THE CONE COLLECTOR

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THE CONE COLLECTOR

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On the Cover:

Our friend Gonçalo Rosa photographed this beautiful specimen of *Conus geographus* Linnaeus, 1758 last December at Panglao (Bohol), Philippines, during a night dive. It was strolling around 32 metres deep.

Whereas many living Cones are not the most photogenic of animals, since the narrow aperture conceals most of the soft parts, *C. geographus*, with its big body and large aperture makes a much more striking subject.

Note from the editor

Shell collecting is not, strictly speaking, a scientific activity and not only most shells collectors are not scientists, but many do not have a scientific background.

That of course does not mean that informed amateurs cannot achieve a high level of quality in their appreciation of the natural specimens they are dealing with and in fact many amateurs accumulate an impressive amount of information along many years – often running into decades – of dedication to their favourite areas or subjects. Amateurship is nothing to be ashamed of since on one hand a few famous names of past centuries' Malacology could boast no academic preparation on Zoology or any such field and on the other hand the very word "amateur" comes from the Latin term "amare", which means "to love", and this is obviously a clear indication of the deepness of their relationship with Nature and its many secrets.

The fact remains that shell collecting as such is, at most, a para-scientific activity. This means that there are many different ways of collecting shells. One can collect shells for aesthetic purposes only, even for decorative purposes; and one can collect them in a systematic way. One way is clearly as good as the other and scientific background is something that can always be acquired by anyone at any time, either through formal study or through autodidactic efforts.

Our newsletter aims to include articles of interest to a wide range of both collectors – from beginners to advanced – and academics, something that can only be achieved with the permanent collaboration of everyone, not only in the form of articles, but also through comments, opinions, questions, photos, or, quite often, a simple word acknowledging receipt of each new issue and telling us that you enjoy our company!

While not pretending to be a formal scientific publication, we endeavour to include deep and rigorous studies such as many of those we have had the pleasure to publish in past issues and that you will find in the present one. But there is at least one characteristic of a straight scientific publication that I strongly wish to preserve in our admittedly para-scientific newsletter: science is made of hypothesis that are successively tested and preserved until new facts cause us to change them. No one has the final word when it comes to interpreting the Universe or the much smaller – but already vastly complicated – environment in our home planet. Different researchers studying one problem can easily reach different conclusions and their job will then be to convince others that facts do not contradict them! This of course can only be achieved through an open, frank and friendly discussion of every issue and *The Cone Collector* really aims to be an adequate forum for such open-minded discussions, in an effort to enlighten our views on the marvellous world of shells (generally speaking) and more particularly of Cones.

A.M.

Who's Who in Cones: Carlos M. L. Afonso

I was born in Lourenço Marques (now Maputo), Mozambique, East Africa, on the 22th February 1973. After the independence of this former Portuguese colony, my family and I moved to Johannesburg, South Africa. Here, we used to head south, to the Natal region, camping near the seashore and simply spending most of the summer period enjoying nature. We spent hours observing the marvelous South African sea life and picking up seashells at low tide. I can say that my parents were my first mentors and the ones responsible for my early passion for collecting seashells and my general interest in wild life.

At the age of 10 we moved definitively to the Algarve region, in South Portugal. At that time, the Algarve was a very calm and unspoiled place, with uncrowded beaches with traditional fishing boats on lovely white sandy beaches bathed by crystal clean Atlantic waters. Nowadays things have changed and the region is a well known touristical Mecca with a wide range of hotels, spas, golf courses, exquisite fish cuisine and frenetic night life but, nevertheless, still a wonderful place to live in and to collect shells.

As I grew up my interest in shells grew too. As a child, I loved to help fishermen untangle their nets, hoping to get some of those uncommon deeper water shells, to add to those I collected at low tide. One day, when I had stored a considerable amount of shells, my father brought home an introductory Shell book, written in Portuguese by José A. Silva and Gil Montalverne. This was my first general guide to the wonderful world of shells and opened the door to correspond with António Monteiro (at the time member of the Portuguese Malacological Society) who kindly introduced me to several local collectors and dealers. I rapidly started to build up a systematic collection of local shells with accurate labels and field data notes. When I installed the internet in the early 90's, a whole new shell world opened up for me and I energetically started trading shells with collectors all over the world, some of which became very good friends. At that time I collected worldwide marine families but had a particular interest for Cones already.

In 1993 I began studying for a university degree in Food Engineering. I rapidly realized that this had nothing to do with me and in 1995 I switched to Marine Biology and Fisheries. I did my final biology thesis in Mozambique in 1999-2000 and graduated the same year at the University of the Algarve, Portugal, where I remain until today as a Research Assistant in several research projects on ecology. I am a member of the Centre of Marine Sciences of the Algarve (CCMar). I presently work together with a wonderful team of biologists (known as the Kteam) on a long term project of underwater mapping dealing with the biology and bio-distribution of benthic marine organisms found from 0 to 30 meters deep along the Algarve coast.

The specialized interest in the *Conidae* family began after reading Dr. Emilio Rolán's PhD thesis on the Cape Verde fauna, which led to the first of many trips to the Islands in 1999 with my very, very good friend and Cone shell collecting companion Manuel J. Tenorio. Together we explored this puzzling Cone world and came back to "Iberia" completely amazed with our first findings as well as fascinated with such a variety of species and forms found there. On that same year I traveled to Mozambique where I remained for almost a year. There, my interest in Cones grew even bigger and with two good friends, José Rosado and Armando Verdasca, we dived for shells in

the most incredible and unexpected places.

Upon my return from Mozambique, I focused my Cone explorations and shelling activities on the Cape Verde Islands. Now, with over 30 trips and hundreds of hours of diving and snorkeling around the Islands of the archipelago, I have built up a considerable reference collection showing most of the population variability of endemic and non-endemic species. During these trips I had the luck to dive and snorkel with some remarkable collectors, such as David Pirinhas, Gonçalo Rosa, Paulo Morenito, Bernardino Monteiro, Miguel Ángel López-Verdegay, Freek Titselaar, Regina Cunha, José Évora and Gabriela Raybaudi, to mention but a few. I have also participated in several Atlantic scientific diving expeditions to offshore seamounts in the Cape Verde with the aim of finding and cataloguing *Conidae* species. I have traveled to several other African and Caribbean Islands too, in search for Cones. I am author and coauthor of several papers dealing with new *Conidae* species from the Cape Verde Islands, and have helped, guided and oriented several works and theses dealing with the Cape Verde mollusc fauna. Besides being a worldwide Cone collector, with a particular interest in West African species, I am also fond of deep water *Euthria* and freshwater *Neritidae*.

All my life I have been linked to the ocean and am fortunate to say that my wife and 3 year old daughter Melissa share the same feelings. I am happy with life, work and my family, and hope to remain an avid Cone collector surrounded by many friends for many years to come.

Identification Needed!

We have received from our friend Robert Eason the photos of two specimens in his collection that require proper identification. Can anybody help?

4-5 m under a small coral slab in a medium current via snorkeling form the shore at Cable Beach, Nassau, Bahamas in March of 1987. The specimen measures 17.5 × 9.0 mm. Sorry the photo isn't of better quality, but all I have to work with is a camera phone.

I think it is in the *cardinalis* group but just what critter it is eludes me. I found it at Roosevelt Roads, Puerto Rico in August of 1982 at a depth of 3-4 m on a sandy patch in a reef area while snorkeling. It is 19.0 mm long.

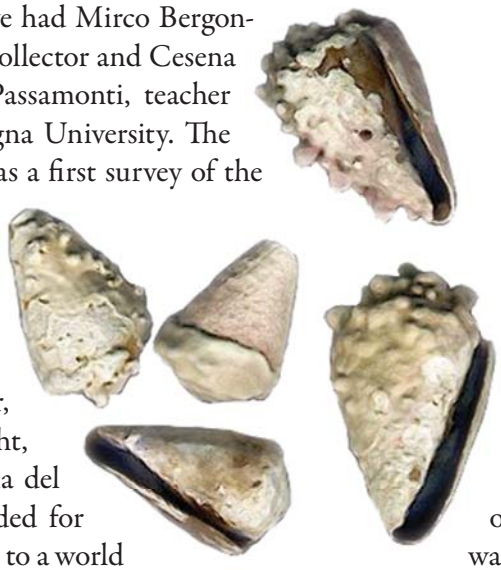
A Collecting Trip to the Farasan Banks - Saudi Arabia, Red Sea

Marco Bettocchi

In April 2008, four scuba divers from Cesena Blu (a scuba diving school in Cesena which I am proud to belong to) discovered a new reef in Farasan Banks, Saudi Arabia, Red Sea, which was never marked before on nautical maps.

The reef, located at 19° 46' 210" North and 39° 58' 396 East GPS, was again the target of a new trip in April this year, which I joined to have the opportunity to do some beautiful dives and look for cones in a part of the Red Sea that is almost unexplored, given that it was opened to tourism only two years ago.

Together with the group, we had Mirco Bergonzoni, a well-known cowrie collector and Cesena Blu member, and Marco Passamonti, teacher and researcher at the Bologna University. The main purpose of the trip was a first survey of the malacological fauna of this area.



Unfortunately, the trip was not so long, but we were on a boat (the Dream Voyager, a 28 metres long motor yacht, belonging to La Compagnia del Mar Rosso) that never landed for the entire cruise and took us to a world of submerged reefs and scattered desert islands, the largest of them about ten square metres.

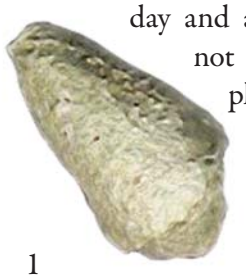
The travel started on April 3rd and, after meeting in Cesena, we reached Milano airport by minibus, and then we flew to Jeddah, Saudi Arabia, where another minibus took us to Al Lith, the boarding place.

Marco, Mirco and I soon made research plans for the coming days: we would not scuba dive all day long, but would rather do some snorkeling also, to have the opportunity to look for shells even in shallow waters.

The other Cesena Blu friends, rather uninterested at first, were gradually more and more involved in our research and enthusiasm, up to the point that they even asked us for some evening lessons, in which we were invited to talk about cones and cowries.

But let's come to the reason for this paper: the cones we found during our cruise.

The species we found were not many, also because we couldn't do a lot in six days: an average of 2-3 dives a day and a lot of snorkeling. Although not knowing the right collecting places, I have to say I was quite lucky and well aided by my two friends, because on the whole I was able to bring home nothing less than about 150 specimens.



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My first impression was that Farasan Banks are a very favorable habitat for cones (actually, we found more cones than cowries), although, especially from 10 meters down, you may often come across quite strong currents that do not help collecting. Most of the specimens were collected within 2 meters of water, always in sandy pockets between the reef and often with the molluscs being active during the day.

Here are the diving places; depths were never excessive (my maximum depth was 27 meters), but most of the findings were between 10 and 15 meters:

April 4th – Danak Channel, Cioppy Point Reef and Shib Ammar N/D

April 5th – North Mudhhar Reef, South Mudhhar Reef and Shib Ammar (Channel)

April 6th – South Shib Ammar Island, Fantasy I Reef Canyon II and Fantasy Lagoon

April 7th – South-West Malathu Island, Cesena Blu Reef and Mar Mar Island

April 8th – Malathu Island, Gorgonia Reef and Jadir Island

April 9th – Brown Reef and Abu Lat Island

The following species were found in shallow water: *C. catus f. nigropunctatus*, *coronatus* (even at 20 cm depth) *flavidus*, *locumtenens* (50 cm depth, among sea grass), *miliaris*, *nussatella*, *parvatus*, *rattus*, *sanguinolentus*, *taeniatus*, *tessulatus*, *virgo* (both in shallow water and in deeper water); in greater depths, *C. textile* and *vexillum sumatrensis* have been found too.

Also, thanks to Francesco Fontana, the chairman of Cesena Blu, I had a good fresh dead specimen of *C. striatus f. floridus*, still with its periostracum. About this, I must say that I was not aware of the presence of this form in the Red Sea and I think I may be quite satisfied about this finding.

C. flavidus was the most abundant species found, followed by *parvatus*, *rattus* and *sanguinolentus*. Considering that this was not strictly a research trip, the experience was very positive and certainly deserves to be repeated. Next time, however, more focused on shell collecting and, maybe, with more days to collect.

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Figures

Fig. 1 – Natural look of *C. sanguinolentus* and *flavidus*
Fig. 2 – *C. striatus f. floridus* (67.8 x 36.8 mm)
Fig. 3 – *C. textile* (75.5 x 36.4 mm)
Fig. 4 – *C. nussatella* (29.9 x 10.7 mm)
Fig. 5 – *C. catus f. nigropunctatus* (left to right: 35.3 x 20.3/33.8 x 17.7/31.3 x 16.9/29.1 x 16.0/28.2 x 15.2/ 24.5 x 13.8 mm)
Fig. 6 – *C. vexillum sumatrensis* (left to right: 89.0 x 52.1/74.5 x 45.1/84.3 x 52.0 mm)

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Identification Needed!

We have recently received from our friend Julian Joseph these photos of an identified specimen he recently picked up in St. Lucia. Here is what Julian had to say about it:

"My wife and I have just returned from twelve days in St. Lucia. We did a lot of snorkeling and I found a number of interesting shells, but only one cone.

This was on the southern coast of Pigeon Island, which itself is really a small peninsula on the north-west coast of the island. It looks to me like a juvenile of something in the *aurantius* group. It measures 14 × 7 mm, and I found it empty and quite worn in about 30 cm of water, on coarse sand and finely broken shell fragments by a small boulder at the shoreline in an area of sand and numerous such small boulders and larger rocks.

I would be very grateful if you could include this item, in the hope that someone can identify it more accurately.

I would also like to record my belated thanks to John Tucker for his response to my item about *Conus granulatus* back in Issue #5."

Little Stranger

Jon Singleton

I found this small cone size 29.2 mm × 16.1 mm in a bag containing a number of *C. mucronatus*, all just marked Philippines.

This stranger is more ventricose than *mucronatus*, and the main body whorl is covered with 20 well-defined grooves.

The base colour is white, with medium brown flammules, with two thin white bands showing an intermittent dash pattern, anterior white with a pale brown minimal pattern. The spiral whorls have brown flammules evenly spaced, and I assume the dark protoconch is not natural.

Anyone out there have a similar specimen?

Floraconus anemone: An Example of Circular Overlap?

John K. Tucker

Jon Singleton (2009) asked a question that has long interested me. 'Is *Conus novaehollandiae* a synonym or subspecies of *Conus anemone*, or are they two separate species?' Jon's preliminary answer was that there are two species. One of these, *Floraconus novaehollandiae* is endemic to Western Australia and ranges from the western side of the Northwest Cape to the King Sound region near Derby (Singleton, 2009). In contrast, *F. anemone* ranges from Shark Bay, West Australia to New South Wales and Tasmania (Singleton, 2009).

Röckel, Korn, and Kohn (1995) give the range of *F. anemone* as Queensland southward and westward to Western Australia, northward to King Sound and the north coast of Tasmania. They thought that *F. novaehollandiae* was neither a distinct species nor a subspecies of *F. anemone* because northwestern populations (*novaehollandiae*) could not be separated from typical *F. anemone* (southern populations) by spire height or shape. Their conclusion was that *F. novaehollandiae* was a form of *F. anemone*.

Röckel, Korn, and Kohn (1995) listed 18 names as synonyms of *F. anemone*. These are listed in Table 1. They reviewed these and I see no reason to repeat their conclusions on each. The number of synonyms indicates that there is considerable variation and that it is not well understood. Variation in color and shell shape among individual specimens makes understanding the systematic difficult.

The question I wanted to approach is: are there any patterns in shell shape and spire height variation range-wide? These traits are often said to identify species or subspecies in *F. anemone* (Singleton, 2009). If there are patterns, are these systematically instructive? Is this more than one species, a polytypic species, or multiple species?

Methods and Materials

Except for some specimens from Esperance in Alan Kohn's collection, all of the specimens examined are in my personal collection. I did examine records for Australian museums using OZCAM (*www.ozcam.gov.au*) to locate records for Queensland and the Northern Territory. The specimens in my collection were almost all self-collected by Australian collectors and traded to me for this study. Many were purchased from Australian sources but collected under my protocol. The ideal collection from any locality was one that included all specimens encountered up to some maximum limit determined appropriate by the collector. The goal was to get samples that were not biased by selecting particular morphologies.

Each specimen was measured. The shell length, width, and body length were all determined with calipers using methods outlined by Kohn and Riggs (1975). Spire height was determined by subtracting body length from shell length making it the obverse of body length. All measurements were made to the nearest 0.1 mm. The main statistical procedure used was analysis of covariance (ANCOVA), which I performed using SAS. This procedure is less prone to statistical error than the use of ratios (e.g., Packard and Boardman, 1999). In all ANCOVAs shell length was the covariate. This procedure removes the effect of variation in shell length. For all tests I used the Bonferroni adjustment for multiple comparisons.

Results

Overall 546 specimens of *Floraconus anemone* were measured (Table 2). Range-wide the shells that were examined average about the same size in shell length (Table 2). Specimens in my collection ranged from Queensland to Western Australia (Kings Sound) (Table 2). I could not locate specimens from Northern Territory in OZCAM. The Australian Museum has two specimens from Queensland (AM C135780 from off South Port and AM C388270 from Moreton Bay, Redcliffe Peninsula, Clontarf, Woody Point).

Despite shell samples for each state being about the same size, significant variation in shell shape was exposed by ANCOVA (Table 3). Once corrected for differences in

shell length, specimens from South Australia are narrower, have shorter bodies, and have longer spires (Table 3) than do shells from New South Wales, Victoria, Tasmania, or Western Australia ($p < 0.0001$ for all comparisons). The only other difference was that shells from Tasmania were significantly wider than those from Victoria ($p = 0.0178$) but not compared to the other states ($p > 0.05$). Comparisons to Queensland are omitted due to the small sample size available.

Comparisons by state may be misleading because samples for each state are wide spread geographically and as such may hide important details. Consequently, least squares means were determined for a series of subdivisions from throughout the area studied (Fig. 1). These lsmeans were then plotted to compare variation throughout the range on a finer scale.

Shell width lsmeans (Fig. 2), for samples from throughout South Australia are narrow compared to samples from West Australia and Victoria, Tasmania, and New South Wales. The Queensland sample is also narrow in width but the sample size is so small ($N = 3$) that the validity is questionable. In this instance, samples from populations on the west end of the distribution resemble those on the east end of the distribution (Fig. 2). Note that the Esperance, West Australia sample (#4) has a narrow body width average similar ($p > 0.05$ for all pairwise comparisons) to those from samples 5-12. It is statistically distinct ($p < 0.0001$) from samples collected further west (1-3).

Body length and spire height lsmeans show a somewhat similar pattern to those for shell width (Fig. 3). Specimens from South Australia tend to be shorter bodied than those from other regions. However, South Australian populations from the east side of the state (samples 9-14) more or less form a cline with those from Victoria, New South Wales, and Tasmania (Fig. 3). There is also clinal variation on the west side of the distribution (samples 1-5). Samples 1-3 do not differ statistically ($p > 0.05$). Sample 4 from Esperance differs from sample 1 ($p = 0.0108$) and from sample 2 ($p = 0.0237$) but not from sample 3 ($p = 0.1287$). Sample 5 differs from samples 1-3 ($p < 0.0001$) but not from sample 4 ($p = 0.1678$). The samples with the shortest bodies (Fig. 3) and the longest spires (Fig. 4) are located in Spencer Gulf (samples 6-8). Here also the eastern most and western most set of samples are roughly similar in body length (Fig. 3). The variation in spire length (Fig. 4) is essentially the obverse of the pattern in body length (compare Figs. 3 and 4). Spire length is much longer in Spencer Gulf (samples 5-8) than they are elsewhere. The variation may be clinal similar to the clinal variation in body length.

Shell morphology also varies. Besides variation in shell shape, there is variation in shell structure. Shells from Queensland (Figs. 5-7) and New South Wales (Figs. 8-10) do not have a well developed carina along the shoulder (compare to Figs. 45a, b). Shells from Victoria have a carina developed but it is not very pronounced (Figs. 11-13). Tasmanian shells also have the carina present similar to Victorian shells (Figs. 14-16). Shells from South Australia are most often distinctly carinate (figs. 17-28). Finally, West Australian shells have little or no development of the carina especially in specimens from central and northern West Australia (Figs. 29-40). Specimens from southern West Australia (Figs. 37-40) also have little development of the carina. The sample from Esperance, which is the eastern most West Australian sample available have shells with and without carinae (Figs. 41-44). Thus, shells at the eastern and western ends of the range are more similar to each other than they are to shells from the central portion of the range in carinal development.

Discussion

There are a couple of details to cover before discussing the variation in shell morphology uncovered in this study. The range of *Floraconus anemone* almost certainly extends into central Queensland based on specimens that I figure (Figs. 5-7) and on those in the collections of the Australian Museum. Singleton's (2009) exclusion of

Queensland from the range of *F. anemone* appears to be incorrect. The species is, however, uncommon in Queensland. I can confirm that there is a major gap in the range of *F. anemone* in the tropical regions of Australia. It, apparently, is completely absent from the Northern Territory and from much of northern Queensland

The identity of *Conus fusiformis* Lamarck, 1810 has been somewhat doubtful prior to study by Kohn (1986; 1992). He suggested that it was an unusual specimen of *Floraconus anemone*. One specimen that I examined (Figs. 46a, b) from Kangaroo Island, South Australia is similar to Lamarck's specimen. Thus, Lamarck's *C. fusiformis* seems to be a synonym of *F. anemone*.

