

SYDNEY SHELLER

Newsletter of the Shell Club of Sydney
NSW Branch, The Malacological Society of Australasia Limited ACN 067 894 848

Shell Club of Sydney Mission Statement:

To appreciate, understand and preserve shells and their environment and to share this with others.

Next Meeting:

26th May 2001

Fossil Shark Teeth

Adrian Brown

(normally 4th Saturday)

**Ryde Eastwood
Leagues Club**

117 Ryedale Rd
West Ryde, Sydney

1.30 for 2.00pm



Contributions:

Please send contributions to:

Steve Dean

**166 Narrabeen Park Parade,
Mona Vale NSW 2103**

Text in electronic form only. Photos, and discs by mail, or preferably by email to steve@dean.as

If you cannot get your text onto disc, then **Karen Barnes** may be prepared to type it for you - send material to:

**1/7-9 Severn St
Maroubra NSW 2035**

Office - Bearers:

President: Patty Jansen
Vice Pres: Maureen Anderson
Secretary: Chris & Karen Barnes
Treasurer: Peter Pienaar
Sheller Editor: Steve Dean
Raffles: Maureen Anderson
(The executive plans the field trips)

Some of the topics inside:

- 2000 Swains, some more shells
- Shell club field trip to Hawks Nest
- NSW shell collecting size and bag limit
- Shell club minutes x 2
- Vale lo Meyer

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Or to the Sheller Editor, Steve Dean

Note: The Sydney Shell Club is a branch of
 the Malacological Society of Australasia
 (MSA) It is preferred that you are also a
 member of the MSA. MSA membership
 can be organised through Des Beechey
Des@phm.gov.au
 26 Malga Ave
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**2000 Swains Trip
 more shells:**

Dear Steve,

Thanks for sending me a copy of your
 Swains Trip article. It was very well
 done, and the pictures brought back
 fond memories. Off the top of my head I
 can add a few species to the list you put
 together.

Cypraea ziczac - 1 dredged
Vexillum taeniatum - 2 dredged
Imbricaria conularis - 1 dead
Vexillum coronatum - 2 live
Cancilla filiaris - 1
Vexillum rugosum - 1
Cronia biconica - 1

One of the *Oliva guttata* collected was
 world record size.

I have not yet had time to identify many
 of the smaller species from obscure
 families

Fred Schroeder, Guam

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Shell Club field trip to Hawks Nest

A Brief Summary

Steve Dean

Hawks Nest is at the Northern Entrance to Port Stephens 250Km North of Sydney. (The port has clean water and sandy bottoms and always has a lot of Dolphins for tourists to watch). The port has a conical headland each side of its entrance. There is an ocean beach running 40km northwards from the northern headland of Port Stephens. Hawks Nest is a beach town on this beach close to the headland.

There were not many shells on the beach during the 2km walk down to the headland, but there were a lot of good dead sand shells amongst the rocks at the headland, probably because of the long beach.

There were a variety of damaged volutes – *Cymbiolista hunteri*, *Amoria zebra*, *Cymbiola magnifica*, what looked like *Livonia mammilla*, and very large

numbers of only slightly worn *Amoria undulata*. (I found four *Amoria undulata* that were in better condition than the ones I already had in my collection.)

There were several *Naticidae* species, and a good number of *Semicassis pyrum* in 'fresh dead' condition.

There were many *Cancellaria undulata* some very large. The *Tylospira scutulata* were the largest I have ever seen, although worn.

There was a lot of good shell grit in the sand between the rocks with small shells and micro-shells for Patty, Michael and myself to sift through. I am still sorting these.

I went further around the headland than the others. The sand between the rocks disappeared and there was more life on and under the rocks. There were large numbers of live *Turbo imperialis*, and something I have not seen for a long time, twelve large *Haliotis* exposed along a shady ledge above the low water line.

Keith and myself crossed the sand dunes to look at the rocks at the headland inside Port Stephens (Only 50M). There was a little more life under

the rocks, but again the large amount of sand has taken its toll. I only collected some *Stomatella impertusa*.

On the walk back it was interesting to watch how the "pipis" *Donax deltooides* move themselves back up the beach with the incoming tide. With most waves small numbers of them come out of the sand and move up and down the beach then dig in again – I assume feeding.

However whenever there is a lull in waves followed by an unusually large wave that crashes particularly hard and loud before shooting up the beach, they all fire themselves up out of the sand in unison just ahead of it, then dig in again much further up the beach.

The NSW beaches are strewn with single valves of *Glycymeris grayana* On the main surf beach we found a few that had both valves, as well as a couple of *Glycymeris holsericus*.

The only cowries we saw on the beach were extremely worn and unidentifiable. There were not even worn ones amongst the rocks.

I trust others will write about the variety of smaller shells we collected.

NSW Sea Shell collecting limits.

As specified by NSW fisheries Nov1999

Invertebrates can be collected by hand, and while snorkelling, but if using Scuba only Sea Urchins and Scallops can be collected. Also the following limits apply:

legal length = minimum length and **bag limit** = maximum number per person in possession.

Haliotis 11.5 cm minimum, bag limit 10
Oysters bag limit 50
Turbo torquatus*, *Turbo imperialis 7.5cm minimum
 Bag limit 20 for the sum of the above **turbans, plus other snails, plus limpets, plus chitons.**
Sea urchins bag limit 10
Scallops bag limit 50

On the spot fines up to \$500

Hidden Marine Stingers

Extract from a Sydney Newspaper article.

Large quantities of blue-bottles washed into Sydneys beaches earlier this year may not have been the only cause of all the painful stings to humans.

Bill Rudman, principal research scientist at the Australian Museum's Malacology unit suggested that the nudibranchs and sea snails that feed on blue bottles can

store the blue-bottles venomous 'nematocysts' as they eat them, and can store and concentrate them for their own use.

THE RURAL AUSTRALIAN THESAURUS OF COMPUTER TERMS

Log On - Make the barbie hotter
 Log Off - Don't add any more wood
 Monitor - Keeping an eye on the barbie
 Download - Get the firewood off the ute
 Hard drive - trip back home without any cold tinnies
 Floppy Disc - What you get lifting too much firewood at once

Keyboard - where you hang the ute, and bike keys
 Window - What you shut when it's cold
 Screen - What you shut in the mozzie season
 Byte - What mozzies do
 Bit - What mozzies did
 Mega Byte - What Townsville mozzies do
 Chip - A bar snack
 Micro Chip - What's left in the bag after you have eaten the chips
 Modem - What you did to the lawns
 Dot Matrix - Old Dan Matrix's wife
 Laptop - Where the cat sleeps
 Software - Plastic knives and forks you get at Big Rooster
 Hardware - Real stainless steel knives and forks from K Mart
 Mouse - What eats the grain in the shed
 Mainframe - What holds the shed up
 Web - What spiders make

Web Site - The shed or under the verandah
 Cursor - The old bloke down the pub who swears a lot
 Search Engine - What you do when the ute won't go
 Yahoo - what you say when the ute does go
 Upgrade - A steep hill
 Server - The person at the pub that brings out the counter lunch
 Mail Server - The bloke at the pub that brings out the counter lunch
 Internet - Complicated fish net repair method
 Netscape - When fish manoeuvres out of reach of net
 Online - When you get the laundry hung out
 Off Line - When the pegs don't hold the washing up

Club Minutes 24/02/2001.

