



*THE
CONE
COLLECTOR*

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Note from the Editor

Dear friends,

The Cone scene is moving fast, with new papers being published on a regular basis, many of them containing descriptions of new species or studies of complex groups of species that have baffled us for many years. A couple of books are also in the making and they should prove of great interest to anyone interested in Cones.

Our bulletin aims at keeping everybody informed of the latest developments in the area, keeping a record of newly published taxa and presenting our readers a wide range of articles with much and often exciting information. As always, I thank our many friends who contribute with texts, photos, information, comments, etc., helping us to make each new number so interesting and valuable.

The 3rd International Cone Meeting is also on the move. Do remember to mark it in your diaries for September 2014 (definite date still to be announced) and to plan your trip to Madrid. This new event will undoubtedly be a huge success, just like the two former meetings in Stuttgart and La Rochelle. You will enjoy it and of course your presence is indispensable!

For now, enjoy the new issue of TCC and be sure to let us have your opinions, views, comments, criticism... and even praise, if you feel so inclined.

António Monteiro

On the Cover

A young *Conus episcopatus*
from Tahiti, part of the
VENOMICS expedition

Who's Who in Cones: Bernardino Monteiro

My first contact with shells was around 1970, when my father was in the army in the Cape Verde Islands at a time when this territory was still a Portuguese colony. My mother and I used to find nice empty shells – *Cypraea*, *Conus*, etc. – on the shores, but only when my family was back in Portugal did I find out that shells could be collected like stamps or coins. After buying a book by Gert Lindner, I began trying to identify the shells I found along the Portuguese beaches as well as some bought from shops that sold decorative shells from Philippines.

I started to collect more seriously when I was 16 and got particularly interested in Portuguese shells after reading the old books of the most famous Portuguese zoologist, Prof. Augusto Nobre. I got a big fascination for land shells and finding some elusive species was a challenge for me.

At the time I had few contacts with other collectors because most of them lived in or near Lisbon, whereas I lived in Oporto, but I managed to keep interested and focused in malacology, exchanging shells and information via mail with collectors around the world. Needless to say that there was no Internet in those days. A single exchange could take several months to be completed and some shells that are commonly found in the market today – like *Cypraea guttata*, *Conus thomae*, etc – were very rare and beyond the budget of most collectors.

After taking a degree in Biology at the age of 23, I taught marine biology for a year but later found a better paying job in a big supermarket firm and for 10 years I was very busy dealing with fresh food, training staff and being responsible for the fresh food sales department. I left the firm in 2001 and opened my own small supermarket, which I sold one year later with a profit. I decided by then to stop working so hard and took some time off travelling to tropical countries in search of shells, diving and

making contacts with local fishermen. I had the chance to go to Brazil, Cape Verde, Mozambique, Venezuela and Morocco and I travelled many times with several friends that I had met in the meantime: António Luís, Carlos Afonso, Manuel Tenório, Armando Verdasca, David Pirinhas and José Rosado. Lately my companion of adventure for shell trips is my stepson Nelson Tiago, who shares my liking for shells and also for spearfishing.

Today I still work as a marine biologist in a Portuguese public institution that works with professional fishermen in the main fishing harbours. My daily routine includes trying to convince fishermen not to keep small – under legal size – fish, in order to preserve the fisheries resources that begin to have problems of sustainability.

Although I keep shells of almost every family in my person collection, my main interest now are West African shells & *Conidae*.

There is one place that never stops to amaze me: the Cape Verde Islands! The findings are always exciting and I am sure that many species are still to be discovered in these islands, already famous for the several endemisms – *Conus*, *Euthria* and others. Who knows what Cape Verde's shallow and deep waters still hide?

In recent years I began to be deeply worried with the misunderstanding the general public and authorities have about shell collecting. Inside the shell world we know that collectors are very concerned with environment issues, but the wave of fundamentalism that leads some countries to ban shell collecting is not good. Without private collections some species of land snails, for instance, would never be known, their habitats totally destroyed by human construction, forest fires and pollution. Despite all this I hope for many years ahead of joy with shell collecting. I remember that someone wrote "better to have a taste for shell collecting than to be a millionaire."



Microhabitats of Two *Perplexiconus* Species in Aruba

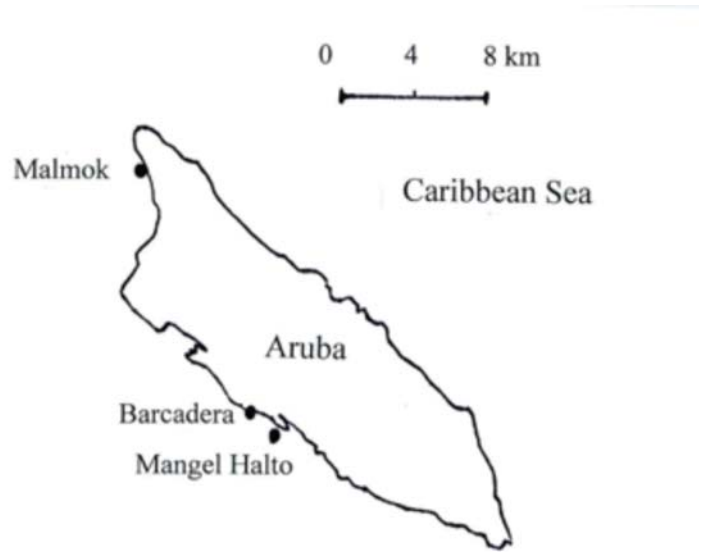
David P. Berschauer, Leo G. Ros and Jordy Wendriks

Aruba is part of the Kingdom of the Netherlands in what was previously referred to in the literature as the Netherlands Antilles. Aruba is self-governing with a “status aparte” within the Dutch Kingdom, with justice and defense being the responsibility of the Dutch government.

The island nation is located in the Caribbean approximately 27 kilometers north of the coast of Venezuela. Aruba is approximately 32 kilometers long and 11 kilometers wide and is located at the southern end of the Leeward Antilles island arc of the Lesser Antilles. Aruba is generally flat with some rolling hills, a dry climate, and an arid grass and cactus-dominated landscape. The western and southern coasts of Aruba consist primarily of protected white sandy beaches whereas the windward shores along the northern and eastern coasts are battered by fierce ocean currents.

The marine fauna of Aruba is somewhat distinct from its neighboring islands Curacao and Bonaire (together sometimes referred to as the ABC islands) because of its proximity to the coast of Venezuela and the shallow waters surrounding the island. By way of comparison the waters off the coasts of Curacao and Bonaire extend to 1000m deep whereas the waters between Aruba and Venezuela do not exceed a depth of 135m.

Aruba has several endemic species of cone shells including the famous *Tenorioconus curassaviensis* (Hwass, 1792), and *Arubaconus hieroglyphus* (Duclos, 1833). There are two species or subspecies of cone shells in the *Conilithidae* found on Aruba which are related to *Perplexiconus puncticulatus* (Hwass, 1792), and only one of the species has been heretofore named, *Perplexiconus puncticulatus columba* (Hwass, 1792); the other was recently named by Manuel J. Tenorio and Carlos Afonso, *Perplexiconus wendrosi* (Tenorio & Afonso, 2013). In spite of over 25 years of active diving, snorkeling, and shell collecting on the island of Aruba the local co-authors have never found any live or dead specimens of the main species *Perplexiconus*



puncticulatus (Hwass, 1792) on Aruba. There are very distinct differences between the two Aruban *Perplexiconus* species or subspecies, both in morphology and habitat which will be explored here.

Perplexiconus species and subspecies

The type locality of *Perplexiconus puncticulatus* (Hwass, 1792) is Santo Domingo in the Dominican Republic, and it ranges in the Caribbean from Panama through Guadeloupe, Martinique, and to the coast of Colombia. *Perplexiconus puncticulatus* (Hwass, 1792) is variable and has several well-known forms and subspecies, including *Perplexiconus puncticulatus columba* (Hwass, 1792) and *Perplexiconus puncticulatus cardonensis* (Vink, 1990). *Perplexiconus puncticulatus* (Hwass, 1792) is a moderately heavy robust shell between 15 and 30mm in length, the protoconch has 1½ whorls, a slightly concaved pointed spire, flat spire whorls, a roundly angled shoulder, and a convex body whorl. The body whorl is generally smooth with flat spiral ridges over the anterior half of the body whorl, however in some forms the body whorl may be either partially (anterior half of the body whorl) or fully pustulose. The anterior end of the shell is twisted resulting in a distinct siphonal notch. The shell is purplish white

with spiral rows of purplish-brown dots and purplish or brownish axial flames. This species is found on muddy or sandy bottoms up to 10m in depth, often in large concentrations. It bears repeating that *Perplexiconus puncticulatus* (Hwass, 1792), sensu stricto, has not been found on Aruba.

Perplexiconus puncticulatus cardonensis (Vink, 1990) was described from Punta Cardon, Paraguana Peninsula, Venezuela, and its geographic range is along the coasts of Colombia and Venezuela on muddy bottoms up to 10m in depth. This subspecies generally has a flatter sided body whorl, a stronger angled shoulder, and the shell is white with spiral rows of brown dots and gray-blue or brown axial flames. *Perplexiconus puncticulatus cardonensis* (Vink, 1990) has not been found on Aruba, and is distinctly different from the two Aruban *Perplexiconus* species or subspecies.

Aruban species or subspecies of *Perplexiconus*

1. *Perplexiconus puncticulatus columba* (Hwass, 1792) and its microhabitat

Perplexiconus puncticulatus columba (Hwass, 1792) was described from Fort de France, Martinique, and its geographic range is throughout the West Indies, including being found along a narrow stretch of coast on the leeward side of Aruba. This subspecies differs in being proportionately wider at the shoulder, often with a sharp angled shoulder in larger specimens, and more widely spaced flat spiral ridges over the anterior half of the body whorl. The body color is usually pure bright white to ivory, with occasional specimens displaying very small faint light brown dots in sparse spiral rows, and very rarely shells are pustulated in some regions.

To the authors' knowledge the habitat of *Perplexiconus puncticulatus columba* (Hwass, 1792) has not been described in detail. Two of the co-authors of this article have been collecting cone shells, both live and dead, on the island of Aruba for many years through



Perplexiconus puncticulatus columba (Hwass, 1792) specimens ranging in size from 8 to 12mm

scuba diving and snorkeling, and have explored every beach and habitat on the leeward side of the island. Through all of these years of exploring *Perplexiconus puncticulatus columba* (Hwass, 1792) has been found in only two locations on Aruba. Both live and dead specimens of *P. columba* have been found at Mangel Halto and Malmok, on white sand ridges in relatively shallow water between 2 ½ and 4m deep, easily accessible by snorkeling.

The habitat at Mangel Halto is an open white sandy beach with patches of live coral and dead coral boulders located slightly further off shore forming an outer limit to the area where the majority of the *P. columba* are found in Aruba. The *P. columba* specimens have been found at Mangel Halto, (and some at Malmok) and only in the clean white sand areas. *Perplexiconus puncticulatus columba* (Hwass, 1792) have been found feeding on small red polychaete worms buried in the white sand. The body, foot and siphon of the live animal is white, and live specimens occasionally have some growth of green algae on the body whorl. No postulated forms of *P. columba* have been found on Aruba.

2. New species of *Perplexiconus* and its microhabitat

The co-authors herein describe only the microhabitat of a new species, *Perplexiconus wendrosi* (Tenorio & Afonso, 2013), endemic to Aruba. For collectors to understand the differences, this cone has a sharply concave pointed spire, a rounded shoulder, is substantially narrower



View of *Perplexiconus puncticulatus columba* (Hwass, 1792) habitat from shore

in overall body shape than *P. puncticulatus*, *P. puncticulatus cardonensis*, and *P. puncticulatus columba*, has a smooth body whorl, flat spiral ridges narrowly spaced over the anterior half of the body whorl, and the shell is white with sporadic spiral rows of brown dots and brown axial flames. Rarely the base color of the shell is darker, a grayish blue. The body, foot of the live animal is white with gray spots and siphon is gray, and live specimens occasionally have some growth of green algae on the body whorl. Several specimens are illustrated below.



Comparison of live animals of *P. puncticulatus columba* (animal is all white) and *Perplexiconus wendrosi* (animal with gray spots and mantle). Photo with permission and courtesy of Carlos Afonso © 2013



Perplexiconus wendrosi specimens have been found to range in size from 3 to 21mm. Note the darker specimen.

This new species of *Perplexiconus* is found inside a sandbar adjacent to a stagnant mangrove swamp at Barcadera, Aruba. The entire microhabitat is no bigger than six square meters. The adjacent side of the sandbar is open water for approximately 25 meters and is protected by a narrow barrier islet. The water inside of the sandbar extends for between 5 meters and 15 meters to a mangrove swamp. The water between the sandbar and the mangrove swamp is slightly acidic from decaying mangrove leaves, and is slightly brackish



View of *Perplexiconus wendrosi* (Tenorio & Afonso, 2013) mangrove swamp habitat from shore

from rain water entering through the mangroves from the rolling hills. There is very little water exchange with the tides. The cone snails can be found just under the sand on the sandbar from the shore to a depth of no more than 30 cm. In the water beyond this cone's microhabitat there is a field of shoal grass extending the rest of the way to the mangroves.

Numerous live *Melongena melongena* (Linnaeus, 1758) and *Bulla solida* (Gmelin, 1791) can be found in this same area in or near the shoal grass, and *Neritina virginea* (Linnaeus, 1758) are abundant and can be found adjacent to and on the mangrove roots. There is a species of jelly fish (similar to a *Nausithoe* species) which is abundant in this area and inhabits the shallow waters between the sand bar and the mangroves and leaves a moderate burning sensation on the skin followed by a reddish mark and numbness. The co-authors have not yet discovered what type of polychaete worms this new species of *Perplexiconus* eats.

The microhabitats of *Perplexiconus puncticulatus columba* and *Perplexiconus wendrosi* do not overlap whatsoever. Further there have been no intergrades or hybrids found. Almost every specimen of *P. puncticulatus columba* found by the co-authors over the years (out of many hundreds of specimens) has been pure white, with only six or seven specimens

displaying some very small faint light brown dots in sparse spiral rows; none have been pustulose. A side by side comparison of these two *Perplexiconus* makes the distinctions obvious.

Sadly, the microhabitat of this new species of *Perplexiconus* near the mangrove swamp at Barcadera, Aruba, is slated to be destroyed. A government project to build a shipping container yard, involving dredging the area and bulldozing the shoreline, is set to begin in the next calendar year to construct a multi-million dollar container yard. One small snail does not stand much of a chance against politics and economics.



Comparison of *P. puncticulatus columba* and *Perplexiconus wendrosi* (Tenorio & Afonso, 2013)

VENOMICS in Tahiti: Looking for *Conidae* in French Polynesia

David Touitou & Pierre Escoubas

Introduction

April 27th, 2013: at last we leave for Tahiti! The VENOMICS team is back together, this time for a second “Cones” mission heading for French Polynesia. Pierre Escoubas (VenomeTech) and Frédéric Ducancel (CEA Saclay) are the team’s scientists, both participants to the VENOMICS project funded by the European Commission. This year again, they are accompanied by David Touitou, pharmacist and shell collector, specializing in CONIDAE which acts as the expert field collector. The team will be completed by his friend Michel Balleton, another Cone expert who lives in Tahiti and will act as our local guide. And others will help us during this mission, as we shall see below !

After the Mayotte adventure in 2012, why choose that destination? The VENOMICS project is now going

full speed after 18 months of work by all members of the consortium. The analyses of the first venoms have already led to fascinating results. But now the project must go into high gear to complete the bank of samples that will be used to identify the venom molecules that may one day become innovative drugs. Cones constitute an important part of that bank, and the samples collected in Mayotte in 2012 will not be enough. New species must be brought into the workflow and this year’s mission organized by Pierre, Fred and David aims at bringing back at least 20 to 30 new Cone species. So, after having considered a number of different plans, Pierre and David selected French Polynesia as the collecting destination. There were two main reasons for that choice: the fact that David knows the place well, having lived for four years in Moorea, and maintains good contacts over there, and the ability to obtain the necessary authorizations



The complete team

from both the Polynesian and French authorities. As a matter of fact, this constitutes one of the bottleneck of mission logistics: it has become next to impossible to get collection permits from other countries and France, through its numerous overseas territories, has direct access to a large variety of biotopes, including huge coral reef areas in Polynesia. So, Tahiti it is in 2013 !

After more than 6 months of preparation and once Pierre has managed to obtain the collection permits from the Polynesian government and assembled all the logistics for the expedition, we depart at last. Fred and Pierre have never been to Polynesia, so they are quite eager to see those mythical lagoons ! The “battle plan” prepared by David will take us this year from Tahiti to Moorea, then to the Tuamotu archipelago. Two weeks are really a short time for the mission, so we will not be able to visit every archipelago in Polynesia. Hence we have decided that after exploring the Society Islands we will head to the Makemo atoll, which occupies a central position in the Tuamotu Archipelago and where there is a diving club. Unfortunately, we will have no possibility of going to the Marquesas, the Australes nor the Gambiers Islands during this mission. Locally, the team will be strengthened this year by Michel Balleton, a malacological connoisseur and a friend of David’s who lives in Tahiti. His role as the local expert will be of utmost importance, since Michel has an intimate knowledge of the collection spots, having lived in Tahiti for the last 40 years. Moreover, he is one of the founding members of a project that began eight years ago and aims at preparing a reference work on Polynesian shells. It is a titanic piece of work that includes gastropods, bivalves, micro shells and nudibranchs. The book should be available within a few months and we eagerly await its publication.

Even though the malacological fauna of Polynesia includes more than 70 species of *Conidae*, we must subtract from our potential list the endemic species of the Marquesas Islands (*Conus gauguini*, *C. marchionatus*, *C. vautieri*, *C. textilinus*, *C. encaustus*), the deep water

species (*C. moluccensis*, *C. boutetorum*) and those found only sporadically (*C. auricomus*, *C. aureus*, *C. arenatus*, *C. acutangulus*, *C. litteratus*, *C. emaciatus*, *C. tenuistriatus*, *C. glans*, *C. mitratus*, *C. granum*, *C. geographus*, *C. eldredi*, *C. bullatus*, *C. auratinus*). This means that our mission can realistically aim at finding about thirty species for the project and the total number of Cone species that we may hope to find will certainly be no more than forty if we are lucky.

Most of our collecting calls for exploration of the bordering reefs, the barrier reefs and the lagoons. The poverty of the outer reef slopes does not justify scuba diving, to find perhaps only one more species such as *Conus legatus* in precise spots, which is not our purpose. In all likelihood, the “common” Polynesian Cones will be enough to look for novel molecules, since their venoms have never been studied in depth, in the way we do it in the VENOMICS project.

It should be said that since our first mission to Mayotte, when we describe our sampling trips we are frequently asked one question by the shell collectors: is it possible to collect the venom glands without breaking the shells? If theoretically the answer is yes (as it is sometimes possible to anesthetize the animal to take it out of the shell), in our case the destruction is unfortunately necessary. As a matter of fact, two different kinds of studies are conducted on the samples: on one hand we study the transcriptome (the RNA molecules) of the venom gland, and on the other hand we study the venom itself. Although it is possible to freeze the animal and remove it from its shell afterwards without altering the quality of the venom sample (whose molecules are very stable), that is not the case for the RNAs, which are very fragile molecules. The gland tissue must therefore be dissected very quickly from the living mollusk and for that reason it is mandatory to break the shell in order to dissect the tissue within a few seconds and place it in a special preservation solution that will permit transportation to the lab. This means that this year again, David will have the arduous task



It is always the collector that handles the hammer!

of breaking all Cones found! But his collector's soul is now hardened by the Mayotte experience, so that this time he will handle the hammer less nervously!

Abbreviations used in the text:

I.R.D. = Institut de Recherche pour le Développement (previously ORSTOM)

Saturday 27th April 2013

For David and Pierre, the departure is from Nice. They face a long check-in due to Pierre's 80 kg luggage. In addition to his snorkeling gear, he has to carry a "portable lab" that fills two suitcases of 20 kg each, and over 10 kg of photo and video equipment. They finally board the plane but just before take-off a call is heard: "Mr. David Touitou please report at once to one of the crew members". A touch of anxiety: what is happening? Well, David had forgotten his diving light on a seat near Pierre's. His suitcase just escaped destruction by security! A close call. Having collected his precious HID light, the plane takes off and Pierre and David join Frédéric Ducancel in Charles de Gaulle Airport in Paris, where the team is now complete. The departure for Tahiti is scheduled for 19:10.



Arrival at Papeete, Frédéric, Pierre, David and Michel

Sunday 28th April

After a very long but eventless flight, we arrive in Tahiti at 5:30 a.m. local time. Michel Balleton is at the airport to welcome us with superb flower necklaces (he had to come all the way from the peninsula and had to get up at 4:00 a.m....). In spite of the diving mask placed on David's face, he easily recognizes him... So, we are already well into the Tahitian atmosphere and after the customs and car hiring formalities we go straight to our quarters located at the IRD centre at Arue. A building by the water, luxuriant vegetation: a wonderful setting. A much awaited shower awakes everybody up and at 7:00 a.m. we are on the war path! Our first contact



Our laboratory at IRD

with Polynesia however will be at Arue's Carrefour supermarket, luckily open on a Sunday morning. Some shopping for supplies is needed before planning our expeditions with Michel for the following days, around a most welcome cup of coffee. It is now 9:30 a.m.

Michel leaves us around eleven o'clock and we finally depart for the black sand beach of Taaone with Fred and Pierre, to do some snorkeling, thus avoiding the temptation of a nap and ignoring the jetlag. Just like in Mayotte, we cannot wait to get into our diving suits and find our first Cones! But the bordering reef is not interesting at all and we explore it only for a short time. Some twenty minutes of flipper action will then be needed to cross the deep channel and reach the barrier reef. We do not know the area but rely on David's instincts... The first zone after the channel is made of coral debris mixed with coarse sand, and does not look auspicious to find *Conidae*. Apart from the numerous cowries *Cypraea obvelata*, it is a true desert. Nevertheless, we find our first Cones, albeit in small numbers: *Conus aristophanes*, *C. pulicarius*, *C. lividus*, *C. sponsalis*, *C. nanus* and *C. vitulinus* are collected, so that we will not go back empty handed. David then suggests that our small party goes all the way to the barrier reef, over 200 meters away from our first stop. Muscles start cramping, the flight was long and muscles are stiff. The bottom is now sprinkled with blocks of living coral that we cannot lift, but the sand is much finer, which leads us to think that it is in fact a good spot, where we may hope to find nobler species such as *C. textile*, *C. canonicus* or *C. episcopatus*.

David quickly finds a first specimen of *Conus textile* and we cannot but admire the delicate shell patterns of that species. Our morale skyrockets! It is a great specimen and we had not collected this species during our previous mission. Altogether, David will find 8 specimens (plus numerous scattered fragments, proof of recent nocturnal fights), so that Fred and Pierre begin to get jealous! David also finds a beautiful *Conus striatus*, buried in sand under a dead coral slab. The



David, Pierre et Patrick after a collecting trip

expertise of the field researcher has spoken and David is truly the master of Cone collecting. But our mission is not over...

In all, however, not many Cones are collected: *Conus lividus*, *C. pulicarius*, *C. distans* (on top of the reef) and *C. vitulinus*. On the way back, Pierre runs into a wonderful fresh dead *Conus tulipa* in perfect condition, a species that nowadays is hard to find alive in Tahiti.

We also find specimens of mollusks from other families, but always in small quantities: *Cypraea obvelata*, *C. moneta*, *C. fimbriata*, *C. caputserpentis*, *Terebra guttata*, *T. crenulata*, *T. affinis*, *Oliva amethystina*, a few *Drupa*, small conchs and a few mitres.

After three hours of snorkeling, we decide to go home, since we should really take it easy after more than 20 hours of flight and a 12 hours time difference. We go back to the IRD, where we make an inventory of our samples and begin dissecting them. It is important to keep a daily track of everything collected and stored, because we will soon be swamped with samples. Even though collecting in Tahiti appears to be harder than in Mayotte, our first day – and David's efficiency - shows that in 15 days we should be able to gather hundreds of specimens.



Sorting the specimens at the IRD laboratory



Interview for local TV

Monday, April 29th

The day begins with the first contact with our IRD colleagues and our installation in one of the laboratories made available for our exclusive use. This will be an invaluable asset for us, because work conditions in Tahiti will be absolutely optimal: benches, a table, refrigerators etc., are truly indispensable and a field laboratory never provides the same conditions. Samples may degrade, as Pierre has experienced in French Guyana. Hence, IRD's support of our mission will be one of the key factors of success. Having finished the necessary formalities and dissected the Cones collected the day before, we depart to collect more specimens. This time, we shall be exploring the waters at the Pomare V point, near the IRD.

We do not waste any time on the small edge reef that ends in an abrupt slope, and we cross the channel to reach the barrier reef. In our hearts we feel a slight apprehension at the possibility of meeting a shark patrolling the "blue", since the bottom of the channel is invisible. It is always a relief, after several minutes of crossing the deep blue, to see the bottom again! On the other side we are met by a forest of colorful anemones that shelter a myriad of small tropical fishes. A few large slabs lie six meters beneath us, on a small sandy plateau at the bottom of a channel marker. David decides to check the area quickly because apneas in a wet suit without lead weights are very hard. The second slab will

reveal a nice *Conus textile*, the only one in the entire day. We proceed towards the top of the reef, slowly searching. The area is poor in mollusks and we collect *Conus lividus*, *C. rattus*, *C. coronatus* and *C. pulicarius* by following their tracks in the sand, and one heavily encrusted *Conus distans* near the upper part of the reef. While collecting, Fred will be lucky enough to briefly see three blacktip sharks, much to Pierre's chagrin, since he dreams of seeing the Tahitian sharks but so far has not seen a single one!

After searching for two hours, we go back to shore and spend some time on the bordering reef. A large number of common Cones are found there: *Conus lividus*, *C. nanus*, *C. miles*, *C. sponsalis*, *C. rattus*, *C. sugillatus* and *C. miliaris*. David, always looking for other malacological rarities, will be lucky enough to find



Frédéric and Pierre in their conference at University



Conus lividus



Conus rattus



Pomare V reef spot



Conus pulicarius



Conus imperialis

a fresh dead *Cypraea teres* and then three wonderful recently dead *Cypraea lynx* all at the same spot, quite probably left there by an octopus.

