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IN THIS ISSUE

FRONT COVER:
Microstelma oshikatai **Lan 2003,**
(specimen 15 mm, from Philippines)
Photo by Somwang Patamakanthin
BACK COVER:
Photo by Somnuek Patamakanthin

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HAPPY NEW YEAR 2005

From The Editor's Desk,

Yes, we survived the tsunamis. I was fortunate to have selected a place to settle that was not only quiet, but protected from the open sea by a large cape and offshore islands. I am going to present here three short articles I posted on our website prior to and after the disaster.

The photo of yours' truly that graces this page was taken by Dr. Robert Robertson at the joint meeting of the American Malacological Union and the Western Society of Malacologists in San Diego, California. The year was 1975.

It appears that our magazine is now the lone "popular" type shelling magazine. After 35 years, La Conchiglia, has ceased publication. Sad to see and it's rather lonely out here all by ourselves.

Please go to page 283.

Tom Rice

Tom Rice, Editor


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Shelling on Bahia de Kino

JOYCE MATTHYS

Sunday, October 17 – On Our Way

It was the first shelling expedition outside the United States for four of us and our expectations were high as we boarded our plane in Portland, Oregon. Our destination was Bahia de Kino, Sonora, Mexico. Oregon Society of Conchologists members Mark and Barb Reekie had previously visited Kino and had planned this trip. Club members were invited to join them. My husband Ken and I jumped at the chance to collect some new species and another Salem couple, Larry and Carolyn Wacker, rounded out our "six-pack."

Knowing that we would be in 90 degree plus temperatures later in the day, the six of us braved the cool Oregon 5:00 AM temperatures in attire more suited to Bahia de Kino, Sonora, Mexico.

All adventures have to have a beginning and our starting point was boarding our plane. On the plus side, the plane was said to be one of the fastest small jets in the air. On the down side, anyone over 6'2" had to walk down the aisle with their head tilted to the side or they would scrape the ceiling. The seats were seemingly designed for passengers who are either anorexic or long term followers of the Adkin's Diet, Once we got into them, they felt like pieces of plywood covered with a folded bath towel, a thin bath towel at best. They had a slight forward and downward tilt giving one the sensation that in case of a quick stop you'd slide to the floor. That is, of course, if it weren't for the fact that the seat in front of you was so close you couldn't slide anywhere even if you wanted to. Heaven forbid that you should try to cross your legs. Since we returned home I read an article in the newspaper talking about the planes smaller airlines are using. They mentioned some of these same problems.

Kino Bay shells shown on page 220

#1 *Pecten vogdesi* (Arnold, 1906) 76 mm
#2 *Laevicardium elatum* (Sowerby 1833) 150 mm
#3 *Chione gnidia* (Broderip & Sowerby 1829) 52 mm
#4 *Megapitaria aurantiaca* (Sowerby, 1831) 78 mm
#5 *Dosina ponderous* (Gray, 1838) 154 mm
#6 *Hexaplex nigritus* (Philippi, 1845) 160 mm
#7 *Oliva incrassata*(Lightfoot, 1876) 80 mm & 86 mm
#8 *Turritella gonostoma* (Valenciennes,1832) up to 146 mm
#9 *Polinices reclusianus*(Deshayes,1839 up to 56mm
#10 *Strombus granulatus* (Swainson,1822) up to 76 mm
#11 *Conus princeps* (L., 1758) 54 mm

We changed planes in Phoenix and found to our delight that this smaller, slower, "prop job" had comfortable leather seats and leg room, but a stewardess who was either bored, over tired, grumpy or in retrospect, maybe all of the above.

We arrived in Hermosillo about noon. It is the capital city of Sonora and is approximately 168 miles south of Tucson, Arizona and Bahia de Kino is 50 miles west of the Hermosillo international Airport. The airport security system was different from any I had seen before. Each incoming passenger waited his or her turn in line. When you reached the front of the line you pushed the button on a gadget with two lights, one red and one green. If the red light illuminated, your baggage was hand checked but if it's green you're free to go. Luckily all of us got green lights and we could proceed to the Hertz rental counter. Shucks, Hertz didn't have our Ford Winstar available and they had to upgrade us to an Excursion. What a break! And, then we were off.

Since Barb just retired from the Army and had driven large Army vehicles, she accepted the appointment of designated driver. I had heard many horror stories about driving in Mexico but I was surprised at how easy and uneventful our whole trip was. The asphalt highway to Kino was a bit rough due to age and damage from rains of hurricane Javier. Three weeks earlier it had dumped 9" of rain in 12 hours on this land that usually doesn't see that much in a year. We limited our speed to about 40-mph, however, we were continually being passed by all sorts of vehicles in various states of disrepair. It was amazing that some of them were even on the road. As we drove along we passed citrus orchards as well as walnut orchards and fields of table grapes. The further west we drove, the more desert-like the countryside became. We did notice that the desert was very green from the recent rains and Mark pointed out the bodies of water we passed that he said had never been there before. Later we would find that the usually pristine beaches had been littered by debris washed out into the Gulf of California from the river flooding.

Bahia de Kino is a town of contrasts. Viejo Kino, "Old Kino" (population approx. 3,500), is a fishing village where the men either are fishermen or work in seafood related jobs. There are a number of seafood companies on the waterfront of this small town. Further down the road, "New Kino" is the vacation destination for people from Hermosillo and retirees from the United States. La Playa Hotel and RV Park is one of the first vacation facilities one sees after leaving "old" Kino. Unlike San Carlos, Kino has not been "Americanized". The only supermarket and bank is 25 miles away in Miguel Aleman better known as Calledoce to the tourists. However, 24-hour emergency health care is available in Kino.

Our accommodations at La Playa RV Park and Hotel (really a motel) were first class. The view of the ocean from each room was spectacular. The large rooms were equipped with a large TV, microwave, refrigerator, coffee maker, and, probably most important, air conditioning. Granted, there was not a thermostat but it kept our room very cool. Mark had described the large bathrooms as having marble walls and floor with a shower that would hold all six of us. He was right, although we left it at that.

Suitcases were unpacked and then it was off to the beach only to discover that it was high tide. With very few shells to pick up, we decided to find a local grocery store to pick up some bottled water and snacks. There are no grocery stores like we are accustomed to shopping in the U.S. Instead, in Kino each neighborhood has its own small store. We drove to one of these neighborhood stores in old Kino. Ken, Barb and Carolyn went in to pick up a few items. They hadn't been in the store long when a Mexican army truck pulled up. Three soldiers armed with AK47's jumped out and went into the store. We were wondering what was going on and were relieved to see them come out within a couple minutes each carrying a bottle of Coke. Our shoppers were so engrossed in their task they hadn't seen them. Speaking Spanish isn't necessary in Kino, but sometimes it helps when you are shopping. When Barb and Carolyn couldn't remember how to say "beer", Ken finally got the message across by pantomiming chugging a drink and then staggering. The clerk immediately knew what he meant and pointed towards a liquor store down the street.

When we returned from our shopping venture we asked Rosie, the La Playa owner, where to go for dinner. She said The Marlin Restaurant in old Kino had the best food in town and promptly made reservations for us. When we arrived at The Marlin we found that reservations certainly were not necessary because there were only a few patrons. We sat down at one of the empty tables but were quickly moved to another table when the waitress came up to us and said, "Rosie?" We answered, "Yes" and were moved to a table with a reserved sign propped up on it. This table had a clean tablecloth opposed to the slightly soiled one where we were previously sitting and it was located right in front of an ancient air conditioner recessed in an exterior wall. Its power source was a dangling wall plug without a faceplate, but it was working and spewed out a welcome coolness on this warm evening. Obviously, it was the best table in the house. The gracious service we received and the good food at very reasonable prices brought us back for dinner on other evenings.

When we left the restaurant we found the streets alive with families out enjoying the cool of the evening. Small eateries or food vending carts are found on every corner and all of them had customers. Adults gathered in clusters over food and drink while children and dogs skittered from one group to another. I watched some children playing a mini version of beach volleyball. In lieu of a net, a long stick was placed on the dirt street. Four rocks marked the corners of the boundaries. Three players on each side of the stick hit a worn ball back and forth responding to the cheers and jeers of their companions on the sidelines.

Monday: Desert Shelling

Even with a foam mattress brought from home to compensate for the traditionally hard Mexican mattress, Barb got up at 4:30 AM after a night of tossing and turning trying to get comfortable. Since it was low tide, she decided not to miss the opportunity so she grabbed her flashlight and headed for the beach. By 6:00 Ken, Carolyn and Mark joined the "beach patrol" but by that time the tide, pushed by onshore winds, had already covered most of the shells. It was decided that this would be a good day to do some "desert shelling" but first we went to Pargo Rojo for breakfast.

The local residents of old Kino eat the meat of murex and discard the shells wherever they please out in the desert. It was our quest to drive the dirt and sand backroads and look for pink and white mounds that were within walking distance from the car. From the size of the shell piles, it appears that the people carry the shells out in five-gallon buckets dumping them an adequate distance from their homes to avoid their stench. We followed dirt roads no more than wide paths that wound their way around the outskirts of the village. We hadn't gotten far when Ken hollered, "Stop!" The bright pink apertures of some murex had caught his eye. It was just what we were looking for and they were right along the side of the road. The shells were a lovely sight. Just what we had been looking for, but there was a problem. Right next to the murex was a big pile of fish guts and skins covered with flies. This smell was a little more than we had bargained for so we grabbed a few shells and moved on.

This would be the first of many stops but probably the most unusual find was right in the middle of the road. The recent heavy rains had washed a three-foot deep gully in the dirt road. As we skirted the edge of the hole, I saw something pink in the bottom so Ken and Carolyn got out to investigate. Evidently some murex had gotten buried under the sand sometime before people started driving there and the recent rains had exposed them. They were free from smell and from weather damage. Ken and Carolyn were down in the gully when a propane truck approached us from the rear. In order to let it by, we had to back up leaving our desert shellers behind. When the truck reached the gully, it stopped. We watched as an attempted conversation ensued. Although the truck driver spoke no English, the language barrier was overcome and the message came through loud and clear. "Follow

me," he motioned and pointing to the murex he extended his arms saying, "Mucho grande!" He waited for Ken and Carolyn to get back into the car and then we were off following the propane truck through the back roads of Kino. Before long we were driving along the waterfront. Suddenly he stopped and motioned to a parking lot where the fishing boats come ashore. There we found huge piles of both pink and black tip murex and he was right. There were many and they were grand!

The men of Kino use pongo boats for fishing as well as for transporting seafood from large commercial shrimp boats that anchor offshore to the seafood companies on the waterfront. These boats are oversized rowboats with good-sized motors. They are launched with the help of family members and friends who push them from the sandy beach into the water. When the day of fishing is done, the boats are run up on to the beach once more. While we were looking at the piles of murex we saw that one of the fishermen and his entourage was having a very difficult time getting his boat from its resting spot high on the sand into the water so Ken and Mark lent him a hand.

I guess it was a case of "one good turn returning another" because immediately after helping with the boat, Mark thought he recognized one of the fishermen in the parking lot. He called out his name. It was Enrique, a Kino resident who had taken Mark out diving for sea cucumbers eight years before. Enrique didn't speak English but his buddy had enough of a vocabulary that Mark was able to communicate that we were looking for someone to take us to Tiburon Island for shelling and fishing. We agreed to meet later in the day at La Playa so we could have Rosie translate for us.

When Enrique arrived at the appointed time, Rosie was not in the office. Luckily we had met a fellow Oregonian earlier in the day who spoke Spanish. Len lives in Albany, but winters in Kino. With his help a deal was made. We gave Enrique 1000 pesos for gas and he agreed to pick us up Wednesday morning bringing his air compressor so he could do some diving for lobster and scallops.

That afternoon everyone, except for Mark and Ken, decided to put their feet up and relax. They decided to do some shelling and took off for Red Rock Beach about three or four miles from Kino. It is only accessible by a road that would probably have been more appropriate for someone with four-wheel drive. After driving at 5 mph or slower the whole way the only thing that they found were a few nerites.

Our Oregon interpreter Len also became our resource person on how to get to another of our destinations, Sand Dollar Beach, about 50 miles from Keno. After giving us directions, Mark asked if he had a tide chart to which he replied, " Let's check the Internet." Would you believe that out there in the middle of nowhere the RV park has fiber-optic Internet connections. We decided that the reason was because the park owner is the magistrate for the county, mayor and head of the police department

Our breakfast at Pargo Rojo had been so good, we decided to return for dinner.

Tuesday: Shelling the Sonora River Estuary Beach

Alarms were set for 5:00 AM so we would be ready to leave for the estuary of the Sonora River at 5:45. It was too early for the restaurants to be open so we just snacked on whatever we had on hand. Thank heavens for the coffee and coffee maker provided by the motel.

It was just getting light when we arrived at the beach where the river empties into the Gulf of California. We watched as the red, yellow and pink sunrise silhouetted unending flocks of birds flying past us on their way to the estuary mudflats. The only sounds heard were the motors of the pongo boats heading out into the gulf and the gentle lapping of the water on the beach. We had been told about the abundance of shells there and we were not disappointed. It was here that we found *Turritella leucostoma, Turritella goniostoma, Turritella cooperi and Turritella anactor.* In many places they were so plentiful that you could barely see the sand underneath them. I'd been told that this area is the "cup and saucer limpet capital of the world" and we found many *Crucibulum scutellatum, Crucibulum spinosum and Crucibulum scutellatum.* In fact, I got some great video clips of one limpet feeding. Beautiful cones were also abundant including a number *of Conus perplexus* and *Conus purpurascens.* Ken found one *Architectonica nobilis* and we found a number of *Agaronia testacea*. Carolyn kept her special shells in her fanny pack. One of these was a beautiful *Agaronia testacea.* When we were heading back to La Playa Carolyn happened to open her pack for some reason or another. Immediately the van filled with an odor that shellers can identify in an instant. Although her *Agaronia testacea* was a beautiful specimen, it obviously had the remainders of its body inside

The afternoon found Mark and Barbara trying to exchange some of their U.S. dollars for Mexican currency. They discovered that neither Kino nor Calledose, a larger town about 25 miles away, had a bank where the change could be made. The rest of us stayed at La Playa to clean shells and loaf.

We tried a new restaurant for dinner. Jorge's seemed to be where the snowbirds gather. It was apparent that the customers were regulars who had just returned from the north. The dinner special came with a free marguerita so that was our choice. Those of us who don't drink margueritas passed them on to

someone who did. The evening was made even more meaningful when Jorge got out his guitar and serenaded us. His voice was excellent.

Wednesday: Shelling and fishing on Isla Tiberon and Isla Pelicano

Alarms set for 6:00 AM; breakfast at Pargo Rojo's as soon as the doors opened at 7:00; and back to La Playa to meet Enrique at 8:00, that is how our day started. Armed with life jackets that we had brought from home, some snacks, water, a couple of borrowed fishing poles and Mark's Spanish dictionary, we headed for the beach and Enrique's pongo boat. He picked us up right in front of La Playa. Remarkably, Enrique was always early or on time whenever we made arrangements to meet him. Much is said about "Mexican time" but Enrique certainly did not follow that clock. The boat, about 26 feet long and 7 feet wide, had seats that were only about 8 inches wide. A piece of plywood had been cut to fit over the space between two of the middle seats creating a wider section that was a bit more comfortable.

We crawled into the boat one at a time. That, in my opinion was no easy task. The sides of the boat were a bit tall for my short legs. It took me a couple days to figure out how I skinned my knee. After we all got in and pushed off there was only one thing left to do – shift the 75hp motor into high gear and go full speed ahead for about an hour. That is how long it took us to reach Tiburon, the largest island in the Gulf of California. At one time a cannibalistic tribe of Indians called the Seri's inhabited the island. They were moved to Punta Chueca on the mainland by the government in 1927 because Mexican fishermen kept disappearing while out fishing. Now the Seri tribe makes and sells seashell necklaces and beautiful carvings from the wood of ironwood trees. And now the island is a preserve and a shelter for wild sheep, mule deer and all kind of animals that dwell in the desert of Sonora. As we arrived at the first headland of Tiburon, the osprey soared high overhead. Blue-footed boobies, cormorants, pelicans and many other shore birds splashed about on the rocky shoreline and welcomed us to their island as did curious sea lions.

Enrique came prepared to dive so that meant that the back of the boat had more gear than it would if we had been just going for a ride. A web of ropes held a 2'x 6' board to the last seat of the boat. Bolted to this board was a Honda motor and a compressor. The belt between the motor and the compressor was kept tight by a piece of a tree limb jammed between the two. A beer keg served as the air tank. It had a pressure gauge but was devoid of any type of filtration. We learned later that many of the men die of lung disease which probably relates to the contaminated air they breath while they are diving. The air hose connected to Enrique's regulator consisted of various types of tubing connected to each other in a mysterious manner using string and, I would presume, some type of adhesive.

Before we reached the beach where we wanted to shell, Enrique stopped the motor and donned his wet suit and diving gear. After making the sign of the cross, he jumped into the water and for the next hour he trudged on the bottom of the Gulf in search of lobster, scallops, and fish for fishing bait. Shortly after he entered the water, Mark decided to snorkel and see what he could find. Instead of being the hunter, he became the victim of a number of jellyfish. By the time he swam back to the boat he had numerous stings on his arms and legs. Luckily Carolyn had some Benadryl with her and it seemed to help. Enrique returned with eight lobsters, twenty scallops and a couple of fish that he had speared and then we were on our way again heading for a beach where we could shell while Barb and Larry could fish.

From a distance the beach we were heading for looked broad and sandy but as we approached we discovered that is was covered with rocks and stones. Not a good place to find shells. Mark dug out his dictionary once again to find how to say sand not rocks. After ten minutes going full throttle again, we landed on a sandy beach on a point of land. The shellers departed and the boat headed around the point into a bay to do some serious fishing. Being one of those who were left on the beach, I can not attest to who caught what but every now and then we would hear some hooting and hollering. I guess that would have been when Barbara caught "the big one that got away". After collecting on the first beach, Ken and Mark walked across the point of land to the beach on the other side. There were piles of empty shells, and, some not so empty freshly dead fragrant ones. We left Tiburon with *Stombus granulatus*, *Strombus gracilior*, *Columbella strombiformis, Trivia solandei, Cypraecassis coarctata, Cassis flammea, Turbo fluctuosus, Conus princeps* and many others.

As the afternoon wore on, the wind picked up and before long white caps were visible in the Gulf. It was time to head back. Luckily we did not have to head into the wind but rather it was coming from behind us at about 45 degrees. Even under these circumstances it was a bit of a bumpy ride. I was sitting in front and when I looked towards the back, there was Larry with hardly a dry spot of clothes on him. Every time we came off a swell, he would get sprayed.

No boat trip would be complete without stopping on Alcatraz Island, or, Pelican Island as it is also called because of all the pelicans that roost there. It is the island you can see from our rooms. When we got out to look for more shells, Enrique and his helper brought the fish ashore and started to clean them. Instead of a filet knife, he had a very rigid, old, dull butcher knife that he proceeded to sharpen on the rusty

Ken desert shelling in one of the hundreds of piles

Sunrise shelling where the Rio Sonora meets the Sea of Cortez

Ken barganing with Seri Indian on a seashell piece of ironwood

Headland of Isla Tiburon on southeast side

Walking the tidelines of Kino Playa

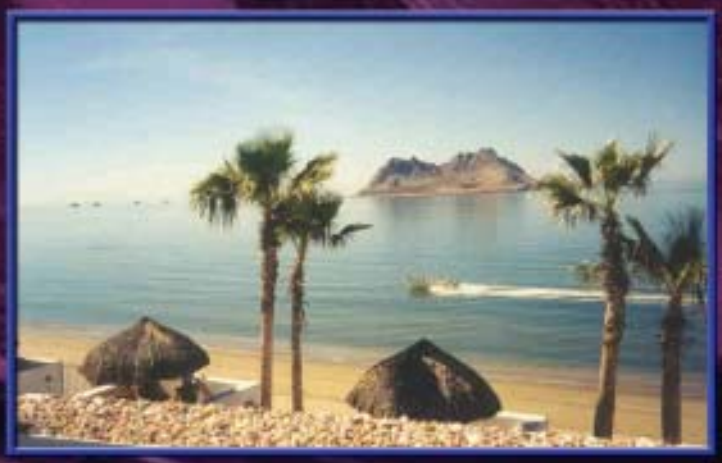
Alphonso's shellshop

Alphonso's grinding wheel

Ken and Carolyn at Trampar's shellshop great bargains

Joyce and Mark enjoying Mexican Lobster

Judy Stoll's shellshop

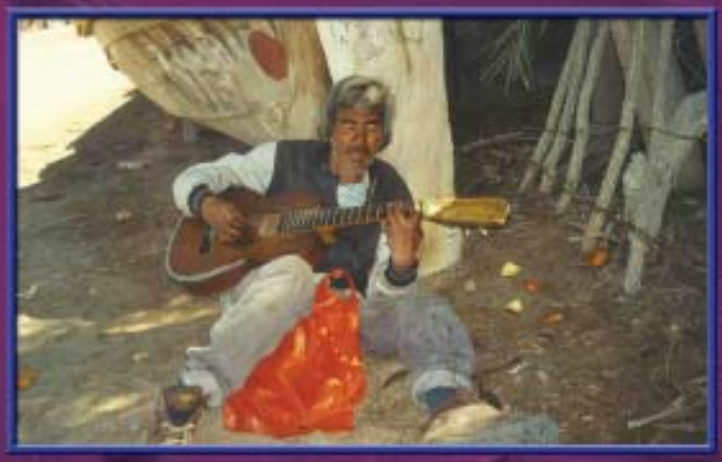


Pelicano Island and Bahia Kino, smooth as glass

Turritellas waiting for you

Camarone(shrimp) boats are rusty but colorful.

Pelicans, Pangas and good times



Happy Go Lucky playing his musica

Another day of shelling in paradise comes to an end

boat anchor. An old kitchen appliance that I believe may have been a small refrigerator had washed up on shore and was lying on its side. The exterior cover was missing but there were enough metal braces exposed for it to serve as a table. That is where the fish were filleted. I managed to find a couple of plastic bags to put the fish in because flies were everywhere. Once again our quest for good specimens was successful with us picking up beautiful colored *Heterodonax bimaculatus* and some *Bulla gouldiana.* We kept some of the fish and all the lobster for a potluck dinner we were having with RV'ers at La Playa later that evening and gave the rest of the fish and all the scallops to Enrique for his family. Then it was a matter of riding back to La Playa, hitting the beach and then hitting the showers. Never has a shower felt so good !

There were about 12 of us for dinner, that is if you don't count the thousands of flies that joined us. We were told that this two-week-long hatch of small flies only happens in October and March. Supposedly they live only about five hours, but that is long enough to drive a person absolutely nuts. They are in you hair, on your face, and, they even get behind your glasses. The good news is that they disappear when the sun goes down. The bad news is that is when the mosquitoes come out. At least mosquitoes react to insect repellant.

The snowbirds that we met at La Playa were from New Mexico, Washington and Oregon. They brought chairs, tables, snacks, a salad, rice and shrimp. We furnished the lobster and fish. Since we had no utensils, the RV'ers brought an electric frying pan for the shrimp, a deep fat fryer to use for boiling the lobster, and a George Foreman grill to fry the fish. It was like a three-ring circus, but fun. I drank my first Tecate!

Thursday: Sand Dollar Beach & San Carlos

We were up at 5:00 again so we could be at Sand Dollar Beach by dawn and the low tide. Since it was about 50 miles away there was no time for breakfast just coffee and snacks that we had brought from home.

We had directions to the beach, Punta Banda, but they were a bit sketchy at best. We had been told that we would be driving through a couple of villages that were poorer than Kino and this was very true. One of the villages, Sahuimaro, was right on the beach where we went to shell. It consisted of four or five homes. I refer to them as homes instead of houses because some were no more than sheds or lean-to's. A common building had "banyos" painted in huge letters on its wall and I suspect was the community bathroom and water storage area. While we were there, a tanker brought in their water supply. A large open structure with a thatched roof created a shady area where children were playing and a dog was getting its turn swinging in a hammock. I don't really know how excited the dog was about that.

I always seem to bring up the rear when we are walking down the beach so I can take pictures and video. I probably have more pictures of peoples' backsides than anyone else. This time I was joined by three little girls from the village. I had been told that sometimes they like to help you look for shells in exchange for some cookies or crackers. In anticipation of this happening, I had put some snacks in my backpack. I used my limited knowledge of Spanish to carry on a bit of conversation and after a while offered them some peanut butter cracker sandwiches. They were delighted and from that moment on they were bringing me all sorts of shells, most of which were discarded after I got home. Carolyn was smarter than I was. She showed them what she was looking for and they would find that specific shell if they could..

As you might expect, the beach gets its name from the sand dollars that can be found there, but we did find more than just sand dollars. Among the species we brought back were *Megapitaria aurantiaca, Pododesmus marcroschisma, Olive incrassata, Neverita reclusianus and Dosina ponderosa.*

The second objective of our day was to get some money exchanged. This meant driving to San Carlos which was 40 or so miles beyond where we had been shelling. Unlike Kino, San Carlos is a very Americanized town. All the houses are modern as are the businesses. When we finally found a restaurant where we could get a late lunch, we found that the prices here were higher, obviously reflecting the more affluent community.

It was late in the day before we got back to Kino. We decided to go to The Marlin for dinner again. Once again we had "the good table" by the "almost efficient" air conditioner.

I'm developing a taste for Tecate and had one for dinner.

Friday: Sonora River Estuary Beach shelling, the second time

Another 5:15 AM wakeup so we could be down to the river by 6:00. Barbara had to stay at La Playa and wait for an anticipated telephone call that she never received. First the office wasn't open and when it did open, the girl taking Rosie's place couldn't speak English. It was a day of frustration for her.

