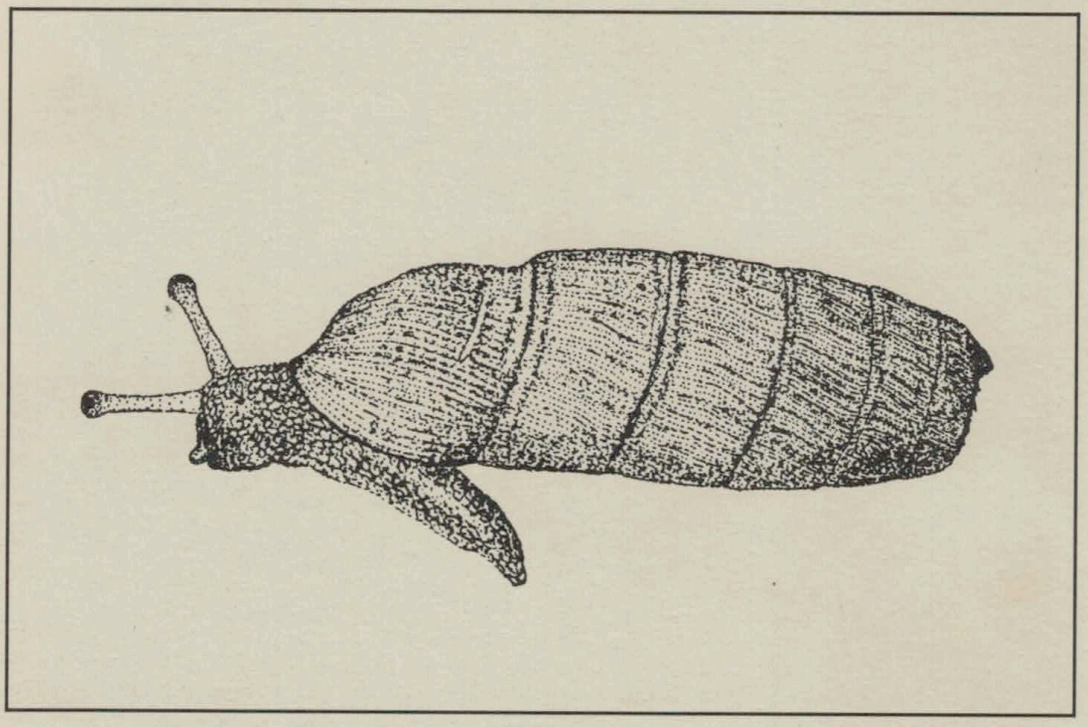
Schriften zur Malakozoologie

aus dem Haus der Natur - Cismar

Heft 2



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Annotated descriptions of some new and old members of Cypraeidae.

By
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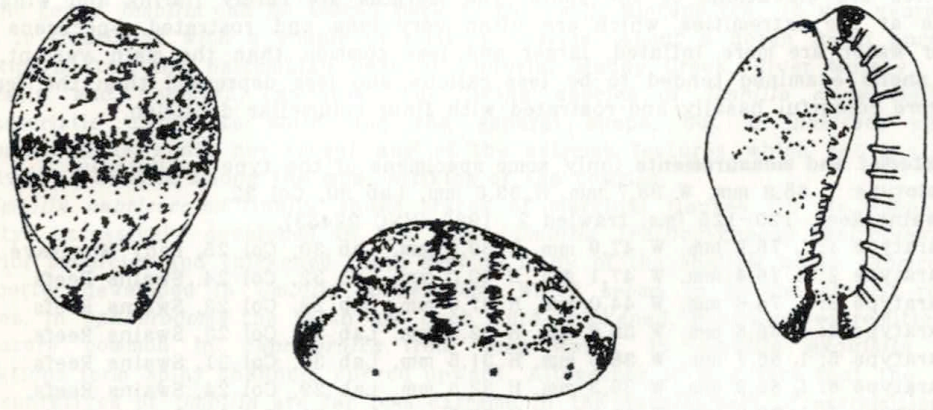
Introduction: Since the publication of the monographs of SCHILDER and SCHILDER (SCHILDER & SCHILDER 1938, 1952, 1970) there has been practically no systematical study on living and fossil Cypraeidae. In the following a number of taxa are introduced to add to the taxonomical basis for a comprehensive monograph on cowries, their races and phylogenetical development (LORENZ & HUBERT, in progress).

Acknowledgements: Many malacologists, colleagues and friends have submitted their help, important information and material for studies. For their kindness the author wants to express his grateful thanks to: BRUNO DE BRUIN, ENA COUCOM, MISHA FAINZILBER, GRAHAM McGRATH, JOHN HARRIS, RHONDA HARRIS, Prof. Dr. ALEX HUBERT, ARIE JOOSTE, WILLIAM R. LILTVED, Capt. FELIX LORENZ, THEA MARSH, MOHAMMED (of Zanzibar), NOGGS NEWMAN, KETY NICOLAY, Dr. LUIGI RAYBAUDI, ADAM TATES, NOLAN WEBB, STEPHEN WHATMOUGH, TONY WILSON, Dr. VOLLRATH WIESE and finally DAVID HINGSTON for checking the spelling in the manuscript.

Material: If not otherwise stated all illustrated or measured shells are in the collection of "Haus der Natur - Cismar" or in the author's collection.



Text-fig. 1: *Erronea (Purpuradusta) fimbriata quasigracilis* n. ssp.

1. Description of a new *Umbilia* species from Queensland

***Umbilia capricornica* n. sp.**
(Plate 2)

This new species has been discussed thoroughly by the author in La Conchiglia No. 230-231 (LORENZ jun. 1988b, 14-20) where it was provisionally described as a form (taxonomically invalid status) of *U. hesitata*. Now more material has come to hand and it was made sure that the *Umbilia* dealt herein is not a mere form but a valid species, the third known living representative of the genus *Umbilia*.

The species was discovered in 1979 in the Capricorn-Channel off Rockhampton/ Queensland. Since early 1982 the species was collected in greater numbers in a relatively restricted area.

Diagnosis: The new species differs from other living species of *Umbilia* by the presence of a fossula and stronger dentition as well as a more archaic structure of margins and extremities.

Etymology: The name *Umbilia capricornica* is derived from the Tropic of Capricorn which runs through the area the new species was found in first.

Description: The holotype is globular inflated with strongly rostrated extremities. Its margins are tuberculate towards the extremities, the anterior extremity has a prominent tubercle dorsally. The aperture is narrow and curved behind. The dorsum and margins are greyish brown, the base with darker blotches. The margins are distinctly spotted, the dorsum paler and profusely spotted. The spire is umbilicate.

The dorsal surface is covered with microscopic granules causing a rather dull luster. The fossula is slightly produced, smooth and distinctly projecting. Columellar teeth (22) are strong, slightly extending onto the base and into the aperture, labral teeth are finer and more numerous (30) and only slightly extending onto the lip.

Paratypes from less deep water are more elongated and callous, the dorsum is less globular. The base is usually blotched with reddish-brown on both sides of the aperture, the teeth are always strong, rarely obsolete midway on columellar side. The extremities are always tuberculate, the labral teeth often cross the margin posteriorly forming small tubercles on the dorsal part of the extremity. The dorsum may lack any spotting, but the margins are always spotted and very often tuberculate. The tubercles are elevations of the spots. The margins are rarely flaring and winglike-fragile at the extremities which are often very long and rostrated. Specimens from deeper water are more inflated, larger and less common than the main variant. The male shells examined tended to be less callous and less depressed than the females but more colourful basally and rostrated with finer columellar dentition.

Material and measurements (only some specimens of the type lot listed):
Holotype: L 65,8 mm, W 38,7 mm, H 33,5 mm, Lab 30, Col 22,
Swains Reef, 120-125 fms, trawled 2. 1989 (HNC 22453).
Paratype 1: L 78,9 mm, W 47,9 mm, H 39,9 mm, Lab 30, Col 25, Lady Musgrave Isl.
Paratype 2: L 76,4 mm, W 47,1 mm, H 40,0 mm, Lab 32, Col 24, Swains Reefs.
Paratype 3: L 74,8 mm, W 44,0 mm, H 37,0 mm, Lab 28, Col 23, Swains Reefs.
Paratype 4: L 66,6 mm, W 39,6 mm, H 32,2 mm, Lab 31, Col 23, Swains Reefs.
Paratype 5: L 66,7 mm, W 38,5 mm, H 31,5 mm, Lab 30, Col 21, Swains Reefs.
Paratype 6: L 65,9 mm, W 39,3 mm, H 32,6 mm, Lab 29, Col 24, Swains Reefs.
Paratype 7: L 70,8 mm, W 41,5 mm, H 33,9 mm, Lab 29, Col 24, Swains Reefs.
Paratype 8: L 70,5 mm, W 38,8 mm, H 33,0 mm, Lab 31, Col 22, Swains Reefs.
Paratype 9: L 69,2 mm, W 39,9 mm, H 32,4 mm, Lab 32, Col 22, Swains Reefs.
Paratype 10: L 65,2 mm, W 38,2 mm, H 31,3 mm, Lab 29, Col 18, Swains Reefs.
Paratype 11: L 64,1 mm, W 38,1 mm, H 31,7 mm, Lab 30, Col 23, Swains Reefs.
Paratype 12: L 63,8 mm, W 37,3 mm, H 30,4 mm, Lab 27, Col 21, Swains Reefs.

Paratype 13: L 67,5 mm, W 38,4 mm, H 31,6 mm, Lab 30, Col 21, Swains Reefs.
Paratype 14: L 58,5 mm, W 34,2 mm, H 28,6 mm, Lab 27, Col 22, Swains Reefs.

Animal: The animal is rather pale yellow brown with darker hairlike papillae and longer pale ones. The papillae are thick, slightly branched and dense. The foot is pale yellow-grey. The reproductive tract of both sexes as well as further details on animal and radula features have already been illustrated (LORENZ jun. 1988b, 14-20).

Habitat and distribution: The species is trawled from depths of 210 to 600 m from flat bottom with sponge growth. The diet are sponges and tiny molluscs.

U. capricornica lives in almost direct contact with typical *Umbilia hesitata* in the area between Brisbane and Newcastle where *capricornica* is very rare but typical in its conchological features. The subspecies of hesitata found there is *hesitata beddomei*, the shells are particularily dark and smaller than southern *U. h. hesitata*. In the centre of distribution of *capricornica* in the area of the Tropic of Capricorn in Queensland the species is the only cowrie found in this depth.

Specimens have been found as far north as Cairns where they appear to be more inflated, with very long rostrations at the extremities, and paler.

Specimens from depths between 210 and 300 m are consistently smaller and more callous and depressed than those from greater depths.

Discussion: The new species is the most remarkable in the genus and one of the most extraordinary of all cowries. The knobby, rostrated extremities and globular dorsum make it unmistakeable. In *U. hesitata* the extremities may be equally rostrated, but are smooth and rounded at the margins and never tuberculate. The dentition in *hesitata* and *armeniaca* is finer and closer, there is no fossula margin visible as in *U. capricornica*, which is normally also characterized by its darker base. The outer animal features of *hesitata* show that it has coarser, unbranched papillae and the radula shows slight differences in the conformation of the denticles.