It is time for a break and a sandwich, and then we leave for another spot, the Venus point. We enter the water from the parking lot, and we proceed towards the reef. Same thing: the area is rather poor. David goes to the barrier reef alone but the more he approaches it the fewer Cones he finds, it is all quite disappointing. Along the way he will find three species only: *Conus lividus*, *C. vitulinus* and *C. pulicarius*. Pierre and Fred having joined him, the group then spends a little time on the bordering reef and finds a few specimens of *Conus lividus*, *C. miliaris*, *C. sponsalis*, *C. sugillatus*, *C. vitulinus*, *C. rattus*, *C. eburneus*, *C. ebraeus* and *C. pulicarius*. Fred will get lucky with another great sighting: a huge common stingray. After several hours in the water, it is now time to go back to the lab and the evening is spent dissecting the specimens collected during the two snorkeling sessions. Our feeling from the first two collecting days is that it will be much more difficult than in Mayotte, and these samples have to be earned ! Nevertheless, in spite of the feeling that we found fewer individuals, once numbers are added and everything is put into perspective the final result is not bad at all. In two days we have already found 12 species and collected about 70 Cones. So, things are looking good.

Tuesday, April 30th

We depart at dawn (6:00 a.m.) to join our two experts Michel Balleton and Patrick Marti at the peninsula for a « boat day ». After a one-hour drive, we arrive at the miniscule port of Pueu. Our two enthusiastic collectors have already put the boat in the water and ten minutes later we anchor near a reef. Everybody gets in the water: there are five of us today, including three expert malacologists! From the very first strokes we sense that the area is rich. David quickly finds *Conus textile* and *Conus tessulatus*, and soon afterwards two

nice *Conus canonicus* hiding under dead coral slabs. But the dominant species by far is *Conus imperialis*, of which numerous specimens resting on corals are collected. The team slowly approaches the reef, where depth is very low but the current very strong. We fight to stay put, and without the garden scrapers bought at Carrefour, which enable us to hook onto the rocks and dead coral heads, we would quickly be swept by a wave and pushed several meters back. To move forward against the tidal current, we must struggle, grab the rocks on the bottom and use our flippers vigorously for several minutes. The going is really tough ! David finds *Conus canonicus* again and then *Conus episcopatus*, which is locally uncommon. We also spot shells from other families and it is quite pleasant to find a lot of life under the blocks of dead coral. The biotope is rich, in strong contrast with the sites explored the two previous days. In that location we find several new species, such as *Conus lithoglyphus*, *C. sanguinolentus*, *C. moreletii*, *C. distans* and a very large *Conus striatus*. Collecting is good today!

Back on the boat after three and a half hours of snorkeling, we sort out shells and compare our findings. Michel has found beautiful *Conus vexillum* and one *Conus obscurus* (which allows David to see it alive at last). Patrick got a fine specimen of a rather rare species: *Conus magnificus*. Pierre and Fred, on the other hand, have collected numerous species already mentioned above, benefiting from the experience they accumulated during our Mayotte expedition. They have been very active and have filled their respective boxes. It is a good result, even though the sea conditions are quite tiring, because of the waves and the current.

After a short break we seek another collecting spot, not far from the previous one. Having Michel with us is a great asset: he knows all the best places and is very much aware that from one side of the reef to the other a few hundred meters can make all the difference. Biodiversity varies between the different zones of the reef. This second zone is also calmer and the low tide



Conus textile, always magnificent



Delicately patterned *Conus canonicus*



Moorea, Temae lagoon coral & fishes



Conus tessulatus



Conus striatus

no longer allows the ocean to pour in so violently into the lagoon. Biodiversity here is slightly less, but within two hours we collect a good number of species: *Conus textile*, *C. distans*, *C. miles*, *C. lithoglyphus*, *C. terebra*, *C. flavidus*, *C. frigidus*, *C. lividus* and *C. moreleti*. Fred had the excellent idea of combing the seaweed on the top of the reef, which enables him to find several specimens of *Conus miles*.

David is in heaven for having at last seen living *Conus obscurus*, of which he has collected a total of four specimens! It is the first time that he finds this species, which he previously searched for unsuccessfully in Tahiti and the Seychelles, as well as in Mayotte. His collector's soul is at peace with this find, which of course means next to nothing to our two researchers, who are interested only in collecting the more common species. The spot also provides a pretty freshly dead *Conus coffeae* and two more old dead Cones: *Conus tulipa* and *Conus terebra*. These are of no interest for the VENOMICS project, but we are always interested in making a census of the existing species. Dead Cones indicate the presence of species that can perhaps be found alive some day.

At this point, a count indicates that 31 species of Conidae have been found, 29 of which alive; and for several of them sufficient quantities have already been collected, so they will not be collected anymore. Our mission potentially appears as a success, which is quite reassuring to Pierre and Fred, since the investment to organize a mission in Tahiti is considerable and they are under an obligation to get results. A few classical species, such as *Conus leopardus*, *C. chaldeus*, *C. quercinus* and *C. virgo*, have not been found yet, but we will rely on the talent of our collectors to hunt them down. Michel informs us that *Conus bandanus* has become rare and that *Conus emaciatus* has not been found for a long time. But it does not really matter, since the other species should be present in sufficient quantities.

Wednesday, May 1st

The morning schedule is full and Pierre feels like he is back in France, under the usual work pressure: first of all, we need to process the samples from the previous eve, and that will be filmed by a crew from the local television channel Polynésie Première together with an interview of the team. The whole program will be aired that same day, in the 19:00 h news report, and also back home on the France 3 channel. Afterwards we must go to the airport, to prepare the dispatch of two trunks containing our lab equipment to our next destination, Makemo. The bad news is that on Sunday we will have to take our trunks to the airport at 4:00 a.m., for the 7.00 a.m. plane.... We also have to prepare a press statement announcing our Friday conference, confirm the return of our luggage from Tuamotu, and manage various aspects of logistics. And in addition, Pierre was interviewed on the phone by Radio 1, a local station. We have to keep running! In the afternoon we continue processing our samples and afterwards we go to the brand new Papeete ferry station to book tickets to Moorea on Thursday. We end that super-busy day by renting diving equipment at Arue's marina, for the night dive scheduled later tonight. With all comings and goings, the day was fully occupied, even though we did not collect a single Cone!

At 5:00 p.m. we leave again for the peninsula, where we meet our two specialists Patrick and Michel at the usual spot, for a night dive on a sandy bottom. Since their small boat cannot carry five divers and their equipment, Michel will first take Pierre and Fred to a small beach and will come back to fetch Patrick et David. Diving at night will be a first for Fred, who has never made a nocturnal dive. He and Pierre are alone on the beach, fully equipped; the night is quite dark but they are looking forward to get into the water! Pierre has dived at night before and has loved that unique experience. A short boat round trip later, the group is complete and as Fred is not used to night diving, Pierre and him decide to search the zone at a depth of 5-10



Frédéric and Pierre in the lab (IRD)



Departure for Moorea



Getting in the water under a stormy sky



The venom ducts of two Cones



Coming back from our night dive at the peninsula

meters, while Patrick, Michel and David go for the 10-20 meter depth. The whole area is sandy, sometimes sprinkled with coral debris and sparse blocks of coral. We hope to find the sand species of which we have no or only a few specimens, such as *Conus eburneus*, *C. virgo*, *C. quercinus* and *C. tessulatus*.

However, an annoying incident happens to Michel: his diving light breaks down and he has to go back to the boat after only fifteen minutes of exploration. The rest of the group goes on and has a treat! The Cones are out by the hundreds and each flipper stroke enables us to collect some, crawling on the sand. It is truly magic, the light beam reveals numerous animals, making everything much easier than searching each square centimeter of reef in daytime! Naturally, it is important to be familiar with the zone and it is only due to Michel's experience that we are able to have such a great harvest. After diving for one hour, Fred and Pierre return to the boat with many *Conus quercinus*, *C. eburneus* and *C. textile*.

In all, no less than 50 Cones will be returned to the water that evening, which shows how abundant the populations were! That night we would undoubtedly have been able to collect several hundred specimens, but we are aware of conservation issues and do not take more than we really need. One advantage of the state of the art techniques that we use in VENOMICS, is that they allow us to work with a small number of specimens only. We can therefore carry our research work without destroying any populations or endangering the ecosystems.

Patrick and David surface after one hour fifty, which means that they had enough time to explore a large area, first the bottom of the bay, some 18 meters deep, then a zone closer to the shore at a depth of ca. 10 meters. They were able to register the presence of very large numbers of small *Conus eburneus* (15 mm for about 90% of them), a single *Conus tessulatus*, a single *Conus leopardus*, about ten *Conus quercinus*, two *Conus*

textile, and a fragment of a good sized *Conus bullatus*. Obviously, other families are also present, for instance *Olividae*, *Terebridae*, *Mitridae* and *Costellariidae*.

Michel takes Pierre and Fred back to the marina first and while Patrick and David wait for him to collect them for the second crossing they wade in shallow water to pass the time. It is then that David's light illumines a magnificent *Harpa major* moving swiftly on the sediment near the shore, in a depth of 1.5 meters!! This species is only very rarely found alive in Polynesia; suffice it to say Michel, who has lived there for 40 years, has never seen one and neither has Patrick! David then approaches Patrick, who is about fifty meters away, to share that find and on his way spots three more specimens in a nocturnal spree! Unbelievable! This particular species is supposed to come out of the sediment where it buries itself, for only short periods before going under again, so the chances of finding it during the night are very small. In any case, it was an unforgettable encounter. Now back to the port, it is time to sort out the samples, store the materials and then hit the road for the one hour trip to Papeete. Back at the IRD campus at 23:00 h, it has been a very long day! And tomorrow we will have to get up early. We are decidedly not enjoying holidays in Tahiti...

Thursday, May 2nd

Waking up early at 3:00 a.m. allows David – who is still suffering from jetlag – to write a few emails while he waits for everybody else to get up. The time lag of +12h, as well as the cruel lack of sleep since our departure weakens him day after day, and obviously the frenetic rhythm of our mission does not help either. Pierre and Fred, on the other hand, sleep soundly all night long. Fred is a great sportsman who falls asleep easily at night and is quickly up and running in the morning, ready to start work, whereas Pierre, a very experienced traveler used to visiting every corner of the world, has brought along his flask of Melatonin...



Arrival at Makemo airport



David searches in spite of shallowness of water



One afternoon's results



Our collecting zone at Tuamotu



Today the harvest is good

Michel joins us and this morning we ride the ferry to Moorea, where David has lived from 2002 to 2006. It is an emotional return for him. We pay a visit to the mother of his wife Nicole, whose home, set amidst luxuriant vegetation and surrounded by a wonderful garden with lots of flowering bougainvillea, commands a stunning view of the island. We take the opportunity to watch our newscast interview aired the day before and we are pleasantly surprised by the quality of the TV coverage. It is indeed a very accomplished communication effort and during our stay we will later find that the same report was broadcast several times and watched by lots of people in Tahiti, presenting VENOMICS and our work on Cones to a very broad audience. After a souvenir photo session with the family, we get in the car to go to work. Moorea offers wonderful landscapes and a stop at a lookout enables Pierre, our photographer, to capture the typical Polynesian picture postcard: blue sky, coconut palms and stilt houses covered with palm leaves, above the turquoise waters of the lagoon! A picture that will undoubtedly end up as a screensaver on our computers!

We begin our search at the Temae barrier reef, the only one accessible from the shore, where a beautiful white sand beach is bordered with coconut trees. But the results are appalling: we find nothing, the spot is a real malacological desert, and on top of it all we have to fight a very strong current. We find only a few Cones: one *Conus canonicus*, two *Conus imperialis*, one *Conus lividus* and a few *Conus textile*, that is to say, nothing we had not already found and between the four of us only 10 specimens are collected! Even so, we will keep them as little by little, any additional Cones complete our samples, as we must have enough specimens for each species. Nevertheless, it is frustrating to find so few Cones and after three hours of struggling against the strong current we return to the shore for a quick picnic under tepid Polynesian rain. The sky is grey, it rains heavily and we hit the road slightly disappointed.

After a few kilometers, the sun shyly comes out and

we stop at random on the roadside, close to the Hilton Hotel (formerly Sheraton). Pierre and Fred search the bordering reef and part of the lagoon while Michel agrees to accompany David to the barrier reef, one kilometer from the shore. The current is strong again and it will take them 30 minutes of forceful swimming to reach the reef. However, disappointment awaits them: the current is so strong and the waves so numerous that they will not withstand the elements for long... Ten minutes of collection and a few Cones (*C. textile*, *C. distans*, *C. canonicus*) later, they cross the lagoon in the opposite direction: a lot of effort for a scant result. As a matter of fact, the findings of our scientists near the bordering reef end up being better: *Conus vitulinus*, *C. leopardus*, *C. ebraeus*, *C. chaldeus* are found, well hidden among corals covered with algae. One must have a good eye and Pierre, who has thoroughly searched the corals near the shore, is happy: he has managed to find a good number of Cones completely blending into the décor, among de coral debris. Only their triangular shape slightly distinguishes them from their environment. He certainly has developed a good eye for Cones, although David and Michel, being more experienced, always manage to find more.

The day ends with a coffee break and the purchase of some souvenirs, before getting back to the ferry. Although the day has not been especially fruitful and the weather was rather morose, we still had a chance to discover Moorea, a gem of an island, endowed with exceptional landscapes. We now have to dissect the Cones collected today and those from yesterday night. Another extended day...

Friday, May 3rd

No collecting today. Indeed, numerous side chores await us and we must stay in Papeete. We begin the day in the laboratory, finishing the dissections of the samples collected the previous days, and we also host a journalist from the TNTV channel for a new interview, our second appearance on television in just a few days!



Conus retifer



Conus retifer



Makemo reef



A pretty nudibranch in a daytime stroll



Pierre, our cameraman

Then at 11:00 a.m., we attend a meeting in Papeete with representatives of the local authorities: Mrs Tea Frogier, the Research Delegate for the Polynesian government, and Mr. Eric Clua, from the Research and Technology Department. They both made our mission possible by helping with permits and giving administrative support. We discuss the VENOMICS program for about one hour, in a very friendly atmosphere. Indeed, our mission garners great interest from all those involved in science in Polynesia ! Then, after a quick lunch with our host Sylvain Petek at IRD, we are back in the lab for more dissections. Fred et Pierre must also prepare their talks for the conference scheduled that same evening at the University of Polynesia.

At 5:00 p.m. we are welcomed by Taivini Teai, a colleague from the University and Fred and Pierre present VENOMICS and its scientific work to an eclectic audience that includes many non-specialists. After the talk, there are plenty of questions to be answered, a thoroughly pleasant moment for our two speakers. Furthermore, we have the opportunity to meet some local shell lovers, with whom we schedule a malacology meeting and plan some field work to find the Cones species that have eluded us so far. Everybody appears to be willing to help us.

Saturday, May 4th

We meet again with Michel and Patrick at 8:00 a.m. in Pueu, for a new boat outing to one of the numerous reefs of the peninsula. However, the motor of the boat does not start, which worries us. After multiple attempts and a few blows with a screwdriver by our mechanics specialists, Michel eventually succeeds in making the motor start, with the aid of a length of rope... Whew, we can proceed with our collecting, albeit with a slight worry: will the motor restart later on?

The sea is calm, but the current is still violent. Pierre is especially motivated this morning and for the first time he is the first one in the water! He goes with Fred to the

top of the reef, to look for further specimens of *Conus vexillum*, as we do not have enough examples of that wonderful but hard to find Cone species. David prefers to stay in the 1-2 meters zone and to look under dead coral slabs, in search of the rare *Conus magnificus*. This is not a priority of our mission, but his passion must be satisfied now and then, as finding only common species is certainly frustrating in the long run and he also looks for rarity. The area is quite rich and some relatively uncommon species are present, such as *Conus canonicus* and *Conus episcopatus*. David also finds a freshly dead *Conus pertusus*, albeit with a broken lip, and then a living juvenile with its typical red and yellow color. He also finds living *Cypraea scurra*, *C. fimbriata*, *C. helvola* and *C. maculifera*, dead *C. bistrinotata* and *C. goodalli*, fresh dead *C. poraria*, as well as a beautiful fresh dead *Harpa amouretta* and a just deceased *Mitra aurora*. Shortly before getting back to the boat, he happens upon a small dead *Conus retifer*. And of course the other common *Conidae* species are also present and the number of our samples grows a little more every passing day which means that for some species we already have enough specimens. In that new spot we also find *Conus imperialis*, *C. lividus*, *C. rattus*, *C. distans*, *C. flavidus*, *C. textile*, *C. sanguinolentus*, *C. miliaris*, *C. miles* and *C. lithoglyphus*.

Fred ends up finding a magnificent *Conus vexillum* and Michel a medium sized *Conus terebra*. We have to go back but alas, when we try to restart the motor... nothing happens! The starter does not respond and all attempts at manually starting the engine fail, despite 15 minutes of unabated efforts by Fred and Michel. We are in no danger, since we are only a few hundred meters from shore, but the harbor is rather far away, so rowing back with one oar is not an option. What to do? Now, this is where being in Tahiti makes all the difference: the island is small and everybody knows one another. Patrick picks his mobile phone and calls a friend who lives... right in front of where we are ! His friend – another Patrick – comes out of his house and we can even see him. He kindly accepts to take out his



Michel, Frédéric and Pierre



Pierre landing on a desert beach



Typical Tuamotu habitat



The tide retreats quickly, swimming is impossible



Lagoon facing the bungalow (Makemo)

own boat and to come to our rescue. A few minutes later we are pulled towards the small Pueu harbor, under a bright sun. All in all, just a slight misadventure caused by a failing battery. Thanks are owed to Patrick who kindly and good humouredly came to our rescue on a Saturday morning, thus saving our day! We go back to Papeete amid a throng of vehicles ornamented with orange or blue and white flags: this is the weekend of presidential elections in Polynesia and the pickup corteges cause many traffic jams. A friendly and joyful ambiance is created along the roads by the supporters of both camps. We are far away from the usual French street demonstrations!

After a nice lunch in a local snack bar, we take our leave from Patrick Marti, whom we shall not meet again during our stay. It is always touching to meet again a friend after a number of years only to be separated again soon after; so many stories to tell! But we will undoubtedly meet again with Patrick. Back to the IRD in the afternoon, we organize our samples and pack everything as we will depart early the next morning to the Tuamotu archipelago and Makemo.

Sunday, May 5th

Getting up at 4:00 a.m., that's tough ! Fred and Pierre go to the airport to drop the two trunks containing our lab equipment at Air Tahiti, and they come back to fetch David and the remaining luggage. Even leaving some things in Papeete, we do not travel light. Michel joins us at the airport and after a coffee break we depart for a three hours flight to the Makemo atoll. The arrival is quite friendly, as we are met by Ludo (Ludovic Berne), from the ScubaMakemo inn, and his flower necklaces. Makemo's airport is a tiny building and the ambiance is more alike that of a small provincial train station than that of the busy airports we are familiar with. Here we are truly at the end of the world. The atoll is 35 km long, but is really no more than a narrow band of circular coral with only a small livable zone on one side, and a tiny village. Once the luggage is

tucked in Ludo's Land Rover, we climb in the back, fitted with wooden benches, and the car takes off. The change of scenery is striking: compared to Makemo, Papeete looks like a big metropolis! After riding the entire length of the atoll road (11 km) we arrive at the inn run by Ludo and Brigitte. Their house sits right on the lagoon and visitors are hosted in tiny wooden bungalows. Pierre settles in his, a superb room on stilts, while David and Fred take possession of their hanging hut. Michel will be entitled to the bungalow doubling as laboratory. We are 10 meters away from the water and the lagoon, under the palms of coconut trees. Our host greets us with freshly cut coconuts, with straws sticking from them. What a dream...

After a quick lunch, we depart in the early afternoon towards the reef facing our inn across the road. The coral band that constitutes the atoll is very narrow, so we only have to walk 100 meters to reach the reef. In the Tuamotu, the reef is the place of highest biodiversity and it is there that the three species we hope to collect are hiding: *Conus retifer*, *Conus tulipa* and *Conus catus*, the latter having been collected alive in Tahiti only very rarely.

As often happens in the Tuamotu, there is very little water, we can barely swim, the rare rocks that can be lifted are very heavy (in fact, they are parts of the slab) and afterwards one must get down with a mask and look whether there is anything to be found under. This has nothing to do with our searches in the Tahitian lagoons! Furthermore, the current and the waves are not helping, and we must also beware the dozens of urchins that are scattered throughout the reef as well as the moray eels, who do not like being disturbed.

Nevertheless, we manage to find dozens of small *Conus ebraeus*, as well as *C. sponsalis*, *C. nanus*, *C. rattus*, *C. lividus*, *C. sanguinolentus* and *C. miliaris*, as well as a few less common *Conus chaldeus*. Common cowries are present too, of course, and we notice the white coloration of most *Cypraea moneta*. David also spots a

tiny live *Cypraea oryzaeformis*. All things considered the collecting is quite good. As a matter of fact, we will need a rather large number of specimens from species such as *Conus ebraeus*, considering their small size. *Conus chaldeus*, on the other hand, is never common, which means that each specimen found adds to our sampling, and will eventually enable us to conduct our genetic analysis, once we have enough animals. The small size of the venom duct in such species obliges us to dissect a large number of specimens to have enough tissue, so at this point each cone counts.

Finally, David is lucky enough to find his first live *Conus retifer*! A few years before he had found a fresh dead one on the Fakarava atoll, but never a living one. Hence, he is on cloud nine and takes the opportunity to photograph the living animal with his waterproof camera. For Fred and Pierre, it is a new species, so everybody is happy, but we need to find other specimens. After two hours searching the reef, we go back across the road and then spend one hour and a half in the lagoon in front of the inn. How convenient! The biotope is different: a sandy bottom with large coral blocks, and plenty of algae. Cones are harder to find, but we do manage to collect *Conus ebraeus*, *Conus miliaris* and *Conus sponsalis*, all of large size, as well as some *Conus pulicarius*. What is unbelievable is that under each dead coral slab are dozens of cowries (mostly *Cypraea moneta*, *C. obvelata*, and *C. caputserpentis*). David spots a beautiful nudibranch and some *Cymatium mundulum*, while Michel collects a large *Conus vitulinus*.

Pierre keeps the daily inventory of species and number of specimens collected perfectly updated and like every day we now return more than 30 Cones to the water, after having identified and sorted out our samples. Up to now, more than 150 animals have already been returned to their biotope. No need to uselessly depopulate the reef and accumulate too much material, even though we work with a safety margin. It also lessens the burden of daily dissections! We have learned our lesson from the Mayotte mission, when Fred and Pierre did daily

dissecting marathons, up to 5 to 7 hours in a row, to handle all samples!

Here we have installed a field laboratory on a picnic table, sheltered in one of the bungalows, and work is done outside in the evenings, illuminated by a desk lamp. The “field mission” ambiance is guaranteed!

Monday, May 6th

First thing in the morning: to make sure that our luggage will be returning to Tahiti. Fred and Pierre mount bikes for a visit to Pouheva, the small village of Makemo. Fred is a hardened cyclist who rides thousands of kilometers every year, so he is quite at ease and goes off ahead, whereas Pierre only uses his mountain bike from time to time and has a little trouble pedaling in his flipflops! But it is a wonderful ride, among the coconut trees. Everybody smiles and says good morning, they pass children going to school at 6:30 a.m., and the whole environment is so pleasant! After finding the Air Tahiti “office”, actually a small room in a private dwelling, they go to the local grocery store for some shopping. A few shelves stock basic products and the arrival of vegetables depends on planes that come in every other day. Once again we feel that we are at the end of the world... Each day they will make this trip for supplies with great pleasure and Fred will even enjoy a quick roundtrip to the airport on his too small bike. The weather conditions make riding more pleasant here than around Paris !

Back at the inn, we meet with Lucien, a Paumotu well known to Michel, who had previously stayed almost ten days at his place. Lucien takes us along the reef in his pick-up truck, and between the village and the airport we explore three different spots, all comparable to the one where we have been the day before: little water, large dense heavy rocks... Lucien uses a large crowbar to lift the rocks, he is an experienced and extremely efficient Cone collector. In spite of the difficulty of the task, we find numerous *Conus tulipa*, each one more beautiful

than the next, together with *Conus catus*. A bit more rare, *Conus retifer* is also found and everybody is happy with the collecting. As a matter of fact, these species are new both for our Polynesian inventory and for our global VENOMICS collection. So, they will complete our panel of samples and will soon be analyzed by the project. Michel and David look unsuccessfully for the very rare *Conus auratinus*, but Michel will only find two specimens, dead and in poor shape. Lucien is very productive, since he is used to collecting seashells, particularly Cones, and he is quite familiar with the different species and their biotopes. While we search in vain, he picks up several *Conus tulipa* and other species as well. During our stay in Makemo he will be of great help and his contribution will be quite significant to the final success of our mission.

At 1:30 p.m. Ludo takes us scuba diving in the pass to explore a different biotope. The water is crystal clear but the cloudy skies prevent the corals from displaying their full colors. We descend to -20 meters and we silently glide above magnificent coral gardens. As we go down we are at last met by a small white-point lagoon shark, which Pierre films with his GoPro camera.

As we approach the pass, the current becomes very strong and we encounter a massive grey shark and also a large napoleon fish. We drift smoothly along the slope, following the current and in spite of several attempts at searching the scarce sand pockets, no Cone is to be found, as it appears that the biotope is not adequate at all. David finally gets hold of an old *Conus legatus*, some forty millimeters long, and with a defect, indicating the presence of the species in Makemo. It was nevertheless a very nice dive and we ascend gently above the coral gardens, evolving amidst the shoals of multicolored fishes.

Back at the inn, dissecting begins and today Fred and Pierre will break their record, with almost three hours of work and several dozen Cones dissected. We recover from that day savoring the raw fish prepared by Brigitte,

a true culinary cordon bleu. During our stay, she will treat us with exquisite fish dishes, cooked with the local products and prepared in huge quantities meant to satiate daily a pack of famished Cone collectors! At 7:00 p.m. it is already pitch dark and we go to bed. Here one sleeps early and gets up at dawn! But a strong wind will disrupt Fred and David's sleep, their stilted little house sometimes shaking with the gusts. Michel and Pierre still experience no sleeping problems!

