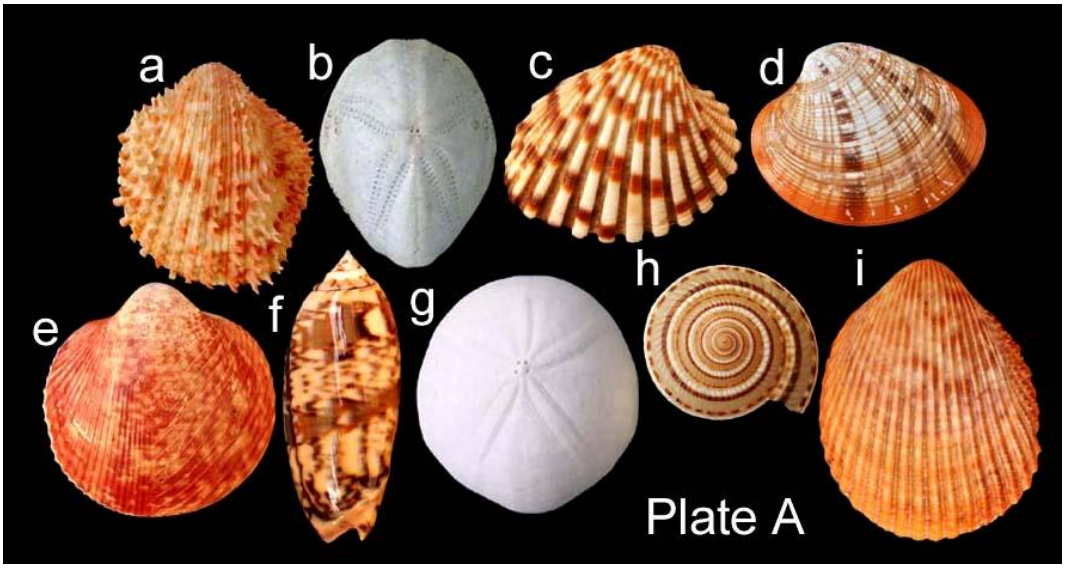
Loris, Volume 28, Issues 1 & 2, December 2017. Pages 57-59.



A selection of shells and sea urchin tests from the collection of Malik Dernando
Compare these with the weathered subfossils.
(a) *Frenexicardia victor*; (b) *Nacospatangus alta*; (c) *Cardites bicolor*; (d) *Callista erycina*;
(e) *Lyrocardatum lyratum*; (f) *Oliva reticulata*; (g) *Echinoneus cyclostomus*;
(h) *Architectonica perspectiva*; (i) *Vasticardium angulatum*

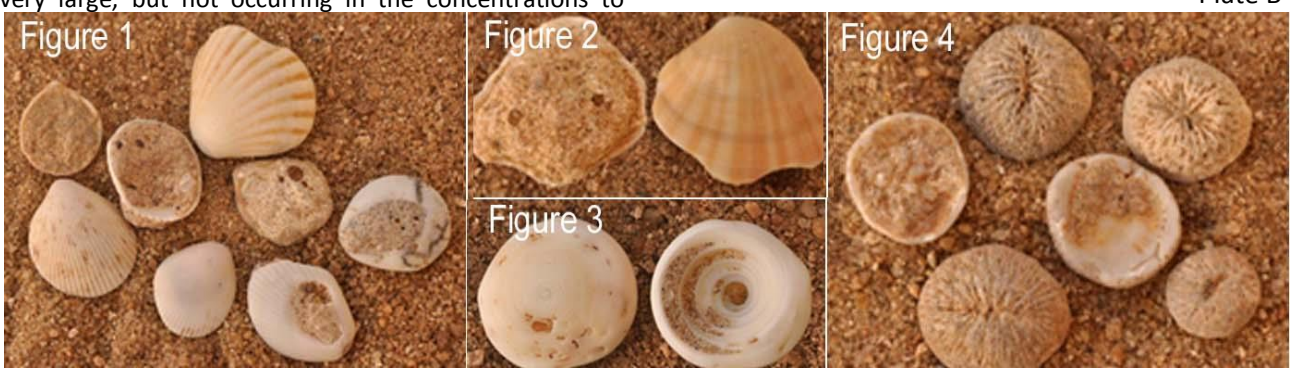
BEACH-COMBING SURPRISES: Fossils or Subfossils?