Meeting opened, P. Jansen at 2:05pm.

Field Trip Reports Steve Dean reported on a trip to Long Reef a couple of weeks ago, with his cub group and Phil Colman. Steve also reported running into Chris Barnes at Little Bay one afternoon when Steve and his father Keith were exploring the eastern shores. Steve handed around a heart urchin and a couple of Cypraeidae collected at Little Bay.

Patty Jansen informed us that her visit to Pattonga (Hawkesbury River) had been postponed due to inclement weather. Long Reef was visited instead, hoping to photograph some specimens, though Patty found the conditions a bit rough. Patty collected a beached specimen of *Polinices mammilla* (Linnaeus, 1758) on the way back to the car, and wondered what it was doing this far

south as its normal range extends only as far south as Southern Queensland.

Michael & Jenny Keats have returned from a holiday to Norfolk Island. Michael found some Naticids, *Bulla angasi* (Pilsbury, 1893) a Marginellid with great markings and sculpture as well as lots of Muricids. The native Norfolk Is *Lyrta nucleus* (Lamarck, 1811) eluded him however.

New Acquisitions M. Keats reported on the purchase of the Walter Cernohorsky research collection, including a full set of the La Conchiglia publication.

General Business A kind donation, from Thora Whitehead of a book titled "Southeast Asian Conus" was received by the group (thank you). Thora mentioned that she very much enjoyed receiving the Sydney Sheller. Tea money total collected was \$264.00, one years RELC fees are \$363.00, in Peter Pienaar's absence C. Barnes agreed to make up the shortfall, pay the fees on the way out of the club and recover the

difference from the treasurer at a later date. P. Jansen suggested that the group hold a buy/ swap/sell in the coming year.

Meeting closed at 3:31pm.

Presentation Ron Moylan gave a video presentation containing two topics, the first on the Auckland Shell Show held in October 2000. Ron mentioned the displays were of a very high standard. The second half of the tape contained footage of research into conotoxins being carried out on the Great Barrier Reef and in particular, on Lady Elliot Island.

C. & K. Barnes

Secretary

Club Minutes 24/03/2001.

Meeting opened, P. Jansen at 2:07pm.

Field Trip Reports Ron Moylan reported on a trip to Lamont Reef (Barrier Reef, Qld). Ron added the trip was very successful, stating a number of melanistic and rostrate Cypraeidae

specimens were collected. These included : - *C. felina*, *C. caurica*, *C. arabica*, *C. cribaria*, *C. erronea*, *C. moneta* and *C. vitellus*. While away for five days and nights, they were able to shell at two tides a day three hours at a time. Ron donated a live taken *Bursa granularis* (Röding, 1798) for the groups' raffle prize.

Michael Keats reported on a trip to Nth Narrabeen beach near the sea wall, he acquired some shell grit samples to

investigate microscopically. The locals were right on to him though, until he produced his licence/permit. Michael added the grit was quite productive, yielding a number of Conus and Cypraeidae. Michael also reported he'd been for a trip to Huskisson with Stephanie Clark in search of a mollusc. Steve Dean reported that the large seas had just about washed away the beach near his home. On further inspection all he found at the beach was a dead penguin and some bird eggs.

Chris Barnes reported collecting a fresh dead specimen of *Cypraea subviridis* Reeve, 1835 washed ashore by the storms; the shell had a very dark dorsum and rose terminals. Chris handed around a worn specimen of *Bursa granularis* (Röding, 1798) also collected in Sydney.

New Books Patty Jansen displayed a new book called "Marine Molluscs in Japan" edited by Takashi Okutani. This is a beautiful bilingual book with lots of photos, including live and micro shells. The only catch is the \$700.00 price tag.

General Business Initially M. Keats wished to propose a field trip to

Huskisson, but after some discussion the group agreed to have a field trip to Hawks Nest near Tea Gardens at Port Stephens on Sunday the 8th April meeting near the surf club at the south end at 12.00 noon.

Meeting was adjourned at 2:35pm for afternoon tea.

Presentation Jack Hannon from NSW Fisheries gave an informative slide presentation on Mollusc Habitats and possible threats to their existence. Rocky reef was one environment discussed, "white rock" grazed by urchins was displayed. Sea grass beds in estuaries was another sensitive area

considered. Pollution traps plus gravel pits to contain run offs and sediments was a process currently in place to protect habitats from suffocation. Jack added that 5 - 10% of the area of a new development is required to be artificial wet lands to prevent degradation of existing environs. Jack answered questions from the group. M. Keats offered a vote of thanks.

Meeting closed at 3.42pm

C. & K. Barnes Secretary

Vale - Io Myers

February 2001

By Michael Keats

Few women who achieve the title of Lady fully meet the implied criteria of what a 'Lady' is. Io Myers was a rare individual who combined the ingredients of life with the obligations of title with a grace that left all she met in deep respect and admiration. Even after a single encounter one felt motivated by her enthusiasm.

The condolences and thoughts of members of the Sydney Branch of the Malacological Society of Australasia are with Sir Rupert and the family on the loss of one of Australia's most dedicated achievers for community causes and

one of the most ardent exponents of shell collecting and appreciation.

Io's interest in shells was total. Colour, form, sculpture and their sheer beauty made her an advocate for shell appreciation at every level. The intensity of her passion was the driving force that made the Second Australian National Shell Show staged in 1998 a reality.

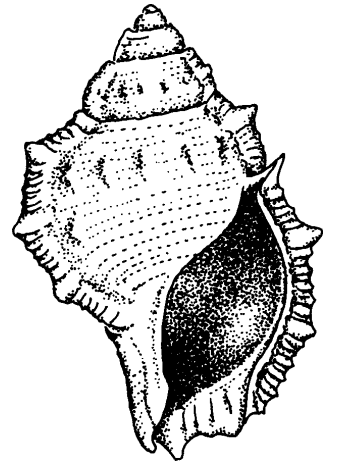
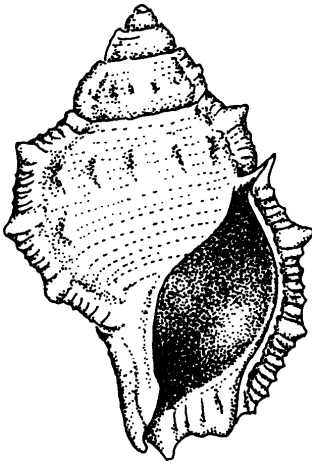
Io suggested to a club meeting in 1996 that Sydney should follow up on the success of the first National Show in Adelaide and stage the next Show. After the debate on the merits of the idea and our finances, I said 'come to me with \$10,000 and we will do it.' I honestly thought that would be the end of the matter. A week later Io was on the phone to advise that her long time friend and fellow collector Claude Fay had pledged the money! I was stunned. Her home became the event command centre for some 2 years. The Show was an outstanding success. Thank you Io. You put the Sydney branch on the map!