Tuesday, May 7th

This morning we board with Lucien on his boat to head towards a new collecting spot near the Makemo pass. Once again we must walk in shallow water and lift large heavy rocks, then bend down with a mask, so that we will not miss any Cones. Not a very easy way to collect, so we try to swim as soon as possible! Some of us will try it in only 20 to 30 cm of water and our bellies scrape the corals, but fortunately we are wearing full neoprene suits!

Nevertheless, we find again the common species *Conus retifer*, *C. tulipa*, *C. vexillum*, *C. catus*, *C. distans* and interestingly *C. coffeae*. Pierre will be the first one to find a specimen. In spite of his limited expertise in the determination of species, he realized at first glance that this was something new, not yet collected. This is rapidly confirmed by David and Michel and we are all happy to have found that uncommon Cone. We shall encounter it several times afterwards, which will allow us to add yet a new species to our list of samples for VENOMICS. Venturing to swim without flippers above the submerged top of the reef, David finds a beautiful and large *Conus episcopatus*. Already one and a half hour has passed, and the result is not very good, so we decide to move to a different place.

With the boat we quickly seek another spot, as Lucien knows a place where *Conus episcopatus* may be found, and this is a species for which we have collected only a few specimens in Tahiti. We anchor and first big



Frédéric and David's bungalow The hotel's boat on anchorage



In front of Michel's bungalow, a *Conus auratinus* taunts us...



Coconut water between dives



Our two researchers in their field laboratory

surprise, at last we can swim! The water is between one and two meters deep and there are numerous pieces of coral to lift, the biotope resembling the locations for *C. canonicus* and *C. episcopatus* in the Seychelles. We snorkel for two hours amidst myriads of fishes, the water is crystal clear, the sun is out and the corals are splendid, it is pure bliss. The side of the coral slope is teeming with life and the fish shoals come and go, but it is impossible to go far from the shore as the outgoing current is really too strong. We do indeed find *Conus episcopatus*, as well as *Conus canonicus* and a few more specimens of *Conus coffeae*, as the species is really more common here than in Tahiti. After three and a half hours of searching we go back to the inn for a sandwich break, without even removing our wet suits, because in the afternoon we will go diving again, with Ludo and Lucien as skippers.

The dive this time will be a drift dive following the outgoing current, and for that reason we will follow the wall of the pass. A considerable number of fishes, a large nurse shark hiding in a crevice, beautiful napoleons and one eagle ray make this dive an unforgettable experience. In spite of the strong current, David manages to search numerous sand pockets and upturns many dead coral blocks, but to no avail, not a single Cone is to be found. Nevertheless, he eventually finds a nice fresh dead *Cypraea teres alveolus* under a coral slab, as well as two *Cypraea scurra indica*.

Michel who did not join us on the dive, has undertaken a tour of the reef during our absence. Being in Makemo is a great opportunity and none of us will remain idle during those four days; every free minute will be dedicated either to collecting or processing the samples and Michel, who was not in the mood for diving that afternoon, did not make an exception to that rule, so he just went to the reef to see what he could find. We join him after our dive for an extra hour of searching the reef: it is impossible to resist the call of Cone hunting! We do take a few extra specimens belonging to species already collected and Michel finds a dead

Conus tenuistriatus, a truly uncommon species.

After such a busy day, we still must spend about two hours dissecting, like every evening, before a well-deserved dinner and rest.

Wednesday, May 8th

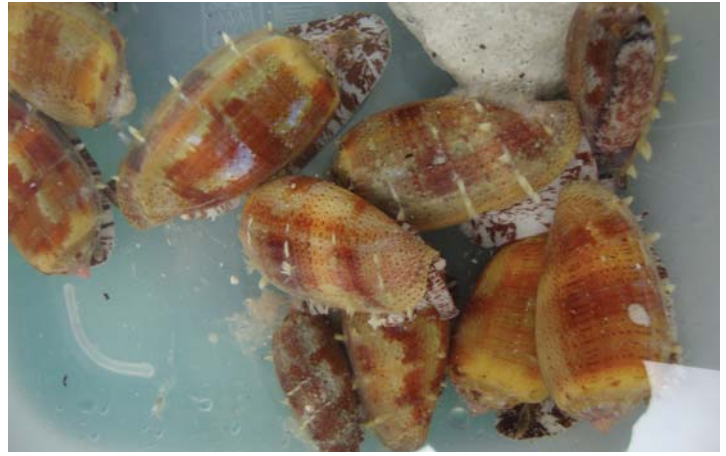
Today, the program involves scuba diving at 8:00 a.m. on the outer slope, upstream from the pass, an early dive in order to have enough time to desaturate before flying tomorrow. David and Michel hope to be able to dive at last above a bottom covered with debris, so that they can look for new species of *Conidae*. They describe their ideal spot to Ludo, who takes us to the outer reef and today, Brigitte is our dive guide. However, from the very moment we get into the water we reach an inescapable conclusion: this will not be a shelling dive. The bottom is composed of live coral only. Visibility is remarkable, probably around 40 meters, and the current is very gentle. We dive to -15 meters among coral ridges perpendicular to the reef, separated by narrow sandy channels. The spot is truly magic, the weightlessness of the dive allowing us to overfly the ridges and then to plunge between the coral masses, amidst the fishes. It is not a place for shells, but it is a wonderful dive. Raising our head we can see in the distance our diving companions suspended in the crystal clear water, the plumes of their bubbles outlined against the blue background. A truly magical moment...

Pierre is totally happy with his GoPro, he goes through the shoals of fishes, filming the napoleons, glides slowly above the ridges and valleys of the reef accompanied by Fred, he is in fact a fish among other fishes... a true stone-fish [Ed.: pun with Pierre's name, since "pierre" is French for "stone"]! When it comes to Cones, however, David only finds a fragment of *Conus auratinus*... dreadful! Only Fred will find a living Cone, namely a *Conus distans*.

In the afternoon we decide to complete our sampling



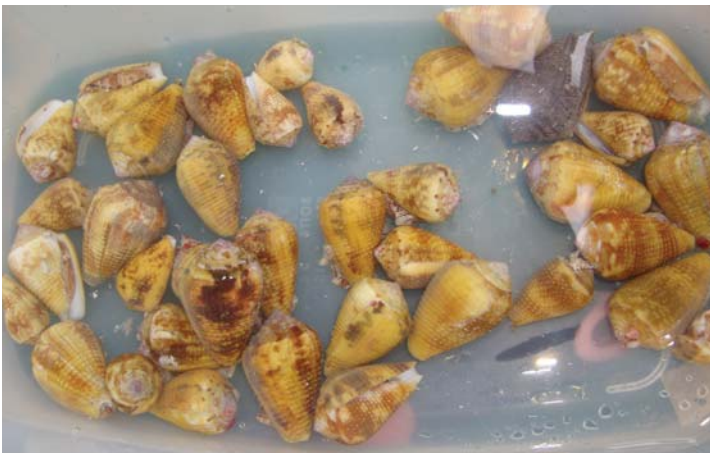
Conus tulipa



Conus tulipa



The sun comes back to the Tuamotu



Conus catus



Conus retifer

and we go back to the barrier reef with Lucien. Our first stop is fruitless: after only 15 minutes we realize that there are no mollusks to be found there. We move to a different zone, a couple of kilometers away, where we find Cones right away under the first overturned rock (heavy as always), a good omen. The usual reef species are quickly found: *Conus retifer*, *C. tulipa*, *C. catus* and *C. coffeae*. Lucien finds a wonderful *Conus retifer* of remarkable size for Tuamotu, with a splendid pattern. No way that will we break that one! David finds four *Conus tulipa* under a single large slab and the specimens of *Conus coffeae* that we find in that spot are really huge for Polynesia. Like every other day, we leave numerous Cones behind as we already have sampled sufficient numbers for many species.

It is remarkable that in spite of the apparent homogeneity of the reef around the atoll, locations apparently similar from the point of view of the biotope show a variable biodiversity. Our sampling has shown just that: even if the species are the same, their abundance varies according to factors impossible to identify from a simple observation of the reef. It is clear that the different spots on the reef are not equivalent. It is also interesting to note that the abundance of Cones is quite high in these atolls: within a few hundred square meters it is possible to find 30 to 40 large *Conus tulipa* or *Conus catus*. Since the atoll is 35 km long, that seems to indicate a gigantic population, even taking into account the apparent heterogeneity of the spatial distribution of the animals.

Back to the field laboratory, we photograph the live shells and dissect the venom ducts. And for a change, in the evening Pierre our chief surgeon, will extract from David's left hand no less than one dozen urchin spines, with the help of his fine Dumont dissecting forceps and his binocular microscope! This proves that knowing how to dissect micro animals may come handy for other purposes...

Thursday, May 9th

No collecting today, unfortunately, as we must pack everything and the morning is dedicated to putting everything in order. We say our goodbyes to Lucien, who has become a full member of the VENOMICS team, and we take leave of Brigitte, who gives each of us as a souvenir a huge seashell necklace, made by the local children. It will be a precious souvenir and Pierre's, which is particularly bulky, now has pride of place in his study. After some final family photos we depart around noon for the tiny Makemo airport. We register our luggage in an otherwise deserted airport, use the luggage scales to weight ourselves and take our leave from Ludo, who has accompanied us. While we wait for the plane, Pierre will get acquainted on the roadside, with a gang of rather tipsy playful fellows who have come to the airport to accompany one of their mates. It ends up with some talk and group photos, an amusing happening, revealing the hospitality and joy of living in Polynesia...

A quiet flight takes us back to Tahiti in mid-afternoon, and there we find "civilization" again: arriving from Makemo, we are under the impression of reaching a big metropolis. A huge difference!

Upon arrival, we learn that Jean-Luc Piart, a local collector, has kindly collected for us several *Conus leopardus* and one *Conus virgo* in the lagoon, near his home at Paea. When we had met at the University after the conference, he had offered to try and collect some Cones for us, and as we have not found those species, it is all excellent news. Michel, who has a sense of duty and of work well done, and who was already on his way to the peninsula, does not hesitate to turn back to face a long extra drive in order to take the specimens to the IRD. Hence, we tackle an unexpected dissecting session while Pierre is again interviewed by a reporter from Les Nouvelles de Tahiti, one of the local daily newspapers. There we are, the pressure goes up again just upon our return from Makemo!

Friday, May 10th

For this last morning of collecting, we are meeting at Papara, in the Southwest of the island with Florent Tintillier, a student at IRD, whom we had met before leaving for Makemo. He promised that he knew of a spot with high biodiversity and takes us snorkeling in the lagoon, on the edge of a magnificent black sand beach. Unimpeded view, blue sky, flat sea: finally an ideal weather after two weeks of rain, wind and grey skies. The place is indeed rich and full of life and the fishes are plentiful. Large coral boulders form an immense labyrinth that we follow towards the reef. Moray eels, multicoloured fishes and invertebrates abound. We also encounter many “taramea” (*Acanthaster planci*), the spiny starfishes that prey on coral, busy at devouring the madrepores. An eradication campaign in the area is planned soon. In any case the coral is beautiful and well alive, the ecosystem is rich and a joy for the eyes.

The lagoon has also numerous sandy areas that allow David to track about fifteen venomous augers, thanks to the paths left in the sand by the mollusks. As a matter of fact, this was the main goal for the day, established by our two scientists: to complete the Cone collection with a few augers, whose venom will be distinct. The two species present are *Terebra guttata* and *Terebra subulata*. The area also harbours the majestic *Conus striatus* in considerable numbers, a species we had spotted only rarely so far, and large *Conus textile* that sleep under the slabs of dead coral. Pierre catches a very pretty *Conus canonicus* that boasts the pattern of *Conus textilinus* from the Marquesas on its ventral side. And finally, under a huge plate of dead coral, David finds two *Conus striatus* accompanied by two *Conus textile*! Unbelievable! It is a great moment that he shares with his companions and is immortalized in a video. Except for a small scare for Pierre, whose GoPro was ripped by a powerful wave – but was quickly found again resting on the bottom – it is a marvelous last day indeed. Our sampling today has allowed us not only to reach our goals but also to complete our sampling of *Conus striatus*, thanks to the help of Florent and his secluded spot. 100% success !

Back at IRD, we dissect our small collection of the day, and then Michel, once again coming all the way from the peninsula, joins us. Michel and David then leave for a collectors’ meeting at Vincent Wagnier’s place, with Jean Letourneux, Jean-Luc Piart and his son Teiva, and also Christian Beslu. David takes the opportunity to thank Jean-Luc personally for his precious help, and then the two depart for the peninsula, to spend an evening discussing their interests as collectors.

Saturday, May 11th

While Pierre and Fred, having packed the laboratory equipment for our departure the following day, visit Papeete and its market for some last minute shopping, Michel and David go enthusiastically for a last collecting trip on another one of the peninsula reefs. They get into the water at 8:00 a.m., the sea is quite calm and there is no current. This morning again they will find most of the common reef species, such as *Conus lividus*, *C. sanguinolentus*, *C. vitulinus*, *C. lithoglyphus*, *C. canonicus*, *C. imperialis*, *C. rattus*, as well as one *Conus episcopatus*. David will also find several small *Harpa amouretta*, numerous *Cypraea fimbriata*, three *Cypraea punctata trizonata*, while Michel will pick up a few living *Cypraea teres*. Four and a half hours later, it is time to get back. Lifting a piece of dead coral on his way to the boat, David finds a Cone species seldom found alive: *Conus cylindraceus*. As a matter of fact, it is the very first time that he finds that particular species and for him it is the culmination of two fruitful weeks. Although the sight of that pretty but small Cone does not elicit the same emotion as other findings from our two scientists, we are all happy that David was able to add such a nice specimen to his collection.

It is now time to pack for our return flight tomorrow morning. The 40 kg of lab equipment go back into the trunks, and the suitcases are locked. And for our last evening we will go to the restaurant for a last dish of fish, accompanied by Michel, to whom we say our goodbyes with emotion. Until next time...

Sunday, May 12th

We leave Tahiti at 7:50 a.m. with regret, for a long trip, with lots of souvenirs in our heads! The 20 hours flight will seem long, but we are all eager to get back to our families, while for Pierre and Fred there is much work awaiting them in France to follow up: the material must be stored properly, the samples prepared for DNA sequencing and proteomics analysis, and we already dream of the abundance of exciting scientific results that will arise from our mission.

Conclusion

The VENOMICS Polynesia 2013 mission has met with total success, as we have been able to collect 38 species of living Cones and 6 species of dead ones, bringing the total to 44 recorded species, out of the 65 *Conus* species known from Polynesia. So, in only 15 days we have covered most of the available *Conus* biodiversity, thanks to the invaluable help of our malacology colleagues and our local partners. About 30 species will be analyzed in the VENOMICS project, which largely exceeds our initial expectations. And the evolution of technology in the next couple of years will no doubt allow us to use smaller samples and therefore some of the remaining species too.

Species collected alive (38): *Conus aristophanes*, *Conus canonicus*, *Conus catus*, *Conus chaldeus*, *Conus coffeae*, *Conus coronatus*, *Conus cylindraceus*, *Conus distans*, *Conus ebraeus*, *Conus eburneus*, *Conus episcopatus*, *Conus flavidus*, *Conus frigidus*, *Conus imperialis*, *Conus leopardus*, *Conus litoglyphus*, *Conus lividus*, *Conus mcbridei*, *Conus magnificus*, *Conus miliaris*, *Conus miles*, *Conus moreleti*, *Conus nanus*, *Conus obscurus*, *Conus pulicarius*, *Conus quercinus*, *Conus rattus taitensis*, *Conus retifer*, *Conus sanguinolentus*, *Conus sponsalis*, *Conus striatus*, *Conus sugillatus*, *Conus terebra*, *Conus tessulatus*, *Conus textile*, *Conus tulipa*, *Conus vexillum*, *Conus vitulinus*.

Species only found dead (6): *Conus auratinus*, *Conus bullatus*, *Conus legatus*, *Conus nussatella*, *Conus pertusus*, *Conus tenuistriatus*.

Nevertheless, that result will not have been achieved without great efforts: waking up every day around 5:00 a.m., we have spent more than 40 hours underwater, either snorkeling or scuba diving, often in rough conditions, constantly struggling against the currents, tossed about by waves and dragged on the corals. The weather was not ideal either, so to sum it all, we were far from the cliché of a holiday in paradise !

Our dissecting efforts (over 20 hours) will have been very effective, thanks to our greater experience this year. Fred and Pierre are both able to dissect a Cone in just a few seconds, which enabled us to accumulate several hundred samples for the project. Also, our field lab is now well tested, between the Cone missions and the jungle missions in French Guiana. And lastly, when it comes to the media exposure of the project, it was exceptional this year, since we accumulated within two weeks two appearances on television, one on the radio, a public conference and several articles in the daily press, one of them a full page.

Mission accomplished! Wonderful images will remain in our heads and we will fondly remember both the help we got from all the people who went out of their way to allow us to fulfill this mission under the best possible conditions, and the very warm welcoming of the Polynesians. Maruru!!!

Acknowledgements

Our warmest thanks go to the Polynesian Government and its representative (Research Delegate) Mrs. Tea Frogier, as well as to Mr. Eric Clua (DRRT Polynésie), for their help in obtaining collection permits. Without the logistics support of our IRD colleagues in Polynesia, we would have been unable to carry our work successfully: sincere thanks are due to



Frédéric meditating

Philippe Lacombe, Sylvain Petek, Cécile Debitus, Joël Orepuller and Lisette Florian. Many thanks also to Taivini Teai for organizing the conference at the University of Polynesia.

Our most sincere thanks are extended to Michel Balleton, Patrick Marti, Florent Tintillier, Jean-Luc Piart and his wife, and Lucien Ravigaru, from

Makemo, for their invaluable help and friendship. We also heartily thank Ludovic and Brigitte Berne, from ScubaMakemo, for their warm welcome (as well as for the flowers and seashells necklaces and the wonderful raw fish).

Types of the Cones Described by André Fenaux Rediscovered at Last

William J. Fenzan & R. Michael Filmer

Abstract

Cones described by André Fenaux have been puzzling to modern authors. They were briefly described and illustrated with photographs. However, the specimens used in these descriptions were retained in the private collection of the author. These shells eventually disappeared. Only the photographs from the original publications were available to subsequent authors trying to study these taxa. This paper provides the first digital photographs of the shells since their rediscovery. Dimensions of the shells on which the taxa were based, which were not contained in the original descriptions, are also provided along with an analysis of how these names have been applied since their introduction.

Keywords

Conidae, *Conus*, Fenaux, *seurati*, *circumclausus*, *nitidissimus*, *incinctus*, *fulvus*, *viaderi*, *praeclarus*, *debilis*, *oblongus*, *dautzenbergi*, *richardi*, *sirventi*, *subacutus*, *cavailloni*, *douvillei*, *fulvostriatus*.

Introduction

In 1942, André Fenaux described twelve new cone names and proposed one new replacement name in the *Bulletin de l'Institut Océanographique* (Monaco). He described three additional new species of cones in the same journal the following year. New species names introduced were based on specimens in his collection at the time of publication. Types for the new taxa were not explicitly designated in either paper. This was acceptable under the rules of zoological nomenclature at the time.

When the International Code of Zoological Nomenclature was created in 1961, the shells in these descriptions became primary type specimens. Authors attempting to review these names during the late 20th century have been frustrated by the apparent disappearance of the Fenaux collection in the early

1970s. Photographic plates used in the descriptions were good, but usually showed only one view of the specimen and neither the text nor plate captions indicated the size of the shells. These shortcomings contributed to the differences in interpreting the actual status of these proposed new taxa by subsequent authors.

In 2007, the Fenaux cones were located, photographed with a digital camera, and studied by the first author. This paper provides additional illustrations of the specimens and their dimensions. Opinions of other authors about names introduced by Fenaux are also listed and discussed. The authors give their conclusions as to the status of each of Fenaux's names.

History of the collection: Little is known about the life of André Fenaux. Hansson (BEMON, retrieved November 3, 2012) provides the following biographical entry: "André Fenaux, 1???-19??, lived in Marseille, France. He was a private collector of marine fossil and recent molluscs. Between 1936 and 1944 he published at least 17 malacological articles in which he described numerous new taxa, mainly from the Mediterranean Sea and the Indo-Pacific area. He donated some of his shells to the Muséum d'Histoire Naturelle de Marseille. However, the whereabouts of his main collection containing the type material is not known." Coan et al (2400 Years of Malacology, retrieved November 3, 2012) provides the following summary: "Fenaux, André (1***-19**; France); Papers on marine mollusks in 1930s-1940s, mostly Indo-Pacific."

In his first paper describing cones, Fenaux himself stated that he been researching cones for 30 years and had 450 species and varieties in his collection (Fenaux, 1942). The Institut Oceanographique in Monaco maintains a catalog of accessions that has a few listings of shells transferred from André Fenaux to the Institute during 1939, 1942 and early 1943. Some of these transfers were cones, but other types of shells were provided as well. Shells were either a donation or

consigned for sale to the public through the Institut gift shop. Altogether, between 150 and 200 shells (mostly exotic) were transferred by Fenaux. Catalog entries showed that André Fenaux was an "Ingenieur" (engineer) who lived at 119 Rue Paradis, Marseille and not a professional malacologist (Pers. Comm. Michèle Bruni). Attempts to trace shells transferred by André Fenaux to the Muséum d'Histoire Naturelle de Marseille were unsuccessful (Pers. Comm. Alain Bidar).

Fenaux also states (1942) that he was convinced of the need to publish descriptions of new species because they had not been named in the *Journal de Conchliologie* since the publication of new cone species in a monograph by Phillip Dautzenberg (Dautzenberg, 1937).

About 1964, Fenaux sold his shell collection with all the cone type material to an antique shop in Cannes, France (Pers. Comm. Denise Boulet-Dunn, formerly Denise Valéro). Denise Valéro was told about the collection, recognized its value, and convinced her family to purchase it late in 1965 for a private museum they maintained in Nice. This museum was called the Musée International de Malacologie. It was located in the city flower market at 3 Cours de Saleya. In 1967, Ms. Valéro wrote an article about the collection for the local newspaper (Nice-Matin). This article reported that André Fenaux was deceased. In response, a reader wrote to the paper saying Mr. Fenaux was living "somewhere on the French Riviera." Contacting local post offices, Ms. Valéro was able to locate André Fenaux in a small village within Department du Var (a government administrative region around the city of Toulon) and she was able to interview him. She learned that he had sold his collection after 50 years of work because his "new species" were rejected and put into synonymy. He appeared to be about 70 years old at the time of the interview in 1967. He no longer pursued malacology, but spent his time repairing old, valuable china pieces. Unfortunately, the notes from this meeting have been lost. (Pers. Comm. Denise

Boulet-Dunn, formerly Denise Valéro).

While the Fenaux collection was in the Musée International de Malacologie in Nice, Denise Valéro corresponded with Dr. R. Tucker Abbott concerning the cones. She also published brief notes in the journal ("Pes-Pelicans") of the local malacological society (Centre Français de Malacologie sur la Côte d'Azur (C.F.M.C.A.)) about the Fenaux cones (Valéro, 1968 & Valéro, D. 1972). In particular, *Conus cavailloni* was mentioned in both Pes-Pelicans articles and described as a high-spined form of *Conus keatii* Sowerby, 1858. *Conus keatii* is now considered by most authors to be a synonym of *Conus inscriptus* Reeve, 1843. The rare cones from the museum collections were displayed in two glass showcases (vitrines). Only one Fenaux cone was stored in these showcases – *Conus cavailloni* (in vitrine No. 22).

In 1974, the Musée International de Malacologie was closed for about a year for repairs. When it reopened, Ms. Valéro hired a curator for the museum. The new curator was Louis Johannis Demay who had studied paleobiology at the University of Nice. After only a short time as curator, he was directed to pack up the collection for sale to the city of Nice by the city officials while the owners (the Valéro family) were out of the country. All the materials in the museum had to be crated and relocated to the city museum for storage within 48 hours. The speed of this sale was caused by timing of urban renewal projects altering the entire flower market area. (Pers. Comm. Denise Boulet-Dunn, formerly Denise Valéro).

The collections from the Musée International de Malacologie were stored in the Museum d'Histoire Naturelle, Nice (MHNNI) (text figure 1) located at 60 Boulevard Risso in Nice, France starting in 1975. This museum is dedicated primarily to birds, fungi, geology, and mineralogy of the region, so the shells purchased for it by the city remained in storage for years. The museum itself was closed for many years during



Figure 1: Museum d'Histoire Naturelle Nice France (MHNNI)

this period and only reopened in December 2002. During 2006, museums in France were all directed to establish computer databases with an inventory of their collections. This project caused the museum to assign a volunteer, Mr. Patrice Grassi, to enter data on the shells in storage. By early 2007 they discovered they had the collection of André Fenaux, including most of the specimens on which his species descriptions were based (Pers. Comm. Alain Bidar).

Text Figure 1 – Museum d'Histoire Naturelle Nice France (MHNNI)

In the years since 1975, while the Fenaux collection was in storage, several malacologists, cone collectors, and authors tried to find the collection in order to study the cone types in it. These investigations were unsuccessful in locating the shells until 2007. At that time, the first author initiated an internet search for Denise Valéro resulting in discovery of a marketing web page for a book recently written by Denise Boulet-Dunn which included mention of Denise Valéro as an earlier name of the author. Denise Boulet-Dunn was contacted and her association with the Fenaux cones was confirmed.



Figure 2: Storage of Cone types in MHNNI

Once Denise Boulet-Dunn provided information on the sale of the shells to the city for storage in the local natural history museum, an e-mail was sent to the museum in Nice to confirm the presence of the shells and request permission to study them. Dr. Alain Bidar responded and advised that the Fenaux shells had recently been found (text figure 2) and they were in the process of being cataloged. In July 2007, the first author traveled to Nice, France to take digital photographs of all the existing Fenaux cone types, measure each of the shells, and learn as much as possible about the collection.