The more important finding is that variation in shell meristic traits is predictable. Shells from South Australia have shorter bodies, taller spires, and narrower shells than do shells from elsewhere. The most divergent shells come from Spencer Gulf at least for body length and spire height. Regardless, there is tremendous variation in shell morphology in every sample I examined. There are specimens with the elevated spires supposedly characteristic of *compressus*, which is often applied to such specimens (e.g., Figs. 19, 20, and 24), but others from those samples or nearby ones (Figs. 21, 23, 25, and 27) have spires that are not particularly elevated.

The interesting finding is not so much that South Australia shells are differently shaped (on average) but that shells to the east and to the west and separated by divergent South Australian shells are similar to each other in meristic characters. Moreover, they are similar in having little or no development of the shoulder carina. There are two clines that are variously developed in shell width, body length, and spire height. The eastern cline was detected in all three traits, whereas the western cline was obvious in body length and spire height. No obvious cline was detected in shell width. Possibly a sample collected between Albany and Esperance in West Australia may reveal a narrow and very sharp cline. The break in shell width variation between Albany and Esperance is consistent with Jon Singleton's two species concept. The main difference is that the break is much further east than he predicted.

The original question concerned the systematics of *Floraconus anemone*. Are the western populations in West Australia a recognizable taxon separate from those in populations further east? The data presented here demonstrate that meristically the averages for West Australian shells can be separated from shells collected east of Albany. Moreover, West Australian shells do not have a shoulder carina consitently developed, whereas those from South Australia do. Because variation in body length and spire height seems to be clinal, separation at the species level would be premature without genetic studies. However, there is preliminary justification for recognizing the Western Australian *F. a. novaehollandiae* (A. Adams, 1854). It ranges from Kings Sound to Albany.

Shells from localities east of Albany include two morphs. One of these is the Spencer Gulf morph with its high spire and short body. These are called *F. compressus* by collectors. However, my analysis suggests that is a local form connected by clinal variation to samples both east and west of Spencer Gulf. Recognition as a valid subspecies would be contradicted by this finding. If the Spencer Gulf populations have to be recognized nomenclaturally, I would suggest *F. a. anemone* (Lamarck, 1810), form *compressus*. With this in mind, *F. a. anemone* (Lamarck, 1810) would range from Esperance in West Australia to Queensland..

Another question is how did this situation arise? Without genetic information indicating relationships among populations any ideas will be largely speculative. However, I present a new hypothesis to explain this pattern of variation. What if during cooler climates, *Floraconus anemone* was able to occupy the more tropical regions where it is absent today (Fig. 47)? This would create a string of populations around Australia (Fig. 47). Continent-wide distribution could form a circle of races (i.

e., a possible example of circular overlap) in a polytypic species or a group of subspecies that are linked by clines (Mayr, 1966). Extirpation of populations in Northern Territory and parts of Queensland would leave the western and eastern sides of the former circle (Fig. 48). This hypothesis could be tested by studies of genetics in *F. anemone*. If *F. anemone* does represent the remains of a circle of races, then the western most (northern West Australia) and eastern most (central Queensland) populations might be more closely related to each other than they are to the South Australian populations.

Acknowledgements

I thank the many Australian collectors and particularly Nigel Holmes and several Australian shell dealers for providing collections from the many Australian localities surveyed here. Ian Loch of the Australian Museum introduced me to Ozcam. The outline map of Australia came from the University of Melbourne Library, Map Collection at *www.lib.unimelb.edu.au/collections/maps/digital/outline-maps/index.html*. Alan Kohn allowed me to study the sample from Esperance, West Australia. Jon Singleton kindly read over an earlier version of the manuscript.

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Table 1. Synonyms of *Floraconus anemone* from Röckel, Korn, and Kohn (1995).

Taxon	Author and Date	Type Locality	Subspecies
anemone	Lamarck, 1810	New Holland	*anemone*
fusiformis	Lamarck, 1810	Pacific Ocean	*anemone*
maculosus	Sowerby, 1833	Unknown	*anemone*
novaehollandiae	A. Adams, 1854	Swan River, Western Australia	*novaehollandiae*
comptus	A. Adams, 1854	Natal, South Africa (erroneous)	*anemone*?
superstriatus	Sowerby, 1858	Unknown	*anemone*?
maculatus	Sowerby, 1858	Capul Island, Philippines (erroneous)	*anemone*?
compressus	Sowerby, 1866	Unknown	*novaehollandiae*
roseotinctus	Sowerby, 1866	Unknown	*novaehollandiae*
rossiteri	Brazier, 1870	Cape Solander, Botany Bay, NSW	*rossiteri*
carmeli	Tenison-Woods, 1877	North coast of Tasmania	*anemone*
flindersi	Brazier, 1898	Flinders, Victoria	*anemone*
remo	Brazier, 1898	San Remo, Victoria	*anemone*
peronianus	Iredale, 1931	Sydney, New South Wales	*rossiteri*
atractus	Tomlin, 1937	*Nomen novum* for *fusiformis*	*anemone*
incinctus	Fenaux, 1942	Australia	*anemone*
nitidissimus	Fenaux, 1942	Australia	*anemone*
singletoni	Cotton, 1945	Western Port, Victoria	*anemone*
saundersi	Cotton, 1945	Levens Beach, Edithburgh, Yorke Peninsula, South Australia	*anemone*

Table 2. Dimensions of 578 specimens of *Floraconus anemone* arranged by Australian state.

	Length	Width	Body length	Spire height
State	Mean(SD)/ Range	Mean(SD)/ Range	Mean(SD)/ Range	Mean(SD)/ Range
Queensland N = 3	35.3(4.78)/ 31.7-40.7	17.6(1.23)/ 16.6-19.0	31.3(3.50)/ 28.2-35.1	4.0(1.46)/ 2.8-5.6
New South Wales N = 11	38.0(11.34)/ 25.9-66.6	20.7(5.40)/ 15.0-35.0	34.0(9.75)/ 23.9-59.3	4.0(1.85)/ 2.0-7.3
Victoria N = 62	37.0(6.46)/ 23.6-52.4	19.6(3.71)/ 11.7-28.0	33.0(6.04)/ 20.5-48.0	4.0(1.09)/ 2.6-8.3
Tasmania N = 40	35.9(8.01)/ 20.3-49.6	19.7(4.87)/ 10.3-26.2	32.0(7.50)/ 17.0-45.7	3.9(0.74)/ 2.5-5.4
South Australia N = 199	37.2(10.94)/ 14.0-90.8	18.2-(5.39)/ 6.8-46.1	31.4(9.73)/ 11.7-84.0	5.7(2.4)/ 2.0-14.8
Western Australia N = 263	34.5(6.19)/ 14.2-63.0	18.3(3.24)/ 6.4-30.8	30.8(5.56)/ 12.3-57.5	3.7(1.32)/ 1.4-16.9

Table 3. Least squares means for width, body length, and spire length of *Floraconus anemone* by Australia state with shell length as the covariate. Sample sizes are in Table 1.

State	Width lsmean(stderr)	Body length lsmean(stderr)	Spire length lsmean(stderr)
Queensland	17.87(0.57)	31.72(0.76)	4.02(0.76)
New South Wales	19.60(0.30)	32.04(0.40)	3.70(0.40)
Victoria	19.00(0.13)	31.89(0.17)	3.86(0.17)
Tasmania	19.65(0.16)	31.88(0.21)	3.87(0.21)
South Australia	17.48(0.07)	30.17(0.09)	5.76(0.09)
Western Australia	18.96(0.07)	31.99(0.09)	3.85(0.09)
	ANCHOVA		
Variance source	**F**	**F**	**F**
State (df = 16) p < 0.0001 for all	30.06	32.75	32.75
Covariate (length) p < 0.0001 for all	8229	17558	310

Figures

Fig. 1 – Outline map of Australia with subdivisions across the range of *Floraconus anemone* used to determine least square means. Sample sizes for subdivisions and the general areas considered are given.

Fig. 2 – Plots of least squares means for shell width (2a) and locality codes (2b) showing variation in shell width.

Fig. 3 – Plots of least squares means for body length (3a) and locality codes (3b) showing variation in body length.

Fig. 4 – Plots of least squares means for spire height (4a) and locality codes (4b) showing variation in spire height.

Fig. 5 – JKT 1572 31.6 mm x 17.1 mm from Keppel Bay, Queensland.

Fig. 6 – JKT 688 33.4 mm x 16.6 mm collected in rubble, August 1977, at Tin Can Bay, half way between Brisbane and Bundaberg, Queensland.

Fig. 7 – JKT 1286 40.7 mm x 19.0 mm from Langford Reef, Queensland.

Fig. 8 – JKT 2645 36.6 mm x 21.2 mm from Shark Island, Sydney Harbor, New South Wales.

Fig. 9 – JKT 2646 25.8 mm x 14.8 mm from Sydney Harbor, New South Wales.

Fig. 10 – JKT 2646 31.8 mm x 18.3 mm from Sydney Harbor, New South Wales.

Fig. 11 – JKT 1592 31.1 mm x 16.1 mm collected on sand, 19 February 1968 from Phillip Island, Western Port Bay, Victoria.

Fig. 12 – JKT 1249 37.4 mm x 18.2 mm from Melbourne, Victoria.

Fig. 13 – JKT 1246 39.0 mm x 20.2 mm collected under rocks at low tide in 12-15 inches of water, Sorrento, Victoria.

Fig. 14 – JKT 1306 44.3 mm x 25.2 mm collected at low tide, 1972, at Badger Island, Furneaux Group, Chappel Islands, Tasmania.

Fig. 15 – JKT 1307 47.4 mm x 25.9 mm collected at low tide 1972, at Preservation Island, Furneaux Group, Chappel Islands, Tasmania.

Fig. 16 – JKT 1206 26.1 mm x 12.1 mm collected on 17 December 1968 at Maria Island, Tasmania.

Fig. 17 – JKT 2808 40.3 mm x 19.8 mm collected in October, 1978 at Streaky Bay, South Australia.

Fig. 18 – JKT 1590 43.1 mm x 22.6 mm from Port McDonnell, South Australia.

Fig. 19 – JKT 788 27.4 mm x 16.9 mm collected February, 1978 Lance Point, Adelaide, South Australia.

Fig. 20 – JKT 3303 45.8 mm x 19.6 mm collected under a slab in 10 m water, Port Lincoln, South Australia.

Fig. 21 – JKT 1663 42.7 mm x 20.3 mm collected under rocks in 20 feet water, 30 August 1980 at Blanche Point, South Australia.

Fig. 22 – JKT 1670 55.9 mm x 24.8 mm collected under rocks in 20 feet water, 24 June 1980 at Edithburgh, South Australia.

Fig. 23 – JKT 1666 25.2 mm x 12.4 mm collected under rocks in 10 feet of water, 22 March 1980 at Victor Harbor, South Australia.

Fig. 24 – JKT 3303 47.3 mm x 20.4 mm collected under a slab in 10 m water, Port Lincoln, South Australia.

Fig. 25 – JKT 1300 41.8 mm x 20.0 mm collected under rocks in 20 feet of water 7 December 1979 at Fisheries Beach, South Australia.

Fig. 26 – JKT 1229 38.8 mm x 19.5 mm from Kangaroo Island, South Australia.

Fig. 27 – JKT 1674 43.5 mm x 22.4 mm collected under rocks in 4 feet of water 18 February 1980 at Racecourse Bay, Port MacDonnell, South Australia.

Fig. 28 – JKT 1233 52.0 mm x 24.6 mm from Semaphore, South Australia.

Fig. 29 – JKT 95 44.1 mm x 24.0 mm from Broome, Western Australia.

Fig. 30 – JKT 1226 32.5 mm x 18.1 mm from King Sound, West Australia.

Fig. 31 – JKT 1226 34.1 mm x 17.9 mm from King Sound, West Australia.

Fig. 32 – JKT 1226 31.7 mm x 16.1 mm from King Sound, West Australia.

Fig. 33 – JKT 626 35.0 mm x 19.2 mm collected in sand and mud in 0 to 7 feet of water in 1978 at Dampier, West Australia.

Fig. 34 – JKT 1452 27.4 mm x 15.2 mm collected under rocks at low tide on 9 October1972, a few km south of Northwest Cape, West Australia.

Fig. 35 – JKT 1452 44.6 mm x 24.3 mm collected

under rocks at low tide on 9 October1972, a few km south of Northwest Cape, West Australia.

Fig. 36 – JKT 1439 43.1 mm x 23.8 mm from Dampier Archipelago, West Australia.

Fig. 37 – JKT 1132 46.7 mm x 24.4 mm from Perry's Beach, Denmark, West Australia.

Fig. 38 – JKT 630 33.6 mm x 19.1 mm collected in sand in 30 feet, Margaret River entrance, West Australia.

Fig. 39 – JKT 631 38.1 mm x 20.0 mm collected in sand in 30 feet of water, Margaret River entrance, West Australia.

Fig. 40 – JKT 649 29.4 mm x 15.3 mm from Cowaramup Bay, West Australia.

Fig. 41 – Alan Kohn collection 48.1 mm x 21.3 mm from Esperance, West Australia

Fig. 42 – Alan Kohn collection 45.6 mm x 24.1 mm from Esperance, West Australia

Fig. 43 – Alan Kohn collection 38.4 mm x 19.6 mm from Esperance, West Australia

Fig. 44 – Alan Kohn collection 48.6 mm x 24.2 mm from Esperance, West Australia

Fig. 45a, b. – JKT 2643 25.6 mm x 15.4 mm from Melbourne, Victoria. 1a, ventral view, 1b, close up of spire showing carina typical for specimens from Victoria to South Australia.

Fig. 46a, b. – JKT 1229 31.2 mm x 14.1 mm from Kangaroo Island, South Australia. Ventral (2a) and dorsal (2b) of the same specimen. This specimen is quite similar to the type of Lamarck's Conus fusiformis.

Fig. 47 – Hypothetical distribution of *Floraconus anemone* when climate allowed the species to colonize tropical areas where it does not now occur.

48. Present day range of *Floraconus anemone*.

Fig. 1

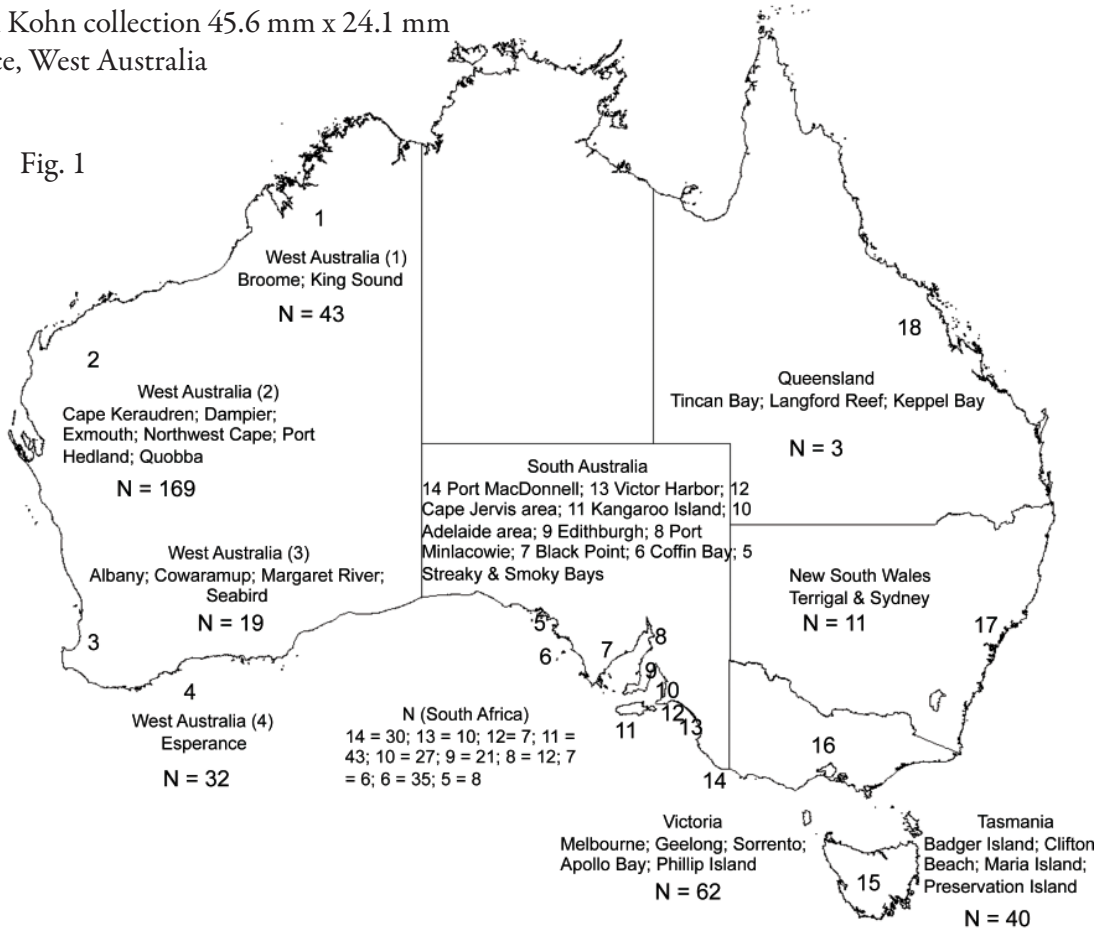

Fig. 2

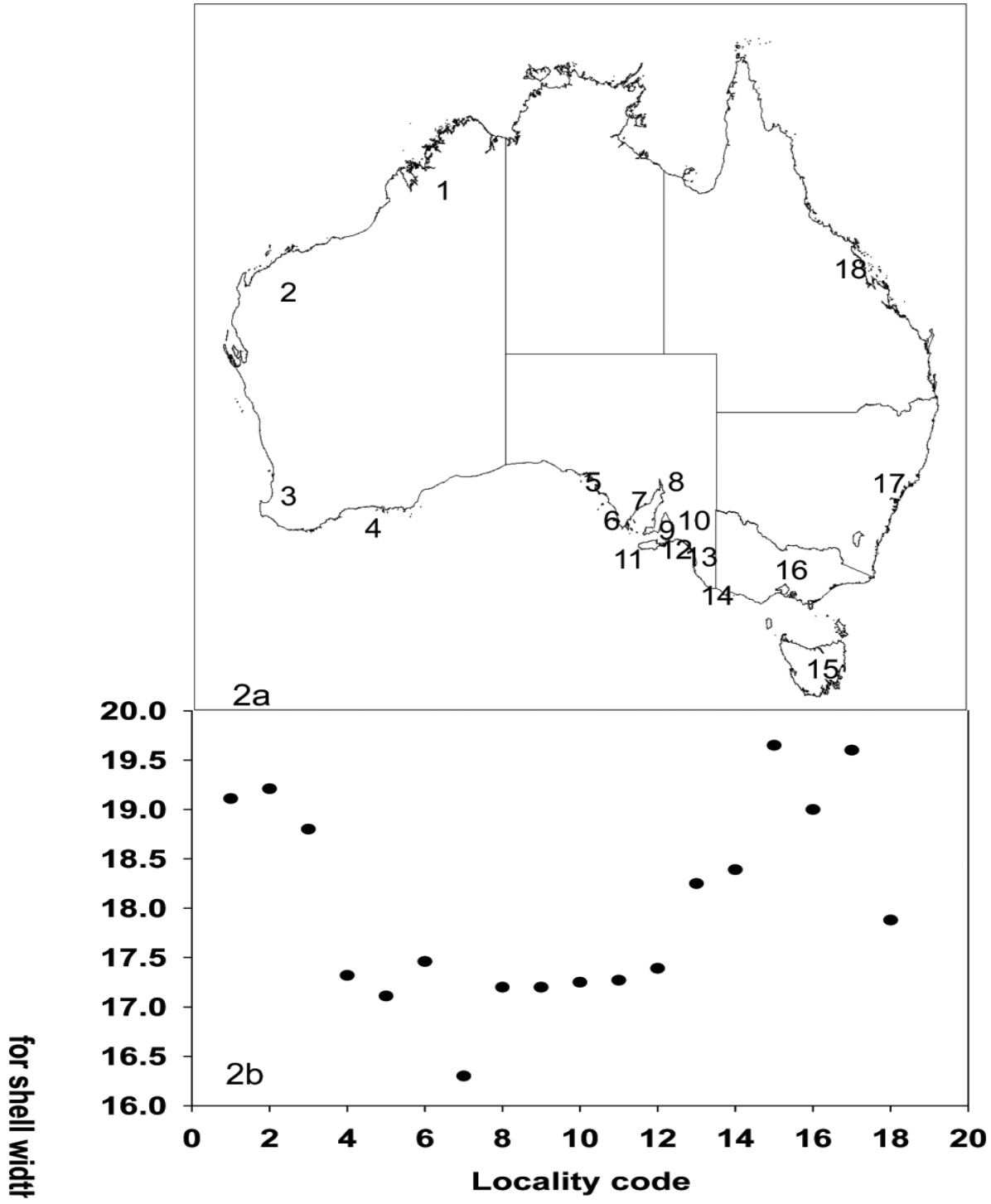
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Fig. 3

