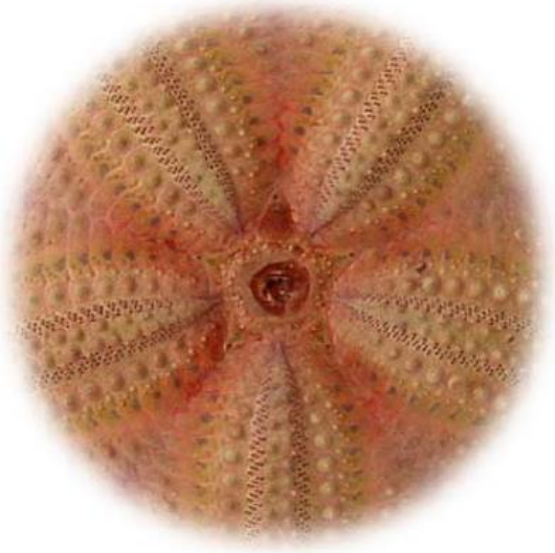
Some
Sea Urchins of Sri Lanka
in Colour

Regular Sea Urchins



Malik Fernando

Colombo 2020

LIST OF SPECIES

REGULAR SEA URCHINS

CIDARIDAE

***Phyllacanthus imperialis* Lamarck, 1816**

Baguette urchin, imperial urchin.

Colombo, no collection data; Galle harbour, detached spines; Kirinda, purchased; Amaduwa, beached test fragment.

Reported by Clark & Rowe, 1971.

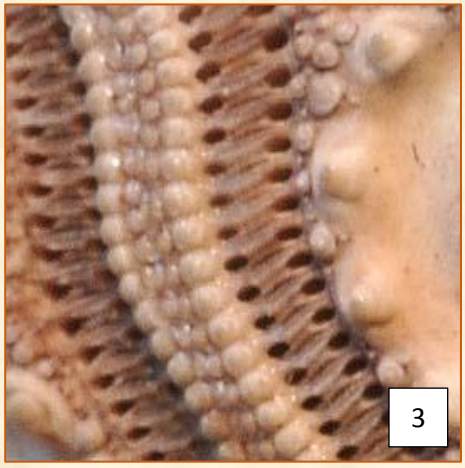
First seen by the author in 1975, the encounter being described in a 1991 article as follows: "We have found this urchin wedged in between rocks at the foot of Bellangala, the rocky islet at Mount Lavinia, at a depth of about 3 m. It is reported as using its large spines for locomotion. By the way it was wedged in the rocks by its spines, resisting all attempts at extrication, one can well imagine how it picks its way amongst the rocks using its spines as three-dimensional stilts. Dozens of detached spines were found on a later dive in the shallows amongst other debris and shell grit in the Galle Harbour."

Identification of this sea urchin was a problem using the key in Clarke & Rowe. The material available consisted of three detached spines (Galle harbour, 1993), and later a damaged test with the apical system missing. The key suggested the genus *Phyllacanthus.* It has finally been confirmed as *P. imperialis* by comparing the spines with good images and description in a Western Australian Museum page[1] that referred to "fine longitudinal ridges on spines". It is a nocturnal animal.

The test of a specimen purchased in Kirinda from a shell craft worker measured 63.6 mm (horizontal diameter), the longest spine being 97 mm, 8 mm at its thickest. The spines tapering, thickest near the base. Apex rounded, ridged with 22 to 23 prominent ridges. One-third of the distance from the apex a second set of low ridges start in between the main rows. All ridges become low as they approach the base, where they end abruptly at the narrowest part of the spine, the lowermost portion being smooth. The ridges are covered with close-set blunt 'thorns'.

(Images at left. More images next page.)

[1] Western Australian Museum Collections https://museum.wa.gov.au/online-collections/names/Phyllacanthus-imperialis. Accessed 2 Nov 2020.