The margins of *capricornica* are winglike and angular, resembling those of *Nesiocypraea teramachii* to some extent. Also the shape of the shell in general and the fossula are quite similar and in fact a certain relation between the two genera seems to reveal from the features of *U. capricornica* to *Nesiocypraea*. Far more interesting is the relation between *Umbilia* and *Cypraeovula (Crossia) cruickshanki* which is apparent in the very close resemblence between the reproductive parts and in fossil specimens intermediate between *Umbilia* and *Crossia* found in great depths in Natal and in deposits in Victoria, Australia. From the structure of the protoconch seen in juvenile *Umbilia capricornica* one may estimate the species has direct development. This is another feature the genus *Umbilia* shares with *Cypraeovula*.

The genus *Umbilia* can be traced back to the early Miocene (ca. 15 Mio. years ago) when it flourished with a couple of striking species. About a dozen fossil ancestors are known from the Balcombian beds of Victoria, Muddy Creek, River Murray, South Australia and northern Tasmania. The living species of *Umbilia* show well the characteristic umbilicate spire and the general shape, but *U. hesitata* and *U. armeniaca* alone would not reveal any of the extreme features which put the fossil relatives of *Umbilia* among the most striking of the cowries.

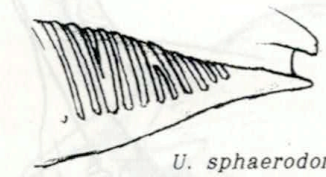
Umbilia capricornica finally shows traces of marginal flanges (in its deep-water variety) excessively developed in the fossil *Umbilia (Palliocygnaea) gastroplax*. The anterior tubercles and thickened teeth seen in many of the shallow water *capricornica* are better developed in *Umbilia sphaerodoma* which seems to be the closest related species. In *sphaerodoma* the teeth are even more thickened. Rostrated extremities are a feature common in *capricornica* from deep water. In *Umbilia exquisita* these rostrations form spiny channels curved upward. Altogether it is a fact that the living representatives of *Umbilia* are far less extreme in the development of extremities and marginal flanges but nevertheless it seems justified to call *capricornica* the most archaic.

The infraspecific variability of *U. capricornica* is incredible in a restricted geographical area and further exploration in deep water may produce new varieties and maybe more surprises. The recent findings of exceptional specimens with very

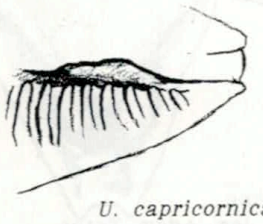
Text-fig. 2: Comparison of the recent *Umbilia* species

	U. armeniaca	*U. hesitata*	*U. h. beddomei*	*U.h.b.* "north. f."	*U. capricornica*
Distribution:	Albany-East Eucla	Portland-Cape Howe	Cape Howe-Grafton	Moreton Bay	Capricorn Channel-Whitsundays Passage
Length ø:	96 mm	92 mm	67 mm	70 mm	68 mm
Width-length-ratio ø:	62,5 %	61 %	61 %	60 %	60 %
Lab. teeth (red.*) ø:	22	21	21	21	20
Col. teeth (red.*) ø:	18	20	19	19	17
Height-length-ratio ø:	54 %	48 %	50 %	48 %	48 %
Ground colour (dorsum):	orange	white		greenish-grey	beige-grey
Colour of extremities:	little darker than dorsum	same colour as dorsum, sometimes slightly brownish		brown, dark	darker, brownish
Colour of base:	bright orange	white, rarely yellowish	white to yellow	blotched brown	blotched dark
Spotting on margins:	indistinct, small and scarce	fine, confluent, orange-yellowish when present		dark, dense	variable, large, often forming elevated tubercles
Margins at extremities:	slightly angular	always rounded, not produced distinctly		slightly margined, slightly produced	margins often wing-like, angular
Dorsal mottling:	fine, pale, mostly confluent	(when present) fine, rather pale, confluent		scattered spots, dark	larger indistinct spots, pale
Teeth:	fine, not extending	rather fine, becoming indistinct midway on columellar side, hardly extending		produced, rather coarse, hardly extending	coarse, produced, often extending onto base and labrum
Fossula:	no fossula	no fossula		no fossula	well produced, slightly curved no dentition on f.

* Number of teeth reduced after SCHILDER-formula. (SCHILDER & SCHILDER 1938).



U. sphaerodoma



U. capricornica

U. hesitata

U. armeniaca

Text-fig. 3: Structure of anterior columellar dentition in 4 *Umbilia*-species.

U. hesitata

U. armeniaca

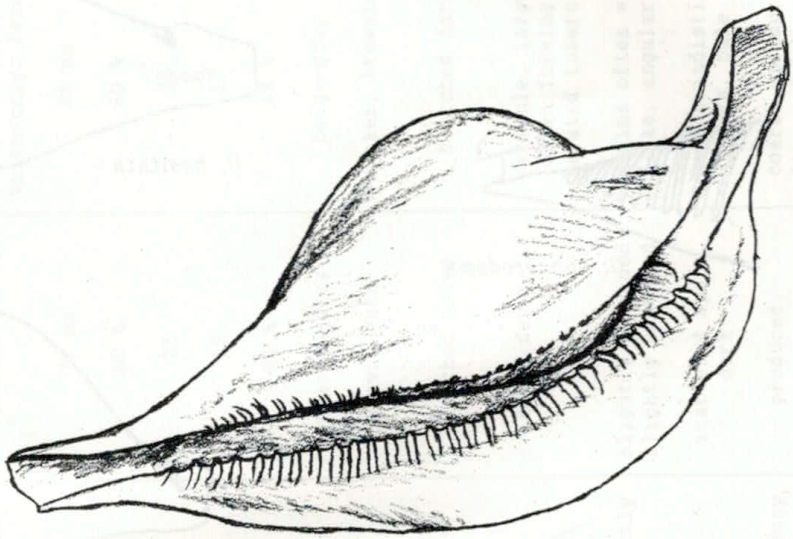
U. capricornica

R. leptorhyncha

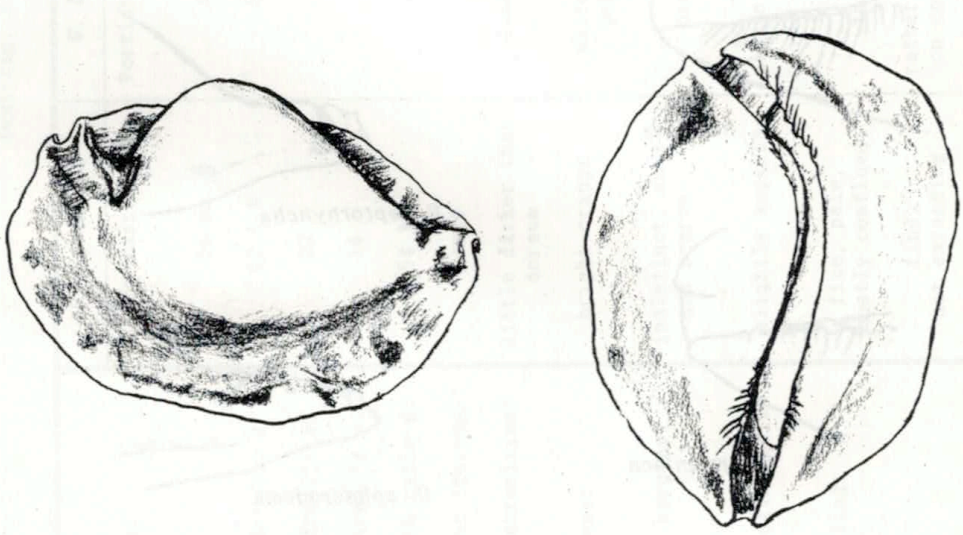
U. sphaerodoma

Text-fig. 4: Lateral view of anterior extremity in *Umbilia* and related species.

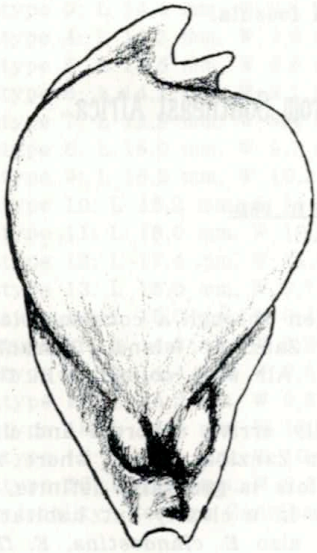
Text-fig. 5: Fossil cowries related to the recent *Umbilia*-species



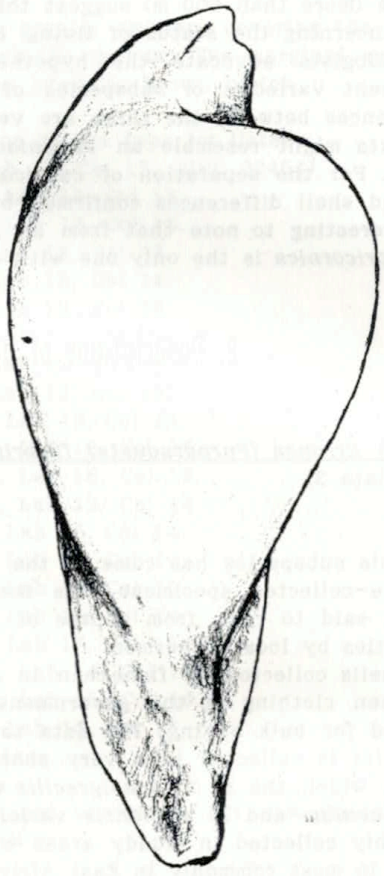
Umbilia spec., ca. 15 cm, Miocene,
Cadell Marl Lens, N. Murbko, River Murray, leg. Adam Tates



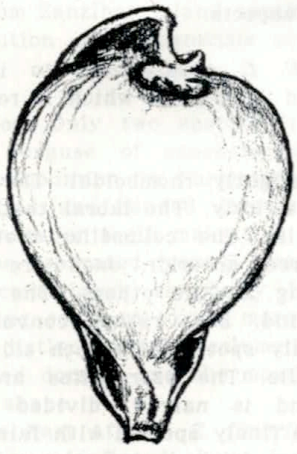
Palliocypraea gastroplax McCOY, ca. 8 cm, Oligocene,
Clifton Bank, Muddy Creek, Victoria.

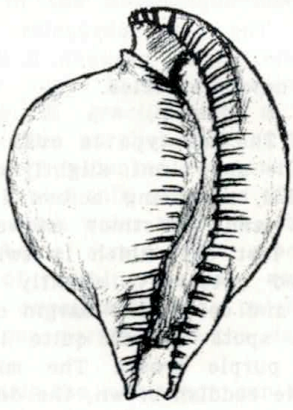


Umbilia sphaerodoma, ca. 9 cm, Miocene,
Cadell Marl Lens, N. Murbko, River Murray.



Umbilia spec., ca. 7 cm, Oligocene.
Table Cape, Tasmania.





Rhynchiocypraea leptorhyncha McCOY, ca. 7 cm, Miocene, River Murray.

rostrated extremities, upward curved channels and very globular shells from deep waters (more than 600 m) suggest this.

Concerning the status of living *Umbilia* species there are different opinions, some malacologists advocate the hypothesis that *armeniaca, hesitata* and *capricornica* represent varieties or subspecies of a single species, *armeniaca*. However, the shell differences between the three are very obvious and constant, it is much to say that *hesitata* might resemble an *armeniaca* or *capricornica* depending on the locality and depth. For the separation of *capricornica* from *hesitata* it has therefore been helpful to find shell differences confirmed by anatomical features (LORENZ 1988b). Finally it is interesting to note that from all investigated species of *Umbilia*, living and fossil, *U. capricornica* is the only one with a well developed fossula.

