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THE FIRST RECORD OF FOUR ISOPODS FROM SOME RED SEA FISHES, YEMENI COASTAL WATERS

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ABSTRACT

A total of 680 fish specimens belonging to 31 species from the Yemeni coastal waters of the Red Sea were inspected for the isopod infestations. Four isopod species belonging to three families of the suborder Cymothoida were detected. These are: *Aega psora* (Linnaeus, 1758) from *Lethrinus lentjan*, *Natatolana insignis* Hobbins and Jones, 1993 from *Abalistes stellatus*, *Excorallana tricornis* (Hansen, 1890) from *Epinephelus fuscoguttatus*, *E. guttatus* and *E. tauvina* and *Alcirona krebsi* Hansen, 1890 from *Epinephelus microdon*. All these isopod species are reported here for the first time from the Yemeni coastal waters of the Red Sea.

INTRODUCTION

The Isopoda are small crustaceans with seven pairs of legs that range in size from 300 micrometres to nearly 50 centimetres. They are diverse, with around 10,283 species found in all ecosystems from the deepest oceans to the Montana terrestrial habitats and deep underground in caves or aquifers (Schotte *et al.*, 2014). Approximately 4,500 marine isopod species are known from all regions of the world's ocean, living most abundantly on the sea bottom from the abyss to the intertidal zone, and with only few representatives in the pelagic zone (Brusca, 1997).

Marine isopods occur on fish host on the outer body or fins, in the mouth, gill chambers, or nostrils, or occasionally in self-made pockets in the flesh of their hosts (Hoffman, 1998). Some isopods like *Natatolana* are obtained from the gut of some fishes (Yasmeen, 2002; 2004). Isopods cause significant economic losses to fisheries by killing, stunting, or damaging these fishes. They can also kill or impair immature fishes so that they do not survive (Bunkley-Williams *et al.*, 2006). Also, the infection with some parasitic isopods leads to secondary infection by pathogenic microbes which may affect the fish population (Ravichandran *et al.*, 2009). Some isopods play an important role in ecosystems as scavengers and occasionally have a negative impact on commercial fisheries by feeding on catches restrained in traps, nets or on lines (Castro *et al*., 2005; Keable, 2006).

According to WoRMS (2014), the marine species of the order Isopoda are classified into 11 suborders among which the suborder Cymothoida includes 32 families. Among the families of the suborder Cymothoida, the family Aegidae includes eight genera and 152 species, the family Circolanidae includes 63 genera and 419 species and the family Corallanidae includes seven genera and 75 species.

Marine isopods are poorly studied animals in many regions of the world and some groups remain completely undescribed (El-Shahawy and Desouky, 2010). This was the situation in the Red Sea (Hiekal and El-Sokkary, 1990), particularly in Yemen, as there are only three published reports. These included the record of the isopod *Gnathia* sp. by Al-Zubaidy (2007), the first record of three isopod species by Al-Zubaidy and Mhaisen (2013) and the record of *Cymothoa indica* by Al-Zubaidy and Mhaisen (2014). Therefore, the objective of the present study was to focus on the analyses of the isopod fish parasitic fauna of the Yemeni coastal waters of the Red Sea.

MATERIALS AND METHODS

Fishes from the Red Sea were examined for ectoparasitic isopods. These fish were obtained during the period from October 2009 till May 2010 by spear fishing, gill netting in shallow Yemeni coastal waters of the Red Sea and some fishes were purchased from Al-Mehwat fish market at Al-Hodeidah city, Yemen.

Fishes were freshly brought to the laboratory and their whole body surface, inside the mouth and the gill arches were individually examined for parasitic isopods. Table (1) shows a list of these fishes with their families, numbers, length range and mean length. The scientific names of these fishes were checked according to Froese and Pauly (2014).

Upon inspection, isopods were removed from their hosts and preserved in 10% seawater formalin. Isopod appendages were dissected out with a needle in pure phenol to achieve temporary mounts. The drawings were done by using a camera Lucida and photographs were made with a Samsung digital camera, 10.1 mega pixels. Specimens were identified according to Bruce (1987), Kensley and Schotte (1989) and Trilles *et al.* (1989). In addition, some isopod specimens were sent for identification to Prof. Dr. N. L. Bruce of the University of Copenhagen and Prof. Dr. S. Ravichandran of the Annamalai University, India.