My fondest memories of Io are from field trips. I have a special memory of many

us at Muddy Creek, an Eocene shell fossil site in Victoria. It was Easter time. It was raining. Our Wellington boots just keeping out the rising water while we hacked into the crumbling rock banks looking for fossils, Io was in the water with the rest of us. Wet and dirty like the rest of us, her efforts were well rewarded. She and Rupert found one of the rarest flanged fossil cowries – *Umbilia gastroplax*.

On another occasion at Port Stephens, Io enticed some of her family to bring the grandchildren to share the joy of discovery of shells in their living environment. Io turned rocks with the best of us and patiently talked to the young ones about the diversity of local marine life, the importance of replacing each rock carefully and only taking a few of any species. The love and respect of her grandchildren was genuine and palpable.

Io, we miss you deeply as others do. Your record of contribution will remain and continue as a challenge for us all to aspire to raise the bar and try harder.



Cone Wars

Don E. Barclay April & May 1999

This article chronicles observations of life in Don Barclay's aquarium, especially the interaction of different species of cones. It was originally written as a series of e-mails posted to the Conch-L mailing list during April and May of 1999.

Cone Wars - Round 1

I did finally get the aquarium set up, and have been catching fish for it for the past three days. I went out to catch some cones this afternoon, and caught most of the ones that I was hunting.

I now have one *Conus textile*, about 80mm ("Art"), one *Conus magnificus*, 70mm ("Eduardo"), one *Conus episcopatus*, about 65mm ("Tom"), another *episcopatus* about 55mm ("Mark"), and a *Conus canonicus*, 50mm ("Ross"). I still plan to put an omaria or two in the tank, and a couple of *bandanus* cones. I'll have to make a trip to get a nice sized *marmoreus* for my experiment: I don't think a 30mm *bandanus* is a fair fight against a 80mm *C. textile*.

To keep the guys from becoming unnecessarily cannibalistic, I also caught some cowries today, all but one of which is now crawling circles around the tank. I collected one *Cypraea talpa*, one *lynx*, four *caurica*, one *erosa*, and four *arabica*, plus a handful of *annulus* and *moneta* cowries. I caught a few other cones too (*catus*, *sanguinolentus*, *capitaneus*) but decided not to include them in the equation.

I didn't even get all the animals in the aquarium before I saw something I'd never seen before. In my collecting bottle, my shy *magnificus*, Eduardo, snaked out his proboscis and stung one of the *Cypraea caurica*! And he did this while he was fully retracted into his shell. He didn't eat the cowry, as I was in the process of moving them into the aquarium. I dumped Eduardo's victim into the tank anyway, just to see what would happen. The *caurica* partially retracted into his shell, but it almost looked like he wouldn't fit. He proceeded to autotomize about the posterior 25% of his foot! I've seen harps do this, as well as several species of nudibranchs, but never cowries. He then remained on the bottom of the tank, motionless, for the next two hours. I went and bought lobsters for dinner, removed the tails, and then fabricated a little scoop to get the dead cowry out of the tank, but... when I went in to remove him, he wasn't where I had left him. In fact, he had crawled to the top of the tank. It wasn't hard to tell which one he was, as only one of the cowries was missing a quarter of his foot.

Cone Wars - Round 2

I waited a couple of days to post the initial results of the cone experiment because I wasn't sure exactly how some of the situations had turned out, and I'm still not completely certain, but here's how the evening unfolded:

I dropped all five cones mentioned in the last instalment into the aquarium, along with the ten cowries. One of the first things I learned was that fifteen molluscs introduced into a 55-gallon aquarium can produce a lot of slime (or "snail slobber," [sic] as I believe one young lady put it). Within an hour, all the fish were running circles and gasping for air, so I took my skimmer and dipped out all the slime that I could catch, and repeated this exercise several times during the evening. It worked, and eventually the water cleared up, and the slime bubbles stopped covering the surface.

It looked like things were shaping up for an absolute cowry slaughter from the very beginning. The cowries immediately hit the aquarium walls and headed for the top, and the big textile cone, Art, was the first to take chase, followed immediately by brothers Tom and Mark *Episcopatus*. All three headed for different *Cypraea caurica*, and the first to reach one was Tom. It just so happened that this was the *caurica* that had shed a piece of his foot earlier. His reaction made me realize why cowries aren't extinct. The cowry had crawled right to the water line, and positioned himself parallel to the water's surface, with about a third of the shell above the water line. As Tom climbed up on the cowry, looking for an appropriate spot to harpoon his dinner, the cowry withdrew most of his foot into the shell, clinging to the glass only with the part of his foot that was above the water. Tom spent several minutes trying to figure out where he should sting the cowry, and then... crawled away!

Art *Textile* had been climbing toward a cowry not far from the one Tom went after, but as he approached his prey, I suppose Tom's cowry either looked or smelled better. About the time Tom decided the situation was hopeless, Art thought he would give it a try, but the results were the same. He didn't seem to find a place to harpoon the guy either, so he turned his attention to a big fat *Cypraea arabica* a few inches away. The *arabica* stayed stationary while Art climbed up on him, and just when I was sure he was about to be eaten, the *arabica* released himself from the glass. Both he and Art tumbled to the bottom, breaking their union. While Art seemed a bit disoriented, the *arabica* crawled over to the glass, and climbed straight back to his perch at the top of the aquarium.

Mark *Episcopatus* was also on the prowl at this time, and I got a bit more education by watching what he did. The third *Cypraea caurica* was easing along near the water line when Mark approached him from behind. Just as Mark touched him with his siphon, the *caurica* seemed to realize he was in danger, and sped away from the cone! From watching these cones and cowries interact, it appears that all of the cowry species in my tank are capable of moving about five times as fast as any of the cones, at least moving horizontally on a vertical pane of glass.

Mark turned around and headed back toward brother Tom, and as they met, they seemed to tip their hats to each other, and continued on their way. They were certainly not in a cannibalistic mood with all the cowries crawling around, which was just as I suspected.

I had initially refrained from naming any of the cowries, as I feared they wouldn't survive long enough to justify naming them, but more to come, including the exploits of my *Cypraea lynx*, "Helmut."

Cone Wars - Round 3

When we left off, the cones in my aquarium were not having the greatest success catching their dinner, even though the cowries were swarming all around. The big *Conus textile*, Art, had already taken one fall from the top of the aquarium, but it wouldn't be his last.

Shortly after the two *Episcopatus* brothers, Tom and Mark, passed each other near the surface of the aquarium, uneventfully, the first of the real cone interactions took place. Art had climbed slowly back to the top of the tank, and was easing toward one of the *Cypraea caurica* on the left, when he encountered Mark face to face. The two cones sniffed each other, and then seemed to get tangled up a bit, each one

apparently trying to climb over the other. In what appeared to be no more than a "get out of my face" gesture, Art zapped poor Mark! Once again, both cones tumbled to the bottom, but only Art crawled away.