Systematic Account

Following is a systematic account of the cone shell types from the collection of André Fenaux that were in the collections of MHNNI and studied by the first author in 2007:

Names published in the *Bulletin de l'Institut Océanographique*, No. 814, 10th January 1942

1) *Conus episcopatus* (Hws.), var. *oblongus* (Dtz)

Plate 1, figures A – G

Notes: Proposed as a replacement name for *Conus episcopatus* var. *elongata* (Dtz.) which Fenaux correctly states is a homonym of *C. elongatus* (Chemn.). Since the name "*elongata*" was proposed in a text note by the editors (Adam & Leloup) of Dautzenberg's posthumous publication, authorship should be attributed to Adam & Leloup, in Dautzenberg, 1937 (Coomans et al, 1986).

Material studied: The second author studied the three specimens of *C. elongata* Adams & Leloup (plate 1, figures A-C) in the Dautzenberg collection in the Institut Royal des Sciences Naturelles (IRSN). The two figures in Dautzenberg (plate 1, figure D) were examined. The single specimen illustrated with a dorsal view in the 1942 Fenaux paper (plate 1, figure E) was not found by the museum staff at MHNNI as of July 2007 in either the stored collection from the Musée International de Malacologie, or in any other collections of shells held by the museum. Specimens of *Conus episcopatus* da Motta, 1982 (plate 1, figure F) and *Conus magnificus* Reeve, 1843 (plate 1, figure G) of a similar size to the figure in Fenaux (1942) were also studied.

Dimensions:

Specimens in IRSN: 42.9 x 16 mm, 41.3 x 15.4 mm & 58.6 x 22.1 mm

Figures in Dautzenberg (1937): 44.0 x 17.7 mm, 42.6 x 16.3 mm

Figure in Fenaux (1942): 40.0 x 16.1 mm

Specimen of *C. episcopatus* da Motta, 1982: 43.2 x 18.2 mm

Specimen of *C. magnificus* Reeve, 1843: 45.4 x 20.0 mm

Opinions of other authors:

Wagner & Abbott, 1978 – A synonym of *C. magnificus* Reeve, 1843.

Walls, [1979] – A synonym of *C. magnificus* Reeve, 1843.

da Motta, 1982a – A homonym of *C. oblonga* Bucquoy, Dautzenberg & Dollfus, 1882. Specimen illustrated a sub-adult *C. episcopatus* da Motta. Replaced by *C. episcopatus* "*pupillaris*".

Coomans et al, 1986 – A substitute name (*nomen novum*) for a *nomen nudum* (*C. episcopatus* var. *elongatus*) and a homonym of *C. oblonga* Bucquoy, Dautzenberg & Dollfus, 1882.

Lauer, 1989b – Not an available name. Replaced by *C. magnificus macilentus* Lauer, 1989.

Lauer, 1990b – Not an available name. Replaced by *C. magnificus macilentus* Lauer, 1989

Röckel et al, 1995 – A synonym of *C. episcopatus* da Motta, 1982, based on a sub-adult specimen.

Filmer, 2001 – A homonym of *C. oblonga* Bucquoy, Dautzenberg, & Dollfus, 1882, renamed *C. pupillaris* da Motta, 1982 and *C. macilentus* Lauer, 1989.

Discussion:

We believe this name is invalid because the name *oblonga* (a name differing only in suffix is defined as a homonym in the International Code of Zoological Nomenclature) had already been introduced by Bucquoy, Dautzenberg, & Dollfus. The specimen described by Fenaux (plate 1, figure E) appears to be a sub-adult specimen of either *C. episcopatus* da Motta, 1982 (plate 1, figure F) or *C. magnificus* Reeve, 1843 (plate 1, figure G) according to subsequent authors. Specimens illustrated by Dautzenberg (plate 1, figure D) and the three specimens held in IRSN are presented here for comparison. We favor the opinion of Röckel et al (1995) that the Fenaux name should be treated as a synonym of *C. episcopatus* da Motta, 1982. The shape of the shell illustrated by Fenaux is closer to that of most specimens of *C. episcopatus*. *C. episcopatus* also has a more rounded outline and a less broad shoulder than *C. magnificus* Reeve, 1843.

2) *Conus dautzenbergi* (Fenaux)

Plate 2, figures A - C

Note: Described as a new species from Madagascar.

Material studied: Holotype of *C. dautzenbergi* Fenaux 1942 (plate 2, figure A), figure in Fenaux (plate 2, figure B), and specimens of *C. imperialis* Linnaeus, 1758 (form *fuscatus* Born, 1778), (plate 2, figure C).

Dimensions:

Holotype: of *C. dautzenbergi* Fenaux, 1942: 39.2 x 18.1 mm

Figure in Fenaux (1942): 40.5 x 17.5 mm

Specimen of *C. imperialis* Linnaeus, 1758 (form *fuscatus* Born, 1778): 42.7 x 19.1 mm

Opinions of other authors:

Wagner & Abbott, 1978 – A synonym of *C. imperialis*

Linnaeus, 1758.

Walls, [1979] – A synonym of *C. imperialis* Linnaeus, 1758.

Coomans et al, 1985 – A synonym of *C. fuscatus* Born, 1778 (A subspecies of *C. imperialis* Linnaeus, 1758).

Drivas & Jay, 1988 – A subspecies of *C. fuscatus* Born, 1778.

Raybaudi Massilia, L., 1992 – A synonym of *C. imperialis* form *fuscatus* Born, 1778.

Röckel et al, 1995 – A synonym of *C. imperialis* Linnaeus, 1758 (form *fuscatus* Born, 1778).

Higo et al, 1999 – A synonym of *C. imperialis* Linnaeus, 1758.

Filmer, 2001 – A synonym of *C. fuscatus* Born, 1778 (a synonym (form) of *C. imperialis* Linnaeus, 1758).

Discussion:

We believe *C. dautzenbergi* Fenaux, 1942 is a synonym of *C. imperialis* Linnaeus, 1758 (form *fuscatus* Born, 1778). This opinion is held by all other authors who have commented on *C. dautzenbergi*. The brown coloring of the holotype and the broken lower lip suggest it was dead when collected. Figure C represents a live-collected specimen of *C. imperialis* Linnaeus, 1758 (form *fuscatus* Born, 1778) of a similar size and pattern.

3) *Conus praeclarus* (Fen)

Plate 2, figures D - G

Note: Described as a new species from "Bermudes" (Bermuda).

Material studied: Holotype of *C. praeclarus* Fenaux, 1942 (plate 2, figure D), figure in Fenaux (plate 2,

figure E), specimens of *C. planorbis* Born, 1778 (plate 2, figure F) and *C. ferrugineus* Hwass, 1792 (plate 2, figures G).

Dimensions:

Holotype of *C. praeclarus* Fenaux, 1942: 27.3 x 15.0 mm

Figure in Fenaux (1942): 62.7 x 31.3 mm

Specimen of *C. planorbis* Born, 1778: 32.6 x 18.5

Specimen of *C. ferrugineus* Hwass, 1792: 31.5 x 16.2 mm

Opinions of other authors:

Wagner & Abbott, 1978 – A synonym of *C. vitulinus* Hwass, 1792.

Walls, [1979] – A synonym of *C. vitulinus* Hwass, 1792.

Abbott & Dance, 1986 – A synonym of *C. vitulinus* Hwass, 1792.

Drivas & Jay, 1988 – Illustrated a specimen of *C. striatellus* Link, 1807 as *C. praeclarus*.

Raybaudi Massilia, L. 1994a – A synonym of *C. vitulinus* Hwass, 1792.

Lauer, 1994 – Doubtful species until the type will be rediscovered.

Röckel et al, 1995 – A synonym of *C. planorbis* Born, 1778.

Higo et al, 1999 – A synonym of *C. vitulinus* Hwass, 1792.

Filmer 2001 – A synonym of *C. planorbis* Born, 1778.

Discussion:

We believe that *C. praeclarus* is a synonym of *C. planorbis* Born, 1778 and that *C. vitulinus* Hwass, 1792 is a much darker more heavily marked form of *C. planorbis*. *C. planorbis* is distinguished from *C. ferrugineus* Hwass, 1792 by possessing a pale mauve basal stain within the aperture which is just visible on the holotype of *C. praeclarus*. Also, Fenaux mentions the closeness to *C. planorbis* in his description. Fenaux's type locality of Bermuda is clearly erroneous as no known species close to the holotype of *C. praeclarus* occurs in the Western Atlantic. Jensen & Pierce (2009) list *C. praeclarus* based on the report of Valéro (1972), which in turn simply reported the data provided by Fenaux. Fenaux also compares *C. praeclarus* to *C. orion* Broderip, 1833, however that species also does not occur in the Western Atlantic.

4) *Conus fulvostriatus* (Fen)

Plate 3, figures A - C

Note: Described as a new species from "I. Bourbon" (Reunion).

Material studied: Holotype of *C. fulvostriatus* Fenaux 1942 (plate 3 figure A), figure in Fenaux (plate 3, figure B), and specimens of *C. quercinus* [Lightfoot], 1786 (plate 3 figure C).

Dimensions:

Holotype of *C. fulvostriatus* Fenaux, 1942: 31.6 x 17.7 mm.

Figure in Fenaux (1942): 70.6 x 38.9 mm.

Specimen of *C. quercinus* [Lightfoot], 1786: 33.2 x 17.6 mm.

Opinions of other authors:

Wagner & Abbott, 1978 – May be *C. quercinus* [Lightfoot], 1786.

Walls, [1979] – A synonym of *C. quercinus* [Lightfoot], 1786.

Raybaudi Massilia, L., 1993a – Is *C. caillaudii fulvostratus*.

Röckel et al, 1995 – A synonym of *C. quercinus* [Lightfoot], 1786

Filmer, 2001 – A synonym of *C. quercinus* [Lightfoot], 1786.

Discussion:

We are convinced that *C. fulvostratus* Fenaux, 1942 is a synonym of *C. quercinus* [Lightfoot], 1786. Some specimens of *C. quercinus* contain very fine spiral lines similar to *C. fulvostratus*, but many do not. Some specimens of *C. quercinus* are yellowish, but others are white or off-white. All *C. quercinus* have the violet protoconch which is faded, but visible, in the holotype of *C. fulvostratus*.

5) *Conus douvillei* (Fen)

Plate 3, figures D - F

Note: Described as a new species from Madagascar.

Material studied: Holotype of *C. douvillei* Fenaux, 1942 (plate 3, figure D), figure in Fenaux (plate 3, figure E), and specimens of *C. imperialis* Linnaeus, 1758 (form *fuscatus* Born, 1778) (plate 3, figure F).

Dimensions:

Holotype of *C. douvillei* Fenaux, 1942: 51.5 x 27.0 mm

Figure in Fenaux (1942): 53.6 x 26.1 mm

Specimen of *C. imperialis* Linnaeus, 1758 (form *fuscatus* Born, 1778): 52.3 x 27.8 mm

Opinions of other authors:

Wagner & Abbott, 1978 – A synonym of *C. imperialis* Linnaeus, 1758

Walls, [1979] – A synonym of *C. imperialis* Linnaeus, 1758

Coomans et al, 1985 – A homonym of *C. douvillei* Cossmann & Pissaro, 1901 (fossil), a synonym of *C. fuscatus* Born, 1778 (a subspecies of *C. imperialis* Linnaeus, 1758).

Raybaudi Massilia, L. 1992 – A synonym of *C. imperialis fuscatus* Born, 1778.

Röckel et al, 1995 – A synonym of *C. imperialis* Linnaeus, 1758 form *fuscatus* Born, 1758.

Higo et al, 1999 – A synonym of *C. imperialis* Linnaeus, 1758.

Filmer, 2001 – A homonym of *C. douvillei* Cossmann & Pissaro, 1901. A synonym of *C. fuscatus* Born, 1778, (a synonym (form) of *C. imperialis* Linnaeus, 1758).

Discussion:

C. douvillei Fenaux, 1942 is a homonym of *C. douvillei* Cossmann & Pissaro, 1901 (fossil). We are convinced that it is also a synonym of *C. imperialis* Linnaeus, 1758 (form *fuscatus* Born, 1778). All other authors have the same opinion.

6) *Conus incinctus* (Fen)

Plate 4, figures A - C

Note: Described as a new species from Australia.

Material studied: Holotype of *C. incinctus* Fenaux, 1942 (plate 4, figure A), figure in Fenaux (plate 4 figure B), and lectotype plus additional specimens of *C. anemone* Lamarck, 1810 (form *remo* Brazier, 1898) (plate 4, figure C).

Dimensions:

Holotype of *C. incinctus* Fenaux, 1942: 26.5 x 11.6 mm.

Figure in Fenaux (1942): 27.2 x 11.9 mm.

Lectotype of *C. anemone* Lamarck, 1810 (form *remo* Brazier, 1898): 35.0 x 17.5 mm.

Opinions of other authors:

Wagner & Abbott, 1978 – Inadequately described.

Walls, [1979] – A synonym of *C. anemone* Lamarck, 1810 = a juvenile of *C. compressus* Sowerby, 1866.

Raybaudi Massilia, L., 1993b – A synonym of *C. anemone* Lamarck, 1810.

Wilson, 1994 – A synonym of *C. anemone* Lamarck, 1810.

Röckel et al, 1995 – A synonym of *C. anemone* Lamarck, 1810.

Filmer, 2001 – A synonym of *C. anemone* Lamarck, 1810.

Discussion:

C. incinctus Fenaux clearly belongs in the *C. anemone* Lamarck, 1810 group of proposed species names. Within this group there are many described forms. *C. incinctus* seems to us to be closest to the form *C. remo* Brazier, 1898 although its spire is somewhat higher than the lectotype and typical specimens. The orange coloring of the *C. remo* body whorl is a feature that is also present in *C. incinctus*. This coloring is also found in high-spired specimens of *C. anemone* from the Port Lincoln area (see under *C. nitidissimus* below). Consequently, identification of *C. incinctus* with *C. anemone* Lamarck, 1810 (form *remo* Brazier, 1898) is made with reservations.

7) *Conus nitidissimus* (Fen)

Plate 4, figures D - G

Note: Described as a new species from Australia.

Material studied: Holotype of *C. nitidissimus* Fenaux, 1942 (plate 4, figure D), figure in Fenaux (plate 4, figure E), specimens of *C. anemone* Lamarck, 1810 form from South Australia (plate 4 figure F), and the holotype of *C. compressus* Sowerby, 1866 (plate 4, figure G).

Dimensions:

Holotype: of *C. nitidissimus* Fenaux, 1942: 20.9 x 8.5 mm.

Figure in Fenaux (1942): 21.0 x 9.0 mm.

Specimen of *C. anemone* Lamarck, 1810 form from South Australia: 56.8 x 21.7 mm.

Holotype of *C. compressus* Sowerby, 1866: 24.8 x 10.6 mm.

Opinions of other authors:

Wagner & Abbott, 1978 – Inadequately described.

Walls, [1979] – A synonym of *C. anemone* Lamarck, 1810 = a juvenile of *C. compressus* Sowerby, 1866.

Wilson, 1994 – A synonym of *C. anemone* Lamarck, 1810.

Raybaudi Massilia, L., 1994a – A *nomen dubium*.

Röckel et al, 1995 – A synonym of *C. anemone* Lamarck, 1810.

Filmer, 2001 – A synonym of *C. anemone* Lamarck, 1810.

Discussion:

We believe *C. nitidissimus* Fenaux is a sub-adult specimen of *C. anemone* Lamarck, 1810 from the Port Lincoln area of South Australia. These shells differ from all other forms of *C. anemone* due to the presence of distinct nodules on a relatively high turreted spire. At one time, Port Lincoln shells were identified as *C. compressus* Sowerby, 1866 and considered a subspecies of *C. anemone*. We believe this is an error that can be confirmed by direct comparison of Port Lincoln shells (plate 4, figure F) to the type of *C. compressus* (plate 4, figure G). Shells matching the type of *C. compressus* have only been reported from the islands off Northwestern Australia. *C. compressus* possess a more rounded outline than Port Lincoln shells. They are small, lightweight shells with a relatively high spire lacking nodules and lacking fine spiral striae on the body whorl. Port Lincoln shells have also, more recently, been identified with *C. carmeli* Tennison-Woods, 1877. This synonym of *C. anemone*, although possessing a high spire, does not have nodules on the spire whorls. We therefore provisionally consider *C. nitidissimus* conspecific with the Port Lincoln shells. It is our opinion that the *C. anemone* complex requires an in-depth study which may result in *C. nitidissimus* Fenaux, 1942 being designated as a valid species distinct from *C. anemone*.

8) *Conus circumclausus* (Fen)

Plate 5, figures A - C

Note: Described as a new species from Mauritius.

Material studied: Holotype of *C. circumclausus* Fenaux, 1942 (plate 5 figure A), figure in Fenaux (plate 5, figure B), and specimens of *C. cernicus* H. Adams, 1869 (plate 5, figures D & E).

Dimensions:

Holotype of *C. circumclausus* Fenaux, 1942: 17.8 x 9.6 mm.

Figure in Fenaux (1942): 17.6 x 10.0 mm.

Specimen of *C. cernicus* H. Adams, 1869: 24.7 x 14.1 mm.

Specimen of sub-adult *C. cernicus* H. Adams, 1869: 15.9 x 7.8 mm.

Opinions of other authors:

Wagner & Abbott, 1978 – A synonym of *C. cernicus* H. Adams, 1869.

Walls, [1979] – A synonym of *C. cernicus* H. Adams, 1869.

Coomans et al, 1985 – A synonym of *C. cernicus* H. Adams, 1869.

Raybaudi Massilia, L., 1992 – A synonym of *C. cernicus* H. Adams, 1869.

Röckel et al, 1995 - A synonym of *C. balteatus* Sowerby, 1833.

Filmer, 2001 – A synonym of *C. cernicus* Adams, 1869 (a synonym of *C. balteatus* Sowerby, 1833).

Discussion:

Although the holotype is a dead collected worn specimen, we are convinced that *C. circumclausus* Fenaux, 1942 is a synonym of *C. cernicus* H. Adams, 1869. This conclusion is shared by other authors. Adults of *C. cernicus* (plate 5, figure D) are usually broad, but sub-adult specimens (plate 5, figure E) about the same size as the type of *C. circumclausus* are more cylindrical and a better match. Whether *C. cernicus* is a valid species or a form of *C. balteatus* Sowerby, 1833 is subject to different opinions. We prefer to consider *C. cernicus* a form of *C. balteatus*.

9) *Conus viaderi* (Fen)

Plate 5, figures F - G

Note: Described as a new species from Mauritius.

Material studied: The single specimen of *C. viaderi* illustrated in the 1942 Fenaux paper (plate 5, figure F) was not found by the Nice museum (MHNNI) staff, as of July 2007 in either the stored collection from the Musée International de Malacologie or in any other collections of shells held by the museum. Specimens of *C. locumtenens* Blumenbach, 1791 (plate 5, figure G) were studied as comparable.

Dimensions:

Figure in Fenaux (1942): 28.5 x 12.4 mm.

Specimen of *C. locumtenens* Blumenbach, 1791: 24.9 x 12.1 mm.

Opinions of other authors:

Wagner & Abbott, 1978 – May be a *Columbellidae* from Mauritius.

Walls, [1979] – Not a cone (a *Columbellid*, possibly *Conella?*).

Raybaudi Massilia, L., 1995b – A *nomen dubium*.

Röckel et al, 1995 – A synonym of *C. locumtenens* Blumenbach, 1791

Filmer, 2001 – A synonym of *C. locumtenens* Blumenbach, 1791.

Discussion:

Without a type specimen and with a rather poor figure it is difficult to determine the status of *C. viaderi* Fenaux, 1942. Most authors have considered it either a *nomen dubium* or a species not in the genus *Conus*. Röckel et al and Filmer concluded it was a synonym

of *C. locumtenens* Blumenbach, 1791 (formerly known as *C. acuminatus* Hwass, 1792) with which Fenaux compared it. However *C. locumtenens* does not occur in Mauritius the type locality given for *C. viaderi* by Fenaux. Also, the spire of *C. viaderi* is much higher than that normally found in *C. locumtenens*. An unusual, elevated spire in the specimen is possible, especially since Fenaux described other cones with spires higher than typical specimens. Until the holotype becomes available for study, we prefer to classify *C. viaderi* as a synonym of *C. locumtenens*.

10) *Conus subacutus* (Fen)

Plate 6, figures A - C

Note: Described as a new species from Madagascar.

Material studied: Holotype of *C. subacutus* Fenaux, 1942 (plate 6, figure A), figure in Fenaux (plate 6, figure B) and specimens of *C. amadis* Gmelin, 1791 (plate 6, figure C).

Dimensions:

Holotype of *C. subacutus* Fenaux, 1942: 46.2 x 22.0 mm.

Figure in Fenaux (1942): 46.5 x 22.0 mm.

Specimen of *C. amadis* Gmelin, 1791: 41.9 x 19.2 mm.

Opinions of other authors:

Wagner & Abbott, 1978 – Inadequately described, probably *C. amadis* Gmelin, 1791.

Walls, [1979] – A synonym of *C. amadis* Gmelin, 1791.

Lauer, 1990c – A synonym (form) of *C. amadis* Gmelin, 1791.

Raybaudi Massilia L., 1995a – A synonym of *C. amadis* Gmelin, 1791.

Röckel et al, 1995 – A synonym of *C. amadis* Gmelin, 1791.

Filmer, 2001 – A synonym of *C. amadis* Gmelin, 1791.

Discussion:

We are convinced *C. subacutus* Fenaux 1942 is a synonym of *C. amadis* Gmelin, 1791. Other authors came to the same conclusion. We therefore believe Fenaux's stated type locality of Madagascar is erroneous. *C. amadis* is a species only occurring in the northern Indian Ocean.

11) *Conus richardi* (Fen)

Plate 6 figures D - F

Note: Described as a new species from Madagascar.

Material studied: Holotype of *C. richardi* Fenaux, 1942 (plate 6, figure D), figure in Fenaux (plate 6, figure E) and specimens of *C. amadis* Gmelin, 1791 (plate 6, figure F).

Dimensions:

Holotype of *C. richardi* Fenaux, 1942: 44.6 x 24.7 mm.

Figure in Fenaux (1942): 44.5 x 23.0 mm

Specimen of *C. fumigatus* Hwass, 1792: 38.8 x 21.2 mm.

Opinions of other authors:

Wagner & Abbott, 1978 – A synonym of *C. excavatus* Sowerby, 1866.

Walls, [1979] – A synonym of *C. excavatus* Sowerby, 1866.

Raybaudi Massilia, L., 1994b – A synonym of *C. fumigatus* Hwass, 1792.

Röckel et al, 1995 – A synonym of *C. fumigatus* Hwass, 1792.

Filmer, 2001 – A synonym of *C. fumigatus* Hwass, 1792.

Discussion:

We are convinced that *C. richardi* Fenaux, 1942 is a synonym of *C. fumigatus* Hwass, 1792 (form *C. excavatus* Sowerby, 1866). Almost all other authors have reached the same conclusion. We therefore believe Fenaux's type locality of Madagascar is erroneous, as *C. fumigatus* occurs only in the northwest Indian Ocean.

12) *Conus cavailloni* (Fen)

Plate 7, figures A – F and plate 8, figures A – H

Notes: Described as a new species from "Bermudes" (Bermuda). Corrected (Tucker & Bozzetti, 2010) to Sandraviny, southeast Madagascar.

Material studied: Holotype of *C. cavailloni* Fenaux, 1942 (plate 7, figure A & plate 8, figures C & F) and the figure in Fenaux (plate 7, figure B). A specimen of *C. inscriptus* form *keatii* Sowerby, 1858 (plate 7, figure C) was stored with the holotype of *C. cavailloni* (plate 7, figure B) when the collection was studied in 2007. As displays of the Musée International de Malacologie were packed in 1975, this shell was packed together with the holotype of *C. cavailloni*. It was included in the exhibit so it could be compared to *C. cavailloni* by museum visitors. This specimen of *C. inscriptus* was not owned by André Fenaux. (Pers. Comm. Denise Boulet-Dunn, formerly Denise Valéro), so it is not part of the type material. Two syntypes of *C. keatii* Sowerby, 1857 (plate 7 figures D - E) and the holotype of *C. lynceus* Sowerby, 1858 were studied by the second author. Images of two specimens from Madagascar (plate 8 figure A -B) identified as *C. cavailloni* by Tucker & Bozzetti (2010) were obtained. Specimens of *C. inscriptus* Reeve, 1843 (form *keatii* Sowerby, 1858)

and *C. lynceus* Sowerby, 1858 (plate 8, figures D – E & G - H) from authors collections were also examined.

Dimensions:

Holotype of *C. cavailloni* Fenaux, 1842: 48.1 x 19.0 mm.

Figure in Fenaux (1942): 46.8 x 18.1 mm.

Specimen of *C. inscriptus* Reeve, 1843 stored with holotype of *C. cavailloni*: 32.1 x 15.7 mm.

Two syntypes of *C. keatii* Sowerby, 1858: 48.1 x 21 mm & 46.2 x 21.2 mm.

Holotype of *C. lynceus* Sowerby, 1858: 59.5 x 27.5 mm.

Specimens from Madagascar identified as *C. cavailloni* Fenaux, 1942: 80.2 x 37.5 mm & 79.6 x 37.3 mm.

Specimen of *C. inscriptus* Reeve, 1843: 42.8 x 20.0 mm.

Specimen of *C. lynceus* Sowerby, 1858: 49.9 x 21.5 mm.

Opinions of other authors:

Clench, 1953 – Seriously questioned Bermuda as the locality for this species.

Valéro, 1972 – A synonym of *C. keatii* Sowerby, 1857.

Wagner & Abbott, 1978 – A malformed *C. regularis* Sowerby, 1833.

Walls, [1979] – A tentative synonym of *C. lynceus* Sowerby, 1858. Also mentioned are *C. inscriptus* and *C. janus*.

Coomans et al, 1983 – Provisionally a synonym of *C. keatii* Sowerby, 1857.

Raybaudi Massilia L., 1992 – A synonym of *C. keatii*,

a subspecies of *C. inscriptus* Reeve, 1843.

Röckel et al, 1995 – A synonym of *C. inscriptus* Reeve, 1843 (aberrant form).

Filmer, 2001- A synonym of *C. inscriptus* Reeve, 1843.

Tucker & Bozzetti, 2010 – A valid species in the genus *Asprella*.