2. Descriptions of new subspecies from Southeast Africa

2.1 *Erronea (Purpuradusta) fimbriata quasigracilis* n. ssp.

(Plate 3)

This subspecies has come to the author's attention through a considerable number of live-collected specimens from the west coast of Zanzibar Island, Tanzania. They where said to come from depths of less than 10 m. All were collected in the early seventies by local fishermen.

Shells collected by fishermen in Zanzibar generally arrive unsorted and uncleaned in linen clothing at the governmental shell shop in Zanzibar Town, where they are offered for bulk buying. The data to each of these lots is generally definite, because each lot is collected in a very short time, normally in a clearly cut habitat. In the lot in which the *E. f. quasigracilis* were discovered, also *E. clandestina*, *E. fimbriata*, *P. diluculum* and *E. chinensis variolaria* were mixed, denoting that the lot was most probably collected in muddy areas with dead coral which is the habitat these species occur in most commonly in East Africa.

The small number of typical *E. fimbriata durbanensis* found among the bigger number of *quasigracilis* seems to imply that both are found together on the same spot or at least in close proximity.

Diagnosis: The new subspecies of *Erronea fimbriata* is characterized by its ovoid depressed shape and prominent columellar callousity, larger average size and paler colouring. It closely resembles *E. gracilis* in these aspects.

Etymology: The new subspecies is named *E. f. quasigracilis* to indicate the conchological relationship between *E. fimbriata* and *E. gracilis* which is revealed most clearly in this new subspecies.

Description: The holotype is oval depressed, slightly rhomboidal. The extremities are callous, wide and blunt, slightly margined anteriorly. The labral teeth are sharp and distant (14), extending across 1/3 of the lip. The columellar teeth (17) are extremely fine and indistinct midway, the three anterior ones are thickening, especially the last one which is twice as strong as the others. The aperture is slightly widened anteriorly, slightly curved behind. Base rather convex and very callous, labral and columellar margin callous, hardly spotted: On both sides two very faint brownish spots appear quite in the middle. The extremities are distinctly blotched with purple brown. The middorsal band is narrow, divided and hardly interrupted, pale reddish brown, the dorsal surface finely spotted with faint brown. At the spire there is a darker transversal zone of reddish brown, the spire itself is slightly darker than the blotching of the tips and hidden by callus.

In some subadults the marginal spots are more numerous and distinct labrally, while there is hardly more spotting on the left margin, which is always very callous. The dorsal banding may be indistinct and blurred, there may be fine ziczac-stripes

and darker spots around the banding as well, always rather faint and pale. The shape is always inflated oval, slightly depressed.

In other specimens the posterior extremity is greatly swollen, covering the whole spire. The posterior blotches on the tips may reach the dorsum. The marginal spotting is mostly absent. The dorsum very rarely shows an irregular brown blotch.

Material and measurements (only some specimens of the type lot listed):
Holotype: L 16,4 mm, W 10,3 mm, H 8,4 mm, Lab 14, Col 17. (HNC 22454)
Paratype 1: L 17,8 mm, W 10,8 mm, H 8,8 mm, Lab 15, Col 13.
Paratype 2: L 17,5 mm, W 10,5 mm, H 8,4 mm, Lab 13, Col 15.
Paratype 3: L 14,4 mm, W 9,1 mm, H 7,2 mm, Lab 16, Col 17.
Paratype 4: L 14,3 mm, W 9,0 mm, H 7,2 mm, Lab 15, Col 14.
Paratype 5: L 15,6 mm, W 9,6 mm, H 7,5 mm, Lab 13, Col 16.
Paratype 6: L 14,7 mm, W 9,1 mm, H 7,4 mm, Lab 16, Col 14.
Paratype 7: L 12,9 mm, W 8,4 mm, H 6,4 mm, Lab 12, Col 15.
Paratype 8: L 16,0 mm, W 9,7 mm, H 7,7 mm, Lab 13, Col 19.
Paratype 9: L 16,2 mm, W 10,2 mm, H 8,1 mm, Lab 13, Col 14.
Paratype 10: L 18,2 mm, W 11,2 mm, H 9,0 mm, Lab 12, Col 16.
Paratype 11: L 18,0 mm, W 10,8 mm, H 8,5 mm, Lab 16, Col 18.
Paratype 12: L 17,4 mm, W 11,0 mm, H 9,0 mm, Lab 13, Col 14.
Paratype 13: L 16,0 mm, W 9,7 mm, H 7,7 mm, Lab 15, Col 14.
Paratype 14: L 15,0 mm, W 9,4 mm, H 7,6 mm, Lab 14, Col 14.
Paratype 15: L 14,5 mm, W 9,2 mm, H 7,3 mm, Lab 14, Col 15.
Paratype 16: L 14,4 mm, W 9,5 mm, H 7,6 mm, Lab 14, Col 14.
Paratype 17: L 16,2 mm, W 9,8 mm, H 8,2 mm, Lab 15, Col 15.
Paratype 18: L 16,9 mm, W 10,6 mm, H 8,8 mm, Lab 14, Col 13.
Paratype 19: L 16,5 mm, W 10,0 mm, H 8,0 mm, Lab 15, Col 16.
Paratype 20: L 15,1 mm, W 9,4 mm, H 7,6 mm, Lab 15, Col 16.
Type locality: Western Zanzibar Island, Tanzania.

Animal: Animal and radula are unfortunately not known up till now, although a considerable number of specimens were collected alive.

Habitat and distribution: *E. f. quasigracilis* is so far only known from the type locality, Western Zanzibar Island, Tanzania, most probably on muddy ground among dead corals.

The other subspecies of *E. fimbriata* in East Africa are far more widely distributed. The small, narrow and darker bluish *E. f. fimbriata* lives in northern Tanzania, Kenya, Somalia and the Seychelles, the larger, pale greyish *E. f. durbanensis* is found from Zanzibar Island southwards to Cape St. Francis, South Africa. Centre of the distribution of *durbanensis* seems to be in the Mozambique-Southern Tanzania area.

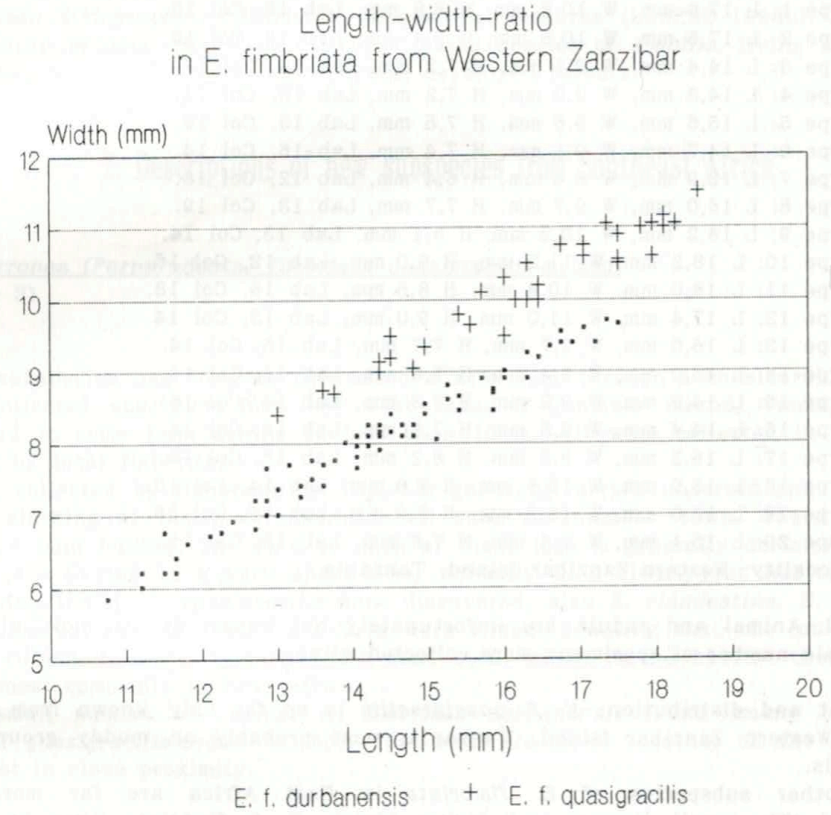
Discussion: Only two species in Cypraeidae ought to be compared with the new subspecies because of conchological similarity: *E. gracilis* and *E. fimbriata*. The species' accomodation in *Purpuradusta* is easy. The purplish tint of the extremities, finely freckled and banded dorsum and anteriorly widening aperture with thickened anterior columellar teeth make it a typical member of this subgenus of *Erronea*.

It can be separated from *E. gracilis* by the much wider aperture, the labrum being distinctly constricted anteriorly instead of being straight in *gracilis*, the faint spotting being confined to the margins instead of reaching the base as in *gracilis*, the finer, less distinct midway columellar teeth in *quasigracilis*, the paler tinting of the terminals and dorsum and the mostly more callous margins and the depressed instead of inflated shape.

From the East African *E. fimbriata durbanensis* the new taxon can be distinguished by the far more inflated shape (compare text-fig. 1). The specimens of *quasigracilis* are consistently broader than those of *fimbriata durbanensis*. On the diagram (text-fig. 6) the greater size of most specimens of *quasigracilis* is evident. The tinting of the tips in *quasigracilis* is also more discrete and paler, brownish rather than purple

in many specimens. The dorsal banding is narrower and paler than that of *fimbriata*. The strength and conformation of the teeth is generally the same.

The marginal spotting is only slightly less dense and dark than that of *fimbriata durbanensis*. The most important and significant distinguishing features are shape and size.



Text-fig. 6.

For a statistical distinction it is important to measure only fully adult, normally grown specimens of each group, from one and the same locality to avoid distortion of measurements due to juvenile shells or ecological influences (such as unusual strong deposits of callus).

Additional notes: As I have demonstrated in other genera it seems to be nothing unusual in Cypraeidae to have areas of distribution in which two subspecies (or races) of one species may be represented. In Tanzania for instance, the following pairs evidently occur in close association:

Leporicypraea mappa geographica and *L. mappa alga*,
Erronea felina and *E. felina fabula* (the latter is very rare however),
Erronea (O.) caurica elongata and *E. c. quinquefasciata*, rarely *E. c. dracaena*,
Palmadusta diluculum and *P. diluculum virginalis*,
Erosaria erosa and *E. erosa similis*,
Erosaria helvola argella and *E. helvola meridionalis*, very rarely also *E. helvola mascarena*,
Cribrarula cribraria comma and *C. cribraria abaliena* n. ssp.,
Erronea chinensis variolaria and *E. chinensis violacea*.

Many of these pairs have different habitats within the same range - while the typical *E. erosa* is found in depths between 2 and 4 m under dead loose coral slubs in slightly silty water and among weed, *E. erosa similis* is found in turbid water just below the high tide level in rocks, crevices or on pilings amongst sponge, always in close association with *E. caurica elongata*. The latter race is also found together with *E. e. erosa*, but less commonly and in a slightly smaller, more depressed type. *E. chinensis variolaria* and *E. c. violacea* on the contrary can be found together under the same coral slab, constantly differing in their features. Even the mantle of *violacea* is darker red and more papillose than that of *variolaria*. Probably other ecological barriers such as different diet, different breeding seasons and different predators must be the seperating factor in such cases.

