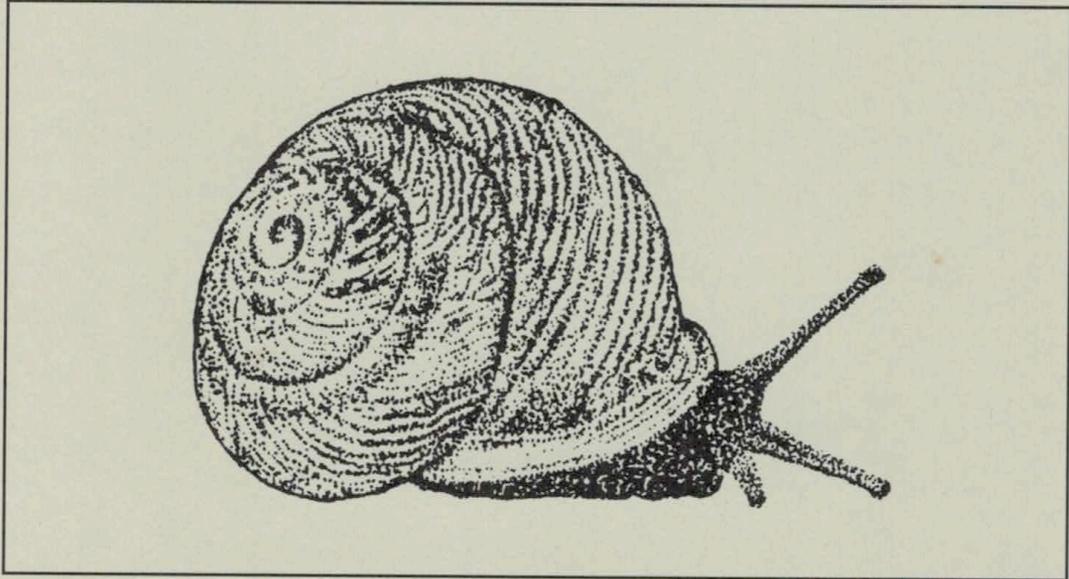


Schriften zur Malakozoologie

aus dem Haus der Natur – Cismar

Heft 5



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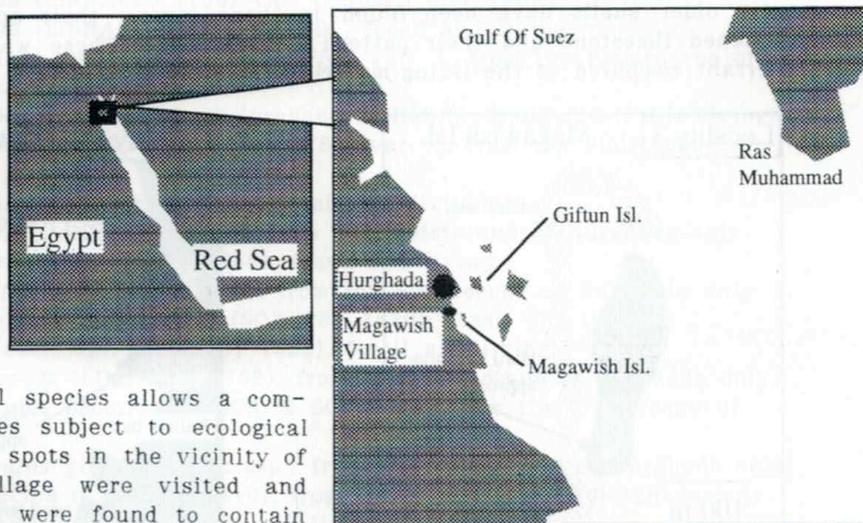
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Pleistocene Cypraeacea from the vicinity of Hurghada, Egypt.

By
FELIX LORENZ jun., Lauenburg.

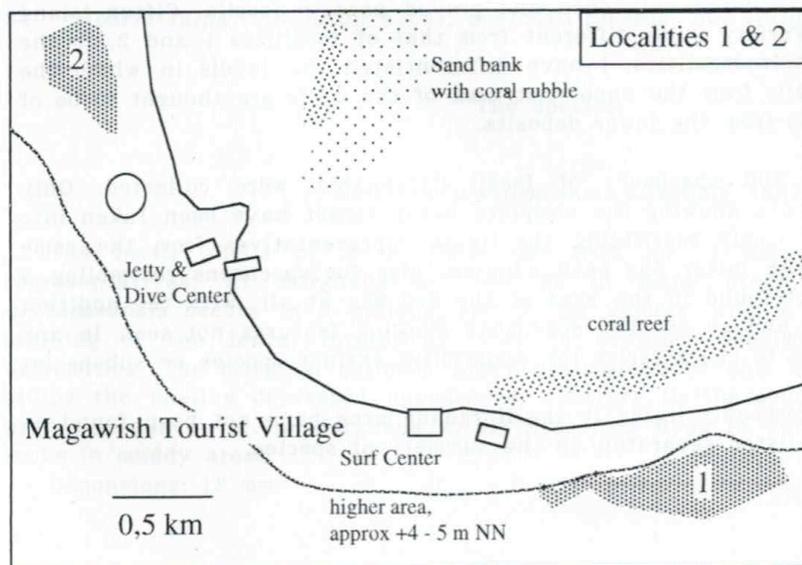
Abstract: Several species of Cypraeacea from the Pleistocene of Hurghada, Egypt are discussed in comparison with their living representatives. Three new taxa of Pleistocene Cypraeidae are described.

Introduction: During a longer stay at the Magawish Village 16 kms south of Hurghada, Egypt, I was able to collect a large number of fossil Cypraeidae as well as living representatives, often of the same or similar species. Due to the dry climate in this region the fossil shells are all in exceptionally good condition, often retaining traces of coloration. The abundance of some of the fossil species allows a comparison of features subject to ecological modification. Four spots in the vicinity of the Magawish Village were visited and several formations were found to contain fossil cowries.



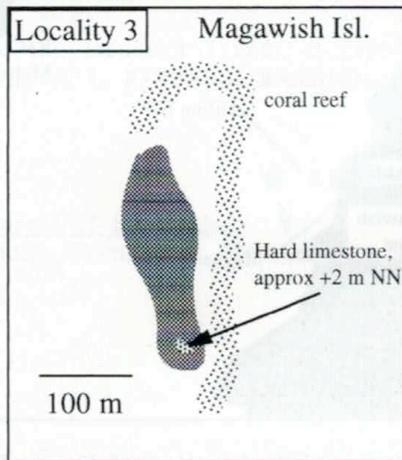
Text-figs. 1-2: Location of Hurghada.

The localities: The maps show four areas from which samples have been taken. Localities 1 and 2 were visited most frequently and also proved to contain the largest variety of species.

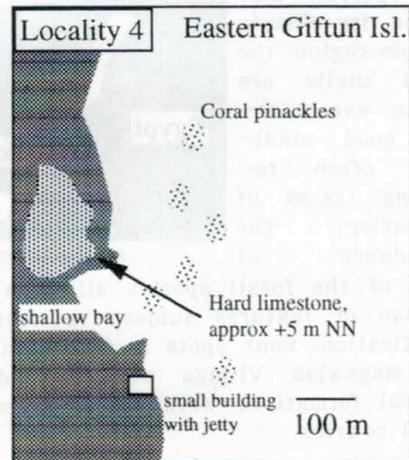


Text-fig. 3:
Location of research
areas 1 and 2.

These areas are characterized by fossil coral rubble and solid blocks of limestone and corals. Inbetween this conglomerate, the shells could be taken out without any tools or a knife. There is a steep wall rising from approximately 100 m of the beach to 5 to 6 m height. Above there is a flat sandy, slightly wavy land without traces of vegetation, forming the Arabian Desert running about ten kilometres at same height, then rising up, with a chain of rocks and thereafter the red shimmering mountain chain (up to 2600 m high, running all along the western Coast from the Gulf of Suez to the Nubian Desert in Sudan) whose reflection gave the Red Sea its name. The limestone formations, that run all along the coasts of the Red Sea in the northern areas, are thought to be geologically young (1-4 Million years in average). At times when the level of the Red Sea was much higher, extensive coral reefs grew along the coastline. These reefs got exposed and dried out when the sea level sank. Nowadays similar reefs frame the coastline, about half a kilometre away from the fossil reefs. On top of the walls rising from the beach-level there are many fossil shells in good condition. These are thought to be quite young. They are also those most easy to separate from the substrate they stick to. Their aperture is filled with loose sand but no hardened limestone. On the bottom of the walls there is a harder limestone conglomerate from which it is difficult to remove the shells undamaged without tools. The apparently older shells have been found in these layers, their apertures are filled with hardened limestone and their pattern has vanished. These were also the shells most aberrant compared to the living material.



Text-fig. 4: Research area 3.



Text-fig. 5: Research area 4.

Localities 3 and 4 are hardened limestone walls at the adjacent islands Giftun and Magawish. The latter was visited only once and proved poor in fossils. Giftun Island however showed a rich variety quite different from that of localities 1 and 2. In the record of species and their localities, I have differentiated the levels in which the shells were found, so shells from the uppermost area of the walls are thought to be of a younger age than shells from the lower deposits.

