



## First record of sea star *Astropecten indicus* Döderlein from the coral reef in the Iraqi coastal Waters

Huda Kadhim Ahmed\*

*Department of Marine Biology, Marine Science Center, University of Basrah, Basrah- Iraq*

**Key words:** Asteroidean, Coral reef, First record, Iraq, Morphology, Sea star.

<http://dx.doi.org/10.12692/ijb/16.1.120-125>

Article published on January 15, 2020

### Abstract

The first recorded of sea star *Astropecten indicus* Döderlein, from the coral reef in the coastal waters of Iraq, North West Arabian Gulf, was done to explore the biodiversity at this habitat, by collected 31 individuals from three samples sites, during July 2012, June and December 2014. The specimens were described according to the morphological features.

\*Corresponding Author: Huda Kadhim Ahmed ✉ [hudamcs@yahoo.com](mailto:hudamcs@yahoo.com)

## Introduction

Asteroidean, Starfish or sea stars are attractive benthic invertebrates belong to the phylum Echinodermata. Ecologically, their role in marine ecosystems are well known (Raghunathan, 2017), some large species of starfish are a keystone species in the benthic communities, that play effective role in the distribution and abundance of animals, such as fish, crabs and sea urchins ( *Menage and Sanford, 2013*). Otherwise, sometimes they have negative impacts on the ecosystems particularly caused damage to coral reefs community, for example the coral of north Australia and some of them are considered pests or invasive species (Brodie *et al.*, 2005). Nearly 1,500 species of starfish were recorded in various seabed in the world's oceans, from the tropics to the polar waters, and they are found in a depths ranged from the intertidal zone habitat to a depth down to 6,000 m below the sea surface (Mah *et al.*, 2012). Starfish typically have a central disc and five arms, but few species have more than five arms, they have obvious radial symmetry and their internal skeleton is made up of calcium carbonate plates which loosely linked together. Their body have two sides, an upper surface or aboral side which may be smooth, granular or spiny, and a bottom side or oral side (lay on the seabed) (Lawrence, 2013).

*Astropecten* is a genus belonged to the primitive order Paxillosida and the family Astropectinidae, it includes 43% of the total number of species in this family. The genus consists 102 identified species, some species are very similar to each other and it can't be recognized by their photograph only (Pillon, 2009). Most species of *Astropecten* are limited to tropical and temperate regions, lives at depths ranging from 0-2 m to >5000 m (Mah *et al.*, 2011).

*Astropecten indicus* was described for the first time by Doderlein (1888), in Ceylon (Seri Lanka), later decades, it was recorded by other authors, Price (1981, 1982 and 1983), Jones (1986) in the Northwest of Arabian Gulf and in the northern region of Indian Ocean, Mah (2019) listed it in the World Asteroidea Database, on the other hand, Pratoomyot *et al.*

(2018) reported that *A. indicus* was utilized as attractive diet in shrimp aquaculture.

The present paper is the first record of the sea star *A. indicus* in the different regions of the Iraqi marine waters and, especially from the coral reef site in the Palinurus Rock which had been discovered recently in an extreme environment of in the coastal waters of Iraq (Pohl *et al.*, 2014), and is a part of the programme conducted by the Marine Science Center, Basrah University, aiming at exploring the biodiversity at this habitat.

## Materials and methods

Samples of the sea star *Astropecten indicus* were collected during three intervals July 2012, June and December 2014, from the sea bed of three sites of Iraqi Marine waters, two of the samples sites were located in Khor Abdulla:- Site 1: 29 50' 65.7" N 048 37' 27.6" E, Site 2: 29 52' 32.2" N 048 38' 00.1" E and Site 3 was collected from the coral reef area which located at 29 37' 00" N 48 48' 00" E (Pohl *et al.*, 2014).

Benthic Dredge sampler was used for the collection of sea star specimens from the sand sea bed (site 1 and 2), whereas the specimens of the coral reef (site 3) were collected by the scientific vessel of the MSC, university of Basrah by SCUBA scientific diving method. Sea stars were photographed before they preserved in 70% ethanol. In laboratory the morphometric measurements of specimens were taken by Vernier calliper to the nearest 0.1mm. The taxonomic identification was based on morphological characters given in related literatures (Price, 1981, 1982 and 1983; Jones, 1986).