E. fimbriata quasigracilis n. ssp. and *E. f. durbanensis* only overlap in a restricted area. It is not known whether they directly occur sympatrically or only in nearby association. I assume that *E. f. quasigracilis* is found in greater depth or on a different microsubstrate where *E. f. durbanensis* does not occur. The South African *E. f. durbanensis* has its northernmost point of distribution in Western Zanzibar, I have not seen many typical *durbanensis* from Pemba Island. In Kenya *E. f. durbanensis* is replaced by a very large intermediate form of *E. f. fimbriata* with darker ends and rather inflated shell. North of Kenya only the smaller, cylindrical, pale blue *E. f. fimbriata* is found. In these areas the southernmost finds of *E. gracilis* in Africa are located.

2.2 *Erronea (Ovatipsa) chinensis somaliana* n. ssp.

(Plate 4)

In the early seventies deep water fishing was carried out along the Somalian coast, for the first time in greater depths. In the wake of great discoveries like *Lyncina broderipii* and *Conus milneedwardsi* several smaller and less conspicuous new species have been overlooked. Among these were the recently described *Pseudosimnia wieseorum* LORENZ jun. 1987 and *Marginella emmae* BOZETTI 1988. The new subspecies of *E. chinensis* described herein is especially interesting as it represents a true geographic intergrade to the related *E. coloba* and fills the gap in the distribution of the species in this area. Few specimens have been found so far and very few are perfect adults. However, the differences to East African members of the genus are so significant and conspicuous that the basis for a description is given, and I am convinced that with the establishment of the new taxon more attention will be drawn to the *Ovatipsa* sp. from Somalia and consequently more material will become available.

Diagnosis: In this new subspecies the colour of the base, fine dorsal netting, less produced dentition and less callous margins are distinguishing features from other *E. chinensis*. It is considered a connecting link between *E. chinensis* and *E. coloba*.

Etymology: The new subspecies is named *somaliana* to indicate it originates from the Somalian coast.

Description: In a fully adult and obviously live-collected specimen (Paratype 1) the shell is globular-pyriform with slightly produced extremities. The spire is umbilicate, the margins slightly callous and edged labrally. The teeth are distant and coarse, extending slightly from the aperture over 1/2 of the labrum and about 3 mm from the aperture onto the base on columellar side. The margins and base are orange-tan, the teeth slightly paler, their interstices bright orange-brown. The margins are spotted with pale purple brown rather large distant spots which reach onto the dorsum at the margins. The dorsum is very pale greyish-blue, distinctly banded with four interrupted purplish-brown bands which dissappear towards the labral half of the dorsum. There is a fine greenish netting leaving a distinct dorsal line. The columellar sulcus is smooth, there is no fossula margin.

The holotype and paratypes 2, 3, 4 have a less regular dorsal netting and no dorsal line is visible. Paratype 2 is a very heavy, slightly eroded specimen with mud deposits on teeth and base, here the fossula sulcus is distinctly ribbed from the anterior part along 3/4 of the aperture's length. The distinct banding is a constant feature in all subadult and adult shells. All types have the orange-tan tint of base and margins.

Material and measurements:
Holotype: L 26,7 mm, W 16,7 mm, H 13,6 mm, Lab 15, Col 16, live-collected adult. (HNC 22456)
Paratype 1: L 23,1 mm, W 15,2 mm, H 11,8 mm, Lab 12, Col 11, live-collected adult.
Paratype 2: L 30,2 mm, W 19,0 mm, H 14,6 mm, Lab 15, Col 17, slightly eroded adult.
Paratype 3: L 30,0 mm, W 18,9 mm, H 14,6 mm, Lab 15, Col 16, live-collected subadult.
Paratype 4: L 28,6 mm, W 17,8 mm, H 14,1 mm, Lab 15, Col 16, live-collected adult.
Several other specimens have been collected, now distributed in various European collections.

Animal: The dried animal obtained from the holotype 2 was pale yellow-brown, features of the mantle or radula could not be noted.

Habitat and distribution: The type material has been collected in fairly deep water of approximately 100 m around Mogadiscio, Somalia. Since all specimens known have been obtained by trawlers the exact locality is unknown, and the habitat must be fairly smooth bottom.

Discussion: As mentioned in the beginning it is believed that *E. chinensis somaliana* is a conchological and geographical intergrade between the species of *E. chinensis* and *E. coloba* (compare text fig. 7).

The new subspecies differs from already known subspecies of *E. chinensis* by the very fine netting which does not form lacunae and which is always coarser in any other race. The dentition is much less produced than in other subspecies and the columellar teeth are slightly longer and not restricted to the aperture as in other *E. chinensis* where the teeth extend only very slightly.

The conspicuous embryonal banding on the dorsum in adult shells is only found in the South African *E. chinensis tortirostris* which is much smaller and more elongated. In the new taxon the marginal spotting is less purple but more brownish, the margins are darker orange tan rather than white to yellow grey, as in other subspecies of *E. chinensis*, the spotting is also less dense and larger. In East Africa there are three subspecies of *E. chinensis*: 1. the southernmost one is *E. chinensis violacea*, which ranges to the southern Transkei coast, 2. the dwarf *E. c. tortirostris* is restricted to the Natal-Mozambique-Madagascar areal, 3. together with *E. c. violacea* lives *E. c. variolaria* from Mozambique to northern Kenya.

E. c. variolaria and *E. c. violacea* come into consideration for a comparison. Both differ from other *E. chinensis* in the Pacific and northwestern Indian Ocean by being darker and more confusely mottled, seldom forming regular lacunae. The mottling is denser and more contrasting. The spotting is also darker marginally and the dentition is coarser with darker interstices.

E. c. violacea differs from *E. c. variolaria* by the labrum being rounded rather than angular and less callous. The base is often blotched with pale purple at the columellar margin, the teeth are less rostrated and knobby as in *variolaria*. The shell is more elongate-oval instead of rotund-rhomboidal and depressed than in variolaria. The fossula of *E. c. violacea* finally is smooth while in *E. c. variolaria* it is always distinctly ribbed in adult shells.

Text-fig. 7:

Conchological characters of *E. chinensis*, *E. c. somaliana* and *E. coloba*

	E. chinensis (both E-Afr. subsp.)	*E. chinensis somaliana*	*E. coloba*
Shape:	oval-rhomboidal, mostly elongated, rather depressed, callous	inflated oval-pyriform, light, slightly callous	oval depressed, rather callous and heavy
Fossul. sulc.:	mostly ribbed and callous, smooth in E. c. violacea only	slightly ribbed anteriorly	mostly completely smooth
Spotting:	dark, dense, purple	pale, distant, brownish	very pale, distant, brownish
Base and margins:	pale greyish white to yellowish	orange-tan	orange-brown, often very dark
Col. teeth:	restricted to aperture, only very slightly extending	slightly extending onto base	slightly extending onto base
Netting:	coarse and dense	very fine, distant	rather fine, rarely dense

2.3 *Cribrarula cribraria abaliena* n. ssp.

(Plate 3)

This new subspecies has been discovered when a number of dwarf Cribrarulae were found on the eastern coast of Zanzibar Id. which were first classified as *Cribrarula cribellum* (GASKOIN 1849). Similar but larger specimens from the Daressalaam area and from deeper water off South Africa later showed that a second subspecies exists next to *Cribrarula cribraria comma* (PERRY 1811) along the eastern and southern African coasts.

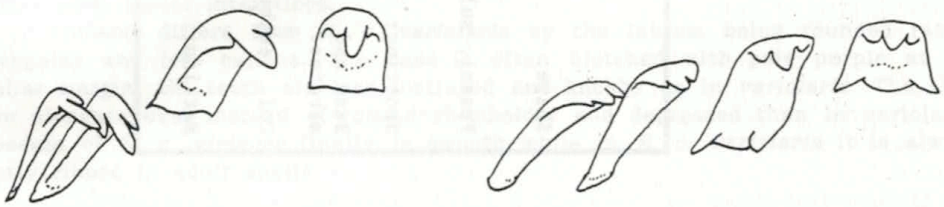
Diagnosis: The new subspecies differs from the geographically sympatric *C. cribraria comma* by a smaller average size along with a far more inflated shape and prominent columellar callousity. The colouring is generally paler. Radular differences are slight but constant.

Etymology: The first impression one has when examining specimens of *abaliena* is that one is dealing with a strange *C. esontropia* (DUCLOS 1833). *Abaliena* (lat. = estranged) is named in credit to this.

Description: The holotype is a fully adult live-collected specimen. The shell is rhomboidal-callous, the dorsum globular, extremities blunt but slightly produced. The marginal calluses are bent up onto the dorsum, especially on columellar side. The base is callous and convex. The teeth are strong and closed, the first anterior columellar teeth slightly produced, the fossula minutely ribbed but hardly projecting, the sulcus ribbed throughout. The labral teeth extend across 1/2 of the lip, the labrum ist slightly constricted anteriorly. 13 labral and 14 columellar teeth. The dorsal netting is pale yellow-brown with regular, large and dense lacunae. The posterior end of the labral margin is slightly pitted. There is no trace of marginal spotting neither in the holotype nor in the paratypes. In the paratypes the size may vary from 10-21 mm, while specimens around 13 mm are most abundant in northern localities, specimens from South Africa are callous and larger. In many smaller specimens the extremities are rostrated. The dorsal colour is always rather pale, the lacunae usually large and dense. The dorsal basic colour is often yellowish in larger specimens.

Material and measurements (only some specimens of the type lot listed):
Holotype: L 15,1 mm, W 10,5 mm, H 8,2 mm, Lab 13, Col 14;
Zanzibar Id. (HNC 22457)
Paratype 1: L 15,9 mm, W 11,5 mm, H 8,5 mm, Lab 15, Col 14; Zanzibar Id.
Paratype 2: L 13,2 mm, W 8,4 mm, H 6,5 mm, Lab 14, Col 12; Zanzibar Id.
Paratype 3: L 12,0 mm, W 7,8 mm, H 6,2 mm, Lab 13, Col 11; Zanzibar Id.
Paratype 4: L 11,4 mm, W 7,7 mm, H 5,9 mm, Lab 12, Col 11; Zanzibar Id.
Paratype 5: L 10,5 mm, W 6,2 mm, H 5,1 mm, Lab 13, Col 12; Zanzibar Id.
Paratype 6: L 20,6 mm, W 14,5 mm, H 11,2 mm, Lab 15, Col 18; Daressalaam.
Paratype 7: L 21,4 mm, W 14,5 mm, H 11,4 mm, Lab 15, Col 15: Natal.

Animal: The dried but fresh animals from ex pisce specimens from Natal and freshly collected specimens from Zanzibar Id. are pale tan yellow with dark red dashes on the mantle which seems to be heavily papillate. The radula (verified by dissecting several specimens) is shown in comparison with that of *Cribrarula cribraria comma* from the same area in East Africa.



Text-fig. 8: Radular teeth of *C. c. comma* (left) and *C. c. abaliena* n. ssp. (right).

Habitat and distribution: Little is known about the exact habitat but it seems to range from intertidally to depths of about 40 m. Dead shells were collected among vital reef blocks and rubble in a quiet reef-lagoon in Kenya. The new subspecies has been found by the author in Diani Beach, Kenya, dead among corals in shallow water along with dead *Cribrarula cribraria comma*, in unknown depths but probably shallow from Zanzibar Island, rarely with *Cribrarula criraria comma*, in subfossil deposits and rarely alive in the Daressalaam area and Mafia Island. It has not been reported from Mozambique so far but from the Seychelles in shallow water from where it is referred to as *Cribrarula esontropia*. The reports from the Maldive Islands need confirmation. Two shells have been shown to me as coming from Madagascar, three specimens found ex pisce have been supplied with parts of the animal inside from Richardsbay, Natal, as coming from depths around 40 m.