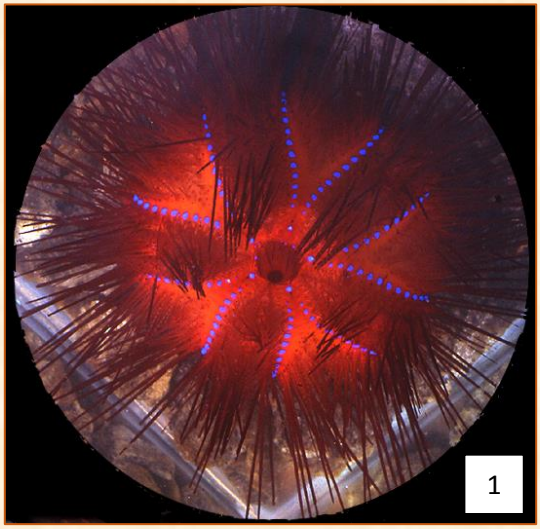


Phyllacanthus imperialis

1. Test showing tubercles for spines and wavy ambulacrum. The large perforate tubercles for primary spines are ringed by smaller tubercles for secondary spines. The opening below is the peristome that would have been skin covered with the mouth at its centre.
2. A partially cleaned test showing spathulate (flattened) secondary spines that would have protected the articular membrane surrounding the base of the primary spines, and tertiary spines and miliary spines covering an ambulacrum.
3. A close-up of a cleaned ambulacrum shows two rows of tubercles for tertiary spines either side of a double row of smaller tubercles for miliary spines. On either side of the rows of tubercles are seen the paired holes for the tube feet.

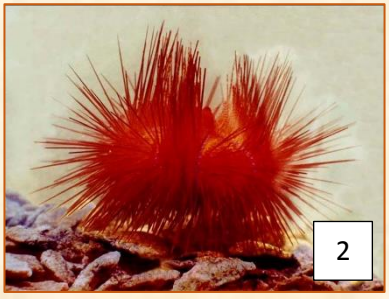
DIADEMATIDAE

***Astropyga radiata* (Leske, 1778)**



Obtained from the tanks of an exporter on 3 3.1995. Collected from the sand bottom at a depth of 15 to 25 m off Dehiwela. Said to live gregariously and to move about rapidly as a group, "never found in the same place on two consecutive days". Also found in the same area were another sand-dwelling species *Salmacis virgulata*. Many specimens had been collected ranging in colour from pale pink to a deep orange-red—one of the darkest coloured obtained and photographed.

A very striking animal, especially in bright sunlight, with rows of 1 mm diameter iridescent blue spots on either side of the ambulacra, bordered by a Y-shaped bare area. The test very flexible in the live animal but rigid when dried. It is attractively coloured. The animal was highly active in an aquarium, using the long spines on the oral aspect for rapid locomotion. The tube feet were hardly seen amongst the spines, being extended only a few millimetres.



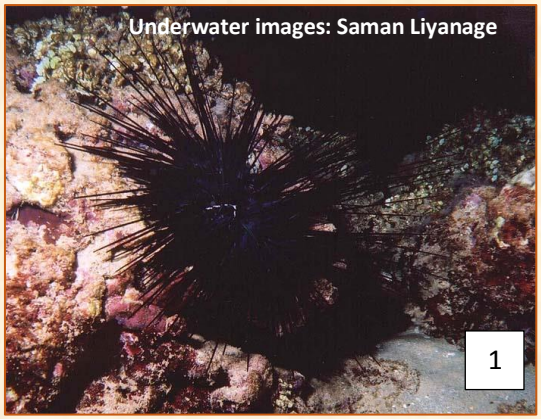
Astropyga radiata

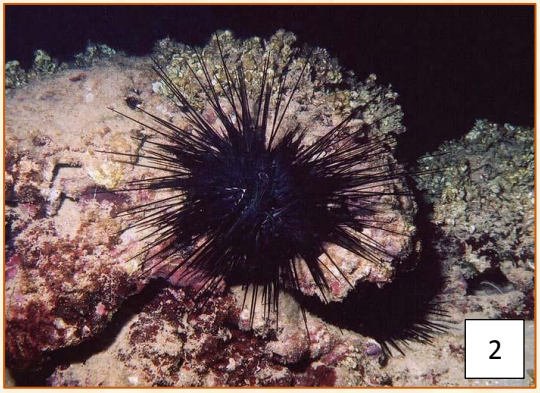
1. Viewed from above in bright sunlight.
2. Viewed from the side in an aquarium. The animal moves on its spines. Its tube feet probably only serve a respiratory function. It evacuated muddy sand pellets in the aquarium, suggesting that it ingests the sand substrate on which it lives and extracts whatever organic matter contained therein.
3. The dried test viewed from above. Diameter 65 mm.
4. An oral primary spine on which it moves, with blunted tip. Other spines are slender and pointed. All are barbed, as seen in the detail below.