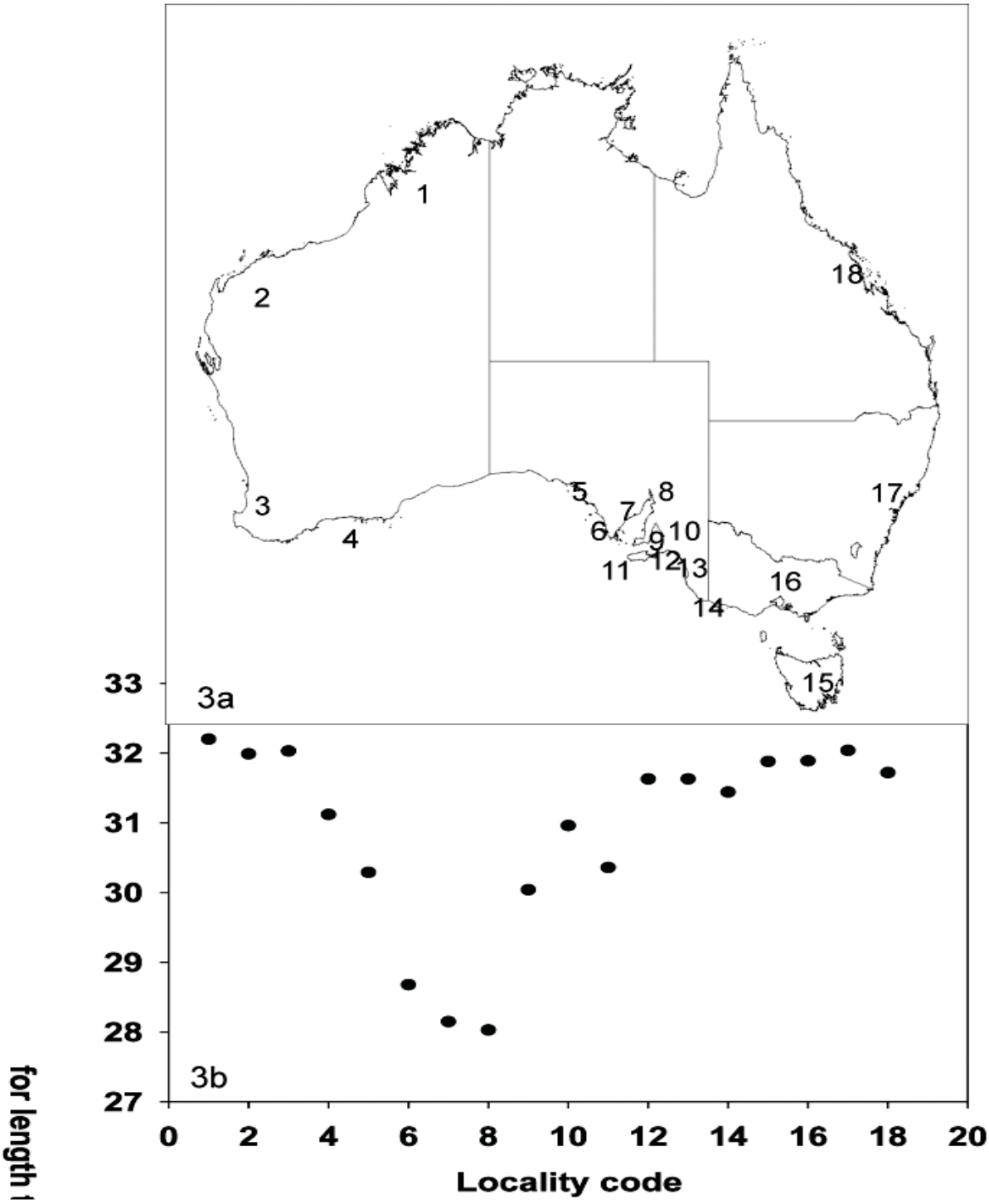
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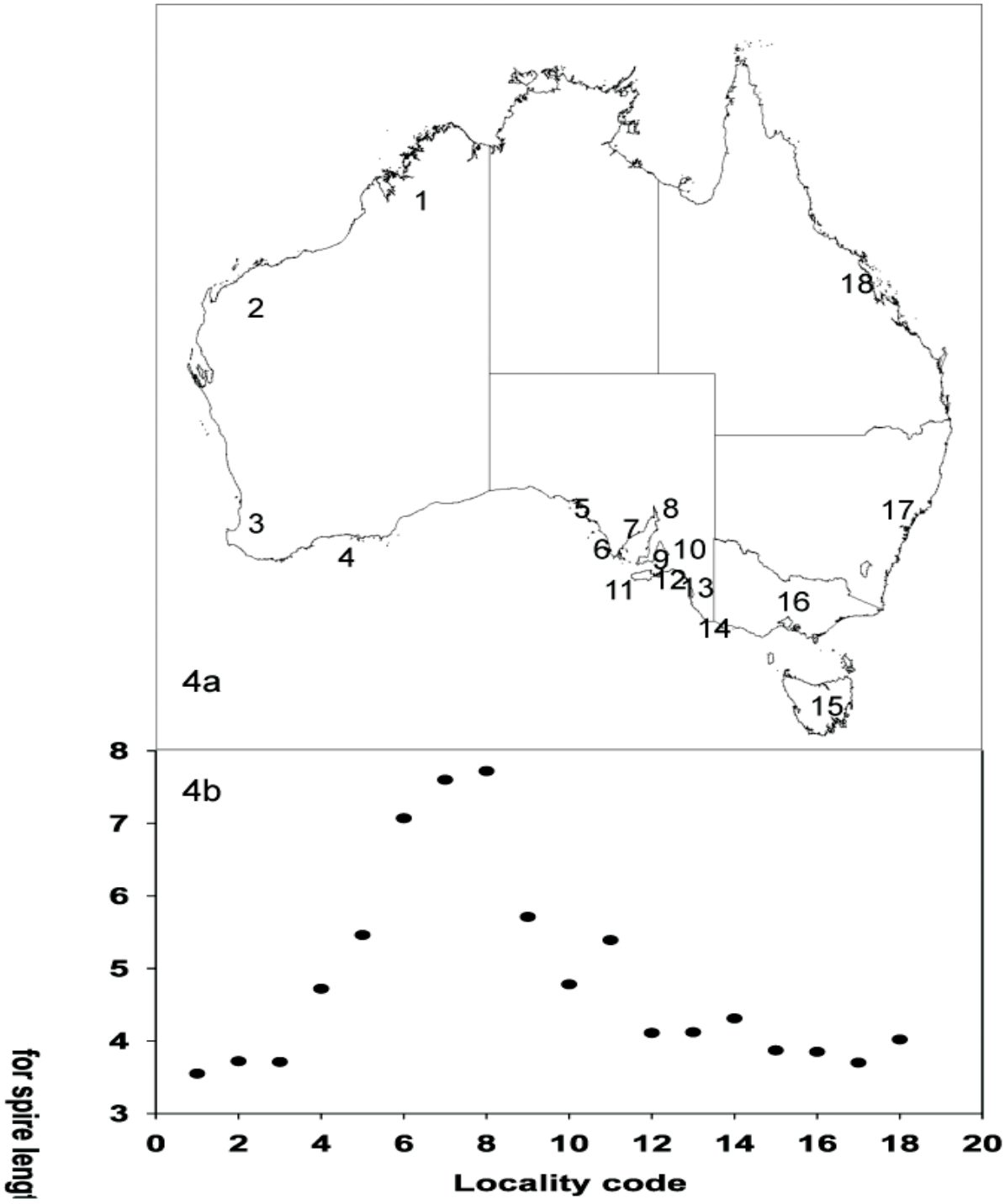
Fig. 4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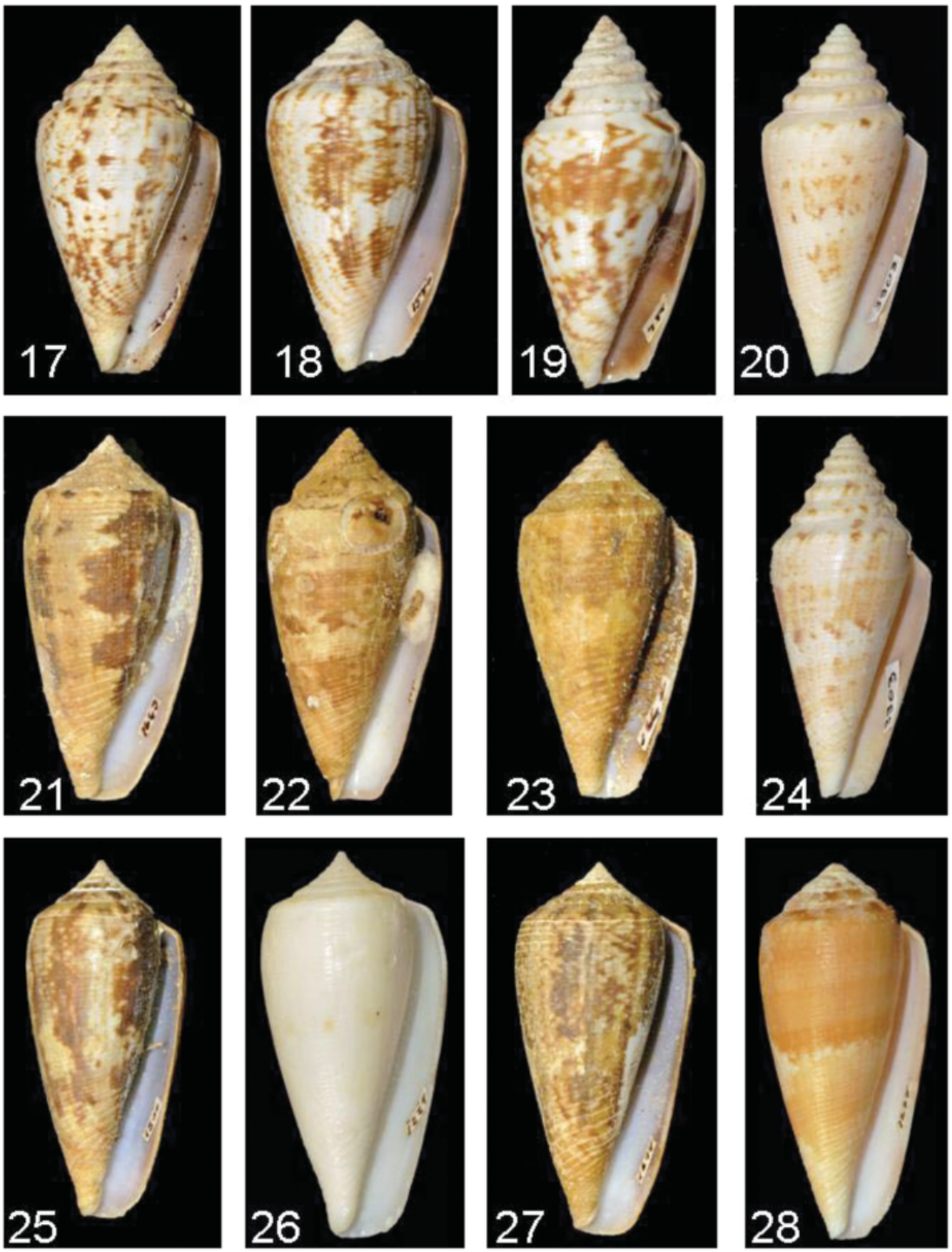
Queensland