Discussion: Superficially the small specimens from Zanzibar Island with rostrated extremities resemble *C. cribellum* from La Réunion and Mauritius. Larger specimens, for their rhomboidal inflated callous shape resemble pale *C. esontropia* but the new race can be distinguished safely from these species by the complete absence of marginal spotting.

This feature shows that it seems to belong rather to *C. cribraria* than to any other species in the genus. From *C. cribraria comma* it can be distinguished at once by the smaller average size (14 mm against 22 mm) and the more rhomboidal rather than cylindrical shape. The base in *abaliena* is callous and convex while in *comma* it tends to be thin, translucent and flat. The dentition is roughly identical while the marginal calluses in *comma* are restricted and never bent up, in *abaliena* they extend towards the dorsum midway, even in slightly subadult shells (paratype 2). The dorsal colour of *comma* is dark reddish brown to chestnut, the lacunae usually small and rather distant. The margins are very often faintly spotted in *comma*, while in *abaliena* such spotting has never been observed in the more than 100 specimens investigated. In *abaliena* the dorsal lacunae are large and often very dense, the dorsal colour consistently pale yellow brown, even in fresh specimens.

The new subspecies may connect *C. esontropia* with *C. cribraria* conchologically. The only distinguishing feature in fact is the absence of marginal spotting in *C. c. abaliena*.

2.4 ***Staphylaea limacina clarissa*** n. ssp.
(Plate 5)

This new subspecies can be considered as an overlooked one since it is not particularily rare but very conspicuous and easy to distinguish from the other races of *S. limacina*.

Diagnosis: Geographical (and probably also ecological) subspecies of *S. limacina* in southeastern Africa, characterized by midways shortened columellar teeth (similar to the Hawaiian *S. semiplota* MIGHELS), distinguished from that species by the lack of brown tinting in the marginal serrations.

Etymology: Named in memoriam of CLARISSA NEWMAN of East London, 1886-1977, Vice-Pres. of Internat. Council of Women.

Description: Elongate oval, with slightly swollen margins, the dorsum is separated from the labrum by distinct untinted pitting which continues across the tips and the fourth part of the left side towards the extremities. These are rostrated with the last tooth on all ends forming a spine. The base is callous and convex, the extremities hence slightly bent upwards. The spire is completely hidden under the posterior extremity. Both extremities are divided from the dorsum with a v-shaped groove which is actually formed by the dorsal line which forms a very shallow groove across the dorsum on the left third. The labral teeth are produced, especially towards the

extremities and about equally long across 2/3 of the labrum, reaching the margins towards the extremities only. The columellar teeth are narrower but distinct, they extend across 3/4 of the base anteriorly and posteriorly but grow shorter rather abruptly midways on the basal portion opposite the marginal callus which obscures the pittings in this part as well. The teeth are framed with tan, the tips are of the same colour, base and margins white. The dorsum is paler greyish brown-beige with sparse but distinct white spots that do not form elevations but become smaller and crowded along the dorsal line.

In the paratypes there are sometimes slight elevations, like granules associated with the white spots on the dorsum, especially in specimens from localities north of Natal. The dorsal colour varies little, it never has blueish or reddish tints, is always beige to brownish. The marginal calluses often reach onto or even across the entire dorsum, partially obscuring the white spots. These may be very indistinct and confluent. The columellar teeth are normally distinctly shortened midways. Sometimes they may be strongly thickened anteriorly so that in extreme specimens from northern localities they may be fused with a callous ridge known as a common feature in closely related genus *Erosaria (Paulonaria).*

Material and measurements:
Holotype: L 24,5 mm, W 14,1 mm, H 12,0 mm, Lab 20, Col 20;
Richardsbay, South Africa. (HNC 22458)
Paratype 1: L 25,4 mm, W 15,5 mm, H 12,7 mm, Lab 21, Col 22;
Richardsbay, South Africa.
Paratype 2: L 23,1 mm, W 14,5 mm, H 11.8 mm, Lab 18, Col 16;
Mbotyi, Pondoland, South Africa.
Paratype 3: L 25,5 mm, W 15,0 mm, H 12,8 mm, Lab 21, Col 20;
Bazaruto Id., Mozambique.
Paratype 4: L 23,0 mm, W 14,2 mm, H 11,7 mm, Lab 20, Col 22; Zanzibar Id.
Paratype 5: L 22,3 mm, W 12,8 mm, H 10,9 mm, Lab 21, Col 21; Zanzibar Id.
Paratype 6: L 28,2 mm, W 16,5 mm, H 13,2 mm, Lab 18, Col 20;
Gonubie, South Africa.

Animal: A single specimen collected by the author in Daressalaam, Tanzania, was black, with a smooth mantle. A dried specimen from a stomach of a "slinger fish" taken in approximately 30 m depth of Richardsbay, Natal, was dark reddish brown. The radula of this specimen displayed considerable differences to the radula of the Daressalaam specimen.

Habitat and distribution: *Staphylaea limacina clarissa* n. ssp. is found from Diani Beach, Mombasa Kenya, Pemba and Zanzibar Id., Daressalaam, Bazaruto Id. Mozambique to various localities in Natal, Pondoland to Zululand and finally Cape Province, South Africa, the southernmost record being Port Elizabeth. It is exceedingly rare in East African localities and restricted to depths below low tide level but has its centre of population in Natal where it is abundant in moderate depths to 200 m deep. Most specimens are obtained in an eroded state on Transkei beaches or ex pisce from Natal. Specimens with fused anterior columellar teeth are only known from Zanzibar Id. and Kenya, where the subspecies is more common in subfossil sediments.

Discussion: The new subspecies has already been discussed along with several extreme ecological variations of *S. limacina interstincta* (WOOD 1828) (LORENZ jr. 1988. 17). Conchological separation from other East African Staphylaeae represents no difficulty since the feature of midways shortened columellar teeth is unique and only known of one other species in the genus which is the Hawaiian *S. semiplota* (MIGHELS 1845). Indeed this species is the only one very similar to *S. l. clarissa* but can be distinguished from it at once by the brown tinting in the marginal serrations (pitting). *S. l. clarissa* differs from *interstincta* also by the smaller, less distinct spotting which normally does not form elevations but if so, very fine and distant ones. *Clarissa* is more inflated and pyriform but very rarely cylindrical as are *interstincta* and other races of *limacina*. The basic dorsal colour is also much paler than beige when fading. *S. l. clarissa* replaces *S. l. interstincta* in the South African distribution of the

species. In Tanzania the two subspecies occur in the same areas but seem to be ecologically separated as *clarissa* normally appears after strong storms and is rare while *interstincta* is a fairly common reef dweller restricted to the intertidal zones. *Interstincta* is becoming scarce south of Tanzania, in Mozambique it has another fairly extensive population centre near Nacala while in Natal *clarissa* seemingly takes over completely. In this area the protective offshore reefs are disappearing while the preferred habitats of Indopacific Cypraeidae are starting in the sublitoral zones in depths around 20 m. This has lead to the development of several races (e. g. *clarissa*) restricted to subtidal zones in southern Africa (while common intertidally in other areas of the Indopacific).

2.5 ***Staphylaea staphylaea nolani*** n. ssp.
(Plate 5)

This is another example of an endemic South African subspecies of a widespread Indopacific species. It has first come to the author's attention when the late NOLAN WEBB of Grahamstown submitted a large series of specimens collected on the beach at Mbotyi, Pondoland, with the remark that "South African Staphylaea have no granulations".

Diagnosis: An overlooked geographic subspecies differing from other *S. staphylaea* by the completely smooth dorsum and shorter, always broader teeth not extending to the margins midways as in other races.

Etymology: The new subspecies is named in honour of NOLAN WEBB, Grahamstown, giving credit to his subtle spirit of observation which has contributed greatly to the understanding of the molluscan fauna of the South African east coast.

Description: Oval, depressed, callous shell with blunt extremities. The aperture is narrow throughout. The dentition is coarse with narrow interstices and flattened teeth widened outwards. The labral teeth extend towards the margins at the extremities only, forming denticles in their interstices shorter midways. On the columellar side they do not reach the margins, shortened slightly midways, whilst branching out in the middle of the base but becoming coarser at the aperture. The margins are callous, distinctly but finally pitted throughout. The fossula shows seven denticles, taking 1/2 of the sulcus which is smooth posteriorly. The dorsal line forms a shallow groove. The dorsal spotting is very fine and forms very tiny granules directly at the extremities but otherwise the dorsum is smooth. The marginal calluses reach high onto the dorsum, obscuring the dark brown colour with a whitish blue teint, the spots shining through the tips are still darker brown, with black terminal spots. The dental framing is very dark brown, distinct. The paratypes show the same structure of dentition that shortens midways on both sides, not reaching the margins but normally taking no more than 2/3 of the base and labrum. The dorsum is always smooth, the margins reach high, sometimes reaching the dorsal line. The blotching on the tips is more conspicuous in faded shells. The aperture may widen a bit anteriorly but is often very narrow. There is sometimes a brownish tinting to the marginal pitting, which may be very indistinct in callous shells. The extremities are never rostrated. The fossula is always well developed, showing up to nine denticles.

Material and measurements (only some specimens of the type lot listed):
Holotype: L 23,3 mm, W 15,0 mm, H 12,4 mm, Lab 17, Col 16; Mbotyi. (HNC 22459)
Paratype 1: L 18,5 mm, W 12,1 mm, H 9,5 mm, Lab 18, Col 18; Mbotyi.
Paratype 2: L 19,6 mm, W 12,5 mm, H 10,1 mm, Lab 18, Col 17; Mbotyi.
Paratype 3: L 22,8 mm, W 14,1 mm, H 11,2 mm, Lab 18, Col 17; Xora Transkei.
Paratype 4: L 18,9 mm, W 12,3 mm, H 9,7 mm, Lab 18, Col 17; Port Grosvenor.
Paratype 5: L 17,5 mm, W 11,5 mm, H 9,1 mm, Lab 17, Col 19; Mbotyi.

Animal: Up till now there has been no information about the living animal.

Habitat and distribution: The new subspecies lives in depths from just below high tide level to 150 m. It is usually found washed ashore in moderately fresh state, rarely taken ex pisce. It ranges from East London to Natal, being very rarely found northwards of Mozambique. A series of fresh specimens is available from Bazaruto Island, Mozambique, conchologically similar shells have been taken alive in shallow water around Zanzibar Island.

Discussion: *Staphylaea staphylaea* is a widespread species that forms slightly modified subspecies in the main four Indopacific areas in which the various subspecies known also from other Indopacific Cypraeidae have their distribution in:

1. Australia-Polynesia (*S. staphylaea consobrina*), 2. Central Pacific to Asia (*S. staphylaea staphylaea*), 3. Western Indian Ocean (*S. staphylaea laevigata*) and 4. South Africa (*S. staphylaea nolani*).