Malik Fernando & Jayantha Jayewardene

Early one morning in 2016 one of us (JJ), set out for his morning constitutional on the beach at Wennappuwa. There were some seashells washed up that he collected. Try as he might, he could not clean them of the sand and grit that was strongly adherent to them. Intrigued by this he passed them on to MF who, he knew, dabbled in shell collecting with the question "Why is it not possible to clean the sand and grit off these shells?"

Figures 1 to 4 (Plate B)
All the fragments collected from the Wennappuwa beach were of sand-dwelling species – mostly bivalve clams, one gastropod snail and many corals, all weathered, discoloured and damaged. The photographs show recognisable upper surfaces and sand-encrusted under surfaces of members of a number of families - see (A) for shells in their natural colours and two heart urchin tests.
Figure 1. Pieces of cockles, family CARDIIDAE. Cockles are sand dwelling bivalves that are important edible species in temperate climes but not utilised in Sri Lanka. We have many species, some very large, but not occurring in the concentrations to make harvesting practical.
Figure 2. A Venus clam fragment, showing the upper surface at right and the sandstone filled inner surface at left.
Figure 3. The solitary specimen of a gastropod snail was a much-worn sundial shell, family ARCHITECTONICIDAE. There are two species in Sri Lanka, flat and disc-like. The upper surface is very colourful; the under-side has a sunken central portion, in this specimen very exaggerated due to erosion.
Figure 4. There were 15 pieces of corals. These are solitary, free-living, sand bottom dwelling corals of the Family FUNGIIDAE. Most likely genus is *Cycloseris*. They never grow more than 10cm diameter. The groove on the upper surface is where the mouth is situated. The under surface is smooth, with sandstone fragments attached. They start life attached to a solid substrate (rock) and eventually fall off on to the sand. Fungiids keep themselves free of sand and sediment by producing copious amounts of mucus. In life they are yellowy-brown. There are a number of fungiid species around our shore, mostly in deeper waters - see (C).

Plate B



THE NEGOMBO FINDS

It so happened that MF had faced this same problem in 1993 when he collected some shells and sea urchin tests (shells) from the sand bottom at 15 m while diving off Negombo. The items collected were hard, like stone, and had what appeared to be sandstone firmly adherent to the outside, or filling the cavity. Were these fossils? Lying on the sea floor? Subsequent dives in 1994 and 1998 in the same general area enabled collection of more similar shells, mostly bivalve clams—but also sea urchin tests and some curious nodules thought to be casts of Brachiopods. Some bits off a sandstone reef were also prised off with many shells embedded in sandstone.

They were shown to Dr. Siran Deraniyagala, who has seen many fossils in his lifetime. He asked a question - "Do they stick to your moistened lips? If they were fossils they will." They did not—so they were not fossils. The collection consisted mostly of identifiable shells and sea urchin tests that had been collected previously, but also a few curiosities not previously seen - such as Brachiopod casts.

Many years passed and at a talk delivered by Kelum Manamendra-Arachchi we heard the term 'subfossil'. And shortly after that JJ went on his walk and the Wennappuwa finds came to light and we started looking at the items again - were these subfossils? To start at the beginning, what are fossils and subfossils? Thankfully we now have the Internet!

FOSSILS AND SUBFOSSILS

"*Fossils* are the really, really old remains of a plant or animal — so old they've turned to stone".[1] The process by which this happens is explained by another quote: "*Fossils* are formed when minerals in groundwater replace materials in bones and tissue, creating a replica in stone of the original organism or of their tracks."

