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OPHIOCOMA SCHOENLEINI and OPHIOCOMA ANAGLYPTICA (OPHIUROIDEA : ECHINODEMATA), A NEW RECORD FROM THE RED SEA WITH NOTES ON THE OTHER RELATED SPECIES

(With One Pl. and 10 Figs.)

By

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تسجيل جديد لنوعين من نجوم البحر الهشة في البحر الأحمر هما : أفيوكوما شوين لينـــــي وافيوكوما أناجليبتكا (طائفة النجوم الهشة : الجلد شركيـــــــات)

فتحي السيد سليمـــان

لقد سجلت الدراسات الدولية وجود إحدى عشر نوعاً من النجوم الهشة والتى تتبع جنـــس أفيوكوما فصيلة أفيوكوميدى وأن هذه الأنواع مرتبطة إرتباط وثيق الصلة بتواجد وتوزيـــــع الشعاب المرجانية خاصة في المنطقة الإستوائية · ولقد سجل وحتى قبل هذه الدراسة خمـــــة أنواع فقط من الإحدى عشر سابقة الذكر في البحر الأحمر بالرغم من وقوعه في المنطقة الإستوائية وشبه الإستوائية وكذا الإنتشار الواسع للأنواع المختلفة من الشعاب المرجانية والساحـــــات الشاسعة التى تغطيها هذه الشعاب وهذه الأنواع الخمس هى أفيوكوما بوسيلا ، أفيوكوما فالينشى افيوكوما بيكا ، أفيوكوما أسكولوبندرينا وأفيوكوما ايربناشيس · ولذا فقد أجريت هـــــذه الدراسة على طول الساحل الشمالى الغربي للبحر الأحمر في المنطقة من شمال مدينة مرســـــى علم جنوباً إلى شمال مدينة الغردقة شمالاً · وقد أثبتت هذه الدراسة وجود نوعين آخرين تابعين لنفس الجنس أفيوكوما السابق ذكره هما أفيوكوما شوين لينى وأفيوكوما اناجليبتكا وقد سجـــل الأول عند خط عرض ٢٦° ١٥ آ وخط طول ٣٤° ١٧ والثانى عند خط عرض ٢٦° ٤٥ وخط طـــول ٣٤° ٠٠ ليصبح عدد الأنواع المسجلة في البحر الأحمر من جنس افيوكوما سبعة أنواع معظمها متواجد على السواحل المصرية · وقد وصفت الأنواع الجديدة وقورنت بمثيلاتها ووضع مفتاح تقسيمى لربطهـــا بالأنواع الأخرى المعروفة مسبقاً ·

SUMMARY

New record of two ophiuroid species belonging to the common tropical coral reef genus Ophiocoma: Ophiocomidae; from the littoral and intertidal zones of the Northwestern part of the Red Sea was recognized. These two species are O. schoenleini Müller and Troschel and O. anaglyptica Ely. The former was collected at 26° 15 'Latitude and 34° 17' Altitude and the latter at 26° 45' Latitude and 34° 00' Altitude. the two species are described in detail, discussed with five previously known Red Sea Ophiocoma species and a key for the seven species is constructed by the present author.

F.E. SOLIMAN

INTRODUCTION

The abundance and distribution of the different species of genus Ophiocoma have an intimate relationship with the distribution of the coral reefs and wherever the coral reefs are present the species of Ophiocoma are expected to be present (JAMES, 1982). MORTENSEN (1957) cited that "the occurrence of Ophiocoma tumida Müller and Troschel in the Mediterranean Sea resting on mistakes and the main genus of the family Ophiocomidae; Ophiocoma; so characteristic of the littoral region of Tropical Seas.