The new subspecies can be distinguished from the three already known ones and *laevigata* in particular by the dorsal granules being practically absent while present although less conspicuous in *laevigata*. The most distinctive feature are the teeth which do not reach the margins and which are broader with narrow interstices. The aperture is a bit narrower than in *laevigata* where it tends to widen anteriorly. The fossula of *S. s. nolani* is better developed than in *laevigata*, the dorsal spotting finer. The marginal callus reaching onto dorsum, obscuring the dark colour with a paler layer is a feature not found in other *staphylaea* subspecies except *nolani*. The occasional tinting of the pitting is also found in *laevigata*. The extremities finally are less rostrated in *S. s. nolani* than in other subspecies of *Staphylaea staphylaea*. The brown framing of the dentition is more conspicuous than in *laevigata* and especially in the Pacific subspecies.

Conchologically *S. s. nolani* connects *S. staphylaea* with *S. limacina* on the feature of midways shortened teeth. In *S. limacina clarissa* of course this feature is far more conspicuous but it is interesting to note that both subspecies, *nolani* and *clarissa*, share this feature as most distinctive from their respective relatives while they also share the distribution in Southeast Africa.

3. Notes on some species of the genus *Cypraeovula* from South Africa

Recently W. R. LILTVEDs "Cowries and their Allies from South African Waters" has appeared on the market and gave the first more comprehensive summary on the knowledge of the South African endemic genus *Cypraeovula*. Its examination is still in an early state on account of the inaccessability of the habitats the species live in. There is an enormous amount of micropopulations to most species throughout the respective ranges some of which differ considerably from the typical populations. The reason for this is the extreme heterogenity of the endemic biotopes around the Cape, mainly caused by climatic disparities: The Atlantic Ocean and the Indian Ocean meet at Cape Point and numerous smaller bays with warmer water as well as wild turbid coastlines form a great amount of different habitats.

Like other cold water genera of Cypraeidae (e.g. *Notocypraea* and *Zoila* from Australia) also *Cypraeovula* from South Africa have no free swimming veliger stage so that consequently a genetic flow between populations over longer distances practically does not take place. Accordingly many micropopulations with constant features adapted to the respective habitat and depth they live in have developed during evolution. In accordance to LILTVED (pers. comm. 1989) these micropopulations can be considered as races of which two very striking and geographically defined examples are described herein. A short summary of the species involved and their variability throughout their ranges is included.

3.1 *Cypraeovula algoensis algoensis* (GRAY, 1828)

(Plates 6, 7)

The population centre of the typical *C. algoensis* is restricted to the Atlantic Ocean side of the Cape, from Cape Town to Cape Point. GRAY's types are extremely eroded specimens nevertheless displaying the features of the Atlantic *algoensis* well: Shell elongate-oval, mostly rather short, depressed and callous. Labrum sharply distinguished from the dorsum by a step, visible throughout from dorsal view. The posterior extremity is pointed. The anterior extremity shows a callus-accumulation dorsally, the teeth are fine but distinct and equally extending onto the labrum throughout, well produced on columellar side, extending across the columellar portion of the anterior extremity. The spire is slightly projecting and partly covered by callus, protoconch mostly hidden. The dorsal colouration is orange-brown, sometimes yellowish, the pattern fine and rarely netlike, sometimes completely absent. The marginal spotting is large, distant and well separated from the dorsum.

C. algoensis inhabits the lower sublittoral, it is commonly found in depths between 32 and 45 m on rocky walls with growth of soft corals and sponges.

Apparently *algoensis* is heavily preyed upon by fish as many specimens show healed cracks from fish jaws. Juvenile specimens seem to hide as only adult specimens are found openly. Probably these only leave sheltered crevices to meet on the open reef for mating, copulating couples are very commonly found, also in most other Atlantic species found on open reefs.

The living mollusc of *C. algoensis* has an orange translucent mantle with few rarely branched short slightly paler papillae. In the warmer Indian Ocean waters at False Bay the typical *algoensis* is extremely rare, restricted to depths between 40 and 50 m. Here the species is replaced by 2 extreme varieties, probably seperate subspecies so far poorly investigated.

3.1.1 *Cypraeovula algoensis* - "pale variety"

(Plates 6, 7)

The shell is slightly smaller than typical *C. algoensis*, less depressed and not as callous. The extremities are not sharply pointed, the labral teeth well produced. The spire is flat, sometimes slightly umbilicate, mostly covered by callus. The dorsal pattern is coarser and more regular with the ground color white, rarely yellowish. Inside False Bay this variety has been taken at Whittle Rock, Hangklip and eastwards to Hermanus in depths between 25 and 40 m under rocks among thick sponging growth. The mantle is translucent white with yellow branched papillae.

3.1.2 *Cypraeovula algoensis* - "pink variety"

(Plates 6, 7)

This is a very striking "subspecies", most certainly deserving this classification, which cannot be described herein on account of the few specimens known so far. The shell is inflated and very callous, the spire flat and covered by callus. Both margins are callous and densely covered with dark spots. These spots form red lines which extend onto the base towards the aperture. The dorsum is brownish pink when faded, bright purple in fresh specimens. The pattern is coarse and sparse. The mantle of the living mollusc is translucent gray with yellow areas of short branching papillae. This variety is restricted to a small spot at Pringle Bay near Cape Hangklip in depths between 30 and 50 m. The pinkish colouration is obviously not a result of a particular diet as a specimen was collected along with a bright orange *C. algoensis algoensis* under one large rock covered with sponges. The stomach contents of both specimens contained identical spiculae of the yellow sponge which forms the diet of most South African endemic cowries.

3.2 *Cypraeovula algoensis permarginata* n. ssp.

(Plates 1, 6)

This new subspecies has already been illustrated by LILTVED as "globose - deep water variety" (LILTVED 1989, fig. 54 and 56).

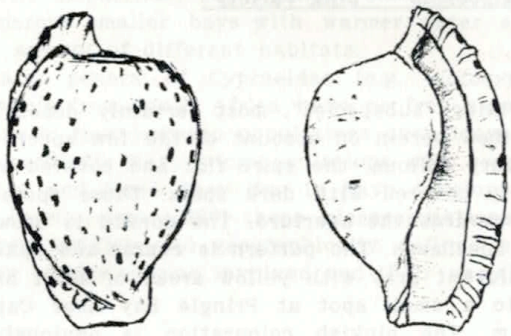
Diagnosis: The heavy globular shell with high margins, marginal spots crowded, extending onto dorsum and fading posterior labral teeth distinguish this deepwater subspecies well from any other *C. algoensis*, whilst resembling *C. edentula* conchologically.

Etymology: *Permarginata* ("per" = very) is supposed to indicate the greatly produced marginal calluses as characteristic feature for this subspecies.

Description and discussion: The new subspecies is restricted to greater depths between 150 and 400 m from Mossel Bay to Port Elizabeth, where *C. a. algoensis* is no longer found. The dense marginal spotting extending onto dorsum and the less distinct labral dentition along the posterior part along the aperture make this subspecies well distinguishable from *algoensis*. The shape and degree of callousity may vary with depth and area the shells are being taken from. This is actually the race deserving the name *algoensis* as it is the only representative occuring as far east as Algoa Bay. The fine dorsal freckling may be very striking, if typical it is unmistakeable. Sometimes specimens with barely noticeable dentition are found around Mossel Bay. These resemble *edentula* rather than *algoensis*. At Cape St. Francis, the westernmost distributional limit of *C. edentula*, a specimen of *C. algoensis permarginata* was collected in approximately 150 m (text-fig. 9). This had a lightweight, hardly callous shell with smooth lips along the aperture but distinct dentition labrally towards the margins. There is little doubt that it represents a conchological and geographical link between *edentula* and *algoensis*. The illustrations show the main features of these species and varieties well. The animal of *algoensis permarginata* is brownish, the mantle shows very tiny, densely packed papillae.

Material and measurements:

Holotype: L 19,4 mm, W 13,6 mm, H 11,6 mm; off Port Elizabeth, 300 m (HNC 22460)
Paratype 1: L 23,2 mm, W 16,0 mm, 13,2 mm; off Cape St. Francis, 140 m.
Paratype 2: L 21,6 mm, W 16,3 mm, H 13,7 mm; off Cape Agulhas, 70 fms.
(coll. HUBERT, Erlangen)
Varieties:
Paratype 3: L 19,6 mm, W 13,9 mm, H 11,2 mm; off Mossel Bay.
Paratype 4: L 17,0 mm, W 11,3 mm, H 9,1 mm; off Cape St. Francis.



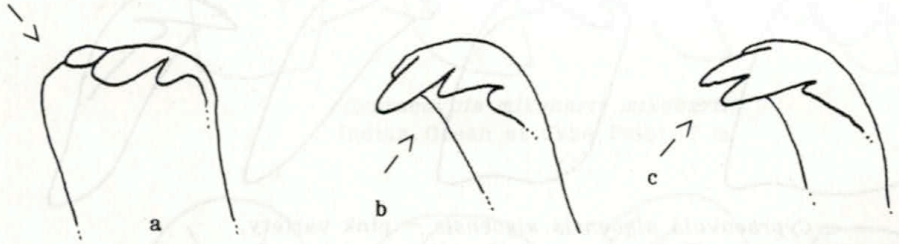
Text-fig. 9: *Cypraeovula algoensis permarginata* n. ssp., small specimen with reduced teeth; off Cape St. Francis.

The radulae in the genus *Cypraeovula* varies considerably from individual to individual, but considering the *algoensis*-like species, some constant features can be made out rather well (text-fig. 10 and 11).

In *C. algoensis algoensis* the lateral tooth forms a steplike extension towards the centre (text-fig. 10 a) while in *mikeharti* it is normally slender. This step is also seen in *edentula* and *alfredensis*, but less distinct. In *edentula* the split inner marginal tooth (text-fig. 10 b) is strikingly similar to that of *permarginata* (text-fig. 10 c) in which both marginal teeth are slit medially.

The rachidia tooth in *mikeharti* is mostly more slender than that of other species in the group but can be very similar to *algoensis*.

The radula of a single specimen of *C. a. permarginata* was available. It shows so striking differences to *algoensis* that certainly further investigation of the living mollusc (when this will finally be available) will confirm or dismiss the possibility that distinction of *permarginata* from *algoensis* is possible also on a higher level.



Text-fig. 10.

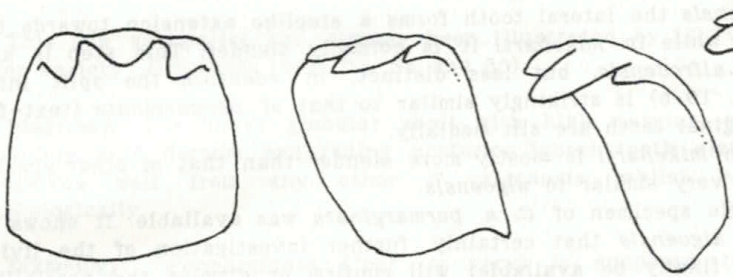
3.3 *Cypraeovula mikeharti* LORENZ jun., 1985
(Plates 6, 7)

In the warmer Indian Ocean *C. algoensis* is split into two species: the above discussed *C. algoensis algoensis* (and its varieties) and *C. mikeharti*. In the following the latest findings about *mikeharti* are shortly summarized.

