

## Description a Sea Cucumber Species *Holothuria atra* Jaeger, 1833 from Kish Island Iran (Echinodermata: Holothuroidea)

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### ABSTRACT

As each new species evolved, the ossicles changed with it, so each species has uniquely shaped ossicles. Examination of gross morphology and microscopic ossicles showed that this species is *Holothuria atra*. Color uniformly black or dark brown; when alive body usually covered with sand coating of sand which may also serve to keep it cool by protecting it from the sun's rays. , except for several pairs bare patches dorsally; tables with reduced but sometimes spinose disc. The importance of detailed reproductive biological studies on *Holothuria atra* are necessary due to its important role in the conservation of the marine environment. This species found on subtidal sand and grassbed, 3to 4 m depth at Kish Island. Distributed throughout most of the tropical Indo-Pacific area. *Holothuria atra*, is a holothurian of order *Aspidochirotes* belonging to the family *Holothuriidae* genus *Holothuria*. It is deposit-feeder and is mainly found on sandy bottom of fringing reefs surrounding the Kish island. *Holothuria atra*, is a holothurian of order *Aspidochirotes* belonging to the family *Holothuriidae* genus *Holothuria*. *Holothuria atra* is an omnivore, sifting through the sediment with its tentacles and feeding on detritus and other organic matter. It ingests sand at the same time and digests the biofilm on the sand grains before ejecting them through its anus.

**KEYWORDS:** Holothurians – Echinoderms – *Holothuriidae*– *Holothuria* – Kish island – Persian Gulf

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### INTRODUCTION

Sea cucumbers are members of the class Holothuroidea within the invertebrate phylum Echinodermata (which literally means "spiny skins"). Sea cucumbers (Holothuroidea) inhabit sheltered shallow-water sediments in all tropical and temperate oceans, but their greatest abundance and diversity occur in the tropical Indo-Pacific region (Conand, 1993).

Holothurians are very important members of benthic communities as they can cause significant changes in the sea floor sediment composition. Sea cucumbers are the most commonly consumed echinoderms and have been eaten since ancient times. The original idea for FAO publication is a simple identification guide for commercial sea cucumber species information.

### MATERIALS AND METHODS

The study area covered Kish island lies between  $53^{\circ}, 53'$  to  $54^{\circ}, 4'$  E and  $26^{\circ}, 29'$  and  $26^{\circ}, 35'$  N. This island has an area of 90 square kilometers and is 18 km away from the southern mainland of the Iran. It is a coral island with fringing reefs. This island is one of the most important recreational sea side along the coast and also as a free Trade Zone, imposing lots of pressure on the marine environment resulting in the destruction and disappearance of corals and coral communities in the last 10 years. This also the place where most of the sampling was done, for 16 months by local diverse using the scuba diving apparatus. Altogether, 160 specimen were collected at all depths around the island but mainly from the east coast. We measured wet weight and contracted length, respectively. Length measured from the mouth to the anal pore. The procedure for obtaining spicules is very simple. A slice ( $1\text{cm}^2 \times 1\text{mm}$  thickness) is cut from the dorsal area then placed in a small test tube with 3 ml of commercial bleach. After 10-20 minutes transferred the fine white sediment onto a microscope slide by using a pipette. The covered slip, and examine using a microscope with 100x magnification.

**Identification:**

*Holothuria atra* weights varied between 50 gr and 500gr. The highest weight was in April, while the lowest weight was recorded in February. The shape of this sea cucumber is an elongate cylinder from 90-500mm but known to grow up to 600mm.

**Gross Morphology**

1. **Overall shape:** It is approximately cylindrical in shape but with a more or less flattened ventral sole. (Figure1) .

2. **Maximum body length:** Length exceptionally up to 600 mm or more, but usually up to 300 mm.

3. **Body wall:** soft but fairly thick.

4. **Position of mouth:** Mouth is ventral.