Marcus Episcopatus lay on his side, with his foot only extended a couple of millimetres outside the aperture of his shell. He never moved the rest of the night, other than his siphon, which he could still extend and retract. The fish in the aquarium were beginning to show some interest in the disabled fellow, so I interfered and rotated his shell so that the aperture was down, affording him a bit more protection. Two days later, Mark was still in the same position.

Meanwhile, the *Cypraea lynx* (now named "Helmut") had made about five circuits of the aquarium, crawled over every rock and log, across the top of the aquarium (which is a couple inches out of the water), and investigated every nook and cranny. His next action surprised me once again. After the encounter with Mark, Art had climbed back to the top of the aquarium, and had his sights set on a lonely *Cypraea caurica*.

Helmut climbed to the top of the aquarium, made a 90-degree turn, and bore down on Art nose to nose. Instead of going around the *Conus* textile or retreating from him, Helmut climbed directly over his foot and siphon and onto his dorsum, and stopped, as if he had reached his destination. Within a few seconds, Helmut's weight caused Art to lose his grip, and for the third time (for Art) they tumbled to the bottom of the aquarium. Helmut immediately hit the wall of the aquarium and headed back to the top, but Art had evidently had enough, and remained on the floor of the aquarium. He crawled over to the *Cypraea erosa*, who was half tucked under a rock, and remained there watching him for the rest of the evening.

Helmut wasn't finished. Apparently enjoying the ride from Art, he headed straight up the wall for Tom, the remaining healthy *Conus episcopatus*. Tom was slowly crawling toward a stationary *Cypraea caurica* at the water line when Helmut overtook him from behind. Helmut climbed up on Tom's dorsum, this time from the spire, and once again stopped in the middle of the cone's back. The results were the same as with Art, and within a few seconds Helmut had pulled Tom off the wall, both plunging to the bottom of the tank. By now I was wondering whether this was some instinct that Helmut was exhibiting, a new trick he had just learned, or purely coincidence...

Tom had had enough excitement for the night after the ride with Helmut, and decided to go to bed hungry. He righted himself, then stood up very tall, with more of his body exposed than I've ever seen before. He lowered his head and began to bury himself in the gravel. His shape lent itself well to this endeavour, and only his spire was visible within one or two minutes. With Tom now buried, Art on a stakeout, and Mark paralysed, I turned out the main aquarium light and the living room lamp, and got ready to go to bed. I could still see what was going on from the light in the kitchen, and within a few seconds Eduardo, the *Conus magnificus*, and Ross, the *Conus canonicus* came to life. Heck, I'd killed most of the night watching the first act of the drama. I figured I might as well stay up and watch the second act.

Cone Wars - Round 4

With all the lights out except for the light in the kitchen, Mark ailing, Tom buried, and Art licking his chops over an expected *erosa* dinner, Ross *Canonicus* and Eduardo *Magnificus* suddenly showed signs of life. My experience with *Conus magnificus* in a collecting bag has always shown them to be rather shy, and *Conus canonicus* is usually not much more active. Eduardo would change my opinion over the next few days, however.

After several motionless hours, Ross decided to explore his new surroundings a bit. He slowly climbed the wall of the aquarium, and cautiously approached the line of cowries near the water's surface. He stopped just short of the first *Cypraea caurica*, and extended his siphon to within a few millimetres of the cowry, but never made any attempt to harpoon it. After a few minutes, he moved around the unconcerned *caurica* and headed for the next cowry in the line. This time he appeared to make a half-hearted attempt at catching the *caurica*, but the cowry wasn't nearly as disturbed by his presence as it had been by Art's approach. It slowly moved away, and the *Conus canonicus* didn't follow. Ross simply meandered around the walls of the tank, and eventually crawled back down and staked his claim on one of the corners at the bottom of the aquarium.

Eduardo hit the glass like he was hungry, and actually out-climbed all of the other cones in the tank. He didn't move nearly as fast as the cowries, but he was quite a bit faster than Art, maybe simply because he wasn't tentative, or maybe all the cowry activity had excited him. In any case, he went straight to the top of the aquarium and rushed up to one of the big *Cypraea arabica*, which simply ignored him. Eduardo only paused for a moment, evidently discounting his chances, and then moved on over to the next cowry, which was the little fellow with three quarters of a foot that he had harpooned earlier in the day. Eduardo gave this one a closer inspection, but the *caurica*'s trick that had worked on Art and Tom appeared likely to be successful yet again. He was still parallel to the water line, with most of his foot out of the water and the lower side of his shell against the glass. Eduardo was considering what his plan of action was going to be, when around the corner came Helmut.

Now, Helmut, the *Cypraea lynx*, had already pulled both Art and Tom off the glass this night by climbing up on each one's dorsum and allowing his weight to break the cone's hold on the aquarium wall. Would he do the same thing to Eduardo? Amazingly enough, yes. Helmut approached Eduardo from the side, and Eduardo saw him coming. He turned slightly toward Helmut, but the cowry never hesitated. Straight over Eduardo's foot, crumpling his siphon, onto his back... then he just stopped. Eduardo seemed to try to turn or tilt his shell away from Helmut's weight, but in a matter of a few seconds, both were headed for the gravel. Once on the bottom, Helmut quickly crawled over to the glass and resumed making his rounds, and Eduardo wasn't far behind. Eduardo seemed to have the best memory of all the cones (or else he just holds a grudge), as he devoted the next few days to ONLY chasing Helmut, completely ignoring the other cowries.

The bane of all the molluscs' existence in my tank has been one blue-and-yellow, inch-long, aggressive little damsel fish. The first thing he discovered about all the cones in the aquarium is that they have little red bites of food attached to these tubes that protrude from the front of the shell, and he felt obliged to try to remove it from every cone in the tank! (All of these cones are related, and each one has a banded siphon, red at the tip, with a white ring behind the red, and a black ring behind the white one.) It almost made me wish one of them had been a *Conus geographus*. After Eduardo's tumble, the fish harassed him for half an hour, alternating between him and his cousins. Then, for good measure, he zipped up to Helmut, and bit his left eyestalk off! I seem to recall a story of someone keeping a *Cypraea testudinaria* that regenerated an apparently-functional eyestalk in his tank (Scott Johnson in Kwajalein?), so maybe I'll see if a *Cypraea lynx* can do the same, assuming he survives. I was beginning to believe that Helmut was going to be at some disadvantage against Eduardo with only one eye - when I noticed that Eduardo's right eye was missing! I determined to remove the mean little fish the next day, but he has completely ignored the molluscs since that night, so I decided to let him stay.

By now I was fairly confident that nobody was going to become dinner this night, so I decided it was time to go to bed. As it turned out, I was mostly correct. The next morning, I went to the aquarium and counted cowries to see how everyone had fared overnight. I saw Helmut down in a corner behind some grass, and there were the *Cypraea arabica* huddled at the top of the aquarium. The juvenile *C. talpa* had tucked himself into some branch coral, and the *erosa* was near the spot I had left him. The *caurica* were spread all over the aquarium, and I counted them: one, two, three, four, five... wait a minute, one, two, three, four, five... Yep, my aquarium had generated one additional *Cypraea caurica*

overnight. I had only brought home four, so I can only guess that there was one in the clump of grass that I had brought in for the fish to graze on!