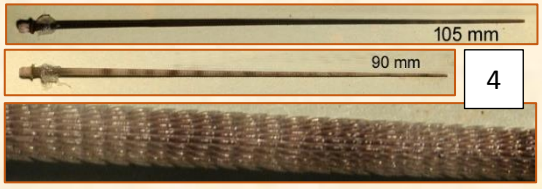
***Diadema savignyi* (Audouin, 1809)** Y-spotted sea urchin

A large sea urchin with slender black spines 70 to 100 mm long, usually found in rocky habitats. Some spines may be banded off-white and maroon. Often seen on the reef off Mount Lavinia. First collected off Bellangala, Mount Lavinia on 6.12.1987 at a depth of 3 m.

Readily recognisable by its black body with five electric blue inverted 'Y'-shaped marks around the sides of the body. These markings distinguish this animal from the similar black-spined *Echinothrix diadema* (see below). In the strobe illuminated underwater images of live animals at right the markings show as white 'V'-shapes.







Diadema savignyi

1. and 2. Strobe-illuminated under water images of live animals.
3. Dried test viewed from above. Most of the apical structures of the periproct missing; three genital plates are present. Horizontal diameter 70 mm. The largest primary spines measured 105 mm.
4. Primary spines - black and barred. Detail showing whorls of forward pointing barbs.

***Diadema setosum* (Leske, 1778)** Long-spined sea urchin

A gregarious, sand dwelling animal with extremely long, slender, fragile black spines that contain venom in the hollow tips. The images at right were taken in Trincomalee, at Clappenberg Bay (upper two) and at Uppuveli (lower). They have not been seen on the west coast. Commonly seen in shallow, calm water they sometimes come right up to the beach. But they are also seen in deeper water—10 to 20 m—in rocky areas, sometimes climbing up on to the rocks.

They are beautiful animals to observe with a diving mask. The jet-black body is set off by rows of scintillating electric blue spots down the sides and a brick-red floppy sac surrounds the anus on top. When feeding on a sand bottom, a trickle of sand grains can be seen coming out of the anal sac and running down the body. These animals congregate in large numbers on sand with their spines interlacing. They play host to schools of small fishes that live within the spine forest—black, red and buff coloured fish have been seen at Trincomalee.

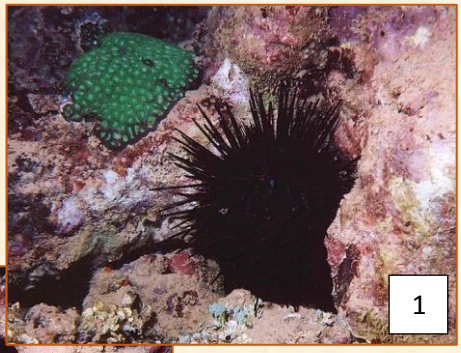
Diadema setosum

1. On a sand bottom at Clappenberg Bay.
2. On a rocky bottom at Uppuveli.
3. A dried test, horizontal diameter 60 mm.
4. Spines, mostly with damaged tips that are extremely fragile. Clipped off at the base to enable transport of the animal to Colombo from China Bay. 17.11.1987. Upper image shows the whorls of barbs.

***Echinothrix diadema* (Linnaeus, 1757)** Blood-red sea urchin

A large black-spined sea urchin living in rocky habitats. Superficially resembling *Diadema savignyi* but easily distinguished from it in the field. Can be found off both the east and west coasts. It was common amongst the corals at the mouth of Unawatuna Bay and the rocky reef forming the Hikkaduwa 'lagoon'.

Black in colour by diffused daylight underwater, the spines are iridescent bright green when caught in a sunbeam. But they are at their most striking at night, by torch light, when they are out foraging, when they show up blood-red in colour. The thick primary spines are well set off by hundreds of needle-like secondary spines that are characteristic of this species.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Images
Malik Fernando


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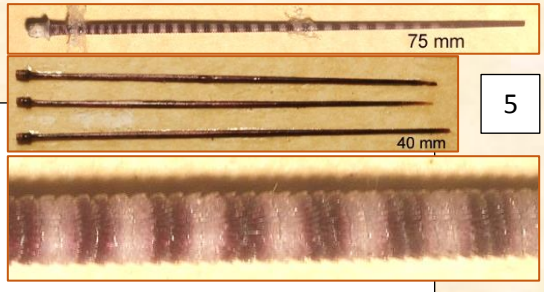

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Echinothrix diadema

1. & 2. Underwater, Hikkaduwa, 2 m.
3. Trincomalee, Dutch Bay, 3 m.
4. Dried test viewed from above. Horizontal diameter 105 mm. The needle-like secondary spines are articulated on the three to four rows of tubercles in-between the ambulacral openings (arrowed).
5. Barred primary spine, three secondary spines and the whorls of barbs on a primary spine enlarged.