CLARK and ROWE (1971) described eleven species of the genus Ophiocoma from the Indo-West Pacific region. These species are Ophiocoma anaglyptica Ely, O. brevipes Peters, O. dentata Müller and Troschel, O. latilanaxa Murakami, O. schoenleini Müller and Troschel, O. wendti Koehler, O. erinaceus Müller and Troschel, O. scolopenderina (Lamark), O. pica Müller and Troschel, O. pusilla (Brock) and O. valenciae Müller and Troschel. Of these previously mentioned species only the latter five are recorded from the Red Sea (CLARK, 1952, 1967a; CLARK & JANE, 1976; CLARK & ROWE, 1971 and JAMES and PEARSE, 1969), though the Red Sea is one of the main habitats of coral reefs. Therefore, the author carried out an extensive studies on the species of genus Ophiocoma in the Northwestern part of the Red Sea from the North of Marsa Alam City to North of Hurghada City (see Fig. 1). In this study two species which are recorded for the first time in the Red Sea are described and compared with the other known related Ophiocoma species.

MATERIAL and METHODS

Ophiuroids were sampled from the littoral zone to the extreme low water spring tide (ELWST) along the Northwestern part of the Red Sea; from North of Marsa Alam to North of Hurghada City. (see Fig. 1). Sampling was carried out every 10 to 20 Km and where the coast is accessible for sampling. The specimens were collected by hand from the crevices of flat dead corals, from under huge and small stones by turning over the latter, from living corals and when they are crawling freely on the dense of algal cover. Specimens were anaesthetized by several drops of ethyl alcohol in two liters of sea water, untill nearly dying then picked and lefted on flat surface to dry taking care to stretch the arms from time to time. Identification and drawing were carried out using a binocular research microscope with attached Camera Lucida. The specimens were labelled and preserved on cotton and Naphthalene in woody boxes.

RESULTS

Ophiocoma schoenleini Müller and Troschel, 1842:

Description: The diameter of the disc varied from 5mm to 20 mm (Holotype 9.5 mm in life specimens). The disc is covered with scales which are completely concealed by small rounded granules (see Fig. 2). There are about 40 to 50 granules per mm^2. But the scales and granules are black in colour.

The interambulacral areas on the oral side (Fig. 3) are well distinct. A small roughtly triangular area at the margin of the disc is covered with granules while the remaining is covered with imbricating scales. The proximal ones carry some of five or more granules which are slightly longer than wide.

Oral shields (Fig. 3A) are hexagonal with black reticular ornamentation except the area of the madreporite (Fig. 3G) which is white in colour. The proximal edges of oral shields are rounded while the distal ones are concave and the lateral margins are nearly straight. Each oral shield is 1.5 mm in length and 1.3 mm in width. There is a pair of adoral shields (Fig. 3F) extending along the lateral sides of each oral shield. Each adoral shield has two projections; one directed outwardly and the other is connected with the lateral margin of the first ventral arm plate (Fig. 3F). Five pairs of nearly triangular, blackly ornamented oral plates (Fig. 3B) are present in front of the oral shields. Oral papillae are four in number on each side of the oral slit (Fig.3I-J). The outer two are black while the inner ones are white in colour. The outermost papilla (Fig. 3I) is the longest and has a free pointed end extending downwardly within the oral slit. The papilla next to the outermost is the broadest and laying at the level of the proximal ones. Teeth papillae (Fig. 3K) are 10 in number arranged in three raws; four in the upper raw and three in both the middle and lower ones. Teeth are present and have enamel covers.

The dorsal arm plates (Fig. 4-1) are black in colour and fan-shaped. They are broader than long; their width is about two times its length. The outerside of each plate is straight or slightly convex.

The ventral arm plates (Fig. 4-2) are roughly four sided, the distal and the lateral sides are concave while the proximal is convex and overlapped by the preceding plate. Ornamentation on the ventral arm plates are black reticular, similar to those on oral, adoral shields and oral plates, except that, there are some white spots inside the ornamentation. The ratio of length to width is 1:1 or slightly wider than long. The disc covers 4-5 segments (Fig. 3). The innermost ventral arm plate is the smallest and its length is nearly half of the remaining ones. A pair of club-shaped tentacle scales (Fig. 4E) are present. Each scale has a black spot on its ventral side.

Each lateral arm plate bears three spines (Fig. 4-3F). The spines are stumpy, stout and smooth. The uppermost spine is the broadest and the longest. Its length nearly equals the width of the dorsal plate. The rest are slender, swollen at base and nearly equal in length. All the spines are black except the proximal and the distal parts of the lower ones where, there are white notches on their ventral surface.

