid species by Fehse, 2001b, and a valid subspecies by Wilson, 1993, Liltved, 2000, and in OBIS, 2003.

draperi, Crenavolva (Cuspivolva), Cate & Azuma *in* Cate, 1973a:55-56, fig. 116.
Type Locality: Off Nada, Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 15637.
Remarks: Considered a valid species by Higo et al., 1999, and Liltved, 2000, valid in the genus/subgenus *Primovula (Crenavolva)* by Okutani & Sasaki, 2000, and valid in the genus *Cuspivolva* by Fehse, 2001b, and in OBIS, 2003.

dubia, Primovula (Adamantia), Cate, 1973a:46-47, fig. 95.
Type Locality: Southeast of Bantayan Id., Cebu Prov., Philippines (11°09'N, 123°50'E).
Type Material: Holotype USNM no. 281027.
Remarks: Considered a valid species by Fehse, 2001b, and in OBIS, 2003.

eizoi, Dentiovula, Cate & Azuma *in* Cate, 1973a:16, figs. 26, 26C.
Type Locality: Off Kirime-zaki, Kii-suido, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 15608, paratype LACM no. 1870.
Remarks: Considered a valid species by Mase, 1989; Higo et al., 1999; Liltved, 2000, Okutani & Sasaki, 2000; Fehse, 2001b, and in OBIS, 2003.

emersoni, Aperiovula, Cate, 1973a:39-40, fig. 79.
Type Locality: Melilla, España (on Moroccan mainland).
Type Material: Holotype NMW no. 70.25 z.2, paratype LACM no. 1890.
Remarks: Considered a valid species by Fehse, 2001b.

emilyreidae, Margovula, Cate, 1973a:18-19, fig. 31.
Type Locality: Off Ogokuda Beach, Shio-no-misaki, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype CAS no. 133323.
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

figgisae, Xandarovula, Cate, 1973a:36, fig. 70.
Type Locality: Off northern tip of North West Cape, Western Australia, Australia (21°50'S, 114°10'E).
Type Material: Holotype WAM no. 1454-70, paratype LACM no. 1869.
Remarks: Considered a valid species by Fehse, 2001b, and in OBIS, 2003.

framea, Aclyvolva, Cate, 1973a:79-80, fig. 177.
Type Locality: Broome, Roebuck Bay, Western Australia, Australia (17°57'S, 122°50'E).
Type Material: Holotype MCZ no. 276104.
Remarks: Considered a valid species in OBIS, 2003, but treated as a possible juvenile of *Phenacovolva haynesi* (Sowerby, 1889) by Wilson, 1993. Incorrect longitude cited by Cate, 1973a: correct longitude = 122°05'E.

fulguris, Pseudosimnia (Diminovula), Azuma & Cate, 1971:267-268, figs. 15, 24 (see also Cate, 1971:363 for omitted discussion).
Type Locality: Off Kirime-zaki, Kii-hanto, Wakayama Pref., Honshu, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 14844.
Remarks: Considered a valid species by Fehse, 2001b, but treated as a junior synonym of *Primovula (Adamantia) roseomaculata florida* (Kuroda, 1958) by Higo et al., 1999, and in OBIS, 2003, and a junior synonym of *Primovula roseomaculata* (Schepman, 1909) by Mase, 1989.

fumikoae, Primovula, Azuma & Cate, 1971:268, fig. 16 (see also Cate, 1971:363 for omitted discussion).
Type Locality: Off Tosa, Kochi Pref., Tosa-wan, Shikoku, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 1036.
Remarks: Considered a valid species in the genus *Stohleroma* by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

fusula, Phenacovolva (Turbovula), Cate & Azuma *in* Cate, 1973a:103, fig. 232.
Type Locality: Off Minabe, Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 14977.
Remarks: Considered a valid species by Higo et al., 1999, Liltved, 2000; Okutani & Sasaki, 2000, and valid in the genus *Turbovula* by Fehse, 2001b.

galearis, Carpiscula, Cate, 1973a:62-63, fig. 134.
Type Locality: North-northwest of Phuket Id., Andaman Sea, Thailand (08°29'N, 97°59'E).
Type Material: Holotype ANSP no. 291498.
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003, and valid in the genus/subgenus *Primovula (Carpiscula)* by Okutani & Sasaki, 2000.

gibbulum, Pseudocyphoma, Cate, 1978a:165-166, fig. 9.
Type Locality: Off the Dry Tortugas Ids., Monroe Co., Florida (24°40'N, 82°55'W).
Type Material: Holotype LACM no. 1793.
Remarks: Considered a valid species by Fehse, 2001b, 2003b, and in WAGD, 2003.

greenbergae, Phenacovolva (Turbovula), Cate, 1974b:382-383, fig. 3.
Type Locality: Off Kao-hsiung, Kao Hsiung Co., Taiwan, Republic of China (22°44'N, 120°21'E).
Type Material: Holotype LACM no. 1556, 3 paratypes AMNH no. 204857 (*ex* C.N. Cate collection) [additional paratype cited in Cate, 1974b, repository unknown] (Boyko & Cordeiro, 2001).
Remarks: Considered a valid spedcies by Fehse, 2001b, and in OBIS, 2003.

habui, Primovula (Primovula), Cate, 1973a:43, fig. 88.
Type Locality: Off Tomida, Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma, Takarazaka, Japan, no. 15606.
Remarks: Considered a valid species by Higo et al., 1999; Liltved, 2000, Fehse, 2001b, and in OBIS, 2003.

hasta, Dissona, Cate & Azuma *in* Cate, 1973a:85, fig. 189.
Type Locality: Off Minabe, Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype in the collection of M. Azuma, Takarazaka, Japan, no. 15418.
Remarks: Considered a valid species by Higo et al., 1999, and in OBIS, 2003, and valid in the genus *Phenacovolva* by Fehse, 2001b.

heleneae, Primovula (Primovula), Cate, 1973a:43-44, fig. 89.
Type Locality: Gulf St. Vincent, South Australia, Australia (34°55'S, 138°10'E).
Type Material: Holotype SAM no. D.954.
Remarks: Considered a valid species in the genus *Primovula* by Wilson, 1993, valid in the genus *Cuspivolva* by Fehse, 2001b, and a junior synonym of *P. verconis* (Cotton & Godfrey, 1932) in OBIS, 2003. The holotype was originally a paratype of *P. verconis* but recognized as distinct by Cate (Wilson, 1993).

hesperia, Crenavolva (Crenavolva) striatula, Cate, 1973a:51, fig. 105.
Type Locality: West of Ankifi and south of Nossi Bé, Madagascar (13°15'S, 48°15'E).
Type Material: Holotype ANSP no. 260880.
Remarks: Considered a full species by Fehse, 1999c, 2002b, and in OBIS, 2003, within the genus *Primovula*.

hirohitoi, Rotaovula, Cate & Azuma *in* Cate, 1973a:48-49, figs. 100, 100C.
Type Locality: Off Hinomi-saki, Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype in the collection of M. Azuma, Takarazuka, Japan no. 15644.
Remarks: Considered a valid species by Higo et al., 1999; Okutani & Sasaki, 2000, Fehse, 2001b, and in OBIS, 2003, but treated as a valid *Primovula* by Mase, 1989.

horimasarui, Primovula, Azuma & Cate, 1971:263, fig. 6 (see also Cate, 1971:362 for omitted discussion).
Type Locality: Off Kirime-zaki, Kii-hanto, Wakayama Pref., Honshu, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 14842.
Remarks: Considered a junior synonym of *Phenacovolva (Hiata) coarctata* (Adams & Reeve, 1848) by Higo et al., 1999, and Okutani & Sasaki,

2000, but treated as a valid species in the genus *Hiatavolva* by Fehse, 1999c, 2001b.

howlandae, Primovula (Primovula), Cate, 1974b:381-382, fig. 1.
Type Locality: Clairview (Mackay), Queensland, Australia (22°07'S, 149°32'E).
Type Material: Holotype AM no. C.92105, paratype LACM no. 1864, 3 paratypes AMNH no. 204853 (*ex* C.N. Cate collection) (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species by Fehse, 2001b, and in OBIS, 2003. This species was differentiated mainly on variations in shell form and further study is needed to determine its status (Wilson, 1993). Incorrect coordinates cited by Cate, 1974b: correct coordinates = 21°06'S, 149°10'E.

iberia, Aperiovula adriatica, Cate, 1973a:37, fig. 72.
Type Locality: Golfo de Cadiz, Cadiz Prov., España (36°33'N, 06°12'W).
Type Material: Holotype LACM no. 1607, paratype LACM no. 1897.
Remarks: Considered a valid species by Fehse, 2001, and a valid subspecies in OBIS, 2003.

imitabilis, Crenavolva (Serratovolva), Cate, 1973a:54. fig. 112.
Type Locality: Ogokuda Beach, Shio-no-misaki, Wakayama Pref, Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype LACM no. 1608.
Remarks: Considered a valid species by Higo et al., 1999, and valid in the genus *Serratovolva* by Fehse, 2001b, and in OBIS, 2003.

improcera, Phenacovolva, Azuma & Cate, 1971:265, fig. 12 (see also Cate, 1971:363 for omitted discussion).
Type Locality: Off Kirime-zaki, Kii-hanto, Wakayama Pref., Honshu, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 1739B.
Remarks: Considered a valid species by Wilson, 1993; Fehse, 2001b, and in OBIS, 2003, and a valid species by Higo et al., 1999, in the subgenus *Pellasimnia*.

incisa, Pseudosimnia (Diminovula), Azuma & Cate, 1971:262, fig. 3 (see also Cate, 1971:362 for omitted discussion).
Type Locality: Off Hinomi-saki, Kii-hanto, Wakayama Pref., Honshu, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 14843.

Remarks: Considered a valid species by Higo et al., 1999, and valid in the genus *Diminovula* by Fehse, 2001b, and in OBIS, 2003.

intricata, Testudovolva, Cate, 1973a:9, fig. 10.
Type Locality: Off southeastern Tawi-Tawi Id., Sulu Prov., Philippines (5°12'N, 120°00'E).
Type Material: Holotype USNM no. 283713.
Remarks: Considered a junior synonym of *Testudovolva pulchella* (H. Adams, 1873) by Liltved, 2000, and a valid species by Fehse, 2001b, and in OBIS, 2003.

jeanae, Aperiovula, Cate, 1973a:37, figs. 73, 73C.
Type Locality: Enshu-nada, between Izu-hanto and Ise-wan, Honshu, Japan (34°00'N, 139°30'E).
Type Material: Holotype LACM no. 1187, paratype LACM no. 1898.
Remarks: Considered a valid species in the genus/subgenus *Primovula (Aperiovula)* by Okutani & Sasaki, 2000, treated as a valid *Aperiovolva* by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003, and a valid *Pseudosimnia* by Liltved, 2000.

kandai, Pseudosimnia (Inflatovula), Cate & Azuma *in* Cate, 1973a:32, fig. 62.
Type Locality: Off Kabae, Oita Pref., Kyushu, Japan (33°14'N, 131°35'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 15641.
Remarks: Considered a valid species by Higo et al., 1999, a valid species in the genus *Inflatovula* by Fehse, 2001b, a valid *Margovula* in OBIS, 2003, but treated as a junior synonym of *Dimniovula punctata* (Duclos, 1831) by Mase, 1989.

kashiwajimensis, Phenacovolva (Turbovula), Cate & Azuma *in* Cate, 1973a:104-105, fig. 235.
Type Locality: Off Tomida, Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 15420, paratype AMNH no. 204953 (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species by Higo et al., 1999, and Fehse, 2001b.

kathiewayae, Pseudocyphoma, Cate, 1973a:70, fig. 45A.
Type Locality: Off San Sebastian, España (43°19'N, 01°59'W) [= error for São Sebastiao, São Paulo, Brazil (WAGD, 2003)].
Type Material: Holotype FMNH no. 161588.
Remarks: Considered a valid species by Fehse, 2000a, 2003b, but treated as a junior synonym of *P. intermedium* (Sowerby, 1828) in WAGD, 2003. Because the type locality was considered suspect by Cate

(1973a:70), a more logical type locality of Isla Icacos, Puerto Rico was designated by Fehse, 2000a.

kiiensis, Phenacovolva, Azuma & Cate, 1971:265, fig. 11 (see also Cate, 1971:363 for omitted discussion).
Type Locality: Off Kirime-zaki, Kii-hanto, Wakayama Pref., Honshu, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 1737.
Remarks: Considered a junior synonym of *Phenacovolva (Pellasimnia) subreflexa* (Adams & Reeve, 1848) by Higo et al., 1999, Okutani & Sasaki, 2000, and in OBIS, 2003.

kilburni, Volva, Cate, 1975a:259-260, fig. 11.
Type Locality: Haga Haga, near East London, Natal, South Africa (33°01'S, 27°56'E).
Type Material: Holotype NM no. 5377, 6 paratypes NM no. A593 (2) NM and A1246 (4), 2 paratypes AMNH no. 204862 (*ex* C.N. Cate Collection) (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species by Liltved, 2000, and Fehse, 2001b, and a possible junior synonym of *Volva volva habei* Oyama, 1961, by Okutani & Sasaki, 2000.

kosugei, Margovula, Cate, 1973a:17-18, fig. 29.
Type Locality: South-southwest of Joga-shima, Sagami-wan, Chiba Pref., Honshu, Japan (35°20'N, 139°20'E).
Type Material: Holotype NSMT no. 6 (= NSMT no. 18048, Higo et al., 2001), paratype LACM no. 1892.
Remarks: Considered a valid species by Higo et al., 1999; Fehse, 2001b, and in OBIS, 2003, and a junior synonym of *Pseudosimnia (Diminovula) punctata* (Duclos, 1831) by Mase, 1989, and Okutani & Sasaki, 2000. Incorrect latitude cited by Cate, 1973a: correct latitude = 35°02'N.

kurodai, Primovula (Adamantia), Cate & Azuma *in* Cate, 1973a:111, figs. 95A, 95AC.
Type Locality: Off Kirime-zaki, Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 15645.
Remarks: Considered a valid species by Higo et al., 1999, a valid species in the genus *Adamantia* by Fehse, 2001, but treated as a junior synonym of *P. roseomaculata* (Schepman, 1909) by Mase, 1989.

kurziana, Cymbovula, Cate, 1976b:161-162, fig. 3.
Type Locality: Malaita Id., Solomon Ids. (09°00'S, 161°00'E).
Type Material: Holotype LACM no. 1764.
Remarks: Considered a valid species by Fehse, 2001b, and in OBIS, 2003.

lacrima, Lacrima, Cate, 1973a:20-21, fig. 35.
Type Locallity: Joga-shima, Sagami-wan, Chiba Pref., Japan (35°17'N, 139°41'E).
Type Material: Holotype HNSM no. 2 (= NSMT no. 18075, Higo et al., 2001).
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003. Incorrect latitude cited by Cate, 1973a: correct latitude = 35°07'N.

lahainaensis, Volva (Phenacovolva), Cate, 1969c:365-366, pl. 56, fig. 2.
Type Locality: Southwest of Maui (= "Lahaina Roads"), Hawaiian Ids. (20°52'N, 156°41'W).
Type Material: Holotype BPBM no. 217597.
Remarks: Considered a valid species in the genus *Phenacovolva* by Kay, 1979; Higo et al, 1999; Liltved, 2000, Fehse, 2001b, and in OBIS, 2003, but treated as a valid subspecies of *Phenacovolva (Pellasimnia) angasi* by Azuma, 1984.

macleani, Delonovolva, Cate, 1976b:159, fig. 5.
Type Locality: Off Punta Quepos, Puntarenas Prov., Costa Rica (09°2"N, 84°09'41"W).
Type Material: Holotype LACM no. 1772.
Remarks: Considered a valid species in the genus *Neosimnia* by Fehse, 2001a, 2001b.

maesae, Simnia, Cate, 1973a:71-72, fig. 159.
Type Locality: Broome, Roebuck Bay, Western Australia, Australia (17°57'S, 122°05'E).
Type Material: Holotype MCZ no. ACC812.
Remarks: Considered a possible junior synonym of *Phenacovolva angasi* (Reeve, 1865) by Fehse, 2001b, but treated as a valid species in OBIS, 2003.

malaita, Cymbovula, Cate, 1976b:161, fig. 2.
Type Locality: Malaita Id., Solomon Ids. (09°00'S, 161°00'E).
Type Material: Holotype LACM no. 1771, paratype LACM no. 1874.
Remarks: Considered a valid species by Fehse, 2001b, and in OBIS, 2003.

marferula, Simnialena, Cate, 1973a:75, fig. 165.
Type Locality: Gulf Beach, Port Aransas, Mustang Id., Nueces Co., Texas (24°45'N, 97°50'W).
Type Material: Holotype LACM no. 1293.
Remarks: Considered a valid species by Fehse, 2001b, and in WAGD, 2003. Incorrect longitude cited by Cate:

correct longitude = 97°05'W).

masaoi, Dentiovula, Cate, 1973a:15, figs. 23-23a.
Type Locality: Off Kirime-zaki, Kii-suido, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype and one paratype in collection of M. Azuma, Takarazuka, Japan, nos. 15605, 14974, paratype LACM no. 1871.
Remarks: Considered a valid species by Higo et al., 1999; Okutani & Sasaki, 2000, Fehse, 2001b, and in OBIS, 2003.

meyeriana, Aperiovula, Cate, 1973a:38, fig. 75.
Type Locality: Mikawa-wan, Aichi Pref., Honshu, Japan (34°40'N, 137°00'E).
Type Material: Holotype LACM no. 1186, paratype LACM no. 1891.
Remarks: Considered a junior synonym of *Primovula rhodia* (A. Adams, 1854) by Mase, 1989, a synonym of *Sandalia rhodia* (A. Adams, 1855) by Higo et al., 1999, but treated as a valid species by Fehse, 2001b, and in OBIS, 2003.

michaelkingi, Spiculata, Cate, 1973a:83-84, figs. 185, 185C.
Type Locality: South of Maui, Hawaiian Ids. (20°45'N, 156°20'W).
Type Material: Holotype BPBM no. 9734.
Remarks: Considered a valid species by Kay, 1979, Fehse, 2001b, and in OBIS, 2003. Incorrect longitude cited by Cate, 1973a: correct longitude = ca. 156°30'W.

minabeensis, Crenavolva (Serratovolva), Cate, 1975a:258-259, figs. 10, 13.
Type Locality: Minabe-wan, Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 16339.
Remarks: Considered a valid species by Higo et al., 1999, and Fehse, 2001b, and valid in the genus *Serratovolva* by Liltved, 2000, Fehse, 2001b, and in OBIS, 2003.

mucronata, Primovula, Azuma & Cate, 1971:264, fig. 8 (see also Cate, 1971:363 for omitted discussion).
Type Locality: Off Kirime-zaki, Kii-hanto, Wakayama Pref., Honshu, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 14845.
Remarks: Considered a valid *Primovula* in the subgenus *Crenovolva* [*sic*] by Okutani & Sasaki, 2000, a valid species within the genus/subgenus *Crenavolva (Cuspivolva)* by Higo et al., 1999, and valid in the genus *Cuspivolva* by Fehse, 2001b, and in OBIS, 2003.

myrakeenae, Primovula, Azuma & Cate, 1971:263-264, fig. 7 (see also Cate, 1971:363 for omitted discussion).
Type Locality: Off Nada, Kii-hanto, Wakayama Pref., Honshu, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 14847.
Remarks: Considered a valid species in the genus/subgenus *Crenovolva* [*sic*] *(Cuspivolva)* by Higo et al., 1999, valid in the genus *Cuspivolva* by Fehse, 2001b, and in OBIS, 2003, and a junior synonym of *Primovula (Crenovolva)* [*sic*] *azumai* (Cate, 1970) by Mase, 1989, and Okutani & Sasaki, 2000.

narinosa, Primovula (Primovula), Cate, 1973a:40-41, fig. 81.
Type Locality: Southeast of Cape Dgaroewawoffi, Japen Id., Geelvink Bay, Irian Jaya, Indonesia (02°30'S, 135°30'E).
Type Material: Holotype ANSP no. 276602.
Remarks: Considered a valid species by Fehse, 2001b, and in OBIS, 2003.

nebula, Prionovolva (Prionovolva), Azuma & Cate, 1971:262, fig. 4 (see also Cate, 1971:362 for omitted discussion).
Type Locality: Off Minabe, Wakayama Prefecture, Honshu, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no.14826B.
Remarks: Considered a valid species by Higo et al., 1999, and in OBIS, 2003, a valid species in the genus *Testudovolva* by Fehse, 2001b, treated as a junior synonym of *P. bulla* (Adams & Reeve, 1848) by Okutani & Sasaki, 2000, and deemed a junior synonym of *Testudovolva pulchella* (H. Adams, 1873) by Liltved, 2000.

nielseni, Pseudosimnia (Diminovula), Cate, 1976a:383-384, fig. 2.
Type Locality: Keppel Bay, Queensland, Australia (23°10'S, 150°49'E).
Type Material: Holotype LACM no. 1707, 10 paratypes AMNH no. 204855 (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species in the genus *Diminovolva* by Wilson, 1993, Fehse, 2001b, and in OBIS, 2003.

nimbosa, Galeravolva, Cate, 1978b:192-193, pl. 1, fig. 2.

Type Locality: Off Wakayama, Kii-suido, Wakayama Pref., Honshu, Japan (31°10'N, 135°15'E).
Type Material: Holotype LACM no. 1830.
Remarks: Considered a valid species in the genus *Habuprionovolva* by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003. Incorrect coordinates cited by Cate: correct coordinates = ca. 34°10'N, 135°05'E.

nivea, Prionovolva, Cate 1974b:383, fig. 4.
Type Locality: New Caledonia (21°30'S, 165°3'E).
Type Material: Holotype ANSP no. 39423.
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

nossibeensis, Phenacovolva (Pellasimnia), Cate, 1973a:100, fig. 226.
Type Locality: West of Angorombala, southwest of Nossi Bé, Madagascar (13°15'S, 48°15'E).
Type Material: Holotype ANSP no. 259661.
Remarks: Considered a valid species by Fehse, 2001b, and in OBIS, 2003.

nubila, Pseudosimnia (Labiovolva), Cate & Azuma *in* Cate, 1973a:34, fig. 66.
Type Locality: Off Hinomi-saki, Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 15642.
Remarks: Considered a valid species by Higo et al., 1999, and valid in the genus *Labiovolva* by Fehse, 2001b, and in OBIS, 2003.

orientis, Testudovolva, Cate, 1973a:8, fig. 8.
Type Locality: Off Pratas Id. (= Dongshaoundao), South China Sea, China (21°00'N, 117°00'E).
Type Material: Holotype USNM no. 285039.
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003, but treated as a junior synonym of *Prionovolva bulla* (Adams & Reeve, 1848) by Mase, 1989, Okutani & Sasaki, 2000, and deemed a junior synonym of *Testudovolva pulchella* (H. Adams, 1873) by Liltved, 2000.

ostheimerae, Crenavolva (Cuspivolva), Cate, 1973a:58, fig. 122.
Type Locality: Geelvink Bay, southeast of Cape Dgaroewawoffi, Japen Id., Irian Jaya, Indonesia (02°30'S, 135°30'E).
Type Material: Holotype ANSP no. 277760, paratype LACM no. 1868.
Remarks: Considered a valid *Cuspivolva* by Fehse, 2001b, and in OBIS, 2003.

pagoda, Xandarovula, Cate, 1973a:35, fig. 69.
Type Locality: Off Tosa, Tosa-wan, Kochi Pref., Shikoku, Japan (33°20'N, 133°45'E).
Type Material: Holotype ANSP no. 277515.
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

parvita, Phenacovolva (Phenacovolva), Cate & Azuma *in* Cate, 1973a:97, fig. 219.
Type Locality: Off Kirime-zaki, Kii-hanto, Wakayama Pref., Honshu, Japan (34°'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. D-1090.
Remarks: Considered a valid species by Fehse, 2001b, and a junior synonym of *Phenacovolva recurva* (A. Adams & Reeve, 1848) by Higo et al., 1999, and Liltved, 2000.

perilla, Pseudosimnia (Diminovolva), Cate, 1973a:29, fig. 56.
Type Locality: North-northwest of Phuket Id., Andaman Sea, Thailand (08°29N, 97°59'E).
Type Material: Holotype ANSP no. 291499.
Remarks: Valid in the genus *Diminovolva* by Fehse, 2001b, and in OBIS, 2003.

periopsis, Crenavolva (Crenavolva), Cate, 1978a:163-164, fig. 5.
Type Locality: Surabaja, Java, Indonesia (07'S, 112°40'E).
Type Material: Holotype LACM no. 1791.
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, 2002d, and in OBIS, 2003.

platysia, Primovula (Primovula), Cate, 1973a:42-43, fig. 86.
Type Locality: Dingo Beach, Prosperine, Queensland, Australia (20°3'S, 149°00'E).
Type Material: Holotype AM no. C.75280, paratype LACM no. 1862.
Remarks: Considered a valid species by Wilson, 1993, Fehse, 2001b, and in OBIS, 2003.

pontia, Aperiovula, Cate, 1975a:255-256, fig. 2.
Type Locality: Off Hinomi-saki, Kii-suido, Wakayama Pref., Honshu, Japan (3'N, 134°4'E).
Type Material: Holotype LACM no. 1701, paratype LACM no. 1889.
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

pseudogracilis, Phenacovolva (Pellasimnia) weaveri, Cate & Azuma *in* Cate, 1973a:101, figs. 228, 228C.