ECHINOTHURIDAE

***Asthenosoma varium* Grube, 1868** Venomous sea urchin

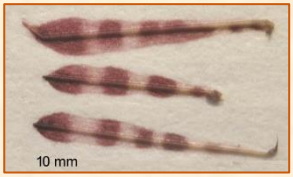
A colourful, venomous sea urchin found on deeper sand bottoms, living gregariously.

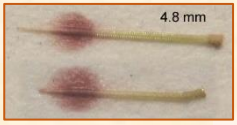
A colony found at a depth of approx. 17 m off Kandakuliya, Kalpitiya.

The white patches on the solitary animal are parasitic snails of the family Eulimidae. 2.3.2004

First specimen obtained in 2000 from an ornamental fish exporter's aquarium and a subsequent one in 2003, said to be from Trincomalee. Observed and photographed in-situ at Kandakuliya. The living animals measured 120 mm and 65 mm in diameter. The test very flexible, collapsing when lifted out of the water and drying into a flat pancake.

Identification of the species based on skeletal anatomy was not possible owing to the fragile nature of the test. Numerous large tridentate pedicellariae were observed. Primary spines spathulate, curved downwards, hollow, present only around the ambitus and the oral surface, white in colour. Radial rows of secondary spines clothed in maroon-coloured, beaded tissue sacs. Bordering the bands of secondary spines are rows of tiny, highly mobile, spines with bright blue venom sacs at their tips, also present on the under surface (George and George, 1979 p. 117) - image at extreme left. Spines are shown in the next two images, mounted on paper and dried. The secondary spines are clothed in complete tissue sacs although appearing beaded in life. The blue venom sac in the tertiary spines dry red. The tube feet were seen to be slender, with sucking discs on the oral surface but blind ended aborally. The little spines remain sharp and the blue venom sacs remain potent even when dried, as the writer found to his cost when examining a specimen a few months after preservation by drying.

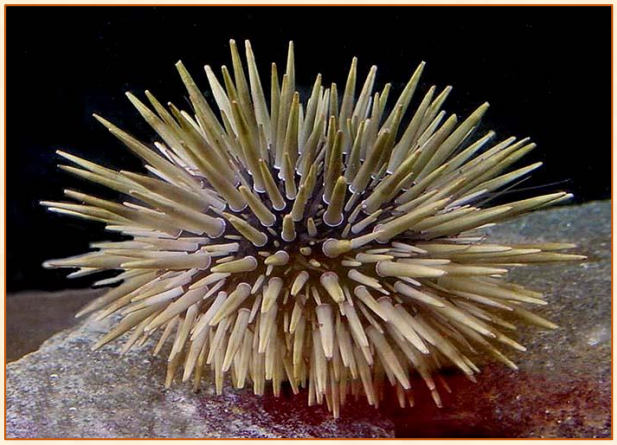




ECHINOMETRIDAE

***Echinometra mathaei* (de Blainville, 1825)** Oval sea urchin

A medium sized sea urchin found in and amongst rocks in reef habitats. An algal browser, it is oval shaped enabling it to get into crevices in its search for food. Collected in Mount Lavinia, at 3 m depth, 13.12.1987 and in Trincomalee, at 2 m in 1995 September.



Echinometra mathaei

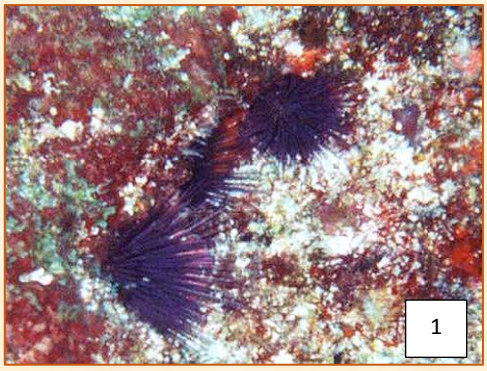
Ex-situ images in an aquarium: lateral view above, at left, and top view, at right, showing the oval shape.