Fossils, Subfossils etc from Negombo and elsewhere

Figure 5: Sandstone matrix with bivalve subfossils. Figure 6: Subfossil bivalves and gastropod snails. Figure 7: Subfossil of *Oxyperas lentiginosa*. Figure 8: *O. lentiginosa* as it is in life. Figure 9: *Echinoneus cyclostomus* - an irregular sea urchin. Dorsal (left), ventral (right). Figure 10: *Nacospatangus alta* - an irregular sea urchin. Dorsal (left), ventral (right). Figure 11 (see next page). Figure 12: Fossilized wood, purchased USA. Figure 13: A foraminiferan *Heterostegina* sp. Figure 14: A fossil giant oyster from Arawakkalu.

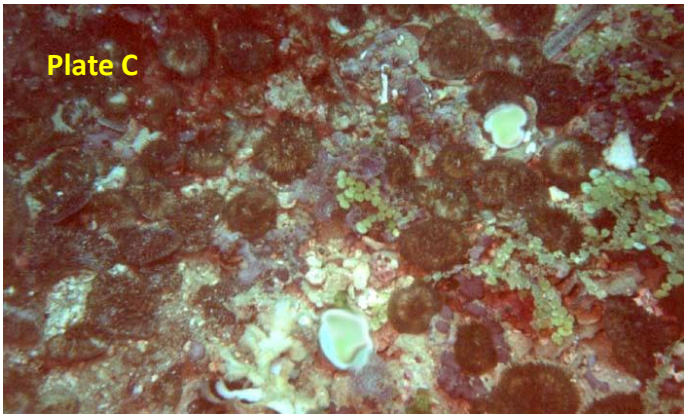


Plate (C) - Discoid solitary fungiid corals, coloured brown, litter the seabed off Kandakuliya. Underwater photo Malik Fernando, 2004.
Figure 11: This is likely to be a Brachiopod. This image is of something we can only guess as to its identity. It is probably a cast of a bivalve-like animal called a brachiopod. No living or dead specimens have been seen, but finding subfossils of them suggest that they are around, waiting to be discovered.

Usually fossils are the remains of animals or plants from an earlier geological period.[2] Then what are subfossils? They are animal or plant remains that have not completed the fossilization process, or as Wikipedia puts it "A *subfossil* (as opposed to a *fossil*) is a bone or other part of an organism that has not fully *fossilized*. This may be because not enough time has elapsed since the animal died, or because the conditions in which the remains were deposited were not optimal for fossilization."[3] It should be noted that, by and large, only hard tissues like bones, shells and teeth are able to fossilize, soft tissues like skin etc. only very rarely. Plants usually only leave an impression of the outline, but wood can turn to stone.

The image of fossilized wood (Figure 12) is a specimen purchased from a fossil shop for tourists in the USA, the piece originating from Arizona. The world fossil record stretches back many hundreds of thousands of years and forms a basis for dividing geological history into numerous divisions. The Sri Lankan fossil history is from more recent periods—the Miocene epoch (23.0-5.3 mya[4]), a subdivision of the Tertiary, was an important phase in Sri Lanka's geological and faunal history. There are two deposits of this period, classified as Jaffna limestone. One such deposit north of Puttalam is the Arawakkalu deposit, from which a number of invertebrate and vertebrate fossils have been identified. A few years ago, microspcopic fossil foraminifers (forams for short) from one of the fossil-bearing layers were studied[5] and it was established that this layer dated to the Burdigalian Age, a stage in the early Miocene, 20.44–15.97 mya.

Forams are protozoa, primitive organisms that live in the sea, with a hard shell. They are usually microscopic plankton but some are larger and bottom dwelling. We were fortunate to find some alive on the seabed while diving off Colombo some years ago (Fig. 13). They were green in colour, discoid with a bulging centre, measuring up to 10 mm in diameter. Dead forams of the same species were white. Reading about them we learnt that many species harbour microscopic algae within their tissues, giving the green colour, like corals. They serve the same purpose as in corals, producing energy through photosynthesis and providing their hosts with a portion of the glucose.