Mark was still where he had been the night before, and Tom was still mostly buried. Ross remained in the back corner of the tank, and Art and Eduardo had both gone underground.

Cone Wars - Round 5

Everyone seemed to have survived the night, even if Mark *Episcopatus* hadn't moved. I could still see his siphon, and it even retracted a little occasionally, so I took that as an encouraging sign. As I looked more closely at the *Cypraea erosa* that Art had staked out the night before, I couldn't see any mantle exposed, so I decided to remove him from the tank and give him a physical. As I suspected, only an empty cowry shell remained. Looks like Art had his *erosa* dinner after all!

Everything remained calm in the aquarium the rest of the day. The cowries stayed parked in the same spots, with the *arabica* at the top of the tank, Helmut Lynx in the corner behind a clump of grass, and the others scattered around at random. As the evening wore on, I closed the window blinds and turned out the aquarium lamp, and waited to see if the action would pick up. It did.

Within two minutes after extinguishing the light, Eduardo came bursting out of the rubble, and headed straight for Helmut without any hesitation. I grabbed my camera, and waited to see what would happen. Eduardo crawled directly onto Helmut's dorsum and extended his long, red proboscis around the cowry's shell. Helmut was still completely retracted into his shell, but sensed immediately that something was wrong. He went from being totally withdrawn to having his entire foot extended in a matter of only two or three seconds (awfully fast for a cowry). Helmut started trying to climb the glass, and indeed was lifting the *Conus magnificus* off the bottom, when Eduardo moved his proboscis around to Helmut's head. I thought, "This is it for poor Helmut," and snapped a photo. The rule that the act of observing an event may actually affect its outcome certainly applied here, but not in the same sense that the physicists would apply it. The flash stunned Eduardo for just a moment, long enough for Helmut to gain an inch of vertical glass and dump Eduardo off in the gravel.

Having narrowly escaped, Helmut cruised around the tank the rest of the evening, never letting Eduardo get near him. Eduardo remained active, and followed Helmut's trail for hours. Several times he passed very near the other cowries, but showed absolutely no interest. Eventually, Eduardo returned to the bottom of the aquarium, apparently resigned to the fact that this was not the day that he would catch Helmut. He sat feigning interest in a clump of branch coral until I went to bed.

Art never resurfaced. I'm not sure how long a *Conus textile* will remain buried after he's eaten, or even how often they feed, but it looks like a good chance to find out. Tom did finally resurface, but never showed anywhere near the interest in chasing cowries that he had shown the night before. And Ross meandered around the aquarium a bit too, but he also seemed less than excited. Maybe the lack of fresh cowry trails everywhere made the not-quite-so-new surroundings seem more normal?

With things settling down and the cowries on patrol, I decided to call it a night. The only other thing I had noticed was that my little puffer had now started to follow the damsel fish's example, and had begun to nip at both the cowries and the cones. I decided to remove him, and returned him to his ocean home.

The next morning when I took inventory, it was much the same as the day before. Eduardo and Art were still buried, and so was Tom. Even Mark was now half-buried, about six inches from where he had spent the past two days! Only Ross was exposed, and had the anterior part of his shell inserted into the aperture of the juvenile *Cypraea talpa*. Helmut had found a new perch at the top of the aquarium in one of the front corners, and the other cowries were once again distributed around the tank. The only thing that was amiss was a single, empty *Cypraea moneta* shell, obviously someone's meal from the night before.

Ross and the juvenile *talpa* were still in the same positions late in the afternoon. Curiosity finally got the better of me, and I took my tongs and extracted the *talpa* from the tank. It was very dead, but only half eaten. I don't know if the fish had eaten on the cowry, or some of the tiny hermit crabs, or if Ross had enjoyed some success himself. If Ross was the perpetrator, he certainly didn't do the extraction job that the molluscivorous cones usually do on cowries. Then again, Ross is relatively small, and the cowry fairly large. He certainly seemed to have shown some interest in the *Cypraea talpa*, though, judging by their positions, whether the cowry was living or already dead.

Once again the daylight hours went by peacefully, and only when the lights were out did the aquarium come to life again.

Cone Wars - Round 6

Within a few minutes of extinguishing the main aquarium lights, once again signs of life began to appear. Most of the cowries, including Helmut Lynx, were distributed around the water line at the top of the tank, and all the cones except Mark *Episcopatus* were buried. Mark was still moving his siphon, but had moved little since Art, the *Conus textile*, harpooned him.

Eduardo *Magnificus* was the first to move, bursting from the rubble at the bottom of the aquarium, and as might be expected, headed straight up the wall to the spot where Helmut was stationed. He climbed fairly quickly at first, but as he approached the cowry, he slowed until he was barely moving. I got my camera and waited to see what would happen. When Eduardo got within a few millimetres of Helmut, he stopped. He extended his siphon to within about a millimetre of Helmut, and just sat there. And sat. Eduardo would move his siphon to either side, back and forth, but never made any attempt to harpoon the lynx cowry. For two hours I sat there, camera in hand, waiting for one of the snails to break the standoff. Neither one had budged, when along the water line came an unsuspecting *Cypraea caurica*. As it became obvious that the *caurica* intended to crawl between Helmut and Eduardo, I thought, "OK, here's an easy meal for Eduardo!" As the *caurica* forced his way between these two, Eduardo never retracted his siphon. Instead, he simply "folded" it to one side, and allowed the *caurica* to pass unmolested. He never showed the slightest interest in the *caurica*, and as soon as he was out of the way, Eduardo resumed his stakeout on the *Cypraea lynx*.

For a total of three hours Eduardo kept his vigil, then finally turned around and headed back to the bottom of the tank. He buried himself without any further attempts at catching a meal, and I went to bed. The next day Mark had still not moved, and his siphon was no longer visible. The third day after being stung by Art I removed him from the tank, and sure enough, he was dead. It seemed amazing that he had survived for over two days after the encounter with the textile cone, only to eventually succumb to the toxin. His foot seemed to be paralysed almost from the beginning, yet he had crawled several inches and partially buried himself just before he died. It made me wonder just how close he had come to surviving the encounter.

That afternoon, a good friend and outstanding photographer asked if he could borrow Tom and Eduardo for a little photo session in the ocean. I said sure, so he took the two cones on a field trip to Faga'alu, on the west side of Pago Pago Harbour. He managed to get photos of both cones, as well as some other creatures that he had planned to photograph, but unfortunately lost track of Tom *Episcopatus*, and only came home with Eduardo. I was happy to have Eduardo back, but when I put him in the tank he immediately buried himself, and I didn't see him again for five days. Thus began a quiet period in the Cone Wars aquarium.