Type Locality: Off Tomida, Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 15419, paratype AMNH no. 204950 (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species by Fehse, 2001b, a valid subspecies by Wilson, 1993, and Okutani & Sasaki, 2000, but treated as a junior synonym of *P. weaveri* by Higo et al., 1999, Liltved, 2000, and in OBIS, 2003.

pustulata, Cypraea, Lightfoot, 1786:106.
Type Locality: Puertecitos, Golfo de California, Baja California, México.
Type Material: Neotype (designated by Cate, 1973a:5, fig. 2) LACM no. 1422.
Remarks: Currently in the genus *Jenneria*.

pyrifera, Pseudosimnia (Pseudosimnia), Cate, 1973a:26, fig. 48.
Type Locality: Off telegraph station, Barbados (13°15'N, 59°30'W).
Type Material: Holotype USNM no. 460466.
Remarks: Considered a valid species by Fehse, 2001b, and a junior synonym of *P. vanhyningi* (M. Smith, 1940) in WAGD, 2003.

quaestio, Testudovolva, Cate, 1973a:9, fig. 11.
Type Locality: Southeast of Bantayan Id., Cebu Prov., Philippines (11°14'N, 123°44'E).
Type Material: Holotype USNM no. 280496.
Remarks: Treated as a valid species by Fehse, 2001b, and in OBIS, 2003, but considered a junior synonym of *Testudovolva pulchella* (H. Adams, 1873) by Liltved, 2000.

queenslandica, Cymbovula, Cate, 1974b:382, fig. 2.
Type Locality: Clairview (Mackay), Queensland, Australia (22°07'S, 149°32'E).
Type Material: Holotype AM no. C.92106, 2 paratypes AMNH no. 204856 (*ex* C.N. Cate Collection) [additional paratypes cited in Cate, 1974b, repository unknown] (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species by Wilson, 1993, [provisionally in *Cymbovula*], Fehse, 2001b, and in OBIS, 2003. Incorrect coordinates cited by Cate, 1974b: correct coordinates = 21°06'S, 149°10'E.

reflexa, Dissona, Cate, 1973a:112, fig. 190.
Type Locality: Off Jolo Id., Sulu Archipelago, Sulu Prov., Philippines (06°0'N, 121°10'E).
Type Material: Holotype USNM no. 263827.
Remarks: Considered a valid species by Fehse, 2001b, and in OBIS, 2003.

rehderi, Phenacovolva (Pellasimnia), Cate, 1973a:99, fig. 224.
Type Locality: Off Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype USNM no. 607171.
Remarks: Considered a valid species by Higo et al., 1999, Liltved, 2000, and Fehse, 2001b.

rhomba, Cyphoma, Cate, 1978a:164-165, figs. 7-8.
Type Locality: Fort Lauderdale Reef, Palm Beach Co., Florida (ca. 27°00'N, 80°00'W).
Type Material: Holotype LACM no. 1792, paratype AMNH no. 204854 (*ex* C.N. Cate Collection) (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species by Fehse, 2001b, 2003a, but treated as a junior synonym of *C. mcgintyi* Pilsbry, 1939, in WAGD, 2003.

robertsoni, Aperiovula, Cate, 1973a:39, fig. 77.
Type Locality: Off Tosa, Tosa-wan, Kochi Pref., Shikoku, Japan (33°20'N, 133°45'E).
Type Material: Holotype ANSP no. 305022, paratype LACM no. 1895.
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003, and a junior synonym of *Primovula (Aperiovula) jeanae* (Cate, 1973) by Okutani & Sasaki, 2000.

rosewateri, Crenavolva (Crenavolva), Cate, 1973a:52, figs. 107, 107C.
Type Locality: Cabalian Point, Jolo Id., Sulu Archipelago, Sulu Prov., Philippines (06°00'N, 121°1'E).
Type Material: Holotype USNM no. 238979.
Remarks: Considered a valid species by Liltved, 2000, and valid in the genus *Primovula* by Fehse, 2002a, and in OBIS, 2003.

rostella, Crenavolva (Cuspivolva), Cate, 1973a:58, fig. 123.
Type Locality: Boetoeng (Button) Id. (= Pulau Butung), southeast of Sulawesi, Indonesia (2°30'S, 120°30'E).
Type Material: Holotype USNM no. 279763.
Remarks: Considered a valid species by Higo et al., 1999, and valid in the genus *Cuspivolva* by Fehse, 2001b, and in OBIS, 2003. Incorrect coordinates cited by Cate, 1973a: correct coordinates = ca. 05°00'S, 123°00'E.

rugosa, Hiata, Cate & Azuma *in* Cate, 1973a:87-88, fig. 197.
Type Locality: Off Minabe, Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).

Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 15603.
Remarks: Considered a junior synonym of *Phenacovolva (Hiata) coarctata* (Adams & Reeve, 1848) by Higo et al., 1999, and Okutani & Sasaki, 2000, a junior synonym of *Hiata coarctata* by Mase, 1989, but treated as a valid species by Fehse, 2001b (as *Hiatavolva*), and valid in the genus *Phenacovolva* by Liltved, 2000.

rutherfordiana, Primovula (Adamantia), Cate, 1973a:47, figs. 96, 96C.
Type Locality: Townsville, Queensland, Australia (19°14'S, 146°45'E).
Type Material: Holotype AM no. C.75281, paratype LACM no. 1865.
Remarks: Considered a valid species by Wilson, 1993, Fehse, 2001b, and in OBIS, 2003.

ruthturnerae, Neosimnia avena, Cate, 1973a:92, fig. 207.
Type Locality: Florida Keys, Monroe Co., Florida (24°40'N, 81°10'W).
Type Material: Holotype MCZ no. 48545.
Remarks: Considered a valid species by Fehse, 2001b, and a valid subspecies in WAGD, 2003.

santacarolinensis, Primovula (Primovula), Cate, 1978a:162-163, fig. 3.
Type Locality: West of Santa Carolina, Mozambique (15°03'S, 40°42'E).
Type Material: Holotype NM no. G-7280.
Remarks: Considered a valid species by Liltved, 2000, Fehse, 2001b, and in OBIS, 2003.

saturnalia, Dentiovula, Cate & Azuma ***in*** Cate, 1973a:15-16, fig. 25.
Type Locality: Off Kirime-zaki, Kii-hanto, Wakayama Pref., Honshu Japan (34°00'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 14974A.
Remarks: Considered a valid species by Fehse, 2001b, and in OBIS, 2003, but treated as a junior synonym of *Dentiovula colobica* (Azuma & Cate, 1971) by Mase, 1989 (as *D. saturnaria*), Higo et al., 1999, and Okutani & Sasaki, 2000 (as *D. saturnalis*).

schilderorum, Margovula, Cate, 1973a:19, fig. 32.
Type Locality: Minhow (= Fuzhou), Fujian Prov., China (26°05'N, 119°12'E).
Type Material: Holotype USNM no. 333976.
Remarks: Considered a valid species by Kay, 1979, Liltved, 2000; Fehse, 2001b, and in OBIS, 2003.

sculptura, Neosimnia spelta, Cate, 1973a:90-91, fig. 205.
Type Locality: São Tomé, São Tomé and Principe, West Africa (00°15'N, 06°35'E).
Type Material: Holotype ANSP no. 267832.
Remarks: Considered a valid species by Fehse, 2001b. These coordinates plot on the island of São Tomé and are obviously incorrect.

sedlaki, Cyphoma, Cate, 1976b:160, figs. 4-4c.
Type Locality: Sombrero Reef, Marathon, Vaca Key, Monroe Co., Florida (approx. 24°40'N, 81°07'W).
Type Material: Holotype USNM no. 710912.
Remarks: Considered a valid species by Fehse, 2001b, 2003a, but treated as a junior synonym of *C. mcginityi* Pilsbry, 1939, in WAGD, 2003.

segaliana, Cymbovula, Cate, 1976b:160-161, fig. 1.
Type Locality: Pinang Id., Pinang, Malaysia (05°25'N, 100°15'E).
Type Material: Holotype LACM no. 1770.
Remarks: Considered a valid species by Liltved, 2000, Fehse, 2001b, and in OBIS, 2003.

serrula, Delonovula, Cate, 1973a:59, fig. 125.
Type Locality: Boetoeng (Button) Id. (= Pulau Butung), southeast of Celebes, Indonesia (2°30'S, 120°30'E).
Type Material: Holotype USNM no. 279763A.
Remarks: Considered a valid species in the genus *Crenavolva* by Fehse, 2001b, and valid in the genus *Cuspivolva* in OBIS, 2003. Incorrect coordinates cited by Cate, 1973a: correct coordinates = ca. 05°00'S, 123°00'E.

shikamai, Aperiovula, Cate, 1973a:37-38, fig. 74.
Type Locality: Enshu-nada, between Izu-hanto and Ise-wan, Honshu, Japan (34°44'N, 136°44'E).
Type Material: Holotype CAS no. 13324, paratype LACM no. 1894.
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

shingoi, Kuroshiovolva, Azuma & Cate, 1971:266-267, figs. 14, 20-23 (see also Cate, 1971:363 for omitted discussion).
Type Locality: Off Hinomi-saki, Kii-hanto, Wakayama Pref., Honshu, Japan.
Type Material: Holotype and two paratypes in collection of M. Azuma, Takarazuka, Japan, nos. 14839, 14910, 1 paratype AMNH no. 204861 (*ex* C.N. Cate Collection), 1 paratype in collection of S. Habu (Boyko & Cordeiro, 2001).

Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003, but valid in the genus/subgenus *Phenacovolva (Kuroshiovolva)* by Okutani & Sasaki, 2000.

simulans, Lacrima, Cate, 1973a:21, fig. 36.
Type Locality: Joga-shima, Sagami-wan, Kanagawa Pref., Honshu, Japan (35°17'N, 139°41'E).
Type Material: Holotype HNSM no. 1 (= NSMT no. 18077, Higo et al., 2001).
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003. Incorrect latitude cited by Cate, 1973a: correct latitude = 35°07'N.

singularis, Primovula (Primovula), Cate, 1973a:41, fig. 82.
Type Locality: Shroud Id. (= Tung-kua Hsü), Zhejiang Prov., China (27°38'N, 121°03'E).
Type Material: Holotype USNM no. 363933.
Remarks: Considered a valid species by Liltved, 2000, Fehse, 2001b, and in OBIS, 2003.

sinomaris, Primovula (Adamantia), Cate, 1973a:45, fig. 87.
Type Locality: Shirahama, Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype GIY (unnumbered).
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003, and a junior synonym of *Primovula (Adamantia) roseomaculata* (Schepman, 1909) by Okutani & Sasaki, 2000.

solemi, Primovula (Adamantia), Cate, 1973a:44-45, figs. 91-91a.
Type Locality: Off Boynton Beach, Palm Beach Co., Florida (26°31'N, 80°03'W).
Type Material: Holotype FMNH no. 78278, hypotype USNM no. 418077.
Remarks: Considered a valid species by Fehse, 2001b, and a junior synonym of *Pseudosimnia vanhyningi* (M. Smith, 1940) in WAGD, 2003.

spatiosa, Globovula, Cate, 1973a:22, fig. 40.
Type Locality: Between Cottesloe Beach and Leighton, Western Australia, Australia (31°47'S, 116°00'E).
Type Material: Holotype WAM no. 68-70.
Remarks: Considered a valid species by Fehse, 2001b, and valid in the genus *Prionovolva* by Wilson, 1993, and in OBIS, 2003. Incorrect coordinates cited by Cate, 1973a: correct coordinates = ca. 32°01'S, 115°45'E.

spectabilis, Dentiovula, Cate, 1975a:257-258, fig. 8.
Type Locality: Off Hinomi-saki, Kii-suido, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'e).
Type material: Holotype LACM no. 1702, paratype AMNH no. 204860 (*ex* C.N. Cate collection).

Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003, and a junior synonym of *D. eizoi* Cate & Azuma *in* Cate, 1973, by Okutani & Sasaki, 2000.

sphaera, Globovula, Cate, 1973a:22-23, fig. 41.
Type Locality: Off Kao-hsiung, Kao Hsiung Co., Taiwan, republic of China (22°44'N, 120°21'E).
Type Material: Holotype CAS no. 13321, paratype LACM no. 1888.
Remarks: Considered a valid species by Fehse, 2001b, and valid in the genus *Prionovolva* in OBIS, 2003.

sphoni, Pseudosimnia (Pseudosimnia), Cate, 1973a:25-26, fig. 47.
Type Locality: Off Key West, Monroe Co., Florida (24°33'N, 81°47'W).
Type Material: Holotype USNM no. 418078.
Remarks: Considered a valid species by Fehse, 2001b, and a junior synonym of *P. vanhyningi* (M. Smith, 1940) in WAGD, 2003.

stigma, Pseudosimnia (Inflatovula), Cate, 1978b:196-197, pl. 2, fig. 6.
Type Locality: Off Wakayama, Kii-suido, Wakayama Pref., Honshu, Japan (31°10'N, 135°15'E).
Type Material: Holotype LACM no. 1831.
Remarks: Considered a valid species in the genus *Inflatovula* by Fehse, 2001b, valid in the genus *Margovula* in OBIS, 2003, but considered a junior synonym of *P. (I.) culmen* Cate, 1978, by Higo et al., 1999. Incorrect coordinates cited by Cate, 1973a: correct coordinates = ca. 34°10'N, 135°05'E.

stohleri, Stohleroma, Cate, 1973a:47-48, fig. 97.
Type Locality: Ogokuda Beach, Shio-no-misaki, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype LACM no. 1188.
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

striola, Pseudosimnia (Diminovolva), Cate, 1973a:28-29, fig. 55.
Type Locality: West of Tavoy Id., Andaman Sea, Myanmar (13°00'N, 97°41'E).
Type Material: Holotype ANSP no. 292804, paratype LACM no. 1861.
Remarks: Considered a valid species in the genus *Diminovolva* by Fehse, 2001b, and in OBIS, 2003.

tadashigei, Dentiovula, Cate, 1973a:14-15, fig. 22.
Type Locality: Sagami-wan, Honshu, Japan (35°17'N, 139°41'E).

Type Material: Holotype NSMT no. 10 [= NSMT no.18023 (Higo et al., 2001)].
Remarks: Considered a valid species by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003, and a junior synonym of *Primovula (Crenovolva) [sic] beckeri* (Sowerby, 1900) by Okutani & Sasaki, 2000.

takae, Aperiovula, Cate, 1973a:38-39, fig. 76.
Type Locality: Off Tosa, Tosa-wan, Kochi Pref., Shikoku, Japan (33°20'N, 133°45'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 14973, paratype LACM no. 1896.
Remarks: Considered a valid species by Fehse, 2001b, and in OBIS, 2003, but considered a junior synonym of *Sandalia rhodia* (A. Adams, 1855) by Higo et al., 1999, and treated as a junior synonym of *Primovula (Sandalia) triticea* (Lamarck, 1810) by Okutani & Sasaki, 2001.

takaeopsis, Aperiovula, Cate, 1978b:198, pl. 2, fig. 8.
Type Locality: Off Wakayama, Kii-suido, Wakayama Pref., Honshu, Japan (31°10'N, 135°15'E).
Type Material: Holotype LACM no. 1833.
Remarks: Considered a valid species by Azuma, 1989, and Higo et al., 1999, and a valid species in the genus *Cuspivolva* by Fehse, 2001b, and in OBIS, 2003. Incorrect coordinates cited by Cate: correct coordinates = ca. 34°10'N, 135°05'E.

takeoi, Dentiovula, Cate & Azuma *in* Cate, 1973a:15, figs. 24, 24C.
Type Locality: Off Kirime-zaki, Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 15640.
Remarks: Considered a valid species by Higo et al., 1999, valid in the genus *Crenavolva* by Fehse, 2001b, and in OBIS, 2003, and a junior synonym of *Primovula (Crenovolva)* [*sic*] *traill*i (A. Adams, 1855) by Okutani & Sasaki, 2000.

tayloriana, Phenacovolva, Azuma & Cate, 1971:265, fig. 10 (see also Cate, 1971:363 for omitted discussion).
Type Locality: Off Kirime-zaki, Kii-hanto, Wakayama Pref., Honshu, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 1739A.
Remarks: Considered a valid species by Higo et al., 1999, Okutani & Sasaki, 2000, and Fehse, 2001b.

testudiana, Aperiovula, Cate, 1978a:161-162, fig. 2.
Type Locality: Mukaishima, Hiroshima Pref., Honshu, Japan.

Type Material: Holotype MNHN (without catalog number)
Remarks: Considered a valid species in the genus *Cuspivolva* by Fehse, 2001b, and in OBIS, 2003.

tinctilis, Margovula, Cate, 1973a:19-20, fig. 33.
Type Locality: Off Kao-hsiung, Kao Hsiung Co., Taiwan, Republic of China.
Type Material: Holotype CAS no. 13685.
Remarks: Considered a valid species by Liltved, 2000; Fehse, 2001b, and in OBIS, 2003

tokioi, Phenacovolva (Calcaria), Cate, 1973a:108, figs. 242, 242C.
Type Locality: Cooktown, Queensland, Australia (15°38'S, 145°25'E).
Type Material: Holotype LACM no. 1190.
Remarks: Considered a valid species by Wilson, 1993; Azuma, 1994, Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

tosaensis, Primovula, Azuma & Cate, 1971:264-265, figs. 9, 18 (see also Cate, 1971:363 for omitted discussion).
Type Locality: Off Kirime-zaki, Kii-hanto, Wakayama Pref., Honshu, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 14840.
Remarks: Considered a valid species by Mase, 1989, a valid *Primovula* in the subgenus *Crenovolva* [*sic*] by Okutani & Sasaki, 2000, and considered valid in the genus *Dissona* by Higo et al., 1999, Fehse, 2001b, and in OBIS, 2003.

translineata, Pseudosimnia (Inflatovula), Cate, 1973a:32-33, fig. 63.
Type Locality: Off Kaipoeri Village, Koeroedoe Id., Geelvink Bay, Irian Jaya, Indonesia (02°30'S, 135°30'E).
Type Material: Holotype ANSP no. 277971.
Remarks: Considered a valid species in the genus *Margovula* by Fehse, 2001b, and in OBIS, 2003.

tripolia, Globovula, Cate, 1973a:22, fig. 39.
Type Locality: Gulf of Oran, Ouahran Dept., Algeria (35°45'N, 00°38'W).
Type Material: Holotype NMW no. 70.25 Z.1.
Remarks: Considered a valid species by Sabelli et al., 1990, Fehse, 2001b, and in OBIS, 2003.

uvula, Primovula (Primovula), Cate, 1978a:163, fig. 4.
Type Locality: Moreton Bay, Queensland, Australia (27°12'S, 153°12'E).

Type Material: Holotype LACM no. 1790.
Remarks: Considered a valid species in OBIS, 2003, and valid in the genus *Dentiovula* by Fehse, 2001b.

virgo, Primovula, Azuma & Cate, 1971:262-263, figs. 2, 17 (see also Cate, 1971:362 for omitted discussion).
Type Locality: Off Hinomi-saki, Kii-suido, Wakayama Pref., Honshu, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 14841, paratype LACM no. 1873.
Remarks: Considered a valid species in OBIS, 2003, and valid in the genus/subgenus *Crenavolva (Crenavolva)* by Higo et al., 1999, and Fehse, 2002b.

wakayamaensis, Phenacovolva (Calcaria), Cate & Azuma *in* Cate, 1973a:107, fig. 240.
Type Locality: Off Minabe, Kii-hanto, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 14846, paratype AMNH no. 204859 (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species by Okutani & Sasaki, 2000, Fehse, 2001b, and in OBIS, 2003, and valid in the genus/subgenus *Phenacovolva (Kurodaovula)* by Higo et al., 1999.

weaveri weaveri, Phenacovolva (Pellasimnia), Cate, 1973a:100, fig. 227.
Type Locality: 'Au'au Channel, Maui, Hawaiian Ids. (20°55'N, 156°45'W).
Type Material: Holotype BPBM no. 9735.
Remarks: Considered a valid species by Kay, 1979, Higo et al., 1999, Liltved, 2000, Fehse, 2001b, and in OBIS, 2003.

whitworthi, Pseudosimnia (Diminovula), Cate, 1973a:30, fig. 58.
Type Locality: Ogokuda Beach, Shio-no-misaki, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype CAS no. 13322, paratype LACM no. 1860.
Remarks: Considered a valid species by Azuma, 1994, and Higo et al., 1999, a valid species in the genus *Diminovula* by Wilson, 1993, Fehse, 2001b, and in OBIS, 2003, and a junior synonym of *Pseudosimnia (Diminovula) punctata* (Duclos, 1831), by Okutani & Sasaki, 2000 (as ***P.*** *whiteworthi*).

wilsoniana, Prionovolva pudica, Cate, 1973a:11-12, fig. 16-16a.
Type Locality: Kao-hsiung, Kao Hsiung Co., Taiwan, republic of China (22°44'N, 120°21'E) (see below).
Type Material: Holotype ANSP no. 275439.
Remarks: Considered a valid species by Fehse, 2000b, 2001b, and Cossignani & Calo, 2002, a valid subspecies by Azuma, 1989, but treated a junior synonym of *Prionovolva brevis* (Sowerby, 1828) by Mase, 1989, and Okutani & Sasaki, 2000, treated as a junior synonym of *P. pudica* by Higo et al., 1999. and in OBIS, 2003, and considered a junior synonym of *Testudovolva pudica* (A. Adams, 1894) by Liltved, 2000. The type specimen is possibly from New Caledonia and not Taiwan as stated by Cate, 1973a; it may have been separated from a sample also containing an unpigmented specimen of ***P.*** *pudica* collected at the same locality (G. Rosenberg *in* Liltved, 2000).

yoshioi, Phenacovolva, Azuma & Cate, 1971:266, figs. 13, 19 (see also Cate, 1971:363 for omitted discussion).
Type Locality: Off Kirime-zaki, Kii-hanto, Wakayama Pref., Honshu, Japan.
Type Material: Holotype in collection of M. Azuma, Takarazuka, Japan, no. 1750.
Remarks: Considered a valid *Phenacovolva* in the subgenus *Calcaria* by Higo et al., 1999, Okutani & Sasaki, 2000, and in OBIS, 2003, and valid in the genus *Calcarovula* by Fehse, 2001b.

zuidafrikaana, Subsimnia, Cate, 1975b:415-416.
Remarks: New name for *Amphiperas smithi* Bartsch, *non* Sowerby, 1894, preoccupied. Considered a valid species by Fehse, 2001b, and Coleman, 2003, but treated as a junior synonym of *Phenacovolva brevirostris* (Schumacher, 1817) by Liltved, 2000.

Superfamily TRIVIOIDEA Troschel, 1863
Family TRIVIIDAE Troschel, 1863
Subfamily TRIVIINAE Troschel, 1863

Genera

Circumscapula Cate, 1979:109.
Type Species: *Trivia (Pusula) myrae* Campbell, 1961, by OD.
Remarks: Considered a valid genus in OBIS, 2003, and a subjective synonym of *Dolichupis* by Fehse, 2002c.

Decoriatrivia Cate, 1979:95.
Type Species: *Cypraea paucilirata* Sowerby, 1870, by OD.
Remarks: Considered a valid subgenus in the genus *Trivia* in OBIS, 2003, and a subjective synonym of *Dolichupis* by Fehse, 2002c.

Discotrivia Cate, 1979:110.
Type Species: *Trivia dartevellei* Knudsen, 1955.
Remarks: Considered a valid genus in OBIS, 2003, and a subjective synonym of ***Pusula*** by Fehse, 2002c.

Galeatrivia Cate, 1979:13, 15.
Type Species: *Cypraea ovulata* Lamarck, 1811, by OD.
Remarks: Considered a subjective synonym of *Triviella* by Liltved, 2000, and Fehse, 2002c.

Robertotrivia Cate, 1979:42.
Type Species: *Trivia eos* Roberts, 1913, by OD.
Remarks: Considered a valid genus by Higo et al., 1999, and in OBIS, 2003, but treated as a subjective synonym of *Trivellona* by Dolin, 2001, and Fehse, 2002c.