Discussion:

Tucker & Bozzetti (2010) summarized opinions of earlier authors concerning *C. cavailloni* and made a detailed study of two cone specimens from Madagascar they identified as "*Asprella* (= *Conus*) *cavailloni* (Fenaux, 1942)". Their study indicated that *C. cavailloni* Fenaux (plate 7, figure A - B) was close to *C. lynceus* (fide Walls –see plate 7, figure F) and forms of *C. inscriptus* (fide Coomans et al, Röckel et al, and Filmer – see plate 7, figures D -E). To determine the closest taxon to *C. cavailloni*, they plotted length vs. width for 21 specimens of *C. lynceus*, 17 specimens of *C. inscriptus* (two forms), the two specimens from Madagascar (plate 8, figures A – B), and measurements of the photograph of *C. cavailloni* in the original description. Fenaux did not indicate dimensions of the holotype. Unfortunately, though they noted that *C. cavailloni* has "an elevated spire", Tucker & Bozzetti did not have a dorsal view of the spire profile (plate 7, figure A & plate 8, figure C) which would have more clearly shown that it (the spire) is abnormally distended (an aberrant specimen as noted by Röckel et al, 1995). We believe distortion of the *C. cavailloni* holotype spire does not allow effective use of a length vs. width plot to provide meaningful analysis.

Another reason offered by Tucker & Bozzetti for connecting the two specimens from Madagascar to *C. lynceus* rather than *C. inscriptus* is that "spirals on the teleoconch sutural ramps" of the Madagascar specimens are "numerous and persistent" like those found on specimens of *C. lynceus*. We agree that *C. lynceus* has more spiral cords on the spire whorls than does *C.*

inscriptus. However, the holotype of *C. cavailloni* was not available to Tucker & Bozzetti for examination of its spiral sculpture. Plate 8, figure F shows the spiral sculpture of the *C. cavailloni* holotype compared to similar views of *C. inscriptus* (plate 8, figure G), and *C. lynceus* (plate 8, figure H). These views indicate that the holotype of *C. cavailloni* has fewer spiral cords than an Indian Ocean specimen of *C. lynceus* of about the same size and the spiral sculpture of the *C. cavailloni* type is most similar to *C. inscriptus*.

Mention of aperture color in the analysis of Tucker & Bozzetti was not conclusive. As they note, Fenaux did not comment on the coloration inside the aperture of the holotype. The photo in the original description (plate 7, figure B) shows a dark aperture, but this is revealed to be shadow after the recent images (plate 7, figure A & plate 8, figure C) are examined. We think the aperture color of the *C. cavailloni* holotype (plate 8, figure C) is closer to that of the form of *C. inscriptus* (shown in plate 8, figure D) than to that of *C. lynceus* (shown in plate 8, figure E).

Clearly, as stated by Tucker & Bozzetti, the stated type locality of *C. cavailloni* (Bermuda) is erroneous. They further note that of the 13 taxa considered by Fenaux, eight were from the southwestern Indian Ocean. Based on this ratio, they believe the holotype of *C. cavailloni* was also collected in the southwestern Indian Ocean rather than in Bermuda. In our opinion, this not enough evidence to conclusively designate a new type locality for *C. cavailloni*.

Finally, Tucker & Bozzetti concluded that Fenaux's *C. cavailloni* and the two Madagascar shells they describe were a valid species rather than a form of either *C. lynceus* or *C. inscriptus* only because of a range gap between Madagascar and past reported collection localities of *C. lynceus* (western limit = Phuket, Thailand). After study of the *C. cavailloni* holotype and Fenaux collection, we are doubtful about the wisdom of designating Madagascar as the type locality of *C. cavailloni*. We

think that the group *C. lynceus*, *C. inscriptus* (plus forms including *C. adenensis*, E. A. Smith, 1891, *C. maculospira* Pilsbry & Johnson, 1921, and *C. keatii* Sowerby, 1858), *C. pretiosus* Nevill & Nevill, 1874, and *C. ranonganus* da Motta, 1978 need detailed study and analysis. Provisionally, we believe that *C. cavailloni* Fenaux, 1942 is synonym of *C. inscriptus* Reeve, 1843.

13) *Conus seurati* (Fen)

Plate 9, figures A- F

Note: Described as a new species from "I. Paumotou" (Tuamotu Archipelago).

Material studied: Three syntypes of *C. seurati* Fenaux, 1942 (plate 9 figures A - C), figure in Fenaux (plate 9, figure D), and specimens of *C. quercinus* [Lightfoot], 1786 (plate 9 figures E - F)

Dimensions:

Syntypes (corresponding to figures):

Syntype 1: 10.4 x 5.9 mm (glue artifact on dorsum);

Syntype 2: 10.0 x 6.0 mm (glue artifact on anterior end of shell);

Syntype 3: 8.5 x 4.5 mm (glue artifact on lateral side opposite lip).

Figures in Fenaux (1942) (left to right):

Figure 13, left: 10.6 x 6.1 mm;

Figure 13, center: ??? (spire of the shell) x 6.9 mm; and

Figure 13, right: 7.0 x 4.6 mm.

C. quercinus [Lightfoot], 1786: 16.4 x 8.5 mm.

C. rutilus Menke, 1843. 10.1 x 6.4 mm.

Opinions of other authors:

Wagner & Abbott, 1978 – Inadequately described and a *nomen dubium*.

Walls, [1979] – Unrecognizable.

Raybaudi Massilia L., 1995a – No information.

Röckel et al, 1995 – A *nomen dubium*.

Filmer, 2001 – A synonym (Juvenile) of *C. quercinus* Hwass, 1792 (amended in 2013 to Lightfoot, 1786).

Discussion:

Although there are three syntypes of *C. seurati* Fenaux, 1942, it is not easy to establish their status. Most authors have concluded that *C. seurati* Fenaux is a dubious species (*nomen dubium*). Filmer (2001) considered it a synonym (juvenile) of *C. quercinus* [Lightfoot], 1786 as suspected by Fenaux. Availability of better syntype images shows that the protoconchs of *C. seurati* specimens are consistently larger than that of juvenile *C. quercinus* (plate 9, figure E). Another possible match for *C. seurati* is *C. rutilus* Menke, 1843 (plate 9, figure F). It can have a similar body shape and often lacks pattern on the body whorl. Unfortunately, the protoconch and early whorls of *C. rutilus* are not sufficiently similar to those of *C. seurati*. We therefore conclude that *C. seurati* should be considered a *nomen dubium* until its status is fully reviewed.

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14) *Conus fulvus* (Fen)

Plate 10, figures A - D

Note: Described as a new species from "Nouvelle-Guinée" (Papua New Guinea).

Material studied: Holotype of *C. fulvus* Fenaux, 1943

(plate 10, figure A), figure in Fenaux (plate 10, figure B), specimens of *C. flavescens* Sowerby, 1834 (plate 10, figure C), specimens of *C. mindanus* Hwass, 1792 (plate 10, figure D).

Dimensions:

Holotype of *C. fulvus* Fenaux, 1943: 23.5 x 11.4 mm.

Figure in Fenaux (1943): 28.2 x 14.0 mm.

Specimen of *C. flavescens* Sowerby, 1834: 23.7 x 11.5 mm.

Specimen of *C. mindanus* Hwass, 1792: 23.2 x 12.5 mm.

Opinions of other authors:

Wagner & Abbott, 1978 – An unknown species from New Guinea.

Walls, [1979] – A synonym of *C. mindanus* Hwass, 1792.

Raybaudi Massilia, L. 1993a – A *nomen dubium*.

Filmer, 2001 – A homonym of *C. fulvus* Schröter, 1803 and of Sowerby, 1889. A *nomen dubium*, possibly a synonym (form) of *C. magus* Linnaeus, 1758.

Discussion:

C. fulvus Fenaux, 1943 is a homonym of *C. fulvus* Schröter, 1803 and *C. fulvus* Sowerby, 1889. We think that *C. fulvus* Fenaux, 1943 (plate 10, figure A) is probably a synonym of *C. flavescens* Sowerby, 1834 (plate 10, figure C). *C. mindanus* Hwass, 1792 (plate 10, figure D) has a wider body whorl with different spire sculpture than *C. fulvus* Fenaux, 1943. If we are correct, then the type locality is erroneous. We should add that we do not know of any *Conus* species from Papua New Guinea, or the surrounding localities, which have the unusual spire outline of *C. fulvus* Fenaux, 1943.

15) *Conus sirventi* (Fen)

Plate 10, figures E – H; plate 11, figure A - B

Note: Described as a new species from Madagascar.

Material studied: Holotype of *C. sirventi* Fenaux, 1943 (plate 10 figure E; plate 11, figure A), figure IX in Fenaux (plate 10 figure F), figure X in Fenaux (plate 10 figure G), and specimens of *C. textile* Linnaeus, 1758 (plate 10, figure H & plate 11, figure B)

Dimensions:

Holotype of *C. sirventi* Fenaux, 1943: 45.6 x 25.2 mm.

Figure IX in Fenaux (1943): 48.8 x 24.8 mm.

Figure X in Fenaux (1943): 45.5 x 25.7 mm.

Specimen of *C. textile* Linnaeus, 1758: 39.9 x 20.6 mm.

Specimen of *C. textile* Linnaeus, 1758 (orange form): 49.8 x 24.1 mm.

Opinions of other authors:

Wagner & Abbott, 1978 – Inadequately described; possibly *C. textile* Linnaeus, 1758.

Walls, [1979] – A synonym of *C. textile* Linnaeus, 1758.

da Motta, 1982b – A valid species in complex *C. textile* Linnaeus, 1758.

Lauer, 1988 – A form of *C. textile* Linnaeus, 1758.

Raybaudi Massilia, L., 1995a – A synonym of *C. textile* Linnaeus, 1758.

Röckel et al, 1995 – A synonym of *C. textile* Linnaeus, 1758.

Higo et al, 1999 – A synonym of *C. textile* Linnaeus, 1758.

Filmer, 2001 – A synonym of *C. textile* Linnaeus, 1758.

Discussion:

Fenaux illustrated two specimens in conjunction with his description of *C. sirventi* (figures IX & X). However, he states in the text that figure IX represents a variety of *C. verriculum* (Reeve) (= *C. textile* Linnaeus, 1758) which is provided for comparison. Only Figure X illustrates the specimen designated as *C. sirventi* by Fenaux. We are convinced that *C. sirventi* Fenaux, 1843 is a synonym (color form) of *C. textile* Linnaeus, 1758. All other authors came to the same conclusion. Fenaux mentions the closeness of *C. sirventi* to *C. verriculum* Reeve, 1843 (= *C. textile* Linnaeus, 1758). Lauer, 1988 gives considerable detail and compares *C. sirventi* with *C. textile* form *loman* Dautzenberg, 1937. Recently, dealers and collectors have been applying the name *C. sirventi* to specimens of *C. textile* from southwest Madagascar that only have an orange component to their color pattern. Plate 11 provides a comparison of the *C. sirventi* holotype (plate 11, figure A) to one of these shells (plate 11, figure B). Since the holotype of *C. sirventi* does have other color components in addition to orange and has a different shape, use of the name *sirventi* for the orange color form of *C. textile* does not seem to be supported.

16) *Conus debilis* (Fen)

Plate 11, figures C - E

Note: Described as a new species from "Nouvelle-Guinee" (Papua New Guinea).

Material studied: Holotype of *C. debilis* Fenaux, 1843 (plate 11 figure C), figure in Fenaux (plate 11 figure D), and Specimens of *C. auricomus* Hwass, 1792 (plate 11 figure E)

Dimensions:

Holotype of *C. debilis* Fenaux, 1943: 27.7 x 10.6 mm.

Figure in Fenaux (1943): 34.0 x 13.4 mm

Specimen of *C. auricomus* Hwass, 1792: 34.7 x 12.7 mm.

Opinions of other authors:

Wagner & Abbott, 1978 – An unknown New Guinea cone.

alls, [1979] – A synonym of *C. auricomus* Hwass, 1792.

Coomans et al, 1985 – A homonym of *C. debilis* Monterosato, 1917, a synonym of *C. auricomus* Hwass, 1792 form *dactylosus* Kiener, 1845.

Lauer 1989a – A homonym, a synonym of *C. auricomus* Hwass, 1792.

Raybaudi Massilia, L., 1992 – A synonym of *C. auricomus* Hwass, 1792.

Röckel et al, 1995 – A synonym of *C. auricomus* Hwass, 1792.

Filmer, 2001 – A homonym of *C. debilis* Monterosato, 1917. A synonym of *C. dactylosus* Kiener, 1845 (= a synonym (form) of *C. auricomus* Hwass, 1792).

Discussion:

C. debilis Fenaux, 1943 is a homonym of *C. debilis* Monterosato, 1917. We are convinced that it is a synonym of *C. auricomus* Hwass, 1792. All other authors came to the same conclusion.

Summary

Table 1 lists a proposed disposition for each Fenaux cone name based on this study.

We do not know how or from whom Fenaux obtained his specimens but it is interesting to note that of the 15 new species he described five appear to have erroneous type localities. We think it is unlikely that he collected any of the shells he described himself. Lauer (1988) stated that Fenaux obtained most of his Madagascan shells from the Governor of Madagascar Raymond Decary, who explored more especially the southern and southeastern coasts. We have been unable to trace the source of this information or confirm it.

Since they were used to describe new taxa, these shells have been rediscovered twice. First in the 1960's when Denise Valéro recognized their value and took steps to conserve them for future study; and second, when Dr. Alain Bidar and the staff of the Museum d'Histoire Naturelle de Nice retrieved them from storage and began cataloging them. It is not known whether there will be a need to study these shells further, but due to the efforts taken to conserve these specimens future study is now possible.

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This paper was written with the assistance of many people. Denise Boulton-Dunn provided critical background information on why the Fenaux cone types disappeared in the mid-1970s. The staff of the Museum d'Histoire Naturelle de Nice: Dr. Alain Bidar, Mr. Olivier Garriet, and Mr. Patrice Grassi provided access to these shells for photography and study during the first week of July 2007. They also arranged for a visit to the Institut Oceanographique in Monaco which revealed information about Andre Fenaux and his association with the institute. The staff of the Institut Oceanographique (Monaco), represented by Michèle Bruni (Assistante du conservateur) and Anne-Marie

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Figures

Plate 1, A – *C. elongata* (variety of *C. episcopus* Hwass) Adam & LeLoup (in Dautzenberg), 1937. Described specimen in IRSN, 42.9 x 16.0 mm, Ambon, Indonesia.

Plate 1, B – *C. elongata* (variety of *C. episcopus* Hwass) Adam & LeLoup (in Dautzenberg), 1937. Described specimen in IRSN, 41.3 x 15.4 mm, Ambon, Indonesia.

Plate 1, C – *C. elongata* (variety of *C. episcopus* Hwass) Adam & LeLoup (in Dautzenberg), 1937. Described specimen in IRSN, 58.6 x 22.1 mm, Ambon, Indonesia.

Plate 1, D – *C. elongata* (variety of *C. episcopus* Hwass) Adam & LeLoup (in Dautzenberg), 1937. Two figures in Dautzenberg, plate 3, figure 7, 44.0 x 17.7 mm & 42.6 x 16.3 mm.

Plate 1, E – *C. oblongus* (variety of *C. episcopus* Hwass) Fenaux, 1942. Figure 1 in Fenaux, 40.0 x 16.1 mm. (dorsal view)

Plate 1, F – *C. episcopatus* da Motta, 1982, 43.2 x 18.2 mm, Gould Reef, Queensland, Australia, W. J. Fenzan collection. (dorsal view).

Plate 1, G – *C. magnificus* Reeve, 1843, 45.4 x 20.0 mm, Malaita I., Solomon Is., W. J. Fenzan collection. (dorsal view).

Plate 2, A – *C. dautzenbergi* Fenaux, 1942. Holotype in MHNNI. 39.2 x 18.1 mm, Madagascar.

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Plate 2, C – *C. imperialis* Linnaeus, 1758 (form *fuscatus* Born, 1778), 42.7 x 19.1 mm, Nacala Bay,

Mozambique, East Africa, W. J. Fenzan collection.

Plate 2, D – *C. praeclarus* Fenaux, 1942. Holotype in MHNNI. 27.3 x 15.0 mm, "Bermudes" (Bermuda).

Plate 2, E – *C. praeclarus* Fenaux, 1942. Figure 3 in Fenaux. 62.7 x 31.3 mm. (lateral view)

Plate 2, F – *C. planorbis* Born, 1778. 32.6 x 18.5 mm, Sanur Beach, Bali, Indonesia, R. M. Filmer collection #06077.

Plate 2, G – *C. ferrugineus* Hwass, 1792. 31.5 x 16.2 mm, Olasana Island, Gizo Province, Solomons, R. M. Filmer collection #02708.

Plate 3, A – *C. fulvostriatus* Fenaux, 1942. Holotype in MHNNI. 31.6 x 17.7 mm, "I. Bourbon" (Reunion).

Plate 3, B – *C. fulvostriatus* Fenaux, 1942. Figure 4 in Fenaux, 1942. 70.6 x 38.9 mm. (dorsal view)

Plate 3, C – *C. quercinus* [Lightfoot], 1786. 33.2 x 17.6 mm, Mombasa, Kenya, W. J. Fenzan collection.

Plate 3, D – *C. douvillei* Fenaux, 1942. Holotype in MHNNI. 51.5 x 27.0 mm, Madagascar,

Plate 3, E – *C. douvillei* Fenaux, 1942 Figure 5 in Fenaux. 53.6 x 26.1mm. (ventral view)

Plate 3, F – *C. imperialis* Linnaeus, 1758 (form *fuscatus* Born, 1778). 49.5 x 21.7 mm, Mombasa, Kenya, East Africa, W. J. Fenzan collection.

Plate 4, A – *C. incinctus* Fenaux, 1942. Holotype in MHNNI. 26.5 x 11.6 mm, Australia.

Plate 4, B – *C. incinctus* Fenaux, 1942. Figure 6 in Fenaux. 27.2 x 11.9 mm. (dorsal view)

Plate 4, C – *C. remo* Brazier, 1898. Lectotype in South Australian Museum (SAMA). 35.0 x 17.5 mm, San Remo, Port Phillip Bay, Victoria, Australia.

Plate 4, D – *C. nitidissimus* Fenaux, 1942. Holotype in MHNNI. 20.5 x 8.9 mm, Australia.

Plate 4, E – *C. nitidissimus* Fenaux, 1942. Figure 7 in Fenaux. 21.0 x 8.9 mm. (ventral view)

Plate 4, F – *C. anemone* Lamarck, 1810 (South Australian form). 56.8 x 21.7 mm, Thevenard, Ceduna, South Australia, R. M. Filmer collection #00375.

Plate 4, G – *C. compressus* Sowerby, 1866. Holotype in the Natural History Museum, United Kingdom (NHMUK). 24.8 x 10.6 mm, locality unknown.

Plate 5, A – *C. circumclausus* Fenaux, 1942. Holotype in MHNNI. 24.8 x 10.6 mm, Mauritius.

Plate 5, B – *C. circumclausus* Fenaux, 1942. Figure 8 in Fenaux. 17.6 x 10 mm. (dorsal view)

Plate 5, C – *C. cernicus* A. Adams, 1869. 24.7 x 14.1 mm, Tulear, Southwest Madagascar, R. M. Filmer collection #09542.

Plate 5, D – *C. cernicus* A. Adams, 1869. 15.9 x 7.8 mm, St. Giles-les-bains, Reunion, W. J. Fenzan collection.

Plate 5, E – *C. viaderi* Fenaux, 1942. Figure 9 in Fenaux. 28.5 x 12.4 mm. (ventral view)

Plate 5, F – *C. locumentens* Blumenbach, 1791. 24.9 x 12.1 mm, Ras Kataib, Yemen, R. M. Filmer collection #04075.

Plate 6, A – *C. subacutus* Fenaux, 1942. Holotype in

MHNNI. 46.2 x 22.2 mm, Madagascar.

Plate 6, B – *C. subacutus* Fenaux, 1942. Figure 10 in Fenaux. 46.5 x 22.0 mm. (ventral view)

Plate 6, C – *C. amadis* Gmelin, 1791. 41.9 x 19.2 mm, Phuket, Southwest Thailand, R. M. Filmer collection #00152.

Plate 6, D – *C. richardi* Fenaux, 1942. Holotype in MHNNI. 44.6 x 24.7 mm, Madagascar.

Plate 6, E – *C. richardi* Fenaux, 1942. Figure 11 in Fenaux. 44.5 x 23.0 mm. (ventral view)

Plate 6, F – *C. fumigatus* Hwass, 1792. 38.8 x 21.2 mm, Dahlak Archipelago, Ethiopia, R. M. Filmer collection #03046.

Plate 7, A – *C. cavailioni* Fenaux, 1942. Holotype in MHNNI. 48.1 x 19.0 mm, "Bermudes" (Bermuda). Corrected to Madagascar (Tucker & Bozzetti, 2010).

Plate 7, B – *C. cavailioni* Fenaux, 1942. Figure 12 in Fenaux. 46.8 x 18.1 mm. (ventral view)

Plate 7, C – *C. inscriptus* Reeve, 1843 (form *keatii* Sowerby, 1858) (= *C. inscriptus* Reeve, 1843 (form *adenensis* E. A. Smith, 1891)). Specimen stored with holotype of *C. cavailioni*. 32.1 x 15.7 mm, Collection locality unknown.

Plate 7, D – *C. keatii* Sowerby, 1858. Syntype in NHMUK. 48.1 x 21.0 mm, Seychelles.

Plate 7, E – *C. keatii* Sowerby, 1858. Syntype in NHMUK. 46.2 x 21.2 mm, Seychelles.

Plate 7, F – *C. lynceus* Sowerby, 1858. Holotype in NHMUK. 59.5 x 27.5 mm, Moluccas (Indonesia).

Plate 8, A – *C. lynceus* Sowerby, 1858. Specimen

identified as "*Asprella*" *cavailloni* by Tucker & Bozzetti (2010) in Santa Barbara Museum of Natural History (SBNH) lot #99899. 80.2 x 37.5 mm, Sandraviny, Madagascar. Photo credit; John K. Tucker.

Plate 8, B – *C. lynceus* Sowerby, 1858. Specimen identified as "*Asprella*" *cavailloni* by Tucker & Bozzetti (2010). 79.6 x 37.3 mm, Sandraviny, Madagascar, Luigi Bozzetti collection. Photo credit; John K. Tucker.

Plate 8, C – *C. cavailloni* Fenaux, 1942. Holotype in MHNNI. 48.1 x 19.0 mm, "Bermudes" (Bermuda). Corrected to Madagascar (Tucker & Bozzetti, 2010).

Plate 8, D – *C. inscriptus* Reeve, 1843 (= *C. inscriptus* Reeve, 1843 (form *adenensis* E. A. Smith, 1891). 42.8 x 20.0 mm. Ras Hafun, Somalia. W. J. Fenzan collection.

Plate 8, E - *C. lynceus* Sowerby, 1858. 49.9 x 21.5 mm. Phuket, Thailand. W. J. Fenzan collection.

Plate 8, F – *C. cavailloni* Fenaux, 1942. Holotype in MHNNI. 48.1 x 19.0 mm, "Bermudes" (Bermuda). Corrected to Madagascar (Tucker & Bozzetti, 2010). (Spire view)

Plate 8, G – *C. inscriptus* Reeve, 1843 (form *adenensis* E. A. Smith, 1891). 42.8 x 20.0 mm. Ras Hafun, Somalia. W. J. Fenzan collection. (Spire view)

Plate 8, H - *C. lynceus* Sowerby, 1858. 49.9 x 21.5 mm. Phuket, Thailand. W. J. Fenzan collection. (Spire view)

Plate 9, A - *C. seurati* Fenaux, 1942. Syntype in MHNNI. 10.4 x 5.9 mm, Paumotu (Tuamotu Archipelago). Note: Glue used to fasten shell on the anterior end remains on the shell.

Plate 9, B - *C. seurati* Fenaux, 1942. Syntype in

MHNNI. 10.0 x 6.0 mm, Paumotu (Tuamotu Archipelago). Note: Glue used to fasten shell on the dorsal surface remains on the shell.

Plate 9, C - *C. seurati* Fenaux, 1942. Syntype in MHNNI. 8.5 x 4.5 mm, Paumotu (Tuamotu Archipelago). Note: Glue used to fasten shell on the lateral surface remains on the shell.

Plate 9, D - *C. seurati* Fenaux, 1942. Figure 13 in Fenaux. (Left image: 10.6 x 6.1 mm; Center image: ?? x 6.9 mm (spire view); Right image: 7.0 x 4.6 mm).

Plate 9, E - *C. quercinus* [Lightfoot], 1786. 16.8 x 8.7 mm, Olango I., Cebu I., Republic of the Philippines. W. J. Fenzan collection.

Plate 9, F – *C. rutilus* Menke, 1843. 10.1 x 6.4 mm, Dampier Salt, West Australia, Australia. W. J. Fenzan collection.

Plate 10, A – *C. fulvus* Fenaux, 1943. Holotype in MHNNI. 23.5 x 11.4 mm, Papua New Guinea.

Plate 10, B – *C. fulvus* Fenaux, 1943. Figure VIII in Fenaux. 28.2 x 14.0 mm. (dorsal view)

Plate 10, C – *C. flavescens* Sowerby, 1834. 23.7 x 11.5 mm. Tarpum Bay, Eleuthera, Bahamas. W. J. Fenzan collection.

Plate 10, D – *C. mindanus* Hwass, 1792. 23.2 x 12.5 mm. Cape Samana, Dominican Republic. R. M. Filmer collection # 04970.

Plate 10, E – *C. sirventi* Fenaux, 1943. Holotype in MHNNI. 45.6 x 25.2 mm, Madagascar.

Plate 10, F – *C. sirventi* Fenaux, 1943. Figure IX in Fenaux. 48.8 x 24.8 mm. (dorsal view)

Plate 10, G – *C. sirventi* Fenaux, 1943. Figure X in Fenaux. 45.5 x 25.7 mm. (ventral view)

Plate 10, H – *C. textile* Linnaeus, 1758. 39.9 x 26.0 mm. Tuléar (now Toliara), Southwest Madagascar. R. M. Filmer collection #09294.

Plate 11, A – *C. sirventi* Fenaux, 1943. Holotype in MHNNI. 45.6 x 25.2 mm, Madagascar.