RESULTS AND DISCUSSION

Among the 680 fishes, representing 10 families and 31 species, examined only six individual fishes harbor one or two isopods species. Four isopod species were collected. These are *Aega psora* of the family Aegidae, *Natatolana insignis* of the family Circolanidae and both *Excorallana tricornis* and *Alcirona krebsii* of the family Corallanidae. According to WoRMS (2014), all these families belong to the suborder Cymothoida, order Isopoda, subclass Eumalacostraca, class Malacostraca and subphylum Crustacea of the phylum Arthropoda. However, some of such isopods are included in the suborder Flabellifera (EOL, 2014; ITIS, 2014). The following is a brief account on the site and rate of infection of the fish hosts, description and synonyms of concerned isopods as well as their geographical distribution in the world.

1- *Aega psora* (Linnaeus, 1758) (Fig. 1):

Material examined:

Examination of the collected fishes revealed that gills of one *Lethrinus lentjan* were infected with one female *A. psora* (Table 1). Length of the infected fish was 28.5 cm. and its weight was 215 gm.

Description:

Body dorsoventrally flattened, measured 4.50 mm. in length, with a maximum width of 1.60 mm. Head fused with first thoracic segment forming cephalosome without carapace; eyes large, sessile, widely separated. Antenna 1 and 2 well developed. Pereon consists of seven free distinct pereonites. Paired uniramous legs present on each pereonite pereopods. Coxae extending ventrally and laterally to overhang coxa-basis articulation of pereopod. Pereopods 1-3 similar, without spines. Pereopod 7 has somewhat long setae and spines. Pleon consists of five distinct pleonites. Pleotelson sub triangular in shape and consists from pleonite 6 which is fused with telson. Uropods reach apex of pleotelson. Exopodite margin convex, endopodite lateral margin nearly straight; both rami heavily spinosed with short spines.

Synonyms:

According to WoRMS (2014), two synonyms are known for this isopod. These are *Oniscus psora* Linnaeus, 1758 and *Aega emarginata* Leach, 1818.

Geographical distribution:

A. psora is widespread throughout the North Atlantic Ocean and has been found in the Baltic Sea, the North Sea and the Irish Sea (Kononenko, 2000). In the north-western Atlantic it is found between the Bay of Fundy and Cape Cod (Schotte, 2013). Also, it was reported from the Red Sea, Saudi Arabia (Bakhrebah, 2006) and the Egyptian coast of the Mediterranean Sea (Ramadan *et al.*, 2011). The coastal zone of the Red Sea of Yemen now represents a new distribution area.

2- *Natatolana insignis* Hobbins and Jones, 1993 (Figs. 2 & 3):

Material examined:

Examination of the collected fishes revealed that seven female specimens of *N. insignis* were detected from the gut of one *Abalistes stellatus* (Table 1). Length of the infected fish was 34.5 cm. and its weight was 415 gm.

Description:

Body surface smooth; without tubercles and setae, 8.0-11.0 (9.4) mm. in length x 2.7-3.8 (3.1) mm. in width. Cephalon with minute rostral process. All coxae with entire carinae; Pleonites 4; pleotelson shorter than pleon, lateral margin convex, posterior margin truncate. Frontal lamina narrow, elongated, anterior margin rounded, lateral margin straight. Peduncle articles 1 and 2 short; article 3 longest; flagellum 13 articled. Antenna 2 long. Pereopods 1-2 biunguiculate, pereopods 3-7 without accessory unguis. Penes absent. Uropod not extending to apex of pleotelson. Females lack the digitate processes on the articles of the antennal flagellum.

Geographical distribution:

N. insigins was recorded from the Red Sea and North West Indian Ocean (Hobbins and Jones, 1993). Northwards in the Indian Ocean to Pakistan, northern Arabian Sea; India: Bombay and Tranquebar; Thailand (Yasmeen, 2004); Japan; Philippine Islands; Indonesia; New Britain; Heron Island; Barrow Island (Yasmeen, 2003). *N. insignis* of the present study is reported here for the first time from fishes of the Yemeni coastal waters of the Red Sea.

3- *Excorallana tricornis* (Hansen, 1890) (Figs. 4 & 5):

Material examined:

Six female *E. tricornis* were collected from two *Epinephelus guttatus*, four females from two *E. tauvina* and two females from two *E. fuscoguttatus* (Table 1). Length and weight of the infected *E. guttatus* were 22-24 (23) cm. and 215-280 (247.5) gm., respectively, *E. tauvina* 21.3-27 (24.6) cm. and 198-320 (276) gm., respectively and *E. fuscoguttatus* 20.5-24 (22.4) cm. and 190-295 (257.7) gm.