Material: More than 200 specimens of fossil Cypraeacea were collected. Only complete shells or fragments showing the complete basal aspect have been taken into account. For specimens closely resembling the living representatives from the same area the valid name of the latter has been adopted, also for specimens resembling a living species or race not found in the area or the Red Sea at all, with the addition "variety A", "variety B" and so on. For specimens showing features not seen in any living relative new names to characterize the apparently extinct species or subspecies have been introduced.

Several species now commonly living in the Hurghada area have not been found as fossils. These have been listed separately in the summary of species.

List of Cypraeacea from the Hurghada area, Egypt:

1. *Bistolida erythraeensis* (SOWERBY 1837), fossil and living.
2. *Bistolida erythraeensis cepaformis* n. ssp., from the Pleistocene of Hurghada only.
3. *Cribrarula cribraria* (LINNAEUS 1758) var. A, from the Pleistocene of Hurghada only.
4. *Cribrarula cribraria* (LINNAEUS 1758) var. B, from the Pleistocene of Hurghada only.
5. *Erosaria nebrites* (MELVILL 1888), fossil and living.
6. *Erosaria nebrites labrospinosa* n. ssp., from the Pleistocene of Hurghada only.
7. *Erosaria turdus* (LAMARCK 1810), fossil and living.
8. *Erosaria (Ovatipsa) caurica quinquefasciata* SCHILDER 1938, fossil and living.
9. *Erronea (Purpuradusta) gracilis* (GASKOIN 1849) var. A, fossil and living.
10. *Erronea (Purpuradusta) gracilis* (GASKOIN 1849) var. B, from the Pleistocene of Hurghada only.
11. *Luria (Basilitrona) isabella* (LINNAEUS 1758), fossil and living.
12. *Luria (Basilitrona) pulchra* (GRAY 1824), fossil and living.
13. *Lyncina carneola* var. A [= ? *leviathan* (SCH. & SCH. 1937)], fossil and living.
14. *Lyncina carneola* (LINNAEUS 1758) var. B, from the Pleistocene of Hurghada only.
15. *Lyncina carneola* (LINNAEUS 1758) var. C, fossil and living.
16. *Lyncina carneola* (LINNAEUS 1758) var. D, fossil and living.
17. *Mauritia (Arabica) arabica* (LINNAEUS 1758) var. A, from the Pleistocene of Hurghada only.
18. *Mauritia (Arabica) arabica* var. B [grayana SCHILDER 1930], fossil and living.
19. *Mauritia (Arabica) arabica* (LINNAEUS 1758) var. C, from the Pleistocene of Hurghada only.
20. *Monetaria annulus* (LINNAEUS 1758), fossil and living (rare).
21. *Monetaria moneta* (LINNAEUS 1758), from the Pleistocene of Hurghada only.
22. *Nucleolaria nucleus* (LINNAEUS 1758), fossil and living.
23. *Palmadusta lentiginosa* (GRAY 1825), from the Pleistocene of Hurghada only.
24. *Paulonaria* spec. aff. *macandrewi* (SOWERBY 1870), fossil and living.
25. *Pseudocypraea adamsonii* (SOWERBY 1832), fossil and living.
26. *Pustularia cicercula* (LINNAEUS 1758), from the Pleistocene of Hurghada only.
27. *Pustularia globulus brevirostris* SCH. & SCH. 1938, from the Pleistocene of Hurghada only.
28. *Pustularia globulus giftunensis* n. ssp., from the Pleistocene of Hurghada only.
29. *Staphylaea limacina* (LAMARCK 1810), from the Pleistocene of Hurghada only.
30. *Trivia oryza* LAMARCK 1810, fossil and living.
31. *Cypraea pantherina* SOLANDER 1786, no fossil records, but living around Hurghada (Pleistocene of Port Sudan).
32. *Lyncina camelopardalis* (PERRY 1811), no fossil records, but living around Hurghada (Pleistocene of Suakin, Sudan).
33. *Lyncina lynx* (LINNAEUS 1758), no fossil records, but living around Hurghada (Pleistocene of Port Sudan).
34. *Talparia talpa* (LINNAEUS 1758), no fossil records, but living around Hurghada.

The species:

1. *Bistolida erythraeensis* SOWERBY 1837

The fossil shells of *B. erythraeensis* from loc. 1 seem identical with living representatives. At Hurghada as well as in many other northern localities *B. erythraeensis* occurs in a callous, rhomboidal variety with a convex base, no black staining of the dental interstices (seen in southern specimens) and callous, dark extremities. The marginal calluses are always produced and bent up, rather angular, giving the shell a depressed appearance. Contrary to the southern populations which prefer deeper water, in Hurghada *B. erythraeensis* lives in very shallow water, under rocks in muddy areas.

Dimensions: 18 mm.

Localities and material: Not formerly recorded from Pleistocene deposits. Two slightly chipped specimens were found in the same locality where also *B. e. cepaformis* n. ssp. was collected, but *B. e. erythraeensis* was in a still younger layer.

Loc. 1: 2 shells; Loc. 2: --; Loc. 3: --; Loc. 4: --.

2. *Bistolida erythraeensis cepaformis* n. ssp.

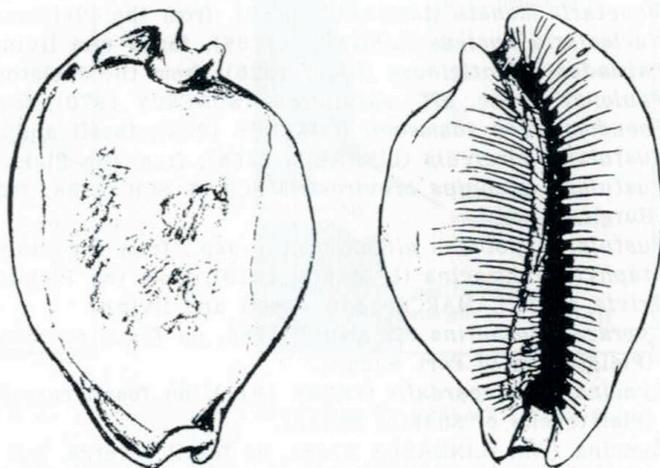
The holotype of this new taxon was first thought to be a species of *Pustularia*: the extremities are elegantly rostrated, slightly curved. The shell is rather globular, the teeth fine and extending. Another shell was then found in the same locality in a younger formation on locality 1 which is less inflated and more similar to *B. erythraeensis*. The new subspecies which has been found along with fossil *B. erythraeensis* s. str. is characterized by its rostrated extremities, rather curved aperture, shorter teeth which extend only slightly towards the base and labrum but do not cross it as in typical *B. erythraeensis*, and the rounded, callous margins which are bent up and rather angular in callous *B. erythraeensis* from the same area. The onion-shape (cepa = lat. onion) due to the rostrated, thin extremities is characteristic. The dorsum irregularly blotched as in typical *B. erythraeensis* (UV-light) but the marginal spotting is very faint and scarce, while that of typical *B. erythraeensis* is fine and dense.

Dimensions: Holotype 21,3 x 12,9 x 9,8 mm; 23 labr. 20 col. teeth (HNC 29092).
Paratype 1: 15,8 x 9,5 x 7,6 mm; 15 labr. 16 col. teeth (coll. LORENZ).

Localities and material: *Bistolida erythraeensis cepaformis* is only known from the Pleistocene limestone deposits of Magawish Village (Loc. 1).

Loc. 1: 2 shells; Loc. 2: --; Loc. 3: --; Loc. 4: --.

Text-fig. 6:
Bistolida erythraeensis
cepaformis



3. *Cribrarula cribraria* LINNAEUS 1758 var. A.

A broad, callous specimen of *C. cribraria* resembling the East Australian *C. melwardi* in shape. The specimen otherwise shows all features found in *C. cribraria*, including traces of the dorsal netting.

Dimensions: 22 mm.

Localities and material: A single shell from the top of the cliff at loc. 1. This Indo-pacific species lives in many parts of the Red Sea. I have not seen specimens from as far north as Hurghada however.

Loc. 1: 1 shell; Loc. 2: --; Loc. 3: --; Loc. 4: --.

4. *Cribrarula cribraria* LINNAEUS 1758 var. B

A narrow, cylindrical specimen of *C. cribraria* resembling the northwestern Pacific variety of the species (*C. cribraria* s. str.) and not at all the living East African and

Red Sea race *C. cribraria comma*. There is faint marginal pitting. The dorsal netting is well preserved and visible under UV-light.