Species and Subspecies

akroterion, Pusula (Dolichupis), Cate, 1979:108, figs. 80-80a.
Type Locality: Coron, Busuanga Id., Palawan Prov., Philippines (12°10'N, 120°13'E).
Type Material: Holotype LACM no. 1837, paratype AMNH no. 204635 (*ex* C.N. Cate collection) (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species in the genus *Trivirostra* by Fehse, 1998, 2002c, and a valid species in the genus *Dolichupis* in OBIS, 2003.

aquatanica, Niveria (Cleotrivia), Cate, 1979:67, fig. 78.
Type Locality: Bulalacao, Mindoro Oriental Prov., Mindoro Id., Philippines (12°3'N, 121°26'E).
Type Material: Holotype LACM no. 1797.
Remarks: Treated as a valid species in OBIS, 2003, considered a valid species in the genus *Cleotrivia* by Fehse, 1999a, 2002c, but considered a junior synonym of *Niveria nix* by Dolin, 2001, and Fehse & Grego (in press).

artema, Decoriatrivia, Cate, 1979:96, fig. 88.
Type Locality: Bahía Stephen, Isla San Cristobal (Chatham Id.), Islas Galápagos (00°04'S, 89°31'W).
Type Material: Holotype LACM no. 1801.
Remarks: Considered a valid species in the genus *Dolichupis* by Fehse, 2002c, and valid in the genus/subgenus *Trivia (Decoriatrivia)* in OBIS, 2003.

aussiorum, Trivirostra, Cate, 1979:93, 95, fig. 150.
Type Locality: Lighthouse Beach, Vlaming Head, North West Cape, Western Australia, Australia (21°50'S, 114°10'E).
Type Material: Holotype LACM no. 1799.
Remarks: Considered a valid species in the genus *Austrotrivia* by Fehse, 2002c, and valid in the genus/subgenus *Trivia (Trivirostra)* in OBIS, 2003.

austrafricana, Triviella, Cate, 1979:23, fig. 14.
Type Locality: St. Francis Bay, Cape Prov., South Africa (34°0'S, 24°58'E).
Type Material: Holotype LACM no. 1827.
Remarks: Considered a valid species by Fehse, 2002c, and in OBIS, 2003, but treated as a junior synonym of *Trivia suavis* Schilder, 1931, by Gosliner & Liltved, 1987.

boswellae, Trivirostra, Cate, 1979:73, fig. 116.
Type Locality: Port Shepstone, Natal, South Africa (30°46'S, 30°25'E).
Type Material: Holotype LACM no. 1805.
Remarks: Considered a valid species in the genus *Trivirostra* by Fehse, 2002c, and valid in the genus/subgenus *Trivia (Trivirostra)* in OBIS, 2003, treated as a junior synonym of *T. hordacea* (Kiener, 1843) by Kilburn & Ripley, 1982, and considered a junior synonym of *T. oryza* (Lamarck, 1810) by Gosliner & Liltved, 1987.

burius, Decoriatrivia, Cate, 1979:96-97, fig. 90.
Type Locality: Bahía de Panamá, Panamá Prov., Panamá (08°50'N, 79°15'W).
Type Material: Holotype LACM no. 1823.
Remarks: Considered a valid species in the genus *Dolichupis* by Fehse, 2002c, and considered a valid species in the genus/subgenus *Trivia (Decoriatrivia)* in OBIS, 2003.

campus, Pusula (Pusula), Cate, 1979:101-102, fig. 101.
Type Locality: Bahía Cholla, Sonora, México (ca. 27°88'N, 111°00'W).
Type Material: Holotype LACM no. 1808.
Remarks: Considered a valid species in OBIS, 2003, and a valid species in the genus *Niveria* by Fehse, 2002c. Incorrect coordinates cited by Cate: correct coordinates = 31°19.6'N, 113°37.8'W.

carabus, Pusula (Pusula), Cate, 1979:100-101, figs. 99-99a.
Type Locality: Golfo de Guayaquil, Guayas Prov., Ecuador (03°00'S, 80°30'W).
Type Material: Holotype LACM 1838, paratype AMNH no. 205283 (*ex* C.N. Cate Collection) (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species in OBIS, 2003, and a valid species in the genus *Niveria* by Fehse, 2002c.

cherobia, Pusula (Pusula), Cate, 1979:101, fig. 100.
Type Locality: Bahía Magdalena, Pacific Coast Baja California Sur, México (ca. 24°30'N, 112°00'W).
Type Material: Holotype LACM no. 1803.
Remarks: Considered a valid species in OBIS, 2003, and a valid species in the genus *Niveria* by Fehse, 2002c.

citeria, Decoriatrivia, Cate, 1979:97-98, fig. 93.
Type Locality: Off Bahía James, Isla San Salvador (James Id.), Islas Galápagos (00°10'S, 90°52'W).
Type Material: Holotype LACM no. 1802.
Remarks: Considered a valid species in the genus/subgenus *Trivia (Decoriatrivia)* in OBIS, 2003, and valid in the genus *Dolichupis* by Fehse, 2002c.

clariceae, Trivirostra, Cate, 1979:74, fig. 119.
Type Locality: Jeffreys Bay, Cape Prov., South Africa (34°0'S, 24°55'E).
Type Material: Holotype LACM no. 1820.
Remarks: Considered a valid species by Fehse, 1999b, a valid species in the genus/subgenus *Trivia (Trivirostra)* in OBIS, 2003, and treated as a possible junior synonym of *Trivia pellucidula* (Gaskoin, 1846) by Gosliner & Liltved, 1987.

coralliana, Niveria (Cleotrivia), Cate, 1979:56, fig. 70.
Type Locality: South Australia(?), Australia (exact locality unknown).
Type Material: Holotype SAM no. D4095-C.
Remarks: Considered a valid species in OBIS, 2003, and a valid species in the genus *Cleotrivia* by Fehse, 1999a, 2002c.

cydarum, Trivirostra, Cate, 1979:95, fig. 151.
Type Locality: Gulf St. Vincent(?), South Australia, Australia (exact locality unknown).
Type Material: Holotype SAM no. D-4095.
Remarks: Considered a valid species in OBIS, 2003, and valid in the genus *Austrotrivia* by Fehse, 2002c.

dorsennus, Niveria (Cleotrivia), Cate, 1979:56, fig. 69.
Type Locality: South Australia(?), Australia (exact locality unknown).
Type Material: Holotype SAM no. D4095-B.
Remarks: Considered a valid species in OBIS, 2003, and valid in the genus *Cleotrivia* by Fehse, 1999a, 2002c.

dumaliensis, Pseudotrivia, Cate, 1979:40, fig. 42.
Type Locality: Off Dumali Point, Mindoro Occidental Prov., Mindoro Id., Philippines (13°07'N, 121°33'E).
Type Material: Holotype LACM no. 1796.
Remarks: Considered a valid species in the genus *Trivellona* by Fehse, 2002c, and in OBIS, 2003, but treated as a junior synonym of *Niveria nix* by Dolin, 2001, and Fehse & Grego (in press).

euclaensis, Niveria (Cleotrivia) pilula, Cate, 1979:59, 62, figs. 73-73a.
Type Locality: West of Eucla, South Australia, Australia (31°40'S, 128°40'E).
Type Material: Holotype SAM no. D-909, paratype D-910.
Remarks: Considered a valid subspecies in the genus *Cleotrivia* by Fehse, 1999a, but treated as a junior synonym of *Trivia globosa* (Sowerby, 1832) by Wilson, 1993, and in OBIS, 2003.

exmouthensis, Trivirostra, Cate, 1979:90-92, fig. 144.
Type Locality: Near Geralia (= Giralia), Exmouth Gulf, Western Australia, Australia (22°00'S, 114°15'E).
Type Material: Holotype LACM no. 1797 (= LACM no. 2230).
Remarks: Considered a valid species in the genus *Austrotrivia* by Fehse, 2002c, but treated as a junior synonym of *Trivia obscura* (Gaskoin, 1849) by Wilson, 1993, and in OBIS, 2003. Incorrect latitude cited by Cate, 1973a: correct latitude = 22°19'S.

fultoni, Pusula (Dolichupis), Cate, 1979:109, fig. 83.
Type Locality: Exact type locality unknown. New Caledonia according to Schilder & Tomlin, 1931.
Type Material: Holotype BMNH no. 1927.6.8.11.
Remarks: Considered a valid species in the genus *Trivirostra* by Fehse, 2002c, and valid in the genus *Dolichupis* in OBIS, 2003.

halians, Decoriatrivia, Cate, 1979:96, fig. 89.
Type Locality: San José, Escuintla Prov., Guatemala (13°57'N, 90°49'W).
Type Material: Holotype LACM no. 1822.
Remarks: Considered a valid species in the genus *Dolichupis* by Fehse, 2002c, and valid in the genus/subgenus *Trivia (Decoriatrivia)* in OBIS, 2003.

hispania, Trivia (Trivia), Cate, 1979:30, figs. 25-25a.
Type Locality: Mouth of Rio Mino, south of Pontevedra, Pontevedra, Prov., España (42°27'N, 08°39'W).
Type Material: Holotype LACM no. 1824, 2 paratypes AMNH nos. 204637, 204696a (*ex* C.N. Cate collection) (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species by Fehse, 2002c.

iota, Circumscapula, Cate, 1979:110, fig. 154.
Type Locality: Bahía San Carlos, Guaymas, Sonora, México (ca. 111°00'N, 27°20'W).
Type Material: Holotype LACM no. 1839, 5 paratypes AMNH no. 204636 (*ex* C.N. Cate collection) (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species in OBIS, 2003, and valid in the genus *Dolichupis* by Fehse, 2002c. Coordinates reversed by Cate: correct coordinates = 27°20'N, 111°00'W).

keehiensis, Trivirostra, Cate, 1979:85, fig. 137.
Type Locality: Off Ke'ehi Lagoon entrance, Honolulu Dist., O'ahu, Hawaiian Ids. (21°17'N, 157°54'W).
Type Material: Holotype LACM no. 1825.
Remarks: Considered a valid species by Fehse, 1998, and valid in the genus/subgenus *Trivia (Trivirostra)* in OBIS, 2003.

kiiensis, Robertotrivia, Kuroda & Cate *in* Cate, 1979:42-43, figs. 44-44a.
Type Locality: Kii-suido, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype NSMT no. 60922 (Higo et al., 1999).
Remarks: Considered a valid species by Higo et al., 1999, valid in the genus *Pseudotrivia* by Okutani & Sasaki, 2000, and valid in the genus *Trivellona* by Dolin, 2001, Fehse, 2002c, and in OBIS, 2003.

loochooensis, Pusula (Pusula) californica, Cate, 1979:104, fig. 106c.
Type Locality: Ryukyu-shoto, Japan (24°40'N, 126°10'E).
Type Material: Holotype LACM no. 1840.
Remarks: Type locality considered doubtful by Fehse, 2002c, and possibly a junior synonym of *Pusula californica* (Sowerby, 1832), but considered a valid subspecies in OBIS, 2003.

meridionalis, Niveria (Cleotrivia), Cate, 1979:54-56, fig. 68.
Type Locality: South Australia(?), Australia (exact locality unknown).
Type Material: Holotype SAM no. 4095-A.
Remarks: Considered a valid species in OBIS, 2003, and valid in the genus *Cleotrivia* by Fehse, 1999a.

millardi, Galeatrivia, Cate, 1979:15-16, fig. 173.
Type Locality: Off Sea Point, Cape Prov., South Africa (34°38'S, 19°17'36"E).
Type Material: Holotype LACM no. 1843.
Remarks: Considered a valid species in the genus *Trivia* by Liltved, 2000, and in OBIS, 2003, and considered valid in the genus *Triviella* by Rosenberg & Finley, 2001, and Fehse, 2002c.

opalina, Robertotrivia, Kuroda & Cate *in* Cate, 1979:43, figs. 46-46a.
Type Locality: Tosa-wan, Shikoku, Japan (33°20'N, 133°45'E).
Type Material: Holotype NSMT no. 60923 (Higo et al., 1999).
Remarks: Considered a valid species by Higo et al., 1999, valid in the genus *Pseudotrivia* Schilder, 1936, by Okutani & Sasaki, 2000, and valid in the genus *Trivellona* Iredale, 1931, by Dolin, 2001, Fehse, 2002c, and in OBIS, 2003.

oshimaensis, Trivirostra, Cate, 1979:73-74, fig. 117.
Type Locality: Oshima Id., Amami-o-shima, Amami-shoto, Ryukyu-shoto, Japan (28°15'N, 129°15'E).
Type Material: Holotype LACM no. 1819.
Remarks: Considered a valid species by Fehse, 1998, 2002c, a valid species in the genus/subgenus *Trivia (Trivirostra)* in OBIS, 2003, and treated as a junior synonym of *Trivirostra oryza* (Lamarck, 1810) by Okutani & Sasaki, 2000

padreserrai, Pusula (Pusula), Cate, 1979:105-106, fig. 109-109a.
Type Locality: Bluff Cove, Palos Verdes Peninsula, Los Angeles Co., California (33°45'N, 118°25'W).
Type Material: Holotype LACM no. 1828.
Remarks: Considered a junior synonym of *P. solandri* (Sowerby, 1832) herein but treated as a valid species in Fehse, 2002c, and in OBIS, 2003.

polynesiae, Trivirostra, Cate, 1979:85, fig. 136.
Type Locality: Club Mediterranean Resort, west side Moorea Id., Society Ids., French Polynesia (17°31'S, 149°46'E).
Type Material: Holotype LAM no. 1121.
Remarks: Considered a valid species by Fehse, 1998, 2002c, and valid in the genus/subgenus *Trivia (Trivirostra)* in OBIS, 2003.

porcellio, Triviella, Cate, 1979:18, fig. 7a.
Type Locality: Jeffreys Bay, Cape Prov., South Africa.
Type Material: Holotype MRAC no. 793.192.
Remarks: New name for *Cypraea oniscus* Lamarck, 1811, *non* Röding, 1798, preoccupied. Considered a valid species in OBIS, 2003 (as *procellio*), and a junior synonym of *T. aperta* (Swainson, 1822) by Gosliner & Liltved, 1987, and Fehse, 2002c.

procella, Trivia (Trivia), Cate, 1979:32, fig. 28.
Type Locality: Barbados (13°15'N, 59°30'W).
Type Material: Holotype LACM no. 1815.
Remarks: Considered a valid species by Fehse, 2002c, and in WAGD, 2003.

samarensis, Pseudotrivia, Cate, 1979:40, fig. 41.
Type Locality: Borongan, Samar Oriental Prov., Samar Id., Philippines (11°36'N, 125°27'E).
Type Material: Holotype LACM no. 1795.

Remarks: Considered a valid species in the genus *Trivellona* by Fehse, 2002c, and in OBIS, 2003, but considered a junior synonym of *Trivia arctica* by Dolin, 2001, and Fehse & Grego (in press).

speciosa, Robertotrivia, Kuroda & Cate *in* Cate, 1979:43, figs. 45-45b.
Type Locality: Kii-suido, Wakayama Pref., Honshu, Japan (34°00'N, 134°48'E).
Type Material: Holotype NSMT no. 60924, Higo et al., 2001.
Remarks: Considered a valid species by Higo et al., 1999, valid in the genus *Pseudotrivia* by Okutani & Sasaki, 2000, and valid in the genus *Trivellona* by Dolin, 2001, Fehse, 2002c, and in OBIS, 2003.

spioinsula, Trivirostra, Cate, 1979:81, fig. 129-129a.
Type Locality: Ableta, ca. 35 km from Jingo, Rossel Id., Louisiade Archipelago, Papua New Guinea (11°30'S, 154°00'E).
Type Material: Holotype LACM no. 1807.
Remarks: Considered a valid species by Fehse, 1998, 1999b, and valid in the genus/subgenus *Trivia (Trivirostra)* in OBIS, 2003.

thaanumi, Trivirostra, Cate, 1979:70, fig. 113.
Type Locality: Lihue, Lihue Dist., Kaua'i, Hawaiian Ids. (21°59'N, 159°24'W).
Type Material: Holotype LACM no. 1826, 10 paratypes AMNH no. 204628 (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species by Fehse, 1998, 2002c, and valid in the genus/subgenus *Trivia (Trivirostra)* in OBIS, 2003.

tortuga, Trivia (Trivia), Cate, 1979:30, 32, fig. 27.
Type Locality: Playa Vera Cruz, Bahía de Panamá, Panamá Prov., Panamá (08°50'N, 79°15'W).
Type Material: Holotype LACM no. 1817, 3 paratypes AMNH no. 204626 (*ex* C.N. Cate collection) (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species by Fehse, 2002c.

vayssierei, Trivirostra, Cate, 1979:87, fig. 139.
Type Locality: Durban, Natal, South Africa (29°51'S, 31°00'E).
Type Material: Holotype MHNM unnumbered.
Remarks: Considered a valid species by Fehse, 1999b, 2002c, a valid species in the genus/subgenus *Trivia (Trivirostra)* in OBIS, 2003, and treated as a possible junior synonym of *Trivia pellucidula* (Gaskoin, 1846) by Gosliner & Liltved, 1987.

vitrina, Trivirostra, Cate, 1979:79, fig. 126.
Type Locality: Malampaya Sound, Palawan Id., Palawan Prov., Philippines (10°57'N, 119°15'E).
Type Material: Holotype LACM no. 1809.
Remarks: Considered a valid species by Fehse, 1998, 2002c, and valid in the genus/subgenus *Trivia (Trivirostra)* in OBIS, 2003.

wayiana, Decoriatrivia, Cate, 1979:98, fig. 95 (refigured from Sowerby, 1870).
Type Locality: Exact type locality unknown. Pacific Ocean, according to Gray, 1832.
Type Material: Unknown
Remarks: Considered a valid species in the genus/subgenus *Trivia (Decoriatrivia)* in OBIS, 2003, and a possible *nomen nudum* by Fehse, 2002c.

zzyzyxia, Trivirostra, Cate, 1979:93, fig. 148-148a.
Type Locality: Lighthouse Beach, Vlaming Head, North West Cape, Western Australia, Australia (21°47'S, 114°10'E).
Type Material: Holotype LACM no. 1800.
Remarks: Considered a valid species by Fehse, 2002c, a valid species in the genus *Austrotrivia* by Fehse & Grego, 2002, a valid species in the genus/subgenus *Trivia (Trivirostra)* in OBIS, 2003, but treated as a junior synonym of *Trivia oryza* (Lamarck, 1810) by Wilson, 1993, and a junior synonym of *Trivirostra oryza* (Lamarck, 1810) by Higo et al., 1999.

Subfamily ERATOINAE Schilder, 1927

Alaerato Cate, 1977:354.
Type Species: *Lachryma bisinventa* Iredale, 1931, by OD.
Remarks: Considered a valid genus by Higo et al., 1999, and in OBIS, 2003.

amamioshima, Alaerato, Cate, 1977:355, fig. 26.
Type Locality: Amami-o-shima, Amami Gun-to Group, Ryukyu-shoto, Japan (28°15'N, 129°15'E).
Type Material: Holotype NSMT unnumbered.
Remarks: Considered a valid species in OBIS, 2003.

geralia, Proterato (Sulcerato), Cate, 1977:348-349, fig. 13.
Type Locality: Geralia (=Giralia), Exmouth Gulf, Western Australia, Australia (22°00'S, 114°15'E).
Type Material: Holotype LACM no. 1763, paratype LACM no. 1875, paratype AMNH no. 205282 (*ex* C.N. Cate collection) (Boyko & Cordeiro, 2001).
Remarks: Considered a valid species in OBIS, 2003. Incorrect latitude cited by Cate, 1973a: correct latitude = 22°19'S.

septentrionalis, Hespererato, Cate, 1977:365, fig. 51.

Type Locality: Vlaming Head, Lighthouse Beach, North West Cape, Western Australia, Australia (21°47'S, 114°10'E).
Type Material: Holotype LACM no. 1762, 2 paratypes AMNH nos. 205284-205285 (*ex* C.N. Cate collection).
Remarks: Considered a valid species in OBIS, 2003.

stalagmia, Proerato, Cate, 1975a:261, fig. 6.
Type Locality: Maqueda Bay, Samar Occidental Prov., Samar Id., Philippines (11°30'N, 125°00'E).
Type Material: Holotype LACM no. 1703.
Remarks: Considered a valid species in the genus/subgenus *Proerato (Sulcerato)* in OBIS, 2003.

SPECIES NAMED AFTER CRAWFORD N. CATE

catei, Bernaya, Schilder, 1963:127-128, unfigured [see illustrations in Cate, 1962, pl. 1 & pl. 2, figs. 1a-1b].
Type Locality: West Wallaby Id., Houtman Abrolhos Ids., Western Australia, Australia.
Type Material: Holotype CAS no. 12756.
Remarks: Considered a junior synonym of *Zoila venusta* (Sowerby, 1846) by Lorenz, 2001, and Groves & Weil, 2003.

catei, Gibberula, Fehse, 1988:232, pl. 1, fig. 5.
Type Locality: Middle Eocene (Lutetian), La Ferme de l'Orme, Yvelines Dept., France
Type Material: Holotype RGM no. 229.408.

crawfordcatei, Bernaya (Bernaya), Groves, 1990:278, figs. 17-18.
Type Locality: Late Cretaceous (latest Campanian/earliest Maastrichtian), Point Loma Formation, near Carlsbad, northern San Diego Co., California (SDNHM loc. 3392).
Type Material: Holotype SDNHM no. 33998.
Remarks: This species is the first *Bernaya s.s.* from the Pacific Slope of North America.

catei, Trivellona, Fehse & Grego, in press.
Type Locality: Bohol Id, Bohol Prov., Philippines.
Type Material: Holotype ZMA no. 4.04.003.

MALACOLOGICAL PUBLICATIONS OF CRAWFORD NEIL CATE

AZUMA, M. & CATE C.N.
1965. Sixteen new species and one new genus of Japanese Ovulidae. The Veliger 13(3):261-268, figs. 1-24 [April 1].

CATE, C.N.
1960a. A new Hawaiian subspecies of *Cypraea cernica* Sowerby. The Veliger 3(1):3-7, pl. 1 [July 1].
1960b. A new subspecies of *Cypraea saulae* Gaskoin, 1843. The Veliger 3(2):34-37, fig. 1, pl. 5 [October 1].
1961a. Redescription of *Cypraea tigris lyncichroa* Melvill, 1888. The Veliger 3(3):66-69, pl. 11 [January 1].
1961b. Rediscovery of *Cypraea marginata* Gaskoin, 1848. The Veliger 3(3):76-78, pl. 14 [January 1].
1961c. Description of a new Hawaiian subspecies of *Cypraea tigris* (Linnaeus, 1758). The Veliger 3(4):107-109, pl. 19 [April 1].
1961d. Remarks on a variation in *Cypraea annettae* Dall, 1909. The Veliger 4(2):112-114, pl. 24 [October 1].
1962a. *Cypraea tigris schilderiana* not found in Florida. Hawaiian Shell News 10(6):8 [April].
1962b. A new Dampierian *Cypraea*. The Veliger 4(4):175-177, fig. 1, pl. 40 [April 1].
1962c. Comparison of two rare cowrie species (Gastropoda). The Veliger 5(1):6-14, figs. 1-2, pls. 1-4. [July 1].
1962d. *Cypraea chinensis* Gmelin, 1791 (Gastropoda) in Hawaii. The Veliger 5(2):74-77, pls. 8-9 [October 1].
1962e. Cowrie holotype located. The Veliger 5(2):93 [October 1].
1963a. A new cowrie (Mollusca: Gastropoda) from west-central Philippines. The Veliger 5(4):140-143, fig. 1, pl. 15 [April 1].
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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@terryarnold.net
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PROGRAM

A Mile of Fossils

Member Wes Farmer will give a PowerPoint presentation on fossils he discovered at Torrey Pines State Beach. Images are from between 1996 and 1998 and beyond.

Meeting date: August 19, 2004

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting July 15, 2004

President John LaGrange called the meeting to order at 7:50 PM. Minutes of the previous meeting were approved as published in the June issue of *The Festivus*. Carole Hertz reported that over $200 worth of supplements of *The Festivus* were sold at the recent WSM meeting in Ensenada, B.C., México and Vice-President Larry Lovell stated that there was now a full slate of speakers for the rest of the year.

The speaker of the evening, Terry Rutkas, was then introduced by Larry Lovell. He is a resident of Whittier, California and a member of two shell clubs in the Los Angeles area as well as the San Diego Shell Club. Up until eight years ago he was primarily interested in archaeology and anthropology, but his investigation of shell middens has spurred him on to the study of mollusks. Since that time he has become a collector of cowries.

In October 2001 Terry spent two weeks at the Pacific Arts Festival on the Pacific island of New Caledonia. This area is a French colony and is surrounded by the second largest barrier reef in the world. The island was discovered by Captain Cook. The audience of 25 people was treated to a travelogue of colored slides from this trip. Included were the arrival of canoes by costumed Pacific Islanders, canoe building, costumed dancers, and a display of native crafts. It was interesting to see that molluscan opercula were used as the eyes in ceremonial carved figures.

J.M.Chatey's book on aberrations in cowries inspired Terry to observe the variation in coloration in the species *Cypraea tigris* of New Caledonia. A series of slides showed normal Indo-Pacific cowries next to another of the same species but with a very dark coloration. Because there are nickel mines on the island, Terry speculates the aberrant dark color may be influenced by the presence of nickel in the surrounding seawater. Terry also brought in a beautiful display of items from New Caledonia.

The evening's door prize was won by Carole Hertz. Refreshments were provided by Nancy Schneider, the Hertzes and Kent Trego. A sale of reprints and books followed the meeting.

Nancy Schneider

Three Volumes of *The Veliger* Available

Three volumes of *The Veliger* are available for purchase from the Club: Vol. 2 (1 July 1958-1 April 1960); Vol. 10 (1 July 1967-1 April 1968); Vol. 11 (1 July 1968-1 April 1969).

If you are interested in any of these volumes, please contact Carole Hertz at 858-277-6259 or e-mail at: <cmhertz@pacbell.net>.

Come to the Annual September Party

The annual September party will be held once again at the beautiful home and patio of Linda and John LaGrange in Solana Beach at 5533 North Rios Ave. It will be on Saturday September 11th beginning at 4:00 PM. It is our purely social function - for those significant others not interested in shells - a chance to get together and have a good time.

A sign-up sheet for food donations will be passed at the August meeting. If you cannot attend that meeting and would like to come to the party, contact Carole Hertz (858-277-6259) and sign up for your food contribution. The Club will provide wine, beer and soft drinks.

It's always a very enjoyable time. Plan to come!

Additions and Changes to the Roster

New members

Bower, Kathy, 224 Stanley Drive, Santa Barbara, CA 93015. E-mail: kathy.bower@mail.co.ventura.ca.us

Oyales, Carmelita, Conchology, Inc., Cebu Light Industrial Park, Basak, Lapu lapu City, Cebu 6015, Philippines. E-mail: carmelitaoy@conchology.be

Change of address

Pister, Benjamin, University of California, San Diego, 9500 Gilman Dr., Mail Code 0116, La Jolla, CA 92093-0116

Change of E-mail address

Rutkas, Terry, tjrutkas@verizon.net

Change of Area code

Levin, Debbi, 951-522-5856

NEW DISTRIBUTIONAL RECORDS FOR PANAMIC PROVINCE EULIMIDAE (GASTROPODA)

CAROL SKOGLUND[1]

Santa Barbara Museum of Natural History
2559 Puesta del Sol Road, Santa Barbara, California 93105-2936

Eulimids are very small mollusks, usually parasitic on echinoderms. Little had been written about the Eulimidae since Bartsch's monograph in 1917 until Emerson (1965) reviewed the eastern Pacific species. Later, Warén (1980, 1984, 1992) revised the family and wrote extensively on the group. Warén and Crossland (1991) revised the genera *Hypermastus* and *Turveria*.

The shells are mostly smooth, shiny and white without many distinguishing characters which makes them difficult to identify. The following records are all from the Skoglund Collection and were collected by me with the exception of the *Melanella falcata* (Carpenter, 1865) which was collected by Bill and Lois Pitt. Almost all were dead when collected, and some were very worn, which made identification even more difficult.

In 1994 I was fortunate to meet and work with Dr. Anders Warén, of Stockholm Sweden, the acknowledged specialist on the family, at the Western Society of Malacologists meeting in Santa Barbara, California. We spent most of a day going through all of my material except for the *Niso* species. He verified my identifications and corrected them where necessary for which I am eternally grateful.

New distributional information is given herein for 14 of those species (Table 1). They are all illustrated in Figures 1-14.

Keen (1971) and Skoglund (2002) were used for information on currently known distributions in the family. In several cases, Keen listed only "Gulf of California" for a species. One of these was *Melanella mexicana* Bartsch, 1917. Bartsch gave the distribution of the species at that time as Ángel de la Guarda, Gulf of California, to Acapulco, Guerrero, México.

ACKNOWLEDGMENTS

My appreciation to Paul Valentich Scott of the Santa Barbara Museum of Natural History for photographing the tiny *Eulimostraca burragei* and to David K. Mulliner for photographing all the rest of the specimens.