We experienced another beautiful Mexican sunrise. What a great morning! We varied our shelling routine somewhat. The plan was that we would walk towards La Playa and Larry would drive the car back a couple miles in that direction and then meet us on the beach. Mark decided to walk even further. While we

were walking we saw evidence of damage from the 2003 hurricane that hit Kino. The soil had been washed away from a number of beachfront homes, leaving them with stairs leading to nowhere and, in one case, the whole exterior wall towards the water was gone. It didn't appear that anyone had made an attempt to repair the damage. Mexican soldiers occupied one of these homes. Their troop trucks and a speedboat sat in the driveway while a large pongo boat with the Mexican government logo painted its side was beached below the house.

Further down the beach we watched a woman and a man in a boat not far off shore. The woman was doing all the work pulling up the crab traps to check them. I thought it was a bit unusual that the man was rowing the boat and the woman was doing the pulling. Later when they came ashore we saw that the man was walking with crutches because he had only one leg.

It was 9:30 by the time we returned to our rooms. There is always the question of what should be cleaned first, the seashells or us. At any rate, I knew it would be a while before we went for breakfast so I decided to take the edge off my hunger pangs with some chips and, of course, Tecate. Having never drank a whole beer before in my life, having one for breakfast was a bit out of character.

It was eleven o'clock before we made it to Pargo Rojo for a late breakfast. By now we all knew how to order our favorite morning meal. Two hot cakes, two eggs and two slices of bacon are "dos por dos por dos". By now the waiter knew who drank coffee, who has bottled water and that Mark drinks tea. We all sit in the same chairs and generally order the same thing every day. After breakfast, Ken decided to buy a couple of iron wood sculptures of seashells, but not until after doing a bit of traditional bargaining. We watched a young man as he wove a hammock, making it look so simple that you'd think that anyone could do it. Then we were off to look for Clorox, the pancake mix they used at the restaurant, and the Tiendita del Mar shell shop. The shop had not been open since May, but we were told that the owner's husband had an outdoor restaurant in new Kino. While Mark talked to him, we visited across the back fence with a fellow who eats breakfast where we do, but evidently is working in this other one.

Our tasks completed, it was back to La Playa to work on the shells we had found before we went out to buy more shells. Driving through town earlier, we had found Alhponso's shell shop. If you can see through the layers of dust and dirt on the shelves, or dig through some of the cardboard boxes of shells on the floor you just might find something you want. Because of the dirt streets, the barren dirt yards and because the shop is open to the street, dusty merchandise is the norm. Alphonso has created hundreds of shell figures, creatures, ornaments and wind chimes but "the good stuff" was in buckets and boxes in his back yard. It was here that he sat down to a grind stone and demonstrated how he takes the top layers of debris off of shells before putting them in Clorax. With shell dust billowing from the grinder, I couldn't help but wonder how much of this dust he has inhaled throughout the years and what his lungs must look like.

We had passed another shell shop earlier in the day, but it had been closed. Now when we drove past again it was open. Just what we need – more shells. Barb, Larry and I opted to stay in the van while Ken, Carolyn and Mark (the serious shellers) entered the inner chambers of this local's cache. Goodness, only one more shell shop to hit. Judy will have it open for us at 4:30 tomorrow afternoon.

Dinner tonight found us again at Jorge's, but to our disappointment Jorge was not there. The food was good, but the musician providing the evening's entertainment played like he was half-asleep and had the personality of a piece of kelp. I guess you can't have everything.

Saturday: Shelling trip to an unknown destination

At the conclusion of our Wednesday shelling trip to Tiburon, Mark and Barb asked Enrique if he could take us out again on a half-day trip. We could see what appeared to be a nice sandy beach across the bay on the other side of Alcatraz Island and thought it would be a good place to check out. When we were in San Carlos on Thursday, Larry had purchased some additional fishing gear to supplement the meager equipment that they had used on the first trip. Now we were "loaded for bear" in the fishing department.

We set our pickup time for 8:30 so we would have time to go to breakfast before we left on this last venture. By the time we returned from, you guessed it, Pargo Rojo, Enrique was ready and waiting for us. Gear, water and a few snacks were collected and we headed for the boat. The water was absolutely still. It was like a mirror and when the motor was shoved into full throttle we literally skimmed over the surface.

Enrique had a new sidekick, but he didn't speak any more English than his boss. Mark didn't think it was necessary to dig out the dictionary so he just pointed to the beach that we thought we would like to explore and said the Spanish word for seashells. Enrique smiled, nodded his head "yes" and we were off. Initially, we were heading in the direction of where we wanted to go, but then, ever so gently, the boat veered off to the right and before we knew it, we're heading out into the Gulf of California – again! So now what do we do? Certainly, we didn't want to hurt his feelings by presuming he didn't know where he was

going, but we had been going “hell bent for leather” for about 20 minutes. Then the thought crossed our mind. Could he be taking us up to Sand Dollar Beach where we had been on Thursday? Does he know that this is supposed to be a half-day trip? We decided just to go along for the ride.

After another 10 minutes, we finally slowed down. This was the fishing hole, or at least that is what Enrique thought. Hooks were baited and anticipations were high. It wasn’t long before Ken’s rod bent over and the fun was under way. Well, it would have been more fun if the fish had been more than eight inches long. Ken kept catching these little critters and then Larry and Barb got into the act. It seems we might have been in too shallow water. Time to move! The new spot proved to be more fruitful. Larry caught a nice sized conche and so the fish call of “Here fishy, fishy, fishy!” was changed to “Here, conche, conche, conche!”

We, the non-fishermen folk, were getting a little antsy from looking at a beach that was certain to hold all sorts of treasures. To keep us happy we were given a walkie-talkie and dropped off at the shoreline. It was obvious that this stretch of beach was basically untouched. Had this been our first shelling excursion of the week, we would have been overwhelmed by the amount and variety of shells, but with five days of shelling under our belt, we were more selective of what we picked up.

Before we knew it the walkie-talkie squawked “It’s time to head back.” Good heaven’s! I just realized that I was going to have to climb over the side of the boat again and I felt about as graceful as a bull sea elephant on a rocky shore. The fishing had not been as good as we might have liked, but it was still fun. We found some more shells, and, it sure was one heck of a boat ride!

When we got back into the Kino Bay, Enrique took us past some of the boats that had been sunk in last year’s hurricane. They were partially submerged and I found it sad to think about how some livelihoods were probably destroyed along with these boats. After leaving the wrecks, we went up close to some of the shrimp boats anchored in the bay. One of the workers held up two squid for us to see. They were probably three feet long. Lots of calamarie there!

By the time we reached La Playa it was afternoon. Last good-byes were said to Enrique. Before leaving, Larry gave him his fish line clipper. It was one that is attached to a cord so you can clip it to your shirt and always have it handy. Enrique was visibly pleased with his gift. Now it was time for us to pack things up and get ready to leave in the morning.

First things first. Barb, Carolyn, Mark and I made a quick run to Calledose, a town thirty miles east of Kino. Barb was in the market for a cowboy hat and Calledose has a Mexican version of our Saturday Market. We left Mark with the car and said we would be back in a half-hour. Poor Mark spent the whole time being harassed by a drunk asking for money. We couldn’t get out of their fast enough for his way of thinking. After a quick stop at a great grocery store where Carolyn found her pancake mix, we were on our way back to La Playa. Because it was late Saturday afternoon, everyone was out and about. We were passed by many pickups carrying three generations of families. There would be three or four people in the front seat of the truck and as many as could possibly be packed in the back of the truck. If someone happened to be standing along the road, they would stop the truck and take on another passanger.

You might think that this was the end of our shopping but, no, Judy was going to open Tiendita del Mar for us at 4:30. Egads, it was almost that time already. Her shop was cleaner and more orderly than the other two we had visited. Judy had been very active in the Arizona shell club and a member of COA, so she was excited to visit with people who were true shell collectors. More shells were purchased and then we were on our way.

Now it was time for our “last supper” and The Marlin was the restaurant we chose. To celebrate our last evening in Kino, most of us ordered their lobster dinner. I ordered my “drink of choice” - Tecate. (What a great beer!) Our special table was occupied by an affluent looking middle aged Mexican couple who clearly had been celebrating some occasion or another for the greater part of the evening before we arrived. Because it was Saturday night, The Marlin had a musician who was playing his guitar and serenading them. Now, the musician’s voice was not great, but decent. The problem was that it was hard to hear him because the male guest at “our table” was singing along. Singing along and singing loud! As the evening wore on, the guest’s voice got louder and more off key. And then, the female guest joined in. Their singing may have been annoying before, but now it was simply horrible! She was at least two notes flat and apparently didn’t have a clue! It was so bad that another American at another table looked at us and made a strange face. That did it. We all broke out in uncontrollable laughter. In fact, it was so bad that I put my camcorder on just to record their voices. We were almost done eating before they finally left and then musician took a break. Peace and quiet!

Sunday, October 17: On our way home

Various methods were used to pack our shells. The goal was to keep them from smelling too bad while we were traveling. Despite our purchase of Clorox and repeated washings, some of them were still rather

fragrant. Our major concern, however, was not the smell, but rather whether or not these shell-laden suitcases weighed more than the 50-pound limit. At last all the bags were packed in the van and we were one our way to Pargo Rojo's for breakfast one last time. Before leaving the restaurant we took a few minutes to watch one of the local craftsmen knot a hammock. Ken took another look at the craftsman's iron wood carvings and then we were on our way to the Hermosillo airport.

We arrived in plenty of time to go through Customs and then put our feet up. Our trip to Phoenix was uneventful. Ms. Grumpy Stewardess was in a better frame of mind and joked with Barb and Mark who were sitting in the front seats. We had time to eat some dinner (if you want to call it that) in Phoenix and then found that our flight was delayed for an hour. In the mean time, due to overbooking, the airline was offering passengers a $300.00 voucher to take a bump. When they upped it to $500.00 Barb jumped at the chance. They put her up overnight and she flew out the next morning.

By 8:00 PM we were back in cold, wet Portland. The freezing level was down to 5,000' and Mark was going to have to drive home is what could be snowy conditions. Ken and I had been greeted by our three year-old granddaughter, Annika, and rode to the motel where we had left our car. Larry and Carolyn called the motel and took the motel van back.

When I opened one of the shell suitcases in the airport to retrieve a small gift for Annika, the expression on her face said it all. There is no smell like "dead snail in a shell smell." Too tired to care, I didn't unpack anything until the next day.. It was only when I removed the dirty clothes from around and on top of the sealed plastic boxes of shells, I found a Department of Security leaflet advising me that they had opened my luggage. It had been placed under the dirty clothes and directly on top of the box of shells. We had sealed our boxes with duct tape and there was no evidence that they had opened them. I would have liked to seen the look on the face of the investigator when he first opened those suitcases and saw only dirty laundry and smelled that smell! Carolyn said that their bags had been opened, too.

Looking Back –

When I reminisce about our trip to Bahia de Kino certain things come to mind and I thought I would jot some of them down so I can ponder on them in my old age.

I will always remember the smiles and the warmth of the people of Kino.

It was a marvel to me that the women of Kino are able to keep their families in clean clothing considering the lack of modern laundry facilities and because all the dust and dirt in this desert village.

I was astonished when I saw some of the women sweeping their dirt yards to keep them tidy while their neighbor's yard might be scattered with debris.

Watching a little boy pulling a squashed 7-Up liter bottle on a string as he skipped down the road raising a trail of dust reminded me that you don't have to purchase toys to have fun.

In my estimation of things, I feel Larry should be given the "Spouse of the Year" award for tolerating the antics of us shell collectors. Of course, being a fisherman he is used to getting up early when he is on vacation, but to get up between 5:00 and 5:30 every morning to do something other than go fishing is above and beyond the call of duty. He even went out with us one morning without mentioning that he had spent the night in the bathroom with the stomach flu.

Larry made the quote of the trip. Recently he had gone on a bird watching trip with Carolyn and some of their friends. Upon returning from a day of shelling he said, "The only thing I can say is that shellers are like birders. The only difference between the two is that birders look up and shellers look down.

For More Information

If you would like more information about planning a trip to Kino, contact Mark Reekie at www.seashellcreations.net. More information about La Playa can be found on their website www.laplayarvhotel.com

Mark had been planning a trip to Thailand, but due to the horrific tsunamis, this trip has been postponed until a later date. Mark will keep in contact with Tom Rice for updates. He is currently planning a shelling trip to Eleuthera in the Bahamas this coming November. Marks groups are small (only eight people including him) so the trips can stay personalized. Information about this trip can also be found on his website www.seashellcreations.net.

[**Editor's Note:** Joyce has produced a facinating video "Mollusks In Motion" which is shown three times daily at the Bailey-Matthews Shell Museum on Sanibel Island, Florida. It was a hit at the 2002 Sarasota meeting of the Conchologists of America too. The video shows bivalves and gastropods eating, moving around, protecting themselves and reproducing. To learn more and see clips from the video, go to www.mollusksin motion.com]

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A PHOTO STUDY OF THE EASTERN PACIFIC HYBRID ABALONES (GENUS *HALIOTIS*)

Buzz Owen

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Part 6

***Haliotis rufescens* Swainson, 1822 x *H. sorenseni* Bartsch, 1940**

ABSTRACT

Sixteen specimens of the very rare hybrid abalone*, H. rufescens* x *H. sorenseni* are illustrated in color. Two specimens of both *H. rufescens* and *H. sorenseni* are also illustrated for comparison. Reasons for the necessity of this review of the Eastern Pacific hybrid *Haliotis* are discussed.

INTRODUCTION

The present work is the sixth in a series of ten papers that will illustrate each of the fourteen interspecific, Eastern Pacific *Haliotis* hybrids that are currently known to have been retrieved from natural populations. Parts one and two treated *H. rufescens* x *H. corrugata* Wood, 1828 (*Of Sea and Shore*, Vol. 25, No. 2), and *H. corrugata* x *H. walallensis* Stearns, 1899 (Vol. 25, No. 3), while parts three and four covered *H. corrugata* x *fulgens* Philippi, 1845 (Vol. 25, No. 4), and *H. rufescens* x *H. kamtschatkana assimilis* Dall, 1878 (Vol. 26, No. 2). The series will be concluded with a tenth paper which will illustrate two unique specimens that represent hybridization of two of these hybrid varieties with a third *Haliotis* species. Hybridization of the Eastern Pacific *Haliotis* has been well documented. Owen (1961) presented a report on six varieties found in Southern California and the adjacent Channel Islands. Owen et al. (1971) expanded this report to include six additional hybrids. These 12 crosses involved all west coast species with the exception of *H. cracherodii* Leach, 1814, however Owen and Leighton (2002) described two hybrids of *H. cracherodii* crossed with *H. corrugata* and *H. fulgens*. Additionally, hybrid *Haliotis* have been reported in South and Western Australia, by Owen and Kershaw (2002, 2003).

Beginning in the early 1980s, a severe population decline was noticed in all *Haliotis* species native to the Southern California Channel Islands. Simultaneously, few, if any, of these hybrids were retrieved by commercial *Haliotis* divers (C. Sites, J. Marshall pers. comm.). The reasons for this decline remain unclear. Commercial overfishing doesn't appear to be a major factor as two species that were never taken commercially in that area, *H. walallensis,* and *H. kamtschatkana assimilis*, suffered a severe decline during the same period as well.

This severe population decline continued in all *Haliotis* species throughout Southern California and the adjacent Channel Islands and finally led to closure of the sport and commercial fisheries in these areas in 1997. This closure is still in effect. It appears clear that few, if any, of the very rare hybrid varieties (hybrids other than the most common: *H. rufescens* x *H. sorenseni*) were taken after the period from 1975 to 1980. Thus, virtually all known specimens exist in either the Buzz Owen Collection (BOC), Gualala, California, or in the Los Angeles County Museum of Natural History (LACM). The LACM specimens were deposited by Owen as reference for the earlier paper on Eastern Pacific hybrids (Owen et al. 1971). The primary purpose of this first work was to prove the actual existence of hybrid *Haliotis* specimens. Thus, only a single shell specimen was photographed in black and white for each hybrid variety illustrated. This led to much confusion in subsequent years when Haliotiphiles tried to use this paper as an identification guide during searches of commercial *Haliotis* shell piles, where the vast majority of hybrid *Haliotis* specimens have been found to date. This has proven to be especially true in Lower California, Mexico, where a commercial fishery still exists (2004). Therefore, the primary impetus for this reappraisal is to illustrate a number of specimens of each hybrid in color so as to facilitate a greater understanding of each variety and make it possible to accurately identify hybrid *Haliotis* shell specimens.

MATERIAL AND METHODS

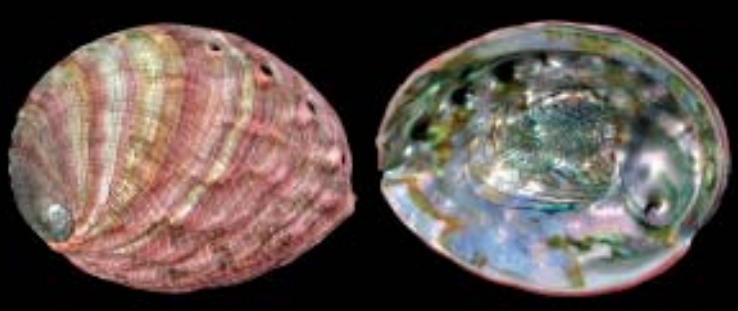
Abbreviations of Collections: LACM: Los Angeles County Museum of Natural History; BOC: Buzz Owen Collection.

All of the 16 illustrated specimens are from the BOC, and 13 were taken from California mainland or Channel Island populations by Owen or commercial divers with whom he worked. Two exceptionally large specimens (Plate 2) were taken in Soledad Bay, northern Lower California, Mexico. The equipment used was a surface air compressor, 300 feet of sinking air hose, a continuous air flow full face mask, an "Aquala" full dry front entry diving suit, and a heavy (25 kg) weight belt. Photography was performed with a Canon A70 digital camera and the resulting images were processed with an iMac computer using Adobe Photoshop version 8.

RESULTS

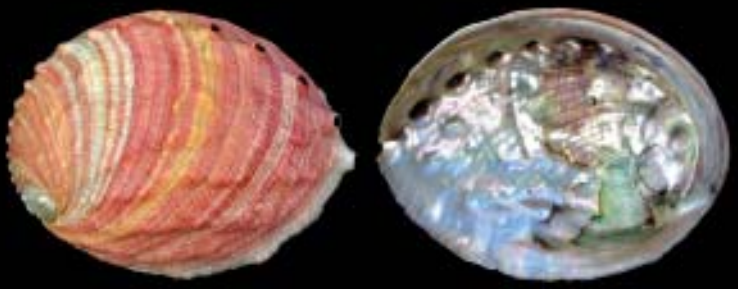
Hybrid: *H. rufescens* x *H. sorenseni.*

The first known specimen of this hybrid was found by Owen in June, 1954, in a pile of commercial *Haliotis* shells which had been taken from near Point Conception, California. This was the first specimen found which suggested hybridization in genus *Haliotis*, and was the impetus for the study that followed (Owen et al. 1971). The next examples found were a group of

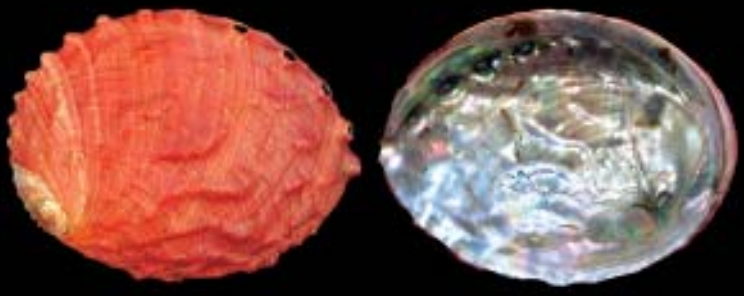


Santa Barbara Island (220.5 mm)

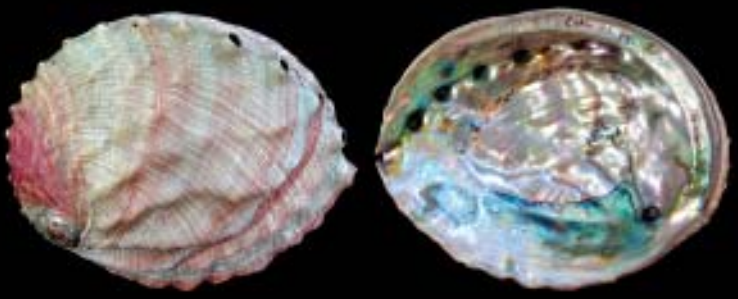
San Clemente Island (183.0 mm)



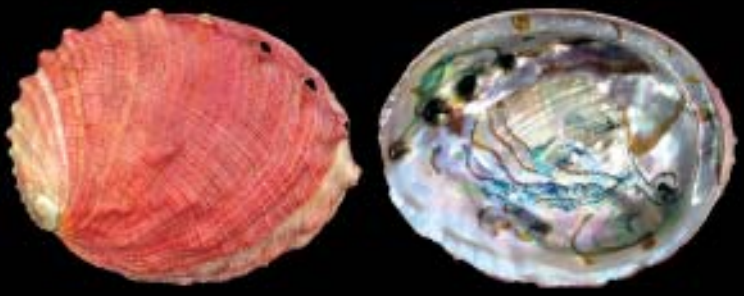
Anacapa Island (205.5 mm)



San Miguel Island (199.0 mm)

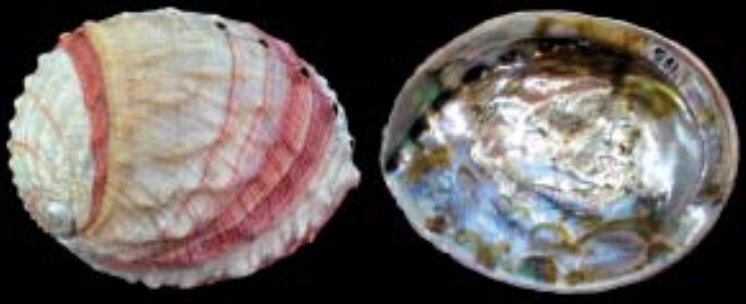


Coal Oil Point, California (205.0 mm)

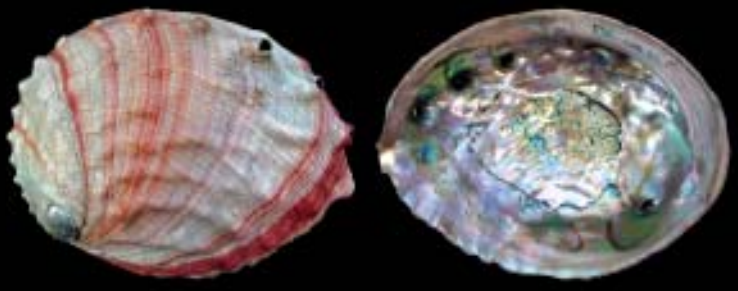


Santa Cruz Island (205.0 mm)

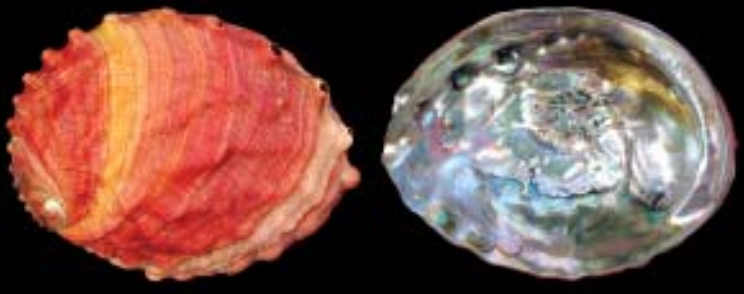
Soledad Bay, Baja California, Mexico (190.0 mm)



Coil Oil Point, California (206.0 mm)



Coal Oil Point, California (211.5 mm)

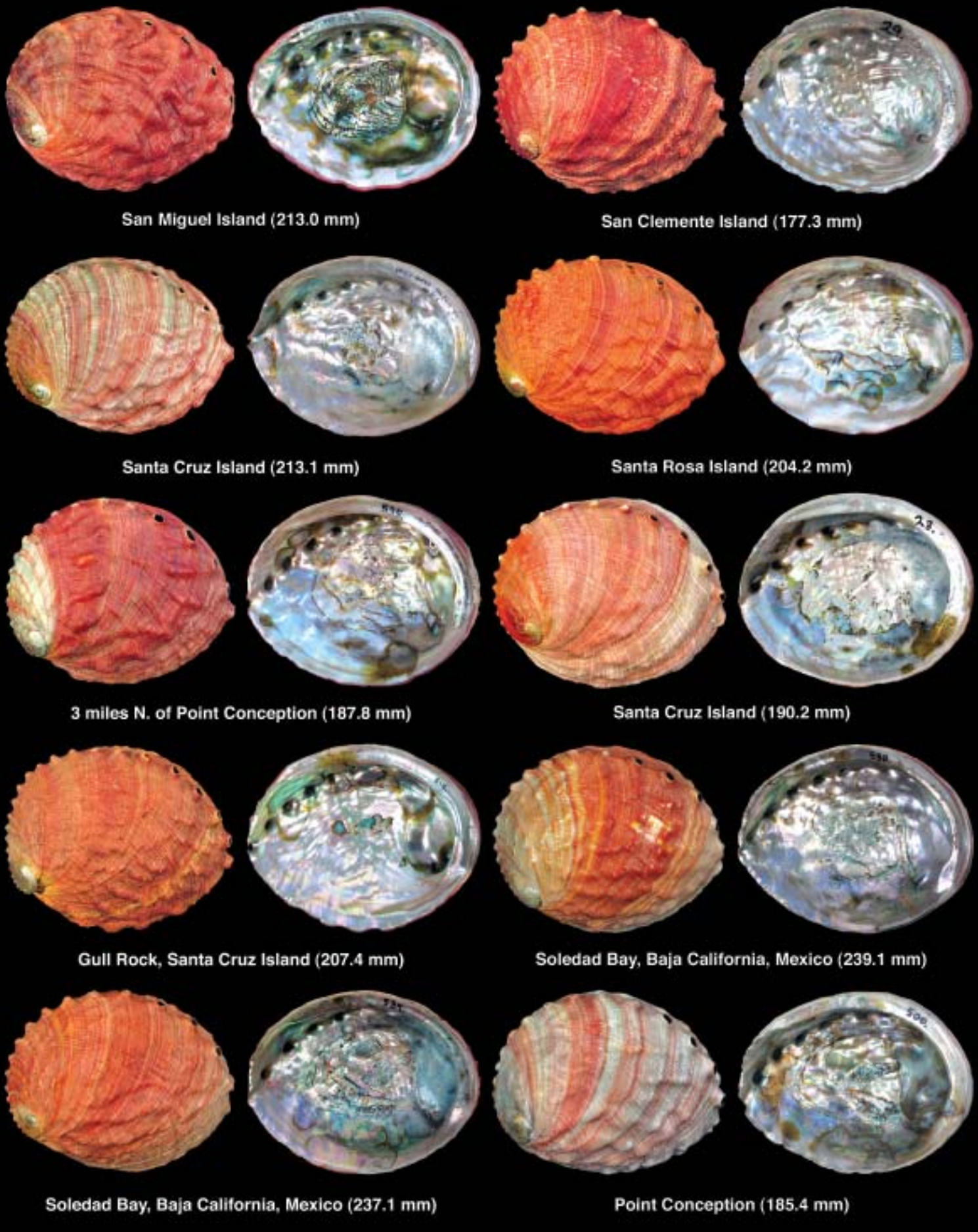


Santa Cruz Island (206.5 mm)

Plate 1

Top Row: *Haliotis rufescens* and *H. sorenseni* (Parent Species).