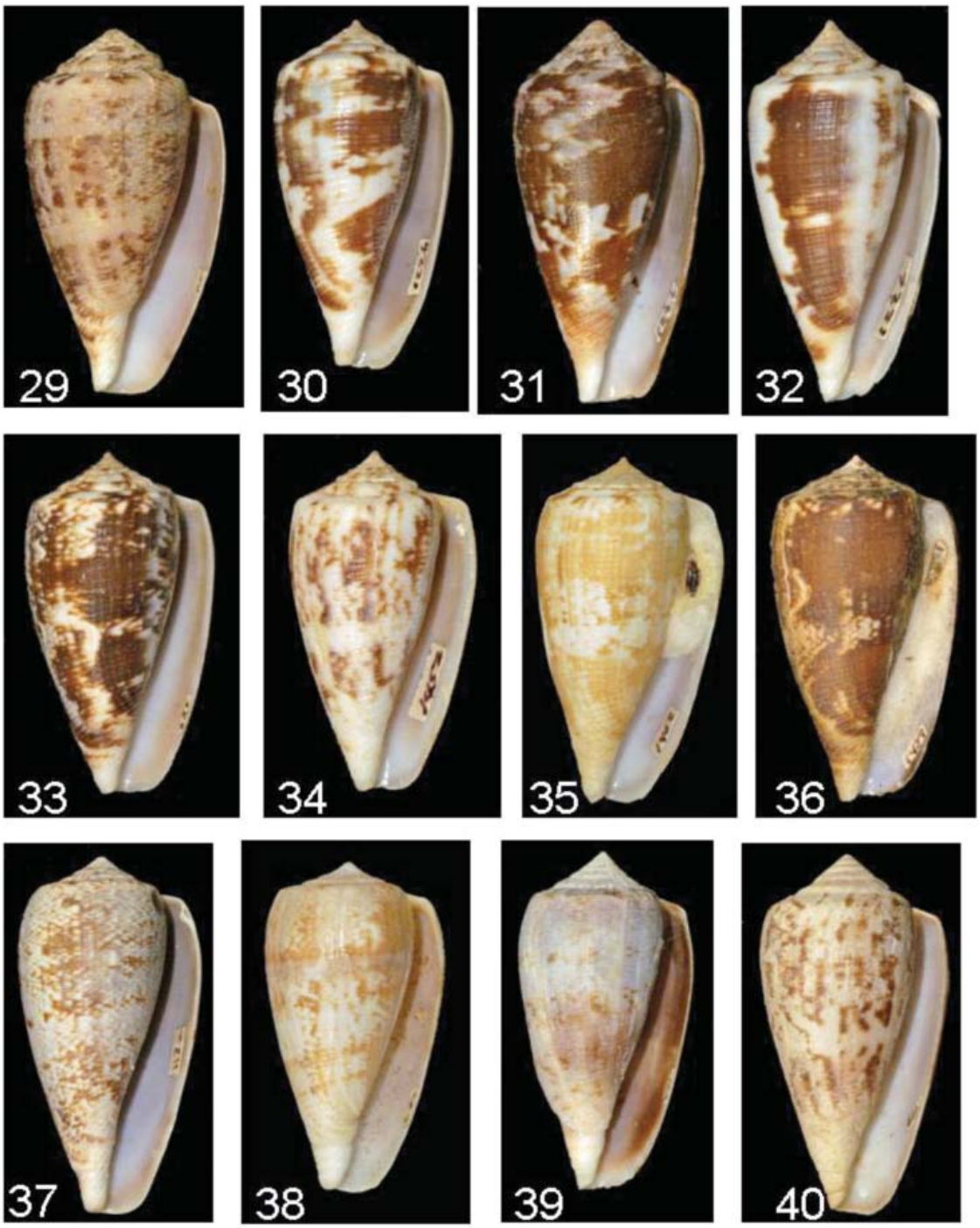
New South Wales

Victoria

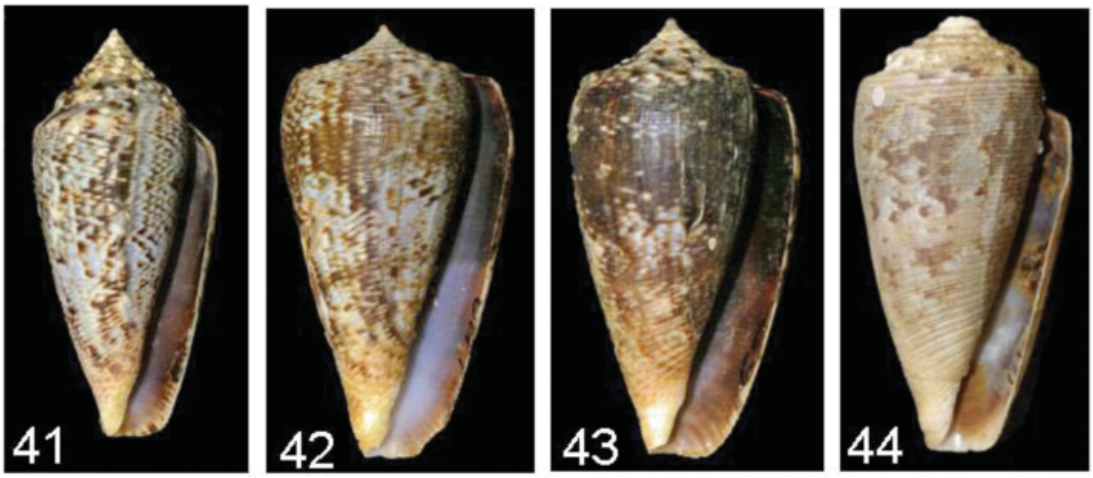
Tasmania



South Australia



Western Australia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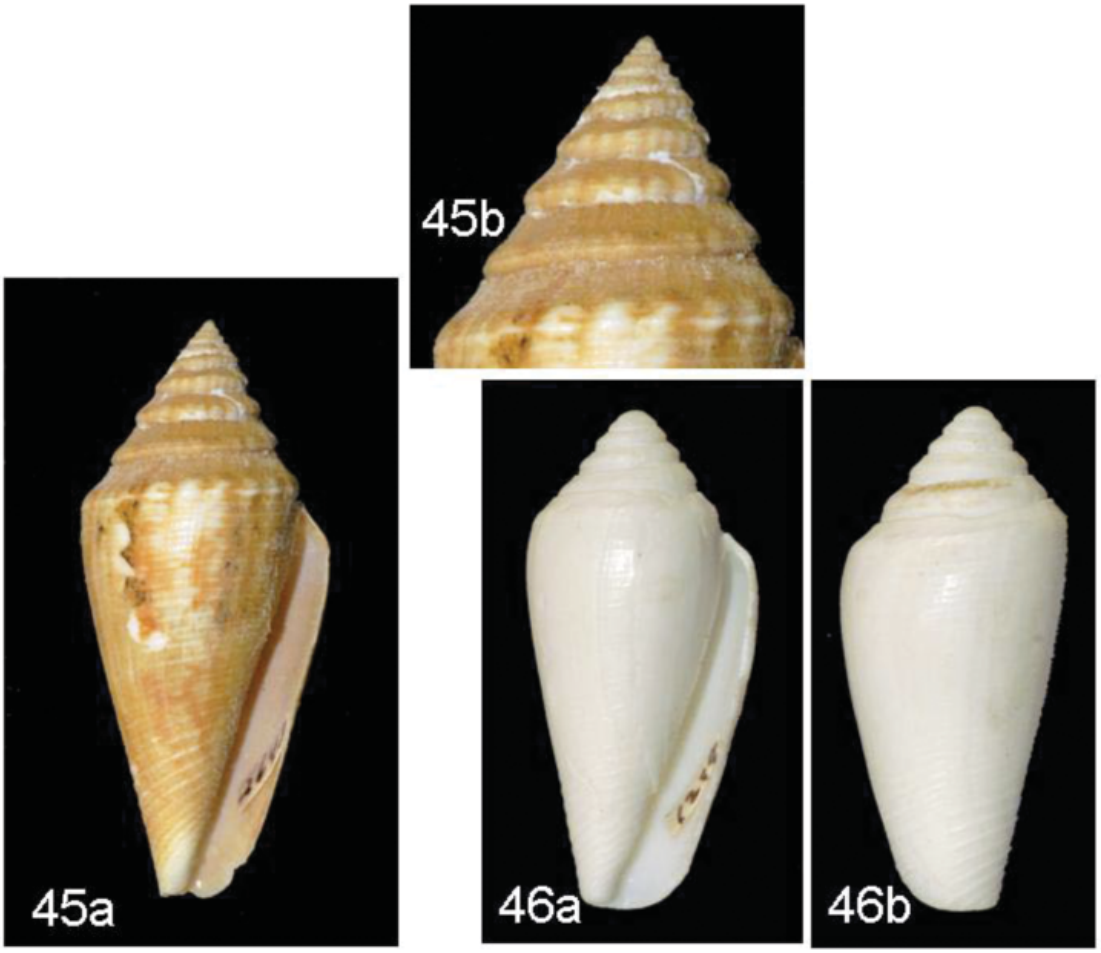
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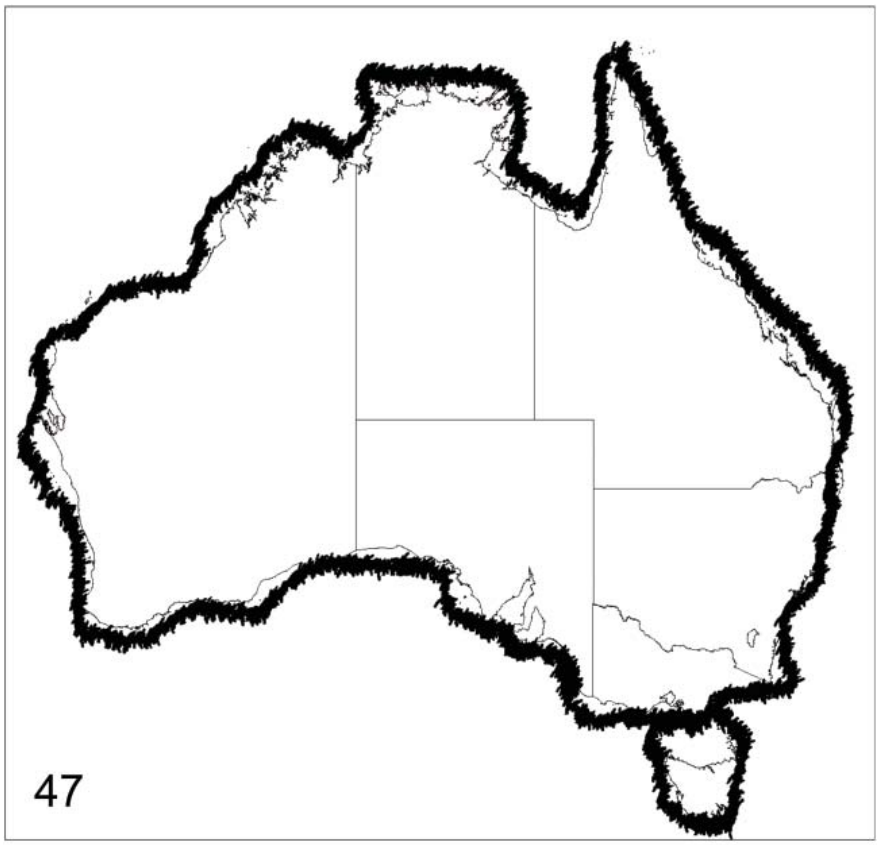
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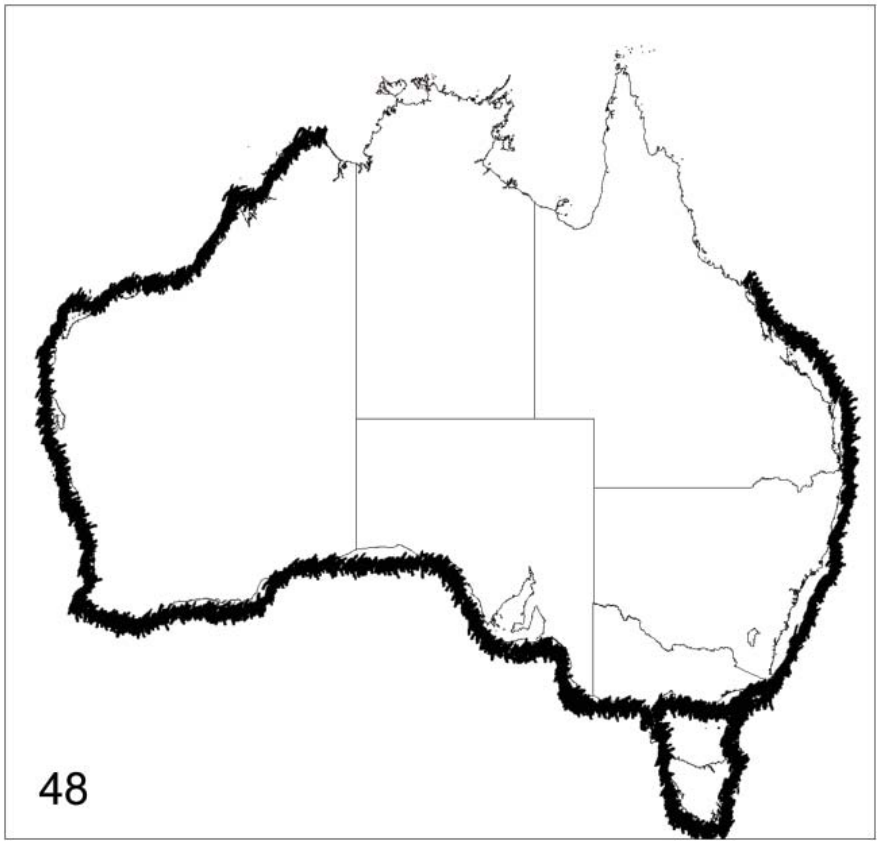
48

Interview with Prof. Alan Kohn

David Touitou

The following interview with Prof. Alan J. Kohn was arranged by our friend David Touitou and published in his site. In view of its great interest, I thought we should also have it in our pages and I heartily thank both Alan and David for their kind permission. The texts and questions are of course David's.

A.M.

Professor Alan Kohn

Professor Emeritus, Zoology
Adjunct Professor, Quaternary Research Center
Adjunct Curator, Burke Museum
Co-Author of *Manual Of The Living Conidae*
Principal Investigator of *The Conus Biodiversity Website*

David Touitou: First of all, I extracted from the Washington University (Biology Department) website this text from Alan, as it is very helpful for the ones that might not know him:

> "The general aim of my research is to increase understanding of the evolutionary processes that have led to high biotic diversity in tropical marine environments. Its more specific goal is to elucidate important evolutionary trends in diversity, morphology, distribution, and ecology of one of the largest families of marine molluscs, the *Conidae*, from its early Cenozoic origin through the Tertiary and Quaternary periods. The focal genus *Conus* is particularly important because of its immense size (about 500 extant and at least as many extinct species), its extensive range of variation in diversity, geographic distribution, ecology, and development, and its highly neurotoxic venoms. Current research efforts emphasize the evolution of taxonomic diversity, Tertiary marine paleoecology, and relationships between larval developmental mode and biogeographic patterns.
>
> Prior to my retirement, some of my graduate students addressed similar questions in their research, but most developed independent studies in diverse areas of functional morphology, ecology and distribution of a variety of local as well as tropical marine invertebrates. Currently, a postdoctoral researcher is using molecular genetic methods to generate hypotheses of the phylogenetic relationships of *Conus* species. Undergraduates in the lab are studying shell and radular tooth morphometrics. This data will be used to better understand the feeding process in *Conus* and to test phylogenetic hypotheses resulting from the gene sequences."
>
> The Conus Biodiversity Website
> *http://biology.burke.washington.edu/Conus/index.php*
>
> This web site is part of a National Science Foundation-sponsored project aimed at expanding knowledge of systematics of the unusually diverse marine gastropod genus *Conus*. The project goals are to integrate species-level revisionary systematics of the major regional faunas, contribute to molecular-based phylogenetic hypotheses, expand predictive classifications, and promulgate the results in both electronic and print media"

Interview

[I would like to thank several cone shell lovers that helped me with this interview: Giancarlo Paganelli, Paul Kersten, Marco Bettocchi and Carlie White for English correction.]

Hello Alan, It is my honour to interview such a major specialist in Malacology, as well as, the co-author of *Manual of the living Conidae*; which is one of the best cone shells-related books that I have ever read. I would like to thank you and your co-authors, in the name of all cone shell lovers, for this spectacular revision of Indo-Pacific Cone Shells. Thanks, Alan!

First of all, would you kindly sum up your profile regarding Malacology? Would you tell us more about your actual activity and main projects concerning the Conidae family?

Almost all of my research over the years has focused on molluscs, and most on *Conus*. Of course it is only one of thousands of molluscan genera, but I argue that it is the biggest and the best. With more than 500 species, *Conus* is the most diverse genus of animals in the sea. Another way to say that is evolutionarily, *Conus* is the most successful genus at producing new species, and it has diversified more rapidly than any other genus of shelled molluscs, as Steven Stanley demonstrated many years ago from study of both fossil and recent species diversity.

Most of my research has been in the Indo-Pacific region and has focused on how *Conus* species make their living, how such large numbers of species can coexist in the same environment without competing with each other for the resources they need (food and space for example), and why some habitats support more species, that is have higher biodiversity, than others. Along the way I have had to study *Conus* taxonomy, because one must determine the correct species names in order to communicate the results of biological research. More recently I have focused more on the systematics and phylogeny of *Conus*, and how its adaptive radiation over evolutionary time can help us understand the evolution of high biodiversity in the tropics more generally.

I've also studied development and life history of *Conus*, and shell and radular tooth morphology and morphometry, mostly in the Indo-Pacific region, in order to better understand the biology of the animals in nature.

As a university professor, I taught mainly courses about the biology of marine invertebrates, a much broader area. And some of my research has been on other carnivorous gastropods such as mitrids, buccinids, and the parasitic taenioglossan *Trichotropis*, as well as a few studies of polychaetes, sipunculans, and tropical invertebrate communities. I also supervised the doctoral studies of 22 graduate students. Most of them did their research on marine molluscs (only one on *Conus*), but others studied the biology of other invertebrates, including crustaceans, polychaetes, nemerteans, and tunicates.

A question that comes to mind, after reading the famous *Manual of the living Conidae* vol.1 (also know as "RKK" for Röckel, Kohn, Korn) which is one of the best and most recent publication about the *Conidae* family is: Do you have plans for a vol.2 ?

There will be no Volume 2 of *The Manual of Living Conidae*. Neither Dieter Röckel, who started and led the project, and is even older than I, nor Werner Korn, who became a museum director, wished to continue. I think we did quite well in that book despite the "RKK" methodology (pronounce it "RKiK" = archaic). We used primarily 19th century methods.

Are you currently working on a revision of this Family?

It is more rational to revise the various biogeographic regions separately, because there are so many species and there is so little overlap of species among regions.

Are you working on a Caribbean project? We all know this area is a real treasure-trove concerning classification.

My current major project is a revisionary systematic study of the Western Atlantic *Conus* species. This formidable project progresses slowly-at the proverbial but appropriate "snail's pace," for several reasons.

First, the very complex geologic history of the Caribbean has profoundly affected the evolution and ecology of marine life in that region today, in ways that differ markedly from the Indo-Pacific region to which I devoted most of

my career. Second, I have very little personal experience with the animals in nature there, in contrast with the Indo-Pacific. I studied the biology of Indo-Pacific *Conus* over a period of 50 years, and obviously I don't have another 50 to devote to the Atlantic fauna. Third, I don't have the benefit of working with my co-authors of the Indo-Pacific Manual.

In addition to the Western Atlantic revisionary study, in collaboration with my former postdoctoral research associates, Tom Duda and Chris Meyer, as well as others, I continue to try to understand how the species of *Conus* are related genealogically or phylogenetically to each other. We published a couple of papers on this aspect in 2008; the citations are on the *Conus Biodiversity Website*, which of course is itself another ongoing project.

Shell lovers can also thank you and your team (Trevor Anderson & Al.) for the excellent website: *The Conus Biodiversity Website*. How did you get the idea for such a database?

Actually it was not my idea. The U.S. National Science Foundation supported the study for four years (2003-07). It requested that grantees of revisionary systematics projects on all groups of organisms develop web sites on their taxa, so we complied. It turned out to be an excellent way to manage databases as well as to make information available and easily accessible to the world. The site has become more popular than I expected. It has been averaging over 60 visits per day, and in January, 2009, for example they came from people in 75 different countries.

However, a web site is like a collection; without continued attention it deteriorates. And now that the NSF support has expired, Trevor Anderson's position has disappeared, and it has therefore become much more difficult to continue the site. Serious users of the site undoubtedly realize that it is no longer regularly updated. The NSF does not fund websites that it initiated after the grants expire. Fortunately the Burke Museum at the University of Washington continues to host the site, but unfortunately we lack funding to maintain and update the site.

Are you, yourself, collecting shells? Would you tell us what are your ten favourite cone shells and why?

I did collect shells, from the time I was a child growing up near Long Island Sound in Connecticut until I joined the University of Washington faculty in 1961. At that time I also became associated with the Burke Museum, to which I donated my collection, of about 2,500 lots. It is not appropriate for a person affiliated with a museum to also maintain a private collection, because it establishes a conflict-of-interest situation.

I will only name my one favourite Conus species: *C. ebraeus*, mainly because it is the most successful of all. The criteria for biological success vary with the category. At the genus level, *Conus* is of course the most successful in the sea, because it has the most species and occupies a correspondingly broad array of habitats and areas. For a species, criteria for success include how widespread it is, how abundant it is, and how many types of environment it can exploit. (This is why our species, *Homo sapiens*, is so successful on land.) *C. ebraeus* has the widest geographic range of any *Conus* species. It occurs throughout the Indo-Pacific region (1/4 of the world's ocean area), and it has also crossed the East Pacific Barrier to colonize the coast of Costa Rica. It has a planktonic larva that stays afloat feeding and growing for at least several weeks and can thus be transported widely by currents. Tom Duda and Haris Lessios have shown that its populations in widely separated regions have almost identical DNA sequences, indicating that they continue to interbreed. In several habitats it is also the most abundant species. And it occurs both intertidally and subtidally, on a variety of different substrate types, although usually associated with coral reefs or other habitats of reef origin.

Another reason why it is my favourite is that I have been studying it off and on for about 55 years, and for most of

that time it concealed a deep secret from us. *C. ebraeus* has a cryptic sister species whose shells we cannot distinguish from it. Tom Duda discovered this a few years ago (by demonstrating from its DNA sequences that it does not interbreed with *C. ebraeus*). We hope to finish a report on this situation later this year.

What about your work on DNA tissues of cone shells species?

I am not a molecular biologist, so I work with others who are. I did require my last several graduate students to learn molecular methods, because they have become so useful in answering so many different kinds of biological questions that we just could not approach before the "molecular revolution." In this project Tom Duda and Chris Meyer did most of the molecular genetic work, and both continue research in this direction. We now have sequences of four genes for perhaps 40% of all *Conus* species (about 250). Not all of these results, as well as those of *C. ebraeus*'s cryptic sister just mentioned, have been published yet. It is heartening, however, that in about 98% of cases in the Indo-Pacific, the DNA results agree with our species-level, shell-based taxonomic decisions in RKK.

Do you regularly have big surprises concerning actual nomenclature?

Nomenclatural surprises do seem rampant in *Conus*, but maybe they should not be so surprising.

Since the publication of the "Manual", there have been many new *Conus* species uncovered. In your opinion, isn't there an inflation of n. sp.? Can your DNA investigation help you with correct identification?

Yes, many *Conus* species have been described several times, but previously undescribed species also continue to be discovered and described. A too common problem is inadequate descriptions that do not distinguish (and sometimes seem not to try to distinguish) intraspecific variation from interspecific differences. Despite the increases in knowledge and technology, published descriptions have improved disappointingly little from Linnaeus's time to ours! I've tried over the years to help give guidance about how to describe species. One such account is on the CBW, and I tried to make my only new species description (*C. kahiko*) a model. But a small fraction of people who have described new species since then (1981) has paid any attention. One doesn't need to be a professional biologist or a Ph.D. to properly describe a new species. One does need a high school-level understanding of how evolution works, and access to and evaluation of all the previous descriptions of species in the genus. I know some non-professionals who have published quite adequate descriptions of new *Conus* species in the last 10-15 years. I think one problem is that somewhere some people who describe new species got the idea that some honor is attached to doing so. But there is no honor; there is only responsibility—the responsibility to defend the hypothesis that the new nominal species is really distinct. The late very distinguished Danish marine biologist Anton Fr. Bruun, whom I had the pleasure of knowing back in the 1950's, attributed this situation to the decision that the species name should be followed by the author's name. This started when it was decided that zoological nomenclature should begin in 1758 with Linnaeus's species. In a letter to the editor of Science in 1950, Bruun called this "widespread mental disease among systematists" the "Mihilisme" and describers who think some honour accrues to the describer, "Mihilists."

It would help greatly if all descriptions were published in peer-reviewed scientific journals. Then, referees of manuscripts would help less experienced authors to prepare adequate descriptions. But the International Commission on Zoological Nomenclature permits the names of species published anywhere to be available.

Since Linnaeus many authors attempted to subdivide the Family *Conidae* in Genera and

Subgenera, but in spite of the great interspecific variation, the current trend is to gather all the species in the unique Genus *Conus*. But is this the right way? Isn't there a complicated taxonomic problem to solve?

If there is, we have not solved it yet. Many attempts have been made to subdivide the genus, starting with Linnaeus, as you said. In 1758, he divided *Conus* into four subgenera on the basis of quantitative characters of shell shape, or morphometry. A problem is that the schemes of different authors have been based mainly on single character sets: shell shape, shell sculpture, shell colour pattern, radular teeth, or DNA sequences. Each basis gives rise to different logical but conflicting schemes. Because the generic/infrageneric classification is not yet resolved, it seems most rational to continue to consider all the species in a single genus. Of course these data also show that some species are more closely related than others, and some day a bright student may show that one scheme for subdividing the genus should be accepted because it explains most of the data on diversity and leaves out the fewest. This is of course how theories become accepted in all of science, and systematics is no exception.

If someone wanted to help you by collecting tissue samples from live specimens, how would one proceed, and to whom should they contact?

The simplest method is to place small tissue samples (we use a slice of fresh foot tissue of a few cubic millimeters) in 95% (190 proof) ethyl alcohol. The volume of alcohol should be at least several times that of the specimen, and the container should be tightly stoppered because alcohol evaporates. Samples can be sent to me or to Chris Meyer at the Smithsonian Institution. They should be accompanied by a photograph of the animal's shell and the usual collection data. Chris keeps a database of images of shells of *Conus* specimens whose genes we have sequenced that is accessible from the Florida Museum of Natural History website. Ideally the shell itself and the rest of the preserved animal should go to a public museum as a voucher specimen where it will be accessible to future generations.

What about the mystery of the presence of *Conus pennaceus* in Hawaii? I noticed you were in Hawaii in the end of 2008, with Chris Meyer DNA analyst, did you learn more about this local interesting specie/subspecies? Do you have records of *C. pennaceus* from other places in the Pacific area?

C. pennaeus remains a mystery as you correctly say. What we call *C. pennaceus* is almost certainly a flock of related species. We know that egg size and reproductive mode, as well as shell form and pattern, differ in different geographic areas. In RKK, we separated Indian Ocean populations as *C. madagascariensis*. Even within Hawaii, where *C. pennaceus* lacks a planktonic larva, shells differ markedly from place to place. Some populations have reddish brown markings on the shells, in other places the shells are yellow and white. Some have long, narrow shells, while others are short and squat, etc. The extent of variation within the Hawaiian Islands is reminiscent of that among some Western Atlantic species that also lack planktonic larvae. But of course we lack adequate samples from all of these for detailed molecular genetic analyses.

The operculum seems to be a rudiment. What is your opinion for the real function for this part of the animal?

The operculum does seem rudimentary, and some species have been reported to have lost it entirely. I don't know that anyone has demonstrated that it functions in any way. If someone has, we would all like to hear about it.

What causes colour changes in the pattern?

Conus regius with half of the whole in citrinus pattern and the other half the normal pattern?

You are what you eat, and at least some individuals can be induced to change colour pattern in captivity by changing their diet. I've done that with *C. striatus* in the laboratory in Seattle. *C. regius* seems to change patterns commonly during its life in nature. This likely is due to a change in diet, but we don't know this for sure. *C. regius* eats polychaetes of the family *Amphinomidae* ("fireworms") and different species in that family themselves have different skin pigments.

What could be the reason for the nice pattern of *Conus* as it cannot be seen normally, because of the periostracum?

The pigments of *Conus* shells are nitrogenous waste products of metabolism. Just as our kidneys secrete urea as our main nitrogenous excretory product, *Conus* kidneys probably produce the pigmented compounds. One can only speculate why they are sequestered in the shells. The patterns likely result from the rhythms of excretion and shell secretion, but little is really known about this also. As you say, the colour patterns probably don't have any visual significance. Some are obscured by periostracum as you noted. Conus species that have a thin, translucent periostracum are those that tend to stay buried in sand during the day, coming out to forage at night when the patterns aren't visible. And those that are out in the open all the time typically have the periostracum covered with algae that obscure the shell colour pattern.

Does cannibalism appear in cone species (ex. adults eating juveniles)?

I don't know of any cases. Of course some *Conus* eat mainly other *Conus*. *C. marmoreus* and *C. bandanus* are good examples, at least in some regions. Members of some species do eat very similar species: I found radular teeth of a *C. canonicus* in the gut of a *C. textile* once. Also I once (only once) did an experiment in Hawaii keeping a large number of *C. pennaceus* in an aquarium for a long time. No cannibalism occurred.

Are cones immune from their own poison?

No, as the previous answer indicates. But remember that the venom must be injected to be effective. If a person or another predator eats a *Conus*, the venom molecules will be digested as food in the predator's gut. Other snails (e.g. *Cymatium*, naticids), some fishes, crabs and mantis shrimps, and people in several parts of Asia don't hesitate to eat *Conus* and are none the worse for the experience. I once taught a short course on the biology of *Conus* to marine biologists in Vietnam. Bad weather prevented much collecting, but the local market provided enough specimens and species for study.