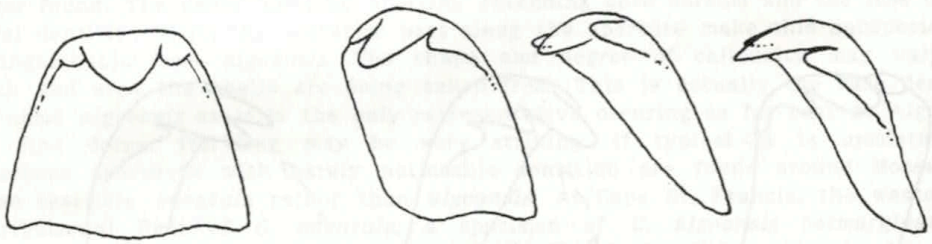
The shell is more elongate-inflated and normally less callous than *algoensis*. The labrum from dorsal view is hidden under the dome of the dorsum while always visible in all *algoensis*-varieties. The labral teeth tend to fade posteriorly, forming a sickle-shaped bay.

The anterior extremity is not covered by a callus accumulation dorsally but more fragile and never pointed. The spire is flat, hardly covered with callus, the protoconch well visible. The dorsal pattern is rather coarse. The ground colour varies from brownish-chestnut to dark purple, rarely paler. Apart from consistent radula differences there are external anatomical details separating *mikeharti* from *algoensis*: The mantle is thick and dark brown to black, rarely showing short, white, pointed papillae. Also the foot is black. *C. mikeharti* is confined to a particular habitat. The depth ranges from 5 to 15 m, rarely deeper. It is found in small groups of 3 to 5 specimens under black sponges or under the trunks of kelp, always well hidden. It feeds on black sponge and on a crinoid (*Comanthus wahlbergi*) associated with this habitat.

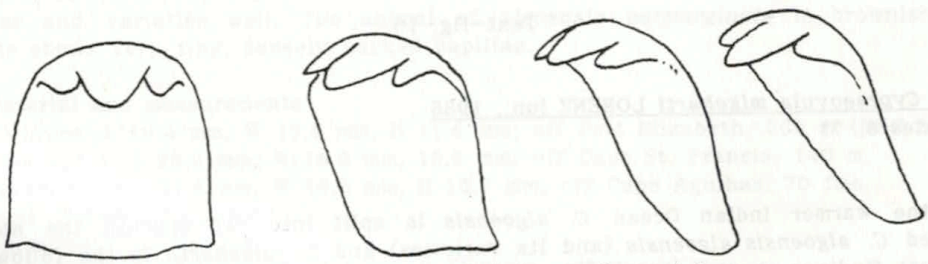
Text-fig. 11: Radulae of *Cypraeovula algoensis* and allies



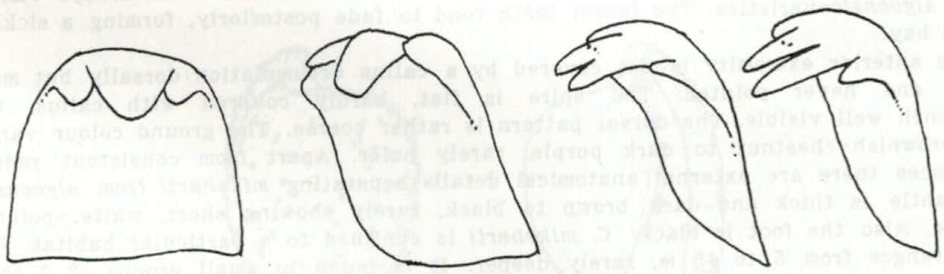
Cypraeovula algoensis algoensis – typical,
Atlantic Ocean at Hout Bay, 40 m.



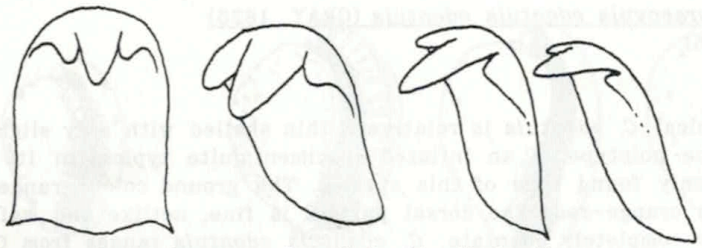
Cypraeovula algoensis algoensis – pink variety,
Indian Ocean at Hangklip, 40 m.



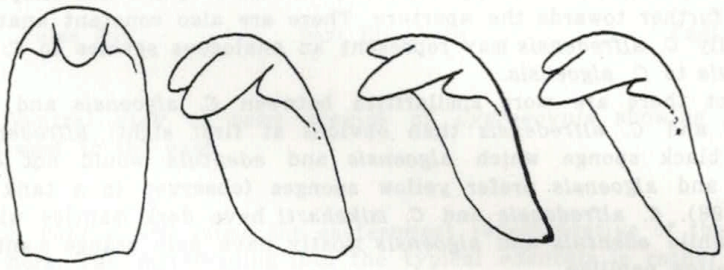
Cypraeovula algoensis algoensis – pale variety,
Indian Ocean at Hangklip, 40 m.



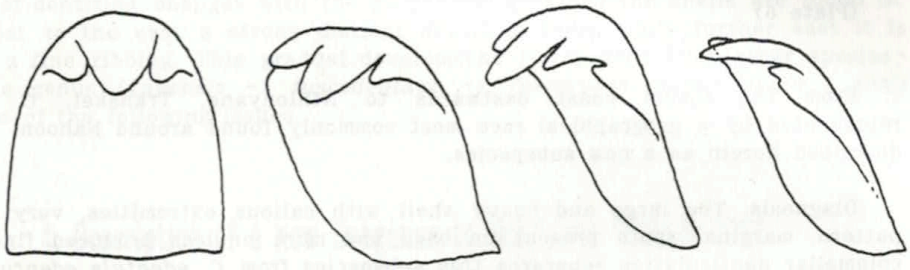
Cypraeovula algoensis permarginata n. ssp.,
Indian Ocean at Cape St. Francis, 140 m.



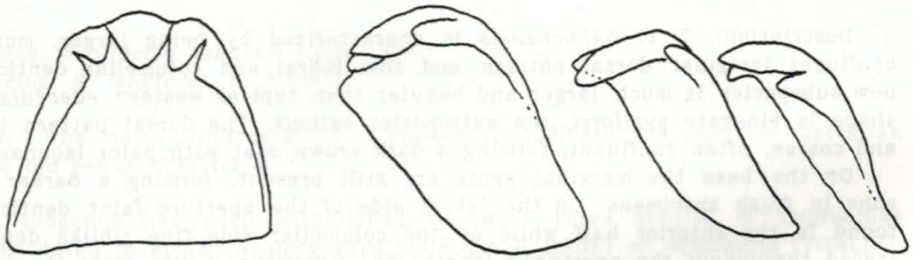
Cypraeovula mikeharti mikeharti,
Indian Ocean at Hermanus, 25 m.



Cypraeovula mikeharti mikeharti,
Indian Ocean at Cape Point, 7 m.



Cypraeovula edentula edentula,
Indian Ocean at Port Elizabeth, 12 m.



Cypraeovula alfredensis alfredensis,
Indian Ocean at Port Elizabeth, 12 m.

3.4 *Cypraeovula edentula edentula* (GRAY, 1825)
(Plate 6)

The typical *C. edentula* is relatively thin shelled with only slight deposit of callus basally. The holotype is an inflated specimen quite typical in its features with the most commonly found type of this species. The ground colour ranges from pale yellow to saturate orange-red. The dorsal pattern is fine, netlike and well defined. The lips are usually completely edentate. *C. edentula edentula* ranges from Cape St. Francis to Begha-Ciskei. It lives in depths from 8 to 200 m among sponges under rocks, along with the very similar *C. alfredensis* which differs conchologically by the purple colour of the dorsum which is mostly blotched, the more cylindrical shape and the spotting reaching further towards the aperture. There are also constant anatomical differences. Incidentally *C. alfredensis* may represent an analogous species to *C. mikeharti* as does *C. edentula* to *C. algoensis*.

In fact there are more similarities between *C. algoensis* and *C. edentula* or *C. mikeharti* and *C. alfredensis* than obvious at first sight: *alfredensis* and *mikeharti* feed on black sponge which *algoensis* and *edentula* would not even touch, while *edentula* and *algoensis* prefer yellow sponges (observed in a tank by LORENZ & DE BRUIN 1988). *C. alfredensis* and *C. mikeharti* have dark mantles with simple wartlike papillae while *edentula* and *algoensis* mostly have pale orange mantles with branched orange-yellow papillae.

3.5 *Cypraeovula edentula nahoonensis* n. ssp.
(Plate 6)

From The Ciskei coast eastwards to Nthlonyane, Transkei, *C. edentula* is represented by a geographical race most commonly found around Nahoon, East London, described herein as a new subspecies.

Diagnosis: The large and heavy shell with callous extremities, very dense dorsal pattern, marginal spots present on base and more or less produced fine labral and columellar denticulation separates this subspecies from *C. edentula edentula*.

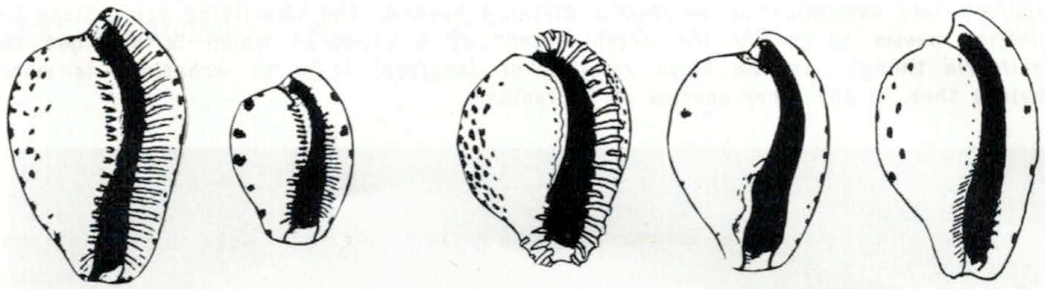
Etymology: *C. e. nahoonensis* is named after its centre of distribution around Nahoon, East London.

Description: *C. e. nahoonensis* is characterized by being larger, more solid with confluent irregular dorsal pattern and fine labral and columellar denticulation. This new subspecies is much larger and heavier than typical western *edentula*. The general shape is elongate pyriform, the extremities callous. The dorsal pattern is very dense and coarse, often confluent, forming a dark brown coat with paler lacunae.

On the base the marginal spots are still present, forming a darker often purple zone in fresh specimens. On the labral side of the aperture faint denticles are often found in the anterior half while on the columellar side fine riblike denticles can be traced throughout the aperture's length. These however never cross the base.

C. e. nahoonensis is rarely found alive. The animal is brownish with wartlike branched papillae. It is found ex pisce from depth of 50 m and more. Reverend DONG COCHRANE of East London reported specimens intertidally after storms and gave detailed descriptions of the animals (personal communication). Very fresh specimens are cast ashore in East London so that the habitat probably cannot be much deeper than ca. 5 m.

Material and measurements:
Holotype: L 26,1 mm, W 16,4 mm, H 13,2 mm; East London, (HNC 22461)
Paratype 1: L 24,5 mm, W 16,7 mm, H 12,3 mm; East London.
Paratype 2: L 22,1 mm, W 13,7 mm, H 11,0 mm; East London.
Paratype 3: L 23,7 mm, W 14,8 mm, H 11,9 mm; denticulate variety; Hickmans River.



algoensis *mikeharti* *permarginata* *edentula* *nahoonensis*

Atlantic False Bay Port Elizabeth East London

Text-fig. 12: Ventral view of some species of *Cypraeovula* showing fading of dentition from the west to the east.