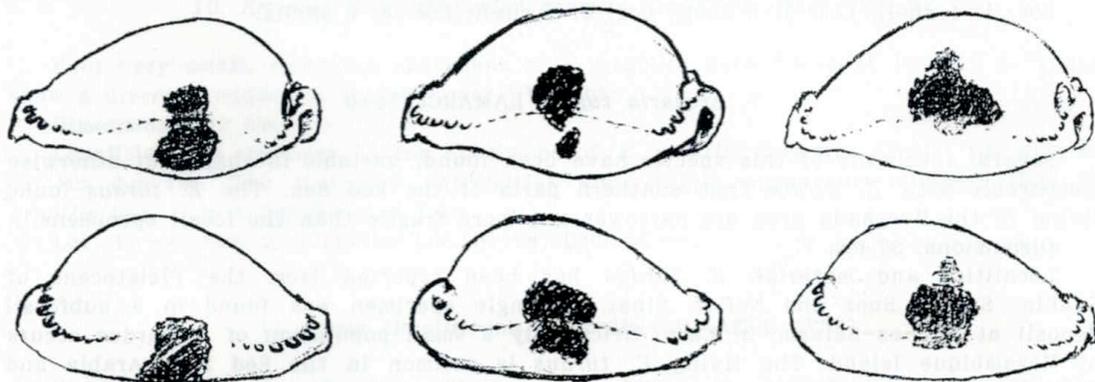
Dimensions: 17,3 mm.

Localities and material: Along with the shell of *C. cribraria* var. A from the top of the cliff at loc. 1.

Loc. 1: 1 shell; Loc. 2: --; Loc. 3: --; Loc. 4: --.

5. *Erosaria nebrites* MELVILL 1888

This species is the most common in the upper layers (younger) of localities 1 and 2. The species is extremely variable in size and shape. Most specimens are so well preserved that the blotches on the margins are visible even in normal light, UV light will show the fine dorsal spotting, and sometimes the basal streaking as it is seen in living specimens which are as commonly found in the vicinity of Hurghada today. One remarkable feature was however observed in the fossil shells compared to the living specimens so far investigated: In many specimens the marginal blotches (which are supposed not to reach the base or the edges of the shell in *E. nebrites*) are split into two smaller blotches, of which one is situated below the marginal edge, and the other above. In the related *E. erosa* from the Indo-Pacific the same marginal blotches occur, however situated directly on the marginal edge, or below, so that they are visible ventrally as well. It is suspected that *E. nebrites* has directly and continuously developed from *E. erosa* (which has still existed in the Red Sea in the Pleistocene of Port Sudan). The position of the marginal blotches in living specimens of *E. nebrites* and *E. erosa* represent a constant and reliable feature for distinction. Text-figs. 7-9 show the transition from *E. erosa* to *E. nebrites*.



Text-fig. 7:
Erosaria erosa

Text-fig. 8:
Erosaria nebrites (fossil)

Text-fig. 9:
Erosaria nebrites

Dimensions: The fossil specimens range from 20-35 mm.

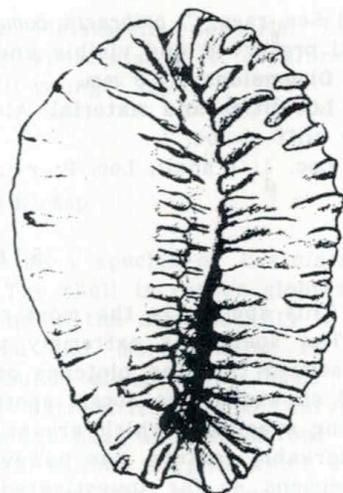
Localities and material: In all younger layers of loc. 1 and 2 *E. nebrites* was found in abundance. At Giftun, only one large (35 mm) specimen, at Magawish Isl. none was found. *E. nebrites* was found in Pleistocene deposits of Suez and Nefiof, Sinai. Living populations are found all over the Red Sea, Somalia, and scattered records from Zanzibar and Sri Lanka.

Loc. 1: 234 shells; Loc. 2: 78 shells; Loc. 3: --; Loc. 4: 1 shell.

6. *Erosaria nebrites labrospinosa* ssp. nov.

This new subspecies is characterized by processes of the labral teeth reaching the marginal edge, forming spines and tubercles. In well preserved specimens even on columellar side such tubercles and ridges can be seen. The holotype from the oldest layers of locality 2 is a well preserved shell with fine dorsal spotting and a characteristic blotch on the left margin dorsally. There is no blotch on columellar side in the holotype but in all paratypes there are two blotches.

These seem less restricted to the dorsal area than in typical *E. nebrites* but also cover parts of the margins, hence visible on basal view as well under UV light. The teeth of the type (15 labr., 14 col. teeth) extend and branch out towards the margin, turning into tubercles and ridges whilst extending almost onto dorsum. On columellar side the teeth are very strong, thickened, elevated posteriorly but not extending far onto base. Towards the margin on columellar side however there are numerous distinct ridges and tubercles, giving the shell a very corrugated outline, even from dorsal view. Some of the paratypes are less extreme due to erosion. This subspecies is very outstanding and seems to represent a sort of sidebranch of the evolution of *E. nebrites* out of *E. erosa* from the Indo-Pacific.



Text-fig. 10:
Erosaria nebrites labrospinosa n. ssp.

Dimensions: Holotype: 29,3 x 19,2 x 13,6 mm (HNC 29388)

Paratype 1: 28,0 x 18,6 x 13,4 mm; loc. 2 (coll. LORENZ)

Paratype 2: 33,2 x 22,6 x 16,2 mm; loc. 3 (coll. LORENZ)

Localities and material: *Erosaria nebrites labrospinosa* has been found (never in abundance) in the very low (old) layers in all four localities, where typical *E. nebrites* were not found.

Loc. 1: 1 shell; Loc. 2: 3 shell; Loc. 3: 1 shell; Loc. 4: 6 shells.

7. *Erosaria turdus* LAMARCK 1810

Several specimens of this species have been found, variable in shape but otherwise comparable with *E. turdus* from southern parts of the Red Sea. The *E. turdus* found living in the Hurghada area are narrower and more fragile than the fossil specimens.

Dimensions: 37 mm.

Localities and material: *E. turdus* has been reported from the Pleistocene of Suakin, Sudan, Suez and Nefiof, Sinai. A single specimen was found in a subfossil deposit at Dar-es-Salaam. In East Africa only a small population of *E. turdus* occurs at Mozambique Island. The living *E. turdus* is common in the Red Sea, Arabia and northeastern Somalia.

Loc. 1: 4 shells; Loc. 2: 8 shells; Loc. 3: 1 shell; Loc. 4: 6 shells.

8. *Erronea (Ovatipsa) caurica quinquefasciata* SCHILDER 1938

Four specimens of this subspecies were found, two in very good condition. Both are exceptionally large and cylindrical, otherwise showing all the characteristics of the living subspecies from the same area. It is interesting to note that despite the large number of specimens collected from some species, only four *E. caurica* were found. Today, *E. caurica quinquefasciata* is the most abundant cowry species on the reefs around Hurghada, followed by *E. nebrites*.

Dimensions: 49,5 mm.

Localities and material: This species was formerly reported from the Pleistocene of Suez and Port Sudan. Recent specimens occur commonly in most areas of the Red Sea.

Loc. 1: 1 shell; Loc. 2: 2 shells; Loc. 3: 1 shell; Loc. 4: --.

9. *Erronea (Purpuradusta) gracilis* (GASKOIN 1849) var. A

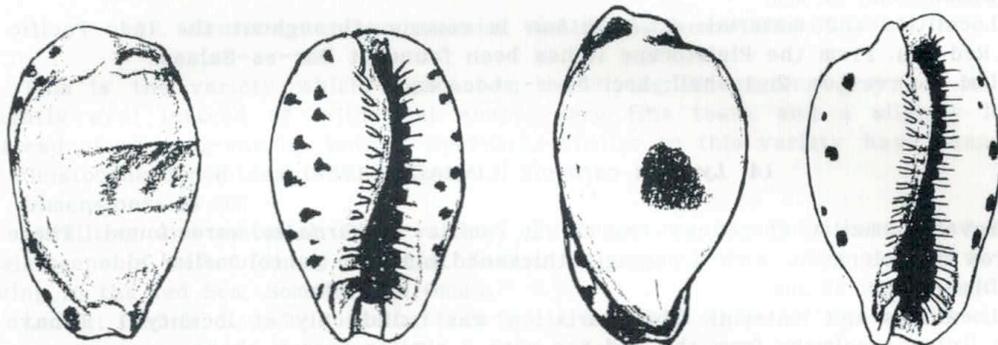
Several complete shells and fragments of *E. gracilis* were found at locality 1.

These show traces of the spotting and banding under UV light. Similar to living specimens of *E. gracilis* from the Red Sea [var. *notata* (GILL 1848)] the posterior end is partly covered by callus.

Dimensions: 15 mm.

Localities and material: *Erronea gracilis* is occasionally found living in the area of Hurghada, but is very common in southern parts of the Red Sea as in the Indo-Pacific. This is the first record of the species from the Pleistocene of the Red Sea region.

Loc. 1: 12 shells; Loc. 2: --; Loc. 3: --; Loc. 4: --.



Text-fig. 11:
Erronea (P.) *gracilis* var. A

Text-fig. 12:
Erronea (P.) *gracilis* var. B

10. *Erronea (Purpuradusta) gracilis* (GASKOIN 1849) var. B

Four very small, rostrated specimens of *E. gracilis* were found at locality 2. These show a discrete middorsal blotch under UV light.