## Results and discussion

### Systematic

The sand star *Astropecten indicus* is classified as follows:

Phylum: Echinodermata

Subphylum: Asterozoa

Class: Asteroidea

Order: Paxillosida

Family: *Astropectinidae*

Genus: *Astropecten* Gray, 1840

Species: *Astropecten indicus* Döderlein, 1888

#### *Synonymised names*

*Astropecten koehleri* deLoriol, 1899 (synonym according to Koehler, 1910)

*Astropecten pleiacanthus* Bedford, 1900 (synonym according to John, 1948).

#### *Remarkson examined specimens*

Fig. 1. Show the general view of *Astropecten indicus* Döderlein, 1888.

**Table 1.** The Numbers of *Astropecten indicus* Döderlein obtained in three sites of the Iraqi marine waters during July 2012, May and December 2014.

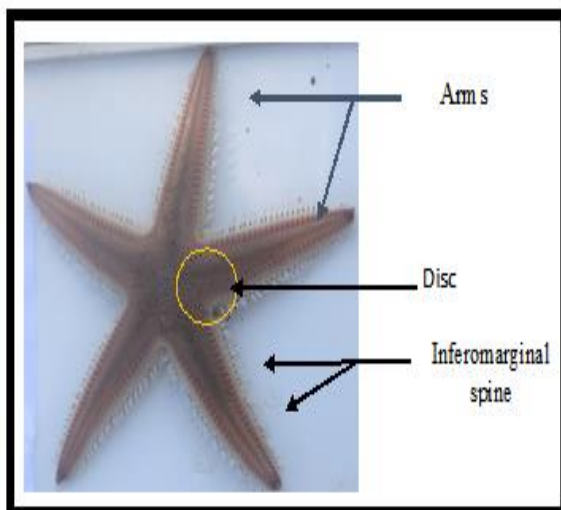
Sites	Species	Number of individual
1	<i>A. indicus</i>	8
2	<i>A. indicus</i>	21
3	<i>A. indicus</i>	2

Morphometric: Total sea star diameter 92mm, disc diameter 10- 20 mm, thick 5-7mm and length of arms 70- 80mm.

Colour: plate grey or brownish orange.

#### *General description*

A relatively small sea star species with a medium-sized disc and relatively five short triangular arms (tube feet) which are rather blunt at the tips. Superomarginal plates appearing broader than long when viewed from above, supero-marginal spines poorly developed (Price, 1981) (Fig.2a &b).



**Fig. 1.** General view of the sand star *Astropecten indicus* Döderlein.

*Description of arm's section in the aboral and oral surfaces (Fig.3)*

Papulas are soft and retractable appendages, Superomarginal plates and spines, Scales and small spines covering the vertical face of Superomarginal plates, Inferomarginal plates and spines, ambulacral groove and pedicellaria, largest abactinal paxillae with ten to sixteen peripheral spinelets (Vandenspiegel *et al.*, 1998).

#### *Habitat*

In present study the *A. indicus* were found in the Shallow waters sea bed at a depth about 0.5- 12 m of the Iraqi coastal waters, the seabed usually composed of a mixture of silt clay, sand clay and mud. However, the species was also found in the coral reef, Palinurus Rock of a water depth between 7-20m.

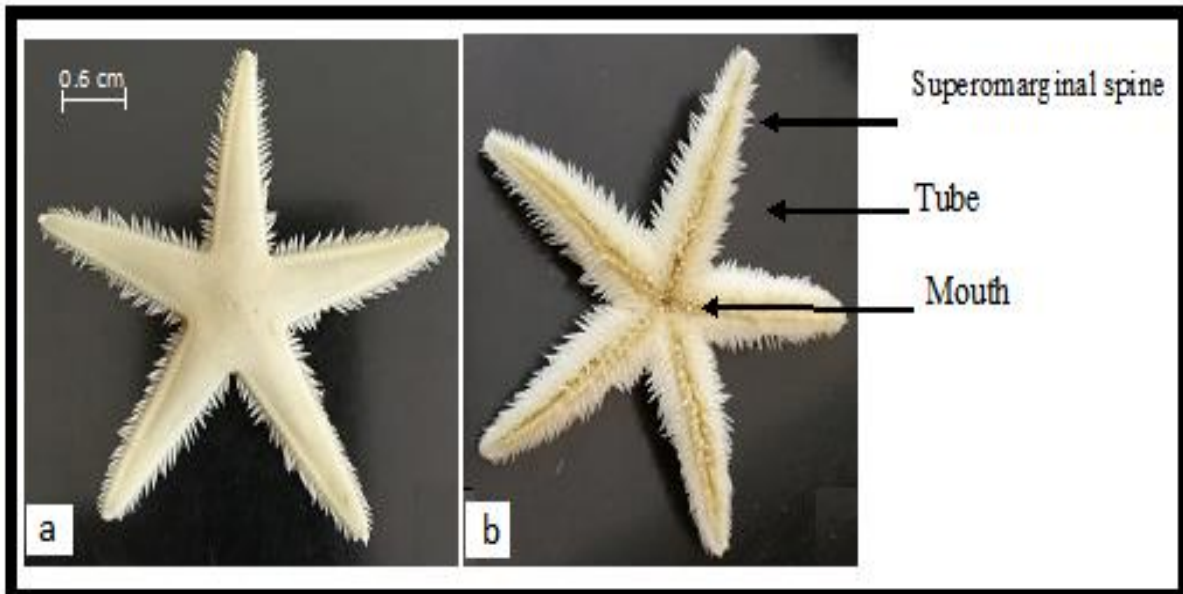
In the other areas of the Arabian Gulf the species was reported from the muddy sand seabed of the sublittoral zones and beyond (rarely intertidally) of Saudi Arabia seawater; and the sea shores of Kuwait (Price, 1981, 1982 and 1983; Jones, 1986).