Bottom Four Rows: *H. rufescens x H. sorenseni* (Hybrids).



San Miguel Island (213.0 mm)

San Clemente Island (177.3 mm)

Santa Cruz Island (213.1 mm)

Santa Rosa Island (204.2 mm)

3 miles N. of Point Conception (187.8 mm)

Santa Cruz Island (190.2 mm)

Gull Rock, Santa Cruz Island (207.4 mm)

Soledad Bay, Baja California, Mexico (239.1 mm)

Soledad Bay, Baja California, Mexico (237.1 mm)

Point Conception (185.4 mm)

Plate 2

Top Row: *Haliotis rufescens* and *H. sorenseni* (Parent Species).

Bottom Four Rows: *H. rufescens x H. sorenseni* (Hybrids).

eight specimens retrieved from a commercial shell dealer in San Diego. These were all found in Mexican commercial *Haliotis* shells taken from Soledad Bay, Lower California, Mexico. As with all known**,** live-taken hybrids, the animal clearly and equally demonstrates characteristics of both species in the epipodial processes and pigmentation of the body, and in clear water, may be visible from a distance of five to six meters, along with the highly ornate and complex epipodial structures typical of this hybrid. To a diver familiar with *H. rufescens* and *H. sorenseni*, the hybrid is immediately recognizable due to these strikingly intermediate features. This is true of all known *Haliotis* hybrids and greatly facilitates their identification (Owen et al. 1971). Coloration of the shell exterior is usually a slightly lighter reddish color than *H. rufescens*, and frequently specimens will show alternating bands of lighter orange-red or bluish-green, indicating changes of alga in the diet. This is common to both parent species. The interior of the shell consists primarily of highly silvered nacre, often with reflections of pink, blue, and green, but usually lacks the well-developed muscle scar of *H. rufescens.* However, mature specimens often have partial development of the scar combined with irregular patches of nacreous material in the area of attachment. Over 1000 specimens have been observed and identified by Owen, with >390 in the BOC. Although that figure may seem large, this hybrid is nonetheless very rare, as well over three million total *Haliotis* were examined to retrieve that number of specimens. The commercial harvest of abalones affords an opportunity to survey very large numbers of individuals, and this sample size is available for few other families. More descriptive text and detailed information on the soft parts of the animal can be found in the earlier work (Owen et al. 1971). This hybrid has been used in spawnings conducted in a marine shellfish hatchery and has proven able to back cross to both parent species, at least three other species, and one other hybrid of different parentage thus producing a "four-species hybrid" (Owen, in press). Several specimens from natural populations demonstrate probable backcrosses to the parent species, and at least two specimens definitely represent a cross with *H. corrugata*. The >390 specimens known to Owen range in size from 109 to 253 mm.

DISCUSSION

Extensive notes taken during the period when most of these specimens were collected (1959–1966) often indicate abnormally large numbers of the hybrid exist in areas of highly disturbed habitat (Owen et al. 1971). On occasion, sculptural details of the dorsum of this hybrid may somewhat resemble the much less common *H. rufescens* x *H. kamtschatkana assimilis*, due to the general similarity of the sculpture of the latter subspecies to that of *H. sorenseni*. However, *H. rufescens* x *H. kamtschatkana assimilis* is virtually always distinguishable from the more common hybrid by the presence of the stronger and wider spiral ribbing of *H. kamtschatkana assimilis*, plus**,** the shell usually having more closely-spaced and smaller tremata. In addition, the genetic chevron-like markings of *H. kamtschatkana assimilis* will often be quite visible in immature and sub-adult stages of development of *H. rufescens* x *H. kamtschatkana assimilis* hybrids – something virtually never observed in *H. rufescens* x *H. sorenseni*. With living specimens, identification and separation of the two hybrid types is easily achieved: *H. rufescens x H. kamtschatkana assimilis* always lacks the regularly-spaced, large clusters of papillae that are always present in the epipodia of both *H. sorenseni* and its hybrid with *H. rufescens* (Owen et al. 1971). These clusters of papillae are never present in *H. rufescens* x *H. kamtschatkana assimilis*.

ACKNOWLEDGEMENTS

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IS IT A NEW SPECIES?

DR. MICHELE DARDANO

Via Petrarca 43; 71100 Foggia, Italy

In my article "Notes on recently described Spondylidae" (of Sea and Shore 26:2 137-143), I compared *Spondylus swinnensi* Lamprell, Stanisic & Clarkson, 2001 with *S. multimuricatus* Reeve, 1856 (with which *S. swinneni* had been confused with in the past).

As I pointed out, there are some remarkable differences between the two species: *S. multimuricatus* (Fig. 1) has white hinge teeth and numerous weak ribs, 5/6 of which are ornamented with concentrically arranged, broad abd blunt, not overlapping spines. Moreover, its interstices show numerous mindo radial ribs bearing minor spines. Shell color orange or red-orange at the umbonal area; margins deep orange, area of attachment variable.

Among the various Spondylidae known from the Philippines, another species (Fig. 2) has been considered a deep water variety of *S. multimuricatus*, but I have my doubt. This spcecie is, indeed, very different from the typical *S. multimuricatus*: the shell is not gibbous, but, on the contrary, it shows a noteworthy, constant depression on the left valve, between the umbonal area and the center of the shell. The spines are neither broad and blunt, nor concentrically arranged in this species. Moreover, unlike *S. multimuricatus*, the spines are overlapping. The complexity of its radial sculpture (Fig. 3) and the presence of numerous, long thin spines favoured an initial misleading identification – the species was called "the Philippine *linguafelis*", but the differences between this species and *S. linguafelis* Sowerby II, 1847 are evident.

This splendid *Spondylus* is very fragile and delicate and comes mainly in three color forms: orange (Fig. 4), purple and white (Fig. 5) which is definitely the rarest. The right valve is more convex than the left valve, the ligamental area is reduced; moreover, the area of attachment and the auricles are rather small.

This species is known only from the Philippines, but the specimen of uncertain identification figured in Fig. 6 is from the Red Sea. It has been called "the Red Sea *linguafelis*"but, in my opinion, it is much more similar to the specimens shown in Figs. 2-5. In fact, it shows all the characteristics described, including the typical depression near the umbonal area.


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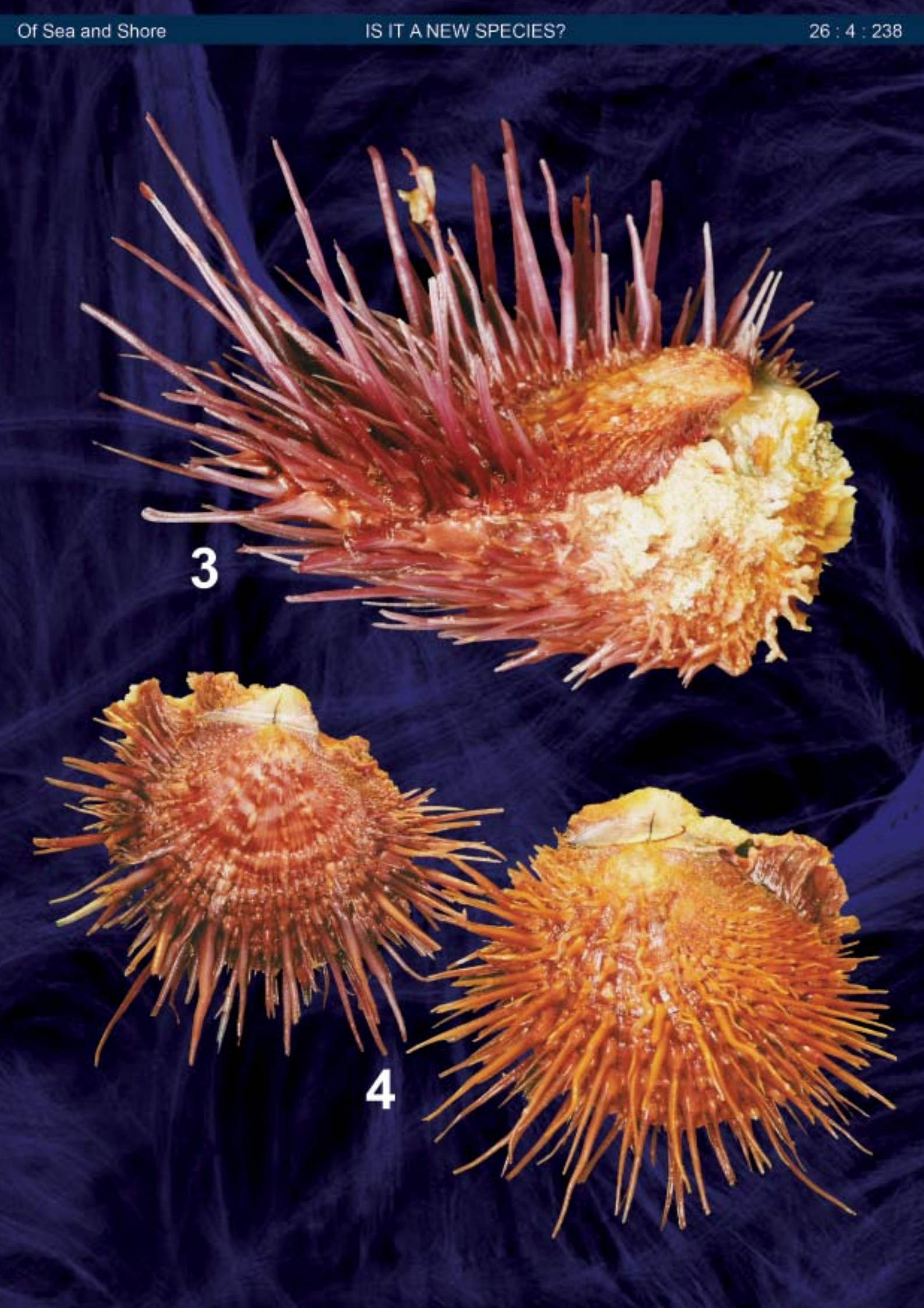
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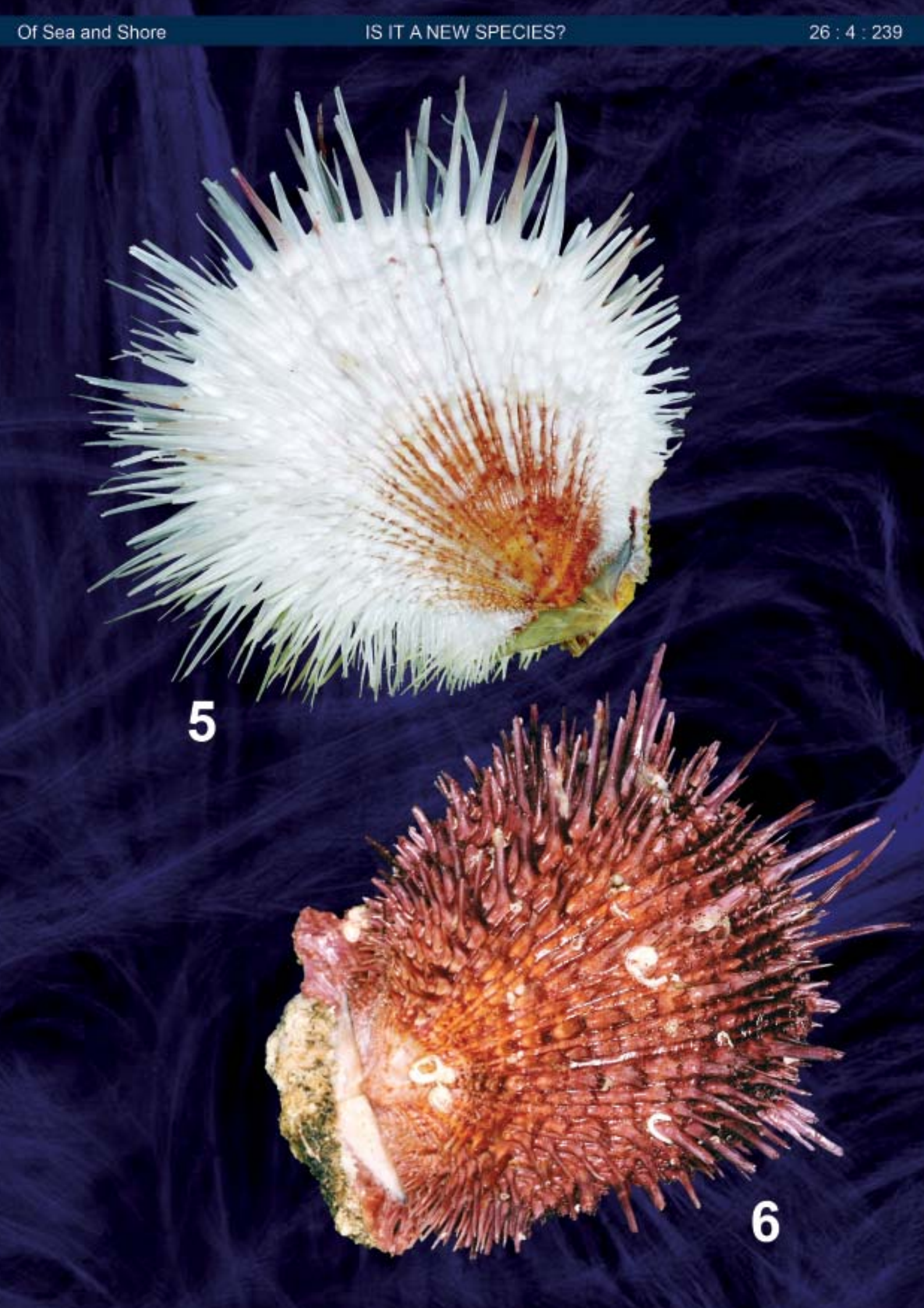
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Recently Described Shelled Marine Mollusks
See color page 240

Cypraea leucodon *forma* ***escotoi***
Poppe, 2004 (Fig. 1)
Type locality: off Aliguay Island, Philipines
Distribution: known only from type locality, dredged 80-200m
Size: to 69+mm

Poppe, G. Descriptions of spectacular new species from the Philippines 9Gastropoda – Trochidae, Cypraeidae). Viscaya 1: 4-19. July

Conus grohi **Tenorio & Poppe, 2004 (Fig. 2)**
Type locality: off Aliguay Island, Philippines
Distribution: known only from type locality, dredged 80-200m
Size: to 26+mm

Conus frausseni **Tenorio & Poppe, 2004 (Fig. 3)**
Type locality: off Aliguay Island, Philippines
Distribution: known only from type ocality, dredged 80-200m
Size: to 47mm

Conus terryni **Tenorio & Poppe, 2004 (Fig. 4)**
Type locality: off Aliguay Island, Philippines
Distribution: known only from type locality, dredged 80-200m
Size: 30mm

Tenorio, Manuel J. & Guido T. Poppe. Description of three deep-water species of *Conus* from the Central Philippines (Gastropoda: Conidae}. Visaya 1: 20-30, July.

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Black and White Plate, page 242

Graphis eikenboomi **(Fig. 1)**
van der Linden & Moolenbee3k, 2004
Type locality: Pt. Guignard, Dominica, West Indies
Distribution: West Indies
Size: to 1.9mm

Graphis lightbourni **(Fig. 2)**
van der Linden & Moolenbeek, 2004
Type locality: S of Castle Roads, Bermuda
Distribution: Bermuda
Size: to 1.8mm

van der Linden, J. and R.G. Moolenbeek. A survey of the *Graphis* species from th West Indies and Bermuda, with the description of two new species. Gloria Maris 43(2-3): 1-13. July 2004

Gloria Maris is published by the Belgian Society for Conchology. Membership information: L. Brockmann, Gerststraat 4, 2861 O.L. Vrouw-Waver, Belgium

Coluzea kallistropha **Harasewych, 2004 (Fig. 3)**
Type locality: 60 mi NE Ponta Sao Sebastiao, Mozambique, 1510-1600m
Distribution: southern Mozambique to KwaZulu, Natal, South Africa, 1335 to 1600 m
Size: to 52mm

Coluzea naxa **Harasewych, 2004 (Fig. 4)**
Type locality: off Western Australia, S of Bedwell Id.
Distribution: known only from type locality, 250m
Size: to 52mm

Coluzea madgascarensis **Harasewych, 2004**
Type locality: SW Madagascar, 450-500m **(Fig. 5)**
Distribution: off southwestern coast of Madagascar
Size: to 78mm

Columbarium quadrativaricosum
Harasewych, 2004 (Fig. 6)
Type locality: off Mendu Point, Transkei, South Africa
Distribution: off Transkei Region, 250 to 550 m
Size: to 45mm

Harasewych, M.G. New Columbariinae (Gaqstropoda: Turbinellidae) from the Indian Ocean. The Nautilus 118(3): 93-102 October

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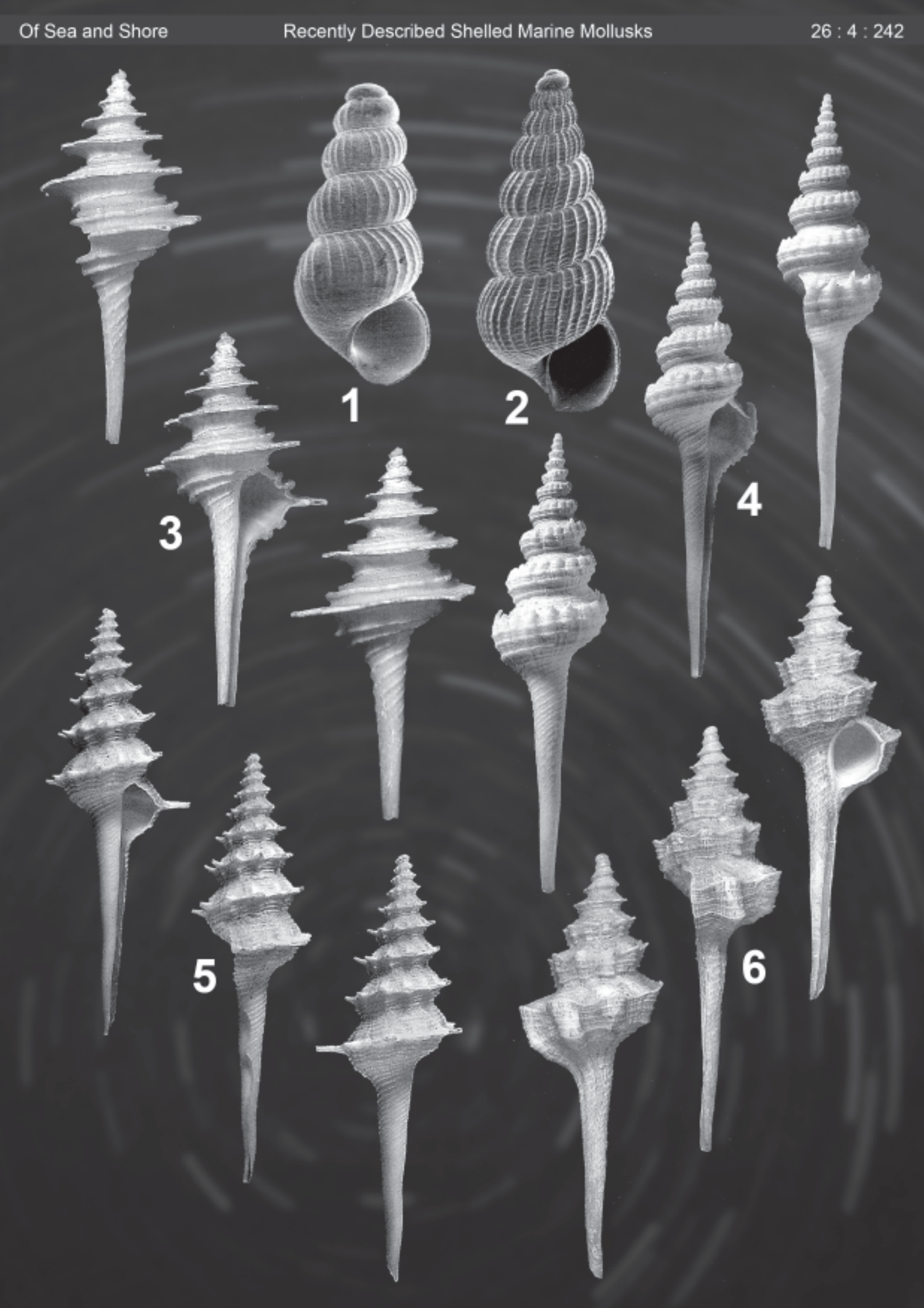
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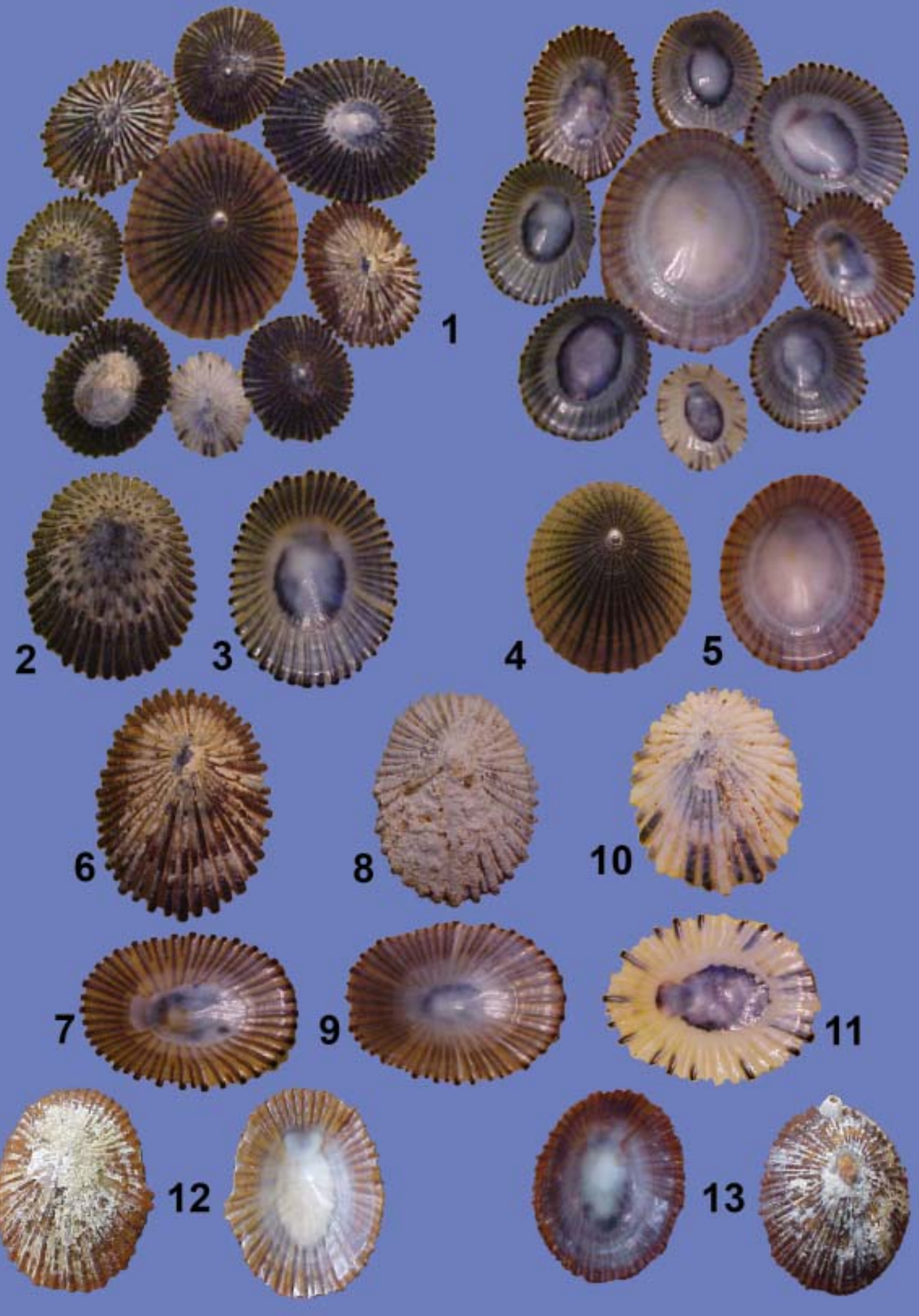
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Opihi Shells of Hawai'i

Daniel R. Goodwin

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Honolulu, HI 96820

Limpet shells or, in the Hawaiian language, "Opihi" are an Hawaiian side dish eaten raw at most traditional Hawaiian dinners, or at parties (also called Luaus). The three popular species of opihis which are usually eaten are *Cellana exarata* (Reeve, 1854), *C. sandwichensis* (Pease, 1861) and *C. talcosa* (Gould, 1846). A fourth species, *Cellana melanostoma* (Pilsbry, 1891) is uncommon to rare and is only found in the northwestern Hawaiian Islands and the islands of Maui and Kahoo'lawe; *C. melanostoma* is the most abundant of the four species in the northwestern islands.