For several days and nights there was little action, with all of the cones staying mostly buried, and the cowries touring the rocks and glass with no worries. I wondered if everyone had become accustomed to the aquarium, and had now entered a period of more typical activity since the novelty was gone. I decided to shake things up a bit, and after a few hours in the water, returned with three new residents for the tank. Meet Paul Textile, slightly smaller than Art, and the Omaria brothers, Andy and Gary. Each *Conus omaria* had a scar on his dorsum, but I decided it would be easy enough to tell them apart, as one had a straight scar (Andy) and one had a curved scar (Gary).

I put all three in the tank at the same time, turned out the light, and waited for the fireworks. It took about five minutes for the three cones to bury themselves, and none of them resurfaced for the rest of the evening! I guess the new surroundings might not have been responsible for all the previous week's activity after all. I thought it over carefully, and decided that all of the unsettled cowry activity might have been responsible for the cones' excitement, so I determined that I would collect a few more small cowries for the tank and see if anyone became more motivated.

This time I went out and caught two *Cypraea isabella* and four *C. erosa*, and dropped them in the tank with the cones. I didn't notice much activity that evening, but in the morning there was one empty *isabella* shell and one empty *erosa* shell, so at least a couple of the cones had had dinner during the night.

That evening I came in and extinguished the aquarium light, and waited to see if any of the cones would chase the remaining cowries. Most of the cowries were lined up near the water line at the top of the tank, though a few were on the rocks or sitting on the gravel. Helmut had taken up residence in the clump of branch coral, and had been there since the previous night. A couple of minutes after the light was turned off, Eduardo came bursting from the rubble, and made straight for Helmut's hideout. Helmut appeared to be in a fairly safe place in the coral, but this time he didn't wait until Eduardo was upon him before he started his escape manoeuvres. When Eduardo was still several inches away, Helmut seemed to sense his coming, and left his hiding spot in the coral and began climbing for higher ground. He climbed to the highest point on the coral branch, actually out onto the very tip of one of the branches, and stopped there. Eduardo continued on to the place where Helmut had been, and then actually stretched upward toward Helmut's new perch, with his siphon pointed directly at him. Eduardo knew the lynx cowry was up there, but he couldn't seem to figure out how to get to him. He pirouetted (slowly) several times; keeping his siphon aimed directly at Helmut, but never made any attempt to climb onto the coral. He eventually gave up and crawled away, and Helmut remained perched on the tip of the coral branch for the rest of the evening.

It turned out that this was the last time Eduardo showed any particular interest in Helmut, as he seemed to have decided that *Cypraea isabella* and *erosa* were now more to his liking (or at least more suited to his hunting skills).

Cone Wars - Round 7

About the time that Round 6 of the Cone Wars ended, it was my pleasure to welcome Betty Jean Piech and Homer and Ann Rhode to Samoa. We spent a lot of time in the water and riding around the island, so I didn't spend a tremendous amount of time watching the tank. Still, we did observe a few interesting things while they were here! I'll leave most of that story for others to tell. At least they got to meet Eduardo and Helmut.

I arose at the crack of noon one morning and gathered up my snorkelling gear, and prepared to meet the other shellers at the Rainmaker Hotel. I decided to take a look in the aquarium before I left, just in case anything unusual was happening. It was. I had collected a pair of *Bursa lamarckii* the week before, and dropped them in the tank so that Betty Jean could look at them when she got here. As I watched, Art Textile's anterior tip came out of the gravel (he was almost exactly spire-down), and pushed the *Bursa* about half an inch off the bottom of the aquarium, harpooning him at the same time! I was stunned, as it appeared that Art had either trailed the *Bursa* from under the gravel, or had been lying in wait for some victim to happen into his snare. Anyway, the *Bursa* attempted to shut his trap door, but the damage was done.

Art sat there working on extracting the *Bursa* until I left for the hotel. I wondered: are *Cypraea* really the prey of choice for the molluscivorous cones? I had seen a *Conus omaria* attack a *Nassarius* on dry land a few weeks before...When I returned from snorkelling, I brought a handful of *Cypraea isabella* and *erosa*, plus a couple of other small cowries and dropped them in the tank. Art was no longer visible, and the *Bursa lamarckii* was back in his normal position. I couldn't resist seeing whether Art had been successful, so I got my tongs and fished the *Bursa* out of the aquarium. He wasn't completely eaten, but Art had managed to remove about half of his foot. I took the *Bursa* over to the sink to see if I could get the rest of the animal out with a dental pick, and I did. The animal seemed to be semi-dissolved, at least at the attachment points, and the entire animal came out of the shell with almost no effort, covered with slime.

I have seen cones extract cowries so completely that there was absolutely nothing left in the shell, but it's quite a task for us humans to do the same thing on a fresh animal. Art seems to know a few tricks that I don't know. I went back to the aquarium to look for the *Bursa*'s operculum, expecting to either have to dig for it or choke it out of Art. Instead, there it was, only a short distance from where the *Bursa* had been lying. I managed to snag it with the tongs also, and put it in a bag with the *Bursa lamarckii*. (These two *Bursa lamarckii* are the only ones I've seen in over three years here.) I gave the *Bursa* to Betty Jean, complete with its data slip/death certificate from Don's Aquarium.

Although I hadn't seen much of Paul Textile since I had put him in the aquarium (actually, I hadn't seen him at all), the Omaria brothers, Andy and Gary, had been quite active. They were out practically every night, with Gary preferring to cruise the rocks and clumps of *Halimeda* on the bottom of the tank, while Andy spent a lot of time climbing the walls. Eduardo was right there with them, and *Ross Canonicus* even joined the hunt occasionally.

Nobody seemed to have much luck while I was watching, but with the introduction of different cowry species into the tank, things began to change. Every morning when I'd check the aquarium before going to work or off to meet the others to go shelling, there would be one or two freshly killed cowries in the tank.

While my visitors were here, I removed 14 empty cowry shells from the aquarium! The preference was definitely for *Cypraea isabella*, with eight of them being eaten, along with five *erosa* and a single *caurica*. The population of cones in the tank at this time consisted of two *C. textile*, two *C. omaria*, one *C. canonicus*, and one *C. magnificus*. By proximity, I could guess who had probably eaten several of the cowries. Although I couldn't blame Andy for any of the kills, Gary Omaria had taken up residence in one of the clumps of *Halimeda*, and I strongly

suspect that he ate a *Cypraea erosa* and a *C. isabella* whose shells ended up in the same clump. It seems like his strategy of letting the prey come to him was more successful than brother Andy's head-on approach.

Several empty cowry shells appeared in the middle of the open gravel over a short time period, and I am fairly certain that these were Art's and Paul's ambush victims, assuming the attack on the *Bursa lamarckii* was typical *Conus* textile behaviour. Eduardo had put on a couple of millimetres of new lip growth during this time, so he evidently had been catching his share of the cowries, even if the menu still didn't include *Cypraea lynx*. (Helmut had established a new residence in one of the corners near the top of the tank.)