#### *Abundance and distribution*

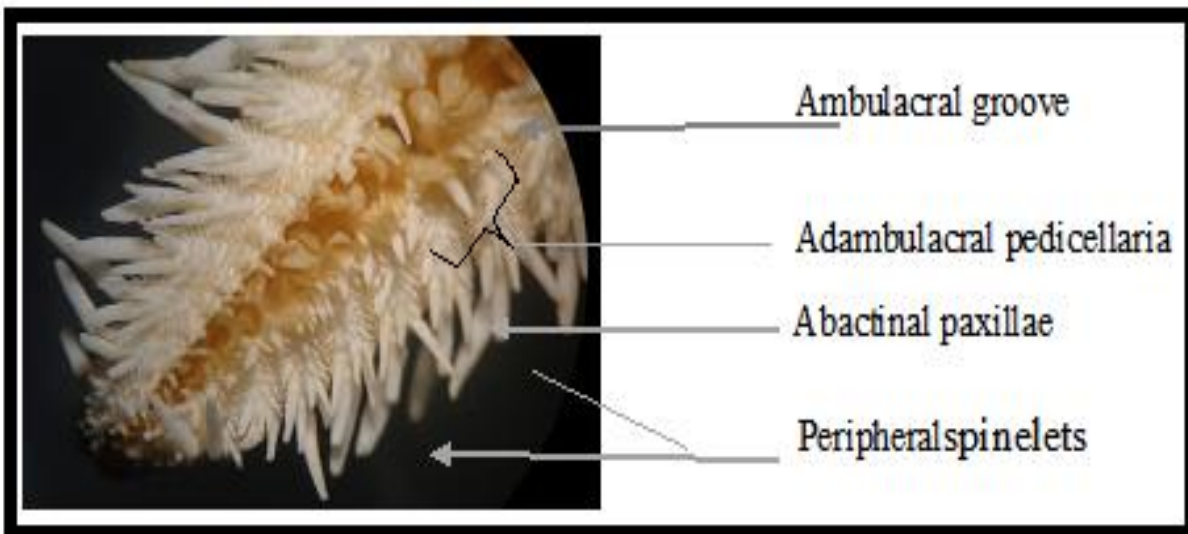
In this investigation 31 individuals of *A. indicus* were obtained from the 3 sampled site, are given in table (1), most of the sea stars (21 ind.) were obtained from the site (2) which located in the sea bed of Khor Abdulla, whereas only few (2 ind.) obtained from the coral reef area. However, this is my bedue to the difficulties of sampling performed by SCUBA divers,

especially the strong tidal currents and high turbidity (Pohl *et al.*, 2014; Ali *et al.*, 2017). In general, the distribution of *A.indicus* were reported from Arabian

Gulf, West India and Pakistan, Maldives area, Sri Lanka, Bay of Bengal and Indonesia (Vandenspiegel *et al.*, 1998).



**Fig. 2.** *Astropecten indicus* Döderlein: a- aboral surface, b- oral surface.



**Fig. 3.** Ventral view of arm in *Astropecten indicus* Döderlein, from Marine Waters of Iraq.

### Conclusion

In this investigation sea star *Astropecten indicus* Döderlein, was recorded for the first time in the coastal waters of Iraq, as part of a program to study and document the existing biodiversity and distribution of starfish species in this habitat.