Dimensions: 12 mm.

Localities and material: Living specimens of *E. gracilis* normally exceed the size of 12 mm by far. The rostrated extremities and fragile appearance suggest that *E. gracilis* var. B is a degenerated form.

Loc. 1: --; Loc. 2: 4 shells; Loc. 3: --; Loc. 4: --.

11. *Luria (Basilitrone) isabella* (LINNAEUS 1758)

Several specimens of this species were found in almost all localities and formations. The size and shape varies as well as the degree of callousity. Some specimens appear exceptionally rostrated.

Dimensions: 20-34 mm.

Localities and material: *L. isabella* has been collected from the Pleistocene of Suez, Port Sudan and even the Pliocene of Tanzania. In the Red Sea it is abundant and widespread. At Hurghada it is found in small (20 mm) and larger modifications.

Loc. 1: 12 shells; Loc. 2: 7 shells; Loc. 3: 2 shells; Loc. 4: 6 shells.

12. *Luria (Basilitrone) pulchra* (GRAY 1824)

Several well preserved specimens conchologically identical with the living *L. pulchra* were found at very old layers. One shell was found inside limestone too hard to cut, in the oldest exposed layers at locality 4. Here most specimens were found. All fossil *L. pulchra* still retain traces of the dark terminal blotches.

Dimensions: 47 mm.

Localities and material: *L. pulchra* was reported from the Pleistocene of Port Sudan and the Pliocene of East Africa [ssp. *gregoryi* COX 1930]. It is found living only in the Red Sea, very rarely in the Hurghada area.

Loc. 1: --; Loc. 2: 2 shells; Loc. 3: --; Loc. 4: 5 shells.

13. *Lyncina carneola* var. A [*leviathan* (SCH. & SCH. 1937) ?]

A single, well preserved specimen resembling the living *L. leviathan* has been found. This species is very common throughout the Red Sea. Its shell is very similar to the sympatric *L. carneola* but apart from larger size has a slightly stepped and often tuberculate labral margin which is not separated from dorsum by a bluish frame. In the fossil shell some features such as coloration are absent, there is also no tuberculation on the labral margin so that the specimen is provisionally added to the *L. carneola* - complex.

Dimensions: 52 mm.

Localities and material: *L. leviathan* is common throughout the Indo-Pacific and the Red Sea. From the Pleistocene it has been found at Dar-es-Salaam.

Loc. 1: --; Loc. 2: 1 shell; Loc. 3: --; Loc. 4: --.

14. *Lyncina carneola* (LINNAEUS 1758) var. B

Several smaller specimens resembling Pacific *L. carneola* were found. These are narrow and elongate, with a strongly thickened hind top on columellar side.

Dimensions: 28 mm.

Localities and material: This variation was found only at locality 1, I have not seen living specimens from the Red Sea with a similar narrow shape.

Loc. 1: 4 shells; Loc. 2: --; Loc. 3: --; Loc. 4: --.

15. *Lyncina carneola* (LINNAEUS 1758) var. C

Two broken shells of a larger type of *L. carneola* were found, similar to a giant variation still found living in the northern parts of the Red Sea. The margins and extremities are rounded, apparently these shells are *L. carneola* and not *L. leviathan*.

Dimensions: 41 mm.

Localities and material: Only two incomplete shells were found in older layers at locality 1.

Loc. 1: 2 shells; Loc. 2: --; Loc. 3: --; Loc. 4: --.

16. *Lyncina carneola* (LINNAEUS 1758) var. D

This is the variation of *L. carneola* that was most commonly found in all deposits, and still is found living along the coasts of the Red Sea. The variation "crassa" is characterized by heavy marginal calluses giving the shell a somewhat rhomboidal depressed appearance.

Dimensions: 28-34 mm.

Localities and material: Most good specimens were found in younger deposits of locality 4.

Loc. 1: 5 shells; Loc. 2: 2 shells; Loc. 3: 4 shells; Loc. 4: 11 shells.

17. *Mauritia (Arabica) arabica* (LINNAEUS 1758) var. A

The cylindrical shape and plateau-shaped dorsum prove that this variety is not the well defined *M. arabica grayana* (Text-fig. 14) found in this part of the Red Sea now. Typical *M. arabica immanis* SCHILDER & SCHILDER 1939 (Text-fig. 13 shows the outline of a specimen from Yeddah) are not found in this northern part of the Red Sea. Apparently, the variability of *M. arabica* in the area around Hurghada was far greater in the Pleistocene than now, possibly the time in between was just enough for the *M. a. grayana*-type to maintain itself against other *M. arabica*-races to form a very distinct subspecies (or species according to some authors) here, while in southern areas of the Red Sea both, *M. arabica immanis* and *M. arabica grayana* do occur alongside each other, and it is often very difficult (if at all) to separate from each

other. This is an interesting example how a polymorphous species such as *M. arabica*, after migrating into the northern Red Sea, has survived only by developing into the humped *M. a. grayana* [perhaps due to convergence more similar in shape to *M. histrio* (GMELIN 1791) from East Africa].

Dimensions: 45 mm.

Localities and material: Typical *M. arabica* have been reported from the Pleistocene of Suez, living *M. arabica* (ssp. *immanis*) seem to occur only as far north as Yeddah.

Loc. 1: 5 shells; Loc. 2: 2 shells; Loc. 3: --; Loc. 4: --.

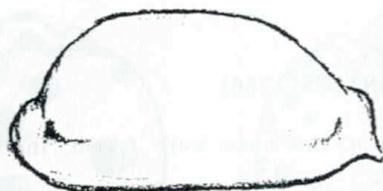
18. *Mauritia (Arabica) arabica* var. B [*grayana* SCHILDER 1930]

This is the variety which approaches the living *M. arabica grayana*. It has a slightly oval instead of cylindrical shape, very fine teeth and a slightly humped instead of plateau-shaped dorsum. Specimens similar to this variety have been found in Pleistocene deposits at Nefiof, Sinai.

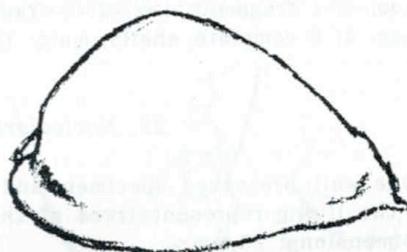
Dimensions: 46 mm.

Localities and material: This variety of *M. arabica* has been reported from the Pleistocene of Nefiof (Sinai) and Port Sudan. The typical *M. arabica grayana* is found living in the Red Sea, Somalia and Oman.

Loc. 1: 1 shell; Loc. 2: 6 shells; Loc. 3: --; Loc. 4: 5 shells.



Text-fig. 13:
M. arabica immanis



Text-fig. 14:
M. arabica grayana



Text-fig. 15:
M. arabica var. A



Text-fig. 16:
M. arabica var. B (*grayana*)



Text-fig. 17:
M. arabica var. C

19. *Mauritia (Arabica) arabica* (LINNAEUS 1758) var. C

This variety has the shape of Pacific *M. arabica arabica*. It is cylindrical, with a flat base and rather blunt extremities. The dorsum is not humped but forms a plateau. Smaller specimens of living *M. arabica grayana* are slightly humped dorsally. The variation C is apparently extinct in this part of the Red Sea.

Dimensions: 38 mm.

Localities and material: The dwarf form of *M. arabica* has only been found in older (lower) Pleistocene deposits at locality 1.

Loc. 1: 8 shells; Loc. 2: --; Loc. 3: --; Loc. 4: --.

20. *Monetaria annulus* (LINNAEUS 1758)

Three very eroded shells were found in a very young part of the fossil reef at locality 2. In this area many well preserved specimens of *E. nebrites* were found, retaining the original nacre and faint pattern.

Dimensions: 21 mm.

Localities and material: *Monetaria annulus* occurs in all parts of the Red Sea. It has been reported from the Pleistocene of Suez, Dar-es-Salaam and many Western Pacific areas.

Loc. 1: -- ; Loc. 2: 3 shells; Loc. 3: --; Loc. 4: --.

21. *Monetaria moneta* (LINNAEUS 1758)

Only a few large, tuberculate specimens with elevated teeth were found. This species is not found alive in this northern part of the Red Sea.

Dimensions: 32 mm.

Localities and material: Despite two fragments of smaller specimens from localities 1 and 2, only few shells have been found in the older formations at locality 4. The species has not been reported from the Pleistocene of the Red Sea before but has been found in deposits of Tanzania, South Africa, the Philippines and Java. The living species is found in the entire Indo-Pacific.

Loc. 1: 1 fragment; Loc. 2: 1 fragment; Loc. 3: --;

Loc. 4: 8 complete shells, many fragments.

22. *Nucleolaria nucleus* (LINNAEUS 1758)

One well preserved specimen and one fragment of the base were found, identical with the living representatives of the species.

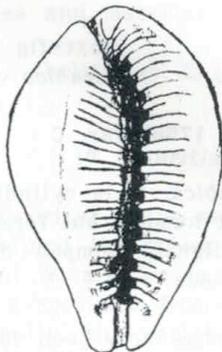
Dimensions: 26 mm.