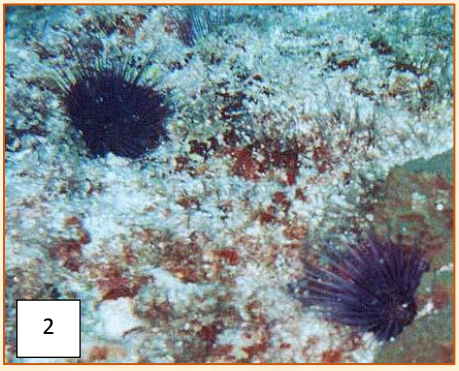
(Left) Dried test. Long diameter 43 mm, short diameter 33.4 mm. Periproct long diameter 3.72 mm, peristome 20 x 19 mm.

Spines stout, tapering, 22 mm long x 3 mm base, coloured grey green. Longitudinally striated.

***Echinostrephus molaris* (de Blainville, 1825)** Purple burrowing sea urchin

A small sea urchin, quite common off Colombo and elsewhere, that burrows into soft rocks. The spines are coloured deep purple. The burrows are a few inches long, into which the animal retreats when disturbed, so that all the spines are inside. When at rest a crown of spines attached to the upper part of the test are seen. The spines on the lower part of the animal are short and stout.





The underwater images at left were taken at Kirinda, below the Great Basses Lighthouse. They have been observed on the Colombo reefs at depths between 2 to 10 m.

The burrows are generally more or less horizontal (image 1) but vertical burrows are also seen (image 2). Removing them from their burrows without damage was extremely difficult (3). The horizontal diameter of the dried test at left (4) is 23.7 mm. Image (5) is a lateral view showing the long primary spines on the upper surface to the right with the short spines below to the left. Image (6) shows the erect long spines and the short spines at right. The longest spines measure 20 mm.

***Heterocentrotus mamillatus* (Linnaeus, 1758)** Slate Pencil sea urchin

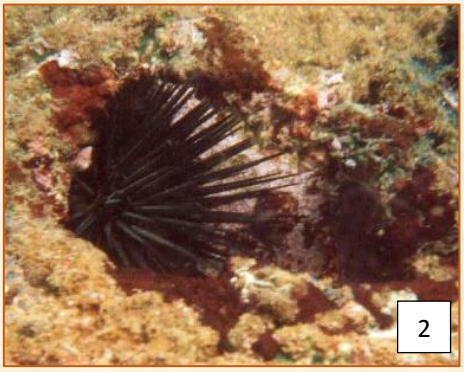
A rare sea urchin that is protected under the Fauna and Flora Protection Ordinance. It has been seen alive only once by the writer, at the Hikkaduwa National Park where the photograph was taken.

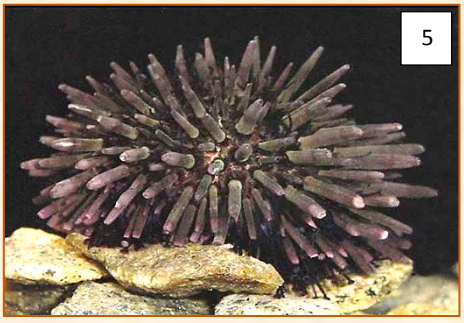
The animal was in full view when first spotted but sensed the approaching diver and slowly withdrew into its cave. The image was made from about 2 m away.

It gets its name from the thick, pencil-like primary spines with red tips. The bases are ringed with white and the membranes covering the articulations are striped in orange and black.

STOMOPNEUSTIDAE

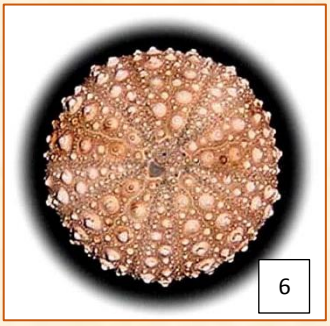
***Stomopneustes variolaris* (Lamarck, 1816)** Common black-spined sea urchin





A medium sized sea urchin with stout black spines that lives on reefs with a lot of water movement. This animal is easily seen as it inhabits shallow reefs and rocks [1, 2, Wellawatte]. It is often found under rocky ledges or lying in shallow depressions in rocks, rarely in large congregations in rock pools as on the Barberyn reef at Beruwela [3]. Its spines are thick and black in colour. They may be sharp [4] or blunt [5], as they are used to scrape the rocks for algae.

Its tests [6] are often seen washed up on beaches, though they may be damaged to some extent. They are flattened to some extent. Horizontal diameter up to 60 mm.