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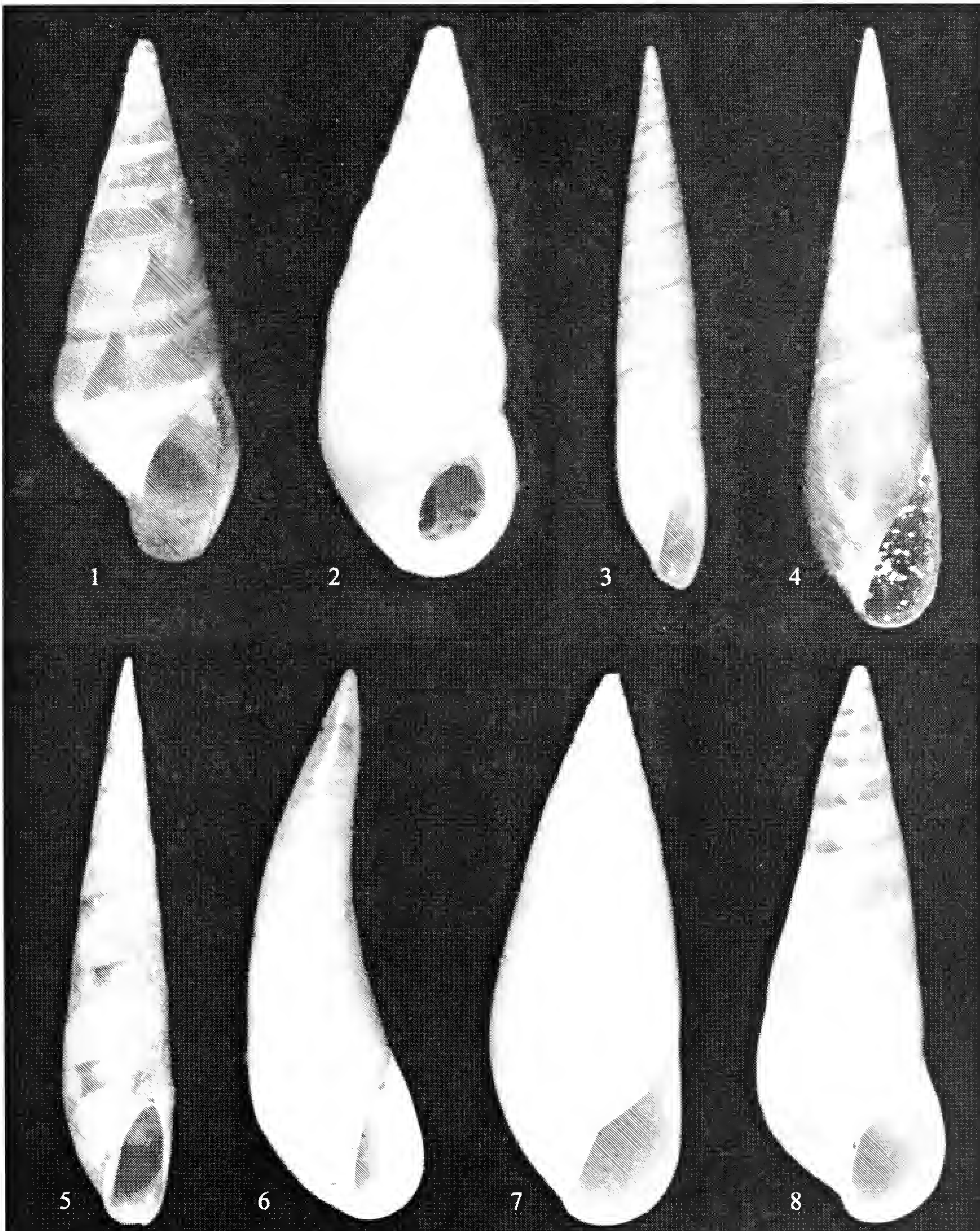
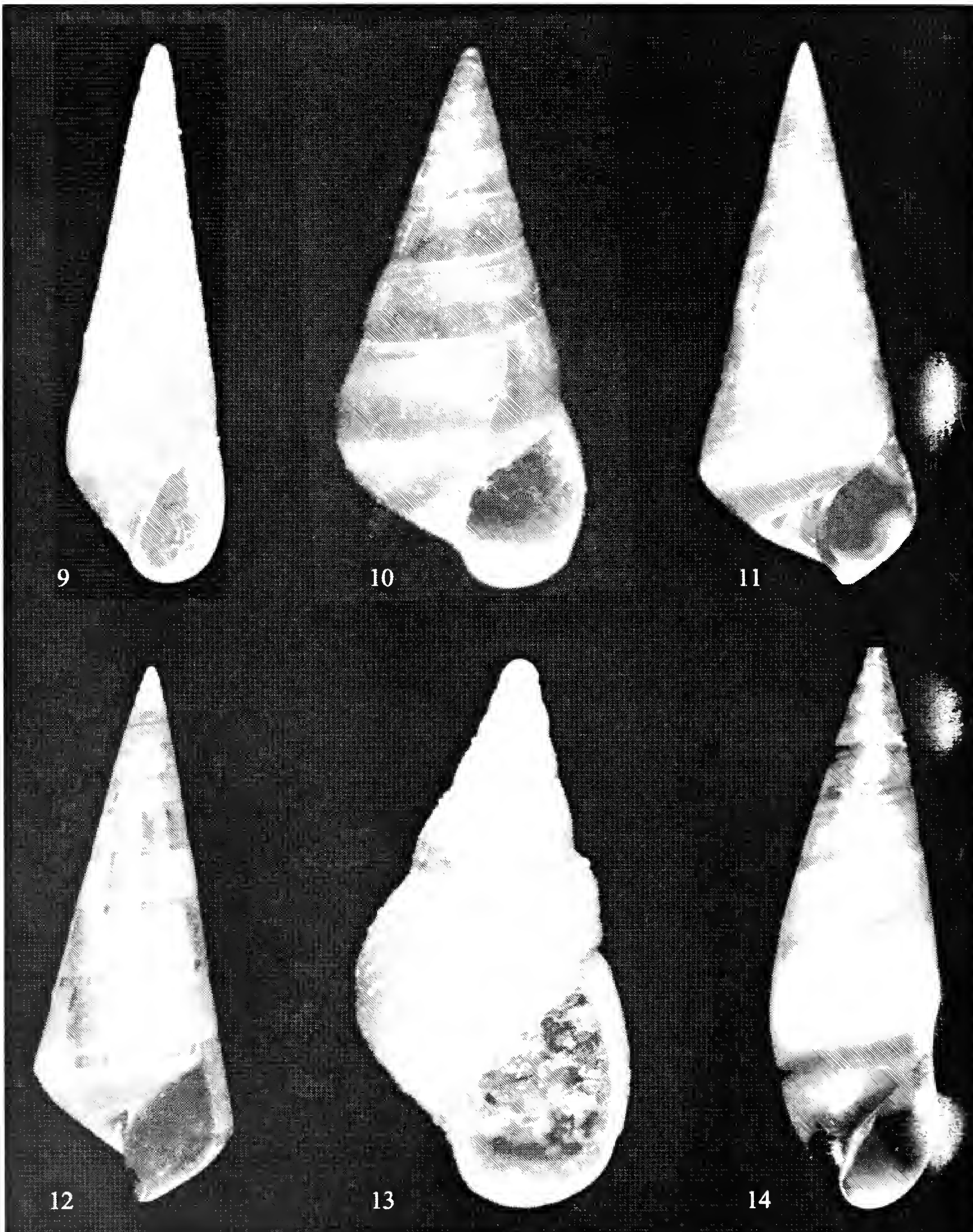
[1] Mailing address: 3846 E. Highland Avenue, Phoenix, AZ 85018, USA

TABLE I: New Records for Panamic Eulimidae

Species	New records	Depth in meters
Eulima chathamensis (Bartsch, 1917)	Bahía de los Angeles, Baja California; Punta Arco, Guaymas, Sonora, México	Dredged, 20 to 40 m
Eulima involuta (Carpenter, 1865)	Bahía San Carlos, Sonora, México	Dredged, 15 to 30 m
Eulima panamensis (Bartsch, 1917)	Bahía la Cholla, Sonora, México	Dredged, 6 to 16 m
Eulima paria (Bartsch, 1926)	Santa Cruz to Platanitos, Nayarit, México	Dredged, 6 to 18 m
Eulima salsa (Bartsch, 1926)	Bahía de los Angeles, Baja California and Bahía la Cholla, Sonora, México; Playas del Coco, Guanacaste Province, Costa Rica	Dredged, 9 to 18 m
Melanella falcata (Carpenter, 1865)	Mazatlán, Sinaloa, México	Intertidal, in drift
Melanella hemphilli Bartsch, 1917	La Cruz de Huanacaxtle, Bahía de Banderas, Nayarit, México	Intertidal
Melanella mexicana Bartsch, 1917	Bahía la Cholla, Sonora and Loreto, Baja California Sur, México	Intertidal
Eulimostraca burragei (Bartsch, 1917)	Bahía Magdalena, Baja California Sur, Bahía de los Angeles, Baja California, Bahía la Cholla, Sonora, México	Dredged, 6 to 16 m
Niso baueri Emerson, 1965	Bahía de los Angeles, Baja California, México	Dredged, 20 to 40 m
Niso emersoni McLean, 1970	Playas del Coco, Guanacaste Province, Costa Rica	Dredged, 24 to 37 m, live collected
Niso excolpa Bartsch, 1917	Puerto San Carlos, Bahía Magdalena, Baja California Sur, México	Dredged, 2 to 10 m, live collected
Sabinella shaskyi Warén, 1992	Bahía de los Angeles, Baja California, México	Dredged, 120 to 170 m
Turveria pallida Warén, 1992	Bahía la Cholla, Sonora, México	Intertidal, live collected



Figures 1-8. **(1)** *Eulima chathamensis*, 4.2 mm H **(2)** *Eulima involuta*, 5.8 mm H **(3)** *Eulima panamensis*, 10.9 mm H **(4)** *Eulima paria*, 12.0 mm H **(5)** *Eulima salsa*, 12.5 mm H **(6)** *Melanella falcata*, 7.7. mm H **(7)** *Melanella hemphilli* 8.0 mm H **(8)** *Melanella mexicana*, 4.7 mm H. Photos: D.K. Mulliner.



Figures 9-14. **(9)** *Eulimostraca burragei*, ±2.5 mm H. Photo: P. Valentich Scott **(10)** *Niso baueri*, 3.5 mm H **(11)** *Niso emersoni*, 13.7 mm H **(12)** *Niso excolpa*, 9.1 mm H **(13)** *Sabinella shaskyi*, 1.9 mm H **(14)** *Turveria pallida*, 4.9 mm H. Photos 10-14: D.K. Mulliner.

FIRST RECORD OF *CYMATIUM (MONOPLEX) MUNDUM* (GOULD, 1849) (GASTROPODA: RANELLIDAE) ON THE PACIFIC COAST OF MAINLAND SOUTH AMERICA

VALENTÍN MOGOLLÓN AVILA

Laboratorio de Invertebrados Acuáticos, Facultad de Oceanografía, Pesquería y Ciencias Alimentarias, Universidad Nacional Federico Villarreal, Roma 340, Lima 18, PERÚ
E-mail: svmogollon@yahoo.com

Introduction

Cymatium (Monoplex) mundum (Gould, 1849) is a wide-ranging Indo-West Pacific ranellid gastropod which has been commonly confused with *Cymatium gemmatum* (Reeve, 1844). Emerson (1991) recorded this species for the first time in the eastern Pacific based on specimens collected by Jacqueline DeRoy and Carmen Angermeyer in the Islas Galápagos, Ecuador, and in the western Atlantic from specimens collected by Frank and Vera Lyman off Florida. It was first reported off the west American mainland, in the intertidal zone, at the Golfo de Montijo, Veraguas, Panamá, by Emerson (1993). The present note records *Cymatium mundum* for the first time in South America (Figure 1) and the second time off the west American mainland.

Abbreviations used herein: AMNH, American Museum of Natural History, New York; USNM, National Museum of Natural History, Smithsonian Institution, Washington, D.C.

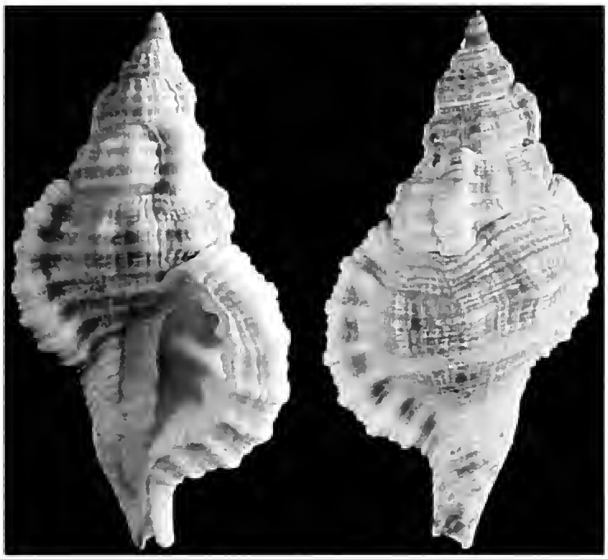


Figure 1. *Cymatium (Monoplex) mundum* (Gould, 1849), 34.7 x 17.4 mm, live collected off Puerto Pizarro, Departamento de Tumbes, Perú, by shrimp trawler, 20 m depth, sand, finely ground shells and slime, February 11, 1981. Leg. Rafael Valladares (Zamora-Corcuera collection). Photos: Roberto Zamora.

Previous records of *Cymatium mundum* in the eastern Pacific Ocean

- Islas Galápagos, Ecuador, Academy Bay, Isla Santa Cruz, 1 fresh beach specimen, June 1966, (ex J.DeRoy), AMNH 139535 (Emerson, 1991).
- Islas Galápagos, Ecuador, Academy Bay, Isla Santa Cruz, 1 crabbed specimen, found at low tide, December 1965, AMNH 232145 (ex J. DeRoy) (Emerson, 1991).
- Islas Galápagos, South Channel (Isla Santa Cruz-Isla Baltra), 1 crabbed specimen, collected about 1975, C Angermeyer Collection (Emerson, 1991).
- República de Panamá, Punta Itaco, Golfo de Montijo, Veraguas (07°40'N, 81°07'W), one living specimen collected on a minus 2.5 ft. tide under rocks, 12 March 1993, leg. J. Ernest (Emerson, 1993).

Discussion

The 34.7 x 17.4 mm specimen studied here (Figure 1) was live collected by Mr.Rafael Valladares aboard a shrimp trawler, off Puerto Pizarro, Departamento de Tumbes, Perú (03°30.0'S, 80°23.0'W), in 20 m depth, on sand and finely ground shells and slime, February 11, 1981. Mr. Valladares sent the specimen, among other shells, to Mr. Roberto Zamora and his wife Zoila Corcuera, and now it is housed in the Zamora-Corcuera Collection in Lima, Perú. Unfortunately, the operculum was lost.

For several years I was unable to identify this specimen until I read Emerson's (1991) paper "First record for *Cymatium mundum* (Gould) in the eastern Pacific Ocean .....". Still with many doubts, I sent the photo, reproduced here in Figure 1, to Mrs. Carol Skoglund of Phoenix, Arizona, and Mrs. Carole Hertz and Mr. Jules Hertz of San Diego, California, who confirmed the identification. Mrs. Carole Hertz sent the illustration to Dr. William K. Emerson, curator emeritus of the Department of Living Invertebrates, American Museum of Natural History in New York, who agreed with the identification (Carole Hertz, 2003, personal communication).

Several studies have recognized the presence of shallow water benthic invertebrates of the Indo-Pacific Faunal Province in the Panamic Faunal Province, which is separated from the nearest Central Pacific islands by some 5000 km (3100 mi.) of open sea, and extends from near the head of the Golfo de California, México, southward to northern Perú (Emerson, 1978). Hertlein (1937) concluded that the Indo-Pacific marine mollusks cross this wide open ocean to west America by means of long-lasting larval stages transported by ocean currents, and/or by attachment to drifting objects, to pelagic fishes, to mammals, or on the feet of wide-ranging oceanic birds. Probably the most important way in which tropical and temperate marine gastropods are dispersed is the transport of veliger larvae by ocean currents (Scheltema, 1979), which provides a means whereby bottom-dwelling species can attain a wide geographical distribution and serves to maintain genetic continuity between isolated populations. Several families of gastropods have long-distance or teleplanic larvae, and Ranellidae is conspicuous among them. The duration of larval development and its relation to current velocity determines the maximum distance which larvae can be dispersed (Scheltema, 1971). It is known that the cosmopolitan *Cymatium parthenopeum* have a larval stage lasting nearly a year in the water column (Scheltema, 1971). The presence of *Cymatium mundum*, like other Indo-Pacific species, in mainland Ecuador and northern Perú, might be due to larval transport by the Cromwell Current, from the Islas Galápagos or the central Pacific, and may be correlated with ENSO events (El Niño Southern Oscillation) (Emerson, 1991; Béarez & Jimenez-Prado, 2003).

Acknowledgments

I thank Mr. Roberto Zamora and his wife Mrs. Zoila Corcuera for the loan of the specimen studied and for taking the photos; also I thank Mrs. Carol Skoglund of Phoenix, Arizona, and Mrs. Carole Hertz and Mr. Jules Hertz of San Diego, California, and Dr. William K. Emerson for helping with the identification of the species.

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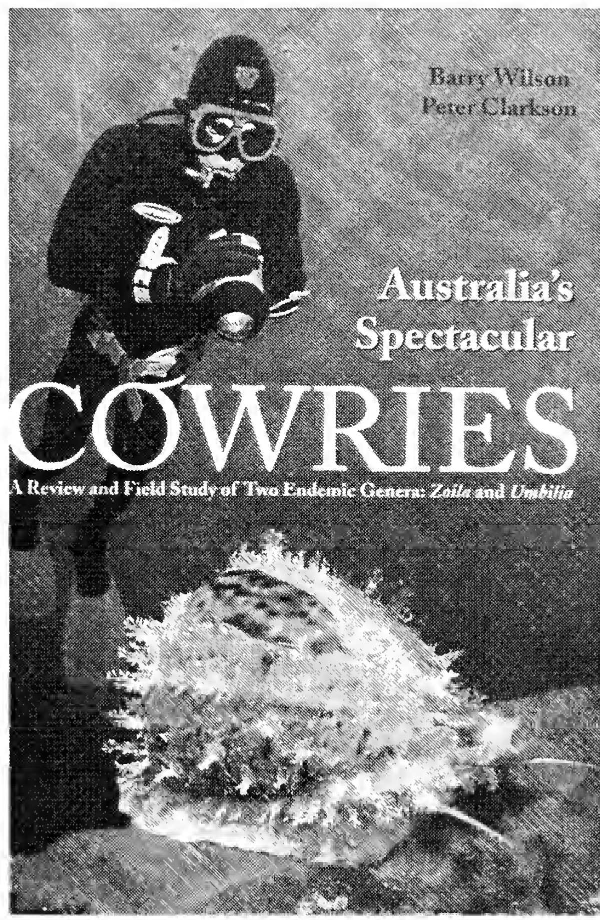
BOOK NEWS

Australia's Spectacular Cowries: A Review and Field Study of Two Endemic Genera: *Zoila* and *Umbilia*.
By: Barry Wilson and Peter Clarkson
Odyssey Publishing, 2004, ix + 396 pages, 383 plates, 22 maps.
Price: $125 US

Whenever a new book with Barry Wilson as an author is announced there is a high degree of expectation. This long awaited book on the endemic cowrie genera *Zoila* and *Umbilia* is a case in point. The authorship represents a collaboration between a well respected malacologist and a well known field collector of these two genera. The melding of these seemingly disparate perspectives was a difficult but very successful undertaking. To say that the book is profusely illustrated is an understatement with only a few black and white plates. The remainder are in very well printed color. There is something for almost everybody in this book. The only readers that may feel left out are those that are looking for an identification guide for the myriad of "dealer names" that have come into use. Their needs might be better served for the genus *Zoila* by the recent book by Felix Lorenz [Lorenz, 2001].

The book is organized into three major sections. The first section provides extensive background on the history of cowrie collection and study, classification at both the family and generic level, an overview of the applicable marine biology, the evolutionary origins of the two genera, and enough regional historical geology to support the origin discussion. The second and third sections address the two genera in detail.

The section on the *Zoila* is best described as a massive (287 pages) but well balanced coverage of the seven species recognized (*friendii, marginata, rosselli, venusta, decipiens, mariellae, perlae*). Three of the species (*friendii, marginata, perlae* are further divided into three subspecies each. The introduction to the genus contains an extensive discussion of the fossil and geographic origins of the *Zoila*. The fossil illustrations are the most complete that this reviewer has seen in one place. Each of the species or subspecies is discussed in a separate subsection. One of the highlights of these discussions are distribution maps illustrated with each of the forms found in each area. These distribution maps and associated plates showing hundreds of specimens provide strong support for the arguments that each of the wide ranging species undergoes a wide range of variation across this range. Some readers may not agree with some



of the conclusions, but there is a massive amount of evidence provided for the stated conclusions. Even the most hard core splitter will find difficulty refuting the evidence. The prior work done by Raybaudi and Lorenz is treated with a very even hand. The arguments for acceptance or rejection of the taxonomic work by these two workers are clearly stated. The taxonomic "heavy going" is followed by habitat descriptions and myriads of in situ photographs of cowries. The argument that particular species/subspecies are host specific in the species of sponge that they feed on is refuted with extensive documentation. Many readers will find the habitat photographs sufficient reason to purchase this book. Each subsection concludes with a detailed discussion of each taxon covered, its history, and the reasons for its acceptance or rejection.

The section on the *Umbilia* is much more modest (49 pages) since it only recognizes three species (*hesitata, armeniaca, capricornica*) and no subspecies. The organization and depth of coverage is the same as the section on the *Zoila*.

The level of scholarship is admirable. There may be a few errors, but they will be noticed only by an expert with the same level of knowledge of the primary literature as the senior author. In most cases these apparent errors are more likely to be differences of opinion rather actual errors. One notable feature is the illustration of cutaway shells that clearly shows the differences in the development of the fossula. This difficult to examine, but very important feature, is well illustrated and is valuable information for the specialist. The recent cowrie molecular work by Meyer [Meyer, 2003] is recognized and used effectively.

This book should be added to the library of any serious cowrie collector. Even a neophyte cowrie collector will find this book of great interest and a worthwhile purchase. The geographic coverage of the illustrated specimens is dense enough, in terms of number of locations and specimens per location, to permit a collector to get a good idea of what a particular specimen on a dealers list will probably look like. This claim cannot be made about any other single source.

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Terry Arnold

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THE FESTIVUS

A publication of the San Diego Shell Club

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Website at: http://www.sandiegoshellclub@terryarnold.net
E-mail: cmhertz@pacbell.net

COME TO THE ANNUAL SEPTEMBER PARTY

Saturday, September 11th at the home of Linda and John LaGrange.
For details, see Club News in the August issue.
For further information, contact Carole Hertz 858-277-6259.

There is no regular meeting this month.

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CLUB NEWS

Minutes of the San Diego Shell Club Meeting August 19, 2004

President John LaGrange called the meeting to order at 7:50 pm. Minutes of the previous meeting were approved as published in the June issue of *The Festivus*. Announcements: Christmas Party will be held on December 4 at The Butcher Shop. The Summer Party will be held on the afternoon of September 11th at the home of President LaGrange in Solana Beach. A map for the event was sent with the August issue of *The Festivus*. Margaret Mulliner has a mahogany shell cabinet, 6 feet high x 24 x 30 inches, in good condition, that she offers to someone who can help transport it in Dave's truck. Kent Trego spoke about the graduate student from Scripps who will be giving the October program with him on deep-water cephalopods.

The speaker of the evening, Wes Farmer, was then introduced by Vice-President Larry Lovell. Wes is a past president of the San Diego Shell Club and has authored eight books on San Diego and Baja California shells and sea life. His address on the work he has done at the local Torrey Pines Reserve was entitled, *A Mile of Fossils*.

Wes has been a docent at Torrey Pines Reserve since 1990. Walking on the beach beneath the bluffs of the Reserve, he picked up a fragment of the fossilized dorsum of a soft shell turtle. Next, he found a fossilized mold of wood bark that bore the marks of bark beetle infestation. He then requested and received a permit to collect at the beach. During that period of time he made complete field notes accompanied by altitude readings by GPS. He ultimately recorded on CD over 2,000 items of data, most of them as photographs. Selected specimens were presented to the audience via a PowerPoint presentation.

Wes would like to see a continuous record made of the items that continue to fall to the beach as the high bluff disintegrates. A database could be made for this locality with the observations he has made. Some of the unknown specimens might be studied as thin sections by academia, adding to the fossil record. The fossilized carbonized trees, fossil oysters and boring clams, etc., have been dated at 45 to 53 MYA in the Eocene epoch. He has not succeeded in interesting a museum, school or university in this undertaking. Wes prepared large display panels depicting specimens of fossils from the beach below the Torrey Pines Reserve, which he brought for our perusal. The interesting panels had also been displayed at the recent San Diego County Fair.

The evening's door prize was won by Kent Trego and refreshments were provided by Bruce Kemp and Kent Trego. The meeting adjourned at 8:35 pm.

Nancy Schneider

The Annual Club Christmas Party

The Club's Christmas party will be held on December 4th (the first Saturday in December) at the Butcher Shop Steakhouse at 5255 Kearny Villa Road in San Diego. Festivities will begin with no-host cocktails at 6:00 pm. Dinner will be served at 7:00 pm. The cost for the dinner including gratuity is $25.00 per person.

The menu entree choices are either Fillet of Salmon or Prime Rib of Beef. All entrees will include California Salad with Honey Mustard Dressing, dinner rolls and butter, garlic mashed potatoes, fresh vegetables, dessert and coffee or tea. The dessert for the evening will be White Chocolate Raspberry Cheesecake. Wine and Sparkling Cider will be provided by the Club.

There will also be a program and the traditional gift exchange. So, save the date and plan to attend the Christmas Party. Further details later.

Addition to the Club Roster

Clark, Roger N., 1839 Arthur St., Klamath Falls, OR 97603-4617. Phone: 541-883-7582. E-mail: <insignis@charter.net>.

A Reminder: An Increase in Domestic Dues Beginning in 2005

A brief reminder that the domestic rate for San Diego Shell Club dues for 2005 has been raised to $20.

As noted in a previous issue (July 2004), this raise becomes necessary due to rising costs for printing and mailing and the greatly increased use of color plates in *The Festivus*. Thanks to generous donations and successful auctions, the Club has been able to subsidize *The Festivus* – which actually costs approximately $50 per member per year. While it is hoped that this generosity will continue, it is deemed prudent to raise the dues at this time to maintain the quality of the publication.

OPISTHOBRANCH MOLLUSKS OF PARQUE NACIONAL DE COIBA, PANAMÁ (TROPICAL EASTERN PACIFIC)

ALICIA HERMOSILLO[1]

Universidad de Guadalajara
Centro Universitario de Ciencias Biológicas y Agropecuarias
Las Agujas, Zapopan
Jalisco, México
E-mail: alicia_titan@infosel.net.mx

Abstract: In May 2003 a faunal study was conducted in Parque Nacional de Coiba aboard Smithsonian's RV *Urracá*. During the expedition, opisthobranchs were targeted during the 50 dives, 22 trawls and 8 intertidal surveys. Over 950 specimens of 75 species of opisthobranchs in the orders "Cephalaspidea," "Notaspidea," Anaspidea, Sacoglossa and Nudibranchia were found. Locality data, size, depth and habitat observations were recorded for each specimen found. Twenty-two of these species have not been previously reported as occurring within Parque Nacional de Coiba, Golfo de Chiriquí, Panamá or anywhere else south of Panamá; 10 species found are unidentified or yet undescribed. Species previously reported for Parque Nacional de Coiba are discussed herein.