Habitat: the species is usually found from the sublittoral to midintertidal areas and very rare in the lower intertidal zone, generally, under small and large stones or in crevices of the old dead flat coral reefs.

Ophiocoma anaglyptica Ely, 1944 :

Description: The diameter of the disc varied from 4 mm to 22 mm (Holotype 9 mm in life specimens). The disc (Fig. 5) is circular devoid from radial shields. The aboral side is covered with scales which are completely concealed by round granules. There are about 20-30 granules at the center and 35-46 granules at the margin per mm^2. In large specimens, the granules at the margin of the disc are longer than wide. The granules which are irregularly arranged vary in colour, some are white and the others are black.

Oral shields (Fig. 6D) are roughly four sided in small specimens and hexagonal in large ones. The proximal margin is wider than the distal. The ratio of length to width of each oral shield is nearly 1:1. The colour pattern is irregular and nearly similar in all the shields except the shield carrying the madreporite. The adoral shields (Fig. 6C) are four sided with a granule on its distal margin.

The interambulacral areas on the oral side are characterized by small areas at the margin of each which are covered with white granules. These granules are longer than wide. The rest of the interambulacral areas are covered with conspecious scales of two types, the central ones are large and partially imbricating.

There are four oral papillae on each side of the jaw (Fig. 6 G-H). Each papilla has a black spot. The outermost papilla lies in vertical position. The upper part of it is broad while the lower part is pointed and directed downwardly twards the base of the mouth slit. The one next to it is the broadest of all. At the tip of the jaw there are 10 teeth papillae (Fig. 6J). The uppermost is the smallest while the lower ones are large andarranged in three raws of three. Teeth are present and have enamel covers.

The dorsal arm plates (Fig. 7-1) are blackly ornamented, fanshaped with convex distal edges, short straight truncated proximal edges and the lateral edges are nearly straight and oblique posteriorly. The ratio of the length to the breadth of each plate is 1:2.

The ventral arm plates (Fig. 7-2) are roughly four-sided, with the distal and lateral margins are concave while the proximal are convex. The proximal edge of each plate is slightly covered with the preceding one. The ratio of length to breadth of each plate is 1:1. The disc covers 4-5 segments (see Fig. 6). The basalmost is the smallest and nearly triangular with three black spots. Its length is nearly half the length of the next plate. Tentacle scales are generally two on each side on most of the arm segments; sometimes have three scales on one side and two on the opposite side of the same segment and this pattern alternates from one segment to the next at lest on the proximal arm segments.

Each lateral arm plate (Fig. 7-3) bears four smooth spines. The uppermost arm spines on the lateral plates of the same segment differ in length, i.e. when the uppermost spine of the left plate is the longest the uppermost spine on the right lateral plate is the smallest and this pattern alternates in successive segments. Generally, spines are swollen at base and pointed distally.

Habitat: The species is very rare; very few specimens were collected from under big and huge stones in the midintertidal zone.

Ophiocoma scolopenderina Lamark, 1816.

Description: The diameter of the disc varies from 8 mm to 25 mm (Holotype 22 mm in life specimens). The disc (Fig. 8) is nearly circular, devoid of radial shields. The aboral side is covered with scales which are completely concealed by course rounded granules. There are about 10-15 granules per mm^2. The scales are black and the granules varigated. Most of the later are black intermingled by irregular groups of white ones.

The margins of the interambulacral areas (Fig. 9) are covered by small; some what longer than wide; white granules while the rest are covered by imbricating plates. The proximal plates carry a cluster of black granules.

Oral shields (Fig. 9D) are hexagonal and black except the prephary of each and the site of the madreporite. The proximal edge of each shield is straight and the distal edge is concave. The ratio of length to width of each oral shield is 4:3. Adoral shields are large and extend along both the sides of the oral shields. Oral plates are five pairs (Fig. 9E) located in front of oral shields.

Oral papillae (Fig. 9H-I) are four pairs in each oral slit. The outermost pair is thin, long and extends deeply in the mouth slit. The second pair from the outermost is the broadest and lies at the same level of the inner ones. Teeth papillae (Fig. 9J) are more than 10 in number irregularly arranged. Teeth are present and have enamel covers.