The most popular, and tastiest, of the species eaten by the local people here in Hawai'i is the yellow-footed *Cellana sandwichensis*; it is followed in popularity by and occasional black-footed *Cellana exarata* and the yellow-footed *C. talcosa*. The colors and characteristics have been documented in previous literature by the author and included in a key to the genus *Cellana*. Opihis are eaten raw in Hawai'i and other Pacific Islands, as well on the African continent. In other areas the opihi are eaten par-boiled or with a twist of lime or with lemon juice.

In Hawai'i fishermen and collectors of opihi risk life and limb to obtain this delicacy – the Hawaiian's call this the "Fish of Death" and "Hawaiian Gold". The opihi's main habitat is the splash zones and high wave marks, making the collecting very difficult and dangerous. Precious and hard to obtain, this delicacy attains very high prices. The raw opihi is prepared by just spooning or cutting the animal out of the shell. The animals are then placed in a bowl – mixed slightly with Hawaiian rock salt, added to taste – and placed in the refrigerator. Fishermen usually collect opihi during low tide and at night. Opihi usually are found attached to smooth rock surfaces on the sides and undersides – out of direct sunlight.

The genus *Cellana* is, as with most mollusks, most active at night, The animal uses its large foot to cling to the rocks and secure itself from the pounding surf. The species *Cellana exarata* has the cleanest shells, living at the highest elevation of the four species. It is followed by *Cellana sandwichensis* and *C. melanostoma* which live at the tide line and have algae and calcium deposits on their shells. *Cellana talcosa* lives below the water line and also has algae and calcium deposits on its shells.

The species *Cellana exarata* has more pressure on the foot of the animal, resulting in a higher or dome-like shell; the species *C. melanostoma,* from the island of Kahoo'lawe and the leeward islands (northwestern Hawaiian islands), has no increase in shell height when compared to specimens collected from the Pleistocene deposits at the Campbell Industrial Park site.

The author believes that the genus *Cellana* H. Adams, 1869, is supported by these four endemic species. The following is the systematics of the Family Patellidae and the genus *Cellana*. Data is taken from a previous paper, "The genus *Cellana* H. Adams, 1869 from the island of Kahoo'lawe, Hawaii (Gastropoda: Patellidae)" in the Bulletin of the Institute of Malacology of Tokyo, 3:8, 118-124, September 2001. Note: all specimens with lengths of 33mm or less were measured *in-situ* and not collected – as required by Hawaiian State law.

Family Patellidae Rafinesque, 1815

Genus *Cellana* H. Adams, 1869

Type species:
Cellana cernica (H. Adams, 1869)

Cellana exarata (Reeve, 1854)
Figures, 1, 2 & 3

Average length of 26.4 to 42.15mm, SD of 6.46, average width of 20.8 to 34.25mm, SD of 5.0, average height of 7.5 to 15mm, SD of 2.88, and with 45-58 ribs, SD of 4.42. Ribs do not extend past the margin, gill cordon interrupted by head, mantle and foot gray or black in color, ribs fine and smooth, color of ribs is black, spatula gray or black, color of interior is blue-white and anterior color is dark gray.

Opihi shown on page 244

1, 2 & 3 *Cellana exarata* (Reeve, 1854) Dorsal and apertural views; collected from the Big island of Hawaii

1, 4 & 5 *Cellana* hybrid??? Dorsal and apertural views, collected from the Big island of Hawaii (Note: Ribs similar to *C. exarata*, interior color similar to C. sandwichensis; ribs extending slightly over the margin; color of animal yellowish

1, 6 & 7 *Cellana sandwichensis* (Pease, 1861) Dorsal and apertural views; collected from the Big island of Hawaii

1, 8 & 9 *Cellana sandwichensis* (Pease, 1861) Dorsal and apertural views; Natural State - notice the calcium deposits on the otter surface of the shell; collected from the Big island of Hawaii

1, 10 & 11 *Cellana melanostoma* (Pilsbry, 1891) Dorsal and apertural views; collected from the Island of Kaho'olawe

1, 12 & 13 *Cellana talcosa* (Gould, 1846) Dorsal and apertural views; collected from the Island of Kaho'olawe

Cellana melanostoma (Pilsbry, 1891)
Figures 1, 10 & 11

Average length of 32.5 to 39.10mm, SD 2.33, average width of 26.5 to 29.70mm, SD of 1.05, average height of 10.2 to 13.0mm, SD of 0.88 and with 35-44 ribs, SD of 2.61. Fossil specimens collected from O'ahu with average length of 50.50 to 82.90mm, SD of 15.06, average width of 45.50 to 74.50mm, SD of 13.55 and average height of 32.00 to 49.00mm, SD of 7.99. Occasional ribs extending past the margin, gill cordon interrupted by head, mantle and foot green in color, ribs course and scabrous, color of ribs is brown to dark brown, spatula brown or black, color of the interior is golden-yellow to green and anterior color is white with brown. Fossil specimens showed no sign of ribs extending past the margin – probably because of their eroded state.

Cellana sandwichensis (Pease, 1861)
Figures 1, 6, 7, 8 & 9

Average length of 38.9 to 42.0mm, SD of 1.0, averagwe width of 29.3 to 32.0mm, SD of 0.92, average height of 11.0 to 13.50mm, SD of 0.74 and with 40 to 52 ribs, SD of 4.0. Ribs extending past the margin, gill cordon interrupted by head, mantle and foot yellow in color, ribs course and scabrous, ribs black in color, spatula black or white, color of interior is iridescent white and anterior color is gray.

Cellana talcosa (Gould, 1846)
Figures 1, 12 & 13

Average length of 43.9 to 66.85mm, SD of 10.39, average width of 33.5 to 57.75mm, SD of 10.0, average height of 9.0 to 20.10mm, SD of 4.28 and with 51 to 68 ribs, SD of 5.79. Ribs do not extend past the margin, gill cordon interrupted by head, mantle and foot yellow in color, ribs fine and smooth, ribs are coppery brown in color, spatula white, color of interior is white and anterior color is brown.

Population studies of the genus *Cellana* from Kahoo'lawe Island resulted in 37% *Cellana exarata*, 4% *C. melanostoma*, 36% *C. sandwichensis* and 23% *C. talcosa*.

Current studies have yielded some results in the possible aquaculture of opihi. Other molluscan genera have been successful, i.e. *Turbo* and *Haliotis*. Currently there is no alarm concerning the depletion of the genus in Hawaiian waters from possible over-collecting, and if aquaculture is successful the pressure on wild caught specimens will decrease as will the prices for the "Fish of Death" or "Hawaiian Gold".

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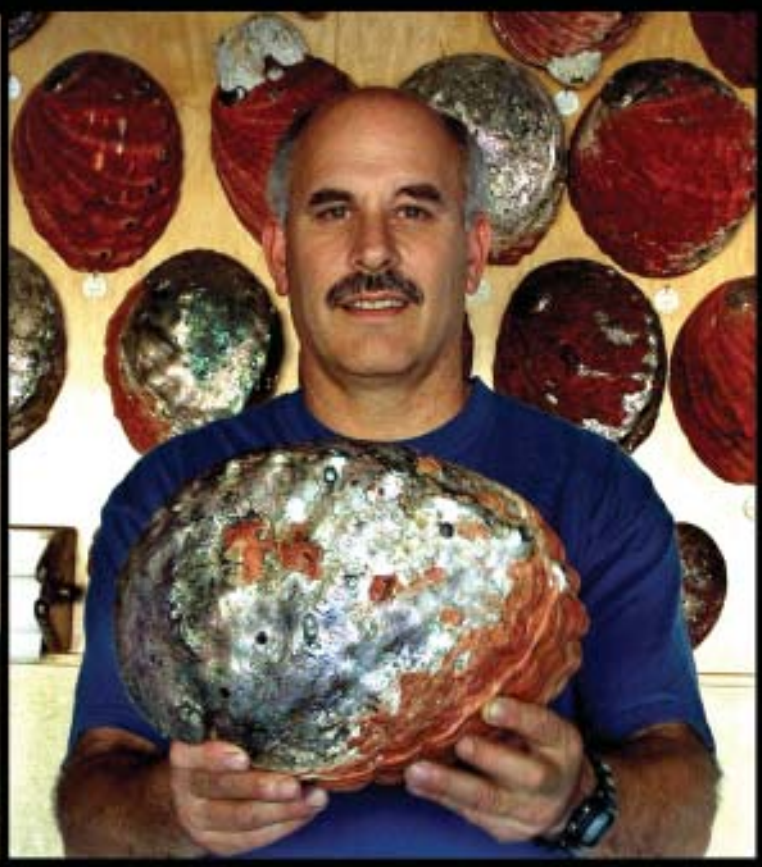
John Pepper with his 313.0 mm (12.32 in.) World Record!



Dinucci with his 2nd largest known 302.5 mm (11.91 in.) giant.

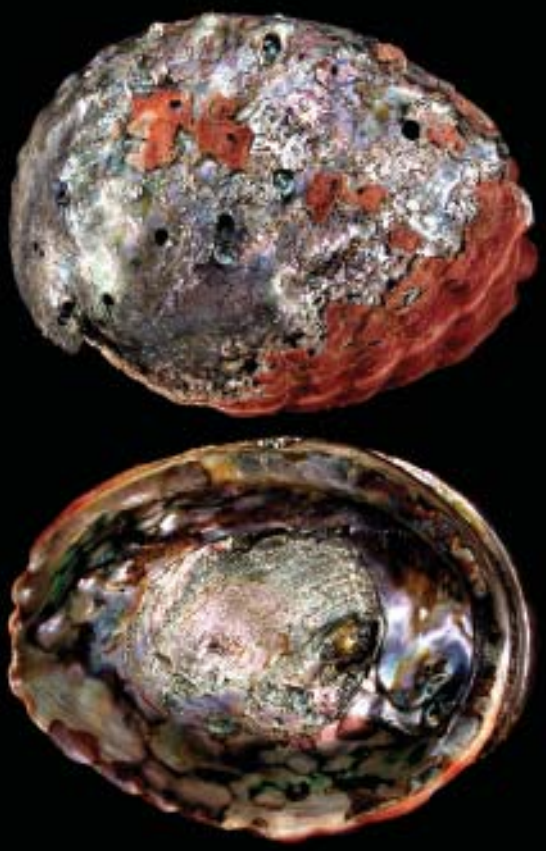
Bob Spinale holding his 3rd largest known 299.5 mm (11.79 in.) giant. (Shells in background [>10.5 in.] are distorted by distance from camera).

Jeff Centoni with his 296.2 mm (11.66 in.) 6th largest abalone.

Plate 1

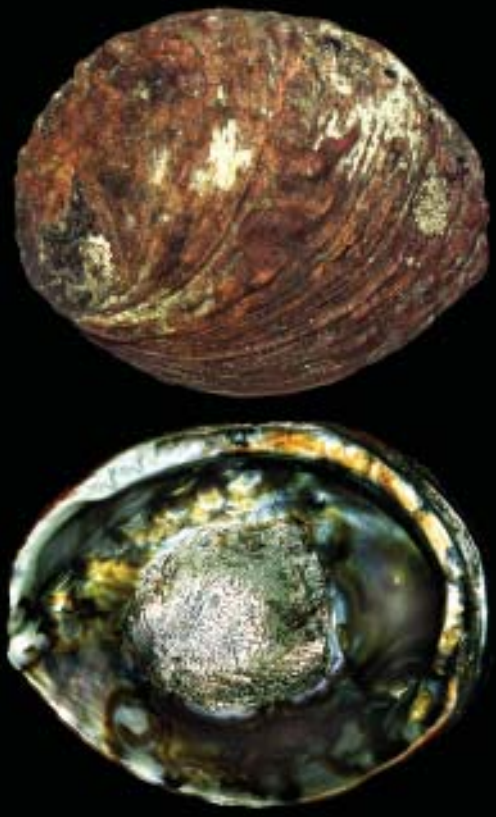
John Pepper, Dwayne Dinucci, Bob Spinale, and Jeff Centoni, with four of the world's largest abalone.

Dinucci with 302.5 mm (11.91 in.) giant. Smaller animal is 269.0 mm (10.56 in.)



World's 2nd largest abalone. 302.5 mm (11.91 in.)

Owen and Pepper with World Record shell. 313.0 mm (12.32 in.)



Worlds largest abalone. 313.0 mm (12.32 in.)

Plate 2

World Record and 2nd largest known abalone shells.

A BRIEF HISTORY AND PHOTO STUDY OF THE WORLD'S SIX LARGEST *HALIOTIS* SHELLS, WITH NOTES ON POSSIBLE FACTORS CAUSING GIGANTISM.

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ABSTRACT

Digital color photographs of the six largest known shells of *Haliotis rufescens* Swainson, 1822, are illustrated. Historical information on very large shell specimens taken in the early to mid twentieth century is presented. Ecological conditions which produce an environment ideal for fast growth and large size are discussed. This information is provided in a somewhat informal format, with an emphasis on accuracy being of foremost importance.

INTRODUCTION

Of the approximately 60 species and subspecies of *Haliotis* known to occur world wide, one emerges easily as the world's largest: *Haliotis rufescens* Swainson, 1822, commonly known as the "red abalone". It is found on the west coast of the United States, from southern Oregon to central Lower California, Mexico. The largest known specimen measures 313.0 mm. (12.32 in.). The largest known specimen of the world's second largest recorded *Haliotis* species, *H. fulgens*, is almost 60 mm smaller (255.0 mm; 10.03 in.). Giant shells of the red abalone, which we'll define as being in excess of 260 mm (~10.25 in.), are extremely rare and are highly prized by those divers who have retrieved them. This interest has led to a specialized class of sport abalone diver who pursue these huge specimens with great passion, and often, the gathering of any and all information concerning the specimens they do or don't find, as well! I was approached by Dwayne Dinucci to present a paper addressing this subject, and in turn asked that he help me with the project because of his deep interest in the subject and the extensive records he has kept (his 302.5 mm [11.91 in.] specimen is the second largest known at the time of this writing). With Dwayne's help, and the information and material shared with he and I by other fanatical "big red" hunters, we would like to present an overview of the subject which will address some of the historical points of interest and environmental conditions surrounding this fascinating topic. When measurements are listed, only those that have been confirmed by the authors (who for years have specialized in measuring large shell specimens) will be given, and no data will be presented of which we are not certain (unless so stated). The subject of giant red abalone shells lends itself to the usual "big fish story" exaggerations, with a large percentage of such stories, when actually pursued (those that can be) almost always leading to a shell much smaller than the original tale. Some of these myths may have been due to crude measuring devices or simply measuring the shell incorrectly.

MATERIAL AND METHODS

Abbreviations of Collections: JPC: John Pepper Collection; DDC: Dwayne Dinucci Collection; BSC: Bob Spinale Collection; BOC; Buzz Owen Collection; EOC: Erik Owen Collection; JJCC: Jeff and Johnathan Centoni Collection; C&JTC: Charlie and Jeannie Thorp Collection; MDC: Mike DeGarimore Collection; TMC: Tim Mulculhey Collection.

All shell specimens examined are in the private collections of the divers who found them. To our knowledge, no museum collection possesses a shell in excess of approximately 270 mm (~10.5 in.). All specimens, except where noted, were live-taken by diving. Most photographs illustrate the shell only, but several are included which show living animals in the shell. The latter provide a more accurate indication of the very large size of these animals.

Photography was accomplished using three digital cameras: a Canon A70, an Olympus C-2100, and a Pentax Optio 330GS. The resulting images were processed using Adobe Photoshop Version 8 on an Apple iMac computer. In preparation for photography, a few of the shell specimens were first lightly cleaned with an X-Acto knife and small wire brush. A very light coat of mineral oil was then applied to make the natural colors of the shell more visible when photographed.

Measurements were made with very accurate calipers, pre-adjusted for accuracy, and were done several times with extreme care. Actual sizes are rounded off to 0.01 in. (0.1 mm).

RESULTS

Historical:

A common belief shared by many casual students of large red abalone, is that most of the extremely large shells were taken years ago, and as a result few are to be found today – the situation thought to be somewhat comparable to the first growth forests of California's giant coastal redwood trees. We believe the facts do not support this analogy, however, and the following provides reason to this thought: In late 1959, Owen met and had a long visit with Andrew "Andy" Sorensen at his home in Pacific Grove, near Monterey, California. It was Andy's name that Paul Bartsch used in 1940 when he described the white abalone (*H. sorenseni*). Andy was 97 at the time, but still very alert and mentally sharp! He was a very active shell collector and had spent many years deeply involved with collecting mollusks on the west coast, the Monterey area in particular. He had known very well many of the

Japanese commercial abalone divers who had dived the Monterey coast in the very early twentieth century. Many years before 1959, he had made a public offer of $100 to anyone who would bring him a 12-inch red abalone shell – just to measure and confirm that it was that size! "Andy" was very outspoken with this offer, and certainly all the Japanese fishermen had known about it for years. The day I met him, he told me that in the many years that had passed since he had first made that offer, NO one had ever brought him "the mythical 12-inch red" and he had come to believe the species simply didn't get that large. At that point, I showed him the 293.0 mm (11.55 in.) specimen that had come into my possession 2 months before. He carefully measured it, smiled as he looked up at me, and said: "Young man, that is the largest abalone shell that I have measured in my life!" (And, as far as we now know, the largest that anyone had measured - until late 1983!). As the Monterey area possesses one of the finest ecological niches on the west coast for the development of extreme size, and the early Japanese divers were working a basically "virgin" fishery in the early 1900's, this event seemed to suggest that factors other than fishing pressure influenced the maximum size individuals of *H. rufescens* might attain. From that time on, careful attention was paid to environmental (ecological) conditions that existed in those areas where unusually large specimens were found. It turned out that there were several which were quite obvious. In the meantime, the 293 mm specimen measured by Sorensen remained the largest ever measured for 24 more years. But records are made to be broken, and in 1983, a specimen was found about 5 mm larger, measuring 11.76 in. (298.7 mm). The environmental parameters that produce such "gigantism" were becoming known, and a small, core group of dedicated, obsessed, and very experienced free divers, became involved in the search for larger specimens. In 1993, one particularly large specimen was found: this giant abalone, a male, measured over 20 mm larger than the 1983 shell, being 313.0 mm, or 12.32 in. (Plates 1, 2, 4, and 5). It is the current "World Record" for size, and is the only *Haliotis* shell ever documented to have reached 12 inches! Since it's discovery, five more specimens ~296 mm or larger have been found, the largest of these measuring 302.5 mm (11.91 in.). With the exception of a single specimen taken at Shelter Cove, these examples were all taken in a similar ecological niche as the 313 mm abalone. Table 1 on Plate 6 shows data on the six largest shell specimens known to us. The actual locality has been omitted at the request of those who found these giants.

Remarks: A photograph of a large shell specimen exists which was measured by a California Department of Fish and Game biologist around 1995 as being 303.4 mm in length. A very poor-quality image may be found on the internet of this specimen being measured, which casts doubt as to the accuracy of the size listed. None involved with this report have ever seen this specimen to confirm its size, and for this reason, it is not included in this report.

Environmental:

Here, listed briefly, are the major specific ecological conditions and other factors shared by a large percentage of the 280 mm plus (11.0 in.+) *H. rufescens* which have thus far been found:

1) Shallow water (usually <5 meters depth [15 feet]).

2) Very low population density – found singly or in groups of two or three – usually without the presence of sub-adults or small juveniles nearby.

3) Areas typically exposed to heavy wave action that normally are far too rough to dive and often have very poor visibility. Accessible only during exceptionally tranquil conditions.

4) Areas with huge boulders and/or deep crevices that afford major protection against heavy seas.

5) Shells containing relatively few attaching organisms which cause shell destruction (boring clams, boring sponge, etc.) The animals are able to deposit shell increment rapidly with little energy expended for shell repair. The shells are often covered with an encrusting yellow sponge that tends to protect the outer shell surface from attack.

6) Living specimens are most often found upside down attached to the top of the crevice or hole.

7) Availability of preferred, algal food species that promote optimal growth.

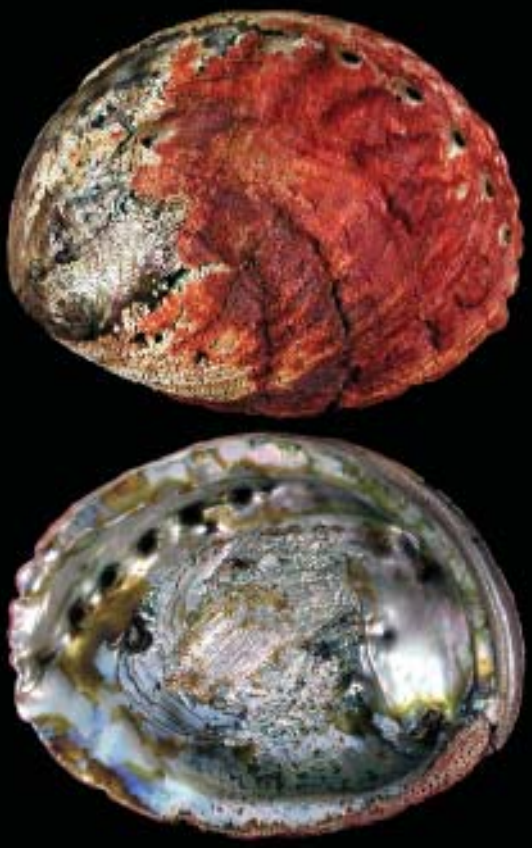
8) Gender of the specimen.

Specific Data:

Presented here are photographs and measurements of the six largest shells known to the authors, plus several additional specimens over 290 mm (11.42 in.) (Plates 2, 3, and 7). Additional photographs illustrate five of the six largest specimens with the divers who retrieved them, one with the animal still in the shell shortly after being taken. Further, a pair of 270–275 mm (10.63-10.83 in.) specimens are shown with animals attached to give an indication of their huge size. These two specimens weighed almost 11 lbs. (~5 kg) each, including animal, and each yielded approximately 1.5 kg (3 lb.) of actual edible meat. Finally, the two largest animals we have thus far

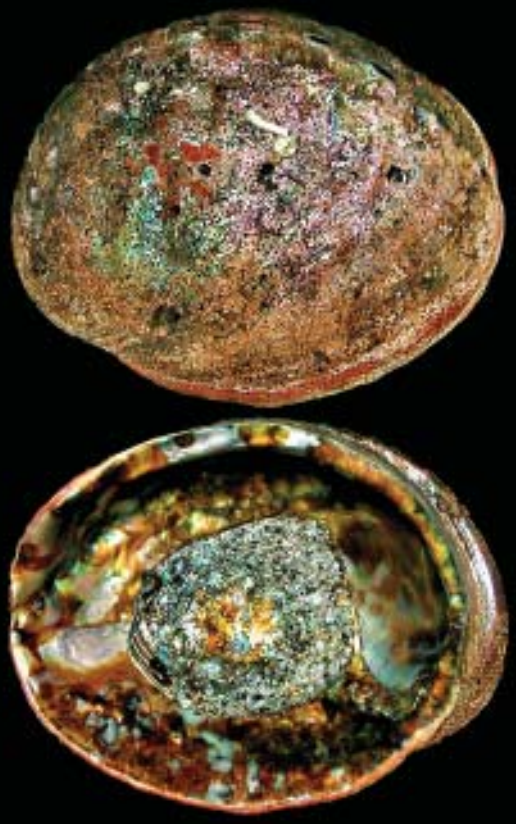
Continued on page 255

Johnathan Centoni with 1 live-taken, 282.0 mm (11.06 in.); 1 broken, 267.0 mm (10.50 in.)



Bob Spinale's 3rd largest. 299.5 mm (11.79 in.)

World's largest known abalone for 31 years - August, 1952 to Sept. 1983. Taken by Gustar "Swede" Armann, at Crook Pt., San Miguel Island. 35 ft. (10 m). 293.1 mm (11.56 in.)



Jeff Centoni's 6th largest. 296 mm (11.66 in.)