Introduction

Parque Nacional de Coiba is a group of islands located south of the Veraguas Province (in the southwest of the República de Panamá) in the southeast part of the Golfo de Chiriquí between 7°10′ and 7°53′N and 81°32′ and 81°56′W. Because of its geographical isolation, a penal colony was established at Isla de Coiba in 1910. It is still active today and has contributed to the preservation of the flora and fauna on the islands. Parque Nacional de Coiba was established in 1991, under the administration of ANAM (Autoridad Nacional de Medio Ambiente), to protect and preserve its natural environment and wildlife.

Coiba itself, (50,314 ha) is among the largest islands of the American Pacific. The other islands in the Park are Ranchería, known also as Coibita (242 ha), Jicarón (2,002 ha), Jicarita (125 ha), Afuerita (27 ha), Canal de Afuera (240 ha), Pájaros (45 ha), Uva (257 ha) and Brincanco (330 ha) for a total land surface of 53,582 ha together with 216,543 ha of marine areas making Parque Nacional de Coiba one of the most extensive parks in the world. It protects three kinds of ecosystems: the islands, reefs and marine life (San Martín et al., 1997) (Figures 1 & 2).

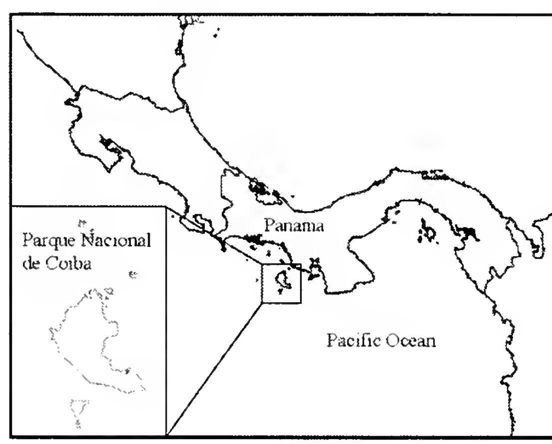

Figure 1. Map of the República de Panamá and insert of Parque Nacional de Coiba.

There are two distinct climatic seasons in Parque Nacional de Coiba: the dry season from December to April, with strong winds that cause upwelling, a drop in water temperature (from 20 to 15°C) and a rise in nutrient levels, and the rainy season, from May to December, with typical afternoon showers, higher water

[1] Mailing address: Tenochtitlan #214, Cd. del Sol, Zapopan, Jalisco, C.P. 45050, México.

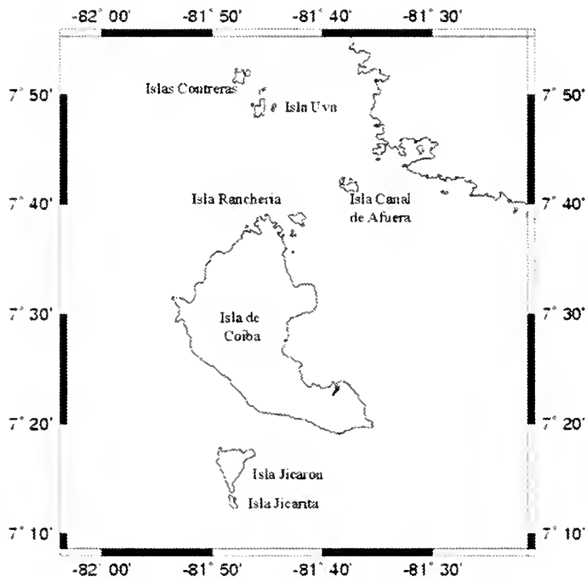

Figure 2. Map of Parque Nacional de Coiba.

temperatures and clearer waters (San Martín et al, 1997).

There is a paucity of information on Coiba and most data were generated during the development of the management plan of Parque Nacional de Coiba. The present paper is the result of an expedition, part of an ongoing faunal study of the coastal and oceanic islands of the Tropical Eastern Pacific conducted by the Smithsonian Tropical Research Institute in Panamá, with the goal of increasing our knowledge of the local fauna.

Keen (1971) reports 28 species of both shelled and shell-less opisthobranchs for Panamá and 10 additional species that occur in adjacent areas and would be expected to inhabit suitable substrates of Panamá. Later, various authors reported 18 species from Panamá but not specifically for Parque Nacional de Coiba: Sphon (1971) one species; Bertsch et al. (1973) one species; Abbott (1974) four species; Ferreira & Bertsch (1975) one species; Bertsch (1979) one species; Bertsch & Kerstitch (1984) one species; Gosliner & Bertsch (1988) one species; Gosliner (1990, 1991 & 1994) seven species; Gosliner & Behrens (1998) one species.

San Martin et. al. (1997) report a species list of 12 opisthobranchs for Parque Nacional de Coiba; 15 additional species are listed in Vega et al. (2000) in an extensive paper listing mollusks for the Veraguas Province (of these, 5 are reported from the Park and 10 in other locations of the Veraguas Province). García and Troncoso (1999, 2001) described two species whose type localities are within Parque Nacional de Coiba. During the present study, several species of opisthobranchs not previously known from the Park or Panamá were collected.

Other authors have studied other elements of the molluscan fauna (Bivalvia, Polyplacophora and the shelled groups of Gastropoda) of the Golfo de Chiriquí in the Veraguas Province: Strong (1939); Hertlein (1946-1950); González, G. (1983); Avilés (1984); Gil (1996) and González, M. (1999).

Materials and Methods

Collecting and observation were conducted during the month of May 2003 aboard the RV *Urracá*. The areas surveyed were sand and rocky shores, sea mounts, islets, estuaries and reefs in order to find the species living in all distinct habitats within the Park. The survey covered three different zones: intertidal, subtidal (5 to 25 m by scuba-diving) and deep (51 to 106 m) by trawling. Opisthobranchs were found on and under rocks, within cracks and crevices and on potential prey or habitat (such as algae, sponges, hydroids, bryozoans, corals and gorgonians). Specimens were deposited at the Natural History Museum of Los Angeles County, California Academy of Sciences and the KL Kaiser Collection.

The trawling was done aboard the RV *Urracá*. The otter trawl used was 5 m wide, with a protective net of 3 cm and an inner mesh of 6 mm. The net was lowered by a metal cable with a winch. The length of the cable was calculated to three times the depth. Once the cable was fully extended, the trawl was conducted for 15 minutes. The net was then winched up to the surface and untied on the deck where the specimens collected were sorted by taxonomic group.

Size, depth and habitat observations were recorded for each opisthobranch found. The size was measured in situ with a metric ruler and depth and temperature were taken with an Uwatec Smart dive computer. A station number was assigned to each dive, trawl and intertidal survey, with the acronym ICP (Isla de Coiba, Panamá) and a consecutive number. For each station we recorded date, latitude and longitude, time of day, temperature range, depth range surveyed, type of substrate, energy level and dominant reef characteristics. All species were photographed in situ when possible and/or in an aquarium.

Results and Discussion

Reported herein are the 75 species of opisthobranchs that were found during the month of May 2003 in 22 trawls, 50 dives and 8 shore excursions. They include members in the orders "Cephalaspidea," "Notaspidea,"Anaspidea, Sacoglossa and Nudibranchia. A total of 951 specimens of opisthobranchs were measured and recorded. Seventy-five species were identified: 4 "Cephalaspidea," 5 Anaspidea, 9 "Notaspidea," 5 Sacoglossa and 52 Nudibranchia. Of this total, 22 species collected have not been previously reported as occurring within Parque Nacional de Coiba, Panamá, or in localities south of Panamá. Additionally, 10 species are new to science.

In order to simplify the presentation of results, all collecting stations were grouped into major areas of the Park. Table 1 presents these localities, the general latitudes and longitudes and shorter names (i.e. Isla de Coiba northwest as Coiba NW) and are then used in Table 2.

Table 1. Collecting Areas in Parque Nacional de Coiba.

Areas	As referred to in Table 2	Longitude and Latitude
Canal de Ranchería	Ranchería	07°37'N, 081°42'W
Isla Afuerita	Afuerita	07°42'N, 081°37'W
Isla Brincanco	Brincanco	07°52'N, 081°47'W
Isla Canal de Afuera	C. Afuera	07°41'N, 081°37'W
Isla Coibita	Coibita	07°39'N, 081°43'W
Isla de Coiba east	Coiba E	07°24'N, 081°39'W
Isla de Coiba northeast	Coiba NE	07°35'N, 081°42'W
Isla de Coiba northwest	Coiba NW	07°37'N, 081°47'W
Isla de Coiba southeast	Coiba SE	07°25'N, 081°41'W
Isla de Coiba west	Coiba W	07°31'N, 081°53'W
Isla Jicarita	Jicarita	07°13'N, 081°48'W
Isla Jicarón	Jicarón	07°17'N, 081°48'W
Isla Uva	Uva	07°49'N, 081°45'W
Islas Contreras	Contreras	07°46'N, 081°45'W
Trawl off Isla Jicarón and Jicarita	Trawl 1	07°17'N, 081°43'W
Trawl off Islas Contreras	Trawl 2	07°40'N, 081°44'W

Benthic Trawl Collections

Benthic trawls brought up specimens of all major taxonomic groups: mollusks, fish, crustaceans, sponges and a few cnidarians. Opisthobranchs taken in trawl samples normally suffer from distortion and damage due to their soft bodies. Nonetheless, the species of opisthobranchs collected in the trawls were successfully identified.

A total of 76 specimens of an undescribed species of *Armina* Rafinesque, 1848 (Nudibranchia: Arminina), were collected live along with what is its known preferred alcyonarian prey (*Cavernularia* sp.). The nudibranch was photographed and videotaped. A description of both the *Armina* and the *Cavernularia* is in preparation.

Other species collected during trawls were: *Flabellina cynara* (Marcus & Marcus, 1967) (12 specimens were collected without any cerata remaining but identified by the unique purple markings on foot, tail, oral tentacles and rhinophores); *Berthellina ilisima* Marcus & Marcus, 1967; *Berthella californica* (Dall, 1990); *Armina californica* (Cooper, 1863); *Navanax aenigmaticus* (Bergh, 1894) and *Chromodoris marislae* Bertsch & Ferreira, 1973. The latter is the first report of this species outside of México.

Subtidal and Intertidal Collections

The mean water temperature registered during our survey for the month of May was 27.9°C, the minimum temperature recorded was 22.8°C at a depth of 18 meters and the maximum at the surface was 30°C. There was a usual drop in the water temperature of two degrees from the surface to the survey depth.

Table 2 lists the 75 species collected. The Table includes each species' size range, depth at which it was found, locality, number of specimens found and the repository voucher reference number. The following abbreviations are used: LACM, Natural History Museum of Los Angeles County; CASIZ, California Academy of Sciences, and KLK, for the K.L. Kaiser Collection.

A species list of opisthobranchs for Coiba was previously published by San Martín et al. (1997) in a comprehensive study of the Park (climate, geology, land and marine environments). Their paper reported 12 species of opisthobranch mollusks. Five additional species for the Park are listed in Vega et al. (2000). Parque Nacional de Coiba is the type locality for two more species: *Phidiana mariadelmarae* García & Troncoso, 1999, and *Favorinus elenalexiae* García & Troncoso, 2001, both found regularly during the present study. Of these 19 species previously reported from the Park, five are not reported herein for various reasons.

Two species, *Doriopsilla janaina* Marcus & Marcus, 1967, reported by San Martín et al. (1997) and *Tyrinna evelinae* (Marcus, 1958) reported by San Martín et al. (1997) and Clay Bryce (Western Australian Museum) in 1998 (pers. comm) were not found during the present study. Further survey would likely have produced these species.

One species reported in San Martín et al. (1997) as occurring in the Park, *Glossodoris edmunsi* Cervera, García-Gomez & Ortea, 1989, is known only from the Atlantic side of Panamá. It has not been reported from the Pacific. I suggest that the report of *G. edmunsi* is a misidentification of *Glossodoris dalli* (Bergh, 1879), which I found regularly in the Park. It has similar morphological characteristics to *G. dalli* such as the patchy brownish-gray dorsum with numerous dark tubercles and scattered larger orange spots, orange margin in both mantle and tail and orange tips of rhinophores and gill.

Berthellina quadridens (Mörch, 1863) and *Berthellina engeli* Gardiner, 1936, were reported by Vega et al. (2000) as occurring in Parque Nacional de Coiba. For some time there has been uncertainty concerning the proper placement of the bright orange pleurobranchs on the Pacific coast and elsewhere. *Berthellina ilisima* (Marcus & Marcus, 1967), *B. engeli, B. quadridens* and *B. citrina* (Rüppell & Leuckart, 1828) have been used interchangeably throughout the literature. A recent study of the world-wide smooth, orange *Berthellina* species, undertaken by Terrence Gosliner and Lucas Cervera (pers. comm., 2003), concludes that the eastern Pacific animals should be assigned to *B. ilisima* as noted in Behrens (2004). Therefore, I consider the species reported by Vega et. al. (2000) and in the present study to be *B. ilisima* which is found abundantly within the Park.

Gil & Pérez (1996) report *Hypselodoris californiensis* (Bergh, 1879) at Tres Islas and Isla Leones, Veraguas, Panamá. These islands are not part of Parque Nacional de Coiba but the report for Panamá should be clarified. This chromodorid nudibranch is a known northern Pacific species distributed from California to the outer coast of Baja California and northern Golfo de California and has not been found to occur from southern México to Panamá. This record most likely is *Hypselodoris agassizii* (Bergh, 1894) which is widely distributed and abundant from Sonora (Sphon, 1971) to Ecuador (Sphon & Mulliner, 1972). *Hypselodoris agassizii* was wrongly identified in Keen (1971) as *H. californiensis*.

The following list presents 22 new distribution records for Panamá and localities south of Panamá. Included are the northern and southern published distributions for each of the species. A short description of the external anatomy is added for those species which were unidentifiable or thought to be potentially undescribed. These descriptions are purposely general in nature and in no way intended as formal descriptions. No trivial names are proposed and no type material has been deposited or designated for them.

Order CEPHALASPIDEA
Family HAMINOEIDAE

•*Haminoea ovalis* Pease, 1868 (Plate 1, Figure G). Previously known from the Indo-Pacific and Costa Rica (Camacho, Y., in press).

•*Phillinopsis cynaea* (Martens, 1879). Previously reported from the tropical Indo-West Pacific (Rudman, 1972).

Order NOTASPIDEA
Family PLEUROBRANCHIDAE

•*Berthella agassizii* (MacFarland, 1909) (Plate 1, Figure F). West Atlantic-Caribbean to Brazil (Marcus, 1955), Pacific coast of México (Gosliner & Bertsch, 1988) and Costa Rica (Camacho, Y., in press.).

•*Berthellina* sp. 1. This typical shaped *Berthellina* is off - white with small opaque spots on the mantle. Rhinophores are rolled and the oral veil is small. It has been found before in Bahía de Banderas, Jalisco-Nayarit, México.

Order ANASPIDEA
Family APLYSIIDAE

•*Phyllaplysia padinae* Williams & Gosliner, 1973. Known from the head of the Golfo de California to Bahía San Carlos, Sonora (Williams & Gosliner, 1973); Bahía de los Angeles, Baja California, México (Poorman & Poorman, 1977) and Costa Rica (Camacho, Y., in press).

Order NUDIBRANCHIA
Suborder DORIDINA
Family CHROMODORIDIDAE

•*Cadlina luarna* (Marcus & Marcus, 1967). Previously reported from La Paz, Baja California Sur; Mazatlán, Sinaloa (Valdés & Angulo-Campillo, 2000); Bahía de Banderas, Jalisco-Nayarit, México and Costa Rica (Camacho, Y., in press).
•*Chromodoris marislae* Bertsch & Ferreira, 1973 (Plate 1, Figure A). Known from Guaymas, Sonora (Bertsch, 1978) to Faro de Bucerías, Michoacán, México (Hermosillo-González, 2003).
•*Mexichromis antonii* (Bertsch, 1976). Reported from Morro Colorado, Sonora (Bertsch & Kerstitch, 1984) and Costa Rica (Camacho, Y. in press).

Family DORIDIDAE

•*Diaulula greeyeli* (MacFarland, 1909) (Plate 1, Figure E). Previously known from Brazil (MacFarland, 1909), Isla Isabela, Nayarit, México (Ortea & Llera, 1981, as *Peltodoris nayarita*) and Costa Rica (Camacho & Valdés, 2003).
•*Taringa aivica* Marcus & Marcus, 1967. Reported previously from Paradise Cove, Los Angeles County, California (Behrens & Henderson, 1982) to Bahía de Banderas, Jalisco-Nayarit, México (Hermosillo-González, 2003) and Costa Rica (Camacho, Y., in press).
•*Discodoris ketos* (Marcus & Marcus, 1967). Known from San Felipe, Baja California and Bahía de Banderas, Jalisco-Nayarit, México (Ferreira & Bertsch, 1975) and Costa Rica (Camacho, Y., in press).
•*Hoplodoris bramale* Fahey & Gosliner, 2003 (Plate 1, Figure H). Known only from the type locality in Costa Rica (Fahey & Gosliner, 2003).
•*Dorid* sp. 1. Three specimens of this species were observed, all of them living in similar habitats under coral rubble. This dorid is light grayish-brown to dark brown. The body has coarse ridges and processes that make the animal look sponge-like. Rhinophores are perfoliated and the same color as the body, the sheaths are irregular in shape. The branchial plume forms a line and is not very visible among the irregular notum surface.
•*Dorid* sp. 2. Very small specimens (3 and 11 mm long) were found living under rocks at depths between 12 and 17 meters. The color of the body is pinkish brown, the notum is smooth with darker spots and some small tubercles. The rhinophores are perfoliated and the branchial plume is unipinnate.
•*Dorid* sp. 3. Only one specimen 12 mm long was found under an intertidal rock. The color of the animal is a light, almost translucent grayish-brown, darker towards the middle. It bears well-defined dark brown spots, smaller close to the margin, larger around the middle and smaller again in the center of the mantle. The body is smooth, with small regular tubercles. The rhinophores are clear on the shaft with a heavily perfoliated brown clavus. The unipinnate gill is also clear with brown tips.

Family POLYCERATIDAE

•*Polycera alabe* Collier & Farmer, 1964. Reported to occur throughout the Golfo de California, from Puerto Peñasco, Sonora, México (Bertsch, 1973) and Costa Rica (Camacho, Y., in press).
•*Polycera gnupa* Marcus, 1967. A very cryptic species that has not been reported again since its description from Puerto Peñasco, Sonora, México (Marcus & Marcus, 1967).
•*Polycerella glandulosa* Behrens & Gosliner, 1988. Previously reported from Morro Bay to San Diego, California; Bahía de los Angeles, Baja California to La Paz, Baja California Sur, México (Behrens & Gosliner, 1988) and Costa Rica (Camacho, Y., in press).

Suborder DENDRONOTINA
Family TRITONIIDAE

•*Tritonia pickensi* Marcus & Marcus, 1967. A very small cryptic species known from Bahía de los Angeles, Baja California to Cabo San Lucas, Baja California Sur (Bertsch & Gosliner, 1984); Bahía de Banderas, Jalisco-Nayarit, México (Hermosillo-González, 2003) and Costa Rica (Camacho, Y., in press).

Family SCYLLAEIDAE

•*Notobryon wardi* Odhner, 1936 (Plate 1, Figure B). Reported from the Indo-West Pacific (Thompson, 1981); Mazatlán, Sinaloa; Bahía de Banderas, Jalisco-Nayarit and Faro de Bucerías, Michoacán, México.

Family DOTIDAE

•*Doto* sp. 1. Three specimens of this species were observed. They were all found living on a brown hydroid. Egg masses are white. The body shape is typical of the genus *Doto*. The color of the body as well as the rhinophore sheaths is rose. The rhinophores and cerata are translucent white. The grape-like cerata are rose, getting darker towards the tips. This species has been observed regularly in Bahía de Banderas and at Isla Isabela, Pacific coast of México.

Suborder ARMININA
Family ARMINIIDAE

•*Armina* sp. 1. Seventy-six specimens of the species were found by trawling and were collected with its preferred alcyonarian prey of the same color. The sizes ranged from 22 to 33 mm in length. They are wider than typical for species of *Armina*, almost heart-shaped. Specimens have white with yellow-orange notal ridges emanating from the frontal notch where striated bulbous rhinophores are situated. The frontal veil and foot are the same color.

Suborder AEOLIDINA
Family FLABELLINIDAE

•*Flabellina cynara* (Marcus & Marcus, 1967). Known from Bahía de los Angeles, Baja California and throughout the Golfo de California (Bertsch & Kerstitch, 1984); Bahía de Banderas, Jalisco-Nayarit, México (Hermosillo-González, 2003) and Costa Rica (Camacho, Y., in press). A very unusual purple color variation was observed (Plate 1, Figure D).

Family EUBRANCHIDAE

•*Eubranchus cucullus* Behrens, 1985 (Plate 1, Figure C). Reported from Isla Ángel de la Guarda, Golfo de California (Behrens, 1985) and Bahía de Banderas, Jalisco-Nayarit, México (Angulo-Campillo, 2002).
•*Eubranchus sp.*1. Three specimens of this minute species were found on a *Bugula* sp. of bryozoan. The color of the body is yellow, the rhinophores are simple. The most distinctive character of the species is a wine-red ring in the middle of the rhinophores. The cerata are yellow and inflated.

Family AEOLIDIIDAE

•*Berghia major* (Eliot, 1903) (Plate 1, Figure I). Known from the Indo-Pacific; Tanzania (Edmunds, 1969); Hawaii (Gosliner, 1979) and Japan (Baba, 1937). In the eastern Pacific it is reported from Puertecitos, Baja California, México (Keen, 1971) and central and southern Golfo de California (as *Baeolidia nodosa* in Kerstitch, 1989).

Family FAVORINIDAE

•*Phidiana lascrucensis* Bertsch & Ferreira, 1974. Reported from Bahía Bacochibampo, Sonora, México and Golfo de Nicoya, Costa Rica (Bertsch & Ferreira, 1974).
•*Noumeaella rubrofasciata* Gosliner, 1991 . Reported from Santa Barbara and Santa Catalina Island, California; Islas San Benito, Baja California, Punta Colorada, Baja California Sur (Gosliner, 1991); Bahía de Banderas, Jalisco-Nayarit, México (Hermosillo-González, 2003) and Costa Rica (Camacho, Y., in press).

Family FACELINIDAE

•*Facelina* sp. 1. This species has been found in Bahía de Banderas and Isla Isabela, Nayarit; Santiago, Colima and Faro de Bucerías, Michoacán, México. It lives on a hydroid, *Tubularia* sp. The body is transparent white, the orange insides can be seen in most specimens, opaque white blotches of various sizes and placements can be observed in some specimens. The body has a thin, segmented dark purple line in the middle of the dorsum and on both sides of the foot. The oral tentacles are long with purple spots and opaque white blotches. The rhinophores are simple with the same coloration as the oral tentacles. The color of the cerata varies among individuals, going from light orange, light red, deep red to purple, some bearing white spots. There is a thin purple line defining the cnidosacs which are always lighter than the rest of the ceras.

Family TERGIPEDIDAE

•*Phestilla hakunamatata* Ortea, Caballer & Espinosa,

2003. This species was described based on a single specimen collected in Costa Rica, but the reproductive system was not studied. Since generic placement for aeolids with uniserrate radula (such as *P. hakunamatata)* requires careful analysis of the reproductive system, the generic assignment is dubious. The species is known to be abundant in Bahía de Banderas and Isla Isabela, Nayarit; Ixtapa, Guerrero, México as well as Parque Nacional de Coiba and the Azuero Peninsula, in Panamá (pers. obs.). Ortea et al. (2003) reported the species as being cryptic and living and feeding on a gorgonian. I have found this species living exclusively on a *Solanderia* sp. hydroid.

•*Cuthona* sp. 1. Two small specimens (4 mm) were found laying eggs on the alga *Padina* sp. The color of the body is transparent off-white, covered with opaque white specks. The rhinophores are long and plain, the same color as the body but without the white specks and bearing a brown ring at approximately one third of the length. The oral tentacles are very short. The cerata are not numerous, are transparent off-white in color, followed by a series of colored rings: yellow, blue, yellow and off-white.

•*Aeolid* sp. 1. Two specimens found living on a floating buoy. We are not able to place this species in any current aeolid genus. The bodies of the specimens are extremely long and slender with 23 rows of cerata for the larger specimen and 12 for the smaller one. Each row bears one to two cerata. The color of the body is a bright brown with a white, almost silvery, line along the dorsum branching to form a circle around each ceratal group. The rhinophores are large and smooth with the pointy end translucent yellow with dense irregular brown and a few white spots (the same coloration is observed on the oral tentacles). There are white speckles dispersed over the cerata. The internal anatomy was not examined.

Conclusions

The fact that 22 out of 75 species identified have not been reported previously for Parque Nacional de Coiba and that 10 more are most likely undescribed shows us how much is yet to be learned about the opisthobranch fauna of the area. As noted before, there are two very distinct climate seasons in the area: dry season during the winter and rainy season during the summer. Since the mean temperature for the surveyed month of May was 27.9°C, one could expect to find some other species if the survey were conducted during the colder season (December to April).

More night dives would result in greater numbers of specimens of known nocturnal species such as *Aplysia parvula* Mörch, 1863; *Stylocheilus longicauda* (Quoy & Gaimard, 1824); *Dolabella auricularia* (Lightfoot, 1786); *Chromodoris baumanni* Bertsch, 1970 and *Notobryon wardi* Odhner, 1936.

Only two species previously reported for Parque Nacional de Coiba: *Doriopsilla janaina* Marcus & Marcus, 1967, reported by San Martín et al., 1997, and *Tyrinna evelinae* (Marcus, 1958) reported by Clay Bryce (Western Australian Museum) in 1998 (pers. comm.) were not found during the present study.