Hawaiian *Conus pennaceus* Born, 1778

Giancarlo Paganelli

Within the family *Conidae*, one of the most interesting and best loved species is without doubt Conus pennaceus, because of its great variability in shape and colour pattern and its wide geographical distribution too. Over the years many phena were described and most probably a few can assume the status of subspecies. *C. pennaceus* is reported from the entire Indian Ocean; in the Pacific Ocean, except for a few specimens found in the Southern Philippines, it is present only in the Hawaiian Islands. In that archipelago it is possible to distinguish several morphologically distinct populations that present a significant difference in shape and colour pattern, when compared to the typical *C. p. pennaceus* from Mozambique. A phenon ascribed to *C. elisae* Kiener, 1845, usually ventricosely conical with a fine axially reticulate pattern, is also present and it is found simpatrically with specimens that show the typical colour pattern, without intermediates. According to laboratory studies (Perron, 1980), this variant is the expression of a Mendelian inheritance in which the phenotype is due to a recessive allele.

I checked twenty specimens in my collection (about 50% of the total), 40.1 to 65.6 mm in length and 8 to 51 g in weight. The maximum length is reported for a gerontic specimen whose weight is 25% higher than for a non-gerontic similarly-sized one.

The shells are of medium to large size and solid. Last whorl rather variable in shape, conical, broadly to ventricosely conical with straight, slightly convex to convex sides; spire low to moderately high with slightly concave to convex outline, shoulder angulate or sub-angulate to rounded.

The aperture is generally wider at base than near the shoulder.

The ground colour is white and the surface rather glossy with a very variable colour pattern, simple to intricate. The last whorl is overlaid with light yellow to orange and reddish, brown to blackish brown, leaving many various sized tent-like ground colour markings. Tents, edged with a darker line mainly at the frontal side, are placed in three spiral bands, below shoulder, near centre and at base. Often coloured overlying blotches, sometimes dotted with small ground-colour markings, forming 2-3 spiral bands. Larval whorls and first post nuclear sutural ramps generally pink to white. Following sutural ramps matching last whorl in colour pattern. Last whorl with weak spirally ribs at base. The aperture is white.

The periostracum is thin, light transparent to moderately opaque, yellowish to brown. Operculum somewhat variable in shape, elliptical to hooked, 1/6 to 1/8 of the shell length.

Larval development, unlike the other species of *Conus* in Hawaii, is mainly non planktonic from lecitotrophic eggs about 500 µm in diameter and concludes within 24 hours. That peculiar way of development brought about the presence of many various populations locally isolated.

With regard to feeding *C. pennaceus* is molluscivorous but not to congeners.

The live animal has a white mottled of brown-reddish foot, siphon white red tipped with a narrow black ring at about 1/3 from the end.

C. pennaceus is usually found in 0.3-3 metres of water, sometimes deeper, in sand, under coral rubble. Most of the specimens of my collection come from Oahu Island, chiefly in the West Leeward Shore. A few, with the typical elongate shape, are collected in Midway Atoll; phenon *elisae* is from Kauai Island.

The Hawaiian *C. pennaceus* populations are geographically separate from other conspecific ones from the Indian Ocean (a gap of about 8,000 kilometres) and most probably have developed different reproductive mechanisms. Because of these reasons, (and also according to RKK, 1995), it is hoped that subspecies status is given to these marginal populations and I think that *Conus pen-*

naceus hawaiiensis could be a good solution regarding the ssp. name (in my opinion, *hawaiiensis*, Bartsch P. and Rehder, H. A., in Kaicher, S. D., 1956, is a *nomen nudum* and for this reason available).

Obviously mine is only an omen and, as I am only a collector, surely it is not my intention to take the place of more reliable Malacologists. Most probably current and future investigations of molecular biology by DNA analysts will provide crucial evidence on the right taxonomic status of these isolated populations.

Many thanks to Dr. Alan J. Kohn and David Watts for their helpful personal communications and to Marco Bettocchi who put a specimen from his collection at my disposal.

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No. 3382, 45.8 mm
Oahu, Leeward Shore

No. 3772, 50.9 mm
Oahu, Leeward Shore

No. 3727, 50.9 mm
Oahu, Leeward Shore

No. 3192, 45.4 mm
Oahu, Leeward Shore, Nanakuli

No. 3660, 62.8 mm
Oahu, Leeward Shore

No. 3711, 42.1 mm
Oahu, Leeward Shore

Plate 1

No. 1886, 54.6 mm
Oahu, Leeward Shore

No. 1903 44.9 mm
Oahu, Leeward Shore

No. 3591, 64.6 mm
Oahu, Windward Shore, Punaluu

No. 3592, 47.0 mm
Oahu, Windward Shore, Hauula

No. 3729, 35.9 mm
Oahu, Leeward Shore

No. 3644, 48.3 mm
Oahu, Leeward Shore

Plate 2

No. 3794, 60.7 mm
Oahu, South Shore, Wailupe

No. 3726, 59.1 mm
Oahu, Leeward Shore

No. 1868, 41.5 mm
Oahu, Leeward Shore

No. 2921, 30.8 mm
Oahu, Leeward Shore

No. 3783, 27.7 mm
Oahu, Windward Shore, Kailua

No. 3747, 26.7 mm
Oahu, Windward Shore, Kailua

Plate 3

No. 3746, 32.6 mm
Oahu, Leeward Shore, Maili

Collection Marco Bettocchi, 46.7 mm
Oahu, Leeward Shore

No. 3773, 49.7 mm w/p
Oahu, Leeward Shore

No. 3774, 42.1 mm w/p
Oahu, Leeward Shore

No. 3777, 33.6 mm (w/p on left)
Oahu, Leeward Shore

No. 3775, 40.1 mm w/p
Oahu, Leeward Shore

Plate 4

No. 3728, 40.5 mm
Oahu, Leeward Shore

No. 3759, 31.0 mm
Oahu, Leeward Shore, Nanakuli

No. 3758, 37.7 mm
Oahu, Leeward Shore, Nanakuli

No. 3760, 27.3 mm
Oahu, Leeward Shore, Nanakuli

No. 3745, 45.7 mm
Midway Atoll

No. 3101, 31.2 mm
Midway Atoll

Plate 5

No. 3744, 53.8 mm w/p
Midway Atoll

No. 3795, 34.6 mm w/p
Midway Atoll

No. 3779, 39.5 mm (*elisae* variant)
Kauai Island

No. 3763, 25.6 mm (*elisae* variant)
Kauai Island

No. 2372, 20.2 mm (*elisae* variant)
Kauai Island

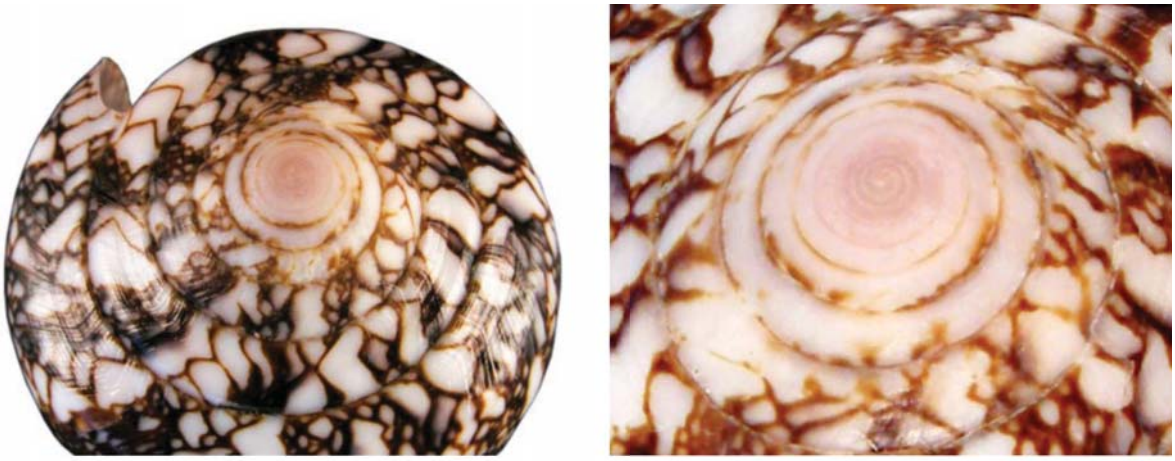
Plate 6

No. 3726

No. 3779

No. 1868

Plate 7, Spire and larval whorls



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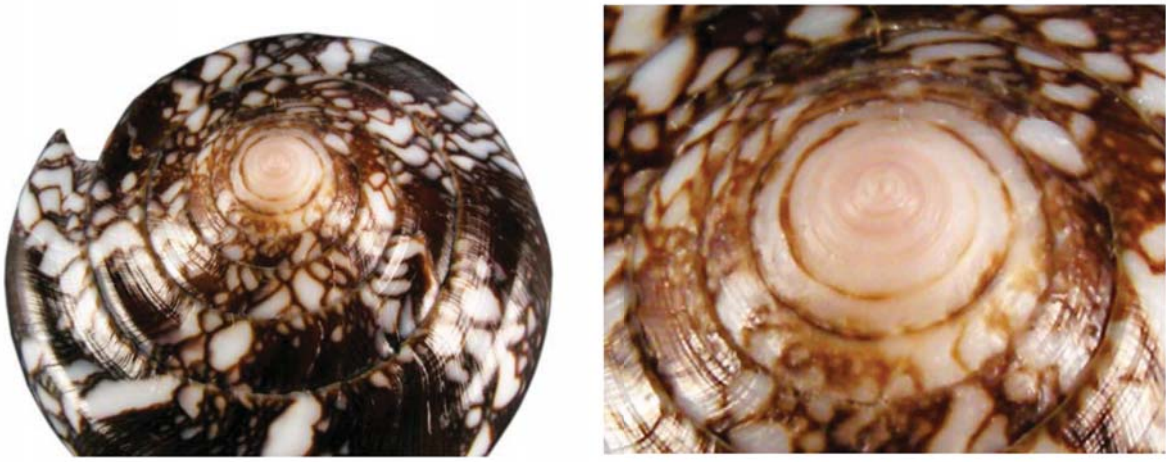

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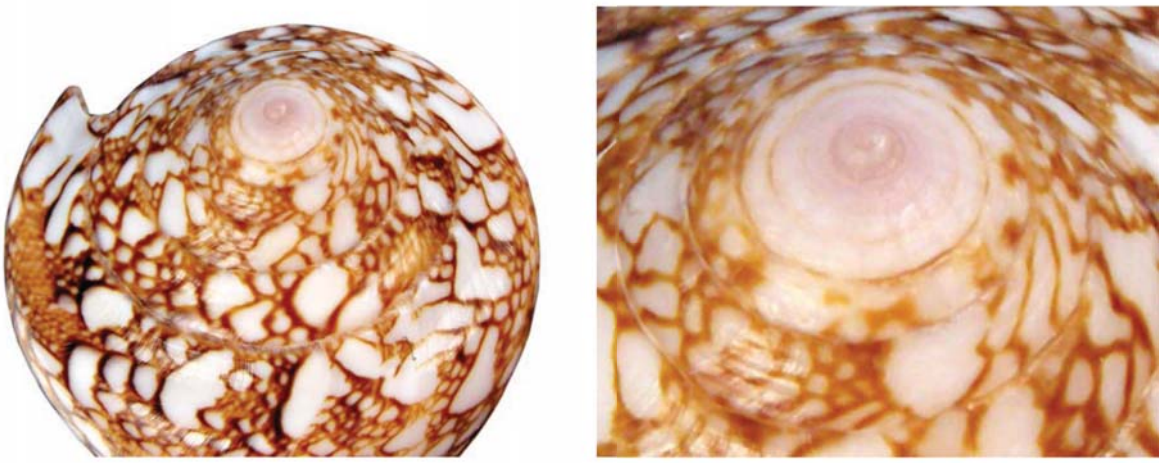

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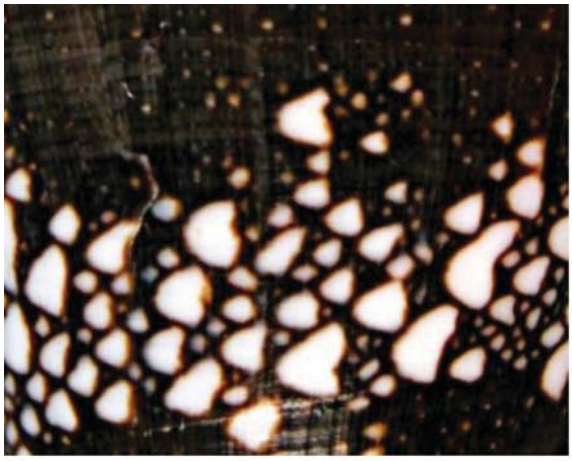
Plate 8, Spire and larval whorls



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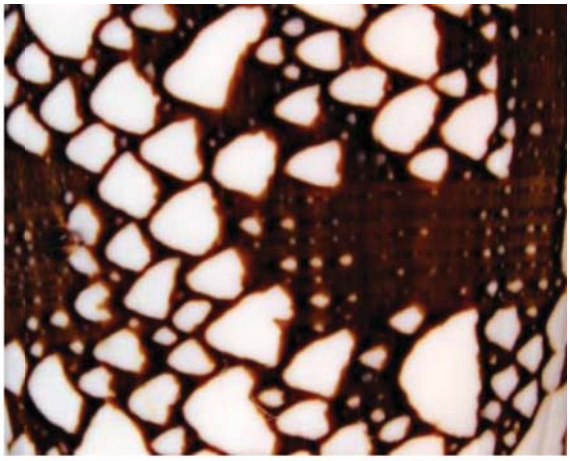

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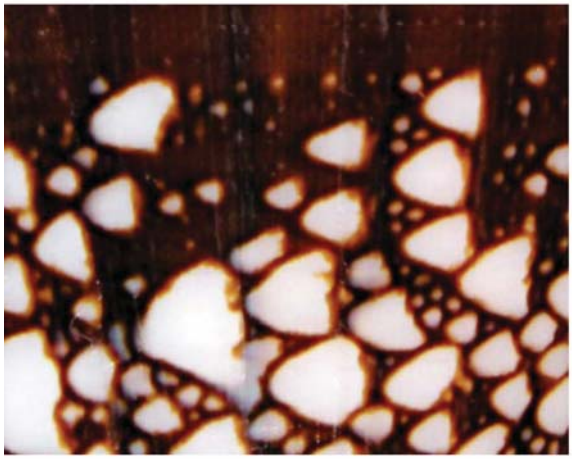

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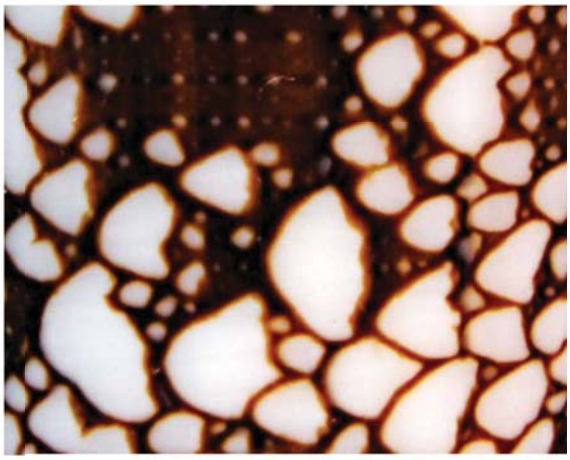

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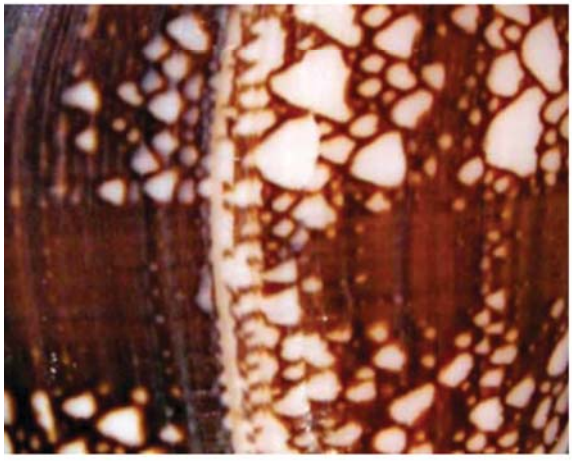

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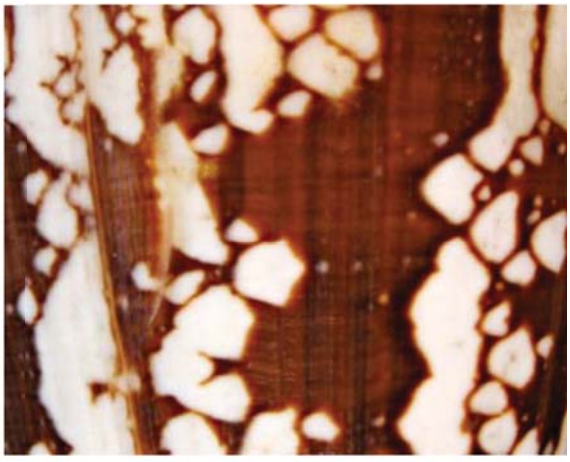

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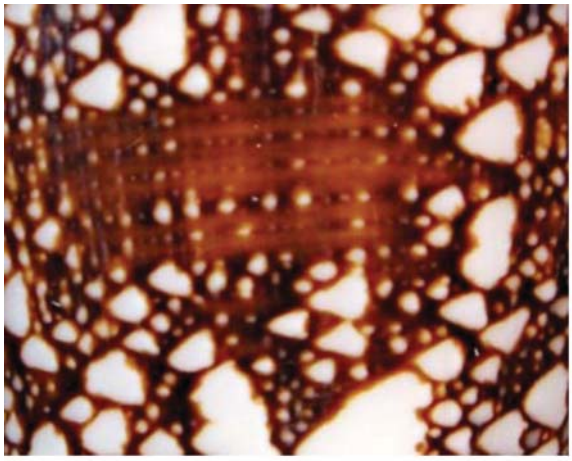
Plate 9, Colour pattern



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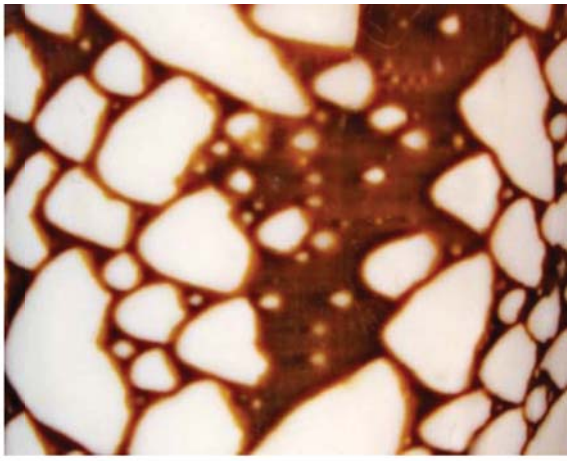

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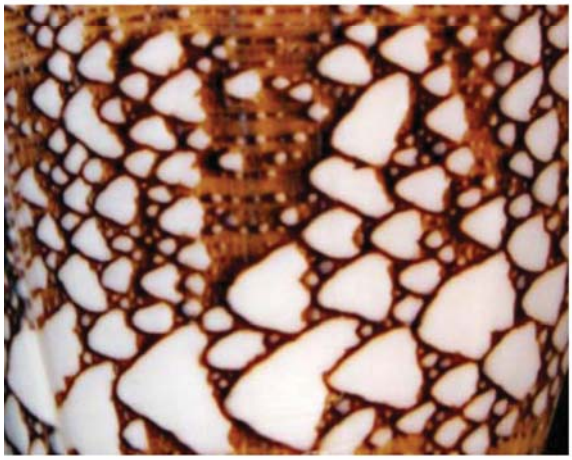

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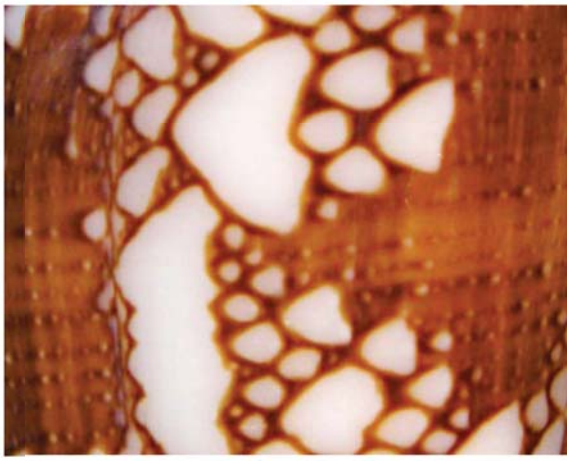

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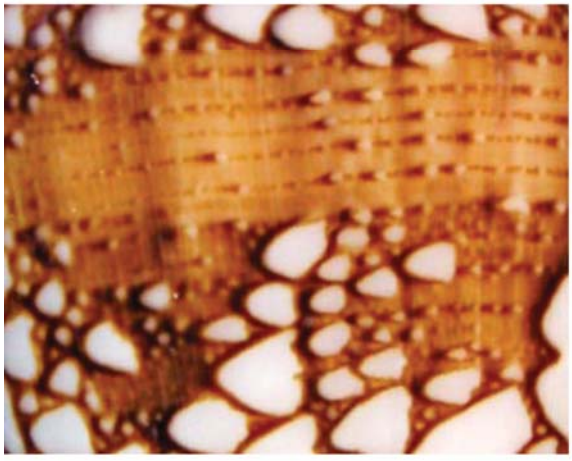