Localities and material: From the Pleistocene this species has been reported from Port Sudan. It is found frequently living in all areas of the Red Sea including Hurghada, and the Indo-Pacific.

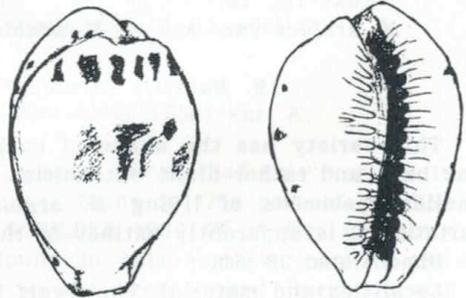
Loc. 1: 2 shells; Loc. 2: --; Loc. 3: --; Loc. 4: --.

23. *Palmadusta lentiginosa* (GRAY 1825)

A complete shell retaining the dorsal and marginal pattern, and a fragment of a base have been found at locality 1. The smaller, complete shell measures 20 x 12,5 x 10 mm and has 13 short teeth on either lip.



Text-fig. 18:
Palmadusta lentiginosa
- (fragment of) base, 28 mm



Text-fig. 19:
Palmadusta lentiginosa
- complete specimen, 20 mm

Dimensions: 20 to 28 mm.

Localities and material: Two specimens were found in the Pleistocene of Magawish, Hurghada. This is the first record from the northern Red Sea area for this species. The distribution of the living *P. lentiginosa* ranges from the southern half of the Red Sea and the Persian Gulf to Thailand.

Loc. 1: 1 complete shell, 1 fragment; Loc. 2: --; Loc. 3: --; Loc. 4: --.

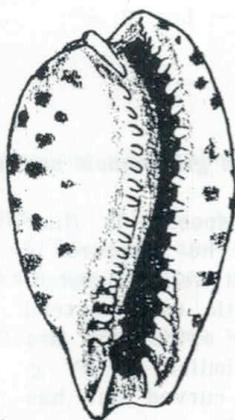
24. *Paulonaria* spec. aff. *macandrewi* (SOWERBY 1870)

The unique shell is pyriform, elongate, with 15 well produced, slightly extending labral and 13 short columellar teeth. These are strongly thickened anteriorly (see fig. f), connected by a slightly shallower ridge not fusing the teeth completely. The dorsum is spotted with large, distant circular spots which are more distinct under UV-light, which also uncovers a dense and regular spotting that reaches far onto the base. The fossula is rather flat, showing two faint denticles. There is no marginal pitting, although the shell is fully adult as can be seen from a produced callousity on each extremity. The shell closely resembles *P. macandrewi* which is found living at Hurghada and throughout the Red Sea. This species has slightly finer, less distant teeth, which are slightly extending on columellar side. The margins in typical *P. macandrewi* are distinctly pitted, at least towards the extremities, there is no development of a tubercle anteriorly. Hopefully, more specimens of this probably new taxon will be found to either confirm or dismiss its characteristics.



Text-fig. 20:

Paulonaria spec. aff. *macandrewi*



Text-fig. 21:

P. spec. aff. macandrewi, anterior

Dimensions: 13,2 x 7,5 x 6,2 mm.

Localities and material: This peculiar variety is known from a single shell from the Pleistocene of Magawish Village, Hurghada. The living *Paulonaria macandrewi* ranges from the Red Sea to Muscat, Oman.

Loc. 1: 1 shell; Loc. 2: --; Loc. 3: --; Loc. 4: --.

25. *Pseudocypraea adamsonii* (SOWERBY 1832)

A single, complete and well preserved specimens was found at locality 1.

Dimensions: 9,4 mm.

Localities and material: *Pseudocypraea adamsonii* is an almost cosmopolitan species found throughout the Red Sea.

Loc. 1: 1 shell; Loc. 2: --; Loc. 3: --; Loc. 4: --.

26. *Pustularia cicercula* (LINNAEUS 1758)

A single, slightly eroded and chipped specimen still retaining the characteristic

dorsal pustulation and the spire blotch (UV light) has been found at locality 1. It agrees with the living specimens of *Pustularia cicercula* now common in southern parts of the Red Sea.

Dimensions: 17 mm.

Localities and material: The single specimen was found in a younger deposit facing the Surf Centre at Magawish Village (locality 1). The species has been found in the Pliocene of Dar-es-Salaam, Tanzania. The living species is found throughout the Indo-Pacific.

Loc. 1: 1 shell; Loc. 2: --; Loc. 3: --; Loc. 4: --.

27. *Pustularia globulus brevirostris* SCH. & SCH. 1938

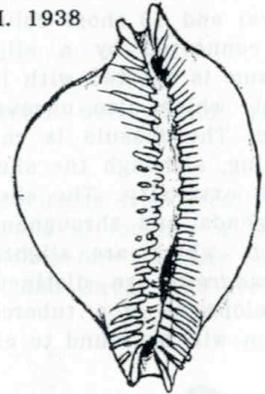
A single, well preserved specimen retaining traces of the original spotting was found. The midway-columellar teeth are connected by a callous ridge, which is characterizing for this subspecies. The aperture is straight. There are 23 labral and 21 columellar teeth. The specimen was found in the top layers of the cliff facing the Surf Centre at Magawish village, in the younger deposits.

Dimensions: 12,9 x 7,7 x 7,1 mm.

Localities and material: Now occurs only in the southern part of the Red Sea, in East Africa and Mauritius. In Dar-es-Salaam since Pleistocene.

Loc. 1: 1 well preserved shell; Loc. 2: --; Loc. 3: --;

Loc. 4: --.



Text-fig. 22:
P. g. brevirostris

27. *Pustularia globulus giftunensis* ssp. nov.

The dentition of this Pleistocene subspecies is finer than in living *P. globulus brevirostris*. The aperture is curved behind, the midway-columellar teeth well separated. There are 28 labral and 26 columellar teeth, which extend onto the middle of labrum and base. The extremities are rather short. The dorsal spotting is similar to *P. g. brevirostris*. Paratype 1 is slightly less curved but has very fine teeth as well (labr. 28 col. 23), it is from a younger deposit on an exposed part of the flat top of a fossil reef, approx. 6 m above sea level. The holotype was collected in an older deposit about 300 m inshore Giftun Island. Here several fragments were found, showing the curve of the aperture is a constant feature. Compared to other species of the genus, the very fine dentition and curved aperture resemble only the living *P. margarita* from the Indo-Pacific, which however is humped dorsally and has connected or fused midway-columellar teeth.

Dimensions: Holotype: 24,5 x 9,2 x 8,2 mm (HNC 29389).

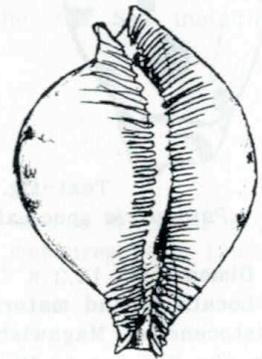
Paratype 1: 15,2 x 9,2 x 7,9 mm. (coll. LORENZ)

Paratype 2: 17,9 x 11,8 x ... mm, 27 col. teeth (incomplete shell, coll. LORENZ)

One fragment of a labrum with 27 lab. teeth.

Localities and material: So far only known from the Pleistocene of Giftun Island.

Loc. 1: --; Loc. 2: --; Loc. 3: --; Loc. 4: 2 complete shells, many fragments.



Text-fig. 23:
P. g. giftunensis n. ssp.

29. *Staphylaea limacina* (LAMARCK 1810)

Two fragments of the base and labrum were found, good enough to verify the species.

Dimensions: 24,7 mm.

Localities and material: This is the first record of *St. limacina* from at least the northern part of the Red Sea. As far as I know, there is no positive record of this species, fossil or living, for the Red Sea at all.

Loc. 1: 2 fragments; Loc. 2: --; Loc. 3: --; Loc. 4: --.

30. *Trivia oryza* LAMARCK 1810

Several specimens of the smaller form of the Indo-Pacific *T. oryza* have been found, some of these did not show a distinct dorsal line as seen in living specimens.

Dimensions: 8 mm.

Localities and material: *Trivia oryza* is found throughout the Indo-Pacific. It varies considerably with every location, several names to subdivide the species have been introduced, of which *T. turneri* (SCHILDER 1932) seems most appropriate.

Loc. 1: 15 shells; Loc. 2: 20 shells; Loc. 3: 5 shells; Loc. 4: 3 shells.

Acknowledgments: Many thanks to my friends in Egypt who helped me wherever they could. Special thanks to Capt. Mohammed Asam of Hurghada, Ayman Samir, Jimmy and Nasser from the diving centre. And finally many thanks to Kerstin for her patience and encouragement.

Literature:

Some citations of fossil records were taken from

SCHILDER, F. & SCHILDER, M. (1971): A catalogue of living and fossil cowries. Taxonomy and bibliography of Triviacea and Cypraeacea (Gastropoda: Prosobranchia). - Mémoires de l'Institut royale des sciences naturelles de Belgique (2) 85: 1-246.

An extensive bibliography on Cypraeidae will be published in the near future.