Plate 3

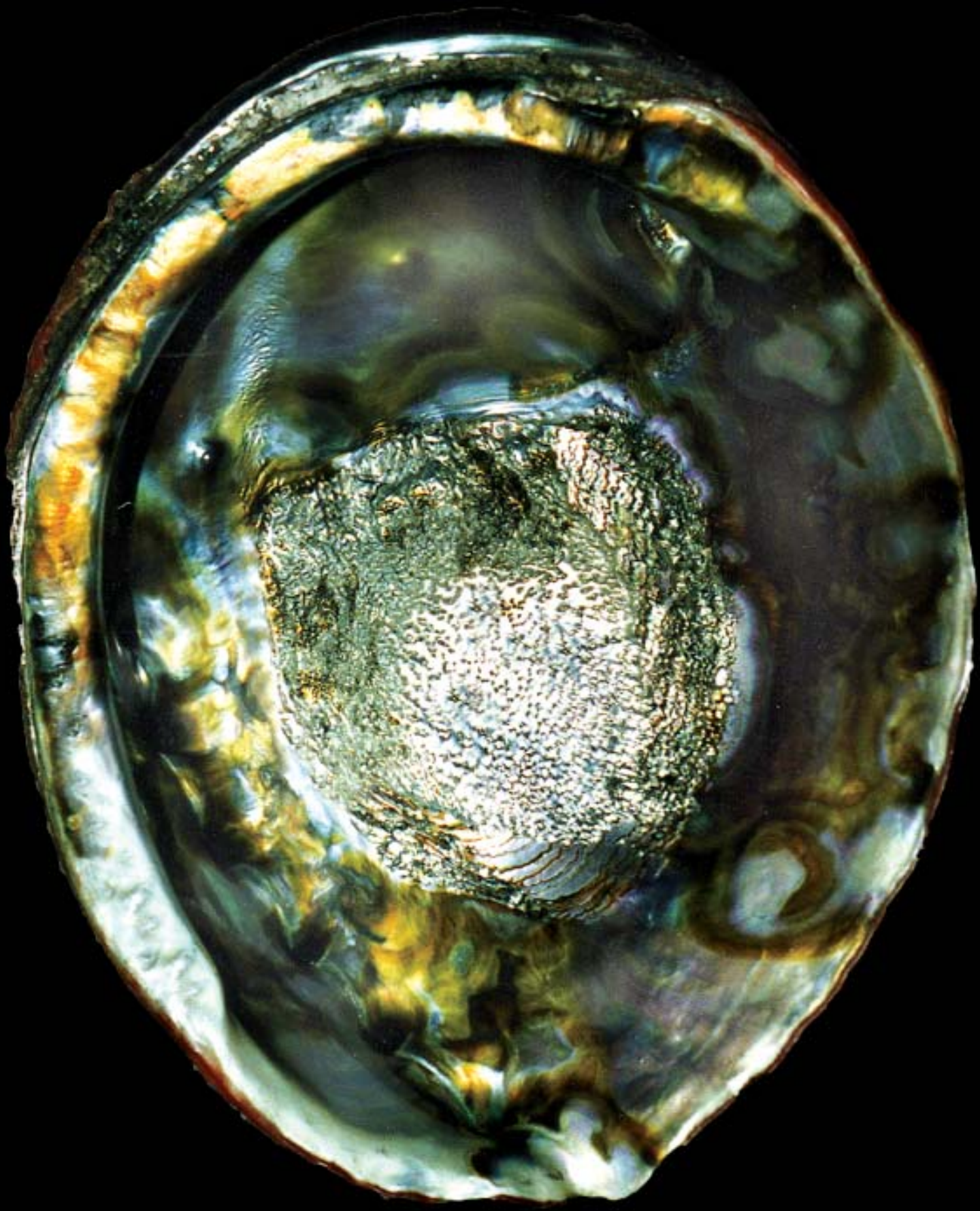
More giant abalone, including the 3rd and 5th largest specimens.

Plate 4

WORLD'S LARGEST *HALIOTIS* (ABALONE) SHELL

This specimen of *Haliotis rufescens* Swainson, 1822, is the only *Haliotis* known to ever reach 12.0 in. (or more) in length. It measures 12.32 in. (313.0 mm) and was taken on 5 September 1993 by John Pepper in 12 feet of water (4 m). The exact location the specimen came from is known only to Pepper.

Plate 5



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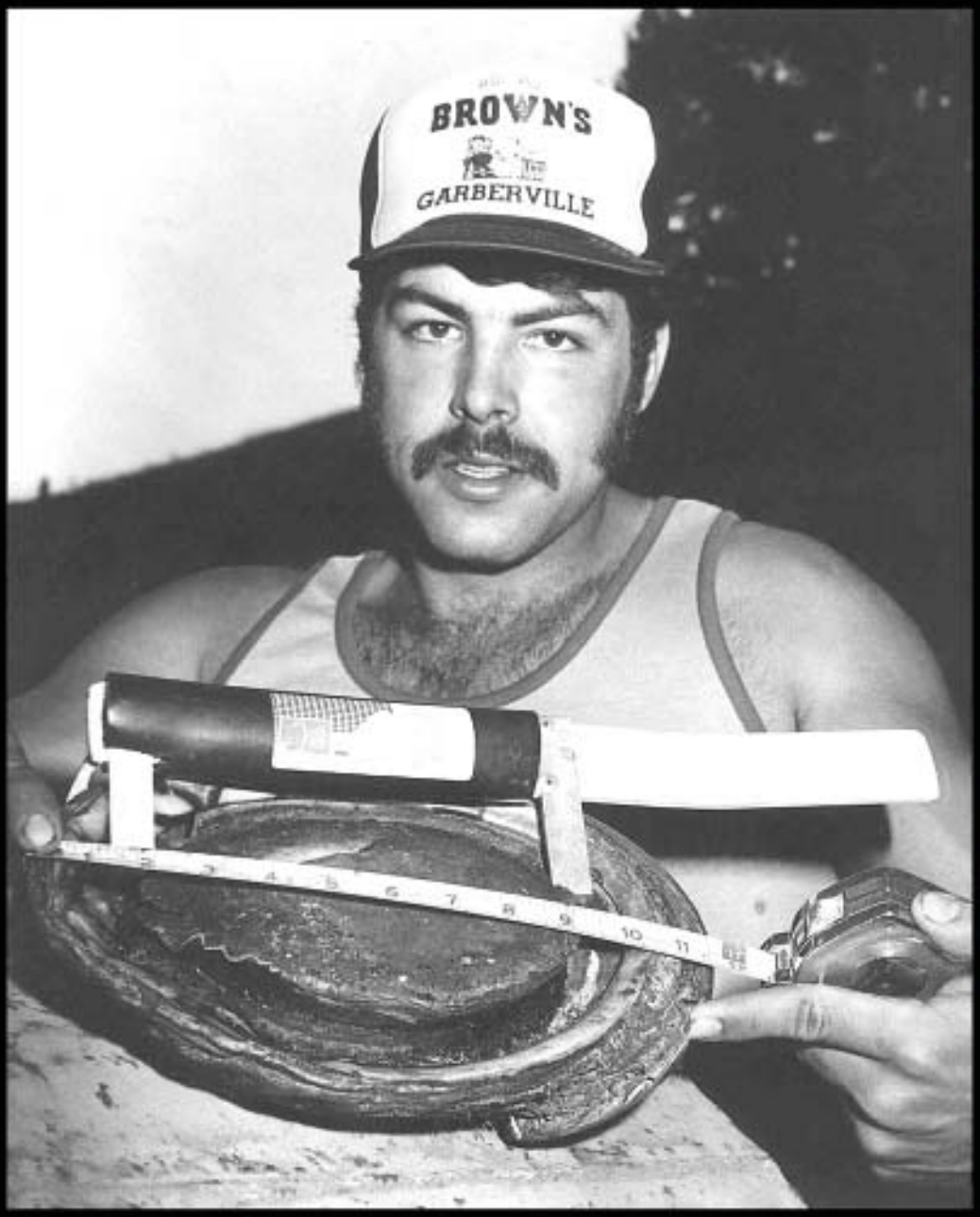
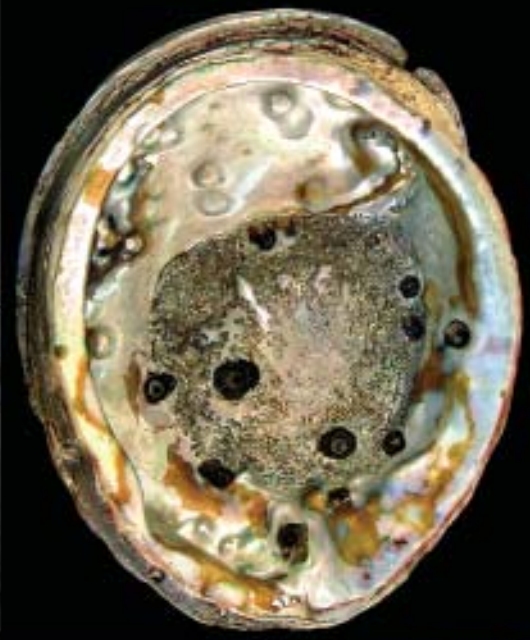
This specimen of *Haliotis rufescens* Swainson, 1822, is the only *Haliotis* known to ever reach 12 (or more) inches in length. It measures 12.32 in. (313.0 mm) and was taken on 5 September 1993 by John Pepper in 12 feet of water (4 m). The exact location the specimen came from is known only to Pepper.





DON THORP 18 April 1961 - 21 June 1985.

This gentle giant of a young man was killed by a terrible logging accident at the age of 24. Loved by all his friends and family, he became sort of a legend to the other "Big Red" hunters (though few really knew him), and became affectionally known as "Donnie" - a name not used by people who actually knew him. These photographs are two of the three known of Don with his "World Record". As the two top images show, the animal was an aged senile specimen, and the shell was heavily eroded. The shell measures 298.7 mm (11.76 in.), but at its maximum size, many years earlier, the shell may well have exceeded 12 in. (305 mm) in length, having lost at least 0.25 in. in size.

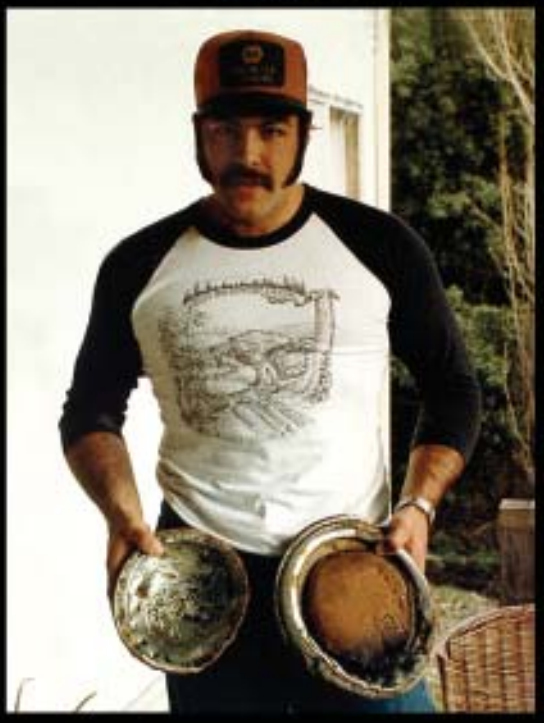


PLATE 6

A TRIBUTE TO DON THORP

Continued from page 250

recorded are photographed; one in a natural state and the other trimmed for consumption. The largest of these would have fed approximately 13 (!) people, in a typical "abalone dinner" scenario.

DISCUSSION

Of the parameters listed that we believe can cause gigantism in red abalones, perhaps the most important are low population density, optimum environmental conditions with respect to water circulation, and availability of the best algal species for food. A number of other *Haliotis* species also seem to respond similarly. Scattered individuals of huge *H. fulgens* Philippi, 1845, (>225 mm; 8.86 in.) used to be found well back under ledges in areas of major exposure to large Pacific swells in North La Jolla, from Marine Street to Alligator Head, and La Jolla Cove. Unusually large specimens – one reported near world record size (>250 mm; 9.84 in.), were found in a similar environment near Corona Del Mar, around 1950 (Conrad Limbaugh, pers. comm.). Very few other *Haliotis* were found in this general area, and virtually all were very large. Giant specimens of *H. corrugata* (>220 mm; 8.66 in.) were sometimes found in these areas as well. One very similar location used to exist near Dutch Harbor, San Nicolas Island, where several huge *Haliotis* were found under two large, deep, undercut ledges in 10 m. Amongst the 5-6 giant abalones found under these two ledges were a specimen of *H. rufescens* measuring >270 mm (10.63 in.) and two huge *H. corrugata* which exceeded 220 mm (~8.75 in.) in length. *Haliotis walallensis* found in extreme northern California and southern Oregon may reach world record size of ~7 in. (>175 mm), and are found back under ledges at very low population densities and in areas of excellent circulation and food availability. In Greece, at a particular spot on the island of Crete (where the closing scene of "Zorba The Greek" was filmed), an exposed open cove area was found where a very low-density**,** scattered population of *H. tuberculata* "form" *lamellosa* existed. Only 20 specimens were found in this cove, but nearly all were over 50 mm in size – the largest of this species that Owen had discovered in eight trips to Greece diving 13 different islands. Several Australian commercially taken species are also distributed similarly (R. Kershaw, pers. comm.). Factors that cause such low population densities in especially choice habitats are largely unknown, but on occasion, one appears to be the severely declining population density of a species as it reaches its distributional limits. Competition for space and food is diminished by fewer animals being present, thereby allowing individuals to approach their full genetic potential in size. This can be demonstrated in a marine shellfish lab as well (Owen, pers. obs.). This is true of both *H. walallensis* and *H. rufescens* in their extreme northern points of distribution, where reproduction and/or recruitment is infrequent and/or marginally successful, but environmental conditions are optimal.

Though the huge >290 mm (11.42 in.) specimens found in northern California have come from depths generally less than 5-6 m (15-20 feet), this appears to be mainly a function of water temperature – *H. rufescens* preferring temperatures below 12-13 degrees C. In southern California, where warmer temperatures are found inside of 15-20 m (45-55 feet) or so, extremely large specimens have been taken in deeper, colder, water. Two examples would be a 293 mm (11.55 in.) specimen from over 28 m (90 feet) at San Nicolas Island (TMC), and another measuring 285 mm (11.25 in.) from the south side of Santa Cruz Island (MDC). Both of these specimens were found in low-density populations.

Another important factor involved in the size a given abalone may eventually become, is genetically controlled. For 14 years, Owen worked in a marine shellfish hatchery, actively involved in abalone culture, mainly with the red abalone. During the course of raising the animals of many spawnings to well beyond one year of age, it was observed that there was a great disparity in the rate of growth within a given spawning. For example, at the age of 12 months, approximately 5% of the animals would have reached a size between 25-30 mm (just over an inch), while 5-10% were less than 8-9 mm (about .25 in.). The remaining 85-90% were scattered along a continuum of sizes intermediate to the two extremes. From years of studying very large numbers of red abalone in natural populations, Owen has discovered that it is sometimes possible to estimate the ages of individual specimens quite accurately, often aided by alternating bands ("diet banding") of bluish-white and a reddish shell color. From such studies, it is obvious that under optimal environmental conditions, an abalone possessing excellent genetics for growth may reach a size of ~200 mm (8 in.) in around seven years. Shell specimens exist, taken from such populations, that have reached a size of about 9 in. (~225 mm) in approximately eight years (BOC). After observing a 9 in., living specimen that was marked by a notch in its shell, replaced in its optimal environmental habitat, and grown out to a size of 10.25 in. (~262 mm) in 2.5 years, it is strongly suspected that a red abalone can, under certain circumstances, grow to a size of 10.5 to 11 in. (265-280 mm) in approximately 15-20 years. After reaching their full, mature size, individuals stop adding new shell increment which increases their maximum length measurement, and a process of biogenic shell deterioration begins, which usually decreases their maximum measurement – often by as much as 8-10 mm (.25 in.). In the case of the world record 313.0 mm (12.32 in.) abalone (JPC), it was taken at a stage of development while it was still growing, but was just beginning to enter the phase of development where the aforementioned deterioration of the outer layer (ostracum) was about to occur. Had the animal been found a year or two later, a section of ostracum in the area where one of the maximum measurement

points occurs, might have crumbled/eroded away, with the shell decreasing in size about 8-10 mm (.25 in.), possibly ending up being slightly less than 305 mm (12.0 inches). It is also clear that had Don Thorp's 11.76 in. (298.6 mm) specimen been taken several years earlier, before (due to extreme senility) severe erosion of the entire ostracum had occurred, it would have almost certainly measured over 12 inches (304.8 mm) in length. This is probably also true of Dinucci's 302.5 mm specimen and Spinale's 299.5 mm shell. Again, it is clear that Pepper's world record specimen was taken during that brief point in time when it had achieved its maximum size, prior to any significant ostracal deterioration. In my opinion (Owen) an "educated guess" as to its age would place it at 22 to 27 years. The same appears to be true of a good percentage (>75%) of the other shells Pepper had taken from this same area. This is interesting, as severe flooding from rivers had occurred throughout coastal areas in extreme northern California during the winter of 1964-1965. This flooding had destroyed very large numbers of red abalones in the near-shore extreme northern parts of the species range (Dale Snow, Oregon Fish and Wildlife, pers. comm.; Ed Samuels, pers. comm.). *Haliotis rufescens* is very sensitive to lowered salinity, and massive flooding from rivers can cause large, though infrequent, mortalities. We believe that most of Pepper's huge abalones found in this area, including the 313 mm world record, represent animals that resulted from "recruitment events" that occurred after the winter of 1964-'65. There is much evidence now that recruitment is very sporadic in these extreme northern parts of the species range – from Eureka, California, to Cape Arago, Oregon (the species extreme northern point of distribution), but it is beyond the scope of this report to pursue the subject further. It seems a reasonable conclusion to suggest that a red abalone, under proper circumstances (excellent environment and genetics) may reach its genetic potential for maximum shell length, in 25-30 years.

Two additional points deserve attention; the size of the animals in these giant specimens, and their gender:

1) Plate 7 illustrates the largest animals that have come to Owen's attention in 55 years of observation and study of large red abalones. The largest of these enormous animals, detached from the viscera, gonad, and other soft tissue, originally weighed over six pounds (2.72 kg), though it lost nearly a pound (454 g) of water after it was frozen and thawed twice, now weighing just over 5 lbs after freezing a third time. The largest animal weighed by Owen previously was just over 4 lbs (1.9 kg) *before* freezing. That the edible processed meat from this >5.0 lb giant would be enough to feed approximately 12 people, gives this figure additional perspective. Animals from the large commercial species found in Australia (*H. rubra rubra*, *H. rubra conicopora*, and *H. laevigata*) seldom weigh in excess of 1.5 pounds (~675 g) (R. Kershaw, pers. comm.). This enormous animal is pictured placed inside a 293 mm (11.55 in.) shell, and easily fills it (Plate 7). The original shell from which it was removed measured 283 mm. A second animal taken in October, 2004, weighed 4 lb 3.5 oz (~2 kg) *after* trimming, and thus appears even larger than the above giant, which from all appearances will probably "trim out" at less than four pounds. The >5.0 lb untrimmed animal is still frozen at the time of this writing (October, 2004).

2) The second point has to do with the gender of these massive animals. All five of the world's largest known specimens were males, and this has been true of the vast majority of 11 in. plus (~280 mm) animals where the gender was recorded. In addition to this fact, and probably related to it is the observation that virtually 100% of the extremely large creamy-white colored (full of glycogen-rich body fluid), animals which are selected from natural populations by sport divers, are also males. This is especially true with large, mature animals (like those most experienced sport divers would select) which generally measure 9 in. or larger (~230 mm). Large, mature females most often tend to be "off-colored" (grayish-brown towards greenish-brown), have a course texture, and are much smaller in animal (muscle) mass – often due to a copious loss of water after removal from natural conditions. These differences in gender may be much less noticeable to absent in small, fast-growing sub-adults (young adults) of barely legal sport size (7 in./~180 mm). These observations are based on the study of large numbers of abalone harvested on the North Coast of California – it will take further study to determine if this is the case with red abalones found south of Point Conception to Baja California, Mexico.

ACKNOWLEDGEMENTS

We would like to thank David Leighton for his help editing the manuscript, and additionally for his assistance in the sections on *Haliotis* biology. We wish to acknowledge Tom Grace and Steve Browning for their helpful suggestions and comments. We particularly would like to thank Jeannie and Charlie Thorp for their patience with us in obtaining the finest set of photographs of their late son Don's legendary shell that exists, and finally, we wish to express our gratitude to the dedicated, highly experienced, skin divers who hunt these giant abalone and provided the material for this report. We list them here alphabetically: Jeff Centoni; Johnathan Centoni; Erik Owen; Jack Likins, John Pepper, Bob Spinale, and the late Les Wandel.

SUGGESTED FOR FURTHER READING

Abbott, R. T., 1974. American Seashells. D. Van Nostrand Co., Inc., Princeton, NJ. Second Edition. 663 pp.

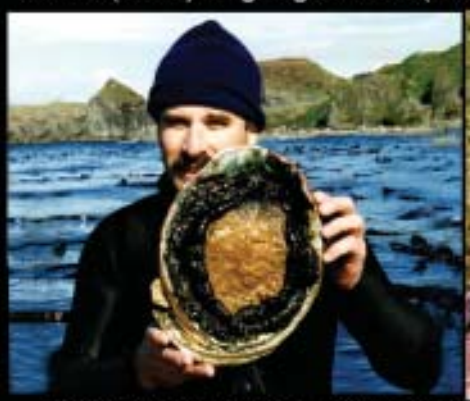
Abbott, R. T. and S. Peter Dance, 1983. Compendium of Seashells. E. P. Dutton, Inc., New York. 411 pp.

Continued on page 274

"World Record" abalone for "finished" weight. Trimmed animal on right weighs 4 lb 3.5 oz (1.92 kg). Shell measures 10.13 in. (257.0 mm).

Third largest abalone in "finished" weight - trimmed animal weighed 3 lb 5 oz (1.50 kg). Shell measures 10.75 in. (272.0 mm). Animal in shell weighed 10 lb 15 oz (4.97 kg).

"World Record" animal (untrimmed weight) from 11.13 in. (282.0 mm) shell. "In shell" weight was 12 lb 2 oz (5.54 kg), with animal (A & B) weighing over 6 lb (2.73 kg). Animal is placed inside an 11.56 in. (293.1 mm) shell in C. Taken by Les Wandel.

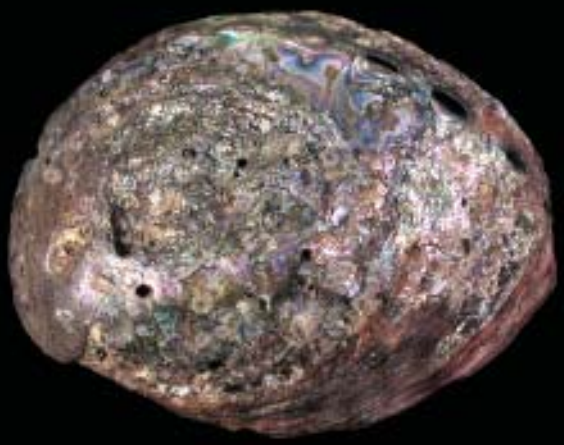


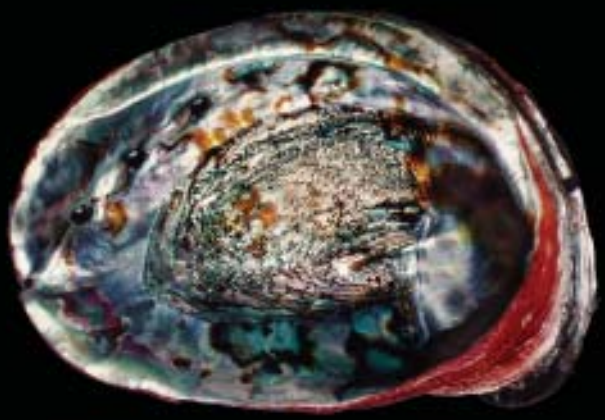
Dinucci with 11.56 in. (293.1 mm) specimen. The animal is somewhat smaller than the others on this plate.

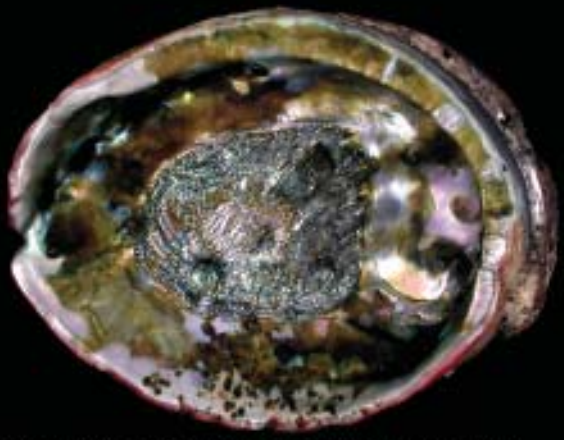
Jack Likins with two specimens with HUGE animals. Each weighed over 4 lb before trimming. Shells measure just over 10.50 in.

Erik Owen with an enormous male over 10.50 in. (267.1 mm). Trimmed animal weighed over 3 lb (1.36 kg).

Plate 7







Fifth largest shell. 11.75 in. (298.5 mm). Taken by John Pepper (1994)

One of the 10 shells mentioned below. 11.55 in. (293.0 mm). Taken by Erik Owen (2002)

6 Largest Abalone

"Ranking"	Length	Width	Height	Weight (shell only)	Collector/Diver	Year
1	12.32 in. 313.0 mm	9.75 in. 247.7 mm	3.50 in. 88.9 mm	5 lb 1.5 oz 2.3 kg	John Pepper	1993
2	11.91 in. 302.5 mm	9.11 in. 231.4 mm	4.13 in. 104.9 mm	4 lb 8 oz 2.0 kg	Dwayne Dinucci	1997
3	11.79 in. 299.5 mm	9.15 in. 232.4 mm	3.70 in. 94.0 mm	2 lb 15 oz 1.3 kg	Bob Spinale	1994
4	11.76 in. 298.7 mm	9.53 in. 242.1 mm	3.50 in. 88.9 mm	4 lb 10.5 oz 2.1 kg	Don Thorp	1983
5	11.75 in. 298.5 mm	8.13 in. 206.5 mm	N/A	N/A	John Pepper	1994
6	11.66 in. 296.2 mm	9.28 in. 235.7 mm	3.72 in. 94.5 mm	1 lb 14 oz 0.9 kg	Jeff Centoni	1994

An additional 10 shells exist which measure between 11.50 in. (292.1 mm) and 11.63 in. (293.6 mm).