5. **Position of anus:** The anus is approximately terminal.

6. **Pharyngeal introvert:** It is a retractile portion of the anterior body wall that allows the complete retraction of the tentacle. This character is not found in this species.

7. **Ossicles:** ossicles are fairly numerous consisting of tables and rosettes in various stages of development.

8. **Tentacle shape:** Tentacles are fairly long and leaf-shaped.

9. **Tube feet:** Podia consisting of numerous pedices crowded on the ventral surface.

10. **Rete mirabile:** In the family of *Holothuriidae* has extensive rete mirabile .

11. **pedicels:** pedicels are numerous and crowded on the ventral side.

12. **Respiratory tree:** The right respiratory tree extends forward to the calcareous ring and is firmly attached to the body wall and the left one is shorter.

13. **Cuvierian organ:** It hasn't cuvierian organ.

14. **Gonads:** Gonads are single, consisting of numerous filamentous tubules united basally into one tuft attached to the left side of the dorsal mesentery and hang freely in the coelom.

15. **Cloacal muscles:** Cloacal muscles adjoin the posterior body wall and the cloaca. They are well developed.

16. **Feeding:** This species is an omnivore, sifting through the sediment with its tentacles and feeding on detritus and other organic matter.

17. **Habitat and Depth Range:** Subtidal sand and grassbed; 3-4 m depth.

18. **Collection Site:** Kish Island

19. **General Distribution:** Throughout most of the tropical Indo-Pacific area.

It is well-known that ossicles are the main taxonomic character in holothuroids (Thandar, 1987a).

Ossicles are crystals of calcium carbonate and are a unique anatomical body features of sea cucumbers used specifically for the identification purposes. The ossicles were measured on a transect across a slide prepared from the mid-dorsal region of each specimen. Also, for the correct identification some specimen has been sent to Prof, David Pawson at the National Museum of Natural history, Washington DC, United States.

**Holothuria (Halodeima) atra Jeager**

*Holothuria (Halodeima) atra* jaeger ; 1833.22.

*Holothuria (Halodeima) atra* : Pearson, 1914: 170-171; Bakus, 1968: :23-31; Rowe, 1969:137-138.fig7; Clark & Rowe, 1971:176, pl.27, fig. 11; Rowe & Doty, 1977 : 224,230-231,figs 3d and 7a. *Holothuria (Halodeima) atra* : Panning.1935 :30-31,fig.22. *Holothuria (Halodeima) atra* : Semper, 1868: 88, pl. 26; Heding. 1940:120; Panning . 1944:61-62 , fig.29; Cherobinner,1955:141.

Description: A Large-sized Species of *Holothuria* , body stout, approximately cylindrical in shape but with a more or less flattened ventral sole; body wall soft but fairly thick; mouth ventral; anus approximately central; tentacles twenty in number, fairly long and leaf-shaped; podia consisting of numerous pedicels crowded on the ventral surface, but more or less confined to the three ambulacra , and fewer smaller papillae scattered over the dorsal surface; colour of live specimens uniformly black or dark brown which is retained after preservation in alcohol; calcareous ring fairly stout, with radial plates up to c. three times the length of the interradials ; spicules fairly numerous, consisting of tables having reduced but sometimes spinose disc and a spire of moderate height crowned with spinelets of ming a maltese cross when viewed from above , and rosettes in various stages of development.

**Taxonomic Notes :** The description of this species was based primarily on BM(NH) material and on accounts in the literature, since specimens were lost from the collections after only tentative identifications had been made (see also PRCem 191:9). Further Collections From the Gulf are clearly needed.