The dorsal arm plates are black and fan-shaped. They are hexagonal and broader than long. The ratio of length to width is 3-7 and the distal edge is concave (see 10-1).

The ventral arm plates are octagonal. Their distal and lateral edges are concave and each plate has two large black spots. The disc covers about 6-7 segments (see Fig. 9). Tentacle scales are two on each lateral plate along the arm segments except the first segment which may carry three tentacle scales on each lateral plate. The ratio of length to width ventral arm plate is 1:2.5.

Lateral arm plates (Fig. 10-3) bear spines which are progressively longer upwards and often alternating three and four on successive series of the same side of the arm or opposite series of the same segment. The alternate uppermost spines are very stout and often long.

Habitat: This species is somewhat common in the algal carpet on flat beach, under rocks, loose coral pieces or in crevices in the intertidal zone.

Table 1. The main differences between O. scolopenderina, O. erinaceus and O. schoenleini .

Character	O. scolopenderina	O. erinaceus	O. schoenleini
1 - Colour pattern	varigated sometimes dark brown dorsally and lighter ventrally.	uniformly dark dorsally and ventrally.	aboral surface dark and oral surface with dark reticular ornamentation.
2 - Number of granules/ mm^2	10 - 15	9 - 16	40 - 60
3 - Oral shield.	hexaginal.	circular or hexagonal.	hexagonal.
4 - Dorsal arm plate.	fan-shaped with distal edge convex.	fan-shaped with flat distal edge.	fan-shaped with distal edge straight or slightly convex.
5 - Ratio of length to width of dorsal arm plate.	3 - 7	-	1 - 2
6 - Ratio of length to width of ventral arm plate.	1 - 2.5	-	1 - 1
7 - Arm spines.	3 - 4, not short and wide and alternate from segment to segment and on the same segment.	3 - 4, not short and wide and alternate from segment to segment and on the same segment.	3, short and wide on each lateral plate.
8 - Length of dorsal arm plate to length of the uppermost arm spine.	1 : 3	1 : 5	1 : 2.5
9 - Habitat.	intertidal zone	sublittoral zone.	from sublittoral to mid-intertidal zone.

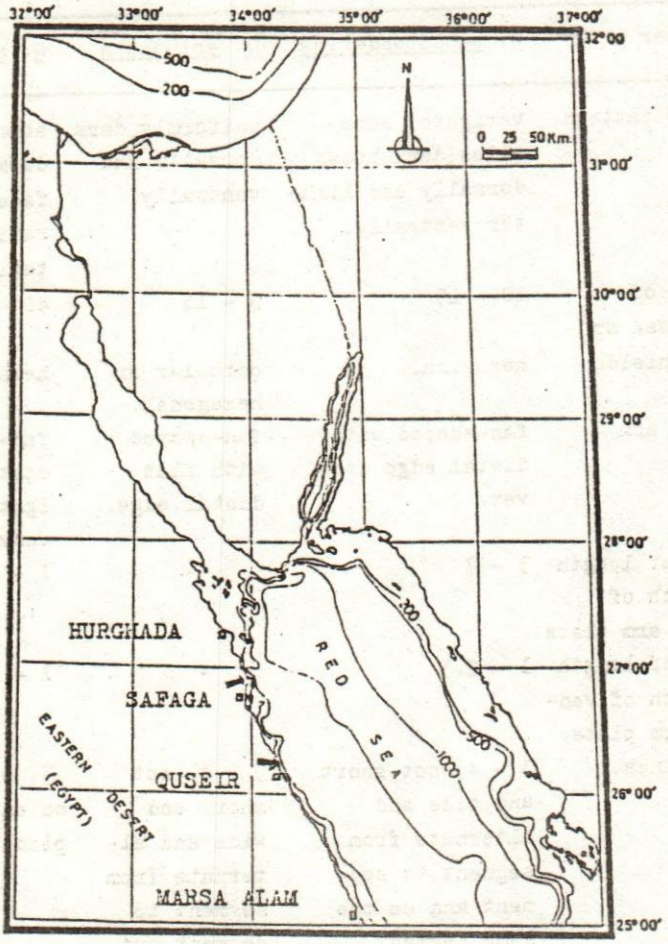


Fig. 1. Map showing the study area. Square symbol shows cities locations and arrows show the locations of the new record.