TABLE 1. Details of the six largest known *Haliotis* shells.

Plate 8

New records of land snails from the locality of "El Yayal" Holquin, Cuba

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Alejandro Fern ndex Vel zquez**

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Key Words: Terrestrial Mollusca, Cuba, New Records

INTRODUCTION

The study of terrestrial mollusks in Cuba, related to specific communities is scarce. In the last decade of the 20th Century (1990-2000) there was a tendency to publish listings of species by locality, which brings us to a greater understanding of their geographical distribution (Maceira, 2000). During the early history of Cuban land snail malacology some localities in Holguin Province were explored and numerous native species were described by both Cuban and foreign naturalists/ biologists. We can cite as the first attempt to catalogue the terrestrial mollusks from the Cuban Archipelago the work by Espinosa and Ortea (1999).

The main goal of these community studies of land snails was systematics. The first reference to malacological explorations was carried out by the greatest Cuban naturalist of the 20th Century, Don Carlos de la Torre y Huerta. He visited El Yayal, but the results of that visit were never published. Aguayo wrote (1932): "… the malacological fauna of the region of Holguin has been almost unknown; Gundlach and Arango had obtained buit very few species from the locality. During the year 1914, Dr. Carlos de la Torre and the late John Henderson visited 'El Yayal', five miles south of the town of Holguin, but as yet the results of their trip remains unpublished. From 1926 to 1931 I (Aguayo) made several excursions to that region, and had the opportunity of finding several new specfies of land shells, those of the genus *Ophistosiphin* were very remarkable …"

The first list of land snails from this locality was made by Bidart et al (1996), where they acknowledged 15 species; another 9 were added by Fern ndez et al (1999). All research was done in the western part of El Yayal. Our focus was on the area towards to the east of the hilly area of El; Yayal, an area not previously researched. Our objective was to add species to those listed previously.

MATERIALS AND METHODS

El Yayal is an area of small hills, 3 km^2 located 5km south of the city of Holguin, Cuba. Holguin has a population of more than 250,000 and is the capital of the Province of Holguin (see map, pg. 263). The Province of Holguin has an area of 6545.9 square kilometers and a population of 311,607.

Semideciduous forests occur at lower elevations in the eastern area of El Yayal between the base and top of the hills. The rocky hillside, N20 50'07.1"; W76 13'54.5" and hilltop N20 50'04.6"; W76 13'54.0" were explored. Highest elevation was 801 ft a.s.l, measured by GPS. Here calcareous rocks are very abundant along with a deep leaf litter. The forest is made up chiefly of wild tamarind (*Lysiloma latisiliquum*). The soil contains high concentrations of N (0.60%) and Ca (1.08%) as well as organic matter (10.25%), Na (23.07 ppm), K (116 pp0m) and the pH is about 7.2 (Bidart, 1971)

Three explorations were carried out during the following year+: October 15, 2002, January 21 and May 11, 2004. The period of the search on each occasion was around 4 hours per day, always between 0900 and 1200 hrs. Participants collected at random in the forest carefully searching leaves, branches and trunks, under and above rocks, fallen branches and logs, as well as leaf litter and the surface of the ground. Dead material was ordered by families and some living specimens were drowned in water over a 12 hour period then preserved in 75% alcohol. Identification of the species was carried out using literature by Aguayo (1932a, 1932b, 1934, 1935), Boss & Jacobson (1973a, 1973b), Clench (1934), Jaume & Torre (1976), Pilsbry (1903, 1904, 1906), Torre & Bartsch (1938, 1941), Schileyko (1998, 2000) and may others.

RESULTS AND DISCUSSION

The land snail species for the El Yayal areas was raised to 31. Previously 22 species had been listed by Bidart et al (1996) and Fern ndez et al (1999). Our efforts resulted in 9 new records of species belonging to five families

GEOGRAPHICAL DISTRIBUTION AND SOME COMMENTS

Alcadia minima (see page 261)

Cuban endemic. *Alcadia minima* was described from throughout Cuba. The geographical distribution in Oriental Cuba is as follows: Hill to North part of Valle Mercedes and other places around Miranda, Arroyo del Agua southeast from Central Ram n in Santiago de Cuba Province; Buena Vista south of Bayamo, Sierra Maestra; Cayo Duan, Santiago de Cuba; Puerto Portillo, Cabo Cruz, Granma; Silla de Gibara, Holguin Province;

Cayo Franc s, Palma Soriano, Portales de Camey n, Pico Turquino (Boss & Jacobson, 1977). Yarayabo y Lagunas, Santiago de Cuba (Freyre & Alayo, 1946). Maceira (2000) recognized this species from Bahia de Caba a, Santiago de Cuba and has confirmed its distribution from Pico Turquino to Pico Cuba. Its discovery in El Yayal is considered a new record.

A. minima is characterized by the small size of the shell (h. max. 4.5mm and diam. Max. 5.5mm), but note a MCZ specimen from Silla de Gibara with height of 4.9mm. Shell fragile and rather colorless, pilose periostracum and the very narrow, slightly expanded lip. *A. minima* has six synonyms: i.e. *Alcadia quinonesi* Clench & Aguayo, 1950 from Banes, Oriente. Boss & Jascobson (1973, pg. 319) give the species main characteristics: periostracum hirsute or pilose, decidudous = *Penisoltia* (*Alcadia minima*). It is importanrt to note that these authors have used "large lots" of specimens from Cuba, but only from USNM, ANSP, MCZ and some from Museo Poey and Warszawa/Poland. Absolutely the best photograph in this work is Plate 1, Fig. 6 = *Alcadia minima* with a big "pearl" on the base of the columella; it is from "Silla de Gibara, Oriente – 4.9mm high (MCZ 128 722).

Helicina species

Identification of specimens from El Yayal and other localities in Holguin Province is very difficult and comparisons with many more of these small land snails is necessary. The occurrence of this genus in El Yayal is considered as a new record for the genus.

***Macroceramus canimarensis* (pg. 262, fig. 3)**

This species is of the genus *Macroceramus* Guilding, 1828, which has not been revised since 1904. In the literature the genus is noted from all provinces of central and eastern Cuba (Espinosa et Ortea, 1999), but in fact is only cited from the provinces of Guantanamo (Yateras afer Gundlach), Palma Sola (after Poey; both in Arango, 1878: 81) and Santiago de Cuba (Pilsbery, 1904: 148 and Pilsbry, 1930: 462). Aguayo et Jaume (1939) state that the species is known from "the entire island, but only in restricted areas". [translated from original Spanish]

The finding of specimens in El Yayal is confirmation of the historic distribution data and are furthermore underlined by specimens from Sao Arriba and Pinares de Mayari, both localities in Holguin Province.

***Macroceramus clerchi clerchi* (pg. 262, fig. 4)**

An endemic species known only from Guantanamo Province, Cuba: Cajobabo, Imias and Jojo (Espinosa et Ortea, 1999: 101) and Pilsbry (1904) who named the mouth of the Tacre River as the type locality; he also remarks on the morphological variability in shell color and pattern. Work on these arboreal mollusks in Holguin and neighboring provinces will present important information concerning the distribution in eastern Cuba as well as ecological and anatomical data.

***Macroceramus gundlachi* (pg. 262, fig. 1)**

Finding this species here is logical because of the historic perspective:

Pfeiffer (1852: 174) – Punta de San Juan de los Perros, insulae Cuba (Gundlach)
Arango (1878: 82) – district of Bayamo (Gundlach) and Holguin (after Clerch)
Pilsbry (1904: 140) – Eastern Cuba: Punta de San Juan de los Perros (type locality), Cayos de Cardenas and Guisa In Bayamo district (Gundlach) and Holguin (Clerch)

In the Museum of Natural History of Holguin are specimens from Santa Cruz, Holguin Province from the historical collection of Garcia Feria, coll.-no. 1-1605, in very beautiful condition.

***Brachypodella angulifera* (pg. 262, fig. 2)**

This taxa is of the very large family Urcoptidae. The scientific literature has described the occurrence of this species only as general to the Holguin Province or especially the hill region of Mayari, Sagbua de Tanamo or Farallones de Nipe, all in the eastern part of the province.

Only Torres (1987: 4) recorded the species as "difficult to find" in the hill system of El Yayal. We have found the species in El Yayal (5 specimens), on the Cerro de Yaranuquen (7 specimens) 12km north of the city of Holguin, on Cerro Machin (3 specimens) near Sao Arriba and from Cerro de Unas (2 specimens) 18km northwest of Holguin in the municipio of Gibara, Holguin.

***Haplotrema paucispira* (see page 261)**

An endemic spoecies from Oriente-Camaguey; also from Guisa. Holguin, Gibara, Guant namo and other places of oriental Cuba (Espinosa & Ortea, 1999). Guant namo (type locality), Yateras, Yunque de Baracoa, Piedera la Vela, all in Guant namo Province; in Corralillo, Brazo del Cauto, Lagunas, San Luis, El Ram n, Jarahueca, and Gran Piedra, all of Santiago de Cuba Province; Guisa, in Granma Province; Sagua de T namo, Gibara and Cueva Grande, all in Holguin Province; Najasa in Camaguey Province. And these additional localities: Pico Cuba, Guam , Santiago de Cuba, La Isabelica y La Idalia, Sierra de la Gran Piedra, Santiago de Cuba, La Tabla III Frente (Maceira, 2000). But our El Yayal specimens add a new locality to the

Alcadia minima

Haplotrema paucispira


1
1
1
2
3
4
5

list. We have found this very small species in many other localities in Holguin Province such as Cerro Machin, Sao Arriba and in the Cerro de Yaraniquen.

Praticollela griseola

An alien species, found in several Cuban localities (Espinosa & Ortea, 1999) The species prefers low bushes and grasses and, sometimes, rocks – always in open spaces. This species, of the family Polyhyridae has a wide distribution in North America, the Bahamas and Bermuda (Pilsbry, 1i894) and was introduced to Cuba. The first record from the island is from Vanatta (1920) for the green city area of La Habana and then Aguayo (1944) added nearly all the provinces of Cuba, probably mostly in cultivated areas.

Subulina octona

A species from tropical America and subtropical areas all over the world. It is known from Cuba in gardens and parks all over the island (Espinosa & Ortea, 1999: 112). The occurrence in El Yayal made be connected with agricultural or human influences.

ACKNOWLEDGEMENTS

First we wish to exprfess our thanks to Marlies Marker who always accompanied us throughout the field work, as well as her generosity in giving financial support for several explorations. And to Maria Osorio of the Museum of Natural History “Carlos de la Torre y Huerta”, Holguin. And to Tom Rice who has “opened the gates” of the magazine of Sea and Shore to publish our articles.

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The Asian Freshwater Clam, *Corbicula fluminea* O.F. M ller, 1774 (Bivavia: Corbiculidae), First Record in Holguin Province, Cuba)

Alejandro Fern ndez Vel zquez & Steffen Franks

(see page 262, fig. 5)

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The intense construction of dams, micro-ponds and all types of water reservoirs and channels (most of them built within the last 40 years) have caused a transformation in the hydrological basins of Cuba. These were all part of the effort for the development of the Cuban socioeconomic resources. Because of the shortage of water as a resource for agriculture, aquaculture, industrial and human consumption as well as to mitigate the damage caused by flooding during the cyclonal season and to store water during intense droughts, these projects were initiated.

This transformation created new landscapes where one can find many different habitats. It also increased the possibility that invader species might colonize all types of artificial aquatic habitats as well as the natural aquatic ecosystem. A very well known example of this is the expansion of th geographical distribution of the Asian Clam, *Corbicula fluminea* M ller, 1774 (Bivalvia: Corbiculidae). A native of tropical Asia, it has invaded North America (Sinclair, 1971; Dundee, 1974; Briton & Morton, 1986; Eichhorst, 2004), the north of Europe (Kinzelback, 1991; Grabow & Martens, 1995) and, recently it was recorded in Cuba (Espinosa et al, 1994; Milera & Quiros, 1995). **Continued on page 275**

THE "BUZZ" ON ABALONES

A TRIO OF GEMS FROM SOUTH AFRICA!

Buzz Owen

This month, I thought it would be nice to continue the "eye candy" idea, and illustrate here three of the South African *Haliotis* species, which are certainly amongst the World's most beautiful shells. The three species I will be focusing on in this report are *H. parva*, *H. queketti* and *H. speciosa*.

But first, a brief overview of the *Haliotis* species found in South Africa. There are five endemic species, with two of them being very common (one having been heavily fished commercially for years). These two are *H. midae* Linnaeus, 1758, and *H. spadicea* Donovan, 1808. Severe poaching, a major problem that has diminished their number**s** greatly, has recently resulted in strict regulatory protection. These two species are the largest of the five, and are found in very shallow water, making them extremely vulnerable to over-fishing. Neither species is particularly attractive to shell collectors, and specimens of decent quality are often difficult to obtain – particularly of the largest form, *H. midae*. Nice specimens of *H. spadicea* are easier to come by, but it is still not a particularly attractive species.

A sixth species, *H. pustulata*, may exist in the extreme northern part of South Africa; in the Durban area and at Park Rynie, along the coast of Natal. (Alwyn Marais, Werner Massier, Dawn Brink, and Steve Browning, pers. comm.). However, this is generally recognized as a western Indian Ocean species and the few shell fragments, whole beach shells, and one or more live-taken specimens found in the past 30 years suggest it is extremely rare in this southern-most extreme of the species range.

H. midae, H. pustulata, and *H. spadicea* are not illustrated herein, as I am testing our good editors patience with the excessive number of photo plates that I am using this issue. I would prefer rather to illustrate and thoroughly discuss the remaining three *Haliotis*, a decision that I am sure few of you would disagree with! So let's get to a little background about these other three gorgeous *Haliotis*, which are: *H. queketti* Smith, 1910; *H. parva* Linnaeus, 1758; and *H. speciosa* Reeve, 1846. All three are smaller species (*H. queketti* and *H. parva*, in particular), and are found most often in deeper water (>8-10 m), though *H. parva* and *H. queketti* can occur in the low intertidal zone as well.

To more specific information:

1) ***Haliotis queketti***: Found mostly from the Transkei region of South Africa, to Natal, (though a single odd-looking specimen was reported as dredged [dead] from >100 m in N.E. Somalia). May reach a size of slightly in excess of 50 mm, though specimens in excess of 45 mm are quite rare. Appears to be most commonly found in 10 to 25 m, though specimens are also found in the low intertidal zone. (T. Grace, pers. comm.). This species used to be considered uncommon to rare, but recent severe shell hunting by diver/collectors has unleashed many specimens on the shell market, and they have become much more available. Many *Haliotis* collectors consider *H. queketti* to be the most beautiful of all the world's species of abalone. A look at Plate 1 will illustrate good reasons why ("One picture [in this case 20] is worth a thousand words")! The species varies *wildly* in spiral ribbing as Plate 1 demonstrates, and to say that it varies in colors, and patterns of markings as well, would be a gross understatement. *Haliotis queketti* possesses a genetic orange color phase, which is quite rare and highly sought after by *Haliotis* specialists.

2) ***Haliotis parva***: The most common of the three forms being discussed, *H. parva* has been found from False Bay, to Coffee Bay, Transkei. It does occur in the low intertidal on occasion, but appears most common in 10-25 m. Attains a size in excess of 50 mm (largest 56.7 mm), though specimens over 45 mm are not very common. Of the three species, it has always been considered the most common, but recent pressure on the population of *H. queketti* at Coffee Bay, may have changed that, with more of that species being offered for sale by dealers recently than *H. parva*. The shell usually has a strongly elevated mid-dorsal rib, which aids in distinguishing it from *H. speciosa*, the species it most closely resembles. *Haliotis speciosa* can also have a much larger shell, with mature specimens measuring well over 60 mm. *Haliotis parva* in similar stages of growth would be uncommon over 45 mm. *Haliotis parva* has a genetic**,** solid orange color phase similar to *H. queketti*, but this phase is seen far more commonly in *H. parva. Haliotis parva* has a fairly strong "channel/groove" below the tremata, while *H. speciosa* more gently slopes in this area. *Haliotis parva* has genetic markings that are more jagged, with frequent "triangles" which often resemble "shark's teeth". The markings on *H. speciosa* are usually more "blocky" and rectangular.

3) ***Haliotis speciosa***: This species is far and away the least common of the three. Until about 1998, few specimens were available for study in the U.S. (Katherine "Kit" Stewart had five), and few people I had contact with really even knew what the species looked like! That year I put some pressure on a shell dealer friend in South Africa to try and obtain specimens for me, and he contacted his divers (who collect high interest specimen shells in the Transkei area) soliciting the species (and *H. queketti* additionally). Within two to three years, a good number of specimens had been found, and I even have some preserved with animal. Incidentally, the animal bears no resemblance to *H. parva*, and is another way to differentiate it from this species should one collect a living specimen. *Haliotis speciosa* is found from "Cape Town" (?) to the Coffee

Continued on page 274

Plate 1

All Rows: *Haliotis queketti* Smith, 1910. Coffee Bay, Transkei, South Africa. 15-25 m.

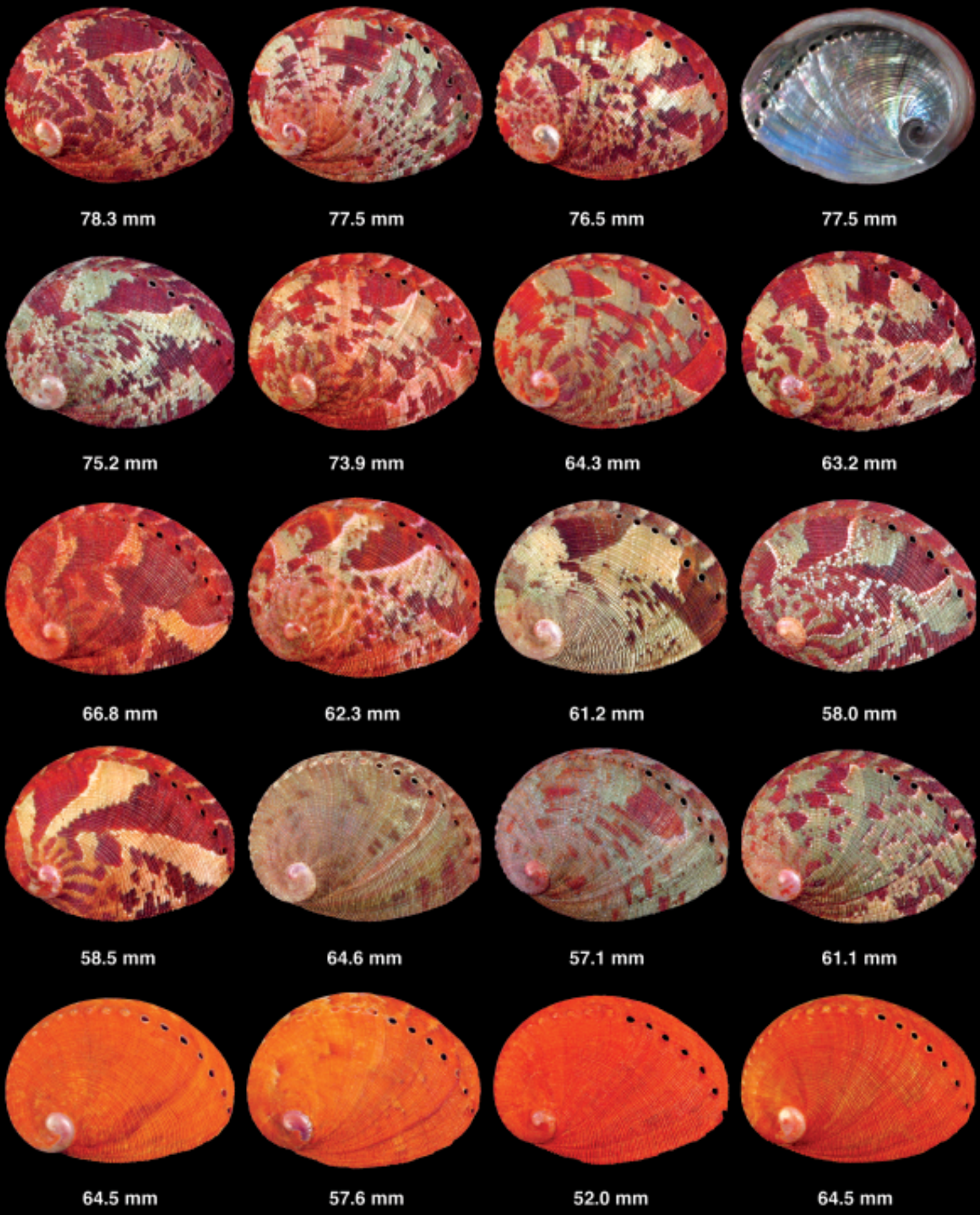

Plate 2

All Rows: *Haliotis speciosa* Reeve, 1846. Coffee Bay, Transkei, South Africa. 20-25 m.

Plate 3

All Rows: *Haliotis parva* Linnaeus, 1758. Jeffreys Bay to Coffee Bay, Transkei, South Africa. 10-20 m.

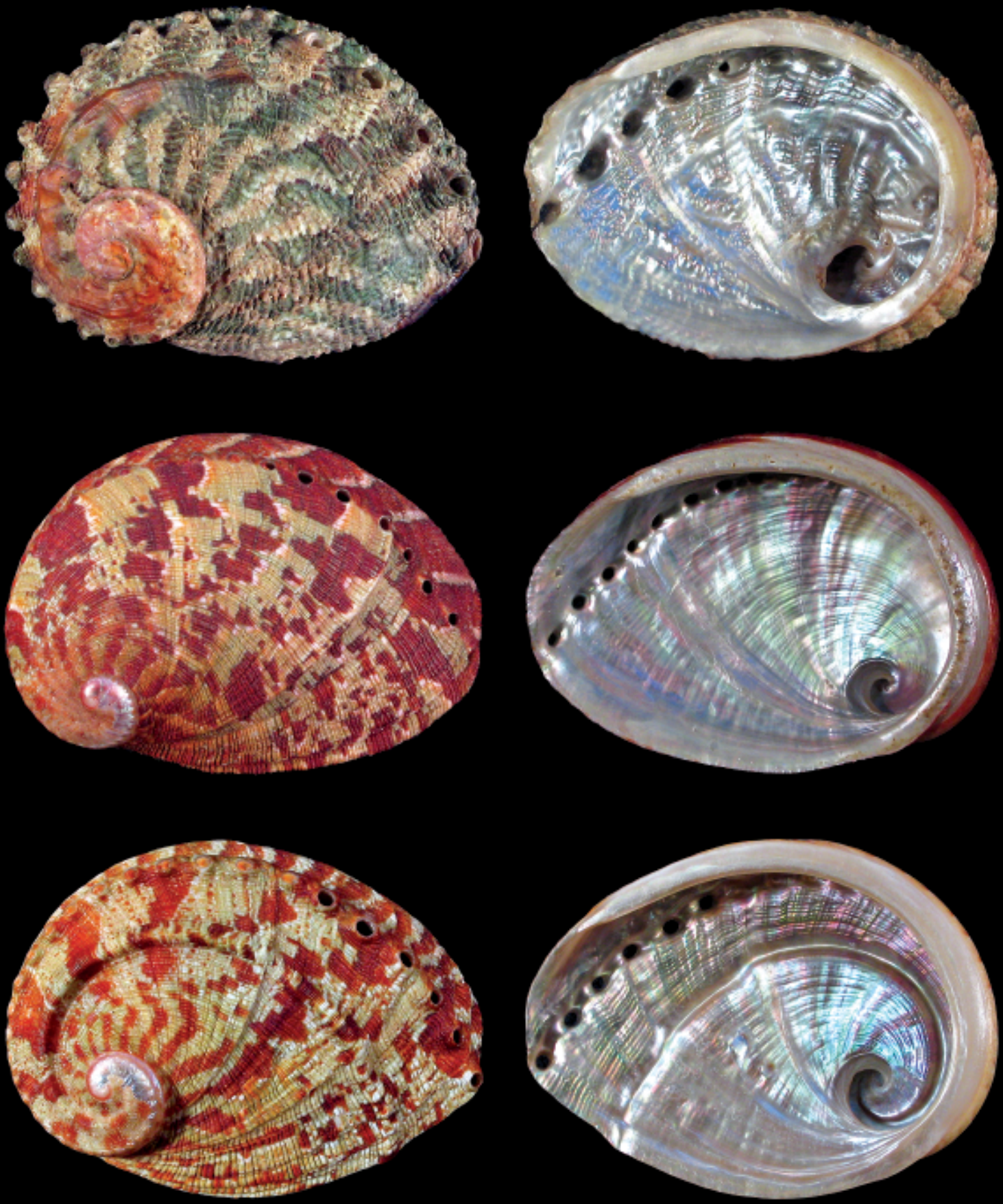

Plate 4

Top Row: *Haliotis queketti*, "World Record" specimen. 52.4 mm. Coffee Bay, Transkei, So. Africa.
Center Row: *H. speciosa* "World Record" specimen. 79.15 mm. Coffee Bay, Transkei, So. Africa.
Bottom Row: *H. parva* "World Record" specimen. 56.7 mm. Jeffreys Bay, So. Africa.

THE CULTURE OF A "FOUR SPECIES" *HALIOTIS* HYBRID IN A MARINE SHELLFISH HATCHERY.