Plate 11, B – *C. textile* Linnaeus, 1758 (orange form). 49.8 x 24.1 mm. Toliara area, Madagascar. W. J. Fenzan collection.

Plate 11, C – *C. debilis* Fenaux, 1943. Holotype in MHNNI. 27.7 x 10.6 mm. Papua New Guinea.

Plate 11, D – *C. debilis* Fenaux, 1943. Figure XI in Fenaux (dorsal view).

Plate 11, E – *C. auricomus* Hwass, 1792. 34.7 x 12.7 mm. Erakor Lagoon, Port Villa, Vanuatu. R. M. Filmer collection #00764.

Table 1

Fenaux name

Conus episcopus var. *oblongus*
Conus dautzenbergi
Conus praeclarus
Conus fulvostriatus
Conus douvillei
Conus incinctus
Conus nitidissimus
Conus circumclausus
Conus viaderi
Conus subacutus
Conus richardi
Conus cavailloni
Conus seurati
Conus fulvus
Conus sirventi
Conus debilis

Disposition

Synonym of *C. episcopus* da Motta, 1982
Synonym of *C. imperialis* Linnaeus, 1758
Synonym of *C. planorbis* Born, 1778
Synonym of *C. quercinus* [Lightfoot], 1786
Synonym of *C. imperialis* Linnaeus, 1758
Synonym of *C. anemone* Lamarck, 1810
Synonym of *C. anemone* Lamarck, 1810
Synonym of *C. balteatus* Sowerby, 1833
Synonym of *C. locumentens* Blumenbach, 1791,
Synonym of *C. amadis* Gmelin, 1791
Synonym of *C. fumigatus* Hwass, 1792
Synonym of *C. inscriptus* Reeve, 1843
A doubtful species (*nomen dubium*)
Synonym of *C. flavescens* Sowerby, 1834
Synonym of *C. textile* Linnaeus, 1758
Synonym of *C. auricomus* Hwass, 1792

Plate 1

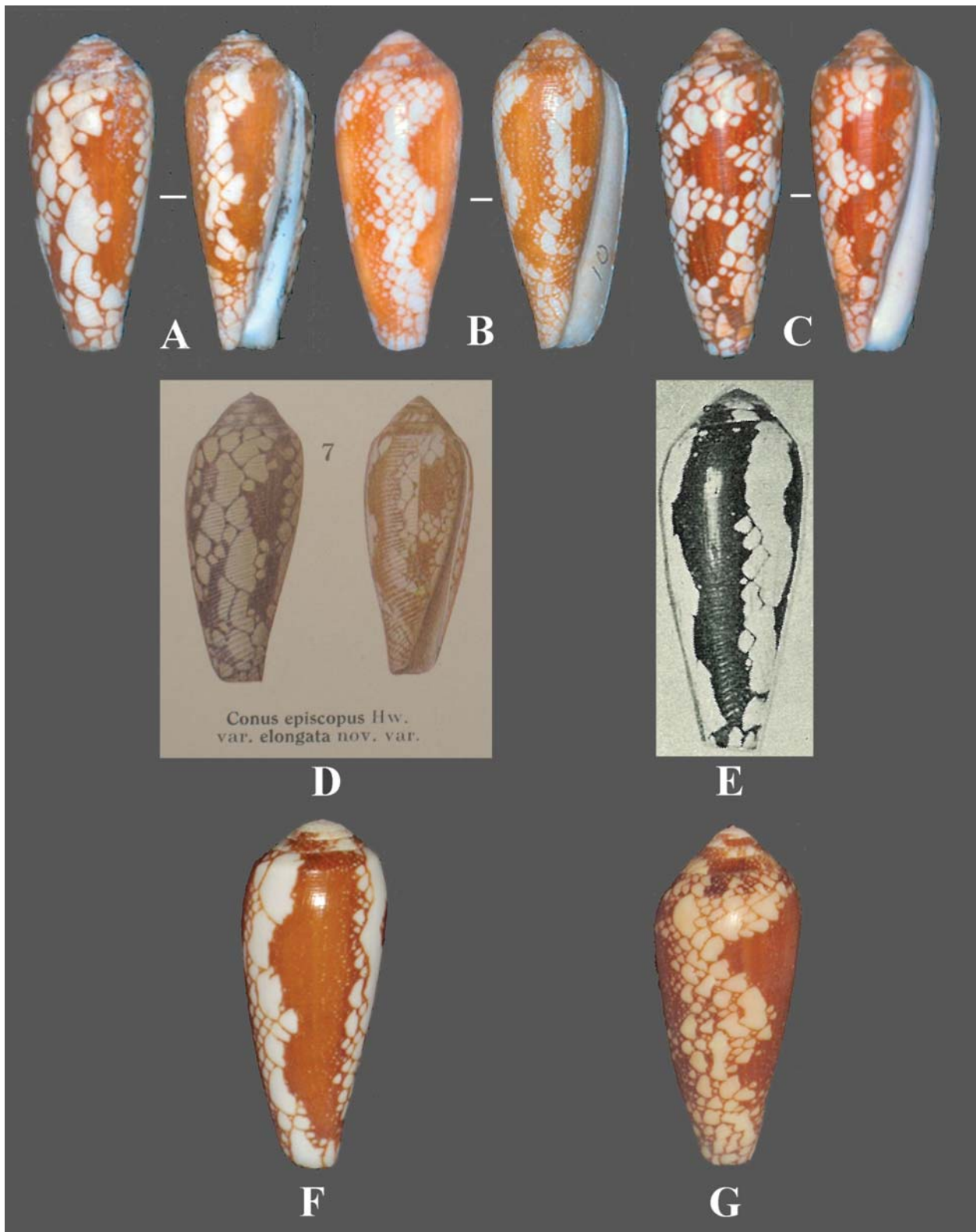


Plate 2

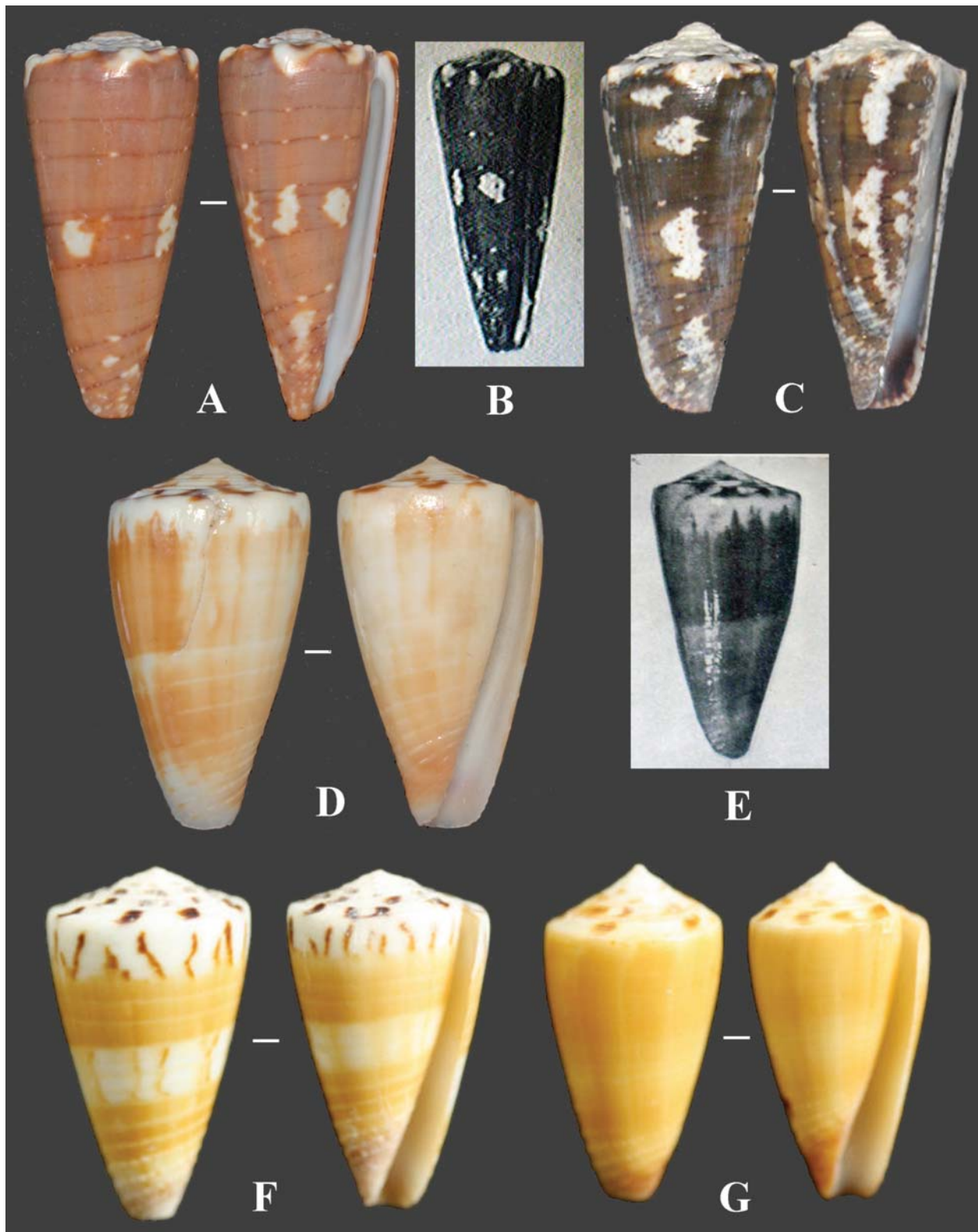


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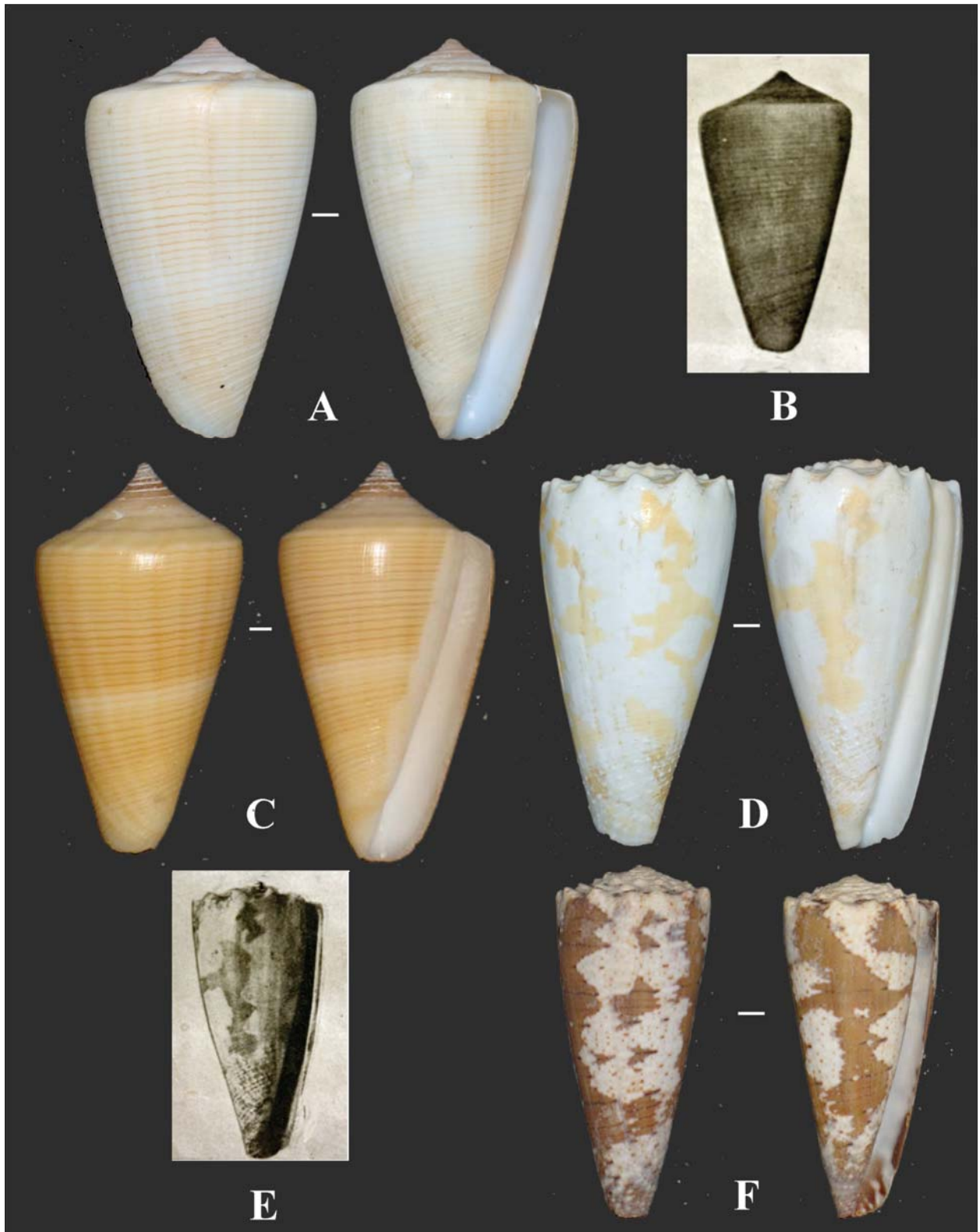