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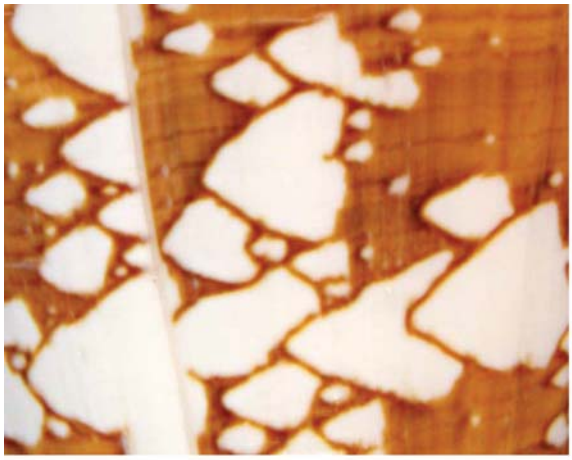
Plate 10, Colour pattern



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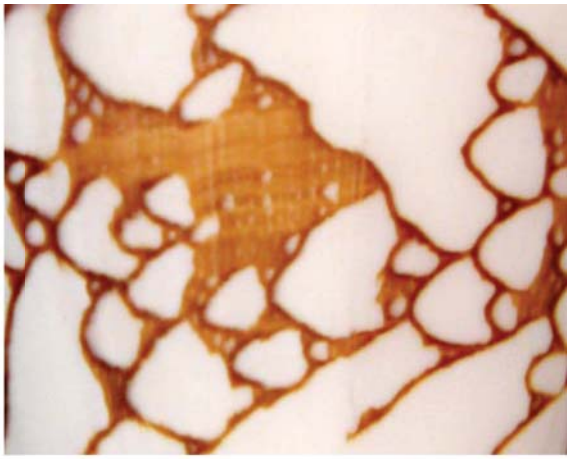

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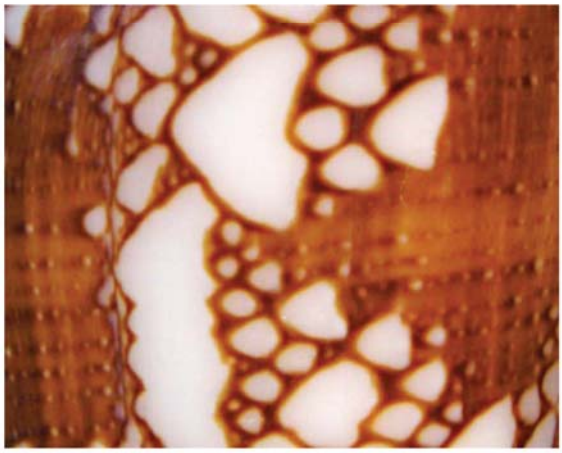

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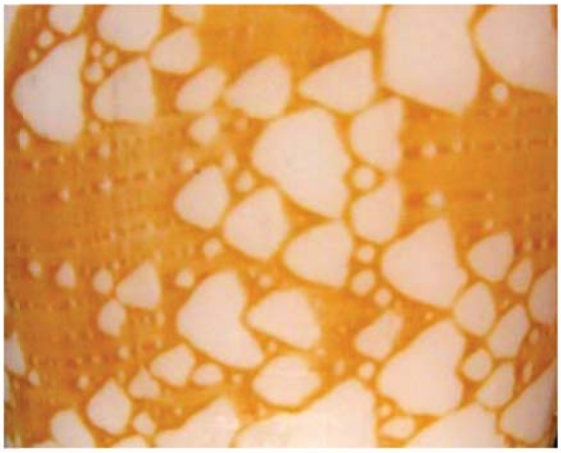

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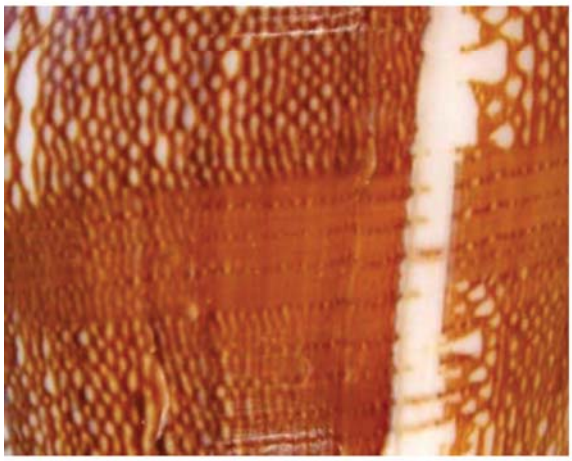

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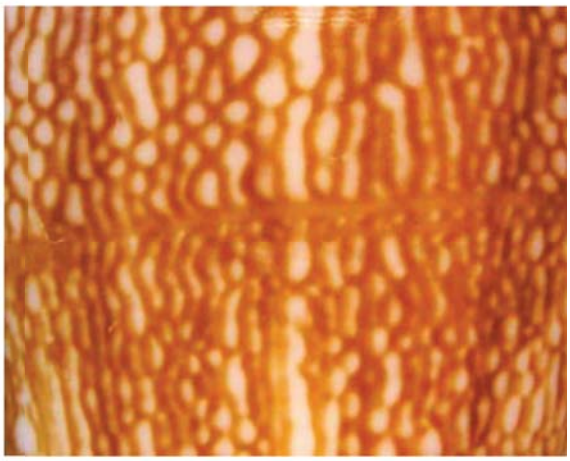

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Plate 11, Colour pattern

Plate 12, Operculum

	L/mm	W/g	RW	RD	PMD	RSH
C. pennaceus Hawaii *	40.1-64.6	8-51	0.27-0.79	0.58-0.77	0.80-0.92	0.09-0.16
C. p. pennaceus Mozambique	50.1-61.7	9-20	0.16-0.35	0.52-0.61	0.79-0.85	0.10-0.16
C. p. ssp. Madagascar	51.9-65.4	12-37	0.22-0.56	0.55-0.65	0.81-0.87	0.09-0.16

Check on about 20 specimens for each Country

SHAPE *	RD	PMD	RSH
Conical	0.65-0.70	0.86-0.92	0.09-0.16
Broadly conical	0.71-0.77	0.88-0.89	0.11-0.14
Ventricosely conical	0.58-0.69	0.80-0.85	0.10-0.16

Plate 13, Morphometry

The Status of an Australian Cone

Jon Singleton

It seems surprising that a long ranging cone species which inhabits the intertidal zones off the N.W. coast of Australia was not named by the early naturalists. Certainly it can be found around the old ports and anchorages used by early explorers and trading vessels. This cone was eventually named *C. reductaspiralis* by Walls in 1979, and placed as a subspecies of *C. nielsenae*.

For myself, I have always considered *C. reductaspiralis* to be a full separate species. It differs in shell shape, structure, colour, pattern, habitat, periostracum and weight.

The type location of *C. reductaspiralis* was stated to be Geraldton, which is midway up the western coast of Australia. This is likely erroneous, as living in Geraldton and prowling the local beaches and inshore reefs, no sign of this species in the region. My own collecting records show the southern limit for *C. reductaspiralis* to be Coral Bay, some 600 kilometres north! The range extends up around the N.W. cape and along the extreme intertidal N.W. coast to north of Broome. The holotype shows a colour and pattern form predominantly found between Port Hedland and Cape Keraudren, a 120 km stretch of coastline.

The living cone seems to prefer the fine silty mud environment, and this helps to preserve and protect the periostracum. Live specimens do exist on reef-tops, but by maturity have lost most of their periostracum and become badly eroded. The periostracum is thick and khaki coloured.

C. reductaspiralis is quite variable in colour and pattern, which gave rise to white specimens being considered *C. clarus*, and the tan coloured as *C. gilvus*. The most common form has a white body whorl sometimes tinted with yellow, a dark brown stain at the anterior, and brown flammules on the spiral whorls. In some colonies a seemingly all-white form exists, but under magnification, the faint spiral whorl markings can be discerned. The form matching the holotype can vary with the amount of fine spiral line markings, from the odd few to a full coverage of the body whorl. An attractive gold to yellow form is found off Condon which is about 150 km further north from Port Hedland, and smaller tan coloured specimens, some with a mid body band, are found off Broome.

The main habitat for *C. nielsenae* is around the off-shore reefs and islands between Townsville and Mackay on the Queensland coast. Most specimens are obtained by trawling between depths of 40 to 70 metres. The shell shape is slightly waisted, and the spire flattish or sometimes slightly depressed. This is a thin light-weight cone, and a 55 mm specimen weighs just 17 grams in comparison to a similar sized *C. reductaspiralis* at 30 grams. The colouration is pastel shades of pink and yellows, some with faint thin encircling spiral lines, and some without. One particular colony has a thick white mid-body band. The living cone has a thin even light brown to yellowish periostracum, with 5 or 6 encircling twin bands of erect hairs, spaced evenly over the body whorl.

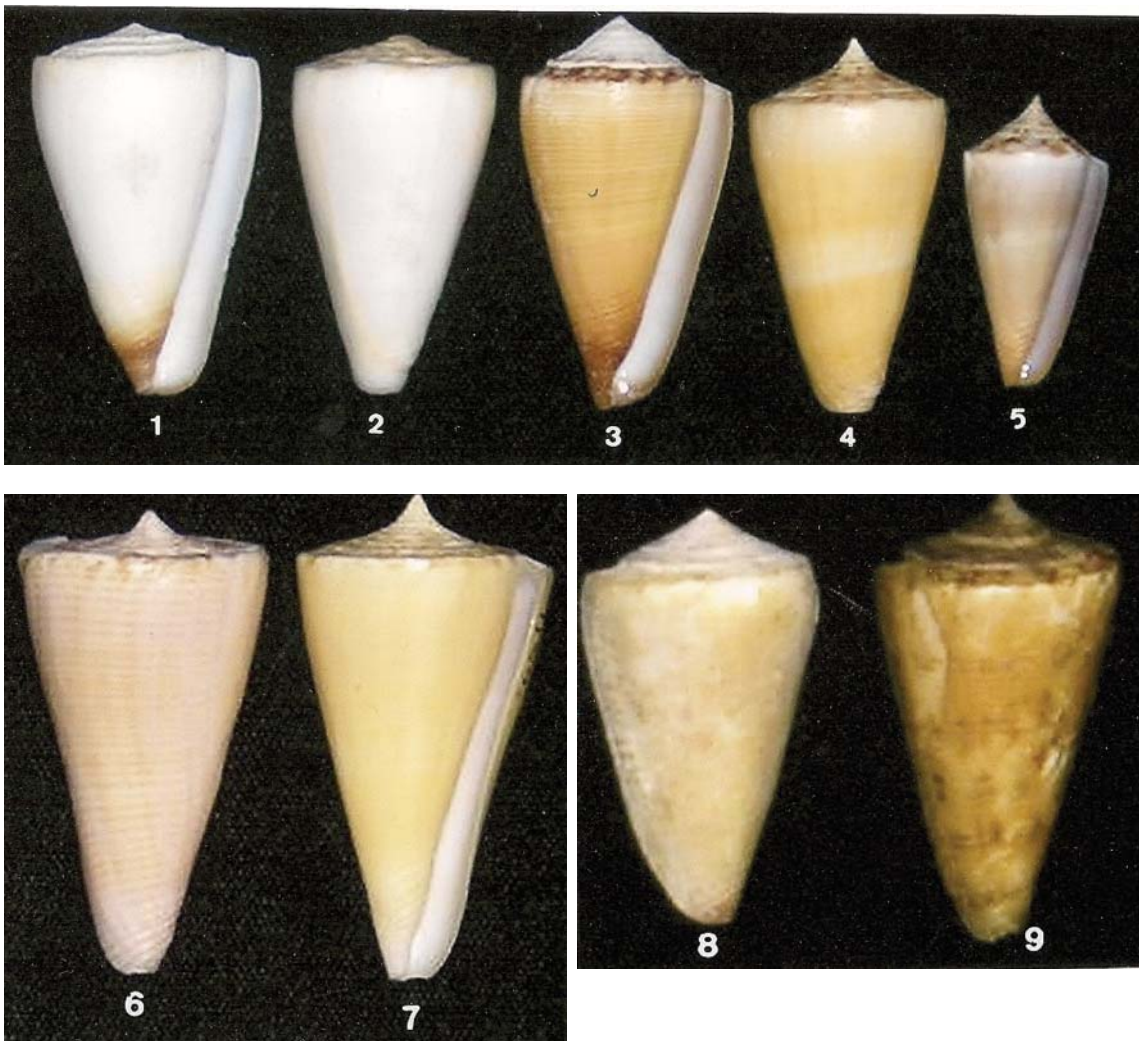
Within the description of *C. reductaspiralis*, it was stated that *C. nielsenae* was also found in New South Wales waters and the Kermadec Islands. The NSW location is likely erroneous, and it is not listed by any authors on NSW shells. The Kermadec location may be based on an article on cones from the region, which included a 61 mm specimen of a possible *C. nielsenae*. The illustration was in black and white, but the specimen seemed to be slightly broader across the shoulder than normal. The whereabouts of this specimen is unknown, and inquiries at two New Zealand Museums were negative.

The illustrated specimens range in length from 33 mm to 48 mm. Fig. 1 is the common form; fig. 2 the seemingly all-white form; fig. 3 a specimen matching the type; fig. 4 the scarce yellow form and fig. 5 the smaller tan form. Figs. 6 and 7 are typical *C. nielsenae* and figs. 8 and 9 show the differing periostraca.

References

1976. H.S.N. Sept. W.O. Cernohorsky, Cones from the Kermadec Islands

1979. Pariah No. 5. J.G. Walls, Description of *Conus reductaspiralis*



Most Memorable Shell: Mike Filmer

In mid 1970, while I was living in Bangkok and collecting all families of shells, I paid a visit to a small shell shop on Sunday morning.

I noticed a *Strombus* shell, which I believed to be a freak *Strombus* (*Doxander*) *vittatus* with a rather large aperture and wing. The lady wanted US $ 10 for it. I thought this was much too much for a rather common shell but despite my offers of a lower amount she refused to budge so I left the shell.

Later that night I was browsing in my copy of the Indo-Pacific Mollusca and came across a description and illustration of *S. listeri* – I immediately recognized that this was the shell I had seen in the shell shop that morning. Then I discovered that its value was US $600! I was astounded to say the least.

The next day I returned to the shell shop to buy the specimen – but to my disgust someone had already bought it. For the next three months I was kicking myself for missing a great opportunity.

About three months later I was in the famous Bangkok Sunday Market at a small shell booth trying to bargain for some shells but the fisherman who owned the booth did not speak English so I was having some problems as I could not speak Thai. Then a kind Thai man stepped in and helped me to bargain.

It turned out that he was also a shell collector (much later I learned that he was in fact Phairot Lenevat a well-known collector). As we were talking he mentioned that he had recently been in Phuket and had purchased some strange Strombs. When he described them I immediately knew that he was talking about *S. listeri*, I asked him how much they had cost him and he said US $8 each. He told me that the fishermen at Rawai Beach on Phuket Island had more of these shells. I went back to my office a telephoned one of my staff who was stationed in Phuket and I asked him to go and buy me some *S. listeri*. Later I received a parcel with six specimens bought for US $6 each. I gave a huge sigh of relief.

In December of that year my family and I took a seven week trip round the South Pacific visiting all the major island groups. I took five *S. listeri* with me and was able to trade each one on a different island for shells to the value of about US $500. Included in these trades were *Cypraea aurantium* and *Conus gloriamaris* live-taken in the Solomons and a *Conus marielae* from the Marquesas among numerous other lovely and at that time rare shells. In the end my sad tale of the missed *S. listeri* turned out to be the greatest success in my forty years of collecting.

Conilithes adversarius (Conrad, 1840): a Left Handful

John K. Tucker

Giancarlo Paganelli (2009) published an interesting article on the only known sinistral fossil cone complex. He followed Petuch and suggested that there were many morphologically and chronologically recognizable species. He also noted that the taxonomic status of these are disputed. Because the beds where the nominal taxa are found are temporally separated it is possible to consider them distinct species (Paganelli, 2009). The purpose of my note is to explain where the dispute is and to look at the most recent and comprehensive review of this 'complex'. I think readers of *The Cone Collector* should understand the depth of evidence for the single species hypothesis.

First, exactly what species names are involved? Overall 10 sinistral taxa have been described from fossil deposits in North Carolina and Florida (Table 1). Of these, six were recognized as valid species by Paganelli (2009) (Table 1, in bold). The primary organizing factor for the species recognized is actually the stratigraphic occurrences of these taxa. This can be seen by the taxa listed as synonyms. For instance *heilprini* and *mitchellorum*, two Okeechobee Formation taxa, were listed as synonyms of *C. scotti*, another Okeechobee Formation taxon. The morphological traits cited such as nodulose postnuclear whorls are helpful only if the range of variation at each site is unknown (Figs. 1-3) (Figs. 1-3) (Figs. 1-3) (Figs. 1-3) (Figs. 1-3) (Figs. 1-3) (Figs. 1-3). In fact, almost all *Conilithes* (*C. antidiluvianus* Bruguière, 1792 is the type species) have these. *C. antidiluvianus* (Bruguière, 1792) is essentially a right handed *C. adversarius* (see Figs. 4-6).

The purpose of my paper is not to criticize Giancarlo. The conclusions he reached are certainly the most logical ones given the concepts that Petuch's species descriptions and time stratigraphy were based on. Fortunately the readers do not have to take my word for it. The new stuff that I mentioned above is in Jonathan Hendricks' exhaustive review of the Plio-Pleistocene fossils of the southeastern United States (Hendricks, 2009a). He examined more than 20,000 specimens of these fossils including 697 specimens of *C. adversarius* that he measured and a further 6,280 specimens in various US collections that he examined (Hendricks, 2009a).

Hendricks' conclusions are telling. First he could identify only a single taxon, *C. adversarius*, from the Pliocene and possibly lowermost Pleistocene. He considered all of the other names synonyms of *C. adversarius*. Specifically, he noted that "Petuch's holotype specimens appear distinctive in shell shape when compared to the lectotype of *Conus adversarius*" (Hendricks, 2009a, p. 26). But he further noted that "These specimens appear less distinctive, however, when large sample sizes are considered and morphological variation is assessed quantitatively" (Hendricks, 2009a, p. 26). The quantitative study of large sample sizes led Hendricks (2009a) to conclude that the various described taxa represent members of only one highly variable sinistral species. Moreover, the variation may be related to the sinistral coiling (Hendricks, 2009b). For instance, nodules along the shoulder angle are often present (Fig. 1) but they may be absent (Fig. 3) or intermediate (Fig. 2). Specimens similar to these can be collected side-by-side at the AMPAC quarry near Sarasota and I have hundreds of them in my collection.

Hendrick's (2009a) also noted problems with the species criteria used by Petuch to delineate all of these sinistral taxa. Mostly these traits are shell size and shape characteristics but no statistical comparisons were made. Moreover, "it appears that Petuch believed that fossil species tend to be restricted to single temporal intervals by narrowly defined geographical regions" (Hendrick, 2009a, p. 7). This philosophy caused Petuch to place special emphasis on temporal rather than morphological separations between otherwise similar species (or identical in my mind).

I highly recommend the Hendricks volume to any collector of Plio-Pleistocene fossils from the southeastern United States (it is available through the Paleontological Research Institution, *www.museumoftheearth.org*; ISBN: 978-0-87710-482-7, US $60.00). My main point of de-

parture with Hendricks is in the use of generic names for the *Conidae*. Hendricks concluded that "With the exception of sinistral coiling, the species that Petuch assigned to *Contraconus* are well circumscribed by generic shell characters of *Conus* as defined by Linneaus..." (Hendricks, 2009a). Nothing could be further from the truth. Use of generic (or subgeneric) names within the Conidae is difficult to be sure. The difficulty is that there are not enough generic names not that there are too many. For instance, I think that *Contraconus* is invalid because it is a synonym of *Conilithes* not because generic names are no good. The species that I include in *Conilithes* are united by the following traits: the shoulder is carinate and the carina may be broken into square nodules; whorl tops are usually smooth or have numerous minute striae; spire is scalariform; the shoulders are angular to subangular; and the anal notch is deep. All of these species are extinct and range from the Eocene to the Pliocene. They occur in Europe and North America. Species of *Conus* (*sensu stricto*) have one to six cords on the whorl tops and their nodules are not associated with a carina.

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Figures

Fig. 1 – *Conilithes adversarius* (Conrad, 1840). JKT 3709 (72.7 mm x 29.8 mm) Quality Agregates Inc., Quarry, 0.25 miles E of I-75 and 1 mile N of Richardson Road, Sarasota County, Florida, L. Pliocene, Tamiami Formation, Buckingham Unit 10, Early Piacenzian.

Fig. 2 – *Conilithes adversarius* (Conrad, 1840). JKT 3709 (87.1 mm x 33.6 mm) Quality Agregates Inc., Quarry, 0.25 miles E of I-75 and 1 mile N of Richardson Road, Sarasota County, Florida, L. Pliocene, Tamiami Formation, Buckingham Unit 10, Early Piacenzian.

Fig. 3 – *Conilithes adversarius* (Conrad, 1840). JKT 3711 (84.2 mm x 43.5 mm) Bergeron Sand and Rock and Aggregates, Inc. Star pit #93-366, 11 miles S of

South Bay and 1/8 mile W of SR 27, Palm Beach Co., Florida, E. Pleistocene, Caloosahatchie Formation, Fort Denard Member.