Address of the author:

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Explanations of plate 6:

(photos: V. WIESE, 1/2 life size)

If not otherwise stated all illustrated specimens were collected from the fossil research sites around Hurghada (explanations see text-pages 19-20). Identical numbers are showing identical shells.

Fig. 1-2: *Mauritia arabica* (LINNAEUS 1758) var. A, loc. 1.

Fig. 3: *Mauritia arabica* (LINNAEUS 1758) var. A, loc. 2.

Fig. 4-7: *Mauritia arabica* (LINNAEUS 1758) var. C, loc. 1.

Fig. 8: *Mauritia arabica grayana* SCHILDER 1930, collected alive, Hurghada.

Fig. 9: *Mauritia arabica immanis* SCHILDER & SCHILDER 1939, collected alive, Jeddah (northernmost spot of distribution in the Red Sea).

Fig. 10-11: *Mauritia arabica* (LINNAEUS 1758) var. B, loc. 4.

Fig. 12: *Mauritia arabica* (LINNAEUS 1758) var. B, loc. 2.

Fig. 13: *Lyncina carneola* var. A [= ? *leviathan* (SCH. & SCH. 1937)], loc. 2.

Fig. 14-17: *Lyncina carneola* (LINNAEUS 1758) var. B, loc. 1.

Fig. 18-19: *Lyncina carneola* (LINNAEUS 1758) var. C, loc. 1.

Fig. 20-23: *Lyncina carneola* (LINNAEUS 1758) var. D, loc. 4.

Fig. 24: *Lyncina leviathan* (SCH. & SCH. 1937), collected alive, Hurghada.

Fig. 25: *Lyncina carneola* (LINNAEUS 1758) var., collected alive, Hurghada.

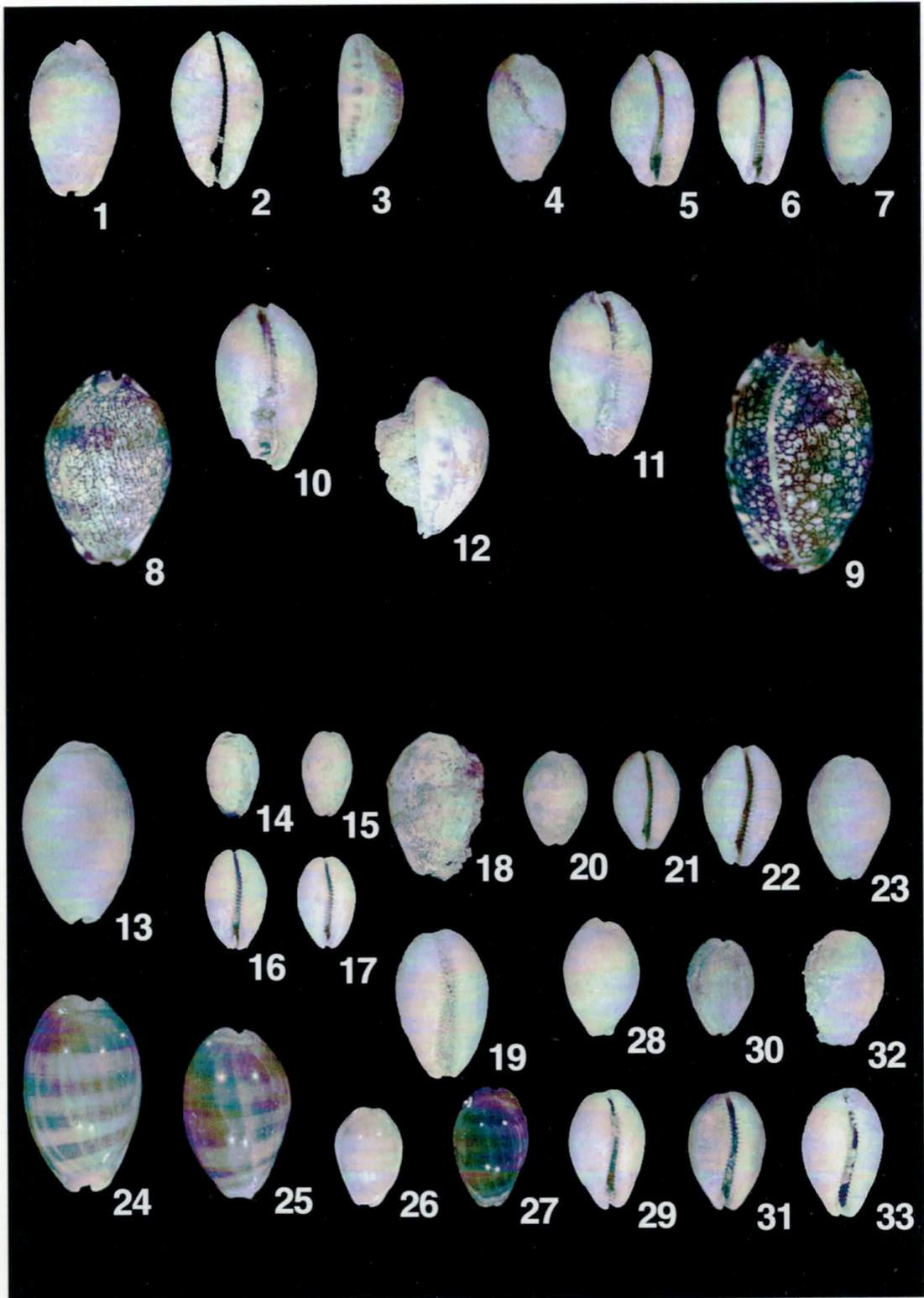
Fig. 26: *Lyncina carneola* (LINNAEUS 1758) var., collected alive, Hurghada.

Fig. 27: *Lyncina carneola* (LINNAEUS 1758) var., collected alive, Hurghada.

Fig. 28-29: *Lyncina carneola* (LINNAEUS 1758) var. D, loc. 1.

Fig. 30-31: *Lyncina carneola* (LINNAEUS 1758) var. D, loc. 2.

Fig. 32-33: *Lyncina carneola* (LINNAEUS 1758) var. D, loc. 3.



F. LORENZ jun.: Pleistocene Cypraea from the vicinity of Hurghada, Egypt.

Explanations of plate 7:

(photos: V. WIESE, approx. life size)

Fig. 34: *Bistolida erythraeensis cepaformis* n. ssp., holotype, loc. 1 (HNC 29092).

Fig. 35: *Bistolida erythraeensis cepaformis* n. ssp., paratype, loc. 1.

Fig. 36-37: *Bistolida erythraeensis* (SOWERBY 1837), loc. 2.

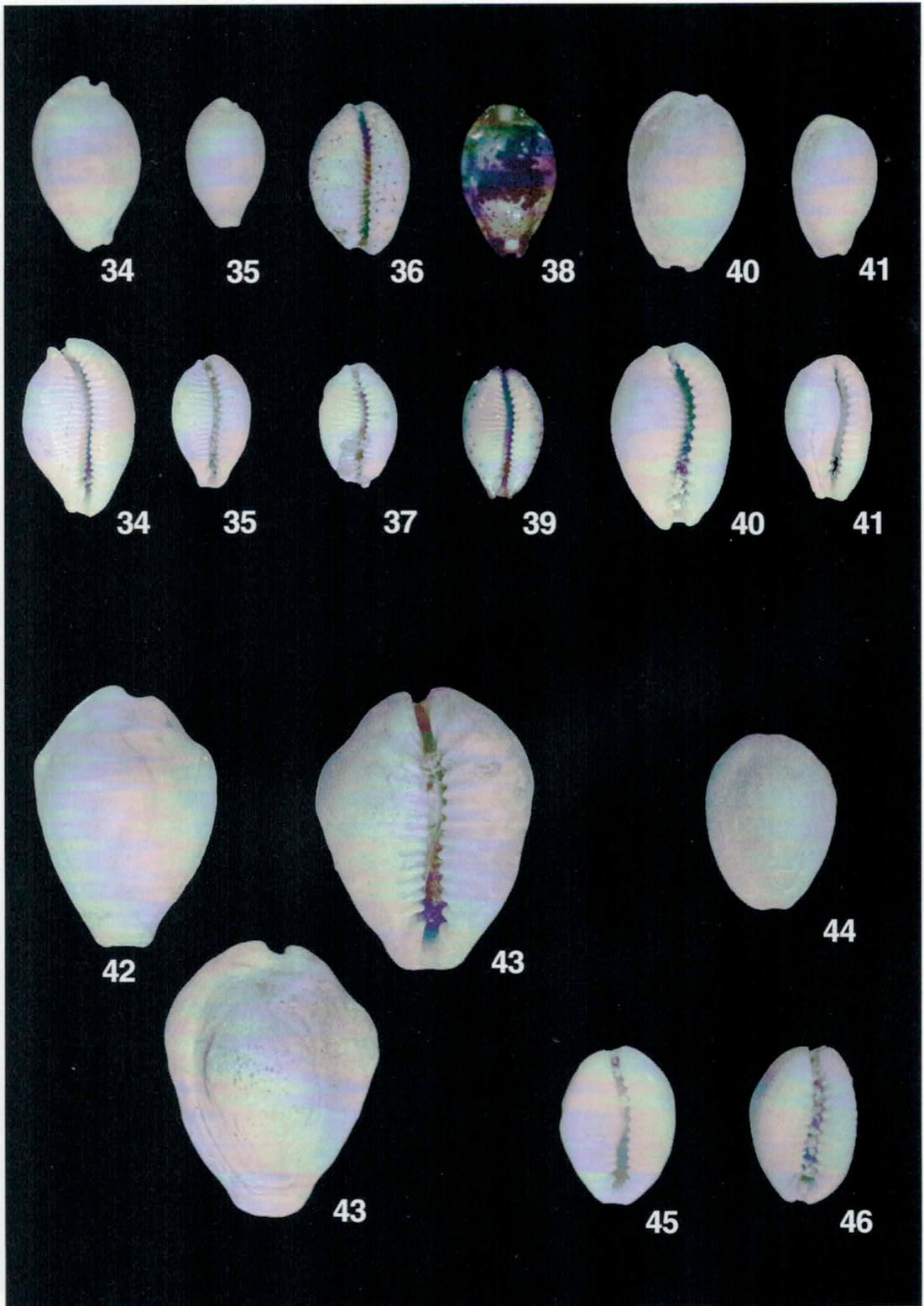
Fig. 38-39: *Bistolida erythraeensis* (SOWERBY 1837), collected alive, Hurghada.