Plate 4

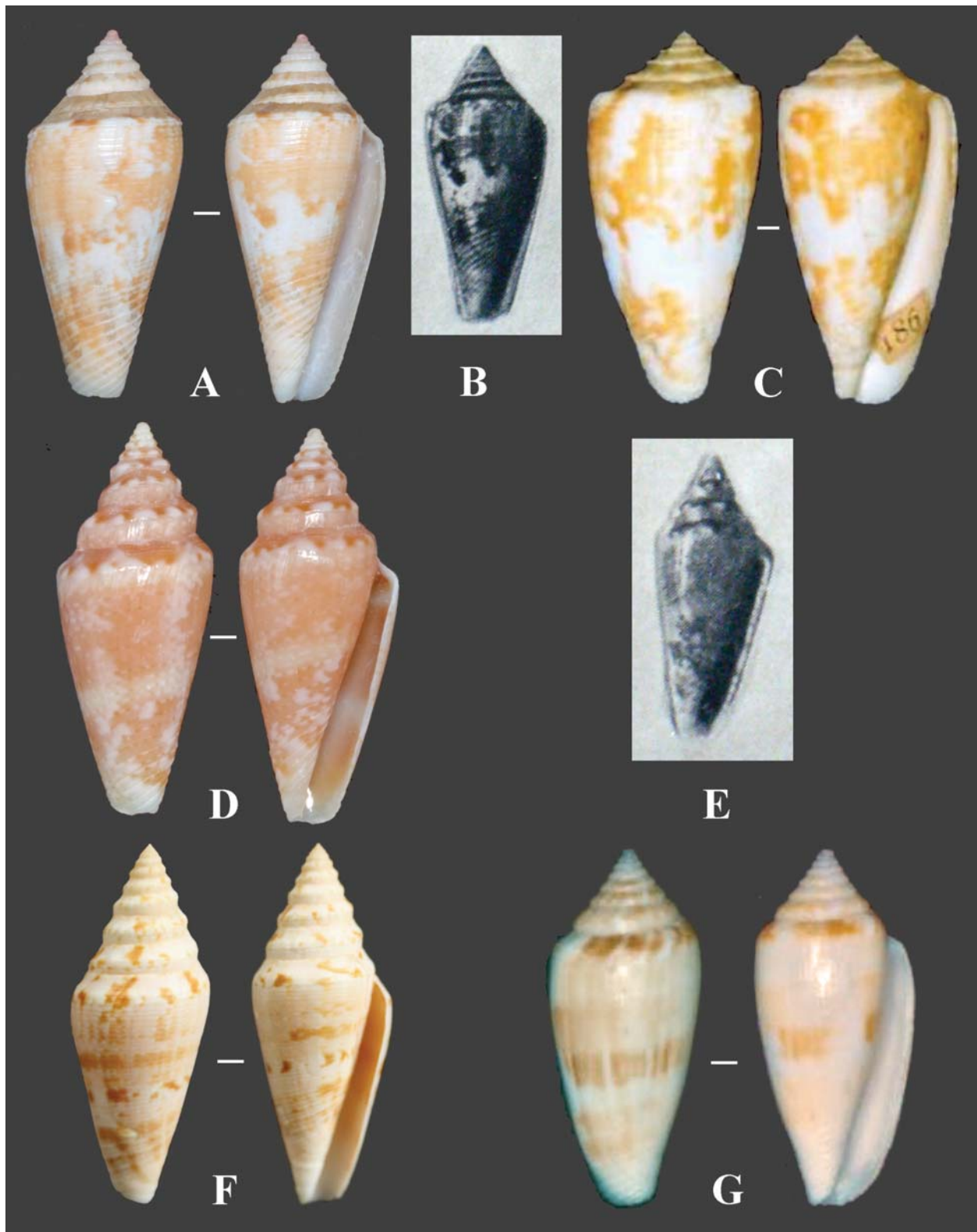


Plate 5

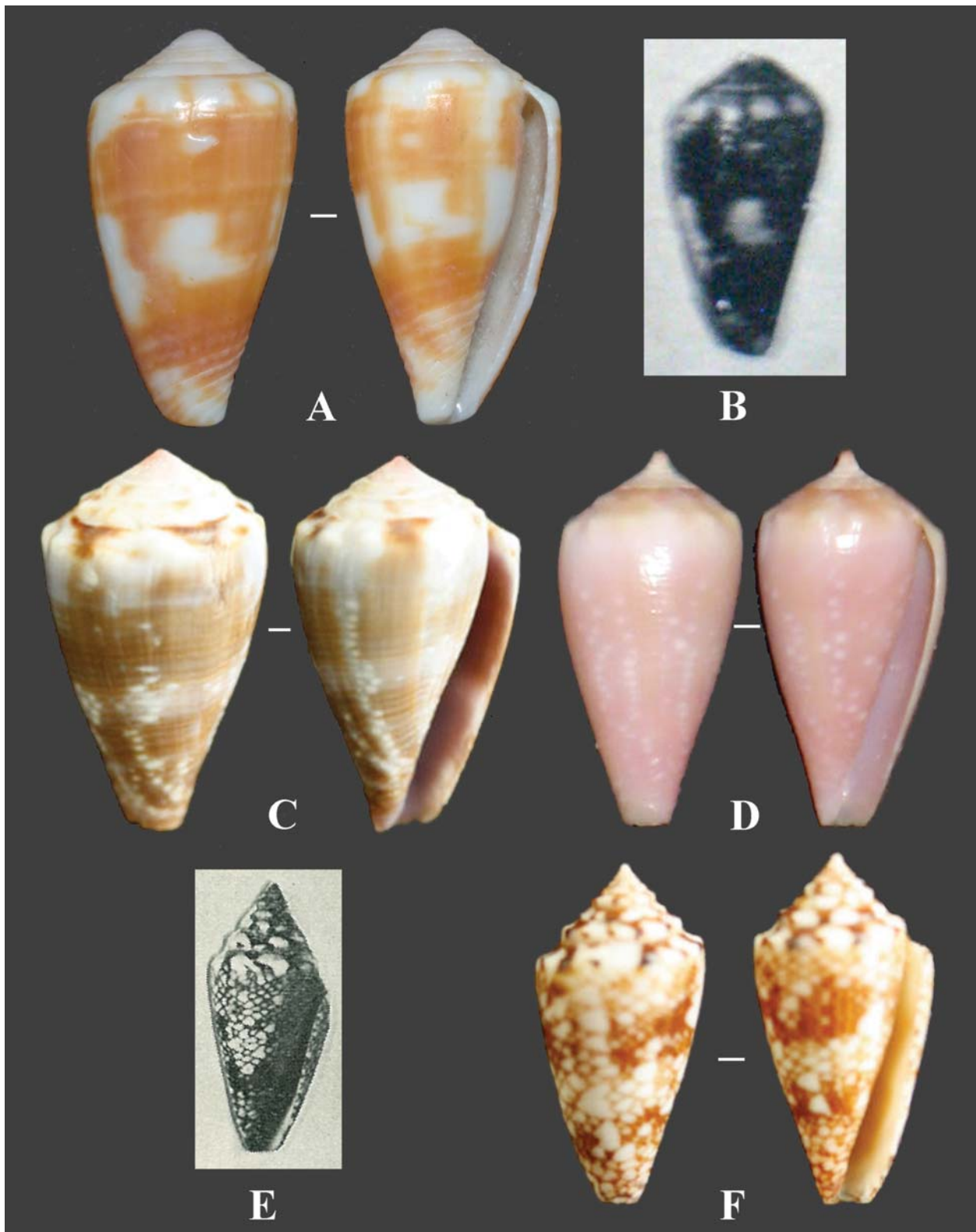


Plate 6

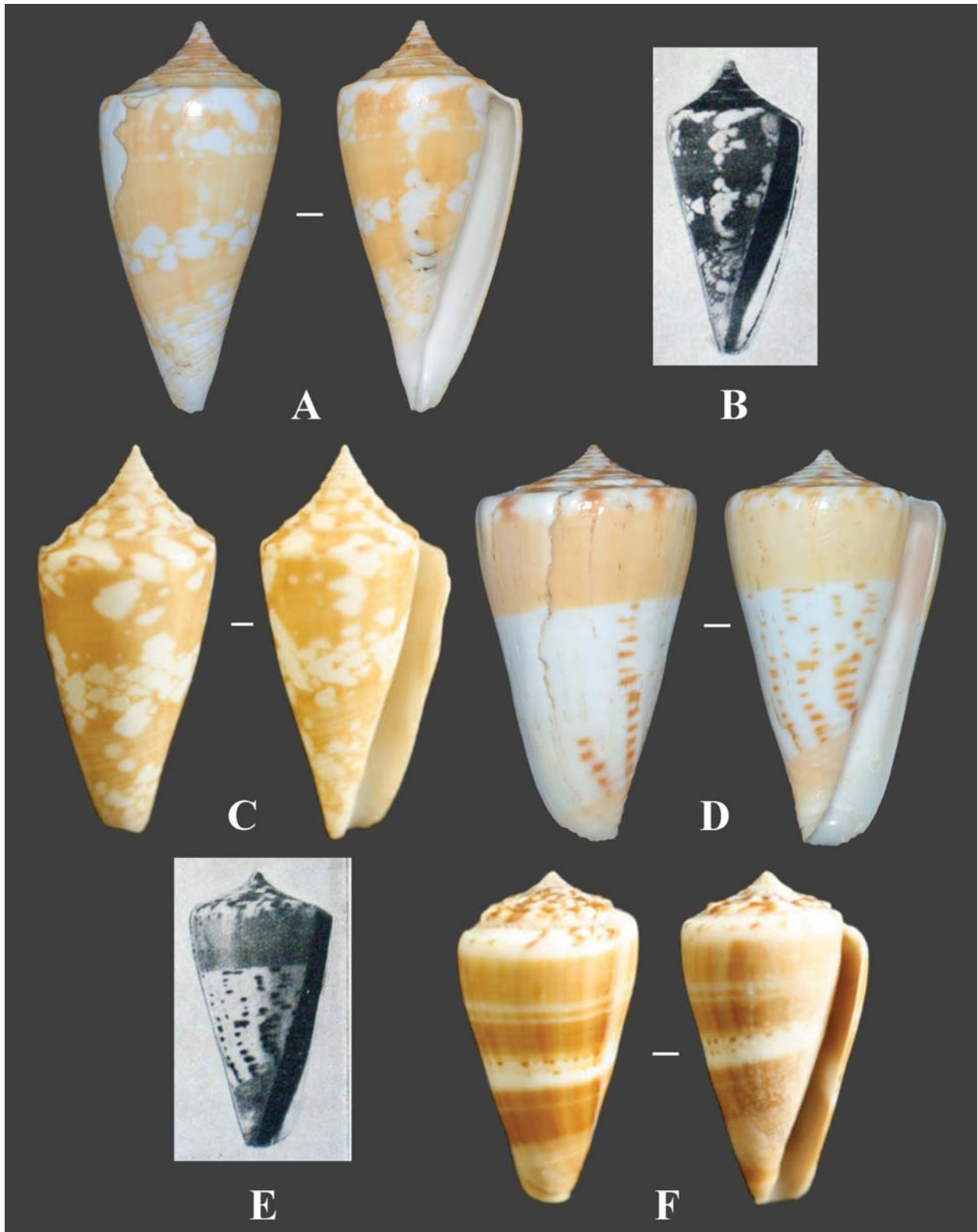


Plate 7



Plate 8

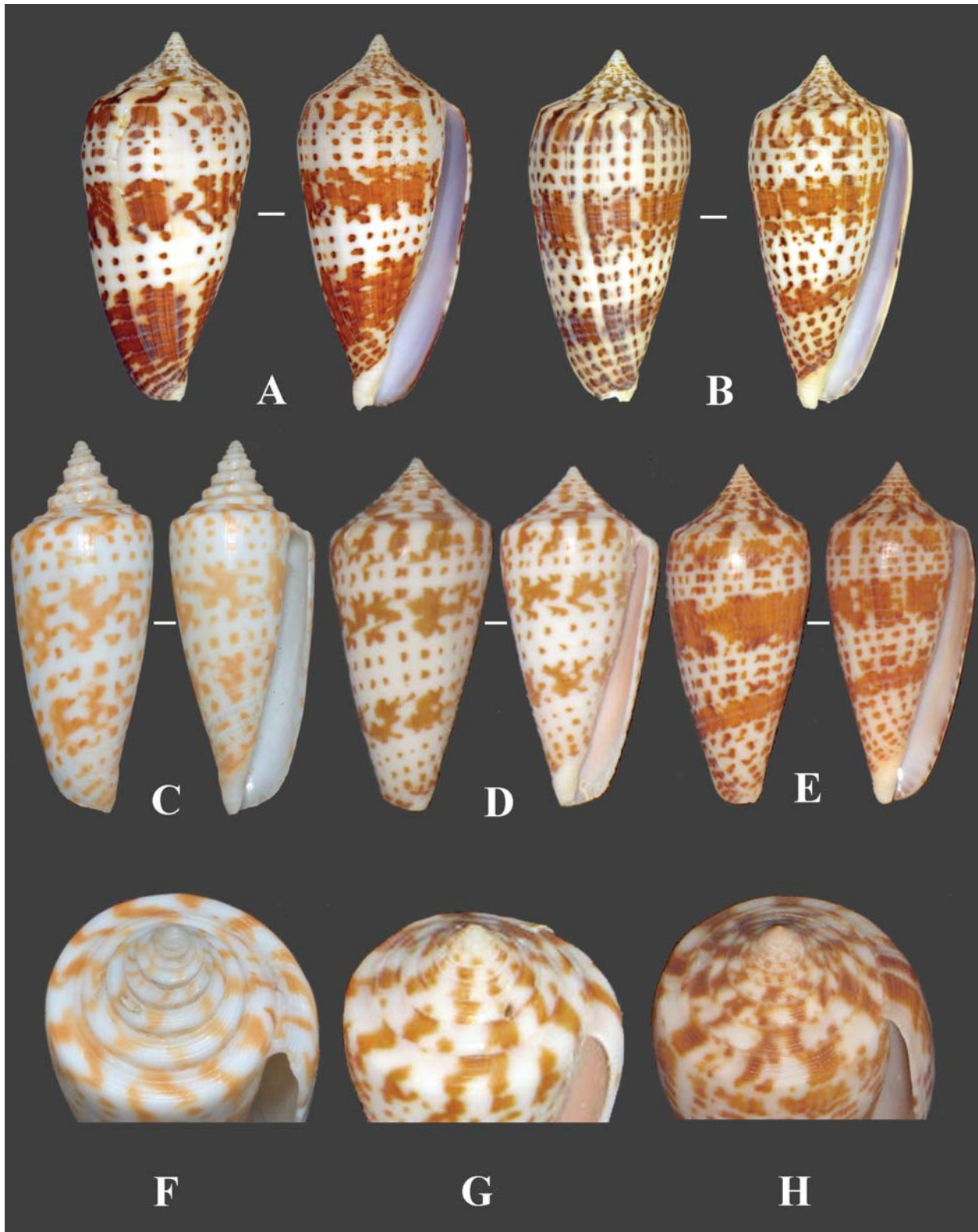


Plate 9

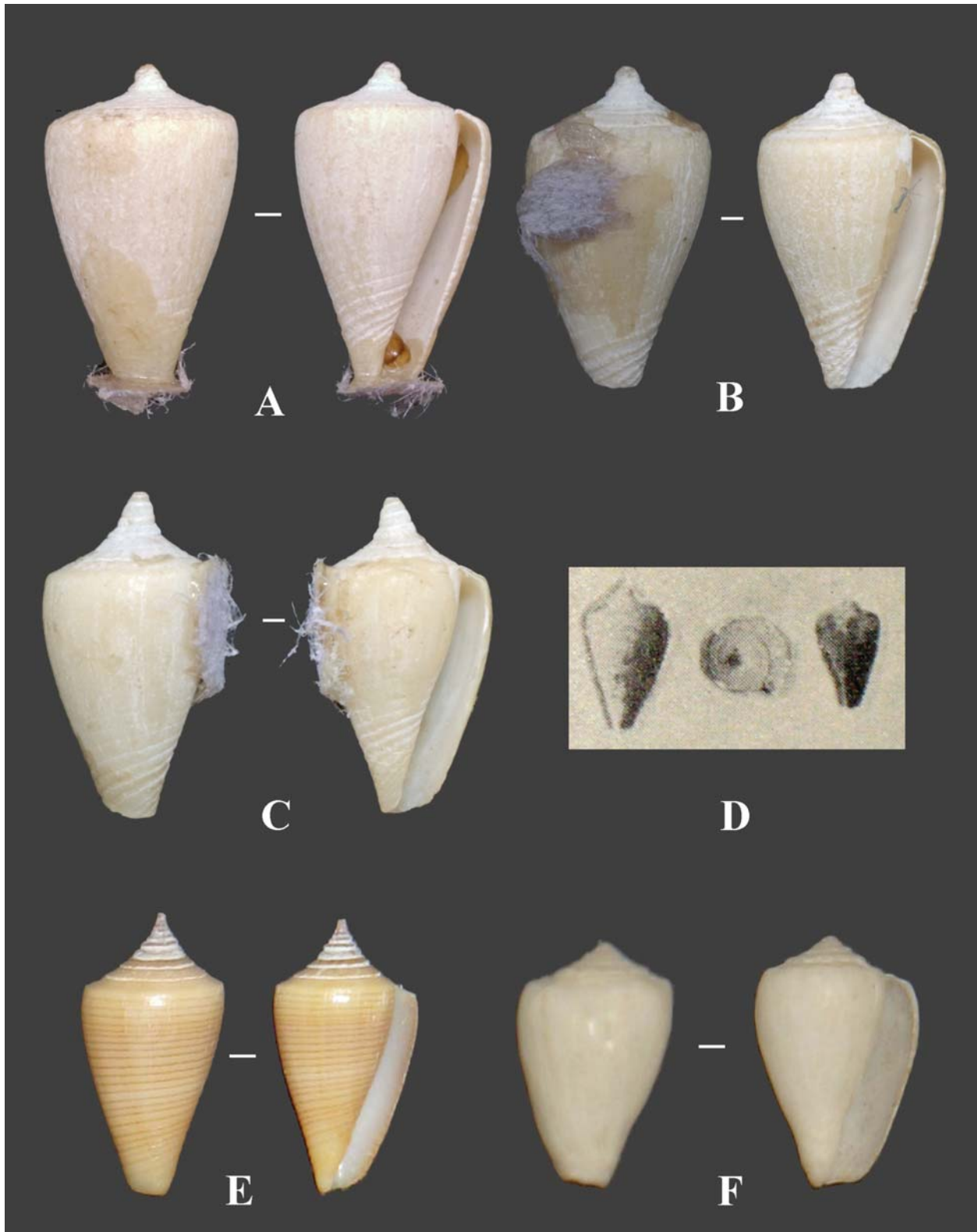


Plate 10

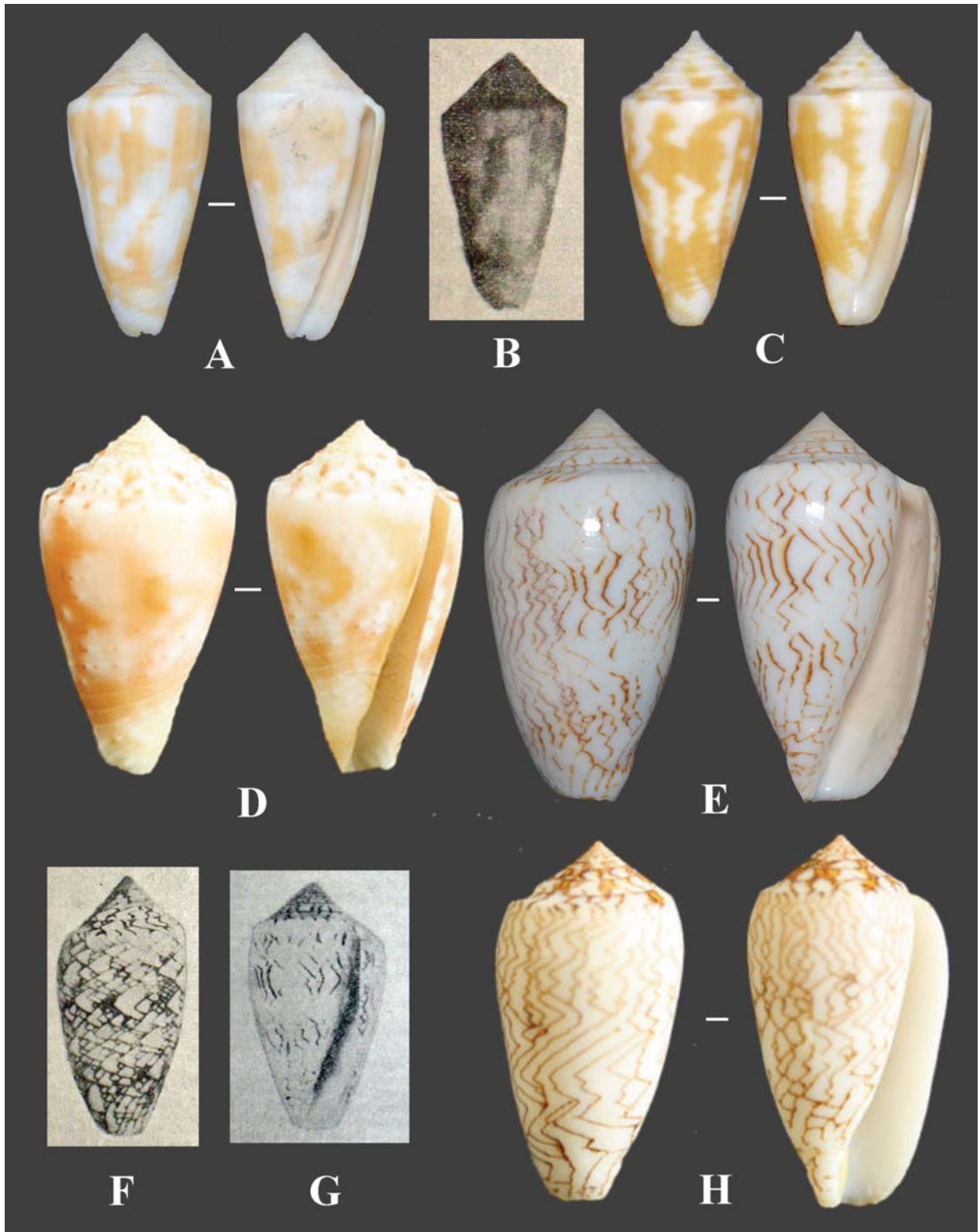
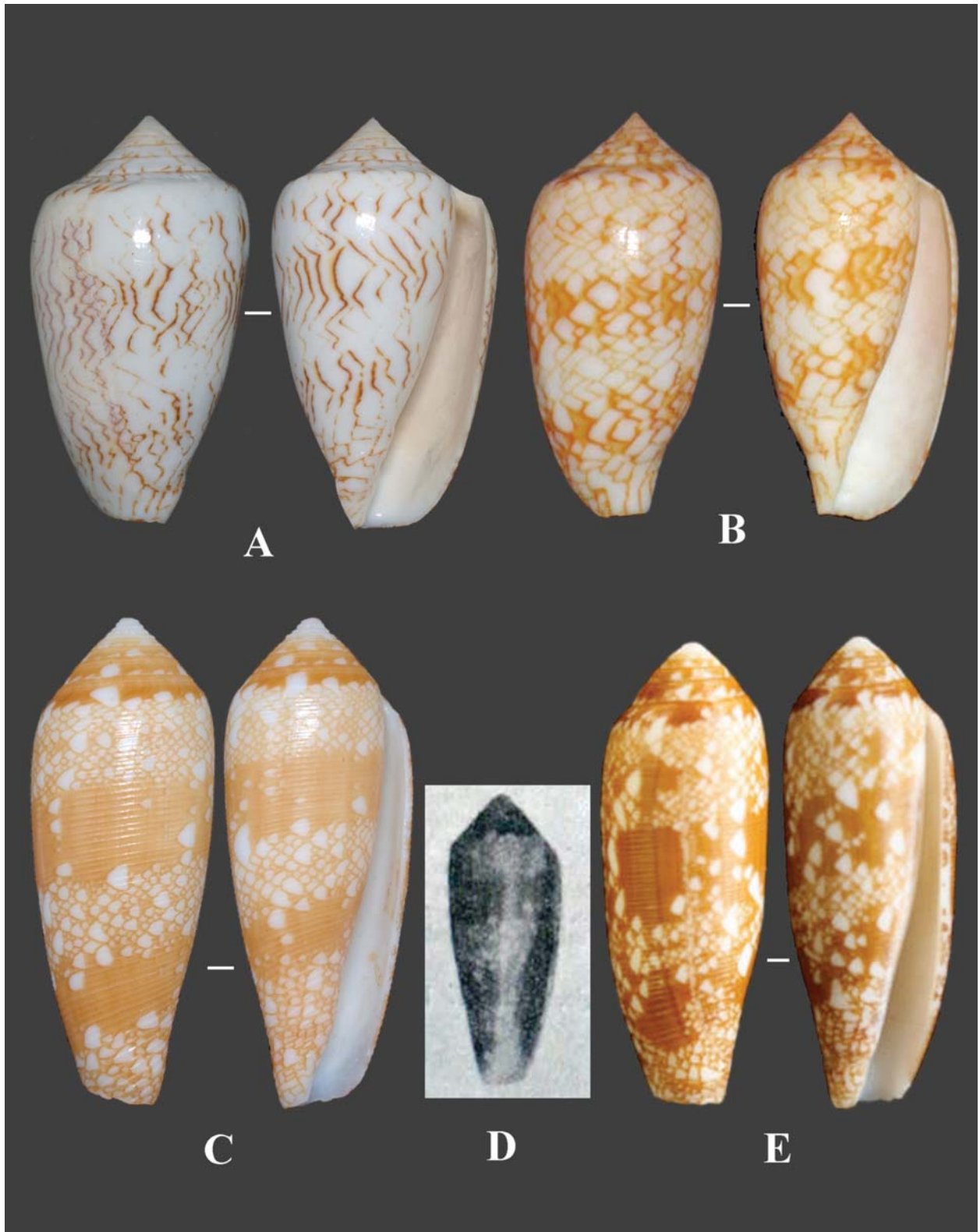


Plate 11



Comments Invited

Allan Vargas



Conus marmoreus form red
66.8mm
Negros, Philippines
May 2013

Allan Vargas has sent photos of a 66.8 mm red coloured *Conus marmoreus* from Negros Island, Philippines.

Such red or reddish specimens are occasionally looked upon with suspicion, because normal black ones have been known to be doctored in order to alter their colours. In this case, Allan guarantees the authenticity, but he would invite comments from our readers on this matter.

Aesthetic Variability in *Conus generalis* Linnaeus, 1767

Michel Jolivet

In the latest issue of TTC, Jim Cootes presented a *Conus generalis* with this comment:

« For me, this is the most beautiful *Conus generalis* I have seen. How about you? »

As an answer, I am glad to submit a selection of thirteen specimens from my collection, chosen because of their quality, but also in order to show the aesthetic variability of this elegant Cone.



54.7 mm
Philippines

60.1 mm
Philippines



66.6 mm
Philippines

60.9 mm
Philippines



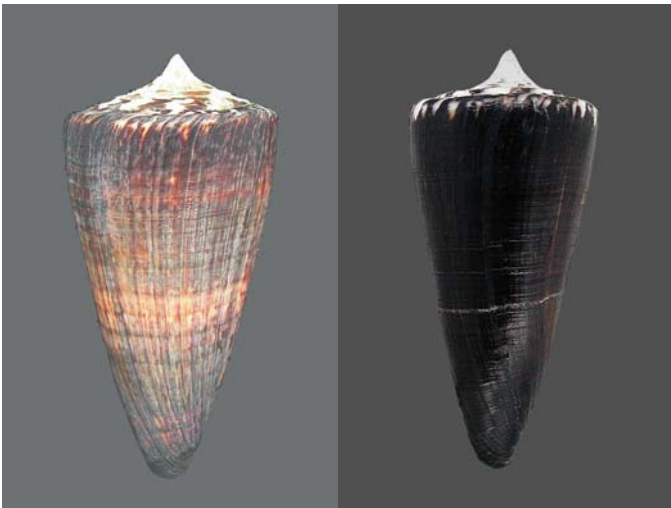
68.3 mm
Philippines

69.2 mm
Philippines



67.4 mm
Bohol, Nocnocan

81 mm
Samar



72.2 mm
Philippines

62.4 mm
Olango



51 mm
Panglao



72 mm, Philippines



60.8 mm, Zamboanga

Conus burnetti from Cape Coral (Florida)

Alessandro Zanzi

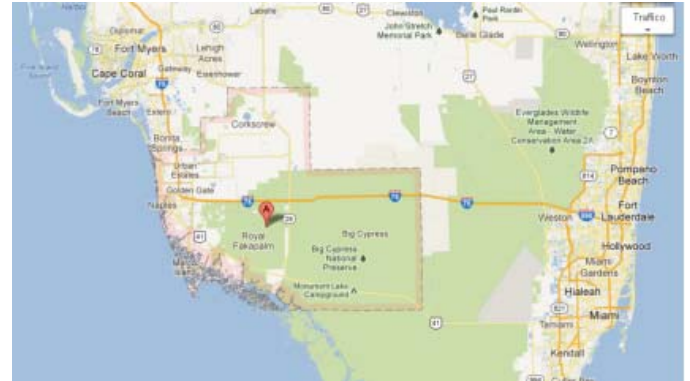
Towards the end of 2011, I received some fossil *Conus* found in the excavation of a canal near of Cape Coral. After examining them and acknowledging some common species (*Contraconus adversarius*, *Conus diegelae*, *Conus griffini*, *Conus jaspideus*, *Conus stearnsii*, *Conus spuroides*), one caught my attention, because of its characteristics, which made him different from any other *Conus* I had seen earlier, in particular his carinate shoulder, forming a prominent ridge, and last whorl with raised spiral threads on basal third.

After some research, reading the article by Jonathan R. Hendricks "The Genus *Conus* (*Mollusca: Neogastropoda*) in the Plio-Pleistocene of the Southeastern United States" (2008), and comparing this *Conus* with the images shown, I could classify it as a *Conus burnetti*, a dextral shell, moderately small, with subsutural flexure asymmetrically curved.

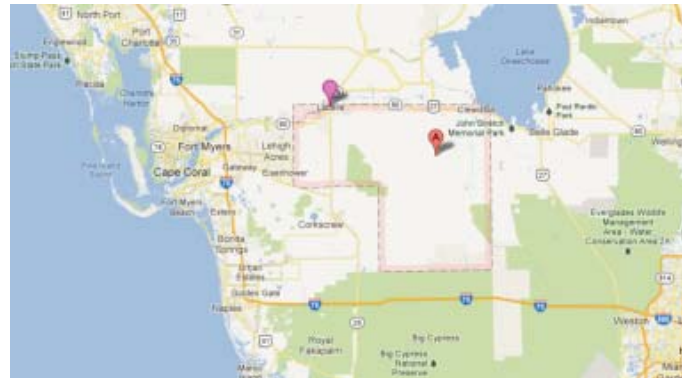


[AZFC N. 414-01] *Conus burnetti*

The holotype (UF 115840) and paratypic lots UF 115841, 115842, 114758, and 114760 were collected from Tamiami Formation (Pincrest Beds) spoil material at UF locality CR014 (Alligator Alley 03, Collier County, Florida), which is designated as the type locality (1). With the exception of a single specimen (UF 58638) from UF locality HN022 (Hendry



Collier County



Hendry County

County Rockpit, Caloosahatchee Formation, Hendry County, Florida), *Conus burnetti* is not known outside Collier County and is likely restricted to the Tamiami Formation (Pincrest Beds) of southern Florida(1). Supposing that since 2008 no other *Conus burnetti* has been found outside the two Counties indicated above, this specimen would be a second exception.

In the description, Hendricks indicates that later ramps are convex, with several raised spiral threads and intervening grooves, but in this specimen, the spiral threads are very light and are visible only using magnifying lens.

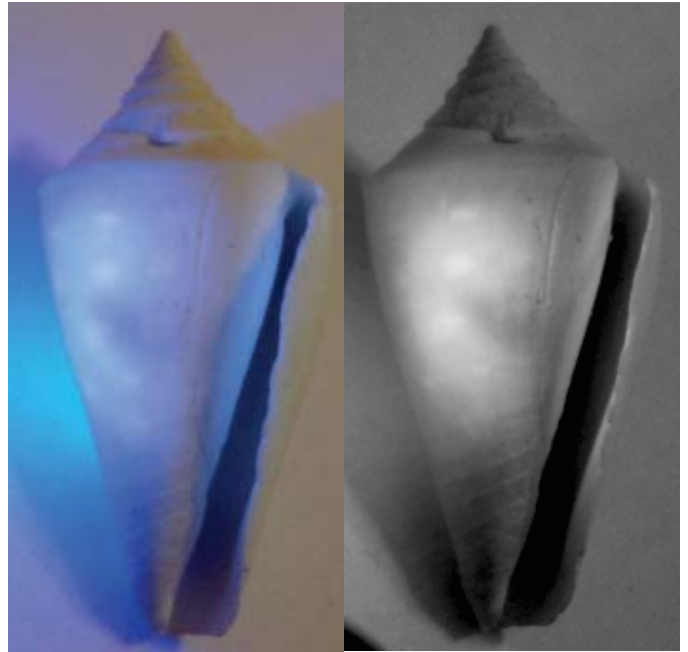
I have also noticed that when this Cone is illuminated with ultraviolet light, it shows elongated spots of pink colour, arranged along spiral lines on the last whorl. I apologize for the quality of images, which certainly do

not have the quality of those obtained in the article by Hendricks: my images were obtained with a diode that emits ultraviolet light and a simple digital camera.



[AZFC N. 414-01] *Conus burnetti* (Jonathan R. Hendricks, 2008) mm. 20,7 x 10,5 – Cape Coral

(Images obtained with ultraviolet light)



[AZFC N. 414-01] *Conus burnetti* (Jonathan R. Hendricks, 2008) mm. 20,7 x 10,5 – Cape Coral

(1) – Jonathan R. Hendricks (2008) “The Genus *Conus* (*Mollusca: Neogastropoda*) in the Plio-Pleistocene of the Southeastern United States”

Etymology of cone species

Letters N-P

António Monteiro

We continue our ongoing study of the etymology of Cone species names, examining the names that begin with the letters N, O and P.

We renew our thanks to all those listed previously who contributed to this work, with special thanks to Kelly Dhondt for her incessant support and many useful suggestions and to Ed Petuch for his indispensable explanations.

About our last section (letters L and M), we did receive a few very useful comments, as follows:

1) Gabriella Raybaudi Massilia pointed out that our previous interpretation of the name of *C. morrisoni* Raybaudi, 1991 completely missed the point! In Gabriella's own words:

I signal you a misunderstanding: *Conus morrisoni* is dedicated to Hugh Morrison, the shell dealer, who supplied the type material

Our deepest apologies to Gabriella and obviously to Hugh Morrison.

2) About the etymology for *C. locumtenens* Blumenbach, 1791, Dariusz Jankowski added the following:

In my opinion the name of this cone may be derived from a military rank of lieutenant (the French translation of locumtenens is adopted as a military rank in numerous armed forces). It is even more probable bearing in mind that some other cones are also named after military ranks: miles, capitaneus, generalis, ammiralis, etc.

Yes, this is probably exactly so, since *locumtenens* gives lieutenant in French (for the rank immediately below captain), lieutenant in English (meaning "a person who holds an office, civil or military, in subordination to a superior for whom he or she acts" and also a military

rank below captain), lugar tenente in Portuguese (with the same meaning), etc.

3) Concerning the etymology for *C. luciae* Moolenbeek, 1986, thanks are due to Gijis C. Kronenberg and especially to Dr. Robert Moolenbeek for clarifying the whole issue. In Dr. Moolenbeek's own words: *Conus luciae* Moolenbeek, 1986 is named after Mrs Lucia M.Th. Loff (1924-1985), who in 1957 married with Dr H.E. Coomans (1929-2010), the former head of the department Malacology of the Zoological Museum in Amsterdam, the Netherlands.