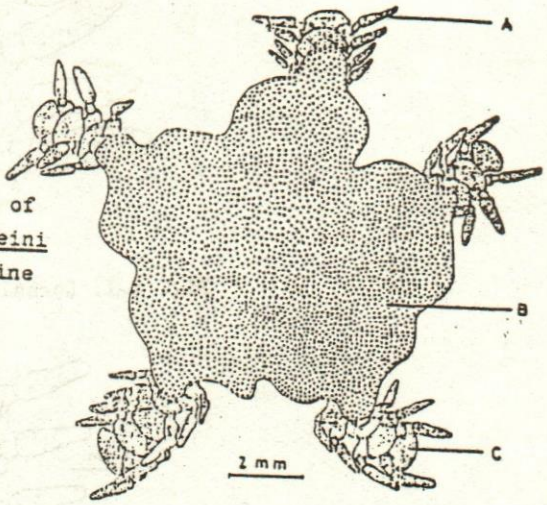


Fig. 2. Aboral surface of Ophiocoma schoenleini
A - Uppermost arm spine
B - Aboral granules
C - Dorsal arm plate

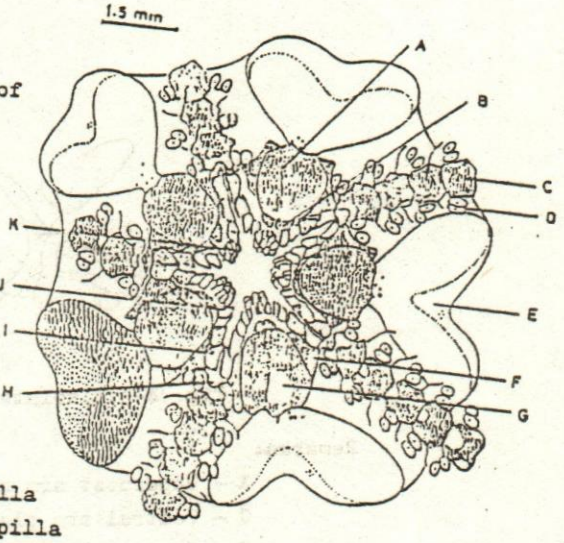


Fig. 3. Oral surface of O. schoenleini
A - Oral shield
B - Oral plate
C - Ventral plate
D - Tentacle scales
E - Interambulacral area
F - Adoral shield
G - Madreporite
H - First venteral arm plate
I - Distal oral papilla
J - Proximal oral papilla
K - Teeth papillae

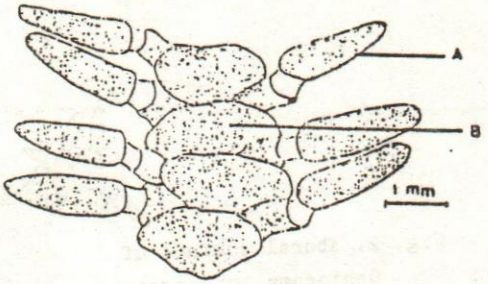


Fig. 4-1. Dorsal view of some arm segments

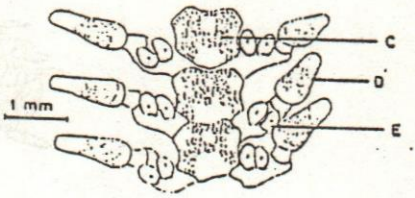


Fig. 4-2. Ventral view of some arm segments

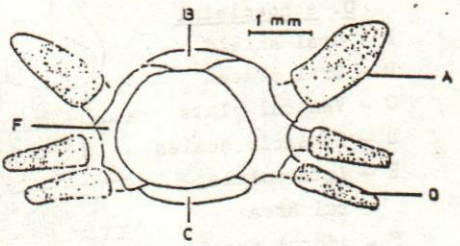


Fig. 4-3. Isolated arm segment

Remarks:

A - Uppermost arm spine
B - Dorsal arm plate
C - Ventral arm plate
D - Lowermost arm spine
E - Tentacle scales
F - Lateral arm plate

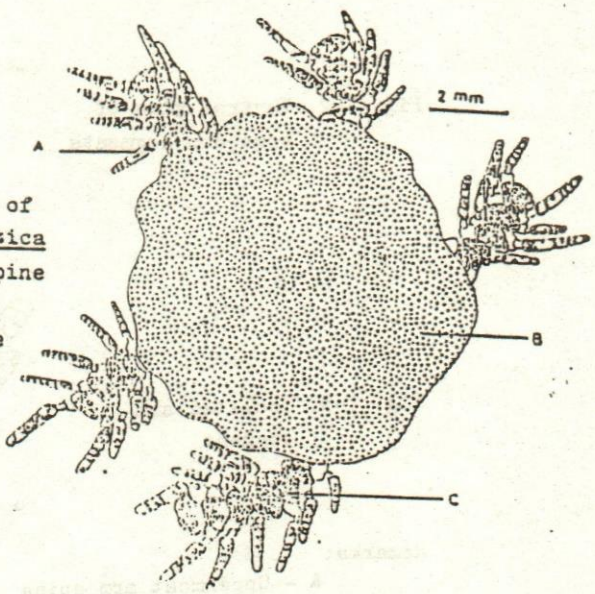


Fig. 5. Aboral surface of Ophiocoma anaglyptica

A - Uppermost arm spine
B - Aboral granules
C - Dorsal arm plate

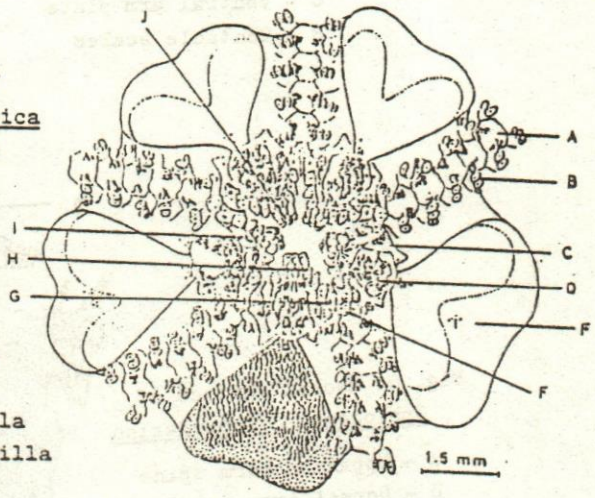


Fig. 6. Oral surface of Ophiocoma anaglyptica

A - Ventral arm plate
B - Tentacle scales
C - Adoral shield
D - Oral shield
E - Interambulacral area
F - First ventral arm plate
G - Distal oral papilla
H - Proximal oral papilla
I - Oral plate
J - Teeth papillae

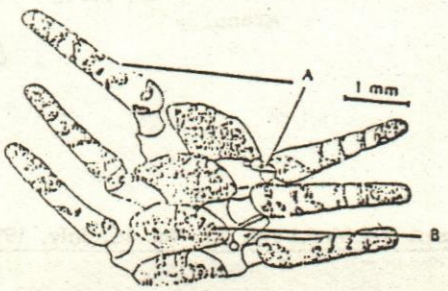


Fig. 7-1. Dorsal view of some arm segments

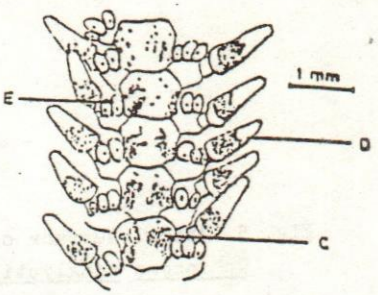


Fig. 7-2. Ventral view of some arm segments

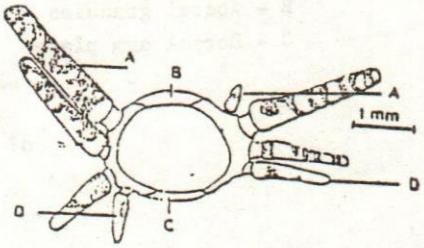


Fig. 7-3. Isolated arm segment

Remarks:

A - Uppermost arm spine
B - Dorsal arm plate
C - Ventral arm plate
D - Lowermost arm spine
E - Tentacle scales
F - Lateral arm plate

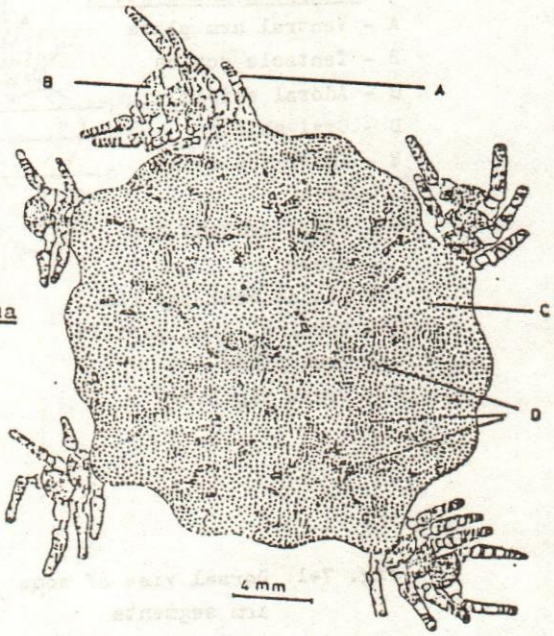


Fig. 8. Aboral surface of Ophiocoma scolopenderina

A - Uppermost arm spine
B - Dorsal arm plate
C - Black granules
D - Clusters of white granules

Fig. 9. Oral surface of O. scolopenderina

A - Ventral arm plate
B - Tentacle scales
C - Interambulacral area
D - Oral shield
E - Oral plate
F - Adoral shield
G - First ventral arm plate
H - Distal oral papilla
I - Priximal oral papilla
J - Teeth papillae
K - Madreporite

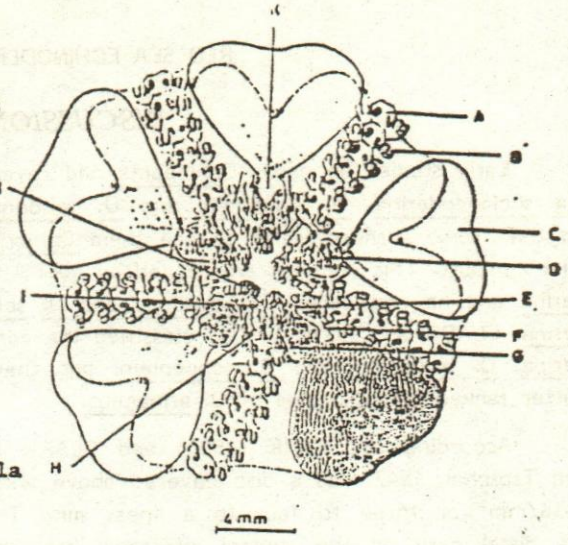
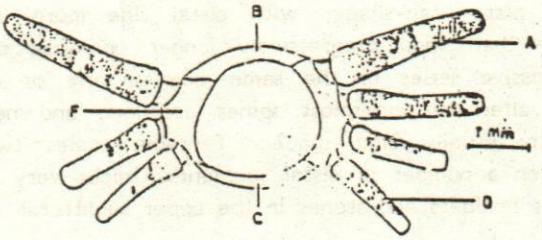


Fig. 10-3. Isolated arm segment



Remarks:

A - Uppermost arm spine
B - Dorsal arm plate
C - Ventral arm plate
D - Lowermost arm plate
E - Tentacle scales
F - Lateral arm plate