On the supposed last night of my visitors' Samoan holiday (had the flight not been cancelled), we finally had the chance to witness Eduardo in action. I turned the aquarium light off as soon as I found out that the Rhodes and Betty Jean were going to be with us another night, in hopes that they might get to witness some activity in the tank. Sure enough, Eduardo came out of hiding, and started slowly up one of the corners of the aquarium, directly below a *Cypraea erosa*. As Betty Jean said, "You can't really tell that he's moving, but the space between Eduardo and the cowry is shrinking." Eduardo continued the slow-motion stalking until he was within about an inch of the cowry, then extended his red proboscis as far as it would reach, and harpooned the hapless *erosa*. The *erosa* immediately fell to the bottom of the tank, but Eduardo didn't seem to know exactly what had happened to the cowry. He turned around and started moving sideways initially, then slowly turned toward the bottom of the tank. It appeared that he did indeed know where the cowry was after all, but then he did a course reversal and acted like he was going to resume his hunt at the top of the tank.

By this time it was getting late, and the paralysed *erosa* wasn't looking so healthy, so I pointed Eduardo in the right direction (I punched him off the wall of the aquarium). Once on the bottom, it only took Eduardo a couple of seconds to realize where the cowry was, and in a very short time he was working on extracting the cowry from its shell. I expected him to engulf the shell, but he didn't. He formed a semi-circular ring around the basal margin of the cowry shell with his foot, giving him something to push against. Within about 35 minutes, he had completely emptied the shell. I had assumed that he would immediately bury himself after eating, but not Eduardo. He resumed his hunting for the next hour, and then finally decided to call it a night. He only took the next day off from his hunting, and then was back to his normal rounds by the second day. It was beginning to appear that the cones in my aquarium had no interest in each other, each one having staked his territory and going about his business night after night.

It continued this way until I got a call at work from my wife, who told me that Chuck Brugman had just caught a "big marmoreus" (it was a *Conus bandanus*) and had put it in my tank.

Cone Wars - Round 8

After being informed by my wife of my new cone's arrival, I was anxious to get home and see the new guy in action. Bob Dayle had cautioned that *Conus textile* and *Conus marmoreus* were natural enemies, and I was curious to see if the reaction would be the same between the pair of *C. textile*, Art and Paul, and a deep-water first cousin of *C. marmoreus*, *Conus bandanus*. When I arrived at home and checked on the aquarium, all was calm, with none of the molluscs in the tank active. I removed the *Conus bandanus* and measured him, a nice 83mm, and I dubbed the new resident Emilio.

The lights had been on since Emilio had been introduced to his new home, so I extinguished them to see if the activity would pick up a little. In typical fashion, Eduardo Magnificus was the first to make a move. Eduardo came crawling out of the rubble, ignoring the new guy, and headed up the wall of the aquarium in search of an easy meal. He eased up to a *Cypraea caurica* positioned near the water line, sniffed at him, and turned around and headed back for the bottom of the tank. This time he went straight toward Emilio, evidently just recognizing him as an intruder. In faster-than-cowry-stalking speed, Eduardo marched up nose-to-nose with Emilio, extending his proboscis in a gesture that I was sure was not a "Welcome" in cone language. Emilio beat him to the punch, however, and snaked out his long white proboscis and harpooned my favourite *Conus magnificus*. Eduardo flinched, then turned to crawl away, but only moved an inch or so. The *Conus bandanus* withdrew back into his shell, and made no attempt at eating Eduardo. I watched as the *C. magnificus* stretched out his foot and retracted it, and moved his siphon, but he seemed to be unable to coordinate his crawling muscles. His foot would move, but he couldn't crawl. This was the exact reaction that I had seen in *Mark Episcopatus* after Art Textile had stung him, and I knew that it didn't bode well. Eduardo remained in the same location for the next three days, except for the occasions when I removed him to verify that he was still alive, and like Mark, after three days he was dead. It was depressing, but life in the aquarium goes on.

Nothing much happened the rest of the evening, but when I arose the next morning practically every cone in the aquarium was out hunting, with the exception of Art and Paul. A few days before, with everything settled, I had introduced two new residents to the tank, a *Conus tulipa* and a *Conus striatus*. Both of these new guys are piscivorous, but I thought I would just put them in the tank for a while to see how they interacted with the molluscivorous cones. The *C. tulipa* was the most active of all the cones I had had in my aquarium, and spent all the hours of darkness out hunting. He would "bulldoze" the cowries around the water line of the tank, and attempted to crawl down the water circulation pipe with the air bubbles in his face, but never made any attempt at eating anything in the aquarium, other than my little trigger fish. (He did finally catch the little guy.) This morning he was out crawling as usual, as were Andy and Gary Omaria and Ross Canonicus. Emilio had partially buried himself, with the tip of his siphon exposed just above the gravel. I sat watching all the action this morning, curious how Emilio would react to all the other cones moving about. Andy Omaria would be the morning's test case. Andy ambled toward Emilio, apparently lacking the sense of danger that Eduardo had displayed. As Andy came closer, Emilio extended his proboscis (which can be extended almost twice as far as his siphon, by the way). He "felt" for the *Conus omaria*'s foot, found it, and zapped him. Andy was immediately unable to crawl, and Emilio didn't retract this time. He slowly, almost clumsily, repositioned himself above the aperture of the *Conus omaria*, and without extending his foot, proceeded to extract the victim from his shell. The process took almost an hour, but Andy's shell was completely empty when he was finished.

Twelve hours in the tank, and Emilio had killed two of my molluscivorous cones. I was beginning to wonder why a "super-predator" like *Conus bandanus* didn't simply wipe out the cone population in an area, instead of being so uncommon like they are in American Samoa. After eating Andy, Emilio buried himself in the rubble, with his siphon against the front glass of the aquarium. He remained there for the next two days, and gave me the opportunity to watch his reaction as the other animals moved over him. Several times cowries crawled over the *Conus bandanus*' siphon, but he never showed the slightest interest. In fact, for the entire time he has been in the aquarium, Emilio has ignored the cowries, showing interest only in the other cones.

After a couple of days in this position, the *C. bandanus* decided it was time to move, and so did Paul Textile. As Emilio dragged himself from the rubble, Paul emerged on the opposite side of the tank, obviously perturbed. He crawled directly up to Emilio, but not in a frontal attack like Eduardo had attempted. The *Conus textile* extended his pink proboscis when he was still six inches from the *C. bandanus*, and approached him from the side, about an inch behind his anterior tip. The *Conus bandanus* froze as the textile cone approached, and never moved to defend himself as he had done with Eduardo. Paul was strictly business, and never hesitated. He stopped his advance as soon as his proboscis would reach Emilio's foot, and stung the *Conus bandanus* the first place he touched. Emilio instantly withdrew, but Paul wasn't

finished. He crawled a little closer, extended his proboscis under the lip of Emilio's shell, and appeared to harpoon him again. He repeated this five times, moving up the length of the shell toward the spire, and then turned around and marched off. Paul had obviously recognized the intruder as a dangerous enemy, and was intent on killing him, not on eating him. It wasn't quite a "David and Goliath" battle, but by volume, Emilio must be at least three times as large as the 63mm *Conus textile*.