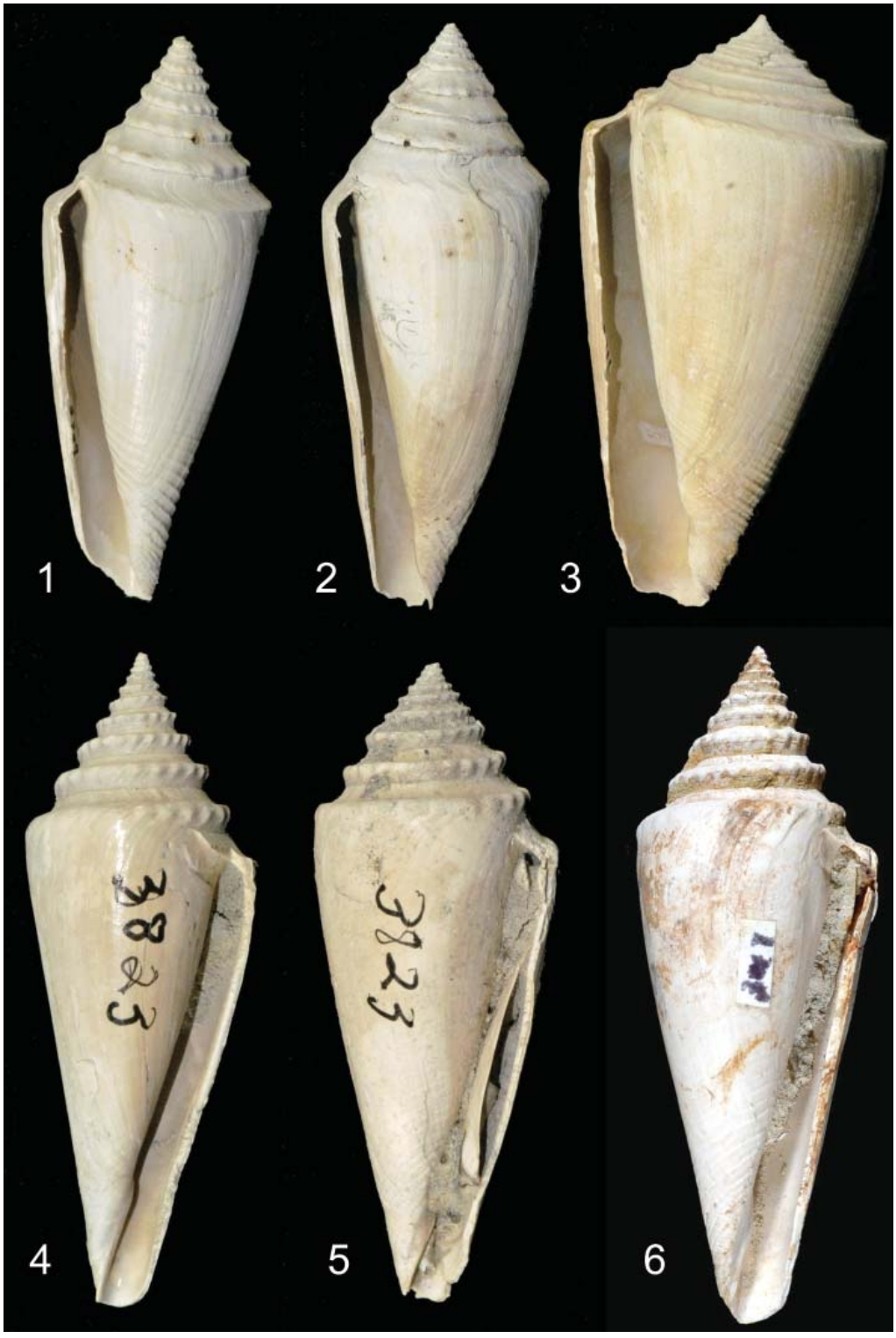
Fig. 4 – *Conilithes antidiluvianus* (Bruguière, 1792). JKT 3823 Castell'Arquato, Italy, Pliocene,

Fig. 5 – *Conilithes antidiluvianus* (Bruguière, 1792). JKT 3823 Castell'Arquato, Italy, Pliocene,

Fig. 6 – *Conilithes antidiluvianus* (Bruguière, 1792). JKT 3017 (33.1 mm X 19.6 mm), Rio Stramonte, Castell'Arquato, Italy, Pliocene.

Table 1. Sinistral taxa belonging to *Conilithes* found in the United States.

Taxon	Author and Date	Type Locality	Stratigraphy cited by author
adversarius	Conrad, 1840	Duplin Co., NC	Miocene
berryi	Petuch, 1994	Sarasota, Sarasota Co., FL	Caloosahatchee Group, Pliocene
heilprini	Petuch, 1994	SW Palm Beach Co., FL	Okeechobee Fm., Pleistocene
lindajoyceae	Petuch, 1991	Sarasota, Sarasota Co., FL	Caloosahatchee Group, Pliocene
mitchellorum	Petuch, 1994	SW Palm Beach Co., FL	Okeechobee Fm., Pleistocene
osceolai	Petuch, 1991	Lake Harbor, Palm Beach Co., FL	Caloosahatchee Fm., Pliocene
petiti	Petuch, 2003	Aurora, Beaufort Co., NC	Chowan River Fm., Pliocene
schmidti	Petuch, 1991	Naples, Collier Co., FL	Caloosahatchee Group, Pliocene
scotti	Petuch, 1994	South Bay, Palm Beach Co., FL	Okeechobee Fm., Pleistocene
tryoni	Heilprin, 1886	Fort Thompson, FL.	Caloosahatchie, Pliocene


1
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5
6

The Amethyst Blotch in Queensland

Jon Singleton

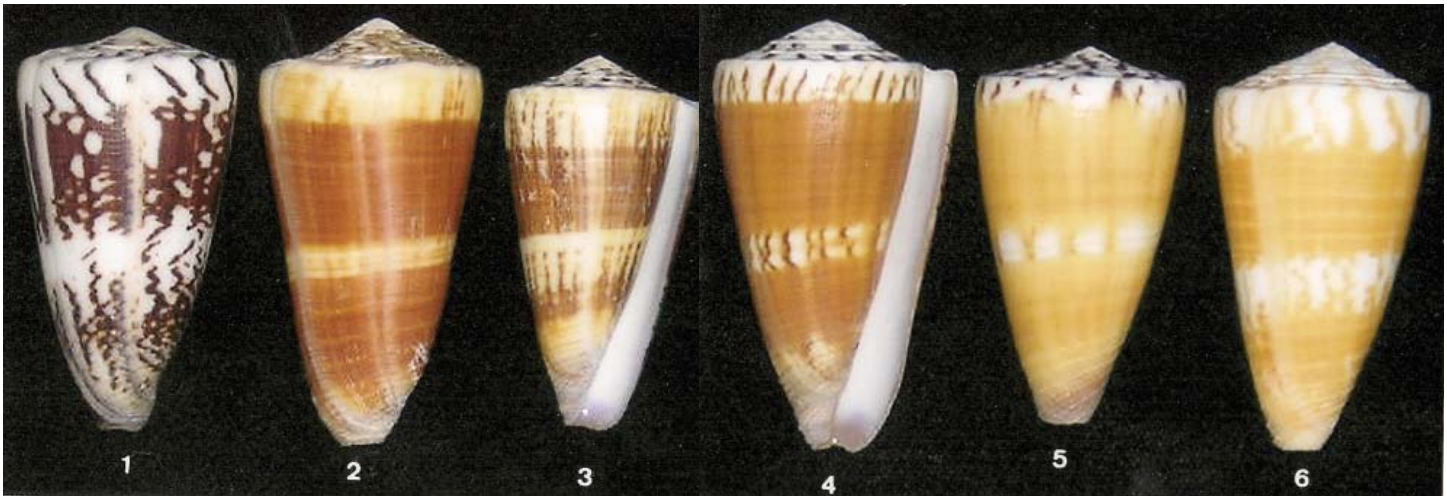
Conus planorbis is a well-known species to collectors with its many colorful pattern variations, named by Born in 1778, and followed by several more names which are now known to be synonyms.

A very comprehensive study of the *planorbis* complex was published in 1993, in which the author looked at a total of 22 names which had been associated with *C. planorbis*, illustrating the type material, true status and distribution. Amongst all the various colors and patterns, it can be basically broken down to just two, the medium brown specimens matching the holotype and the very dark brown to violet form known as *C. vitulinus*. However, there is one characteristic seen on nearly all of the variations, an amethyst blotch on the anterior, both on the outer shell and the inner lip.

There seems a little uncertainty about the range of this species. The medium browns seem to be confined to the Western Pacific, with the *vitulinus* form being far more ranging to the Central Pacific and Indian Ocean. The 1995 Cone Manual showed just a small region East of Madagascar as the Indian Ocean range. The 1993 review also included the *vitulinus* form inhabiting the East African Coast, from Somalia down to Mozambique, including Madagascar. For myself, I have collected at many locations off E. Africa and a couple off Madagascar, but even with periodic visits some years apart, my cabinet contains no specimens from the region.

From Australia, the Queensland waters produce many fine and varied forms of *C. planorbis*. They seem to thrive in the region, and can attain a length of 90 mm. They are also a hardy species, and even the giants seem to escape damage during their growth, though reef-top cones usually suffer some spire erosion. My cabinet contains about 20 of these colorful cones, and the six illustrated range in size from 60 mm to 70 mm in length. The no. 5 is of a colour and pattern matching the holotype of *C. planorbis*, with no. 1 the *vitulinus* form. The no. 6 is from a colony which seems confined to one small reef complex which produces an all yellow and white form, though the famed amethyst blotch is still faintly discernible.

In contrast to the grand display of *planorbis* from Queensland waters, Western Australia is sadly the poor relation. Both *C. planorbis* and *vitulinus* are found around the offshore islands and reefs off the N.W. Coast, and are not uncommon. However, they all seem to be smaller, and do not attain the big size of their Queensland cousins, and also tend to suffer lip damage leaving small growth marks.



Request for Help

Vladimir Holub from the Czech Republic, as recently sent us the following request:

> We would like to build one of the biggest *Conus* collections in the world. With your help, of course. We would like to collect great study material for next generations. The worldwide *Conus* collection will be presented to some world nature museum. Prague's National Museum has enormous interest in worldwide *Conus* collection in this moment.
>
> Are you interested to participate in building worldwide *Conus* collection?
>
> If you are then you can choose anything from next options of sponsoring:
>
> 1. Present any *Conus* shell from your collection (with locality and date informations) in aid of worldwide *Conus* collection
>
> 2. Finance support project of worldwide *Conus* collection
>
> 3. Other ways of support you can find on our web (*www.conuscollection.cz*)
>
> We prefer item No.1. Thanks a lot for your support.
>
> Best regards from Czech Republic,
> Vladimir Holub
>
> Contact information:
>
> Mgr. Vladimir Holub
> Topolova 618
> 28923 Milovice
> Czech Republic
> *www.conuscollection.cz*
> *holubv@email.cz*

Conus tiki Moolenbeek, Zandbergen & Bouchet, 2008

We have received from our friend Philippe Quiquandon (whom we thank heartily) some photos of a specimen of this wonderful recently described – hence still poorly known – species.

It comes from the Marquesas Islands and is 14 mm long.

The Cone from Thevenard Island

Jon Singleton

Thevenard Island is about 30 kilometres off the N.W. coastal town of Onslow, and an endemic cone from here was named by da Motta as *thevenardensis* in 1987. Despite a detailed and comprehensive paper, this species was to be soon regarded as a form of *C. reductaspiralis*, itself lumped with *C. nielsenae* by several cone workers and authors.

In my catalogue, *C. thevenardensis* is rated a full separate species. I have visited and shelled around several coastal islands, some of which are a habitat for *reductaspiralis*. Two visits to Thevenard Islands have never produced any *reductaspiralis*, but *C. thevenardensis* is a common species in shallow water. Certainly this fact would cause the initial thought of any collector to think it a form of *reductaspiralis*! Possibly they were a long time ago, but today these cones look very different.

C. thevenardensis is a solid cone matching *reductaspiralis* in size and weight. All I have seen area a uniform china white with a high gloss. The so-called white *reductaspiralis* lack this high gloss and are only seemingly all-white. Normal *reductaspiralis* have brown flammules on the spiral whorls and even on the whitish form these are always discernible under magnification, though extremely faint. The *thevenardensis* periostracum is an even smooth light brown in comparison to the very thick khaki one on *reductaspiralis*. The animal colour on the former if black, whilst the latter is a medium greyish colour. Certainly in their sub-adult stage, smaller *thevenardensis* are a match in shape for *reductaspiralis*, but when fully adult, their extra broad shoulder is very distinct.

The illustration shows the periostracum and the shape differing stages. The smallest specimen is 29.6 mm × 16.3 mm, and the largest 53.0 × 32.3 mm.

New Species

Conus glorioceanus Poppe & Tagaro, 2009

In the latest issue of *Visaya* (Vol. 2, nr. 4), Duigo Poppe and Sheila Tagaro have described this new species, which comes from the Philippines, between Recodo, Zamboanga City and Perlas Island. It was taken in tangle nets, 80-150 meters deep and measures 49.6 mm

According to our friend Guido, it has "exactly the same colour as *Conus gloriamaris*, but it is a different species, from a different genus" and is "still unique until today".

It is greatly to be wished that further specimens will turn up, so that we can get a better of idea of the population as a whole. In the meantime, we do thank Guido and Philippe Poppe for allowing us to publish the photo of the holotype in TCC.

Shell repair in Conus

Giancarlo Paganelli

Cone snails, even though predators, are themselves also the prey of other animals, such as reptiles, octopuses, rays, fishes, crustaceans, gastropods, and even congeneres. Octopuses and gastropods drill the shell, making small rounded holes. Fishes, crustaceans and reptiles catch the shell by opposite surfaces and squeeze until it breaks. Other crustaceans, as flame boxes crabs, peel the prey breaking up the shell piece by piece at the aperture. Damage may also result from the impact with rocks during a storm. The assault by a triggerfish with crushing dentitions or by a lobster with big claws, if it isn't lethal for the cone, persists indelible as a scar on the surface of the shell, unless it is hidden by a further whorl. Usually the scar or the broken lip are filled with new material and the rebuilt part connects in rather uniform way with the pre-existent one in colour pattern and ornamentation. Sometimes it happens that the surface repaired shows, different from before.

Recently I got two specimens that plainly display this situation. The shell of *Conus floridulus* was at first smooth but the regenerated part after the strike has the surface covered by spirally placed tubercles. The opposite occurs in *Conus muriculatus*: the surface was tubercled in origin; the repaired body whorl shows weak ridges instead of tubercles and the colour of the bands is faded.

The observation of these two specimens leads to the conclusion that both characters, smooth and rough surface, are inherent in the genotype of the animal and they manifest by a different phenotype in specific environmental and physiological conditions.

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Conidae in the Philippine Marine Mollusks Volume II (*)

Guido T. Poppe

It is particularly agreeable to see that the *Conidae*-section in the *Philippine Marine Mollusks* attracts lots of attention and comments. This is understandable, as this family develops a huge biodiversity in the Philippine Archipelago. The present text states a number of facts and highlights the context of the work in general. We lift part of the "behind the scenes" of the books, which we here call PMM.

A general comment is the absence of text as stated by António Monteiro on p. 33 of *The Cone Collector #9*. In part, António already answered most of it himself.

The purposes of the books have been clearly established in the introductions. The main purpose is to "indicate what is known and what is not known about Philippine mollusks." Antonio is completely right that something can be said indeed: about most of the species shown, pages have been written and can be written. But this is beyond the scope of the work. It is merely a tool to use for further research. Writing a decent text on the 3500 species shown in the books should extend the production of these books by at least two decades and highly put into danger their existence proper. A little philosophy is not out of place here. The existence of books such as the RKK book or the PMM depends highly on very special circumstances. Millions of books are born in the mind of humans, only one out of thousands will be written and even less will be printed. Usually the idea will start in the brain of the first author, but many other opportunities and circumstances have to run parallel so that the idea can be realized. In the case of PMM the following factors were coming together, they are not all mentioned, but the few shown here demonstrate the fragility of such an enterprise.

- My own move to the Philippines and the discovery of a highly diversified, undescribed fauna.
- The realization in Conchology, Inc. of fabulous databases.
- Digital photography.
- The still new invention of email and fttp communication.
- The computing brain of Philippe.
- The computing, graphical and zoological skills of young Filipinos.
- Unique fishing techniques by Philippine fishermen.
- Availability and collaboration from over 60 experts worldwide.
- New printing techniques.
- An economical environment which enables the publisher to print and sell the books.
- Enough time for me and 5 people in the company to work on the project.
- Excellent market circumstances to have 5 years of top collecting by fishermen – no longer possible today.

The total time of human effort to realize these books exceeds 3000 working years: over 500 fishermen spent 6 years fishing and collecting thousands of shells, 150 middlemen sorted out thousands of shells from several million "commercial" shells. I spend myself 1 year on the sea and we realized 6000 documented dives, in total, 8 people average on the boat, which results in 8 years on the sea. In Conchology, Inc., we spend 300 full time days with 3 persons going through the result with the middleman and purchasing the necessary material, inquiring for locality data constantly. In order to make the collection accessible to ourselves and allowing comparison between the smaller shells, 31,000 specimens have been filmed and documented. The realization of the books themselves takes about one year per volume by myself, 3 biologists, 2 graphic experts with the permanent help of one computer expert and powerful computers. On top of this, 60 malacologists brought in their most often multiple decade expertise and in some families the result from hundreds of dredgings by the MNHN has been published.

When all this is done, huge financial investments from the publisher and a complicate highly technical effort from the printing business will finally deliver the volumes.

Needless to say that adding even one sentence to each species, which is to double-check and undergo 10 re-readings, will delay the publication by a couple of years already.

This should put in danger the publication of the books, as indeed is proven by the economical events of the latest two years which may render publication of such works impossible for the decades to come.

It was my task to choose an expert who takes responsibility for the final determinations in the books, who brings in knowledge and expertise. I was extremely happy when Gabriella Raybaudi accepted my invitation for this task on the family *Conidae*. She has spent more time in a professional way with *Conidae* than any other person I know. Several other factors crossed my mind in choosing her: she has had access, through her father's legacy, to a gigantic number of specimens. She was taught by brilliant experts in the past: Dieter Röckel and Bob da Motta guided her in the beginning years, but she also was initiated in the secret world of malacological and molecular features of the family under the guidance of "Toto" Baldomero Olivera – the world expert on *Conus* toxins also involved in molecular research. She dedicated 12 years full time of her life, traveling relentlessly, in the pursuit of understanding worldwide *Conidae*.

Through many personal contacts, I understood quickly that her knowledge of *Conidae* is deep, multi-layered, multi-disciplined and truly exceptional.

It was on my invitation, and she agreed with that, to apply form names. While some readers are "not too keen" about that, many others are. The use of form names has been a happy and practical thing in conchology for many decades and there is nothing wrong with that. The snob pseudo-scientific attitude that these names are "not valid" is of no importance. Their use is absolutely "legal" and of great practical value. It is often a good guide for the understanding of either shape or colour variation within a species. The use and description of form names should be promoted in the case that these are regularly turning up "forms" indeed. Today the name *Conus generalis forma regenfussi* guides the mind much faster and easier to that common form than if we say "The *Conus generalis* with two orange bands, very slender and usually from deeper water". It is also easier to say "*Conus vexillum forma sulphuratus*" than "The *Conus vexillum* which is yellow because the shell is young". The cheap argument that variant names have been created to allow dealers to sell more specimens is an invention of "non-paying" shell collectors: any dealer using his time to describe a form will loose more money in the time spent with the description than the shells he can sell in the meantime. Collectors do not need variant names to build large collections of variable specimens, as is well shown by the collections displayed in the numbers of *The Cone Collector*.

Gabriella was also limited in time and pressured by the publication of the PMM, this is exactly why for example the *Conus magus* complex was split without a long argumentative text: the books are not made for that, but they are a perfect place to point with the finger to the existing problems and suggesting already very good solutions.

The name "*Conus magus*" as understood today refers to a complex of species indeed. This is a legacy of 150 years of lumpering fashion. In the second half of the 20th century I even heard many times conchologists pretend that "colour is not important" – while it is the first medium

through which we perceive the world around us. So, "easy lumping" replaced thorough research very often. As a "single human" the researcher is very helpless when confronted with species such as *Conus magus*. To get a fair understanding of such a species, one needs a lifetime: getting material from just 10 % of the Philippine Islands will need over 700 months...

I'm less happy with some comments in *The Cone collector* such as "This book should be considered as just a general shell book and purely a picture guide to identification". This is not doing any justice to the effort delivered: indeed the best documented Iconography ever made on the Philippine shells by hundreds of people and thousands of locality data never published before. I also dislike and take it for what is a sentence such as "the smaller photos of the living animals on the text page is a nice touch". Having spent more than a working year below the surface, my crew of Guphil I having filled 6000 tanks and Philippe having consumed a fortune in the best photographic material that the planet offers today, the photographs should not be allowed to be called "a nice touch" but taken for what they are: often unpublished excellent records of living animals. It is proof of much innocence and inexperience to judge underwater photography in this way.