Distinctive Features : Distinguished from *H.(Halodeima) edulis* by the uniformly black or dark brown body colouration. and by the disc of the tables which are slightly more developed than those of the latter

species. *H.(Halodeima) atra* is also similar in uniformly dark colour to *H.(Mertensiotburnia) leucospilota*, but can be distinguished by the spinelets crowing the table spires, wich from the a maltese cross, rather than a small cluster in *H.(Mertensiotburia) leucospilata*. In the latter species buttons are also present among the spicules, whereas in *H.(Halodeima)* are buttonos are laking *H.( Mertensiotburnia) leucospilota* also has the habit in life of stretching out in a thin shake-likefrom.

**Key for the shallow water orders of class Holothuroidea:**

1a. Podia absent; body vermiform; body wall thin, often translate; dominant spicules in form of anchors with associated with anchor plates tentacles pinnate; pharynx without retractor muscle; no respiratory tree ..... **Apodia.**

1b. Podia presents; body wall moderately thick; body wall with dominant spicules in form, of tables, perforated plates, buttons, rods, or rosettes ..... → 2.

2a. Tentacles peltate or pelyo – digitate; anterior end of body not introverted and associated with retractor muscles ..... **Aspidochirotida** (The only order with commercial species in the area).

2b. Tentacles branched anterior end of body introverted, associated with retractor muscles ..... **Dendrochirotida.**

**ID Key for the shallow–water families of Aspidochirotida occurring in the area:**

1a. Body with trivium (sole) usually flattened and dorsal bivium convex; gonads forming a single tuft appended to the left dorsal mesentery; cnvierian organs present or absent; dominant spicles of form tables, buttons (simple or modified), and rods (excluding c – and s – shaped rods) ..... **Holothuriidae.**

Body usually cylindrical in cross section(flattened in *Holothoria rigida*,but often with a more or less flattened ventral sole; colours various, if the podia are a contrasting colour(*Holothuria billa*) they are light not dark; spicules divers, but C-shape spicules(rods and military) not present.....*Holothuriidae*

**ID Key for the shallow –water genus of Holothuriidae:**

Body wall not smooth or parchment-like; colour of live preserved specimens variable,but not as above; spicules numerous and diverse,consisting of tables, buttoms,fenestrated spheres and rosettes in various combinations.....*Holothuria*

Colour uniformly black or dark brown; body usually covered with sand, except for several pairs of bare patches dorsally; tables with reduced but sometimes spinose disc.....*Holothuria atra* Jaeger,1833

**RESULTS**

**Diagnosis of Genus Holothuria Linnaeus,1767:**

Tentacles 17-30, usually 20, papillae and pedicels arranged variously on the dorsal and ventral sides respectively; anal papillae variously developed or absent; body wall 2-20 mm in thickness; body form variously developed, vermiform, cylindrical or with the ventral side distinctly flattened and sole-like dorsally arched; size ranging from small to large even up to 600 mm in length; calcareous ring more or less well developed usually with radial plates two or three times as long as interrarial plates.Spicules very diverse and variously developed tables present or absent, rosettes and small branched rods sometimes present.

**Identify species:**The careful examination of all 160 specimen of sea cucumbers taken from the sea bottom of Kish Island and also taking into account the identification keys used for this purpose, shows spicules rosette present,discs of tables small; colour uniformly dark brown or black.....*H.(Halodema atra,Jaeger,1833).*

**Systematic hierarchy:**

Kingdom: *Animalia* Phylum: *Echinodermata* Class: *Holothuroidea* Order: *Aspidochirotida* Family: *Holothuriidae* Genus: *Holothuria* Species ***Holothuria atra* Jaeger,1833**

**DISCUSSION**

Being soft-bodies, holothrian tend to lose their obvious external characteristics quickly, especially on hanling or after death. This feature makes them among the more difficult of marine groups to identify. Precise taxonomic classification relies greatly on the form of the endoskeleton, which is reduced and which is made of microscopic calcareous spicules, that can adopt a variety of forms, in the skin(Garry L.Preston,1992). Superficial identification of the most common commercial sea cucumbers,at least to genus level, and often further, is nevertheless normally possible based on external visual appearance. The