Fig. 40: *Cribrarula cribraria* (LINNAEUS 1758) var. A, loc. 1.

Fig. 41: *Cribrarula cribraria* (LINNAEUS 1758) var. B, loc. 1.

Fig. 42-43: *Monetaria moneta* (LINNAEUS 1758) var., loc. 4.

Fig. 44-46: *Monetaria annulus* (LINNAEUS 1758), loc. 2.

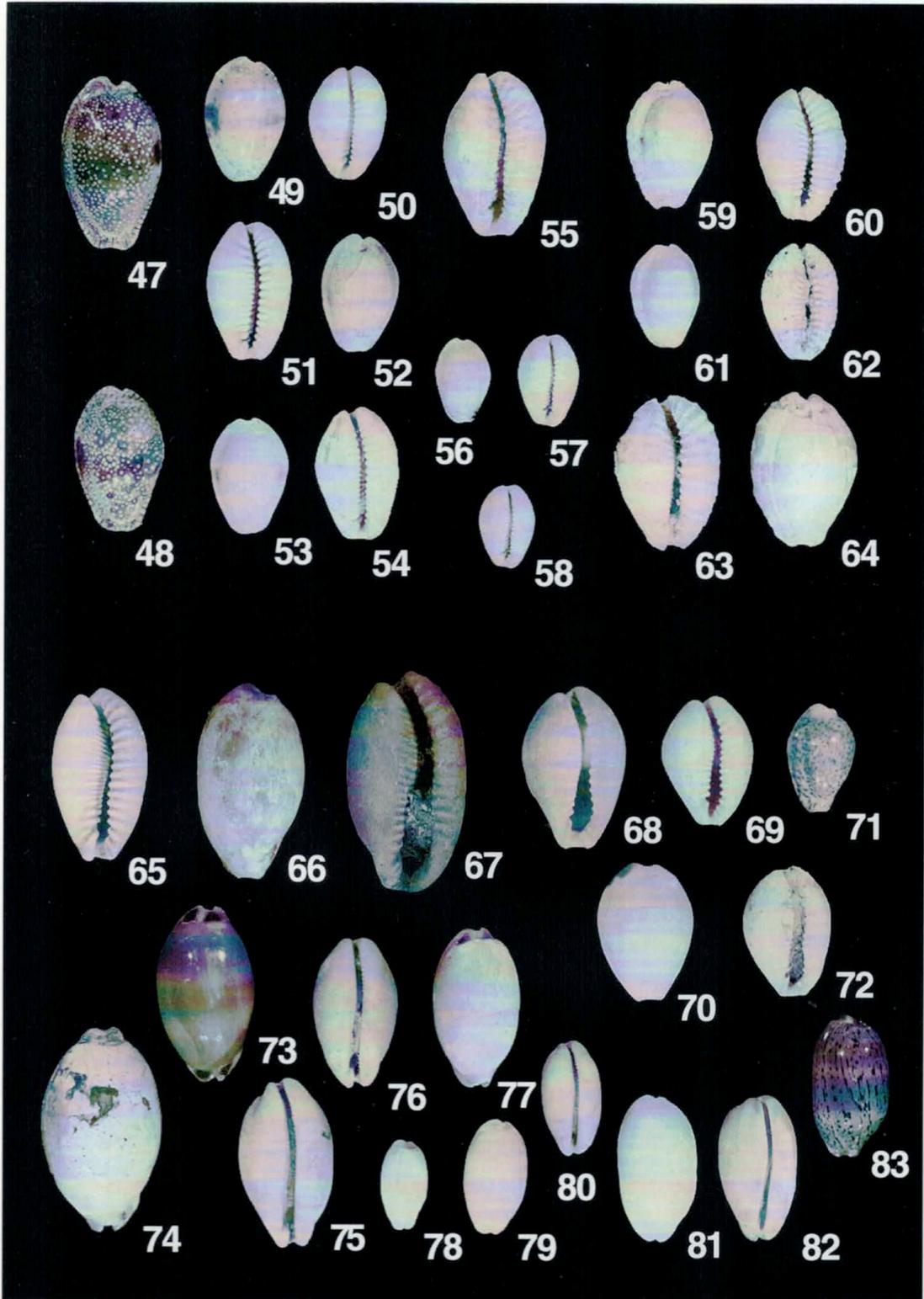


F. LORENZ jun.: Pleistocene Cypraea from the vicinity of Hurgada, Egypt.

Explanations of plate 8:

(photos: V. WIESE, 2/3 life size)

- Fig. 47: *Erosaria erosa* (LINNAEUS 1758), collected alive, Diani Beach, Kenya.
- Fig. 48: *Erosaria nebrites* (MELVILL 1888), collected alive, Hurghada.
- Fig. 49-50: *Erosaria nebrites* (MELVILL 1888), subfossil.
- Fig. 51-54: *Erosaria nebrites* (MELVILL 1888), loc. 1 and loc. 2.
- Fig. 55: *Erosaria nebrites* (MELVILL 1888), loc. 4.
- Fig. 56-58: *Erosaria nebrites* (MELVILL 1888), dwarf form, loc. 1.
- Fig. 59: *Erosaria nebrites labrospinosa* n. ssp., paratype 1, loc. 2 (lower beds).
- Fig. 60: *Erosaria nebrites labrospinosa* n. ssp., holotype, loc. 2 (upper beds)
(HNC 29388).
- Fig. 61: *Erosaria nebrites labrospinosa* n. ssp., paratype, loc. 2.
- Fig. 62: *Erosaria nebrites labrospinosa* n. ssp., paratype, loc. 1.
- Fig. 63: *Erosaria nebrites labrospinosa* n. ssp., paratype 3, loc. 3.
- Fig. 64: *Erosaria nebrites labrospinosa* n. ssp., paratype 4, loc. 4.
- Fig. 65: *Erosaria caurica quinquefasciata* SCHILDER 1938, collected alive, Magawish.
- Fig. 66: *Erosaria caurica* (LINNAEUS 1758), loc. 3.
- Fig. 67: *Erosaria caurica* (LINNAEUS 1758), loc. 2.
- Fig. 68-70: *Erosaria turdus* (LAMARCK 1810), loc. 2.
- Fig. 71: *Erosaria turdus* (LAMARCK 1810), collected alive, Hurghada.
- Fig. 72: *Erosaria turdus* (LAMARCK 1810), loc. 1.
- Fig. 73: *Luria pulchra* (GRAY 1824), collected alive, Hurghada.
- Fig. 74-75: *Luria pulchra* (GRAY 1824), loc. 2.
- Fig. 76-77: *Luria pulchra* (GRAY 1824), loc. 4.
- Fig. 78: *Luria isabella* (LINNAEUS 1758), loc. 2.
- Fig. 79-80: *Luria isabella* (LINNAEUS 1758), loc. 1.
- Fig. 81-82: *Luria isabella* (LINNAEUS 1758), loc. 4.
- Fig. 83: *Luria isabella* (LINNAEUS 1758), collected alive, Hurghada.



F. LORENZ jun.: Pleistocene Cypraea from the vicinity of Hurghada, Egypt.

Explanations of plate 9:

(photos: V. WIESE, approx. 2 x life size)

Fig. 84-89: *Erronea gracilis* (GASKOIN 1849) var. A, loc. 1.