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Table 2. Specimens observed at Parque Nacional de Coiba

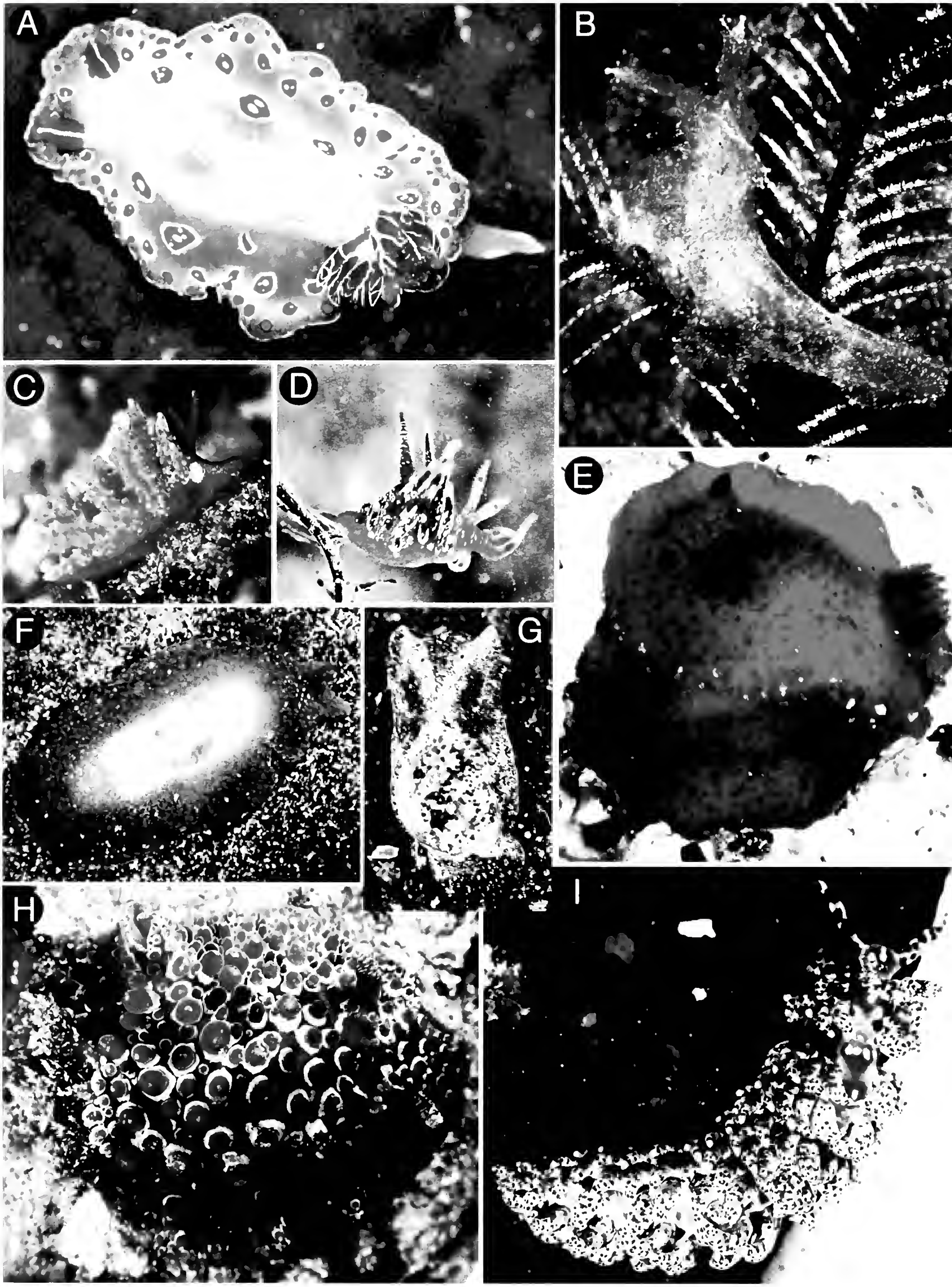
Subclass OPISTHOBRANCHIA	Size range (mm)	Depth range (m)	Locality and number of specimens	Repository
Bulla punctulata A. Adams *in* Sowerby, 1850			Several dead specimens throughout the Park	KLK
Haminoea ovalis Pease, 1868	11	5	Jicarón (1)	LACM 153350
Phillinopsis cynaea (Martens, 1879)	8	17	Coiba W (3)	LACM 153372
Navanax aenigmaticus (Bergh, 1894)	14-65	3-65	Coiba N (4), Coibita (3), Jicarón (11), Uva (2), Contreras (1), trawl 1 (1), total of 22	LACM 153303
Aplysia parvula Mörch, 1863	15	16	Coibita (1)	LACM 153315
Dolabella auricularia (Lightfoot, 1786)	35-210	3-16	Afuertita (2), C. Afuera (7), Coiba E (2), Coiba N (7), Coiba SE (6), Coibita (1), Uva (2), Contreras (3), total of 30	KLK (shell)
Dolabrifera dolabrifera (Rang, 1828)	35-62	Intertidal	Jicarón (8), Coiba N (21), Coiba E (4), total of 33	Photo only
Phyllaplysia padinae Williams & Gosliner, 1973	10	18	C. Afuera (1)	LACM 153306
Stylocheilus striatus (Quoy & Gaimard, 1824)			C. Afuera (4), Coibita (6), Coiba NE (7), total of 17	LACM 153367
Pleurobranchus aereolatus Mörch, 1863	10-51	3-17	C. Afuera (3), Coiba SE (1), Coiba W (6), Coiba NE (3), Jicarón (5), Uva (2), Jicarita (4), Contreras (1), total of 25	Photo only
Berthella agassizii (MacFarland, 1909)	15	2	Afuerita (1)	Photo only

Subclass OPISTHOBRANCHIA	**Size range (mm)**	**Depth range (m)**	**Locality and number of specimens**	**Repository**
Berthella californica (Dall, 1990)	35	65	Trawl 1 (1)	LACM 153333
Berthella martensi (Pilsbry, 1896)	12	5	Jicarón (1)	LACM 153363
Berthella stellata (Risso, 1826)	4-12	12-18	C. Afuera (3)	LACM 153343
Berthellina ilisima Gardiner, 1936	4-54	3-85	Over 100 specimens observed (all stations) including trawls	LACM 153304, 153334, 153347, 153374
Berthellina sp. 1	6-12	2	Coiba SE (1), Afuerita (2), total of 3	LACM 153358
Tylodina fungina (Gabb, 1865)	5-24	2-21	Coiba N (4), Coiba W (10), Brincanco (1), Coiba NE (1), Coibita (2), Jicarón (3), Jicarita (1), Contreras (2), total of 24	LACM 153309, KLK
Umbraculum umbraculum (Lightfoot, 1786)	71	7	Afuerita (1)	KLK
Oxynoe panamensis Pilsbry & Olsson, 1943	3-16	3-12	C. Afuera (4), Contreras (5), total of 9	LACM 153310, 153328
Lobiger souverbii Fischer, 1857	7-27	2	Coiba NE (3)	LACM 153313
Julia thecaphora (Carpenter, 1857)	1		Several stations, in grunge	KLK
Elysia diomedea (Bergh, 1894)	4-61	3-14	Afuerita (10), Coiba E (5), Coiba NW (3), Coiba SE (5), C. Afuera (2), Coiba NE (12), Jicarón (6), Jicarita (4), total of 47	LACM 153342
Polybranchia viridis (Deshayes, 1857)	10-32	6-14	Coiba SE (1), C. Afuera (26), Contreras (11), Jicarita (5), Jicarón (1), total of 44	LACM 153340
Conualevia alba Collier & Farmer, 1964	9-14	9-12	Canal de Afuera (1), Jicarita (1), Coiba W (1), total of 3	LACM 153337, 153368
Cadlina luarna (Marcus & Marcus, 1967)	64	7	Afuerita (1)	LACM 153377
Cadlina sparsa (Odhner, 1921)	3-5	0-13	Coiba W (1), Coiba E (1), Jicarón (4), Afuerita (1), total of 7	LACM 153307, 153321
Chromodoris baumanni Bertsch, 1970	3-22	0-11	Jicarón (1), Uva (3), Coiba SE (3), Coiba W (2), Coiba E (1), total of 10	LACM 153336, 153362
Chromodoris marislae Bertsch & Ferreira, 1973	21	55	Trawl 1 (1)	LACM 153302
Chromodoris sphoni (Ev. Marcus, 1971)	2-24	2-12	Jicarón (2), Uva (7), Coiba NW (2), Jicarita (4), Coiba SE (1), Coiba NE (2), Coiba W (2), Coiba E (2), C. Afuera (3), total of 25	LACM 153328
Glossodoris dalli (Bergh, 1879)	4-45	4-16	Coiba E (2), Coiba NW (2), Coiba W (2), Brincanco (1), Coiba NE (2), Coibita (2), Jicarón (5), Uva (4), Contreras (1), Jicarita (6), total of 27	LACM 153341
Glossodoris sedna (Ev. Marcus & Er. Marcus, 1967)	6-28	0-14	Coiba E (3), Coiba NW (4), Coiba W (7), Brincanco (1), Coiba NE (1), Coibita (2), Jicarón (5), Contreras (5), Jicarita (7), total of 35	LACM 153373

Subclass OPISTHOBRANCHIA	Size range (mm)	Depth range (m)	Locality and number of specimens	Repository
Diaulula greeyeli (MacFarland, 1909)	10-18	Intertidal	Coiba E (4), Coiba W (1), Jicarón (2), total of 7	LACM 153329, 153353
Taringa aivica Marcus & Marcus, 1967	10	6	Uva (1)	LACM 153356
Discodoris ketos (Marcus & Marcus, 1967)	8-31	5-12	Afuerita (1), Coiba E (1), C. Afuera (3), Coibita (1), Uva (3), Contreras (2), Jicarita (2), Jicarón (2), total of 15	LACM 153349, 153357
Hoplodoris bramale Fahey & Gosliner, 2003	27	Intertidal	Coiba E (1)	LACM 153351
Polycera alabe Collier & Farmer, 1964	4-15	15	Coiba N (2)	LACM 153366
Polycera gnupa Marcus, 1967	3	15	Coiba NE (1)	Photo only
Polycerella glandulosa Behrens & Gosliner, 1988	4-6	15-19	Coiba N (5)	LACM 153379
Limacia jansii (Bertsch & Ferreira, 1974)	7	19	C. Afuera (1)	LACM 153339
Dendrodoris albobrunnea Allen, 1933	28-62	3-12	Uva (1), Coiba NE (1), Jicarita (1), Coiba SE (2), Coiba W (1), total of 6	LACM 153310, 153352
Dendrodoris fumata Rüppell & Leuckart, 1881	5-54	4-30	Brincanco (1), C. Afuera (2), Coiba N (2), Coiba SE (2), Coiba W (1), Coibita (1), Uva (4), Jicarita (4), Jicarón (6), total of 23	LACM 153326, 153348
Dorid sp. 1	17-25	4-12	Coiba SE (1), Uva (2), total of 3	CASIZ 167980
Dorid sp. 2	3-11	12-17	Uva (2)	CASIZ 167978
Dorid sp. 3	12	Intertidal	Coiba E (1)	CASIZ 167979
Doto lancei Marcus & Marcus, 1967	4-9	5-18	Coiba SE (20) on floating plastic buoy, Canal de Afuera (2), Coiba NE (1), Jicarón (2), total of 25	LACM 153375
Doto sp. 1	4-5	0-12	Coiba N (3)	LACM 153312
Tritonia pickensi Marcus & Marcus, 1967	3-5	12	Coiba W (12), Brincanco (28), Coiba NE (7), Jicarón (6), Jicarita (2), total of 55	LACM 153320
Lomanotus vermiformis Eliot, 1908	2-7	5-21	Afuera (1), Coiba NW (4), Coiba SE (1), Coiba W (2), C. Afuera (1), Coiba NE (2), Coibita (3), Contreras (2), total of 16	LACM 153371
Notobryon wardi Odhner, 1936	7-14	6-17	Coiba E (1), Coiba NE (1), Coibita (2), total of 4	LACM 153368
Armina californica (Cooper, 1863)	3-8	0-13	Trawl 1 (3), trawl 2 (1), total of 4	LACM 153332
Armina sp. 1	22-33	65-95	Trawl 1 (51), trawl 2 (25), total of 76	LACM 153512, 153302
Flabelllina bertschi Gosliner & Kuzirian, 1990	15-31	70-95	Coiba W (3), Brincanco (1), Jicarón (3), total of 7	LACM 153323
Flabellina cynara (Marcus & Marcus, 1967)	3-6	6-16	Coiba N (1), trawl 1 (11), Contreras (2), total of 14	LACM 153354, 153364
Flabellina marcusorum Gosliner & Kuzirian, 1948	2-8	6-55	Brincanco (1), Coiba NE (4), Uva (1), total of 6	LACM 153305
Flabellina vansyoci Gosliner, 1994	7-8	5-18	Coiba W (2), Jicarón (1), total of 3	Photo only
Eubranchus cucullus Behrens, 1985	3-8	5-12	Coiba NE (11), Coiba W (3), total of 14	LACM 153314, 153345

Subclass OPISTHOBRANCHIA	Size range (mm)	Depth range (m)	Locality and number of specimens	Repository
Eubranchus sp. 1	3	15-19	Coiba N (3)	Photo only
Aeolidiella alba (Risbec, 1928)	5	18	Afuerita (1)	LACM 153322
Aeolidiella chromosoma (Cockerell & Elliot, 1905)	4	3	Coiba E (1), Jicarón (1), total of 2	LACM 153331, 153335
Spurilla neapolitana (Delle Chiaje, 1823)	10-22	0-6	Afuerita (7), Coiba E (2), Coiba N (9), C. Afuera (8), total of 26	LACM 153324, 153330
Berghia major (Eliot, 1903)	7-25	1-16	Coiba N (3), Jicarón (2), C. Afuera (1), total of 6	LACM 153318
Phidiana lascrucensis Bertsch & Ferreira, 1974	6-15	18	Contreras (2), Uva (3), Coiba W (1), total of 6	LACM 153316
Phidiana mariadelmarae García & Troncoso, 1999	7-18	6-7	Coiba E (2), Coiba NW (1), C. Afuera (2), Coibita (1), Uva (1), total of 7	LACM 153338
Bajaeolis bertschi Gosliner & Behrens, 1986	6-21	0-26	Coiba NW (1), Jicarón (2), Coiba W (9), total of 12	LACM 153344, 153381
Favorinus elenalexiae García & Troncoso, 2001	3-10	5-15	Afuerita (1), Coiba NE (2), C. Afuera (7), Coibita (10), Jicarita (1), total of 21	LACM 153319
Facelina sp. 1	3-10	Intertidal	Coiba E (2), estuary	LACM 153355
Noumeaella rubrofasciata Gosliner, 1991	4	12-20	Jicarita (1)	Photo only
Phestilla hakunamatata Ortea, Caballer & Espinosa, 2004	6-7	1-19	Coiba W (10), Brincanco (1), Jicarón (1), Jicarita (1), total of 13	LACM 153521
Phestilla lugubris (Bergh, 1870)	25-32	7	Coiba N (2), Jicarita (1), Coiba SE (1), Coiba E (1), total of 5	LACM 153325
Cuthona sp. 1	4	7-10	Coiba W (2)	CASIZ 167981
Aeolid sp. 1	11-23		Coiba SE (3), on floating plastic buoy	LACM 153376

Plate 1 (A-I). **(A)** *Chromodoris marislae* Bertsch & Ferreira, 1973 **(B)** *Notobryon wardi* Odhner, 1936 **(C)** *Eubranchus cucullus* Behrens, 1985 **(D)** *Flabellina cynara* (Marcus & Marcus, 1967) dark color variation **(E)** *Diaulula greeyeli* (MacFarland, 1909) **(F)** *Berthella agassizii* (MacFarland, 1909) **(G)** *Haminoea ovalis* Pease, 1868 **(H)** *Hoplodoris bramale* Fahey & Gosliner, 2003 **(I)** *Berghia major* (Eliot, 1903). →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REPORT OF THE WSM MEETING — 2004

JULES HERTZ[1]

Santa Barbara Museum of Natural History
2559 Puesta del Sol Road, Santa Barbara, California 93105-2936, USA

The 37th annual meeting of the Western Society of Malacologists (WSM) took place at the Riviera Pacific Convention Center, Ensenada, Baja California, México, June 24-28, 2004. There were 57 registered attendees. This was the first WSM annual meeting held outside the continental USA. The meeting was sponsored by Centro de Investigacíon Científica y de Educatíon Superior de Ensenada (CICESE) and Instituto de Sanidad Acuícola, A.C. (ISAAC) and began on the 24th with registration and an evening reception at Bugambilia's Garden at the Convention Center. Dr. Jorge Cáceres Martínez, WSM President, welcomed the attendees. This was followed by delicious snacks, wine and soft drinks, and several hours of seeing old friends and making new acquaintances.

The technical presentations began on the morning of June 25th with opening remarks followed by the Ecology Session. Some of the presentations were totally in Spanish, others completely in English, and others with a mixture of both languages. The book of abstracts contains abstracts for all papers in both languages. All papers were of high quality with excellent visual presentations. The initial presentation, one of my favorites, by Ryan Hechinger, was entitled "Ecology of the introduced ribbed mussel (*Geukensia demissa*) in Estero de Punta Banda, Mexico: interaction with the native cord grass, *Spartina foliosa*." This introduced species is found in San Francisco Bay, four southern California wetlands and in Estero de Punta Banda (EPB), Baja California. It was estimated that the total biomass of this invader was over four times that of the next most abundant bivalve at EPB. There is a concern of the potential impact of this mussel on the population of light-footed clapper rails, an endangered species in the United States. The birds get caught by the open mussels and lose toes and sometimes their lives. It was found that only a few native parasites colonize these mussels at very low prevalence and intensities. Another paper I found interesting was "Mass stranding of *Argonauta* spp. (Cephalopoda: Argonautidae) in Bahía de La Paz, Golfo de California, México" by Andrés González-Peralta. Data was presented on the mass stranding of three species of *Argonauta* (*A. cornuta*, *A. nouryi* and *A. pacifica)* and the collecting of 1136 shells over a four year period, 1998-2001.

In the afternoon of the 25th, Hans Bertsch introduced the Opisthobranch Session. The paper I found most interesting was "Opisthobranch fauna of Bahía de Banderas, México (Tropical Eastern Pacific)" by Alicia Hermosillo. Few reports have been published in the past on opisthobranchs from this area. The author spent the first year of her study surveying 30 sites representing diverse habitats within the bay. She then statistically selected the 10 sites having the highest species richness. Since March 2003 she has performed monthly surveys at these sites to determine species presence and seasonality. She presented preliminary analysis on distribution and seasonality of four abundant species.

The Phylogenetics Session, also held on the 25th, was introduced by Douglas Eernisse. Two papers in this session stood out. The first, "A new method for genome size estimation in *Haliotis rufescens* (Archaeogastropoda: Haliotidae) using DAPI-fluorescence fading" was presented by Cristian Gallardo Escárte. The DNA extraction method used to quantify nuclear genome size has been reported to be imprecise. An alternate technique using the quantification of fluorescence intensity in nucleus stained with fluorochromes that are DNA-specific also has some shortcomings. This paper presented a new method using DAPI - fading fluorescence combined with image

[1] 3883 Mt. Blackburn Ave., San Diego, CA 92111, USA

analysis processing. This method was used to estimate genome size in *Haliotis rufescens*. A second paper in this session of interest was presented by Reuben L. Paul: "DNA sequence test of the lined chiton (*Tonicella*) species compex." The paper described the use of DNA sequence comparisons to evaluate a complex of *Tonicella* species proposed by R.N. Clark. The results strongly support Clark's distinctions between *Tonicella lineata* and *Tonicella lokii* as well as the monophyly of each. Additional sampling is required to determine the relationship of *T. venusta* and the effect of separation of populations of these species.

On the 26th, there was an Aquaculture Session in the morning and a field trip in the afternoon. A fascinating paper in the morning "The rainbow lip pearl oyster *Pteria sterna* culture in La Paz Bay: tradition and modernity" was presented by Carlos Cáceres Martínez. La Paz Bay was famous for pearl oyster culture at the end of the Nineteenth Century but was terminated in 1910 as a result of the Mexican Revolution. The industry was restarted in 1999 after many years of research using *Pteria sterna*. Two products are being pursued: "mabe" (half pearls) and free pearls. The time for production is three years for the "mabe" pearls and four years for the free pearls. The pearls produced are beautiful and dark and there were many for sale at the meeting.

In the afternoon there was a field trip to BC Abalone, S.A. de C.V., a Mexican company raising abalone in the small village of Ejido Eréndira, about 60 miles south of Ensenada. The tour of the aquaculture facility lasted about two hours and was fascinating. A short lecture on the different types of abalone being raised and the general procedures started the tour. We followed the process from the larval stage where the larvae were feeding on diatoms (also raised there) until the abalones were about 3-inches long. The animals were raised on sections of corrugated fiberglass panels kept in racks in large tanks with water recycling from the ocean. The tanks were kept full of kelp for the larger animals to feed on. When the animals get to the 3-inch size they are sent to a small number of restaurants in San Diego or to Ensenada where they are canned and shipped to China. The shells are not currently utilized and we were each recipients of some beautiful juvenile abalone shells. Many of us were interested in what other mollusks we could find on the kelp in the hundreds of tanks and spent a good deal of time running from tank to tank searching.

The 27th was either a free day or a field trip to the wineries in the Valle de Guadalupe. We visited Camou, a boutique winery, and then one of the largest wineries in México, L. A. Cetto. At both places we were given a tour and then tastes of numerous wines accompanied by bread and cheese. Figure 1 shows some of our group at Camou. We also toured the extensive grounds at L.A.

Figure 1. At the Camou Winery. Left to right: Roberto Chávez, Kirstie Kaiser, Doug Eernisse and Jorge Cáceres Martinez. Photo: Alicia Hermosillo.

Cetto and at the highest point on their property we observed the setting for their concert series. One could look out at the entire Gaudalupe Valley and observe grape vines as far as the eye could see with occasional groups of olive trees. As a side trip, our group also visited a small Russian museum. This housed pictures of a Russian group of emigres who settled there in the early 1900s for religious freedom and the tools they used in their farming. The curator, a Mexican woman who married a descendent of the group, gave an interesting discussion on their history and had samples of their breads and cheese for tasting and sale.

On the final day of the meeting, there was a General Session in the morning and a very extensive Poster Session (16 posters) in the afternoon. My preferred poster was one presented by Jorge Sonnenholzner entitled, "Prevalence of the parasite *Sabinella shaskyi* (Gastropoda: Eulimidae) and sub-lethal damage in *Eucidaris galapagensis* (Echinoidea) in the Galápagos Islands, Ecuador." This was followed by a very short business meeting at which the winners of the best student papers and poster were announced (Figure 2). The sites for the next three WSM meetings were announced: 2005 - Asilomar, 2006 - Seattle, and 2007 La Paz. The Asilomar and Seattle meetings will be combined meetings with the American Malacological Society.

The Banquet was held on the evening of the 28th in a beautiful room at the Convention Center and it proved to be the best WSM banquet I have ever attended. The tables and chairs were beautifully decorated and there was continuous serving of wine and soft drinks. We were served a delicious four-course meal and music was provided by a classical quintet plus vocalist. The music was great and with the continuous flow of wine everyone was in a joyous mood.

The planning for the meeting was superb and the hospitality outstanding. In the few cases where an author was unavailable to present a paper, the schedule was maintained by substituting some slide presentations or a substitute paper. Hopefully this will set an example for future WSM meetings.

Figure 2. WSM award winners. Left to right: Ruben Paul and Alicia Hermosillo (student paper awards), Jorge Sonnenholzner (best poster award). Photo: Roberto Chávez.

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THE FESTIVUS

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E-mail: cmhertz@pacbell.net

PROGRAM

Mollusks and Other Invertebrates at Long-term Monitored Abyssal Station M

Member Kent Trego and Henry Ruhl, a graduate student at Scripps Institution of Oceanography, will give a PowerPoint presentation on Station M, the abyssal oceanographic observatory located off Santa Barbara and monitored since 1989. They will discuss this abyssal environment and will also have a display.

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CLUB NEWS

The September Party

The September Party was once again held at the beautiful home of Linda and John LaGrange. About 20 people attended and enjoyed the gracious hospitality of Linda and John and the opportunity to visit at length with members and some former members that hadn't been seen at Club for several years.

Food, always seeming to be an important part of the Club's functions, was plentiful and delicious, along with wine and soft drinks. It was a very enjoyable get-together and we thank the LaGranges for hosting it once again.

Additions and Changes to the Club Roster

New member

Venken, Gerard, Boerenkrijg-Singel 13 BUS 5 B-3500 Hasselt, Belgium

Change of address

McClincy, Richard J., 2332 W. Calle Ceja, Green Valley, AZ 85614. Phone: (520) 625-5697. E-mail: pmcclincy@att.net

Small, Michael, 12 Lambton Ave, Ottawa, Ontario K1M 025 Canada.

Change of e-mail

Womack, Ed and Jean. <ejwomack@commspeed.net>

A Reminder: An Increase in Domestic Dues For 2005

A brief reminder that the domestic rate for San Diego Shell Club dues for 2005 has been raised to $20. All dues received from October on will be for 2005.

As noted in a previous issue (July 2004), this raise becomes necessary due to rising costs for printing and mailing and the greatly increased use of color plates in *The Festivus*. Thanks to generous donations and successful auctions, the Club has been able to subsidize *The Festivus* – which actually costs approximately $50 per member per year. While it is hoped that this generosity will continue, it is deemed prudent to raise the dues at this time to maintain the quality of the publication.

Upcoming Club Election of Officers

It will soon be time to elect Club officers for the 2005 year. At the October meeting, the Nominating Committee's proposed slate of officers will be announced. Then, at the November meeting, nominations from the floor will be entertained followed by the election of officers. The new officers will be installed at the Annual Christmas Dinner Party on December 4th.

Pre-publication offer: Catalog of Turridae

(From Daniel Geiger, associate editor Mollusca, *Zootaxa*)

Catalog of Recent and Fossil Turrids (Mollusca: Gastropoda). Series : *Zootaxa*
By: John K. Tucker (Illinois Natural History Survey)
1302 pp., 30 cm high
Probable date: September/October 2004
ISBN 1877354503 (Hardback)
List price: US$210.30
Pre-publication special discounted price: US$126.18 (40% discount)

"The impending publication of the *Catalog of Turridae* by John Tucker is announced. Turridae is one of the most diverse marine gastropod families with literally thousands of species yet undescribed. A crucial step towards making work on this family possible is an inventory of all described species, both Recent as well as fossil. This work is the culmination of 30 years of painstaking attention to detail by the author."

To make the work more widely available, it can be pre-ordered at a strong pre-publication discount.

Postage/delivery by ALS (2-3 weeks target)
North America and Asia US$43; Europe, S. America & Africa US$48; Australasia/Oceania US$24.