Fig. 10-2. Ventral view of some arm sements

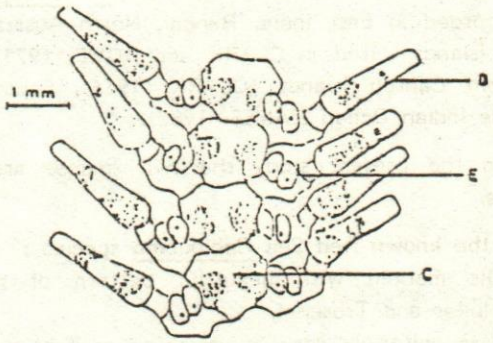
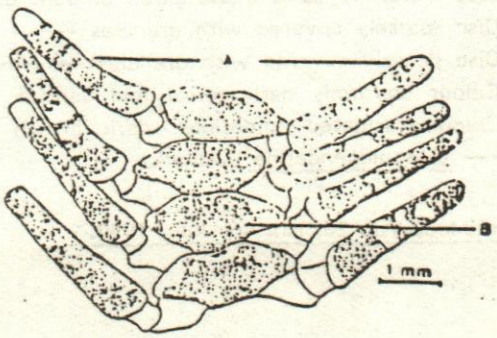


Fig. 10-1. Dorsal view of some arm segments



DISCUSSION

Early studies on genus Ophiocoma had revealed that, the three species Ophiocoma scolopenderina, O. erinaceus and O. schoenleini are very near to each other. So that, some authors prefer to call them Ophiocoma scolopenderina-erinaceus-schoenleini complex. This complex was called by MATSUMOTO (1917) as Ophiocoma scolopenderina and he considered O. erinaceus and O. schoenleini as varieties of O. scolopenderina. CLARK and ROWE (1971) classified the complex into three species, O. scolopenderina, O. erinaceus and O. schoenleini but they noted that O. schoenleini possibly better ranked as subspecies of O. erinaceus.

According to CLARK (1923) and CLARK & JANE (1976), O. erinaceus Müller and Troschel, 1842, has a disc covered above with relatively coarse spherical granules, 9-16/mm^2 or three to four to a linear mm. These granules are extending only on the distal parts of the ventral interradii; oral shields variable, circular or hexagonal. Arm plates fan-shaped with distal side more or less flattened; arm spines rarely more than five, progressively longer upwards; often alternating three and four on successive series of the same side of arm or opposite side of the same segment. The alternate uppermost spines are long and nearly about five times the segment length; usually cigar-shaped. Tentacle scales two proximally; sometimes falling to one on a number of distal segments. Colour very densly black. The species is abundant under boulders and stones in the upper sublittoral zone.

The main differences between the three species O. scolopenderina, O. erinaceus and O. schoenleini concluded from the present study, CLARK (1923) and CLARK & JANE (1976) (see Table 1) suggest that the conclusion of CLARK and ROWE (1971) was right but O. schoenleini should be classified as a separate species in genus Ophiocoma.

Concerning the distribution of O. schoenleini and O. anaglyptica the former was recorded in East India, Bengal, North Australia, China, South of Japan and South Pacific Islands (cited in CLARK and ROWE, 1971) while, the latter species was recorded from Canton Islands (CLARK, 1976), South Pacific Islands (JAMES, 1969) and from the Indian Ocean (JAMES, 1982).

In the present study the two species are recorded for the first time in the Red Sea.

Key to the known Red Sea Ophiocoma species :

1- Dis marked with beautiful pattern of radiating golden lines ----- O. pica Müller and Troschel.

1- Disc uniformiy dark or varigated or light green ------ 2

2- Disc sparsely covered with granules ----- 3

2- Disc densely covered with granules -------- 4

3- Colour uniformly dark dorsal and ventral --- O. erinaceus Müller and Troschel.

3- Colour varigated sometimes dark brown dorsally but always lighter ventrally --- O. scolopenderina (Lamark).

4- Disc granules short, rounded, oral side with black reticular ornamentation and two tentacle scales at least near the disc --- O. schoenleini Müller and Troschel.

4- Disc granules higher than thick and one tentacle scale --- O. valenciae Müller and Troschel.

5- Uppermost arm spines on the same segment variable and alternate from one segment to another and conspicous enlarged round scales in each ventral interradius --- O. anaglyptica Ely.

5- The second from the uppermost spines enlarged and clavate --- O. pusilla (Brock).

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