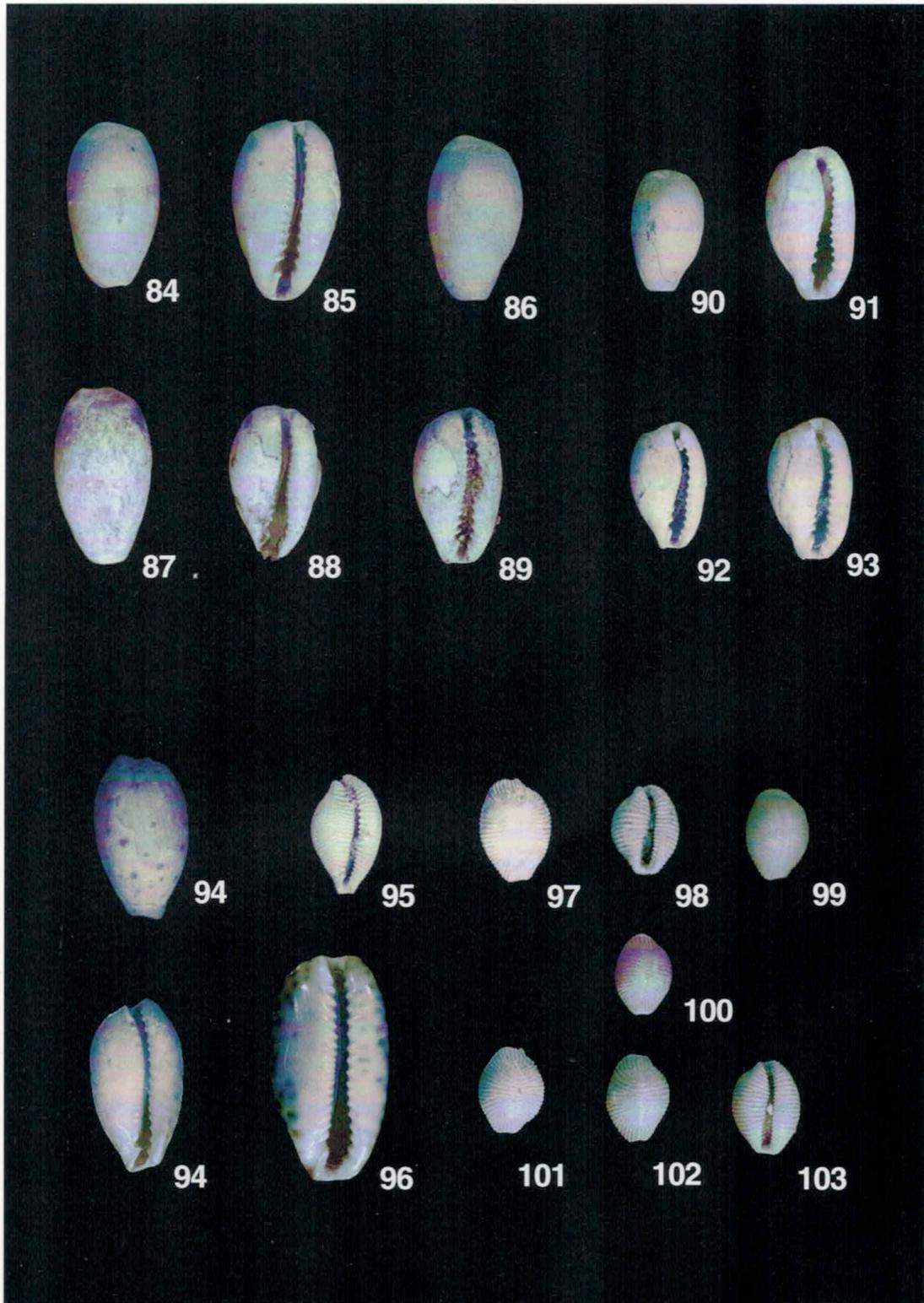
Fig. 90-93: *Erronea gracilis* (GASKOIN 1849) var. B, loc. 2.

Fig. 94: *Paulonaria* spec. aff. *macandrewi* (SOWERBY 1870), loc. 1.

Fig. 95: *Pseudocypraea adamsonii* (SOWERBY 1832), loc. 1.

Fig. 96: *Paulonaria macandrewi* (SOWERBY 1870), collected alive, Hurghada.

Fig. 97-103: *Trivia oryza* LAMARCK 1810, loc. 1 and loc. 2.



F. LORENZ jun.: Pleistocene Cypraea from the vicinity of Hurghada, Egypt.

Explanations of plate 10:

(Fig. 104-109: enlarged x 3/2; Fig. 110-115: enlarged x 2)
(photos: V. WIESE)

Fig. 104-105: *Nucleolaria nucleus* (LINNAEUS 1758), loc. 1.

Fig. 106-107: *Staphylaea limacina* (LAMARCK 1810), loc. 1.

Fig. 108-109: *Palmadusta lentiginosa* (GRAY 1825), loc. 1.

Fig. 110: *Pustularia cicercula* (LINNAEUS 1758), loc. 1.

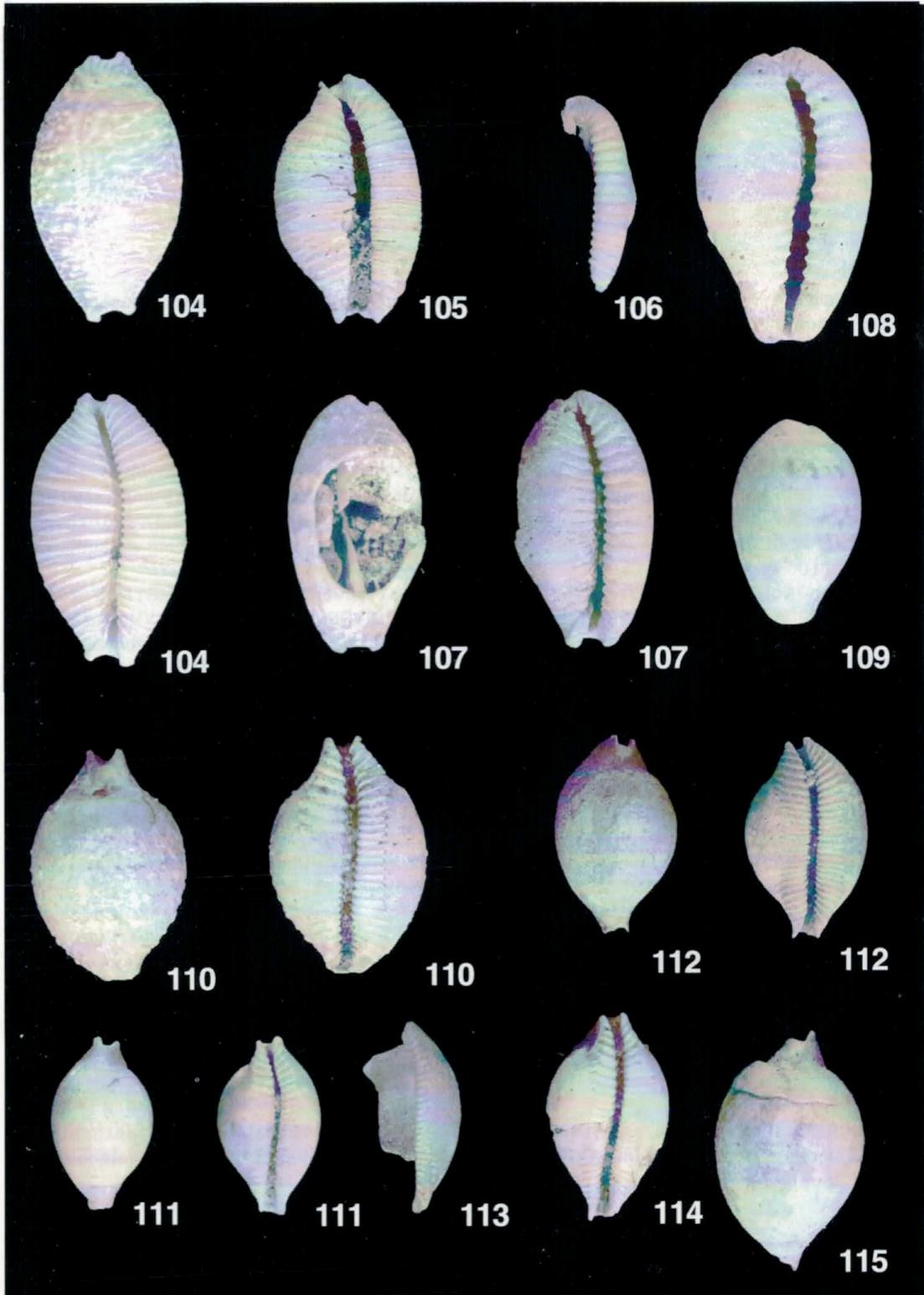
Fig. 111: *Pustularia globulus brevirostris* SCH. & SCH. 1938, loc. 1.

Fig. 112: *Pustularia globulus giftunensis* n. ssp., holotype, loc. 4 (HNC 29389).

Fig. 113: *Pustularia globulus giftunensis* n. ssp., paratype, fragment, loc. 4.

Fig. 114: *Pustularia globulus giftunensis* n. ssp., paratype, loc. 4.

Fig. 115: *Pustularia globulus giftunensis* n. ssp., paratype, fragment, loc. 4.



F. LORENZ jun.: Pleistocene Cypraea from the vicinity of Hurghada, Egypt.