Mailing Address:
Daniel L. Geiger, Ph.D.
Molecular Systematics Lab, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, CA 90007, USA.
Phone: (213) 763 3431. Fax: (213) 748 4432.
NEW e-mail: geiger@vetigastropoda.com

THE FIRST OCCURRENCE OF PEARLS IN THE ATLANTIC WINGED OYSTER, *PTERIA COLYMBUS* (RÖDING, 1798), FROM THE FLORIDA KEYS

ILYA TËMKIN

Division of Invertebrate Zoology, American Museum of Natural History,
Central Park West at 79th Street, New York, NY 10024
BRIDGES Program, Department of Biology, New York University, 1009 Main Building,
100 Washington Square East, New York, NY 10003
E-mail: ilya@amnh.org

A 0.3-mm free pearl was discovered in the tissue of an adult winged oyster *Pteria colymbus* (Röding, 1798), a common bivalve of the western Atlantic. The pearl is a perfect sphere of white color with a faint yellowish tint. Its smooth surface is of considerable luster, however, not highly iridescent (Figure A). Covered by a thin epithelium, the pearl was imbedded in the mantle on the postero-dorsal side of the visceral mass on the left side of the animal relative to the mantle isthmus (Figures B, C). A substantial deformation of the shell's ligamental area immediately dorsal to the pearl's location suggests that serious physical damage to the hinge might have preceded the pearl's formation. The injury resulted in longitudinal splitting of the hinge plate posterior to the resilifer, with more extensive damage in the left valve (Figure D). Subsequently, the wound successfully recovered as the narrow crack was filled with secondary ligamental tissue. Penetration of a particle that served as the nucleus for pearl formation likely occurred during the damage or shortly thereafter while the valves were still slightly ajar. Two larger co-joined blister pearls (approximately 2.8 mm and 2.3 mm in diameter) formed in the left valve in the vicinity of the smaller free pearl (Figure E). While it is difficult to determine the nature of the nucleus, one can speculate that the organic source might have been a worm snail (or its biological byproducts), a fragment of which is attached to the damaged area of the hinge of the left valve (Figure F).

P. colymbus is a member of the most species-rich of three extant genera of Pteriidae, a family that in addition to *Pteria*, or winged oysters, contains commercially important species of pearl oysters, genus *Pinctada*. Despite their close affinity to pearl oysters, winged oysters are not as widely used in perliculture, with the exception of the Indo-Pacific *Pteria penguin* (Röding, 1798), cultured for exceptional blue half-pearls (mabé) in Japan and the surrounding regions, and the eastern Pacific *Pteria sterna* (Gould, 1851) cultivated in eastern Mexico for highly iridescent free and half-pearls with a remarkable range of colors from white to silver to black.

The specimen of *P. colymbus* (AMNH 298920; Figure G) containing the pearl was obtained during a long-term, ongoing molluscan biodiversity research project in the Florida Keys sponsored in part by the Comer Science and Education Foundation and National Science Foundation grants to P. Mikkelsen (American Museum of Natural History) and R. Bieler (Field Museum of Natural History). In addition to *Pteria colymbus*, the study has confirmed the presence of two other shallow water pteriid species, both of the genus *Pinctada*: *P. imbricata* (Röding, 1798) and *P. longisquamosa* (Dunker, 1852) (Mikkelsen & Bieler, 2000; Mikkelsen et al., in press). The pearl-bearing *Pteria* was found in its typical patch reef habitat attached to a gorgonian on the ocean side of Grassy Key at about 4.3 m depth. According to project records, this is the first documented occurrence of natural pearls in *P. colymbus* (P. M. Mikkelsen, unpublished data).

The photographs of the pearl (Figures A, B) were taken by T. Nguyen (AMNH) using a Microptics® micro/macro imaging system based on a high-resolution Nikon® single-lens reflex digital camera; the other photographs were taken by the author using Canon G3 digital camera. Supported by NSF-PEET #9978119.

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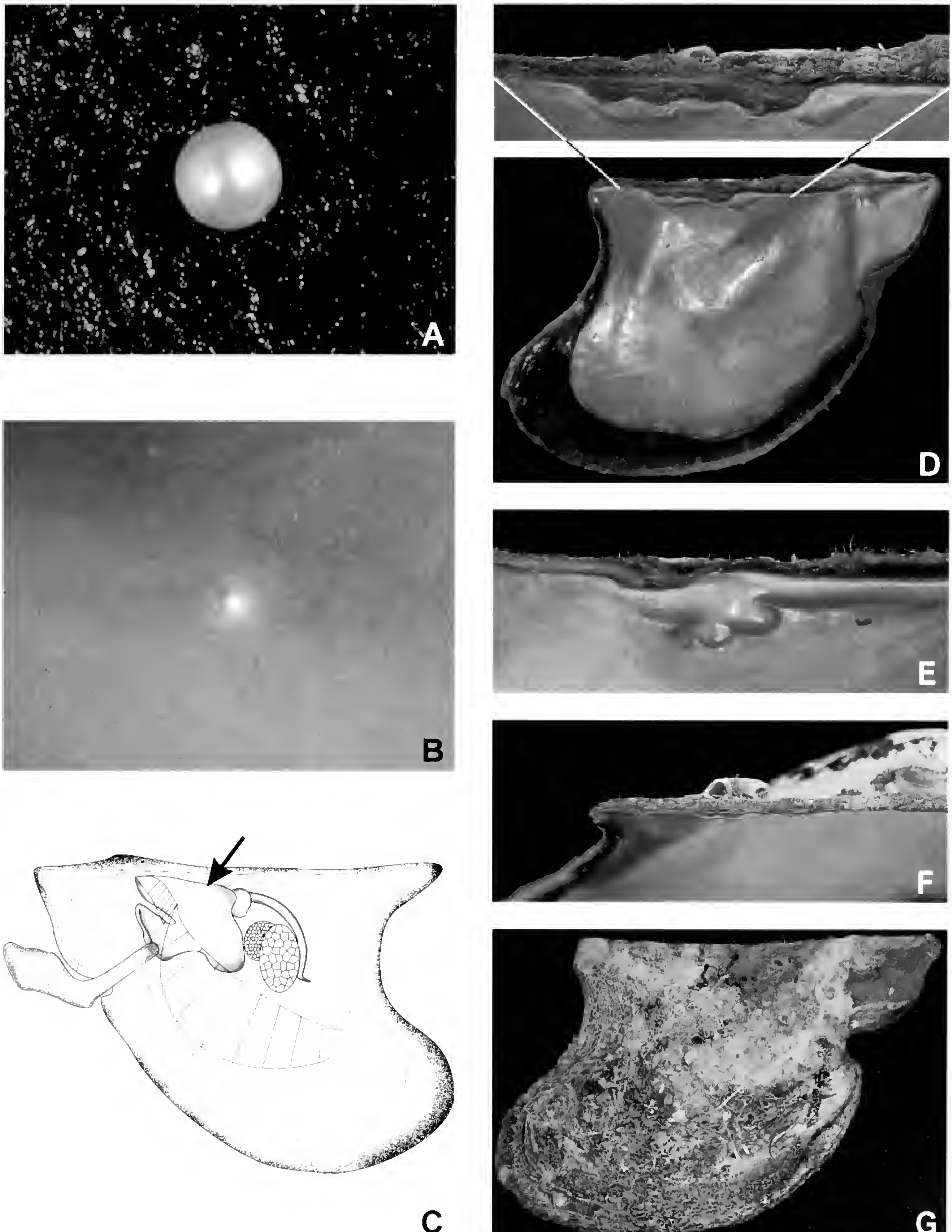
Figures A-G (All figures refer to a single specimen of *Pteria colymbus*. AMNH 298920). **(A)** Free pearl. Diameter 0.3 mm. **(B)** The same pearl *in situ*. **(C)** A diagrammatic lateral view of soft anatomy with left valve removed. The arrow indicated the location of the pearl. **(D)** The interior of the left valve with a detailed view of the damage in the hinge (enlarged). Hinge length 63.8 mm, valve height 50.9 mm. **(E)** A close-up view of two blister pearls on the underside of the left valve resilifer. Diameter 2.8 mm and 2.3 mm. **(F)** A worm snail shell on the exterior of the left valve close to the damaged area of the hinge when viewed from the dorsal side. **(G)** The exterior of the right valve. Hinge length 63.5 mm, height 50.7 mm.➜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AMS MEETS AT SANIBEL ISLAND

ROLAND C. ANDERSON

The Seattle Aquarium, Pier 59, Waterfront Park, Seattle, WA 98101, USA
E-mail: roland.anderson@ci.seattle.wa.us

The 70th annual meeting of the American Malacological Society (AMS) was held at the Sundial Resort on Sanibel Island, Florida on 31 July to 4 August 2004, shortly before hurricane Charlie came through and devastated the island. The large, amenable resort had all the facilities necessary for a conference, including a shell theme in its decorations (Figure 1).

The usual congenial opening reception was held poolside, luckily under a shelter, as one of the typical late afternoon rain showers hit about that time. It was good to catch up with colleagues and share current research. It was also interesting to see how Floridians and tourists continued to enjoy the beach and the warm Gulf waters even in the rain and the 30^0 C heat.

Under the capable organization of president José Leal, the conference had a great complement of research talks and posters, starting with keynote speaker Alan Kohn, who spoke on the interesting topic, "Neogastropoda: questions of tempo and mode in macroevolution and macroecology." In addition, four special sessions were held on biodiversity of marine mollusks: snails and slugs as agricultural pests, coastal molluscan assemblages as environmental indicators, and a special student gathering on how to write and get grants.

Although the quality of the talks at this conference was consistently high, several speakers stood out. Janet Voight spoke on the feeding of the vent octopus, and showed spectacular photos and a video of the vent organisms. Carole Hickman gave one of her exceptional presentations on molluscan assemblages of seagrass beds, and Paul Valentich Scott discussed commensal Galeommatoidean bivalves. Elizabeth Davis gave an excellent talk on using a computer program to predict the potential ranges of some introduced molluscan pests, such as the giant African snail, *Achatina fulica*. Her talk won the well-deserved Connie Boone Student Award.

Besides the usual spirited auction, jointly conducted by Paul Valentich Scott, Paul Callomon and Chris Garvie, the conference had an evening reception at the Bailey-Matthews Shell Museum, an ending banquet, and field trips to an isolated cay, to the Darling Refuge on the island, and to a fossil bed on the mainland. I toured the Darling Refuge with Alan Kohn and we saw three kinds of herons, three kinds of egrets and roseate spoonbills as well as endangered and endearing manatees.

Figure 1. The Nautilus water slide at one of the five hotel pools.

The beaches of Sanibel are why most shellers go to the island. On a quick beach walk (it was really hot!) I saw *Dinocardium robustum*, *Trachycardium muricatum*, *Carditamera floridana*, *Noetia ponderosa*, *Chione cancellata*, *Argopecten irradians*, *A. gibbus*, *Atrina rigida*, *A. serrata*, *Plicatula gibbosa*, and *Anadara transversa*. Shells were lined up on the beach in windrows and besides the many shells, there were many shellers prowling the beach for that special find. On the upper beach were cordoned-off sea turtle and snowy plover nests and numerous shore birds, including baby sandpipers which were very cute. We left the island a week before the hurricane arrived. It is difficult to think of what the wildlife endured as well as the human suffering, and we wish the residents well in their rebuilding.

The 2005 meeting will be a joint meeting with the Western Society of Malacologists to be held at the conference facilities of Asilomar, CA and the 2006 meeting, also a joint meeting, will be in Seattle, WA.

A RANGE EXTENSION FOR *CORALLIOPHILA (PSEUDOMUREX) PARVA* E. A. SMITH, 1877

EMILIO FABIÁN GARCÍA

115 Oakcrest Dr. Lafayette, LA 70503
E- mail: efg2112@louisiana.edu

In January, 2004 a group of shell collectors went to Chile to explore the intertidal zones in areas that covered from Isla Grande de Chiloé in the south to Iquique in the north. While collecting at Playa Lobitos, a beach area composed of sand and rubble with large intertidal bolders and shallow tide pools, Dr. Emily Vokes found in the drift two specimens of a *Coralliophila* species. Upon closer inspection back home they were determined to be specimens of *Coralliophila (Pseudomurex) parva* E. A. Smith, 1877, a species that had not been reported before in studies of the Chilean molluscan fauna (Basly Santa María, 1982; Marincovich, 1973; Ramírez Böhme, 1997). The specimens measure 18.8 (Figure 1) and 23.3 mm, respectively.

Coralliophila parva is a widely distributed species, ranging from the Golfo de California to the Islas Galápagos (Keen, 1971), and including Isla del Coco, Costa Rica, Île Clipperton, a French possession, and Isla de Malpelo, Colombia (Kaiser, 2001). Heretofore, the Islas Galápagos, roughly situated at 1°27'S, 93°W, and the Colombian station, located at 03°51'N, 81°35'W, were the southernmost known range of *Coralliophila parva*. The new findings at Playa Lobitos, situated 20 km south of Iquique, Chile, at 20°27'S, 70°09'W, considerably expands the southern range of the species.

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Figure 1. *Coralliophila (Pseudomurex) parva* E. A. Smith, 1877, Playa Lobitos, 20 km south of Iquique, Chile, at 20°27'S, 70°09'W. Length:

18.8 mm. Left to right: apertural and dorsal views and detail of sculpture.

NORTHERN RANGE EXTENSION FOR *NUTTALLIA NUTTALLII* (CONRAD, 1837) [BIVALVIA: PSAMMOBIIDAE]

DAN YOSHIMOTO

1164 Vista Drive, Eureka, California 95503
E-mail: yoshells2@humboldt1.com

Nuttallia nuttallii (Conrad, 1837) (Figure 1) is a fairly common species of a psammobiid bivalve, previously recorded along the west coast of North America from Bodega Harbor (38°3'N) to Bahía Magdalena, Baja California Sur, México (24°6'N) in the low intertidal zone in sand/gravel and in bays or protected shores (Coan, Valentich Scott & Bernard, 2000).

On April 7, 2004, while collecting immature *Clinocardium nuttallii* (Conrad, 1837) after a die-off in Eureka, Humboldt Bay, Humboldt County, California, I was approached by a local clammer (Ernie Watson). He asked if I could identify a bivalve for him that he had not seen before in his many years of clamming. He brought me the shell and I identified it as *Nuttallia nuttallii*. Thinking that the old clammer had given me one of the famous "Big Humboldt County Stories," I took the shell home and thought nothing of the experience.

A few days later, while picking up more

Figure 1. *Nuttallia nuttallii*, 2 specimens collected at Samoa Peninsula (North Peninsula), Eureka, Humboldt County, CA, inside bay, in a protected cove (40°918'N, 124°13.229'W) in sand at low tide (-0.7 ft). Closed specimen 112 x 78 mm (SBMNH). Leg. Dan Yoshimoto. Open specimen: 107 x 77 mm deposited at Humboldt Bay Harbor Recreation and Conservation District Office. Leg. Ernie Watson.

Clinocardium nuttallii, I found a second specimen of the California Mahogany Clam which encouraged me to write to Paul Valentich Scott of the Santa Barbara Museum of Natural History (SBMNH) and co-author of *Bivalve Seashells of Western North America*. Paul said that it was a range extension, moving the distribution 250 miles north of previous records. One specimen has been deposited in the collections of the Humboldt Bay Harbor Recreation and Conservation District (Specimen 1) and the other to the Santa Barbara Museum of Natural History (SBMNH 352863).

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THE FESTIVUS

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Website at: http://www.sandiegoshellclub@terryarnold.net
E-mail: cmhertz@pacbell.net

PROGRAM

SHELLING IN ALASKA: KETCHIKAN TO ATTU

Member Roger Clark of Klamath Falls, OR, will give a Powerpoint presentation on his work as a NOAA/NMFS Biologist (invertebrate taxonomist) by trawling, diving and tidepooling in the great white north.

GIANT BOOK AND REPRINT SALE (IN TIME FOR THE HOLIDAYS)
Meeting date: November 18, 2004

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CLUB NEWS

Minutes of the San Diego Shell Club meeting October 21, 2004

The meeting was called to order at 7:30 pm by President John LaGrange. Minutes of the previous meeting were approved as published in *The Festivus*.

A slate of officers for 2005 was announced by the Board acting as Nominating Committee. Nominations from the floor will be entertained at the November meeting followed by the election of officers. The slate is as follows: President: Jules Hertz, Vice-President: John LaGrange, Recording Secretary: Nancy Schneider, Corresponding Secretary: Marilyn Goldammer, Treasurer: Silvana Volero. The new officers will be installed at the December Christmas Party.

Kent Trego began the evening's program on "Mollusks and other invertebrates at long-term monitored abyssal Station M." Forty-four cruises have now been made to this location lying 200 miles west of Point Conception and 2500 meters deep. Seventeen species of bivalves, all known, have been reported: 3 gastropods, 2 scaphopods (one new), 2 opisthobranchs, and 1 cephalopod. Henry Ruhl, of Scripps Institution of Oceanography, presented the invertebrates of this deep sea community with imagery from the undersea roving camera on *Alvin*. Time-lapse photography enabled visual observation of movement on the ocean bottom. Ten species of sea cucumbers were found, some being pelagic and transparent. Glass sponges were present, as were heart urchins. Communities of animals were found at depths to 4100 meters, some near hydrothermal vents and cold seeps of methane. Change in the abundance of species in the ecosystem has been observed throughout the study which will continue until June 2006. The faunal changes in this remote area are being correlated to climate fluctuations dominated by El Niño/La Niña. There was a lively discussion from the audience following this outstanding presentation of photographic images

The door prize was won by Nola Michel. The meeting adjourned at 8:50 pm, followed by the coffee hour.

Nancy Schneider

SCUM 2005

The City of San Diego and SCAMIT will be hosting the SCUM IX meeting in San Diego on Saturday 22 January 2005. A formal announcement will be out shortly.

The Annual Christmas Dinner Party Saturday, December 4th

The Club's annual Christmas Party will again be held at The Butcher Shop Steakhouse at 5255 Kearny Villa Road in San Diego. Festivities will begin at 6 p.m. and dinner will be at 7pm. The cost for the dinner including gratuity is $25 per person. Wine and sparkling cider will be provided by the Club. The entree choices are either Fillet of Salmon or Prime Rib of Beef. Dinners include salad, rolls and butter, garlic mashed potatoes, vegetables, dessert and coffee or tea. The dessert is White Chocolate Raspberry Cheesecake.

There will also be a program and the traditional gift exchange. Reservations (checks) must be received by November 28th. Please note your choice of entree on your check. You can combine your check with your membership renewal check (now $20 domestic).

IN MEMORIAM

Yvonne Albi

February 12, 1925 - October 9, 2004

Sadly we report the passing of Yvonne Albi, from complications of Post Polio Syndrome. Yvonne was a Club member and friend since 1989 and was an Associate in both the malacology and paleontology sections at The Natural History Museum of Los Angeles County. She was interested in many aspects of marine life – in fossil echinoids, rudist bivalves, and fossil and Recent ranellids and bursids to mention just a few. Through the years she could be found at the annual WSM and SCUM meetings sharing talk about marine life. She will be greatly missed.

Yvonne is survived by a sister Francine Arrangoiz, daughters Michelle and Gina, sons Kurt and Keith, eight grandchildren and one great-grandchild.

Yvonne has published with *The Festivus* and those papers are listed below.

2002. Does the morphology of Pleistocene specimens of *Crossota californica* (Hinds, 1843) elucidate evolutionaary patterns? *The Festivus* 34(3): 31-42, figs. 1-10.

2004. Reprint of paper listed above in the *Bulletin of the southern California Paleontological Society* 36(5&6): 27-40.

In press. *Coralliochama orcutti* White, 1885 (Plagioprychidae) a rudist bivalve. *The Festivus*.

A REPORT ON THE PLIOCENE MOLLUSKS FROM ARROYO DE SANTA AGUEDA, SOUTH OF SANTA ROSALIA, BAJA CALIFORNIA SUR, MÉXICO

NANCY SCHNEIDER

12829 Carriage Road, Poway, California 92064-6045, USA
E-mail: jtkcmom@sbcglobal.net

Fossiliferous strata south of Santa Rosalia, Baja California Sur, México, has attracted the interest of my husband, Bill, and me over a number of years. It is within the dry Arroyo de Santa Agueda, in an area of marine sandstone, 2.5 km southeast of the Santa Agueda Estuary (Figures 1, 2). For the twenty years that we have visited this site, the brownish sandstone has been regularly tractor-disked to supply fill material elsewhere in the vicinity. For those of us who are awed by not only ancient, but also representative casts of largely Recent molluscan fauna, it seemed a waste of an opportune teaching and collecting site. From the poorly consolidated sandstone matrix, we have collected numerous well preserved casts such as *Turritella, Conus, Fusinus,* and *Cassis*. Impressions in the casts include various muscle scars, pallial lines, columellae etc. Of even greater interest at this site, was an extensive reef of extinct giant *Leopecten bakeri* (Hanna & Hertlein, 1927), in place like pavement (Figure 3). By mid 2002, the locality itself became extinct--no longer existing--having been trucked away to fill holes in Mexican roads.

This fossil location is at an altitude of 37 m by Global Positioning System (GPS) reading. It is within the geographic area of the Boleo Copper District of Santa Rosalia, which covers an area 11 km by 3 km, parallel to the Golfo de California near the town of Santa Rosalia (Wilson, 1955). The fossil site discussed herein is in the bottom of Arroyo de Santa Agueda, which drains into the Golfo de California. The GPS coordinates at the collecting site are 27°18.065'N x 112°14.950'W (Figures 4, 5).

Figure 1. Map of Baja California, México (after Keen, 1971).

SPECIMEN PRESERVATION

The majority of fossils collected at this fossiliferous site are either casts of the interior of the mollusk shell it replaced, or a mold of the exterior of the shell left in the

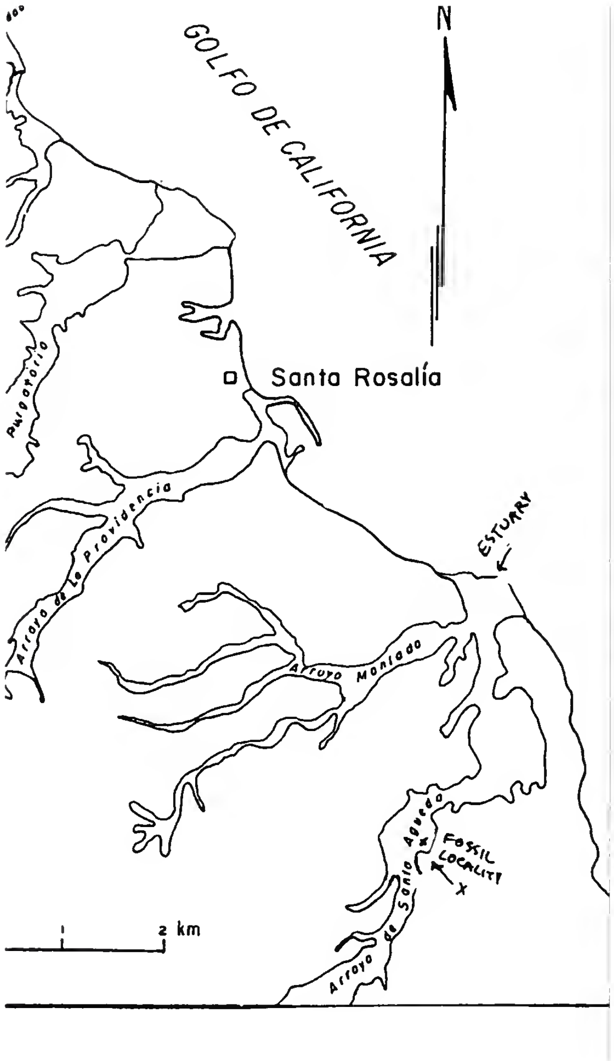


Figure 2. Map showing fossil site in Arroyo de Santa Agueda near Santa Rosalia (aftaer Quiroz-Barroso & Perrilliat, 1989).

Figure 3. *Leopecten bakeri* (Hanna & Hertlein, 1927), in situ at Arroyo de Santa Agueda.

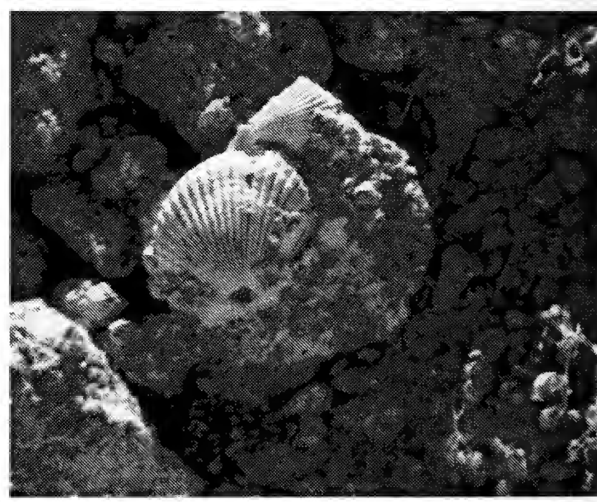


Figure 4. *Argopecten abietis abietis* (Jordan & Hertlein, 1926).

surrounding sandstone matrix. Casts are formed over time as the original shell material is dissolved away by acidic ground water. A shell cast retains the form of the outer surface of the original specimen, and the mold is the material surrounding it (Rugh, 1999). Identification is often difficult when fossil specimens are preserved as interior casts, with no outward form left to identify. Pectinids, on the other hand, have not been so leached. Durham (1950) noted that those pectens not leached contain a higher percentage of magnesium carbonate than the other associated fossils. Therefore, due to better preservation, pectinid identification is easier.

AGE OF FOSSILS AT THIS LOCALITY

Durham (1950), after his 1940 *E.W.Scripps Cruise to the Gulf of California,* considered this locality to be early Pliocene in age and described the San Marcos Formation. He considered the San Marcos Formation to be equivalent to the Imperial Formation of southeastern California. Hanna (1926) had described the fauna of the Imperial Formation and considered the formation to be early Pliocene in age. The Imperial Formation is the oldest late Tertiary marine formation located at the northernmost part of the Proto Gulf of California seaway (Durham, 1950).

Figure 5. View of wall of Arroyo of Santa Agueda from collecting site.

Wilson (1948) established an early Pliocene age for the strata and named it the Infierno Formation. He states that one of the most extensive exposures of the Infierno Formation is in Arroyo de Santa Agueda, and that fossil beds of *Leopecten* characterize it. Déméré & Walsh (1993) refer to the age of the Imperial Formation having been the subject of much debate, but state that it now seems clear that the formation was deposited from late Miocene time through early Pliocene, and possibly into the late Pliocene (approximately 3 to 7 million years ago).

TERTIARY-CARIBBEAN PROVINCE

Woodring (1966) recognized the Tertiary-Caribbean Province as extending from the Caribbean to the Pacific before the mid-Pliocene closure of the Isthmus of Panamá.