*Stichopodidae*, which contains only two genera (*Stichopus* and *Thelenota*) are easy to recognize because of the somewhat square cross-section of the body. The *Holothuriidae* are divided into four genera, of which two (*Actinopyga* and *Holothuria*) are commercially important. *Actinopyga* genera are easy to recognize because of the presence of five calcified papillae, or ‘teeth’ around anus. Most commercial species of *Holothuria* are fairly easy to distinguish, but the genus is subdivided into at least 13 varieties and 114 species (Row, 1969) which also contain numerous non-commercial types. Among coastal species, the *aspidochirotid* holothurians, which contain the commercial species, tend to predominate seas (Conand, 1986).

**Morphological description:** The shape of the sea cucumber is an elongate cylinder from 90-500mm but known to grow up to 600mm. Posterior end blunt. Mouth in the form of transverse slit and surrounded by a conspicuous papillose collar. There are 20 tentacles in a double row. Pedicels numerous and crowded on the ventral side. Papillae rather thicker than the pedicels and sparsely arranged. Anus is terminal. It has a worm like body that lays parallel to the ocean's floor. It also has five rows of tube feet that are all along the length of their body. The internal structure of sea cucumbers consists of an alimentary canal, which is a long tube that runs from the mouth of the sea cucumber at the forward end to the anus which is at the posterior end of the sea cucumber. The posterior end of the sea cucumber is enlarged and becomes narrower towards the anterior end. The calcareous ring is not very large. The radial pieces extend farther forward than interradials. Radials square-shaped, the anterior edge of each radial has a rounded incision while each interradial piece has an anterior tooth. Posterior margin of the interradial arched. In a specimen dissected there are 4 polian vesicles and 18 stone canals. There are two types of respiratory organs, they are the respiratory tree and the Cuvier's organ. These organs function as a pair to pump water through the system. The body wall of the cucumber consists of powerful longitudinal muscles running along the radii, and transverse muscles in the interradia. The spicules consist of tables and rosettes. Tables numerous but not crowded.

<u>Trade name</u>	<u>Scientific name</u>	<u>Minimum sizes</u>	
		<u>Live</u>	<u>Dry</u>
Lollyfish	<i>Holothuria atra</i>	30 cm	15 cm



Figure 1- Ventral view of *Holothuria atra*

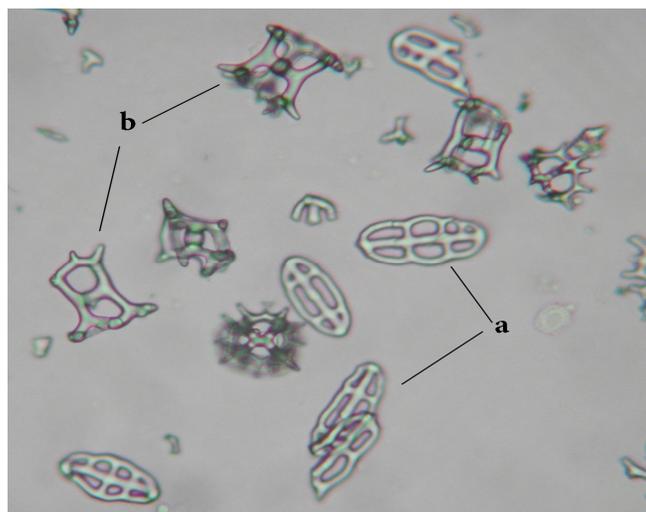


Figure 2-Ossicles of *Holothuria atra*: a; Rosset b; tables

As a defence against predators, *Holothuria atra* emits a toxic red fluid when its skin is rubbed or damaged. When attacked, it does not eject Cuvierian tubules in the way that some sea cucumbers do, but instead ejects its internal organs through its anus. These are also toxic and this sea cucumber is not recommended to be kept in a reef aquarium because the water may become toxic to its other animal occupants.

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