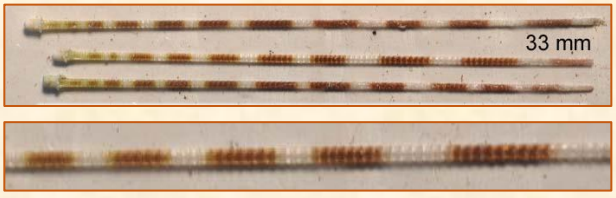
Unwary swimmers who climb up on to exposed rocks and reefs are in danger of stepping on these urchins, sustaining penetrating injuries (left). The tips of the spines break off in the skin. Although not venomous the injuries can cause problems. The retained fragments should be extracted before infection sets in.

TEMNOPLEURIDAE

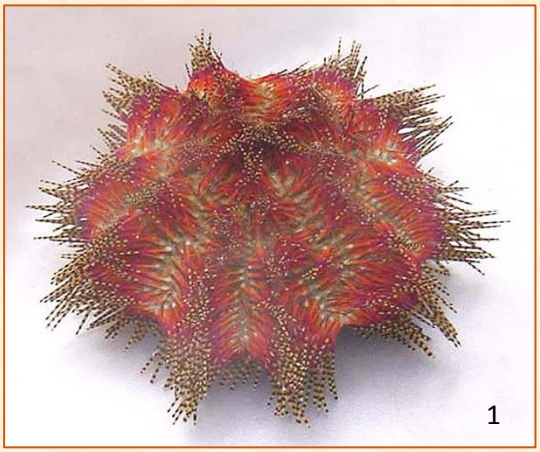
***Microcyphus ceylanicus* Mortensen, 1942**

A single specimen has been collected from a Colombo reef. There is no habitat data recorded.

The live animal is covered with long, slender spines, barred white and reddish brown. The test is olive green in colour with characteristic naked areas devoid of spines, the margins being sinuous.

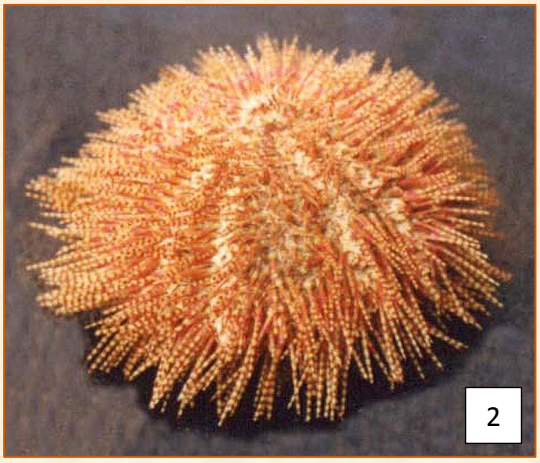


***Salmacis bicolor* L. Agassiz in L. Agassiz & Desor, 1846** Pink sea urchin


1

A colourful sea urchin seen on the Colombo reefs at shallow depths below 3 m. They are always found on rocks and appear to feed on red coralline algae, as observed in an aquarium. When algae-bearing rocks were not available in the tank the animal accepted fragments of boiled prawn, that were ingested whole. The image [1] shows a live animal in an aquarium with its spines grouped. It seems to do this when stressed. On the reefs they are like image [2], which is a dried test with spines intact.

The test [3] is coloured deep pink, the horizontal diameter being 60 mm.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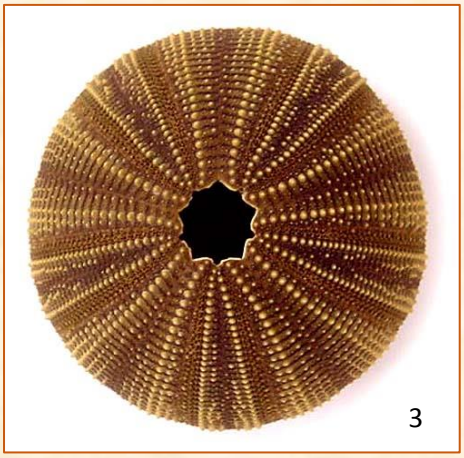
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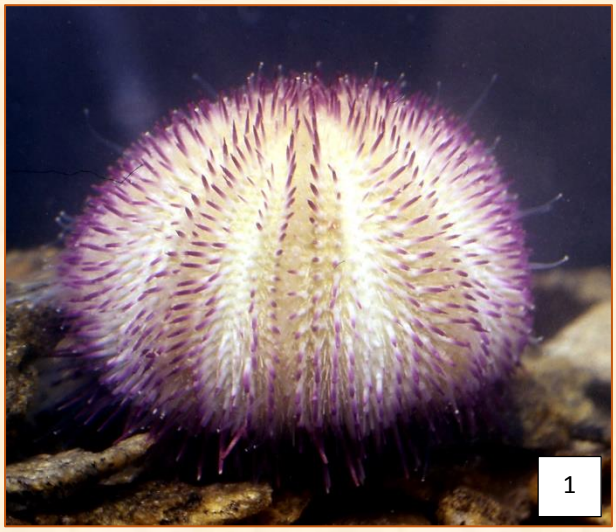
4