Reference: MOOLENBEEK, R.G. (1986): Studies on *Conidae* (*Mollusca, Gastropoda*) 6. *Conidae* of the Chesterfield Islands, with description of *Conus luciae* nova species. — *Bulletin Zoologisch Museum Universiteit van Amsterdam*, 10: 209-214

ETYMOLOGY (N-P)

namocanus Hwass, 1792

Apparently named after the Namoka Island, Kiribati archipelago, Oceania

namocanus badius Kiener, 1847

From the Latin, meaning "reddish brown" or "chestnut coloured"

natalis Sowerby, 1857

Named after the Natal region, South Africa

natalis gilchristi Sowerby, 1903

Named after John Dow Fischer Gilchrist (1866-1924), South African malacologists

neptunus Reeve, 1843

Named after Neptune, the god of water and the sea in Roman mythology

neptunus colorvariegatus Kosuge, 1981

From the Latin, meaning "with variegated colour"

nielsenae Marsh, 1962

Named after Mollie Nielsen, the wife of Tom Nielsen, an Australian conchologist and fisherman

nielsenae reductaspiralis Walls, 1979

From the Latin, meaning “with a reduced spire”

nielsenae thevenardensis da Motta, 1987

Named after Thevenard Island, North Western Australia

nigromaculatus Röckel & Moolenbeek, 1992

From the Latin, meaning “with black markings”

nigropunctatus Sowerby, 1857

From the Latin, meaning “black-dotted”

nimbosus Hwass, 1792

From the Latin *nimbus*, meaning a rain cloud, hence “the cloudy Cone” or “the rainy Cone”

nobilis Linnaeus, 1758

From the Latin, meaning “noble”, “notable”, “of high rank”

nobilis friedae da Motta, 1991

Named after Frieda Huber, the mother of Franz Huber, an Austrian shell collector

nobilis renatae Cailliez, 1993

Named after Renata Wittig-Skinner

nobilis victor Broderip, 1842

From the Latin, meaning “vanquisher” or “conqueror”

nobilis skinneri da Motta, 1982

Named after Renate (1922-1989) and Edwin Skinner-Wittig (?-1989), American conchologists

nocturnus Solander, 1786

From the Latin, meaning “nocturnal”

nodiferus Kiener, 1845

From the Latin, meaning “with nodules”

nucleus Reeve, 1848

From the Latin, meaning “kernel”

nussatella Linnaeus, 1758

Named after the Island of Nussatella, where it was supposedly found for the first time

obscurus Sowerby, 1833

From the Latin, meaning “obscure”

ochroleucus Gmelin, 1791

From the Greek *ochros*, meaning “pale”, and *leukos*, meaning “white”

ochroleucus pilkeyi Petuch, 1974

Named after Orrin H. Pilkey, (b. 1934), American marine geologist (now retired from Duke University), who worked mostly with coastal processes and beach erosion

ochroleucus tmetus Tomlin, 1937

???

oishii Shikama, 1977

Named after Mrs. Tamiko Oishi, a Japanese shell collector

olgae Bacallado, Espinosa & Ortea, 2007

Named after Olga Ucelay Sabina from Tenerife, Canary Islands, who helped the authors in their research

olgiatti Bozzetti, 2007

Named after Giorgio Olgiati, Italian conchologist

omaria Hwass, 1792

According to Reeve, the “pearled” Cone

omaria magoides Melvill, 1900

The name means “resembling *magus*”
omaria patonganus da Motta, 1982
Named after Patong Beach, Phuket Island, Thailand

omaria sindon Reeve, 1844
According to Reeve, the “fine cambric” Cone; from
the Latin, meaning “muslin”

omaria viperinus Lauer, 1986
The name means “viper-like” (referring to the pattern
of the shell)

optabilis Adams, 1854
From the Latin *opto*, meaning “to choose”

orbignyi Audouin, 1831
Named after Alcide Charles Victor Dessalines
d'Orbigny (1802-1857), French zoologist

orbignyi coriolisi Moolenbeek & Richard, 1995
Named after R. V. “Coriolis” aboard which the
MUSORSTOM 5 expedition was carried

orbignyi elokismenos Kilburn, 1975
The name means “scratched in furrows” (from the
Greek ?)

orion Broderip, 1833
From Orion, a giant huntsman in Greek mythology,
who gave the name to the Orion constellation

ortneri Petuch, 1998
Named for the late Dr. Peter Ortner, a marine
biologist and plankton specialist who worked for the
National Oceanic and Atmospheric Administration
(NOAA) out of Miami

ostrinus Tucker & Tenorio, 2011
The name refers to the light purple ground colour of
the shell

otohimeae Kuroda & Ito, 1961

Named after Otohime, the Japanese goddess of fishes
otohimeae rogmartini da Motta, 1982
Named after Roger Martin, a shell collector from the
Philippines

pacei Petuch, 1987
Named after Robert (Bob) Pace, American shell
collector

pacificus Moolenbeek & Röckel, 1996
Named after the Pacific Ocean

pagodus Kiener, 1846
The name means “shaped like a pagoda” (from the
Portuguese “pagode”, referring to oriental temples,
usually pyramid-like towers and typically having
upward-curving roofs

papalis Weinkauff, 1875
From the Latin, meaning “related to the pope”,
possibly referring to the shape of the shell

papilliferus Sowerby, 1834
From the Latin *papula*, meaning “small nipplelike
lump”, and *papilla*, a diminutive, possibly referring to
some aspect of the periostracum (?)

papuensis Coomans & Moolenbeek, 1982
Named after Papua New Guinea, in the western
Pacific

paraguana Petuch, 1987
Named after the Paraguana Peninsula of Venezuela

parascalaris Petuch, 1987
From the Latin, meaning “similar to *scalaris*”,
referring to the species' similarity to *Gradiconus*
scalaris of the Panamic Province

parius Reeve, 1844
From the Latin, meaning “equal”

parvatus Walls, 1979

From the Latin *parvus*, meaning “small”

paschalli Petuch, 1998

Named after Norman Dale Paschall (1924-2003), American shell collector

patae Abbott, 1971

Named after Patricia (Pat) Nelson Ware, American shell collector

patae binghamae Petuch, 1987

Named after Patricia Bingham (b. 1918), the wife of Richard Bingham, American shell collectors

patamakanthini Delsaerd, 1997

Named after Somnuk Patamakanthin, conchologist from Thailand

patens Sowerby, 1903

From the Latin *pateo*, meaning “open” or “accessible” (possibly referring to the wide aperture of the shell?)

patricius Hinds, 1843

From the Latin *patrici*, meaning “aristocrat”

paukstisi Tucker, Tenorio & Chaney in Severns, 2011

Named after Gary L. Paukstis (1953-2007), American herpetologist and naturalist

paulae Petuch, 1988

Named after Paula Honker of Delray Beach, Florida, wife of Thomas Honker, American conchologist and shell dealer

pauperculus Sowerby, 1834

From the Latin, meaning “little poor” (pauper = poor)

pele Moolenbeek, 1996

Named after P.L. van Pel, a Dutch conchologist

penchaszadehi Petuch, 1986

Named after Pablo Enrique Penschaszadeh, a

conchologist from Argentina

pennaceus Born, 1778

From the Latin, meaning “feathered” (probably referring to the pattern of the shell)

pennaceus bazarutensis Fernandes & Monteiro, 1988

Named after the Bazaruto Islands, Moçambique, southeastern Africa

pennaceus behelokensis Lauer, 1989

Named after the locality of Beheloka, Madagascar

pennaceus colubrinus Lamarck, 1810

From the Latin, meaning “snake-like” (referring to the pattern of the shell)

pennaceus corbieri Blöcher, 1974

Named after Fernand Corbier, a French shell collector who has spent long periods of his life on Madagascar

pennaceus elisae Kiener, 1845

Named after Elisa (?)

pennaceus episcopus Hwass, 1792

From the Latin, meaning “bishop”

pennaceus ganensis Delsaerd, 1988

Named after Gan Island, in the Maldives

pennaceus lohri Kilburn, 1972

Named after M. Lohr, a South African conchologist

pennaceus marmoricolor Melvill, 1900

From the Latin, meaning “marble-coloured”

pennaceus praelatus Hwass, 1792

From the Latin, meaning “prelate”

pennaceus quasimagnificus da Motta, 1982

From the Latin, meaning “very close to *magnificus*”

pennaceus racemosus Sowerby, 1874

From the Latin, meaning “full of clusters”, probably referring to the pattern of shells

pennaceus rubiginosus Hwass, 1792

Form the Latin *rubor*, meaning “redness”, “blush”

pennaceus rubropennatus da Motta, 1982

From the Latin *rubro*, meaning “red”, and *penna*, meaning “feather”, probably referring to the pattern of the shells

pennaceus tsara Korn, Neiderhöfer, & Blöcher, 2000

The name “tsara” is a native word that means “nice” or “pretty”, which seems justified by the harmony of the colour pattern of this subspecies

pennaceus vezoi Korn, Niederhöfer & Blöcher, 2001

Named after the ethnic group of the Vezo that lives in southwest Madagascar

pepeiu Moolenbeek, Zandbergen & Bouchet, 2008

Named after a beautiful Marquesan lady named Pepeiu in an old folk story

pergrandis Iredale, 1937

From the Latin, meaning “very large”

perplexus Sowerby, 1857

From the Latin, meaning “intricate”

pertusus Hwass, 1792

From the Latin *pertundo*, meaning “perforate”, hence the “perforated” Cone

petergabrieli Lorenz, 2006

Named after the British musician Peter Gabriel (b. 1950)

pfluegeri Lorenz & Morrison, 2003

Named after Albert Pflueger (1903?-1962), American conchologist

phuketensis da Motta, 1978

Named after the island of Phuket, Thailand

pictus Reeve, 1843

From the Latin, meaning “painted”

pictus transkeiensis Korn, 1998

Named after the South African region of Transkei

planorbis Born, 1778

From the Latin *plano*, meaning “flat” or “even”, and *orbis*, meaning “circle”

planorbis vitulinus Hwass, 1792

From the Latin *vitulus*, meaning “a bull calf”, hence the “little calf” Cone

planorbis vulpinus Hwass, 1792

From the Latin, meaning “similar to a fox” (probably referring to the colour of the shell)

plinthis Richard & Moolenbeek, 1988

From the Greek *plinthis*, suggesting a wall made of bricks like the pattern of the body whorl

plongimarumai Kosuge, 1980

Etymology unknown. Many of Sadao Kosuge’s names contain the word “maruma”, a reference to the vegetable business run by his friend Masaji Suzuki

poormani Berry, 1968

Named after Roy Poorman, American conchologist

portobeloensis Petuch, 1990

Named after the city of Portobelo, Panama

poulosi Petuch, 1992

Named after an American shrimper of Greek extraction, James Poulos, working down in northern Colombia, who first brought specimens of the new species for study

pretiosus Nevill & Nevill, 1874

From the Latin, meaning “precious”

praecellens A.Adams, 1854

From the Latin, meaning “excelling”

praecellens subaequalis Sowerby, 1870

From the Latin *sub*, meaning “beneath”, and *aequalis*, meaning “uniform”

primus Röckel & Korn, 1990

From the Latin, meaning “first”

princeps Linnaeus, 1758

From the Latin, meaning “prince”

princeps apogrammatum Dall, 1910

???

princeps lineolatus Valenciennes, 1832

From the Latin *lineola*, diminutive of *linea*, meaning “line”, hence “decorated with very fine lines”

profundorum Kuroda, 1956

From the Latin *profundus*, meaning “deep”, hence “coming from deep waters”

proximus Sowerby, 1859

From the Latin *prope*, meaning “near”, superlative *propissimus*, hence “the nearest”

proximus cebuensis Wils, 1990

Named after Cebu Island, in the Philippines

pseudaurantius Vink & von Cosel, 1985

From the Latin, meaning “related to *aurantius*”

pseudimperialis Moolenbeek, Zandbergen & Bouchet, 2008

From the Latin, meaning “related to *imperialis*”

pseudocardinalis Coltro, 2004

From the Latin, meaning “related to *cardinalis*”

pseudokimioi da Motta & Martin, 1982

From the Latin, meaning “related to *kimioi*”

pseudorbignyi Röckel & Lan, 1981

From the Latin, meaning “related to *orbignyi*”

pulicarius Hwass, 1792

From the Latin *pulex*, meaning “flea”, hence the “flea-bitten” Cone

pulicarius vautieri Kiener, 1845

Named after Vautier, a French shell collector

puncticulatus Hwass, 1792

From the Latin, meaning “dotted”

puncticulatus cardonensis Vink, 1990

Probably named after the Island of Cardona, Puerto Rico

puncticulatus columba Hwass, 1792

From the Latin *columba*, meaning “a dove”

purpurascens Sowerby, 1833

From the Latin, meaning “purplish”

pusillus Gmelin, 1791

From the Latin, meaning “very small”

pusio Hwass, 1792

From the Latin *pusiti*, meaning “to smoke”

Conus striatulus is Still Present in the Mediterranean Sea

Alessandro Zanzi

In February 2012, I saw a photograph of a "*Conus mediterraneus*" inserted in a forum in 2009. Letting myself be guided by the common belief that in the Mediterranean Sea there is only one species of *Conus*, the *Conus mediterraneus*, with a great variability, I initially compared it with the *Conus mediterraneus* var. *rubens* (Bucquoy, Dautzenberg & Dollfus, 1882), but watching it more closely, I noticed the many differences that allow distinguish *Conus mediterraneus* from the Cone posted in the forum.

I also noticed that, though it may seem strange, this recent Cone looks a lot like an to a *Conus* considered extinct, although still present in the Pleistocene: the *Conus striatulus* (Brocchi, 1814). The resemblance is quite impressive.

This finding should not seem too surprising. As a matter of fact, Bellardi and Michelotti had already expressed their surprise at the failure to find this species among those living in the Mediterranean, given the frequency of findings in the subappenini layers.

Subsequently I reexamined a Cone in my collection, from Greece, whose colour is very similar to that of the specimen seen in the forum, and I compared it with specimens of *Conus striatulus* var. *taurinensis* from Tuscany, and the *Conus striatulus* var. *taurinensis* described in 1849 by Luigi Bellardi and Giovanni Michelotti.

Conus striatulus was described by Brocchi in 1814. In 1826, Bonelli mentioned a *Conus emmanuelis*, but without either a description or a drawing. In 1849, Bellardi and Michelotti renamed this Cone as *Conus striatulus* var. *taurinensis* because, although the differences between *Conus taurinensis* and *Conus striatulus* described by Brocchi might seem very clear, in a series of specimens they saw a transition from the characteristics of *Conus taurinensis* to those of *Conus striatulus*. Subsequently Sacco, in 1893, refers to this Cone simply as *Conus taurinensis*, and describes it as



Conus striatulus var. *taurinensis* - [AZRC N. 547-35]
mm. 26,2 x 14,3 - Ormos Panagios (Grecia) 1982



Conus striatulus var. *taurinensis* - [AZFC N. 197-02]
mm. 25,1 x 13,0 - Palaia, Montopoli loc. Chiecinnella (Toscana) - Pliocene

a very variable species, so that it is hard to find two specimens that look exactly alike.

From the images presented here, you can check out

the remarkable similarities between the Cone recently collected in Greece [AZRC N. 547-35] and *Conus striatulus* var. *taurinensis* fossils [AZFC 197-02], so much so that I feel I can consider this Cone as a recent *Conus striatulus* var. *taurinensis*.

Although the fossil specimen is in rather bad shape, which of course is to be expected, in the two images one can notice the extreme similarity of the spires and the concavity of the sutural ramps.



Conus striatulus var. *taurinensis* - [AZRC N. 547-35]
mm. 26,2 x 14,3 - Ormos Panagios (Grecia) 1982



Conus striatulus var. *taurinensis* - [AZFC N. 197-02]
mm. 25,1 x 13,0 - Palaia, Montopoli loc. Chiecinella (Toscana) - Pliocene

The appearance of the columella, the growth lines immediately above it and the sculpture at the base,

in fact barely visible in the recent sample, are almost identical.



Conus striatulus var. *taurinensis* - [AZRC N. 547-35]
mm. 26,2 x 14,3 - Ormos Panagios (Grecia) 1982



Conus striatulus var. *taurinensis* - [AZFC N. 197-15]
mm. 28,7 x 15,2 - Palaia, Montopoli loc. Chiecinella (Toscana) - Pliocene



Conus striatulus var. *taurinensis* - [AZRC N. 547-35]
mm. 26,2 x 14,3 - Ormos Panagios (Grecia) 1982



Conus striatulus var. *taurinensis* - [AZRC N. 547-35]
mm. 26,2 x 14,3 - Ormos Panagios (Grecia) 1982



Conus striatulus var. *taurinensis* - [AZFC N. 197-02]
mm. 1 x 13,0 - Palaia, Montopoli loc. Chiecinella
(Toscana) - Pliocene



Conus striatulus var. *taurinensis* - [AZFC N. 197-02]
mm. 25,1 x 13,0 - Palaia, Montopoli loc. Chiecinella
(Toscana) - Pliocene

From the comparison it is possible to notice the similarity of the growth lines on the spire and the presence in both specimens of spiral lines that are barely visible on the surface of the coils. It can also be noticed how the subsutural flexure morphologies change aspect, from less to more arcuate along the development of the last spire, in a similar manner in both Cones. The number of spires is identical, and the increase in width of the spires is identical, passing from one spire to the next.

The two following images show discontinuous lines of dark orange colour, whose spacing is similar, formed by dashes stretched and aligned.

Important Change of Editorial Direction at *Xenophora*

The journal *Xenophora* [Ed.: published by the Association Française de Conchyliologie - AFC] is valued in many countries around the world, and has a wide distribution in many French museums and elsewhere. In the past, we hesitated to publish descriptions of new marine shells, mostly out of a concern that we might not possess the necessary competences needed to assess the quality of new submissions. However, over the years, many of our members have become experts by specializing in their favourite families and we are confident that they can judge the merits of any submissions.

The AFC Board have taken the decision that from this point forward, the *Xenophora* editorial team can publish taxonomic descriptions of new species or subspecies providing that the descriptions comply with the rules and recommendations of the ICZN (International Commission on Zoological Nomenclature). Such descriptions will be submitted before publication to an editorial Committee; decisions to publish or not will follow careful refereeing and this committee may make suggested changes to the author. These descriptions will be sent to the Editor of *Xenophora* (redaction@xenophora.org) in French and English with corresponding illustrations in high definition, on CD or other digital media.

Each author will receive five print copies of the description.



Conus striatulus var. *taurinensis* - [AZRC N. 547-35]
mm. 26,2 x 14,3 - Ormos Panagios (Grecia) 1982



Conus striatulus var. *taurinensis* - [AZFC N. 197-15]
mm. 28,7 x 15,2 - Palaia, Montopoli loc. Chiecinella
(Toscana) - Pliocene

Lautoconus ventricosus Near the Strait of Gibraltar

Benito José Muñoz Sánchez

In early April 2013 my brother José Manuel and I visited a rocky area looking for small shells in a lonely beach located in the south of Cádiz Province, South Western Spain, not far away from the Strait of Gibraltar. The rocky platform that we are speaking of is just in the shoreline and is often windswept typical for this place. Snorkeling there is virtually impossible as you can see below for most of the year due to strong currents and powerful waves (Figs 1-2).

Amongst the scarce molluscs species that we found alive in this rough habitat, prisoner of the strong tides, the sun and powerful winds of the Strait, we put our eyes in a few but quite nice specimens of *Lautoconus ventricosus* (Gmelin 1791), a predator of polychaetes which is fairly abundant in several spots of the province, especially in the Northern region.

The environment of this well-known cone species is in the shallowest part of the rocky platform, mostly in the tide pools with moderately calm and crystalline cold water, often crawling beneath the shell and sand rubble, and covered with seaweed (Figs 3-4).

Living specimens were really hard to see in their natural habitat even for well-trained eyes because their small- medium size and the fact that they were strongly covered with small inclusions and seaweed (we call the small algae growth which entirely covers the shell “verdina”) as you can see in the fig. 5. This makes the shells difficult to identify amongst the rubble and seaweed of the rocks.

We only managed a few specimens in 2-3 hours (in daytime), but we think there were more specimens camouflaged in the interstices and holes in the tide pools. We also noted the presence of some dead specimens used by tiny -and happy- hermit crabs as well some dead ones in the home of red octopuses (*Octopus vulgaris*).

In our opinion, this local population does not differ



too much from the other populations that we have able to get and observed directly in our trips looking for local Western-Atlantic seashells in the wild South Side of Spain.

In the fig. 6, you can see two of the best specimens we've collected for study. The rest of specimens found were let alone because the bad condition of their shells.

P.S. Thanks to our friend António Monteiro, who allowed us to publish this article in this wonderful magazine devoted to Cone lovers...



New Publications

1) *Visaya* Vol. 4, No. 1 (February 2013)

Eric Monnier & Loïc Limpalaër, « *Kioconus ruthae* (*Gastropoda: Conidae*), a New Species from the South Western Philippines » (pp. 11-14, pl. 1-2)



Kioconus ruthae 42.93 mm Holotype MNHN



K. ruthae 48,18 mm Paratype 1 Coll. E. Monnier



Kioconus ruthae 51,59 mm Paratype 2 Coll. L. Limpalaër

The new species is compared with *Dauciconus stimpsoni* (Dall, 1902), *Lividoconus eximius* (Reeve, 1849), *L. lischkeanus* (Weinkauff, 1875), *L. escondidai* (Poppe & Tagaro, 2005), *Kioconus voluminalis* (Reeve, 1843) and *K. aff. filicinctus* (Schepman, 1913).

The type location is Balabac Island, Philippines.

Etymology: The new species is named after Ruth Lacanienta Barbier, the wife of the French conchologist Jean Pierre Barbier, who supplied the type series for study.

Loïc Limpalaër & Eric Monnier, « *Cylinder tagaroe* (*Gastropoda: Conidae*), a Valid Name for a Long Time Known Species from the Philippines » (pp. 17-22, pl. 1-2)



Cylinder tagaroe 54.33 mm Holotype MNHN

The new species is compared with *Conus telatus* Reeve, 1848 and *C. scottjordani* Poppe, Monnier & Tagaro, 2012.

The type location is Palawan, Philippines.

Etymology: The new species is named after Sheila P. Tagaro, a biologist at Conchology Inc., Cebu, Philippines.

Eric Monnier & Loïc Limpalaër, « *Darioconus laueri* (Gastropoda: Conidae), New Species from the Eastern Persian Gulf » (pp. 85-90, pl. 1-4)



Darioconus laueri 60.2mm Holotype coll. SMNS

The new species is compared with *Conus telatus* Reeve, 1848 and *C. scottjordani* Poppe, Monnier & Tagaro, 2012.

The type location is Dubai, in the United Arab Emirates, in the South Eastern Persian Gulf.

Etymology: The new species is named after José Lauer (1937-2002), a French conchologist.

2) Edward J. Petuch, *Biogeography and Biodiversity of Western Atlantic Mollusks*, CRC Press (Taylor & Francis Group, Boca Raton, London, New York). 252 pp. Photos by Dennis Sargent. 2013

In this book, the author introduces 9 new genera, as follows:

Family *Conidae* (subfamily *Puncticulinae*):

Arubaconus (type species: *A. hieroglyphus* (Duclos, 1833))

Etymology: Named after Aruba Island, from where the genus is endemic

Attenuiconus (type species: *A. attenuatus* (Reeve, 1844))

Etymology: From the Latin *attenuates*, meaning “stretched out” or “made thin”, in reference to the elongated shape of the shells

Bermudaconus (type species: *B. lightbourni* (Petuch, 1986))

Etymology: Named after Bermuda, from where the genus is endemic

Brasiliconus (type species: *B. scopulorum* (Van Mol. Tursch & Lempf, 1971))

Etymology: Named after Brazil, from where the genus is endemic

Kellyconus (type species: *K. patae* (Petuch, 1987))

Etymology: Named after Kelly McCarthy, wife of André Poremski, conchologist and diver

Poremskiconus (type species: *P. archetypus* (Crosse, 1865))

Etymology: Named after André Poremski, diver and expert on western Atlantic Cones

Sandericonus (type species: *S. sanderi*, Wils & Moolenbeek 1979)

Etymology: Named after the type species of this genus

Tuckericonus (type species: *T. flavescens* (Sowerby, 1834))

Etymology: Named after John Tucker, well-known malacologists, expert on Cones, especially on their higher systematics, and author of many papers and books

Family *Conolithidae* (subfamily *Conolithinae*):

Coltroconus (type species: *C. iansa* (Petuch, 1979))

Etymology: Named after the brothers José and Marcus Coltro, well-known conchologists and shell dealers from Brazil

In the same work, the following are described as new species:



Dauciconus jorioi

Holotype: FMNH, 38 x 29 mm

Type locality: Trindade Island, Brazil

Etymology: Named after Domingos Afonso Jorio, a Brazilian malacologist



Lindaconus therriaulti

Holotype: FMNH, 43 x 25 mm
 Type locality: Off Progresso, Yucatan State, Mexico
 Etymology: Named after Lyle Therriault, American conchologist and Cone collector



Magelliconus eleutheraensis

Holotype: FMNH, 19 x 11 mm
 Type locality: Eleuthera Island, Great Bahama Bank, Bahamas
 Etymology: Named after the type locality

Sandericonus ednae

Holotype: FMNH, 29 x 15 mm
 Type locality: Off Farol de S. Tomé, Rio de Janeiro State, Brazil
 Etymology: Named after Edna Aguilar Jorio, amateur naturalist and wife of Brazilian malacologist Afonso Jorio

Dalliconus coletteae

Holotype: FMNH, 20 x 7 mm
 Type locality: Off St. James, Barbados
 Etymology: Named after Colette Kuiper-Hoorn, from the Netherlands



Jaspidiconus allamandi

Holotype: FMNH, 16.2 x 7.2 mm
 Type locality: Roatan Island, Bay Islands, Honduras
 Etymology: Named after Randy Allamand, well-known diver and shell dealer



Jaspidiconus exumaensis

Holotype: FMNH, 15.2 x 7 mm
 Type locality: Off Cape Eleuthera, southwestern side of Eleuthera Island, Bahamas
 Etymology: Named after the Exuma Dound of the Bahamas



Jaspidiconus oleiniki

Holotype: FMNH, 15 x 8.5 mm
 Type locality: Nixon's Harbour, South Bimini Island, Bimini Chain, Great Bahama Bank, Bahamas
 Etymology: Named after Dr. Anton Oleinik, Department of Geosciences at Florida Atlantic University, who collected the type material



Jaspidiconus mackintoshi

Holotype: FMNH, 13.7 x 7.1 mm
 Type locality: Little St. James Island, U.S. Virgin Islands
 Etymology: Named after Gary Mackintosh, Caribbean shell collector and diver



Jaspidiconus sargenti

Holotype: FMNH, 21.7 x 10.75 mm
 Type locality: Off Roatan Island, Bay Islands, Honduras

Etymology: Named after Dennis M. Sargent, amateur malacologist, naturalist and photographer

We thank Ed Petuch, Dennis Sargent, John Tucker and Dr. Jochen Gerber from the Field Museum of Natural History (FMNH) in Chicago, Illinois, for their help in supplying the photos of specimens of the new species

3) Georges Richard & Michaël Rabiller, « *Conus boutetorum* spec. nov., (*Mollusca, Gastropoda, Conidae*) and Notes on the *Pionoconus* Group in French Polynesia », in *Annales de la Société des Sciences Naturelles de la Charente-Maritime*, Supplément, Mai 2013



Holotype: MNHN, 52.2 mm (photo: Alain Robin)

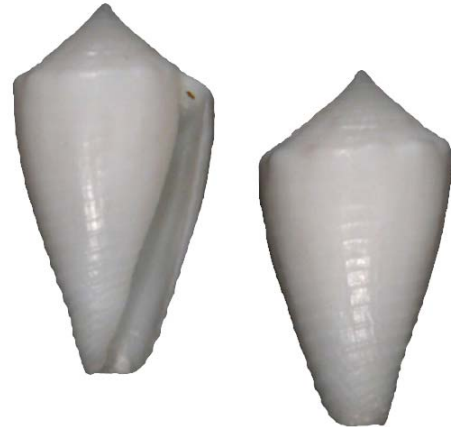
The new species is compared with *C. aurisiacus* Linnaeus, 1758, *C. barthelemyi* Bernardi, 1861, *C. gauguini* Richard & Salvat, 1973 and *C. circumcises* Born, 1778.

The type locality is the Afaahiti lagoon, north coast of Tahiti island, Society archipelago.

Etymology: The new species is named after Michel and H el ene Boutet, conchologists from Tahiti.

4) Rika Goethaels & David Monsecour, « A new species of *Rolaniconus* (*Gastropoda: Conidae*) from the Philippines », in *Novapex* 14(2): 35-37, 10 June 2013.

The authors describe the new species *Rolaniconus dedonderi*.



Holotype MNHN, 20.8 x 11.5 mm

The new species is compared with *Rolaniconus axelrodi* (Walls, 1978) and *R. lecourtorum* Lorenz, 2011.

The type locality is the Coron, Palawan Island, southern Philippines.

Etymology: The new species is named after Fernand De Donder, a well-known conchologist and shell dealer, and the first author's husband.

As always, I thank the authors for making all the above photos available.

We hope to see
your article in
the next TCC!