The genus *Nodipecten* is well known in the Tertiary-Caribbean Province. It is also present in the Panamic and western Atlantic region. Records indicate that it ranged through the Panamic seaway until its closure. Endemic species of *Nodipecten* appeared in the late Miocene in the Golfo de California. *Nodipecten nodosus* first appeared in the late Miocene or early Pliocene in the Caribbean. *Nodipecten nodosus* dispersed by the late Miocene as far as the central Golfo de California, where it was replaced by *N. subnodosus* by the middle Pliocene (Smith, 1991). Wilson (1955) reports *N. subnodosus* from the late Pliocene Infierno Formation, in "thick fossiliferous buff sandstone, on the southeast side of Arroyo de Santa Agueda, below road to Mulegé, 55 meters above sea level." This description lies within the area that we have collected *N. subnodosus* (Figure 5). Comparison of our specimens with the plates in Quiroz-Barroso and Perilliat (1989) confirmed their identification.

CONCLUSIONS

Fossil assemblages are pieces of the geologic record. It behooves those of us who enjoy the collecting of these awesome natural remains to report on their findings, those to be added to the scientific record.

Table I inventories those fossil casts, molds, and shells that we have collected at the locality under discussion, which is: late Pliocene, Infierno Formation, Arroyo de Santa Agueda, near Santa Rosalia, Baja California Sur, México. Figures 6-18 illustrate some of these interesting specimens.

ACKNOWLEDGMENTS

I am especially grateful to Scott Rugh of the San Diego Natural History Museum, Department of Paleontology, for his expertise and assistance with identifications of the more difficult casts and molds discussed here. Carole Hertz, editor of *The Festivus,* has kindly contributed much guidance in the writing of this article. Both Terry Arnold and Carol Skoglund encouraged this endeavor by recommending pertinent reference books and journals to me. Dave Mulliner did the fine photography in Figures 6-18. Finally, this report would not have been possible without the help of my collecting partner/husband, Bill Schneider.

Table 1 - FOSSIL SHELLS FROM SANTA ROSALIA

The table is arranged in alphabetical order by family under Bivalvia, Gastropoda and Scaphopoda with the nomenclature according to Keen (1971) as updated in Skoglund (2001, 2002) and as noted.

Keen No.	Identification	Remarks
	BIVALVIA	
	ANOMIIDAE	
K223	*Anomia peruviana* Orbigny, 1846	One fragment only, 25 x 25 mm, on *Argopecten abietis abietis.*
K225	*Placunanomia* sp. cf. *P. panamensis* Olsson, 1942	One valve only, 55 x 50 mm; 3 radial plications are not obsolete, but rather strong.
	ARCIDAE	
K79	*Anadara mazatlanica* (Hertlein & Strong, 1943)	Size: 80 x 50 x 45 mm; similar to figure in Keen (1971), but larger.
K90	*Anadara multicostata* (Sowerby, 1833)	
	Anadara sp. indet.	
K67	*Arca pacifica* (Sowerby, 1833)	Common; largest is H 35 x W 95 x D 50 mm.
	CARDIIDAE	
	Laevicardium sp.	8 casts, 45 x 30 mm to 65 x 50 mm collected. "an elongated form not present (?) today in Golfo de California" (*fide* Scott Rugh).
K361	*Trachycardium* sp. cf. *Acrosterigma pristipleura* (Dall, 1901)	One fine and complete cast 120 x 80 x 55 mm; "not a common species" (Keen, 1971).
	CRASSATELLIDAE	
K229	*Eucrassatella antillarum* (Reeve, 1842)	Synonym: *Crassatellites digueti* Lamy. Common; excellent casts, W 75 x H 55 x D 32 mm. Type locality is Isla Margarita, Venezuela.

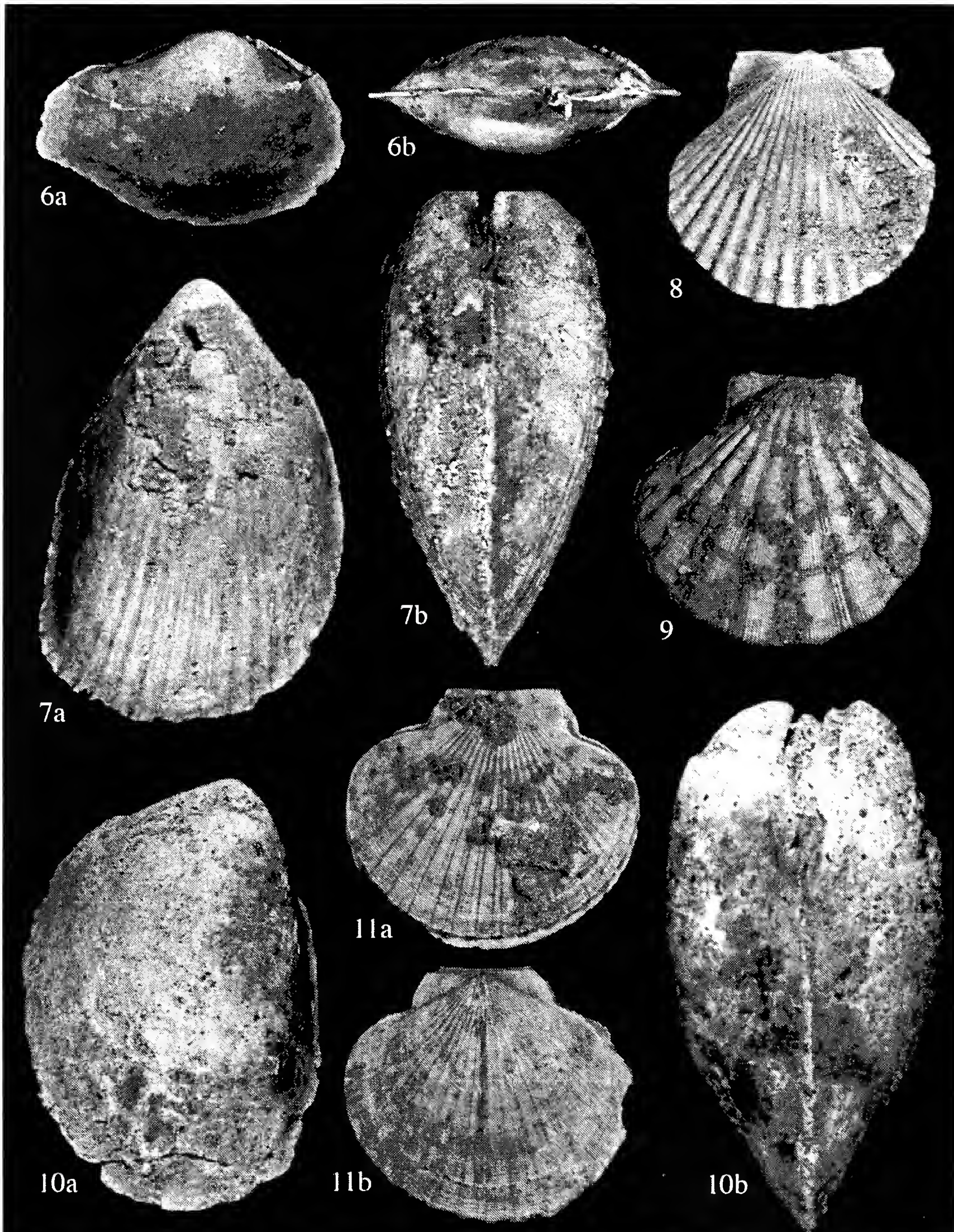
Keen No.	Identification	Remarks
	GLYCYMERIDIDAE	
K110	*Glycymeris gigantea* (Reeve, 1843)	4 casts found; 80 x 80 mm, 53 x 57 mm, 85 x 85 mm, 85 x 85 mm.
	Glycymeris sp. indet.	7 casts, 45 x 45 mm collected.
K117	*Tucetona* sp. cf. *T. strigilata* (Sowerby, 1833)	Margaret Mulliner (2000) reported this species at Isla San Marcos, Golfo de California.
	HIATELLIDAE	
	Panopea sp. aff. *P. abrupta* (Conrad, 1849)	ID in Schneider (1999) by G. Kennedy.
	LUCINIDAE	
K287	*Miltha xantusi* (Dall, 1905)	one cast only, 67 x 71 mm; ID inferred from muscle scars present on fossil cast.
	OSTREIDAE	
K169	*Ostrea conchaphila* Carpenter, 1857	Synonym: *O. lurida* Carpenter, 1864. One valve, 53 x 33 mm.
	Dendostrea vespertina (Conrad, 1854)	One complete pair on *Undulostrea megodon* (Hanley, 1846), 39 x 39 mm; several single valves. Extinct.
	Pycnodonte sp. cf. *P. heermanni* (Conrad, 1855) [generic assignment *fide* Moore, 1987]	130 x 120 mm; only large circular oyster of the Coyote Mountain region (Hanna, 1926). Extinct.
K173	*Undulostrea megodon* (Hanley, 1846)	5 complete casts, ~ 60 x 45 x 40 mm.
	PECTINIDAE	
	Argopecten abietis abietis (Jordan & Hertlein, 1926)	Size: 67 x 68 x 30 mm. Found commonly with both valves; lacks interspaces between ribs. "It is possible that additional collecting at Santa Rosalia (type locality for *Pecten mendenhalli* Arnold) may show that the two species are the same. A few specimens from Arroyo de Gua, north of Loreto, BCS, Mexico are very close to *P. mendenhalli* but the rest are more typical of *A. abietis abietis.*" Durham (1950) Extinct. (Figure 4).
	Argopecten sp. cf. *A. ventricosus* (Sowerby II, 1842)	ID Scott Rugh as *A. circularis.* Common; difficult to distinguish from *A. abietis abietis.* The Santa Rosalia specimens are not greatly convex as *Pecten gibbus* in Grant & Gale (1931, pl. 5).
K181	*Euvola vogdesi* (Arnold, 1906)	One specimen, both valves, encased in matrix, 50 x 50 x 20 mm.
K202	*Nodipecten subnodosus* (Sowerby, 1835)	Only one complete specimen 90 x 95 x 30 mm, resembles Durham's pl. 11, p. 156.
K202	*Nodipecten* sp. cf. *N. subnodosus* (Sowerby, 1835)	Only one complete specimen 95 x 110 x 45 mm; 4 flanges culminating in flared nodes on each valve; 10 ribs on each valve.
	Leopecten bakeri (Hanna & Hertlein, 1927) [generic assignment *fide* Moore, 1984]	Complete specimens abundant in pecten reef. Size 115 x 130 x 20 mm; the left valve is about one-twentieth larger than the right. " *Pecten caurinus* is type species of *Patinopecten*" (Smith, 1991). Extinct.
	Pecten sp. indet.	One 18 mm flat valve with 23 ribs with concentric lamellae.

Keen No.	Identification	Remarks
	SOLECURTIDAE	
K614	*Solecurtus* sp. cf. *S. guaymasensis* Lowe, 1935	
	Tagelus sp. indet.	
	THRACIIDAE	
K766	*Cyathodonta undulata* Conrad, 1849	One only, W 38 x H 27 x D 15 mm.
	VENERIDAE	
K444	*Chione tumens* (Verrill, 1870)	Common, casts of 2 forms were found, some smooth-sided, others exhibited at least 6 spiral ridges.
K427	*Dosinia ponderosa* (Schumacher, 1817)	2 complete casts 80 x 80 mm & 90 x 90 mm plus one interior mold showing coarse concentric sculpture which would probably measure 110 mm W.
	Veneridae sp.	Genus and species not known (*fide* Scott Rugh).
	GASTROPODA	
	BUCCINIDAE	
	Buccinidae sp.	Single cast, 40 x 14 mm.
	Cantharus sp. indet. #1	2 fragments only.
	Cantharus sp. indet. #2	3 fragments only
	BURSIDAE	
	Bursa sp. indet.	3 specimen fragments ~ H 30 x W 19 mm.
	CALYPTRAEIDAE	
K825	*Crucibulum scutellatum* (Wood, 1828)	Attached to shell of *Leopecten bakeri* are as many as 4 of these individual casts. Grant & Gale (1931) list *C. imbricatum* (Sowerby), a synonym of *C. scutellatum* from the Pliocene of Isla Coronado, Golfo de California, México.
	CANCELLARIIDAE	
	Cancellaria cf. *C. arnoldi* Dall, 1909	"Type locality is San Diego Well, Pliocene" (Grant & Gale, 1931). Extinct.
K1452	*Cancellaria obesa* Sowerby, 1832	
	Cancellaria cf. *C. tritonidea rapa* Gabb, 1866	"Type locality is near Coalinga, California, Pliocene" (Grant & Gale, 1931). Extinct.
	CASSIDIDAE	
K948	*Semicassis* cf. *S. centiquadrata* (Valenciennes, 1832)	Abundant casts, largest 70 x 55 mm.
	CONIDAE	
K1396	*Conus* sp. cf. *C. arcuatus* Broderip & Sowerby, 1829	Numerous casts, 25 x 15 mm.
K1511	*Conus* sp. cf. *C. fergusoni* Sowerby, 1873	A single nearly complete cast - 50 x 30 mm.
K1507	*Conus regularis* Sowerby, 1833	Single specimen; a cast within the mold of the shell; outer shape thereby revealed.
	Conus sp. indet. #1	3 small conical casts, 15 x 10 mm.
	Conus sp. indet. #2	3 conical casts, 15 x 10-12 mm.

Keen No.	Identification	Remarks
EPITONIIDAE		
K670	*Amaea brunneopicta* (Dall, 1908)	Size: 35 x 20 mm, 3 whorls only; thin shell material intact over most of cast; cancellate sculpture.
K625	*Epitonium cedrosense* Jordan & Hertlein, 1926	Pliocene. Synonym: *E. minutocostatum (*De Boury, 1912). One fragment of shell material mostly embedded in the sandstone matrix.
FASCIOLARIIDAE		
K1340	*Fusinus dupetitthouarsi* (Kiener, 1840)	7 partial casts, largest diameter 53 mm.
K1324	*Pleuroploca princeps* (Sowerby, 1825)	One specimen only, a cast of its spire lacking the apex. H 125 mm, W 90 mm. This was difficult to identify, but the worn nodes on the shoulder of the body whorl of this specimen match nodose sculpture on interior of body whorl of *P. princeps*. "Hanna has recorded this species from the lower Pliocene Imperial Formation" Durham (1950).
FICIDAE		
K952	*Ficus ventricosa* (Sowerby, 1825)	7 casts, largest diameter 55 mm. "Found in the Pliocene of Coyote Mountain, Imperial Co., California" (Grant & Gale, 1931).
FISSURELLIDAE		
K27	*Lucapinella eleanorae* McLean, 1967	Resembles Keen's figure and the dimensions given L 18 x W 11 x H 3 mm; 2 specimens collected, taller one 5 mm H. Finely cancellate sculpture, crenulate margin all around, not just in the ends within as in Keen (1971).
MURICIDAE		
K980	*Chicoreus erythrostomus* (Swainson, 1831)	Numerous casts. Aid in identification from casts of varices; exposed were worn knobs of spines and numerous fine raised threads running parallel to the knobs.
K1076	*Stramonita biserialis* (Blainville, 1832)	One cast only, incomplete ends, 65 x 40 mm.
K977	*Vokesimurex lividus* (Carpenter, 1857)	A single impression in clay taken from an exterior mold of this shell identifies it.
	Vokesimurex sp.indet.	A single cast in matrix, 45 x 20 mm with incomplete long canal.
NATICIDAE		
K870	*Natica* cf. *broderipiana* Récluz, 1844	
K888	*Glossaulax reclusiana* (Deshayes, 1839)	
	Eunaticina lewisii (Gould, 1847)	5 large casts, the largest 60 mm W. A Californian Province species. "Appears in the Pliocene of several California localities" (Grant & Gale, 1931).
	Polinices sp. indet.	A single partial cast, embedded in sandstone matrix within an *Argopecten*.
K891	*Sinum* sp. cf. *S. grayi* (Deshayes, 1843)	One specimen only – diameter 60 mm, embedded in sandstone matrix.

Keen No.	Identification	Remarks
	OLIVIDAE	
K1370	*Agaronia testacea* (Lamarck, 1811)	Size: 52 x 22 mm typical, moderately common. According to Keen (1971) they live highest up on the beach, confirmed by our observation at El Golfo, Sonora, México.
K1365	*Oliva* sp. cf. *O. spicata* (Röding, 1798)	Common, typically 30 x 16 mm.
	Olivella sp. indet.	A mold of the exterior of an *Olivella*-like spire, diameter 25 mm. Seems very large for *Olivella*.
STROMBIDAE		
K607	*Strombus gracilior* Sowerby, 1825	2 fairly complete casts.
K608	*Strombus granulatus* Swainson, 1822	4 casts, one fairly complete.
TONNIDAE		
K942	*Malea ringens* (Swainson, 1822)	Largest specimen, 125 x 97 mm. Spire is higher than modern counterpart. 13 collected; most ~ H 60 x W 45 mm.
TURRIDAE		
	Knefastia sp.	Cast of 3 whorls only.
TURRITELLIDAE		
K440	*Turritella* sp. cf. *T. leucostoma* Valenciennes, 1832	Many complete casts of coiled whorls, typically 40 mm H. Diameters 4-12 mm; very common.
K449	*Vermicularia pellucida eburnea* (Reeve, 1842)	Several specimens of cast coils, diameter of tube from 5 to 8 mm (excluding shell).
VERMETIDAE		
	Xenophora sp #1	One cast only of 2 whorls, 41 x 17 mm.
	Cf. *Xenophora* sp. #2	One cast only of 3 whorls, 55 x 35 mm.
SCAPHOPODA		
	DENTALIIDAE	
K2	*Dentalium neohexagonum* Sharp & Pilsbry, 1897	One fragment, 2+ mm diameter.

Figures 6a - 11b.
6 a, b . *Eucrassatella antillarum* (Reeve, 1842), 66 x 43 mm **(a)** view of right valve **(b)** umbonal view.
7a, b. *Acrosterigma* cf. *A. pristipleura* (Dall, 1901) 120 x 80 x 55 mm **(a)** right valve **(b)** profile view.
8. *Argopecten abietis abietis* (Jordan & Hertlein, 1926), right valve, 50 x 52 x 22 mm.
9. *Nodipecten* cf. *N. subnodosus* (Sowerby, 1835), 95 x 110 x 45 mm, right valve.
10a, b. *Laevicardium* sp., 50 x 34 mm **(a)** view of left valve **(b)** profile view
11a, b. *Leopecten bakeri* (Hanna & Hertlein 1927), **(a)** 115 x 130 x 20 mm, right valve **(b)** same species, 117 x 130 x 25 mm, left valve.
Photos: D.K. Mulliner.➜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6b
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10b

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Figures 12a - 18.

12a, b. *Cancellaria* cf. C. *arnoldi* Dall, 1909, 20 x 14 mm, **(a)** apertural view **(b)** abapertural view.

13. *Amaea brunneopicta* (Dall, 1908), 35 x 20 mm, view of three whorls only.

14 a, b. *Lucapinella eleanorae* McLean, 1967, 18 x 11 x 3 mm, **(a)** interior view **(b)** exterior view.

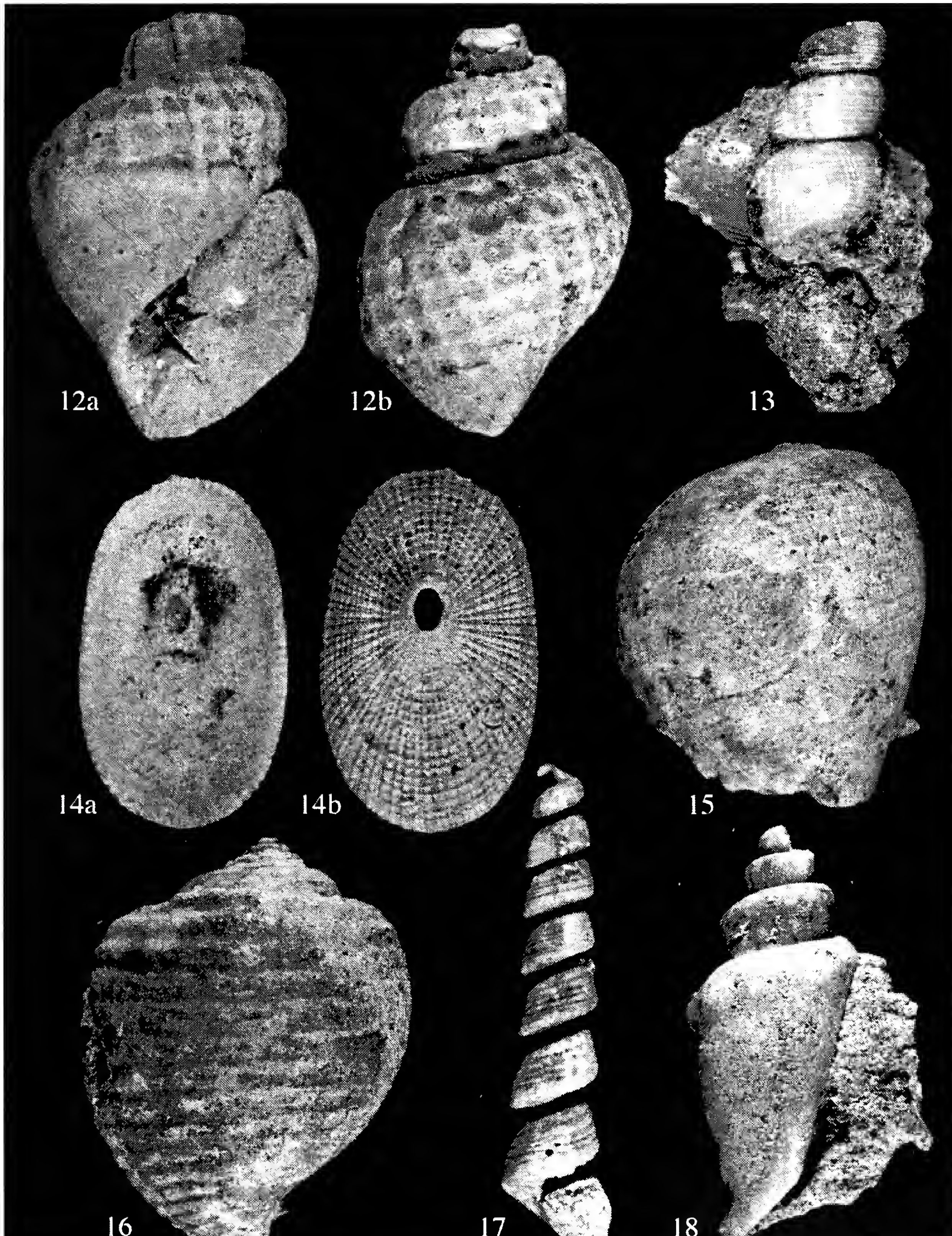
15. *Ficus ventricosus* (Sowerby, 1825), 46 x 55 mm, abapertural view.

16. *Malea ringens* (Swainson, 1822), 58 x 45 mm, abapertural view.

17. *Turritella* cf. *T. leucostoma* Valenciennes, 1832, 55 x 11 mm, abapertural view.

18. *Strombus granulatus* Swainson, 1822, 28 x 59 mm, apertural view.

Photos: D.K. Mulliner.➜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NOTES CONCERNING RECENT AND FOSSIL NERITOIDEA, 31* ON THE ALLEGED OCCURRENCE OF *NERITINA ZIGZAG* LAMARCK IN THE PLEISTOCENE KERE RIVER OUTCROPS, SANTO, NEW HEBRIDES

HENK K. MIENIS

National Mollusc Collection, Berman Building, Dept. Evolution, Systematics & Ecology
Hebrew University, IL-91904 Jerusalem, Israel
and
National Mollusc Collection, Zoological Museum, Tel Aviv University, IL-69978 Tel Aviv, Israel
E-mail: mienis@netzer.org.il

Robinson (1969: 28, pl. 3, figs. 2-3) reported three somewhat worn shells identified as *Neritina zigzag* Lamarck, 1822, Fam. Neritidae, from outcrops of the Kere River, Santo Island, New Hebrides. These Pleistocene shells were considered to constitute the first fossil record of that species on Santo.

Unfortunately Lamarck's name: *zigzag*, or its invalid spelling *ziczac*, has been misused for various, completely different freshwater nerites living in widely separated zoogeographical regions throughout the Indo-Pacific and even the New World. The only similarity of these different species is a dark zigzag-pattern on a lighter background, a common feature among freshwater nerites.

Mermod (1953: 135, fig. 157) figured the type specimens of *Neritina zigzag* Lamarck, 1822. A study of his figures and a personal inspection of the syntypes in the Natural History Museum of Geneva revealed that Lamarck based his description on worn, in part even crabbed, specimens of another freshwater nerite, which he described in the same work as *Neritina gagates*. The latter description was based on much better preserved specimens, which have been re-figured also by Mermod (1953: 137, fig. 158).

Problems concerning the origin of Lamarck's type material: Antilles (?) for *Neritina zigzag* and "unknown" for *Neritina gagates*, has contributed considerably to the confusion surrounding the true identity in the case of *Neritina zigzag*. However, the name *gagates* had been correctly applied at a rather early stage to a freshwater species known to have a restricted distribution on Madagascar, Mauritius, Rodriguez, Réunion, Seychelles, and Comores (Starmühlner, 1969: 69). The correct name for that species reads now *Vittina gagates* (Lamarck, 1822), of which *Neritina zigzag* Lamarck (not of most authors) has to be considered a synonym.

The shells figured by Robinson from the Pleistocene outcrops of the Kere River are therefore incorrectly identified. His figures indicate a species belonging to the genus *Clithon* Montfort, 1810. In fact his specimens agree in full detail with the shell figured by Reeve (1855: pl. 26, fig. 145b) as *Neritina souleyetana* Récluz, 1842, of which the current name reads *Clithon (Clithon) diadema souleyetana* (Récluz, 1842). Riech (1937: 82) had already reported this species from freshwater streams in the New Hebrides.

Because Robinson's material of *Clithon diadema souleyetana* (as *Neritina zigzag*) from Station SM 242, Kere River, Santo, New Hebrides, constitutes the only fluviatile element among the otherwise marine species reported from the local Pleistocene outcrops, it is more likely that *Clithon diadema souleyetana* is most probably living in the Kere River and that some Recent specimens have contaminated the fossil layers along its banks. *Neritina zigzag*, in reality *Clithon diadema souleyetana*, has therefore to be removed from the list of Pleistocene molluscs occurring in the outcrops of the Kere River until the opposite has been proven.

A similar situation: a single fluviatile neritid species [*Clithon rugata* (Récluz, 1842)] contaminating a marine late Pliocene to early Pleistocene marl cropping from the right bank of the Bahay River, Luzon, Philippines, has been exposed by Mienis (1980: 95).

This study was carried out while staying at the Zoological Museum of Amsterdam with the help of a Large-Scale Facility grant awarded by the European Community.

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