The spines [4] are banded, cylindrical basally with flattened tips.

***Salmacis virgulata* L. Agassiz in L. Agassiz & Desor, 1846** Purple spined sea urchin

First collected in 1982 at Kinniya at a depth of 1.5 m, it was next encountered off Colombo at a depth of 32 m on the sand bottom seaward of Vatiya Parai (reef), off Dehiwela. Empty tests have also been found amongst the fishing trash at Mandaitivu, in Jaffna and at Uchchimuni, in Kalpitiya where bottom-set purse seines (Laila nets) are used.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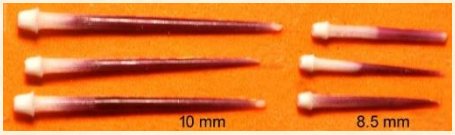
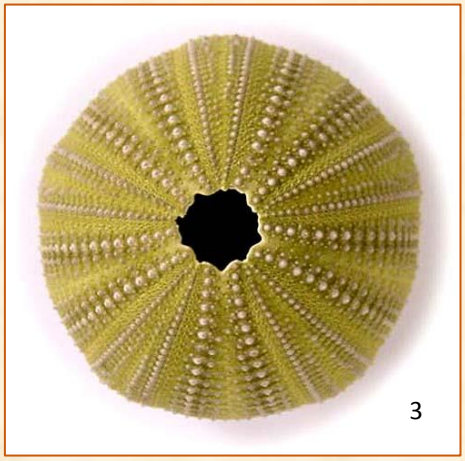
A most attractive animal, the spines [2] are coloured purple with white bases. They are sand dwellers. The first one collected at Vatiya Parai had a small commensal crab living on the oral aspect of the surface of the test. It had clipped a row or two of spines to create a path along which the crab travelled, from the peristome to the outer margin of the test.

2

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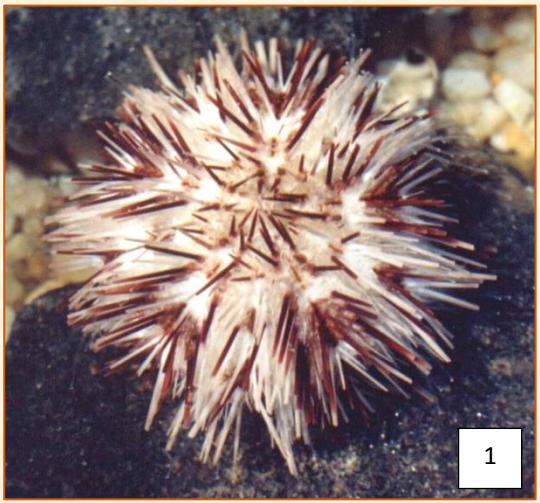
The test [3] is coloured green - the only ones I have found in this colour and is therefore readily identifiable. Horizontal diameter 55 mm. The living animal is also distinctive.

TOXOPNEUSTIDAE

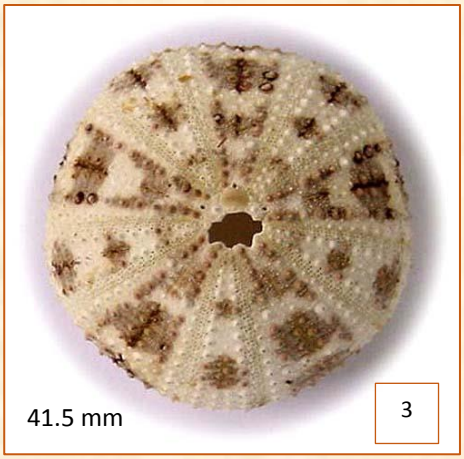
***Pseudoboletia maculata* Troschel, 1869**

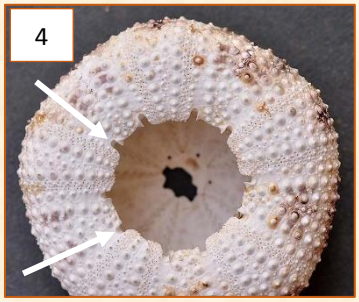
A distinctive sea urchin obtained from an exporter's tanks [1, 2] photographed in an aquarium.