Gabriella and myself agreed to follow the arrangement by similar species-groups as partially done in RKK, in order to avoid confusion. Sheila Tagaro has worked more than a month re-arranging the initial order in the *Conidae*. As for the arrangement on the plates, this is a very personal arrangement for which, as my name is on the cover of the books, I take full responsibility: shells are magnificent productions of nature, and the human approach of wonder and delight is caused by their aesthetic qualities. So, early and mid 19th century authors produced magnificent monographs translating the aesthetic qualities of shells on paper, and by acting as such they aroused human curiosity to learn and study more about them. Their aesthetic approach is followed here, but ameliorated by a definite influence that I got from eastern, mainly Japanese aesthetics, and in practice the results have been executed by modern means on paper that is supposed to survive 600 years.

Gabriella and myself regret that there was no time to apply subgeneric, or even generic names to the different groups within *Conidae*. Like many other families, the "*Conidae*" have been mistreated and we find shells such as *Conus marmoreus*, *Conus bullatus* and *Conus articulatus* in the same genus. A quite unbelievable situation in the 21st century. The more so, after a clear cut out of groups emerging from the tremendous work on radulae by Gabriella and Emilio Rolán in *Argonauta*.

Mike, Bill and Gavin express their regrets that we do not mention the habitats. In an upcoming number of *Visaya* I go in depth on the "locality data" of Philippine shells and I refer to that article in order to get a better understanding of locality data of Philippine shells in general.

The data given in books such as Springsteen and Leobrera and RKK are very vague, most often untrustful but are for sure the best the authors could get at that time. In this sense PMM is a step forward, but far from perfect as yet. The underwater photographs have been taken "in situ", most often without touching any shell, unless we had to turn over rocks or dig out of substrates the specimens, which is rather rare. So, they are guiding already, they also give information on egg capsules etc... Very often, we know "nothing" about a given species. The puzzling

Palawan group of species is virtually only found by Olango divers, who will keep the secret even from their neighbor on how and where to find a *Conus.* Quite understandable, as they have to feed their children with that knowledge.

A general comment, not only about the *Conidae* section, is that the "rarity" quotation does not please many of the readers. As said in the introduction the "rarity" degree corresponds to the chances of the shore collector and diver to find the species himself during a two or three week stay in the Philippines.

Purchasing shells during a trip is not "finding the shell" but rather using a years-experience of somebody else to have the shell in collection.

Conus gloriamaris is virtually impossible to find for a visiting collector, unless he specializes in tangle netting for three weeks, knows the places where to tangle net, and gets a lot of luck to get a *Conus gloriamaris* to the surface. Even then, he will use a knowledge gained by many decades of experiments, and go to Balicasag or Sogod, to ameliorate his chances....

The market value of a shell does not reflect the rarity for the shell-hunting collector: *Conus magus* is very hard to find and one has little chances to collect a specimen himself. But 5000 fishermen catching fish every day, will find every day 20 specimens, which means 7000 shells a year, largely too much for the small community of paying collectors. So, this shell is rare, but very common in collections.

In general, I'm quite delighted with the comments. My own opinions – or absence of opinions – do not always coincide with what I think is an excellent expert view of the Philippine *Conus*, as done by Gabriella.

I'll go through the pages with you and give my own comments, while I leave detailed work to the answer that Gabriella will give you on the particular cases. The comments below are opinions proper to myself, and do not engage the authorship of Gabriella Raybaudi.

Plate 548: This concerns the *Conus bandanus*. In the *Visayas*, *Conus bandanus* is a clear-cut species, and the usual populations of *Conus bandanus vidua* from Palawan are uniform in coloration and shape. However, in Palawan things become more complicated and we find forms such as what is called in fig. 9 var. *equestris*. Regularly unusual shells turn up, but the locality data from Palawan are very vague and untrustworthy, so, unless somebody goes there spending some years collecting themselves, we can only guess...

The same is true for the other Palawan *Conidae*. I'll call this below the "Palawan problem".

Plate 551: *Conus biliosus neoroseus*. I think the choice of name is appropriate, in RKK, *C. biliosus* is a complex of different unsplit subspecies or species.

Plate 552: *Conus boeticus* is a major problem. Personally I believe that *C. ruppellii* is a separate species. Again the Palawan problem.

Plate 554: *Conus floridulus*: most often this species comes in very granulate or either very smooth shells, but intermediates exist of course. I regret the absence of a form name for these. The phenomenon of "granulation" in *Conus* that live at depths between the intertidal and a few dozen meters needs more study. Our understanding of it is close to zero.

Plate 560: The two "forms" shown of *Conus tisii* turn up regularly but I never saw an intermediate. Needs more investigation. I have to admit that personally I could view only 3 shells from the big form, and half a dozen of the dark slender form.

Plate 564: The *tribblei* nr. 6 and 7 deserve a form name. More than a hundred specimens have been collected with similar deformations, and all are small.

Plate 568: *Conus litteratus* may contain more than one species. I urge experts to investigate on the large number of shells in collections.

Plate 569: If the figure 1 is not *Conus moncuri*, then it is an intermediate and *Conus moncuri* does not exist ?

Plate 577: *Conus eburneus* has many regularly turning up variants, often found in aggregations with the same pattern and base colour. Some form names are welcome, for the one who has the time to study the thousands in collections.

Plate 581: Personally, I think it all concerns the same species.

Plate 587: A form name for the *Conus striatus* with a pink base colour is welcome, but possibly it exists already.

Plate 588: The *Conus neptunus* with uniform colour from Aliguay, as shown in fig. 1 regularly turns up, this deserves a form name.

Plate 589: I personally do not understand very well the *Conus flavus-ochroleucus* problem. A detailed article on this subject is welcome.

Plate 590: *Conus blanfordianus*. I frankly think that *Conus zapatoensis* is the same species.

Plate 593-594: Here we are in full in the Palawan problem. This group of *Conus* and the wide diversity we receive without precise data makes one suspect that we are in a "Cape Verde Islands" situation.

Plate 595-596: I think Gabriella gave the best possible subdivision on this group. The "*Conus furvus*" is an extremely complex group of species/subspecies that live from the intertidal in mangroves to sand bottoms 25 m deep, and occasionally trawled much deeper according to the Manila fishermen. May take a lifetime to work out.

Plate 597-602: I refer to the above on the "*Conus magus*" complex.

Plate 603-607: The *planorbis* group. This group of *Conus* is worked out to the satisfaction of the collector but it needs much more investigation. Things are getting even more complicated when one considers the specimens from outside the Philippines. The *Conus lictor* on plate 607 I can confirm as a good species, regularly dived by Olango divers. It is conchologically very constant in shape, size and coloration and as far as I know is only known from the Mactan/Olango/Caubian area. The *Conus circumactus* on this page I used to call *Conus hammatus* in my sales' lists. This particular form as figured here is seldom dived in Olango-Caubian: shells are always bigger, more orange, and more granulate than the Mozambique and Madagascar material I got in the past.

Plate 626-629: *Conus thalassiarchus*. While I've read in the comments that some of the names are technically not valid – this is a detail to solve quickly by one of the *Conus* experts – what is called *C. t. depriesteri* is for sure a good subspecies. I dived this subspecies (-species ?) my-

self from Ticao Island down to the Doong Islands near Negros already. The *C. t. depriesteri* is absent from the Camotes Sea but the southern end of the range is unknown towards the side of Samar and Biliran and we know nothing about the northern boundaries. More to the west we arrive in the C. thalassiarchus with the Palawan problem. Occasionally we get populations, all uniform in coloration and shape and size. It probably concerns subspecies, but one needs a lifetime to de-puzzle existing stocks and confirm their ranges.

Plate 640: The *C. proximus* group. In fact, there are no intermediates between *C. stainforthii*, *C. cebuensis*, *C. proximus* and *C. moluccensis*. I think these are all good species, but possibly Gabriella wanted to express a more "classical view".

Plate 641-648: What I call the "*memiae*" group down to the *praecellens* shells. This group needs to be restudied completely. It is a complex of species and very complicated. We have many shells from this group in the collection as "species". The Philippine material can not be handled without a wider Indo-Pacific perspective of related *Conus*. On plate 646, fig. 1, *Conus habui* was joined on my own initiative without Gabriella. She does not agree with the validity of this taxon and claims that this is a juvenile *Conus samiae*. She is probably right.

Plate 653: Possibly two species are shown: *C. crocatus* and *C. magister*. They live on the same reefs. Figs 3 and 5 are, I think, *C. magister*.

So far as I'm concerned with the *Conidae* section in Volume II.

As from the comments in *The Cone Collector*, I'll select the following which I think are possible true mistakes and we will mention these in the erratum of Volume III.

Plate 609: Figure 6 is indeed a *Conus sieboldii*. In the meantime we got a second specimen, which ads one more species to the impressive list of Philippine *Conidae*.

Plate 700: *C. suduirauti* is indeed Raybaudi 2004, not 2000.

The other comments most often concern technical nomenclatural unsolved problems. *Visaya* is there to publish proper solutions for these problems, with articles written by *Conus* experts and placing, for their solutions the *Conus* species concerned in a wider Indo-Pacific context, with proper illustrations of holotypes and type figures and so many other features that may be explained and deepened out. In this sense, the files from Dieter now online and the photographs as published on page 38 of *The Cone Collector* of types are highly useful to arrive at a better result in next editions of PMM.

Conclusions

The *Conus* from the Philippines are very well known today. At least, they are much better known than the species from other central Indo-Pacific Island groups such as Indonesia, the Solomons and so many others archipelagos.

This is mainly due to the marine-minded Filipino fishermen who take shells as a by catch.

Three times since Linnaeus the fragile circumstances, as described above, came together in order to produce good overviews of the Philippine *Conus*:

- The first time was the effort of Hugh Cuming. He collected very extensively and the combination with Reeve and the Sowerby family resulted in the publication of much Philippine material.
- The second time enormous stocks gathered together and selected out for nice collections by the Leobrera family in Manila, combined with the move of Springsteen to the Philippines, resulted in the publication and overview of Philippine *Conus* in the very popular book at that time "Shells of the Philippines".
- The third time is my own move to the Philippines and the discovery of a gigantic untapped source of new species. The combination of Conchology, Inc. and my own tendency to write. The combination with Gabriella Raybaudi's expertise led to a refreshed overview in PMM vol II.

Three times also, at the end of the ride, collectors were the ones providing the means for these three achievements.

But, as commentators repeated in *The Cone Collector*, text is missing. We hope that the many among you will pursue the task and write down the thousands of missing pages with the knowledge which is there, but unpublished. A little word has to be said about the *Conus* literature in general: endless debates about technical nomenclatural subtleties are not very interesting. They are better solved once and forever in decent articles.

The *Conus* themselves are interesting. If I had the time to write about Philippine *Conus*, then I should write about the three times that I've seen in the flashlight at night an army of *Conus quercinus* moving over the mud-bottoms, crushing all what is alive of their food source, whatever a worm it may be. They all have the siphonal canal in the same direction and look like tanks in a Blitzkrieg on the move. And their relation with what is called *C. albonorosus* by some, which I saw laying dispersed as lazy elephants in 35 m deep water, putting eggs on each stone available in their great mud-bath in Lazi Bay, Siquijor. Or I would like to write about the gobies dancing around the siphons of *Conus striatus*, attracted like bees to honey to their deadly destiny. Or about this other *Conus striatus* sitting like an idiot next to a flat-fish he just killed but about 5 times his own size, not knowing how to start eating. Or about how *Conus bullatus* handles its harpooned fish, still alive, digesting and crushing it while swallowing it within seconds.

Still a mass of information is needed extra on the *Conus* from the Philippine Islands. Finally, we deal with a group of mollusks that live on the fringes of the oceans: on the small border between oceans and land, the ultra-rich area between mainly zero and 350 meter deep. Just in the Philippines, this area is about 36000 kilometres long, fortunately still in almost pristine condition. Most *Conus* are rare in the Indo-Pacific. Their populations have little to do with the conditions as we know them in the Mediterranean or the West African coast where huge densities of one species may gather together. The conchological approach to Indo-Pacific *Conus* is therefore completely different as it is to these West African Conus. Within the large variety of modes of reproduction, another conchological approach is needed for each group. Shells with a multispiral protoconch and wide distributions should be approached differently than a species such as *Conus thalassiarchus*. So, with this knowledge in mind, the classic mistake of approaching to Indo-Pacific *Conus* with the mind of a cold-water expert – which most conchologists are – can be avoided.

The problem of over-collecting *Conus* in the Philippines

is non-existent: most species are way too rare, hard to find and well camouflaged to succumb any damage of that. However, the habitat itself, the coastlines, should be kept in the conditions they are today: unpolluted. The dying and reviving of coral reefs, their move from area to area, are most often natural phenomena which are used today by NGO's and scientists to obtain credits and holidays in sunny paradises: already Darwin in his unpolluted world noticed dead reefs. The protection of some Atlantic *Conidae* may need eventual attention. When I collected a dozen *Conus* in front of Santa Maria in Sal Island in 1980, they were probably the last survivors as today a small city of hotels ruins the whole coast. The same for the hundreds of *Conus guanche* I could save for collections in what was a pristine coast in Los Christianos, Tenerife in 1978. Today, the surviving *Conus* there, if they still survive, all need urgent medical help. But here again, it is the coastline which needs protection, and I hardly see how we can stop hotels building on Gatas Bay in Boavista. If such happens, and it will probably happen, it will be a hecatomb for the many *Conus* living there. But back go our Philippine *Conus*: four gigantic tasks have not even been started in a decent way and are a shame for humanity and for conchology in particular:

- The study of mega-species such as *Conus magus*, *Conus furvus* and many others.
- A thorough exploration of the deep-water *Conus*. Aliguay, where about 50 fishermen explored the small platform between Aliguay Island and Challenger Reef, resulted in a rain of new species. We may expect still dozens of more new species from other areas when these are explored in the same way. Unfortunately, the Aliguay material will be a thing of the past in months to come. Today, only 5 fishermen still work, the costs of fishing surpassing by far the revenue. Gasoline and material have become too expensive.
- An exploration of Palawan. With what we know today we suspect a highly diversified *Conus* fauna of different populations, much the same situation as in the Cape Verde Islands. A group of conchologists should be occupied with that and take an example on the mainly Portuguese, Spanish, German and Belgian exploration of the Cape Verde Islands. Repeat the same but for Palawan and the neighboring Sulu Sea and Sabah.
- A placement of the Philippine fauna in the context of the gigantic Indo-Pacific. Show-off differences and similarities of the species involved, their local variations, different modes of life and more.

As for me, I hope that you as a public now get a better understanding of the difficulties involved to produce the three volumes of PMM within a reasonable time frame. The books are also placed in a historical context of "We learn as we go" and the method of permanent amelioration and growth of knowledge on the subject. This classic Japanese concept of the non-stop amelioration is a much easier and much safer way to achieve our goals of perfection than desperately trying to produce "the perfect final product" which never gets published, so classic for our western culture. In a world of ever growing globalization I think it is proper to grab the best of each culture.

Guido T. Poppe

Mactan, June 3, 2009. It is windy, the sky is covered and the fishermen are not out today.

(*) – All photos illustrating this article were kindly supplied by PoppeImages, whom we heartily thank. Ed.

Australian Corner: Jon Singleton

Conus circumcisus - 34

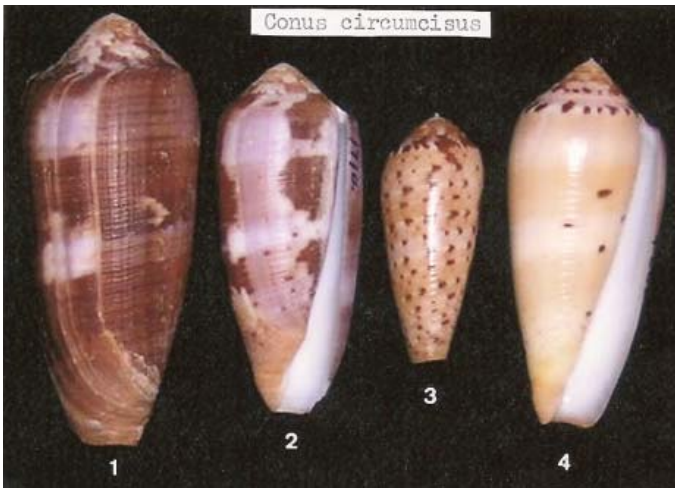
Rather surprisingly, one of the first cone species I acquired after arriving in Australia was a *Conus circumcisus*.

After two days in Sydney, I met up with a diver who worked in the Solomons, and he had a few shells to trade. I was only vaguely aware of this cone, and the only illustration I had ever seen was within the old Handbook for Shell Collectors by W. F. Webb.

It was to be 14 years before I obtained another specimen for my cabinet, but it was a self-collected one from the Scott Reef, off the N.W. coast of West Australia. A few days later, I also found a densely spotted sub-adult circumcises at Seringapatan Reef, some 50 km N.E. of Scott Reef. I have since seen several large specimens from the region, all having dark brown bands and blotches, a form known as *C. circumcises laevis*.

Over in Queensland waters, *C. circumcisus* is an extremely rare species. I have just one specimen, and only sighted one other. Both came from off the Lihou Reef, part of the Coral Sea Territorial waters, which are not part of the Great Barrier Reef. Both specimens are the pale pink and white banded with some small scattered spots, known as *C. circumcises brazieri*.

The illustrated specimens are from 36 to 63 mm in length. Figs. 1, 2 and 3 are from West Australia, and fig. 4 from Queensland.



Conus eugrammatus - 35

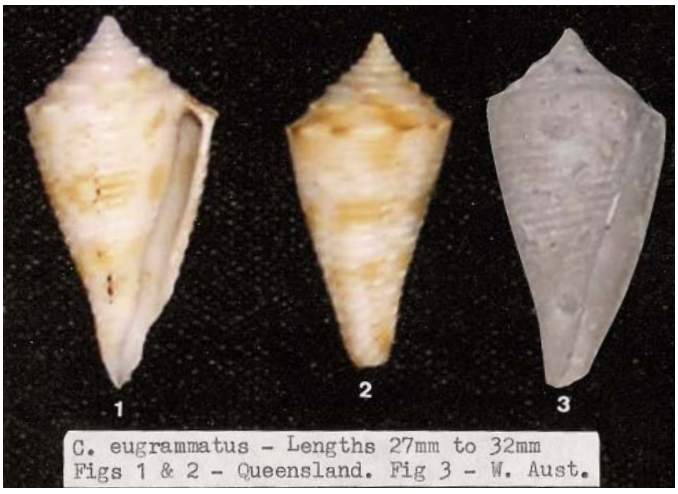
Conus eugrammatus is a species which rarely gets any publicity. Possibly the reason might be that although it has an extensive range in the Western Pacific and extreme Eastern Indian Ocean, the locations seem to be well separated. My own collection has some twelve specimens from six locations, but only one specimen from New Guinea was a live-taken cone.

C. eugrammatus is recorded from three locations in Queensland waters. My only two were trawled off Cape Moreton from 160 metres, both a little worn and with lip damage, but photograph better than they look in reality. One of the best I have seen is illustrated within the *Cone Manual* on Pl. 53, fig. 30, from the Fitzroy Reef.

There is also a possible record from West Australian waters. A deep water research vessel dredged a long dead and eroded cone from 300 metres at Collier Bay off the N.W. Coast some 300 kilometres up the coast from Broome. All we have for identification is the shape and sculpture, so it may be either *eugrammatus* or possibly *C. wakayamaensis*.

References

1995. *Manual of the Living Conidae*, by D. Röckel, W. Korn & A. Kohn



Comments on TCC #10

From Mike Filmer:

Another great issue of *The Cone Collector* on which I have some points:

1) Page 21 – I consider *C. pusillus* Lamarck, 1810 to be a synonym of *C. pusio* Hwass, 1792.

2) Page 25 – *Manual of Living Conidae* – all your suppositions are correct I marked them up in my copy years ago.

3) Page 27 – These small shells are *C. traillii* A. Adams, 1855 synonym *C. micarius* Hedley, 1912.

From Rafael Picardal:

A very excellent issue of TCC again! Hoping more cone collectors will share this wonderful material!!

I just have one comment on the "*Conus mozoii*" because I really wonder why it was spelled like that because *C. mozoii* was named after Tiburcio Mozo and I asked him (T. Mozo) about it and he just said probably a typographical error by the author? Hehe! But for me it is just a golden side of the *vidua* not a species as what most says like *C. marmoreus*.

I would like to announce my new blogsite. I am just starting to develop it, the contents are all about seashells in Palawan and my collecting experiences too. Here is the address: *www.gemsofpalawan.blogspot.com*

Kindest regards,
Rafael

From Jon Singleton:

I guess enough has been stated re: corrections and amendments to the *Conus* section of the Philippine Shells book. However, there is one rather important one which we all seem to have missed. It was given to me by Richard Willan who is the Curator of Molluscs at the Darwin Museum, Australia. It concerns the *C. geographus* text on page 674; the first line under the title is missing one little word: after the words "there is", and before "antidote", insert "no".

We hope to see your contribution in the next TCC!