Discussion: *C. e. nahoonensis* forms the easternmost representative of the group of species discussed here. The intergrading into the typical *edentula* is rather fluent in the area of Hamburg, Ciskei, while the racial features are very constant at the population centres and the main distribution of the two subspecies. Comparing *C. algoensis* -> *C. a. permarginata* -> *C. edentula* -> *C. e. nahoonensis* it is obvious that the feature of dentition changes with the geographic province the shells are found in. From the west to the east a strong distinct dentition fades while further east it is replaced by a fine ribbing. This gradual development is repeated by another species-group in the genus (*capensis* -> *fuscodentata* -> *fuscorubra*) about which I shall report in one of the following issues.

4. Description of a new Subgenus to *Schilderia* TOMLIN 1930

Schilderia (Austrasiatica) n. subgen.
(Plate 4)

Type species: *Schilderia sakuraii* HABE 1970.
Other species: *S. langfordi, S. hirasei.*

Etymology: The name *Austrasiatica* is chosen to indicate the Asiatic-Australian branch of the old genus *Schilderia.*

The new subgenus has been established to cover three species of Cypraeidae formerly accomodated in either *Nesiocypraea* (KURODA & HABE) or *Schilderia* (TOMLIN). The classification to *Nesiocypraea* was made together with the species *teramachii, midwayensis, lisetae* and *maricola* all of which are extreme deep water species with obsolete or calloused teeth and translucent callus fins framing the extremities, besides, all have a frame of dark spots surrounding the dorsum. The species *hirasei* and *sakuraii* as well as *langfordi* lack this framing, all have well developed, rather strong teeth and a far more solid appearance. The accomodation of these three species into *Schilderia* seems difficult either because also *Schilderia achatidea* and fossil ancestors like *S. flavicula* and other European Eocene members of the genus have reduced or absent columellar teeth, besides they all have a strongly reduced, hardly ribbed fossula in contrast to a well developed and distinctly ribbed fossula in *hirasei,*

langfordi and *sakuraii*. The geographic distance between the two living populations in question seems to justify the establishment of a subgenus which is attached to *Schilderia* though, as the close relation of *langfordi* (e.g.) to *achatidea* is more obvious than to any other species of Cypraeidae.

Literature:

(A few titles selected, a comprehensive bibliography on Cypraeidae is given in the near future).

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LOBETTI BODONI, F. (1985): Remarks on some species of the genus *Cypraeovula* GRAY 1824 in the South African coast.-- La Conchiglia, 192-193: 10-14. Roma.

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LORENZ jun., F. (1988b): Considerations on the complex of *Umbilia hesitata* IREDALE 1916 in Keppel Bay, Queensland (Gastropoda: Cypraeidae).-- La Conchiglia, 230-231: 14-20. Roma.

Address of the author:

FELIX LORENZ jun., Ginsterweg 6, 2058 Lauenburg/Elbe

F. LORENZ jun.: Annotated descriptions of some new and old members of Cypraeidae.

Explanations of plate 1.
(2 x life size).

Cypraeovula algoensis permarginata n. ssp.
Left: Paratype 1 (coll. LORENZ)
Right: Paratype 2 (coll. HUBERT, Erlangen)

Explanations of plate 2.
(1/3 life size)

(From left to right,
upper half of the plate: dorsal view;
lower half of the plate: same shells as above, ventral view).

First row:

Umbilia capricornica n. sp., typical variant;
Holotype (HNC 22453), (Swains Reef, 110-180 fms.).
Paratype 3, (Swains Reef, 110-180 fms.).

Umbilia capricornica n. sp., deep water variants;
Paratype, (Hescon Cay, Swains Reef, 300 fms).
Paratype 1, (Lady Musgrave Reef, 250 fms).
Paratype, (Hescon Cay, Swains Reef, 300 fms).

Second row:

Umbilia capricornica n. sp., typical variant;
Paratype 6, Paratype juv., Paratype 14, Paratype (lateral view),
Paratype 13 (lateral view), Paratype 10 (female), Paratype 5 (male).
(all from Swains Reef, 110-180 fms).

Third row:

Umbilia hesitata beddomei
(Brisbane, northernmost distribution limit of U. hesitata).

Umbilia hesitata beddomei (Newcastle).

Umbilia hesitata (typical form, Bass Strait).

Umbilia hesitata "howelli" (Bass Strait).

Umbilia armeniaca (Eucla).

F. LORENZ jun.: Annotated descriptions of some new and old members of Cypraeidae.

Explanations of plate 3.
(life size)

(From left to right,
upper half of the plate: dorsal view;
lower half of the plate: same shells as above, ventral view).

First row:

Cribrarula cribraria abaliena n. ssp.
Holotype (HNC 22457), Paratypes 1–6 (all from Zanzibar).
Paratype 7 (Durban, ex pisce).

Second row:

Cribrarula esontropia (Mauritius, coll. LORENZ).
Cribrarula esontropia (Mauritius, HNC 1755).

Cribrarula cribellum (coll. LORENZ, Mauritius, coll. LORENZ).
Cribrarula cribellum (Mauritius, HNC 1009).

Cribrarula cribraria comma (Zanzibar).

Third row:

Erronea (Purpuradusta) fimbriata quasigracilis n. ssp.
Holotype (HNC 22454), Paratypes 1–5, Paratype 6 (lateral view), Paratype 7.
(all from Zanzibar).

Fourth row:

Erronea (P.) fimbriata durbanensis (Zanzibar).

Erronea (P.) fimbriata fimbriata (Somalia).

Erronea (P.) gracilis notata (Somalia).

Erronea (P.) gracilis – giant variant (Somalia).

Erronea (P.) gracilis gracilis (Philippines).

Explanations of plate 4.
(3/4 life size)

(From left to right,
upper half of the plate: dorsal view;
lower half of the plate: same shells as above, ventral view).

First and second row, left:

Erronea (Ovatipsa) chinensis somaliana n. ssp.,
Left: Holotype (HNC 22456, Mogadiscio, Somalia).
Middle: Paratype 1 (Mogadiscio, Somalia).
Right: Paratype 2 (Mogadiscio, Somalia).

Third and fourth row, left:

Left: *Erronea (Ovatipsa) chinensis violacea* (Zanzibar).
Middle: *Erronea (Ovatipsa) coloba* (Thailand, HNC 1010).
Right: *Erronea (Ovatipsa) chinensis variolaria* (Zanzibar).

First row, right:

Type species of *Schilderia (Austrasiatica)* n. subgen.:
Left: *Schilderia (Austrasiatica) sakuraii* (Taiwan, coll. LORENZ).
Middle: *Schilderia (Austrasiatica) sakuraii* (Taiwan, coll. LORENZ).

Right: *Schilderia (Austrasiatica) langfordi moretonensis* (Queensland, coll. LORENZ).

Second row, right:

Left: *Schilderia (Austrasiatica) langfordi langfordi* (Japan, HNC 15594).

Middle: *Schilderia (Schilderia) achatidea achatidea* (Malaga, HNC 37296).

Right: *Schilderia (Schilderia) achatidea inopinata* (Senegal, coll. LORENZ).

F. LORENZ jun.: Annotated descriptions of some new and old members of Cypraeidae.

Explanations of plate 5.
(almost life size, slightly reduced)

(From left to right,
upper half of the plate: dorsal view;
lower half of the plate: same shells as above, ventral view).

First row:

Staphylaea limacina clarissa n. ssp.
Holotype (HNC 22458, Richardsbay, South Africa)
Paratype 1 (Richardsbay, South Africa).
Paratype 2 (Mbotyi, South Africa).
Paratype 3 (Bazaruto Id., Mozambique).
Paratypes 4-5 (Zanzibar).
Paratype 6 (Gonubie, South Africa).

Second row:

Staphylaea limacina interstincta (Zanzibar).
Staphylaea limacina interstincta (Zanzibar).
Staphylaea limacina interstincta (Zanzibar).
Staphylaea limacina interstincta (Zanzibar).

Staphylaea semiplota (Oahu, Hawaii).

Staphylaea limacina - typical form (Philippines).
Staphylaea limacina - typical form (Philippines).

Third row:

Staphylaea staphylaea nolani n. ssp.
Holotype (HNC 22459, Mbotyi, South Africa)
Paratypes 1-2 (Mbotyi, South Africa).
Paratype 3 (Xora Transkei, South Africa).
Paratype 4 (Port Grosvenor, South Africa).

Staphylaea staphylaea laevigata (Zanzibar).

Staphylaea staphylaea - typical form (Philippines).

Staphylaea staphylaea consobrina (Queensland).

F. LORENZ jun.: Annotated descriptions of some new and old members of Cypraeidae.

Explanations of plate 6. (*Cypraeovula* from South Africa)
(life size)

(From left to right).

First row:

Cypraeovula algoensis algoensis (Western Cape, Atlantic, 35 m, female).
Cypraeovula algoensis algoensis (Western Cape, Atlantic, 35 m).
Cypraeovula algoensis algoensis (Western Cape, Atlantic, 35 m).
Cypraeovula algoensis algoensis (Western Cape, Atlantic, 35 m; ventral view).

Second row:

Cypraeovula mikeharti (Buffels Bay, 8-15 m).
Cypraeovula mikeharti (Buffels Bay, 8-15 m; ventral view).

Cypraeovula algoensis - pale variety (Hangklip, 35 m).
Cypraeovula algoensis - pale variety (Hermanus, 28 m; ventral view).
Cypraeovula algoensis - pale variety (Whittle Rock).

Third row:

Cypraeovula algoensis algoensis (Pringle Bay, 35 m).
Cypraeovula algoensis - pink variety (Pringle Bay, 35 m).
Cypraeovula algoensis - pink variety (Pringle Bay, 40 m).

Cypraeovula algoensis permarginata n. ssp.
(Paratype 2, Cape Agulhas, 70 fms., coll. HUBERT, Erlangen).
Cypraeovula algoensis permarginata n. ssp.
(Holotype, HNC 22460, Port Elizabeth, 300 m, ventral view).

Fourth row:

Cypraeovula edentula edentula (Algoa Bay, 15 m).
Cypraeovula edentula edentula (Algoa Bay, 15 m).

Cypraeovula alfredensis (Algoa Bay, 15 m).
Cypraeovula alfredensis (Algoa Bay, 15 m).

Fifth row:

Cypraeovula edentula - deep water variety (Jeffreysbay).

Cypraeovula edentula nahoonensis n. ssp. - denticulate variety
(Paratype 3, Hickmans River).

Cypraeovula edentula nahoonensis n. ssp. (Paratype 1, Fullers Bay, East London).
Cypraeovula edentula nahoonensis n. ssp. (Paratype 2, Fullers Bay, East London).
Cypraeovula edentula nahoonensis n. ssp. (Holotype, HNC 22461,
Fullers Bay, East London).

F. LORENZ jun.: Annotated descriptions of some new and old members of Cypraeidae.

Explanations of plate 7. (*Cypraeovula* from South Africa)
(living animals)

First row:
Cypraeovula algoensis algoensis (Western Cape, Atlantic, 33-40 m).

Second row:
Left: *Cypraeovula algoensis* - pale variety (Hangklip, 35 m)
Right: *Cypraeovula algoensis* - pink variety (Pringle Bay, 40 m)

Third row:
Cypraeovula mikeharti (Buffels Bay, False Bay, Indian Ocean, 10 m).