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ABSTRACT

The hatchery culture of a previously unknown hybrid abalone combining the parentage of four species of *Haliotis* is described. The parent specimens, both hybrids themselves, were a female *H. rufescens* Swainson, 1822 x *H. sorenseni* Bartsch, 1940, and a male *H. corrugata* Wood, 1828 x *H. walallensis* Stearns, 1899. Details of the technique used to accomplish this, and the problems encountered during the relatively difficult culture of this multi-species hybrid, are discussed. Shell specimens of this exceptional cross are described and illustrated with high-resolution color photography, and the pigmentation and morphology of the soft body parts are described. Some possible reasons why such an unusual hybrid would not likely be found in natural populations are advanced.

INTRODUCTION

Hybridization in natural populations of Eastern Pacific *Haliotis* is well documented (Owen et al., 1971; Owen and Potter, 2002, 2003; Owen, 2004), as is the culture of some of these hybrids in marine biological laboratories (Owen and Meyer, 1972; Leighton and Lewis, 1982; Leighton, 2000). Instances of a number of these hybrids proving to be fertile in laboratory culture have also been described in the literature (Owen and Meyer, 1972; Leighton and Lewis, 1982). The study described here was part of a series of investigations by Owen which demonstrated for the first time that hybrids among abalone species do, in some combinations, produce viable progeny which become reproductively competent upon reaching sexual maturity. At least two, and probably three, different multi-species hybrids, resulting from the crossing of a fertile two-species hybrid with a third species, have also been documented from natural populations (Owen, MS in preparation). In the latter instance, only single specimens are known to exist of each type; their identity confirmed by the morphology of both shell and soft body parts. Such hybrids are extremely rare, and only due to a huge amount of shell material retrieved and carefully surveyed in abalone processing plant discard piles has evidence of interbreeding been detected. The commercial harvest of abalones has afforded an opportunity to examine very large numbers of individuals, and a comparable sample size is available for few other shellfish families.

Throughout 14 years, from 1965 to 1979, the author was employed by a marine shellfish hatchery, (Pacific Mariculture, Pigeon Pt., California). This position provided the opportunity to work with living animals of the different West Coast *Haliotis* species, including a number of rare hybrids. These were obtained from the author's own diving efforts, and from donations of commercial diver friends with whom he had worked (Owen, 2004). Initial work with conspecific fertilizations led to more advanced and complicated multi-species hybrid crosses and culture, which was highlighted in 1971 with the production of the four species hybrids described herein.

MATERIAL AND METHODS

Animals used in all spawning and culture experiments were kept in fiberglass-covered plywood tanks of 400 liter capacity measuring 0.7 x 1.0 x 1.2 m. Seawater, pumped directly from a near-shore intake adjacent to the hatchery, ran through the tanks continuously, and flowed back into the sea through a discharge pipe located ~200 m distant from the intake (known as an "open circuit" or through-flow system). At this point in time, methods used today to induce spawning in abalones were unknown. Early abalone hatchery operators relied on spontaneous spawnings (Leighton, 2000). When specific sea conditions associated with "spawning cues" (see Discussion, Remarks**)** were observed just prior to this spawning, the hybrid parents were given a quick prophylactic "fresh water rinse" (not sea water) and placed in 20-liter plastic pails which were first sterilized with a mild chlorine solution and rinsed copiously with fresh water (not seawater). Highly filtered (<1.0 micrometer) ultraviolet-irradiated seawater was then very slowly run into the two well-separated pails containing the hybrid parents to be spawned. (Prior to the spawning, both hybrids were examined and found to have very mature gonads and deemed ready to spawn).

RESULTS

Approximately one hour after the male *H. corrugata* x *H. walallensis* was exposed to the water-mass that had been filtered, UV-irradiated, and now contained the "natural spawning cue", it started to spawn. Thirty minutes later, the female *H. rufescens* x *H. sorenseni* started spawning as well. After 30 minutes of copious spawning, the eggs were very gently poured off the female and gently rinsed on a 48 micron "Nitex" (nylon) screen with the same <1 micrometer-filtered UV-irradiated seawater. The eggs were then separated into two groups of approximately 20,000 each, and suspended in two 10-liter plastic containers filled with this same highly filtered and UV-treated seawater. One pail was then set aside, well away from the second container, in another part of the hatchery. This was saved as an "unfertilized control" to inspect later for

evidence of spurious fertilization (e.g., cell division) which would indicate unwanted sperm had contaminated the culture. The contents of the second pail were then fertilized with 25 ml of a diluted suspension of "sperm water" from the pail containing the male *H. corrugata* x *H. walallensis* hybrid.

An inspection of approximately 300 eggs from the unfertilized control two hours after the spawning showed no fertilization. Similar results were noted after 6 and 24 hours. It was clear that no spurious fertilization had occurred, and after about 30 hours the control culture was discarded.

An inspection of approximately 300 of the fertilized eggs after 30 min showed many motile sperm cells, but they appeared to become very sluggish and feeble upon traversing the jelly coat and approaching the egg membrane. Further, few eggs showed signs of being fertilized, and normal cell division (mitosis) seemed well under 1%. Inspection of conspecific crosses being conducted elsewhere in the hatchery *(H. rufescens*, and *H. kamtschatkana assimilis* Dall, 1878) exhibited normal rates of fertilization (~100%) and normal early cell division. Twenty-four hours after fertilization, it appeared about 1% of the eggs had become rotating trochophores, but many appeared oddly shaped and abnormal. After 48 hours, an inspection of a few (15-20) swimming larvae showed mostly normal appearing veliger larvae which had undergone torsion, but there appeared to be only about an estimated 250 swimming in the entire culture. This number seemed to drop a bit by the fourth day (estimate 150-200), and as they were approaching late veliger stages and becoming benthic in what appeared to be a fairly normal manner, they were introduced to a water table coated with diatoms with the hope that possibly 75-100 might survive to become juveniles. This occurred, and postlarval development proceeded extremely well, suggesting the possibility that "hybrid vigor" was being expressed. Excellent survivorship continued, and at about two months, the group progressed through the sometimes problematic "1st respiratory pore stage" of development with very little mortality It is just prior to this point that many conspecific postlarvae suffer a significant mortality rate, or "postlarval attrition" (Leighton, 2000).

Over the two years following the date of the two-hybrid spawning, the animals grew well, albeit at very different rates, which is common with conspecific normal crosses as well. As the larger animals of the group passed 25-30 mm in shell length (12-13 months), morphological characteristics of all four species could be observed in shell and animal bodies throughout the group. Numbering about 50 specimens as the group approached two years of age, the largest ~25% had grown to 70-75 mm, and the morphology of all four parent species became even more evident throughout the group, often combined into individual specimens in a highly variable manner. Unfortunately, at approximately 38 months of age, an aquarium accident terminated the experiment.

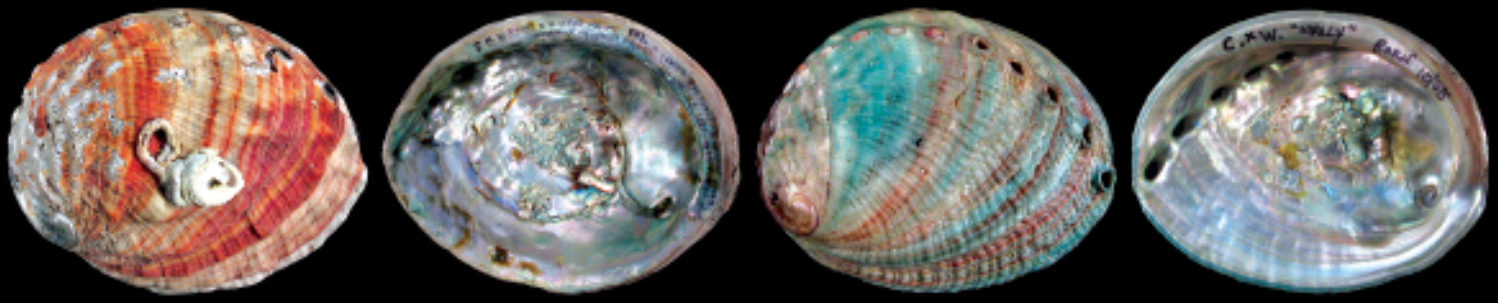
Due to the dramatic visual demonstration of all four species in the pigmentation and markings of the animals, all individuals of the entire group had been photographed just prior to the accident (as a photo assignment by a hatchery employee studying photography). Unfortunately, the photos were not available at the time of this writing. A group of 23 of the shell specimens are illustrated on Plates 1 and 2.

DISCUSSION

One of the more striking findings of these hatchery experiments is the high fertility rate of not only all the species of West Coast *Haliotis*, but of many, if not most, of their hybrids as well (Owen et al. 1971; Owen and Meyer, 1972; Leighton and Lewis, 1982; Owen and Leighton, 2002). Fertilization rate is largely dependent on gamete condition and concentration (Leighton and Lewis, 1982; Leighton, 2000). This appears to be true of many of the species of South Australian *Haliotis* as well, though it is not currently known if the hybrids of these species are fertile (Owen and Kershaw, 2002; 2003). It is curious that although fertilization and subsequent development of the fertilized gametes and early larval stages was largely abnormal in the instance reported here, another multi-species hybrid of nearly the same parentage provided an example of extreme contrast (Owen and Meyer, 1972). Early in 1969, Owen cultured a hybrid of a male *H. rufescens* x *H. sorenseni* hybrid crossed with a female specimen of *H. corrugata*. The techniques used in this spawning were similar to those employed in the four-species cross; however, in this instance, the percentage of eggs fertilized appeared to be virtually 100%, and subsequent larval development proceeded normally. Most significantly, the larvae had a survivorship through the difficult physiological process of becoming benthic and subsequent metamorphosis of over 95%. As stated above, it is at this point a substantial die-off often occurs with conspecific crosses. Postlarval attrition is frequently in excess of 90%. The difference in these two multi-species crosses may be due to the fact that the sex of the *H. rufescens* x *H. sorenseni* hybrid was inverse: in the highly successful cross the hybrid parent was a male. In some instances, heterospecific crosses that yield low fertilization rates succeed more when the reciprocal cross is made (Leighton and Lewis, 1982). It may well be that had the sexes been reciprocated in the four species cross, these early stages of development might have proceeded quite differently. However, obtaining living specimens of *H. corrugata* x *H. walallensis,* of either sex, unless produced artificially, would prove to be most difficult as naturally occurring examples of this hybrid are extremely rare (Owen et al. 1971; Owen and Potter, 2003).

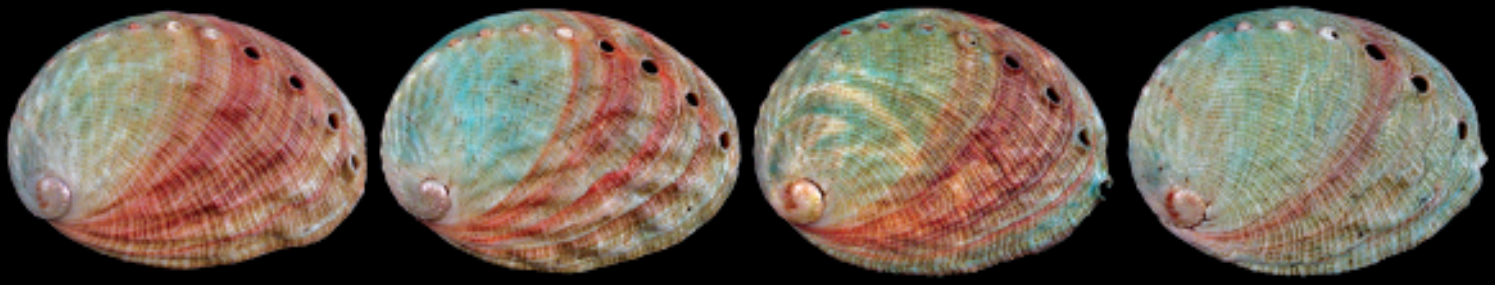
The animals of the four-species hybrid group were highly variable in body pigmentation and epipodial features. This is no doubt due to the fact that the four

Continued on page 273



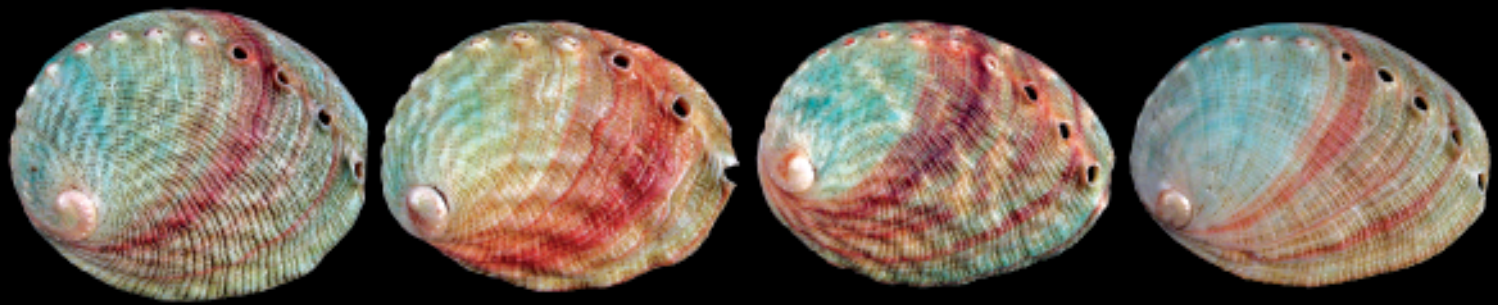
H. rufescens x *H. sorenseni* (female). (206.0 mm)

H. corrugata x *H. walallensis* (male). (74.0 mm)

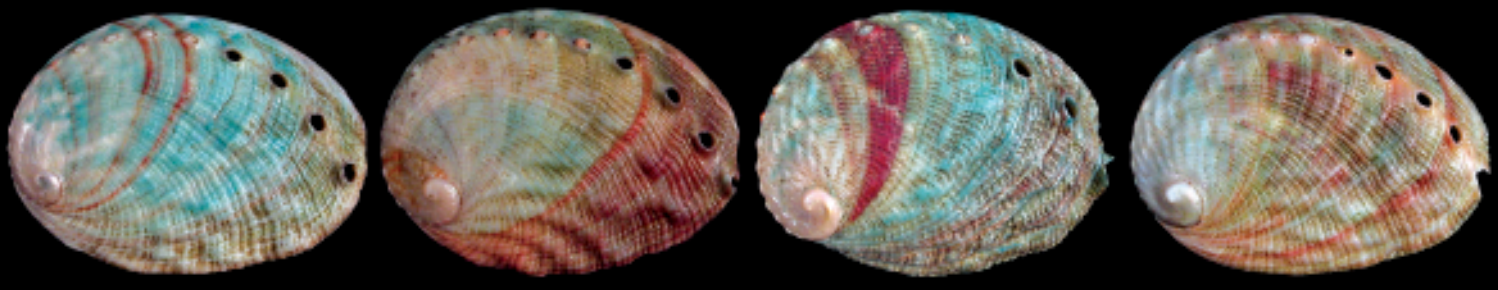


(1) 71.5 mm (2) 74.2 mm (3) 68.1 mm (4) 67.0 mm

(5) 61.4 mm (6) 60.9 mm (7) 63.4 mm (8) 58.8 mm



(9) 57.2 mm (10) 64.9 mm (11) 61.1 mm (12) 57.2 mm



(13) 54.4 mm (14) 48.8 mm (15) 54.3 mm (16) 51.5 mm

Plate 1.

Top Row: Actual "Parent" specimens of "4 Species" hybrids.
Rows 2-5: "4 Species" hybrids.

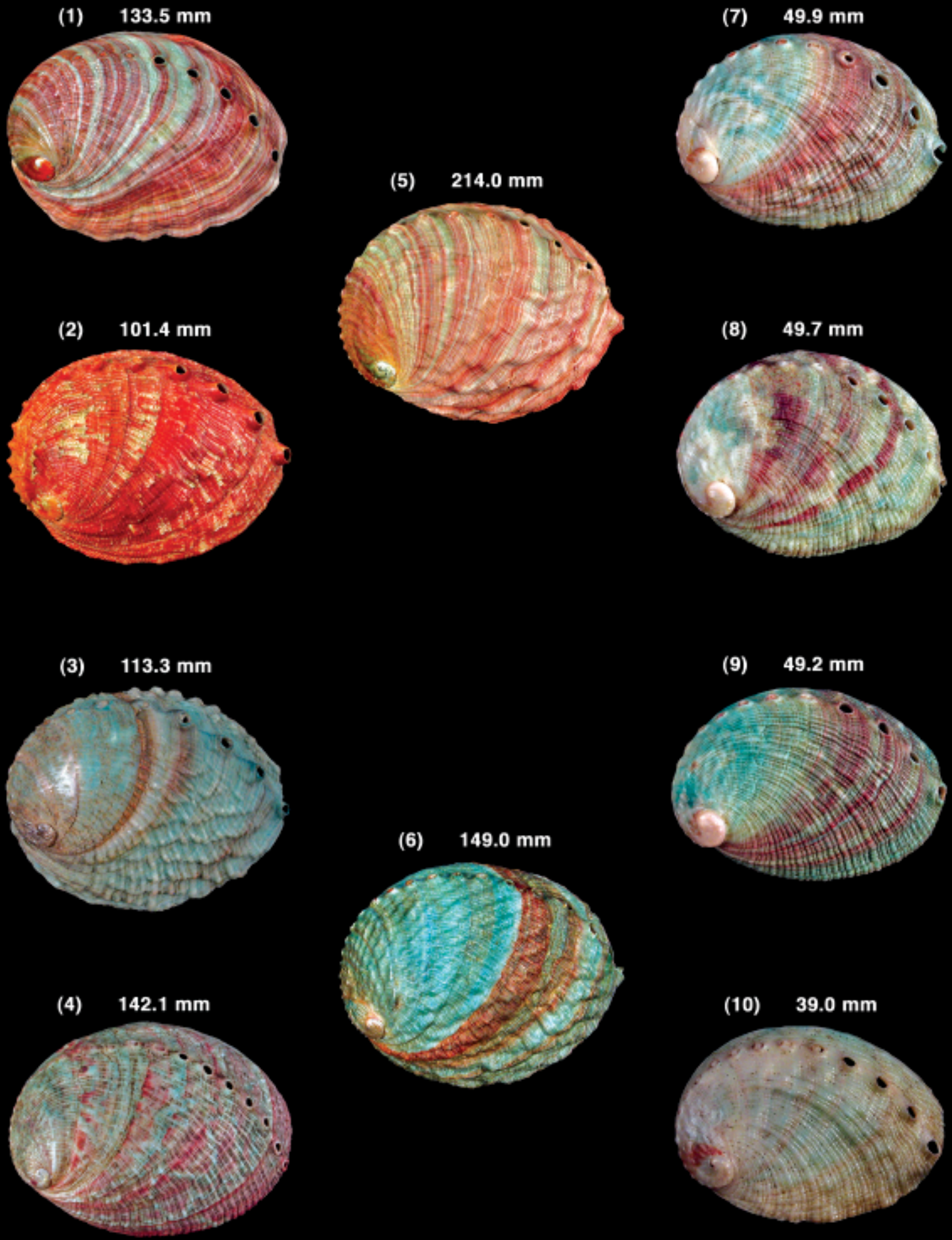


Plate 2

Left row: (1) *H. rufescens*; (2) *H. sorenseni*; (3) *H. corrugata*; (4) *H. walallensis*
Center row: (5) *H. rufescens* x *H. sorenseni*; (6) *H. corrugata* x *H. walallensis*
Right row: (7) through (10): "4 Species" Hybrids

Continued from page 270

parent species vary broadly in these morphological aspects as well. Of interest is the fact that no particular pattern of animal characteristics seemed to be found in any particular shell. For example, an animal having body and tentacle pigmentation appearing most like *H. corrugata,* with epipodial papillae most resembling H. *walallensis*, might be found in one of the five or six larger shell specimens most resembling *H. rufescens*. However, other shell specimens most resembling *H. rufescens*, but with slightly stronger spiral ribbing, or more of a suggestion of weak folded ridges, might possess an animal that appeared entirely different. This condition appeared throughout the entire group, with patterns of body and tentacle pigmentation, details of epipodial margin and papillae structure, appearing in random order throughout the group, regardless of the morphology of the shell containing the animal body. As stated in "Results", this phenomenon was so bizarre and pronounced that all individuals of the entire group were photographed by a hatchery employee studying photography as a hobby (John Lanzone, current address unknown) shortly before the aquarium accident ended the experiment.

It is exceedingly unlikely that a four-species hybrid would ever be found in natural populations for a number of reasons; the foremost being that if a female two-species hybrid spawned, the odds against it being both physically isolated from all other *Haliotis*, but in the presence of a spawning male hybrid of dissimilar parentage, would be impossibly high.

A number of the shell specimens have the weak, fading, "orange band" found in some juvenile specimens of *H. sorenseni* and *H. rufescens* x *H. sorenseni* hybrids (Owen, 2004**)** indicating the female *H. rufescens* x *H. sorenseni* parent may have such a band, but erosion in the early stages of shell growth prevents this from being detected. The presence of a strong "orange band" in a shell specimen most resembling *H. rufescens* is extremely curious, and may possibly represent a recessive gene for this character.

Remarks: Natural cues that promote coordinated spawning in abalone and other benthic, broadcast–spawning, marine invertebrates are not well understood. It is considered instructive to relate events associated with uninduced spawnings in groups of abalones held in tanks at Pigeon Point. Spontaneous mass spawnings appeared to be correlated with a slight increase in temperature and pH of the seawater, conditions that were usually associated with periodic southerly winds and were observed most often between June and October. These events almost always occurred during the full or new moon (generally a day before to a day after). Typically, the prevailing northwest wind would cease, and a gentle southerly breeze (8-15 kph) would develop. A few hours after the wind reversal, a very clear, blue, water mass would become visible, moving from offshore towards the mainland, with an abrupt line separating it from the usual relatively turbid (upwelled) water generated by the northwest wind. This clear water would displace the turbid water, and shortly after would be pumped up into the hatchery tanks. The temperature would be elevated a few degrees (typically from approximately 10.0-10.5 C, to 14.0-14.5 C), and the pH would rise about 0.5 unit to approximately 8.3. From cursory observations, it seemed that the offshore water had a very different planktonic composition, and the plankton would rather quickly block the filtration devices, with the accumulated material on the filters possessing an acrid odor reminiscent of fresh-cut cucumbers. This incoming seawater was rich in dissolved organic material (probably algal metabolites) and when heated to 25-30 C with a heat exchanger, a thick foam would be produced in the tanks, accompanied by the intense "cut cucumber" odor mentioned earlier. Such phenomena were never observed during periods of typical northwest weather.

Lunar periodicity in spawning of abalone and a host of other marine organisms is well recognized. The sea conditions related here also may have introduced chemical factors that acted in concert to synchronize gamete release throughout mixed species groups held in the hatchery seawater tanks. In the four-species hybrid study reported here, ultraviolet light was used to sterilize the incoming seawater, and possibly provided an additional spawning stimulus, as UV-irradiation is now known to facilitate spawning in abalone (Leighton, 2000).

ACKNOWLEDGEMENTS

I would especially like to thank David Leighton for sharing his vast experience and knowledge of *Haliotis* culture with me, and for editing the manuscript. I would also like to acknowledge and thank Steve Browning and Tom Grace for their helpful comments and advice. I also wish to express my gratitude to Bill Budge, owner and president of Pacific Mariculture, Inc., for permitting me to expend the time and effort necessary to work these difficult and time-consuming hybrid culture experiments into my busy work schedule between the years 1965 to 1970. Finally, I would like to acknowledge and thank Richard "Dick" Meyer, who worked with me on preparing the original information (unpublished report, 1972) from which much of the data contained herein was taken.

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Bay area of the Transkei. Nearly all the specimens taken since 1998, that have come to my attention, have been from the Coffee Bay area. As previously mentioned, this species is easily the largest of the three species described in this paper, growing to a size of approximately 80 mm (79.16 mm). It seems to be distributed in slightly deeper water than the other two species, and so far I have not heard of it being found intertidally to ten m or so. Most specimens seem to come from 20-25 m (Brian Hayes, pers. comm.). *H. speciosa* also has a genetic orange color phase, but it is extremely rare. As of October, 2004, I know of only six specimens extant. Four are illustrated on Plate 3.

I feel that is enough "text" about these three wonderfully beautiful and uncommon to rare *Haliotis*. Now take a look at the photo plates and expose yourselves to some real South African "eye candy"!

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Continued from page 263

The freshwater Asian Clam (*C. fluminea*) was found in the Columbia River between Washington State and Orfegon in 1938 (Lay, 1995; Eichhorst, 2004) and was first observed in Cuba in 1987, in a pond "Presa Alacranes", Sagua la Grande River, Villa Clara, located in the central part of Cuba (Milea & Quiros, 1995) and six years later (1992) was inhabiting the artificial Lake "La Jia" and other places of Camag ey Province (Di guez et al, 1997).

We know that *Corbicula fluminea* is invading Cuban territory in the direction of west to east because it has recently been discovered in the northern part of Holguin Province, probably established around 2002. A population was discovered in 2004 (April 15 a number of small – less than 4 cm - specimens were collected) in the micro-pond "Presa Mastrapa", about 2 km north of the town of Velasco in the Gibara Municipality.

It was inferred from biological data as given by Kay ([1995] citing McMahon, 1985) that the period of colonization was between 2002 and 2003. Kay wrote: "*Corbicula fluminea* matures in less than a year and produces an enormous number of offspring (veliger larvae), one individual can release perhaps as many as 68,670 juveniles per year."

In conversations with local fishermen, youths and children who reside nearest to the dam, it was confirmed that they had seen the mollusk in the year 2003 as well as in 2004. One explained that when he first saw th clam population he was alrmed, never having seen this clam before and that its abundance was high.