Cone Wars - Round 9

After Paul Textile had made his calculated attack on Emilio Bandanus, he seemed satisfied, and headed toward the opposite side of the aquarium. I picked up my camera and was trying to get the thing to focus on Paul as he was exiting the scene when, through the viewfinder, I watched a different proboscis extend from the rubble and harpoon Paul in the side of the foot! Paul flinched, as all the cones have when they are stung, but continued on to the other side of the aquarium and stopped with his siphon against the glass. Art came crawling from the spot where he had ambushed Paul, and went over to investigate his victim. He didn't seem particularly interested in Paul any longer, and after a ten minute stroll, buried himself in the rubble again, this time with the tip of his siphon exposed. Paul remained motionless against the aquarium glass for about an hour, and it was beginning to look like *Conus textile* venom is deadly to another *Conus textile*. Paul proved otherwise, though, and after a while he made another round of the aquarium. He ignored Emilio this time, then buried himself near the front glass. He also left the tip of his siphon exposed, and when one of the fish moved a rock or I tapped on the side of the tank, he would extend his proboscis and "feel" for any potential prey moving about! I was just about convinced that Emilio was on his way to bandanus heaven when he began to crawl forward, and then buried himself in the rubble. He continued forward until his siphon was also against the front glass of the aquarium, only a couple of inches from the spot where his nemesis, Paul, was buried. All was calm for some time after that, and as it appeared that things had settled down for the evening, I shut off the lights and went to bed.

The next day things looked essentially as I had left them. There were no stray shells on the bottom of the aquarium, and I could clearly see Paul and Emilio against the glass. I could also see where Art was hiding, as his siphon or proboscis would occasionally protrude from the rubble. He had settled back into what must be his normal ambush position, barely under the surface of the aquarium floor. As I watched the two *Conus textile* extend their proboscides in response to any movement in the tank, I noticed that Art's was quite a bit darker than Paul's, which was only pale pink. Diet, or lack thereof, possibly? While I pondered the colour difference, an oblivious *Cypraea caurica* stumbled around the corner, headed straight for Paul Textile's hiding place. As the *C. caurica* approached, Paul extended his proboscis to full length, whipping it around in an attempt to locate his potential breakfast. The cowny never seemed to detect the cone in front of him, even though Paul was certainly aware of the cowny's presence. The *caurica* continued forward until Paul's proboscis was raking across the front of his shell, and then he froze. Did you ever wonder whether a cowny could crawl backwards? This one did. And he didn't just rise up and turn, but his foot undulated in reverse motion, and he moved directly backward about an inch! Paul never seemed to figure out where the cowny went, and maintained his ambush position without giving chase. After the *C. caurica* had backed up, he turned and climbed up on the glass, making an arc above Paul's hiding spot, and then resumed his rounds on the gravel once he was clear of the danger zone. Paul went without breakfast.

Nothing else of note happened that morning, and all was calm when I darkened the living room that evening. It didn't take long for the *Conus tulipa* to sense that "nightfall" had come, and within a few minutes he had resumed his nightly hunting. He started out by climbing the glass, but in a short while had worked his way down to the bottom perimeter of the tank, obviously on course to crawl directly over Emilio Bandanus. I reached for my camera and waited. As the *Conus tulipa* continued toward Emilio, the bandanus cone sensed his approach, and began to extend his proboscis. The *C. tulipa* was crawling on the glass just above Emilio when he struck. A quick sting, and the *Conus tulipa* fell from the glass, toppling onto his back. He landed almost directly on Emilio's dorsum, and the *Conus bandanus* spent the next thirty minutes clumsily attempting to reposition himself to finish off the *C. tulipa*. During this time the *Conus tulipa* exhibited the same symptoms that the other cones had shown after being stung: he could move his siphon in and out, and could extend or retract his foot, but was unable to crawl or get any grip on the aquarium glass. Emilio did finally get himself and his victim oriented suitably, then harpooned the *Conus tulipa* a second time for good measure. The *C. tulipa* did not flinch this time. Emilio then wrapped his "mouth" around a section of the *C. tulipa*'s foot, beginning near the posterior end, and then slowly stretched it down over the anterior part of the foot. As the tulip cone withdrew into its shell, Emilio went in with it. For two hours the *Conus bandanus* slowly extracted his victim, and you could even see the colours of the tissue being ingested through the semi-transparent tube that the *C. bandanus* used for feeding. For about an hour of that time, Emilio also had his siphon inserted into the tulipa shell. Could he tell by "smell" how the extraction was progressing?

After Emilio had completely removed the *Conus tulipa* from its shell, he cast it aside and worked on getting himself and his new meal back into his shell. The *C. tulipa* wasn't terribly large, but the thin shell holds a lot of animal! I had guessed that the bandanus cone would settle down and hide for a day or so until he could completely retract into his shell, but Emilio didn't. It hadn't been too long since he had eaten Andy Omara, so he wasn't empty and starving, but within about twenty minutes of finishing off the tulip cone he had managed to get his gut and foot both back into his shell. Emilio, now fat and happy, buried his nose in the gravel and all was quiet in the aquarium once again.

The aquarium remained quiet for the next two days. I could still see a proboscis or siphon tip emerge from the gravel occasionally, so I knew where Art and Paul were hiding. If only Emilio had known. Emilio, now recovered from his feasting, decided to check out the territory on the other side of the aquarium. He pulled himself from the rubble, and slowly crawled toward the middle of the tank, directly into Art Textile's ambush. As he passed over Art, the results were predictable. Art reached up and harpooned Emilio, and since he was directly above the anterior tip of Art's shell, the trick he had used on Paul didn't work. I now believe that Paul must not have been successful in all his attempts at stinging the *Conus bandanus*, because the sting from Art stopped Emilio dead in his tracks. With Emilio withdrawn into his shell, it was hard to tell if Art stung him more than once, but I suspect that he did. In any case, Art made no attempt at eating the *C. bandanus*, but he did crawl from his hiding place and make a victory lap around the aquarium before burying himself once again.

I watched Emilio carefully over the next two days, and it was a familiar pattern that I was observing. Like the others before him, and even his own victims, Emilio would retract his siphon, then extend it. At first he could extend his foot slightly, but after the first day he only seemed capable of moving his siphon. I checked on him a couple of times each day to see if he was still alive, but like all of the other "Cone Wars" victims, on the third day after being stung he was dead.

And so ends this volume of the Cone Wars. Salute all the warriors, but hail *Conus Textile*, Champion of the Cone Wars.

EPILOGUE

The Cone Wars "experiment" was hardly scientific, but it was educational for me, and I hope others enjoyed it, too. I learned several cone and cowny survival strategies, as well as getting a glimpse of the hunting methods that a few different species employ. The *Conus textile* are certainly survivors, with a compulsion (and the equipment) to eliminate any potential competitors. The *Conus canonicus* survived mostly by staying out of the way of the bad guys, as did one of the *Conus omarias*. All but one of the original *Cypraea caurica* survived by using a variety of strategies, and then of course there is Helmut...Thanks for all your comments, and best to all you Conch-L'ers! Cheers, Don