### Aknowledgements

I am grateful to the German-Iraq Scientific Diving

Team and the crew of Al-Bahith Research vessel for assistance in the field, special thanks to Dr. T. Phole for sampling. My deep thanks to Prof. Dr. Malik A. Ali for his kind and critical reading of the manuscript.

### References

Ali MH, Ahmed HK, Mohammed HH, Al-Zwar JM. 2017. Five bivalve species from the recently discovered coral reef in the marine coastal waters of

Iraq. Journal of Biology, Agriculture and Healthcare, **7(8)**, 17-21.

**Brodie J, Fabricius K, De'ath G, Okaji K.** 2005. "Are increased nutrient inputs responsible for more outbreaks of crown-of-thorns starfish? An appraisal of the evidence". Marine Pollution Bulletin. **51(1-4)** 266-78.

<http://dx.doi.org/10.1016/j.marpolbul.2004.10.035>

PMID15757727

**Döderlein L.** 1888. Echinodermen von Ceylon. Bericht über die von den Herren Dres Sarasin gesammelten Asteroidea, Ophiuroidea und Echinoidea. *Zoologische Jahrbücher* **3**, 821-846, available online at

<http://www.biodiversitylibrary.org/page/10342794#page/829/mode/1up>

**Jones DA.** 1986. A field guide to the sea shores of Kuwait and the Arabian Gulf. 192 P.

**Lawrence JM.** 2013. Starfish: Biology and Ecology of the Asteroidea. Johns Hopkins University Press. ISBN 978-1-4214-0787-6.

**Mah CL.** 2019. World Asteroidea Database. *Astropecten indicus* Döderlein, 1888. Accessed through: World Register of Marine Species at: on 2019-11-14.

<http://www.marinespecies.org/aphia.php?p=taxdetails&id=368506>

**Mah C, Hansson H. Astropectinidae. In: Mah CL.** 2011. World Asteroidea Database. Accessed through: Mah CL (2011). 2011. World Asteroidea Database at on 2011-10-04.

<http://www.marinespecies.org/asteroidea/aphia.php?p=taxdetails&id=123127>

**Mah CL, Blake DB, Badger JH.** 2012. Global diversity and phylogeny of the asteroidea (echinodermata) *PLoS ONE*. **7(4)**.

<http://dx.doi.org/10.1371/journal.pone.0035644>.

**Menage BA, Sanford E.** 2013. "Ecological Role of Sea Stars from Populations to Meta-ecosystems". Starfish: Biology and Ecology of the Asteroidea. p. 67. in Lawrence (2013).

**Pillon R.** 2009. *Astropecten* of the Mediterranean Sea. Identification guide, English (last revision April 2016). Source ID 286481.

**Pohl TH, Al-Muqdad SW, Ali MH, Fawzi N, Al Ehrlich H, Merkel B.** 2014. Discovery of a living coral reef in the coastal waters of Iraq. Scientific Reports **4**, 4250.

<http://dx.doi.org/10.1038/srep04250>.

**Price ARG.** 1981. Studies on the echinoderm fauna of the western Gulf. Journal of Natural History **15**, 1-15.

**Price ARG.** 1982. Echinoderm of Saudi Arabia. Comparison between Echinoderm faunas of Arabian Sea, SE Arabia, Red Sea, Gulfs of Aqaba and Suez. Fauna of Saudi Arabia **4**, 3-21.

**Price ARG.** 1983. Echinoderms of Saudi Arabia. Echinoderm of the Gulf, Fauna of Saudi Arabia **5**, 28-108.

**Pratoomyot J, Choosri S, Muthuwan V, Luangoon N, Charoendee W, Phuangsantha W, Shinn AP.** 2018. Sand star, *Astropecten indicus* Döderlein, 1888, as an alternative live diet for captive harlequin shrimp, *Hymenocera picta* Dana, 1852. Aquaculture **484(1)**, 351-360

**Raghunathan, Naveen Kumar Nigam C.** 2017. First record of Yellow Mesh sea star *Nardoa novaecaledoniae* (Perrier, 1875) (Echinodermata: Asteroidea: Ophidiasteridae) from Andaman and Nicobar Islands Centre. Proceedings of the International Academy of Ecology and Environmental Sciences **7(2)**, 25.

**Vandenspiegel D, Lane DJW, Janoux M.** 1998. The asteroid fauna (Echinodermata) of Singapore,

with a distribution table and an illustrated Zoology **46(2)**, 431-470.  
identification to the species. The Raffles Bulletin of