Many questions regarding the species biology have been formulated by the local citizens which we were able to answer. They now understand that this group is adapted to the freshwater and that Cuba has a very few species. Some aspects of biological diversity were explained, i.e. that of the total of 327 bivalve species known in the Cunab fauna, 97.8% (320) are marine and 2.2% (7) are freshwater. Endemicity is low (Espinosa et al, 1994).

This new record in Holguin Province is evidence that the invasive direction is from west to east' Milera and Quiros (1995) suggest some dispersers of the species which has moved from Camaguey into Holguin. Among these were migratory aquatic birds that annujally come to the area to either spend the winter or as a st5op on their migratory trip from the Northern to Southern Hemispheres.

This field record shows that *Corbicula fluminea* is continuing its grographical expansion in Cuba. Biological studies o9f this species are important for public health since it is known that in its native range the clam is the i8ntermediate host for Echinostome trematodes. When eaten raw or partially cooked there is often a high local incidence of Echinostomiasis where ithe species occurs in Asia. Although in North America the species is not often used as food. A well-known effect however is the clogging of irrigation canals and the stoppage of water lines and condensers (Sinclair, 1971). Thus it could be a potential risk for Cuba's hydro installations.

Another introduces exotic species is *Tarebia granifera* Lamarck, 1816, belonging to the Family Thiaridae. This species has invaded Cuba in an east to west direction. It was first recorded in Cuba by Jaume (1972) in Guantanamo Province. Three years later Jacobson (1975) confirmed its presence in Guantanamo as well as in Santiago de Cuba and Holguin Provinces. In this case Milera & Cort s (1982) suggest that some vertebrates such as fish (*Cyprinus carpio*; *Ciclasoma tetracanthus*, etc) and birds *(Fulica Americana*) were its dispersers.

Both species are known as pests, have benthic habitats, high reproductive capacity and aer invasive species. In Cuba neither species has been used by local communities as a food source nor as a part of their shellcraft efforts. In most cases the introduction of alien species have had a negative impact on native flora and fauna. The influence of these two species on native Cuban molluscan fauna have not been evaluated.

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- Following information is subject to change. Please verify with individual organization -

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Jun. 22-26 **40th 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

Jun. 26-30 **JOINT AMERICAN MALACOLOGICAL SOCIETY/WESTERN SOCIETY OF MALACOLOGY MEETING**, Pacific Grove, California
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Jul. 2 - 3 **JACKSONVILLE SHELL SHOW**, Jacksonville Beach, FL. Jacksonville Beaches Woman's Club at 2nd Avenue N. & 13th Street. Charlotte M. Lloyd, 1010 N. 24th Street; Jacksonville Beach, FL 32250-2883
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Jul. 19-24 **CONCHOLOGISTS OF AMERICA ANNUAL CONVENTION**, Ft. Myers, FL
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Jul. 16-17 **KEPPEL BAY SHELL SHOW**, Yeppoon, Queensland, Australia
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Jul. 23-24 **TOWNSVILLE SHELL SHOW**, Townsville, Queensland, Australia Cutharinga Bowls Club on Harold Street, West End. Glenda Rowse, 19 Farrell Street; Kirwan 4814, Queensland, Australia (7) 4773-2817

Aug. 19-21 **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

Sept. 17-18 **26th INTERNATIONAL SHELLS & FOSSIL BOURSE**, Ottmarsheim, France
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REMARKABLE BEACHES

Willem Krommenhoek

The Widest Beach

One of the widest beaches in the world is found on the east coast of India, half way between Calcutta in West Bengal and the temple city of Bhubaneshwaqr in Orissa. More precisely between Dingha and Dhamra. Here the Bay of Bengal recedes 5 km daily, leaving a complete emptiness as far as the eye can see. This place is siutuated about 100 km west of the mouths of the Ganges, which produces a gigantic delta in the border region between India and Bangladesh. The shallow gray waters of the Bay of Bengal produce a continuous sediment of a uniquely rippled surface of mud and sand. I visited this area in November 2004 and had an opportunity to make a long walk on this "endless" beach. When the tide came in it appeared to advance slowly, filling the spaces between the ripples first and then inundating everything with a thin layer of water. Because of the muddy water, the number of molluscan species was small, as were the specimens of those species. Amongst the bivalves I notices a small jackknife clam, a cockle and an ark. Two species of moon snails were the most abundant gastropods (the Bladder Moon and a type resembling the Tiger Moon). Next in abundance were the Duplicate Turritella and the Telescope Shell. An augur was occasionally found as were a nutmeg, an olive, a nassa shell and the Spiral Babylon.

A Special Mushroom-shaped Rock

In geology the occurrence of mushroom-shaped rocks in a well known phenomenon, usually occurring in deserts. Their shape is supposed to ge the result of corrosion by wind blown sand particles. As most of the sand particles are transported in the lower layers of air due to their weight, the erosion of the rock is more intense near the surface, resulting in a mushroom shape.

However, this phenomenon can be observed, though rarely, in a marine environment. One of the places where I came across such a phenomenon was on the south coast of Salayar Island, near the larger Sulawesi Island in Indonesia. This happened in the 1990's. The "rock" is about the height of a man and is actually an old coral formation. It is what remains after the erosion of the softer parts of the reef. Left as a single block, the moving sand particles in the surf, like the sand particles in the desert wind, have abraded the lower portion of it, leaving a special mushroom shaped rock of biogenetic origin.

Some observations on a Pebble Beach on Cyprus

During a visit to Cyprus in the spring of 2002 I had the opportunity to visit a nice pebble beach on the south coast of this island which is situated in the eastern part of the Mediterranean Sea. During a walk along this beach I made some interesting observations which I would like to present to you the reader.

The most conspicuous feature of the beach were the well-developed beach cusps made of pebbles the size of a fist (Fig.1). Beach cusps are crescent-shaped indentations lying parallel with the shore on the upper beach face. They are not confined to beaches with a particular caliber of sediment. There is little agreement as to the origin of beach cusps. It is know that they most readily form where waves approach the coast at the perpendicular.

Looking at the individual pebbles I could make other fascinating observations. Some pebbles showed pseudo-fossilisation structures (Fig. 2). However, these remarkable patterns have no relationship whatsoever to living structures. Actually, most sedimentary rocks have small fractures resulting from tectonic processes in which water plus minerals is absorbed by capillary action. When the water eventually evaporates, moss- and fern-like depositions of minerals, usually manganese and iron oxides are left behind.

Other pebbles tell a different story (Fig 3). These are perfectly rounded and show a remarkable pattern on the surface, the so-called collision figures. They are the result of a process that was interpreted a early as 1885 by the German geologist M hlberg. According to him a cone-shaped cleavage pattern develops in the pebble when it is powerfully hit on one spot during its rolling in the surf; the top of the stone being the place where it was hit. In time more and more of these cones are produced as a result of repetitive collisions with other pebbles. At the same time fragments of the pebble are chipped off, resulting in a structure with a minimum of surface in relation to its volume. As a result of this natural smoothening of the surface, sections of older collision cones are exposed as parts of circles, ellipses and paraboles. The specimens shown here are perfect examples of this intriguing process.

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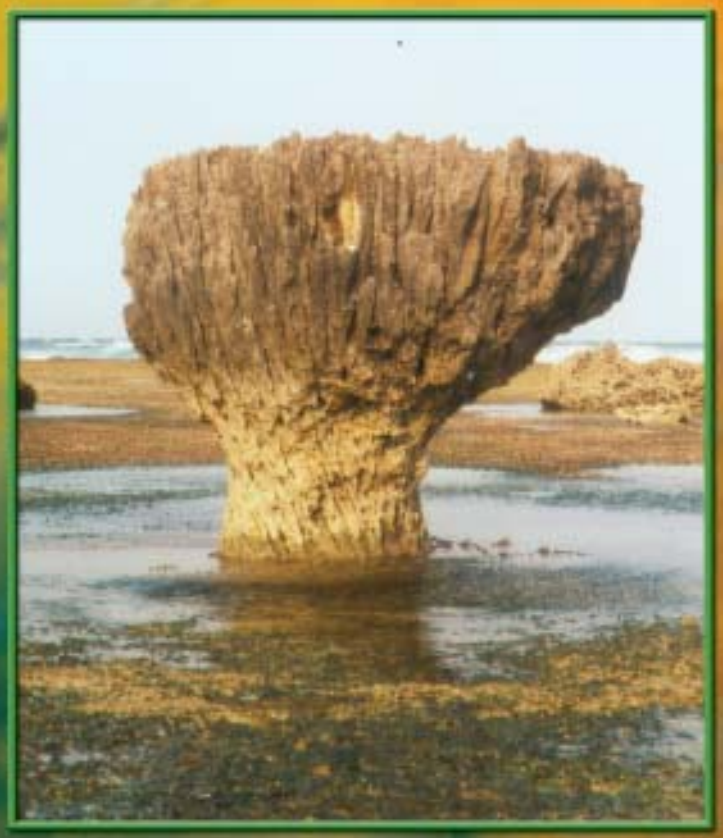
Fig. 2

Fig. 3



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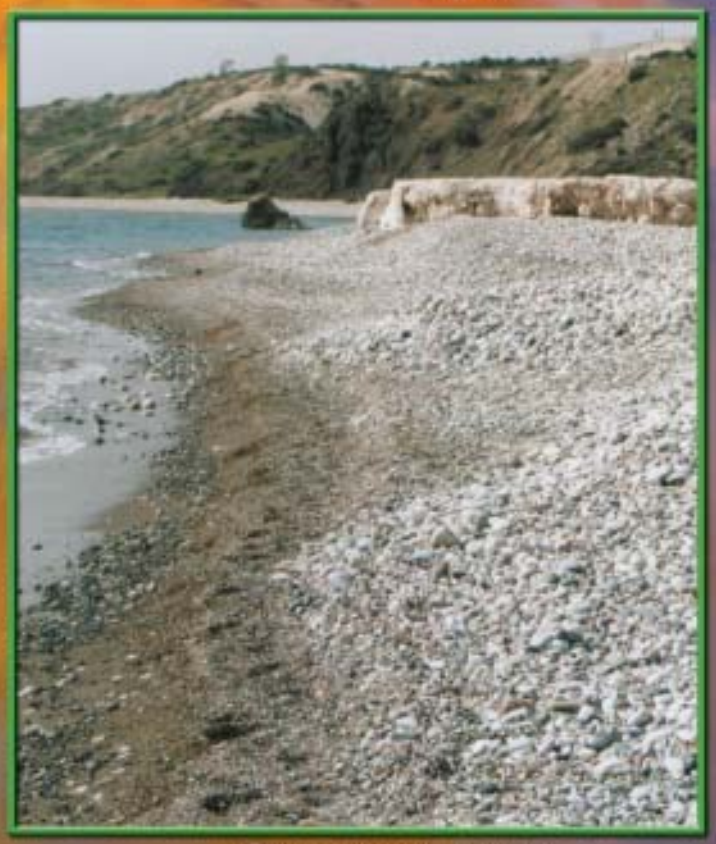

Cyprus beach (Fig. 1)

The widest beach

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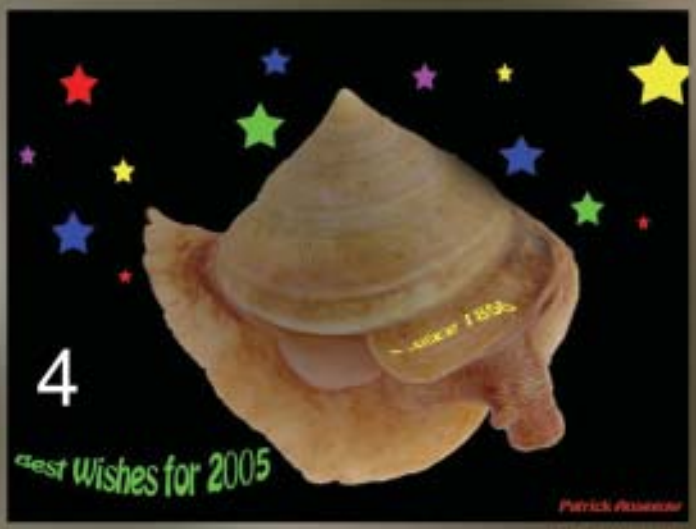

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December 20, 2004

Dear Friends,
Well, as most of you know, I made the big move to Thailand this fall. And decided that this year my New Year's card would contain more than just a greeting - a bit about what's been going on and what's planned for the future.
I have now been leasing the house for two years and this year really saw some additions, both inside and out. Air conditioning was installed a year ago, as was satellite TV (cable will finaly reach Rawai Beach early in 2005, as will ADSL service for Internet access). We changed the furniture a bit, adding a second computer desk, exchanging the wooden sofa for a sleeper-sofa, adding lots of shelving and display units, etc. Outside, as you can see, we've planted bougainvillea, palms, orchids and other shade and flowering plants (we really don't have a jungle behind the house as the photo indicates – a computer enhancement from my graphics guy – but to have a coconut plantation where I've seen monkeys picking coconuts for the owners). Speaking of wild animals (other than the visitors from abroad), I've seen sea eagles, frogs, dolphins, and several dozen species of birds, including a tiny one called the sunbird which acts just like our PNW hummingbirds and loves the flowers of the plants we have on the porch (they let me get within 6 inches of them while their feeding and they measure all of 3 inches in length themselves). Did finally (after 13 years of visiting Thailand) see a live snake crawling along the wall between my home and the neighbor. Still have yet to see a cobra!
You might notice in the front of the house are two vehicles. One is a 2005 Honda Wave and the other a 1994 Suzuki Caribbean 2x4 (which has only 65,000 km on the odometer). The latter is perfect for when you visit and I can show you the sights around Phuket – the back seats sit up high and the windows are huge. The interior has been redone and everything checked by a garage owner (my graphic guy's uncle). Now I just have to get used to driving from the right side of the car in the left lane and watching for the myriads of motorbikes that dash in and around you everywhere. Still not brave enough to attempt night driving!
Future plans are to cut back on the number of publications I do each year and concentrate on the magazine and a few book projects – one on the shells of Thailand, another on the marine shells of the Northeast Pacific (Alaska to California). And, of course, I still get bitten several times a year by the travel bug. This fall I visited the Philippines and Malaysia. Last spring I was in Mozambique (East Africa) and am hoping to make a return visit to Vietnam early in 2005 as well as a visit to Myanmar (Burma) with a shell dealer from Rawai Beach who goes there several times a year. And with a car that has four-wheel drive I plan to get back to some serious collecting and charting the minute species that can be found on the various beaches of southern Thailand – have a GPS unit that will help with this study.
If you've attempted to email me recently my apologies – my server cut me off without warning when the company was sold to a large foreign company (they said upon my inquiry that my email service had been terminated in January of 2003 – but somehow I was not notified and emails were still getting to me at the end of October 2004!). I am switching everything to a company here in Thailand and when completed you can contact me via our web site: www.ofseaandshore.com.
Hope this message find you all well and having had a glorious holiday season that you are looking forward, despite the election results, to a better 2005. I hope to greet some of you here in paradise this year – we have a very nice inexpensive resort just 1,000 feet from me down the beach (www.siamphuketresort.com) . Best weather occurs from November to April. And, it's just possible you'll fall in love with Thailand and its people as I did.

December 27, 2004

You have all, no doubt, been seeing on television the terrible disaster that struck southeast Asia on the morning of December 26, 2004. An earthquake (9.0 on the Richter Scale – largest in 40 years and 5th largest ever) struck off the Indonesian island of Sumatra. The resulting tidal wave (tsunami) struck islands from there all the way to the coast of Africa. That morning as I walked along the beach near my home in Rawai Beach on Thailand's Phuket Island, I thought I really should send emails to family and friends back home, but so little happened since I last corresponded with them that those emails would be short indeed. Later, as I worked at the computer my housemate, Chai, walked into the living room and asked, "Did you feel the earthquake?" No, I replied, thinking he was joking. We then glanced out the open front door and noticed that the street was wet – I thought the local government had decided, as they do occasionally, to wash the street – until I saw a log and other pieces of wood on the roadway. Chai and I looked at one another questioningly. What's going on? We walked to the street and people there told us there had been a tidal wave and we could see that the sea was not its usual calm self. The longtail boats that usually sit bobbing at anchor or pulled up on the beach were, some of them, upside down offshore, while others had been pushed up onto the beach, their sides holed or their sterns caved in. Suddenly a second wave hit and water rushed across the street carrying more debris into the roadside ditch. Fortunately we are on the protected side of Phuket and the waves here we not the 10 meters (30 feet) size of those which struck the west side of the island. Our waves reached possibly 8 feet high, still enough to do damage all along the

shoreline of Rawai Beach, especially in the Sea Gypsy village at the far end where several drowned. A third tidal wave followed the second and there were reports later in the day that more would come at dusk and we evacuated the house and went inland to higher ground. The rumored waves did not come and we were back in the house by 6:00 p.m. A police car went by, its loudspeaker telling us that there was a possibility of more tidal waves until at least midnight. This also proved untrue.Today as more reports come in about the terrible damage cause elsewhere on Phuket and other nearby islands and shore, (more than 500 dead and several hundred more missing) I am thankful that I decided to settle in Rawai Beach. My original reasons were that it was close to the beautiful Phuket Seashell Museum and my adopted Thai family (the Patamakanthins) who produced the museum and also that Rawai was the quiet end of the island as far as tourists spots, bars, hotels, etc., etc. Little did I think about it being protected from tidal waves. Of course Phuket had never had one before.My heart cries for all the people here and elsewhere who have lost loved ones, including the King of Thailand whose grandson was drowned yesterday. And those whose entire lives and livelihoods have been turned inside out by yesterdays disaster. Hopefully the local governments, national governments as well as people and governments elsewhere will pull together to help those so hurt by this unexpected natural disaster.

January 18, 2005

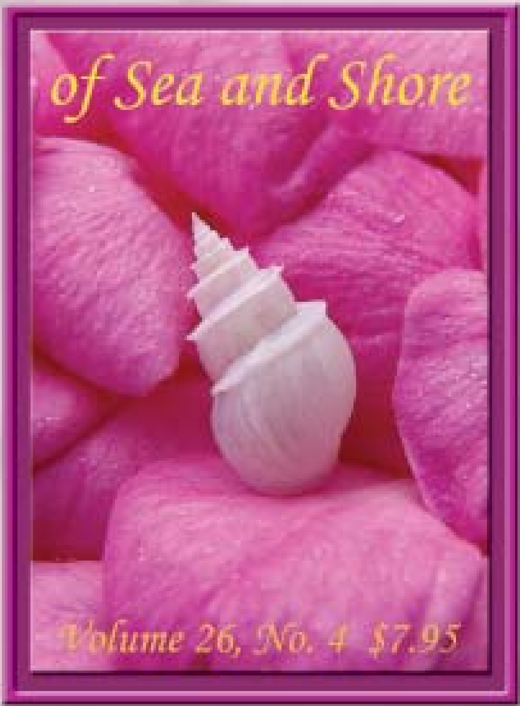
Well, it's been three weeks since the disastrous tsunamis hit Southeast Asia. Here in Rawai Beach the cleanup has been completed and all that remains to get back to "normal" is final repairs on those longtail boats that could be repaired (of the 50 here, a dozen were damaged too extensively to be repaired) – there are motors for four of these boats sitting in my front yard awaiting placement in the repaired craft.

Elsewhere on Phuket the cleanup is also nearly complete. Only three areas on the island, all on the west coast, were badly damaged. There the debris has been carried to an old tin mine for disposal. Reconstruction will, of course, take much monger. The Starbucks at Patong Beach has a sign out front "Brewing Again in February 2005) and other businesses are optimistic as well. The only structures destroyed by the tsunamis were within 100 yards of the beach. Some 90% of the island's hotel rooms are intact; the beaches along the west coast are as pristine now as they were when I first came here nearly 15 years ago. Local governments in the areas hardest hit promise to regulate the beach areas so that they are even better than before. Hopefully they will adhere to that promise. Now all we need are tourists.

Because Phuket was the place the first reports of destruction by the tsunamis was show to people around the world, I think those outside Thailand think the whole island was destroyed. Only 10% of the area and tourist facilities were affected and are closed. It's now a perfect time to come for a visit – hotels are offering fantastic bargain rates to get tourists to return and by coming to Phuket for your vacation and frequenting local establishments for your food and drink, souvenirs, etc. you can help with the recovery. Business here is down some 70% from a year ago – worse than during the SARS scare of two years ago. And there's no reason to stay away – the tsunamis were the first ever here and are unlikely to be repeated in anyone's lifetime. And the beautiful scenery, the fabulous people, the great food, everything (almost) is still here.

I have been, as before, walking the beach every morning picking up trash. I have yet to see any increase in the number of shells that are along the driftline. The usual species that are a part of the local diet (Strombus, various bivalves, etc.) are still present. I did find a fresh dead *Haliotis asinina* in the drift and Chai brought me a *Cypraea* and a couple of other shells that had washed up in Chalong Harbor. But these were not likely the result of the tsunamis. I think that, unlike typhoons, monsoons, hurricanes, etc., the tidal waves came so quickly and were gone so soon, that the only things washed up here were some of the small fish that were in the intertidal zone and sea cucumbers (the latter, by the way, all seem to have crawled back into the intertidal sand/mud). I'll keep watching and plan to explore the reef area on the next low tides; there appears to be a buildup of sand and mud over the intertidal reef area, but what affect that will have on the molluscan population is unknown.

This week new editions of our "A Sheller's Directory of Clubs, Books, Periodicals and Dealers" will be printed. This, the 27th Edition will be the last edition. We are only printing a small number of copies at a time and future printings will include changes, additions, updates, etc. The same holds true for the 6th Edition of "The Directory of Conchologists / Malacologists". Those wishing to be included in either of these publications should contact the Editor (editor@ofseaandshore.com) and will appear in the next printing.



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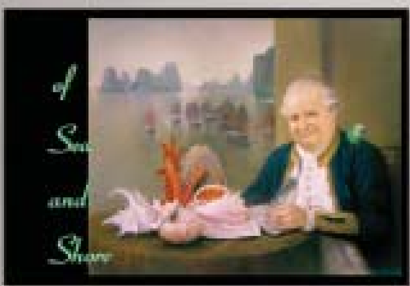
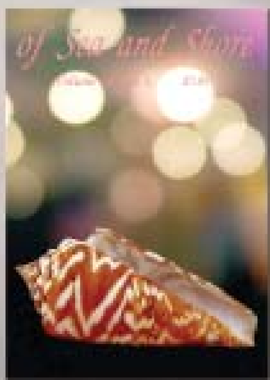
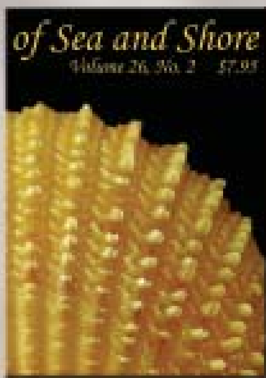

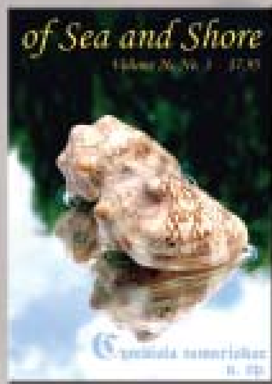

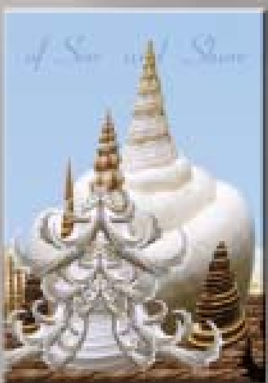
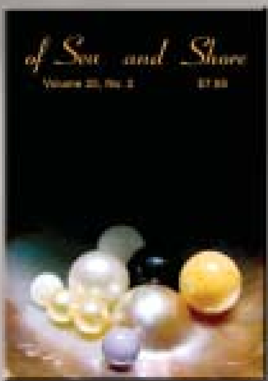

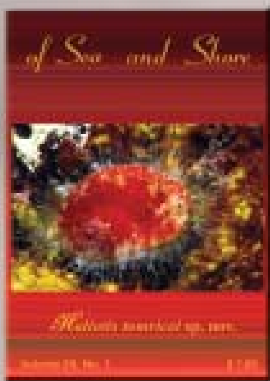

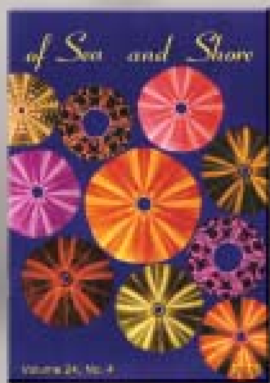

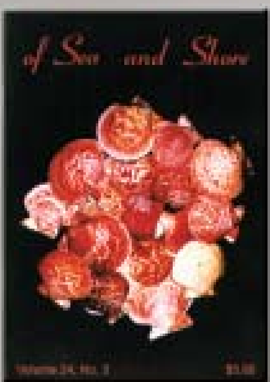

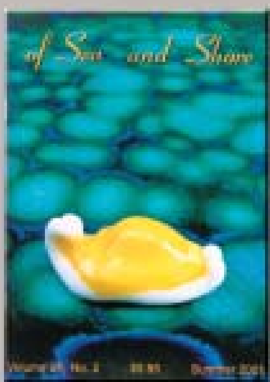

Trophon geversianus Pallas, 1774

A variable species from
The Land of Fire
(Tierra del Fuego, Argentina/Chile)

Photos courtesy of Zindona Shells, Uruguay

See our next issue for a photo essay on this species.

photo: Philippe Poppe, *Cypraea ziczac*, Philippines, Olango Island, 8 m. deep, January 2005.

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