The family Toxopneustidae has deep gill slits around the peristome [4 arrowed] seen on the underside of the test.

This species has radially arranged brown-purple patches on the test [3] and the spines on the corresponding areas are coloured brown or white [5].

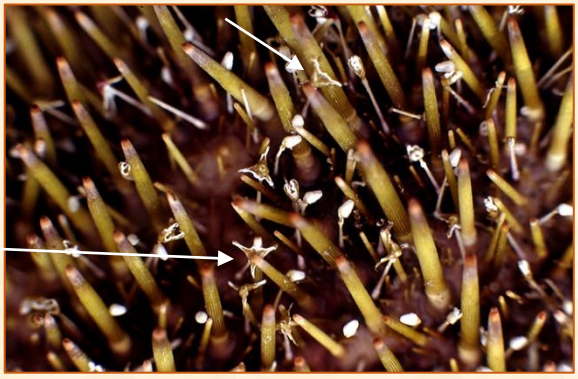




The primary spines are 13 mm long, white, or brown, or brown shading to cream at the tip.

***Toxopneustes pileolus* (Lamarck, 1816)** Flower urchin

The Flower urchin is so called because of the flower-like discoid structures that are prominent among the spines. They are uncommon and have been seen at Hikkaduwa and Colombo hiding in rock crevices, and also on the sand at Unawatuna in 1992, but not after the global warming event of 1998. This species is reported as being venomous. The dangerous part of the animal appears not to be the spines, but protective structures called pedicellariae. All sea urchins possess these pincer-like structures on the ends of moveable stalks, which are used to

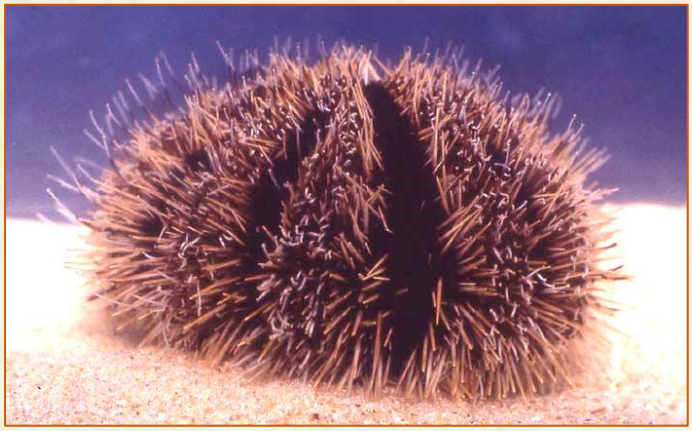


pick off smaller animals, larvae etc. that may attempt to colonise the surface of the urchin. The Flower urchin has exceptionally large ones containing venom glands, usually held wide open and covered by a disc of membrane that have the appearance of flowers The left-hand image above is an animal from Unawatuna photographed in an aquarium, showing the 'flowers', slender tube feet, and some bits of debris held on as camouflage. The right-hand image is a preparation showing the large globiferous pedicellariae (arrowed) and some smaller ones of another type (ophicephalous).

The test is attractively marked on the upper surface (left). Around the peristome are characteristic, deep, gill slits.

The spines are short and stout with rounded tips.

***Tripneustes gratilla* (Linnaeus, 1758)** Star sand urchin



This was the commonest sea urchin seen on the sand at Unawatuna before the global warming event of 1998. It was named Star sand urchin on account of the bold purple radial bands suggesting a star. (A number of common names used in this article have been coined by the writer, like this one.) A short-spined animal, it lives (or lived) gregariously on sand in shallow water off the beach. None have been seen there in recent years. They were not easily recognised as sea urchins when first seen as they were camouflaged with various sorts of rubbish, like coconut fronds, bits of seaweed, bits of rope etc. These animals appear to hold on to any rubbish that passes by and clothe their body with them.

When cleaned of all the debris, they are seen to be covered with short, white spines arranged on a relatively large body. The tube feet are numerous and extended, when not holding on to debris.

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