ARAWAKKALU

Getting back to Arawakkalu, the article referred to a layer of giant oyster fossils lying above the foram layer. We were fortunate to be presented with some of these recently (Fig. 14). The fossil is of the partial lower valve of an oyster that would have been about 25 cm long. A photograph of a recent specimen, possibly the same species, is also shown (Fig. 15), measuring 16 cm long. The definitive identity is not confirmed, probably *Crassostrea gryphoides* (Scholtheim, 1813)[6]. The origin of the *Crassostrea* is not established as it was purchased together with a number of *C. belcheri* oysters from the Colpetty market for eating. As far as we know, the giant oyster layer at Arawakkalu has not been dated, but is likely to be more recent than the foram layer that lies below it.

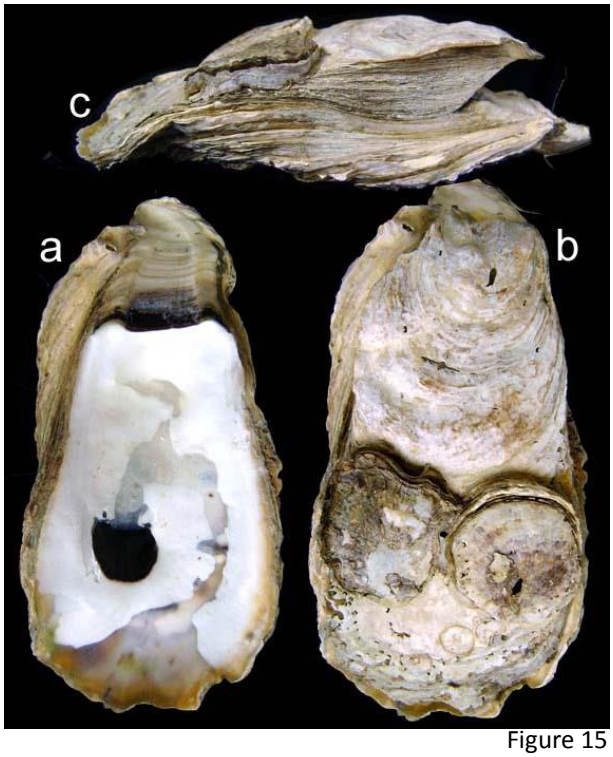


Figure 15

Keeping our eyes open for oddities when outdoors can set in motion a train of thought that opens new windows of knowledge. Develop an inquiring mind.

Acknowledgements

Enoka Corea and Hasula Wickremasinghe for fossil specimens; Dr. Siran Deraniyagala for commenting on finds; divers of the Sri Lanka Sub-Aqua club for helping with Negombo subfossil collecting.

---

1 https://www.vocabulary.com/dictionary/fossil
2 www.dictionary.com/browse/fossil
3 https://en.wikipedia.org/wiki/Subfossil
4 mya = million years ago
5 Ranjeev Epa, Nilmani Perera, Kelum Manamendra-Arachchi and Madhava Meegaskumbura, 2011. Sri Lanka's Aruwakkalu fossil deposit dates to the Burdigalian Age, *Ceylon Journal of Science* (*Bio. Sci*.) 40 (2): 163-174.
6 Siddiqui, K.U., Islam, M.A., Kabir, S.M.H., Ahmad, M., Ahmed, A.T.A., Rahman, A.K.A., Haque, E.U., Ahmed, Z.U., Begum, Z.N.T.,Hassan, M.A., Khondker, M. and Rahman, M.M. (eds.) 2007. *Encyclopedia of Flora and Fauna of Bangladesh, Vol. 17. Molluscs*. 415 pp, Asiatic Society of Bangladesh, Dhaka, p. 280.

Note: The layout of this article is different from that in the printed version - but the textual content is identical. Plate (C) has been included—omitted from the print due to lack of space, although referred to in the text—resulting in an extra page.