Description:

Body elongate; smooth, 7-10 (8) mm. long x 1.6-3.2 (2.5) mm. wide. Dorsum of pleotelson with a pair of elongate setiferous areas. Lateral incisions of pleotelson fringed with hairs. The head is concave above. The abdomen is about as long as the width of the body. The first four segments are sub equal; the fifth a little longer and narrower; all with small tubercles on posterior margin; third, fourth and fifth segments with a median dorsal depression. Telson triangular, abruptly narrower behind attachment of uropods, the middle of the lateral margin incised. Tip of telson with four spines; Antenna 1 extending well beyond posterior margin of cephalon; First antennae about as long as peduncle of second antenna. Flagellum of second antennse about 1.5 times as long as peduncle. Uropods extending beyond end of telson.

Synonyms:

According to WoRMS (2014), *E. tricornis* has one synonym which is *Corallana tricornis* (Hansen, 1890). *E. tricornis* has two subspecies: *Excorallana tricornis occidentalis* Richardson, 1905 and *Excorallana tricornis tricornis* (Hansen, 1890).

Geographical Distribution:

Gulf of Mexico (Pearse, 1952), Puerto Rico (Kensley and Schotte, 1989; Rios, 2008), Colombia (Williams *et al.*, 1994) and Cayman Islands (Semmens *et al*., 2006). So, the coastal zone of the Red Sea of Yemen now represents a new distribution area for this isopod.

4- *Alcirona krebsii* Hansen, 1890 (Fig. 6):

Material examined:

Two female specimens of *A. krebsii* were collected from two *E. microdon*. Length of the infected fishes was 22.5 and 23.8 cm. and their weight 210 and 239 gm., respectively.

Description:

Body often with dorsal setae or tubercles, 14-15 (14.5) mm. long x 6.5-8 (7.25) mm. wide. Antennules peduncle 2- articulate; basal article of peduncle narrow, not expanded. Frontal lamina narrow, pentagonal; clypeus large, crescent-shaped or sub triangular; labrum small, width twice length. Mandible with short incisor, molar process and lacinia small or absent. Maxillule lateral lobe apex with two large falcate spines; medial lobe apex simple, blunt. Maxilla 2-articulate, rounded lobe. Maxilliped without endite; maxilliped basis not elongate; palp always 5-articulate, middle article not elongate. Anterior pereopods often with serrate dactyli and propodi.

Synonyms:

Alcirona insularis Hansen, 1890, *A. hirsute* Moore, 1902 and *A. malvadensis* Stebbing, 1904 are synonyms of *A. krebsii* Hansen, 1890, but according to Delaney (1989) *Alcirona krebsii* might well represent a species complex in need of a thorough revision.

Geographical distribution:

A. krebsii is apparently a circum tropical species, occurring in the Pacific, Indian, and Atlantic oceans. This widespread and variable isopod may represent a species complex (Delaney, 1984), but this isopod may possess little if any host specificity (Bunkley-Williams and Williams, 1998). According to Schotte *et al.* (2009), the overall geographical range of *A. krebsii* includes Florida Keys, Bermuda, Yucatan and the Caribbean. *A. krebsii* is common in the Caribbean and Gulf of Mexico and has been previously found in Bermuda, the Florida Keys, the Yucatan Peninsula, U.S. Virgin Island and Venezuela (Levy *et al.*, 1989). So, the coastal zone of the Red Sea of Yemen now represents a new distribution area for this isopod.

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Table (1): List of fishes from the Yemeni waters of the Red Sea examined for isopods.

Fish families and species	No. fishes examined	Range and (mean) of fish length (cm.)
Carangidae		
Carangoides bajad (Forsskål, 1775)	33	24.5-33.0 (26.5)
Caranx fulvoguttatus (Forsskål, 1775)	10	19.0-30.0 (25.0)
Caranx sexfasciatus Quoy & Gaimard, 1825	25	22.0-28.5 (24.0)
Serranidae		
Epinephelus fuscoguttatus (Forsskål, 1775)	30	18.0-27.5 (24.3)
Epinephelus guttatus (Linnaeus, 1758)	20	22.5-26.9 (24.2)
Epinephelus polyphekadion (Bleeker, 1849)	27	17.8-25.5 (23.0)
Epinephelus tauvina (Forsskål, 1775)	29	21.0-29.0 (25.0)
Lutjanidae		
Lutjanus argentimaculatus (Forsskål, 1775)	21	23.5-31.9 (28.8)
Lutjanus bohar (Forsskål, 1775)	22	16.5-24.8 (22.8)
Lutjanus gibbus (Forsskål, 1775)	23	19.7-26.5 (23.3)
Haemulidae		
Pomadasys argenteus (Forsskål, 1775)	25	24.8-30.4 (27.9)
Pomadasys commersonnii (Lacepède, 1801)	25	20.8-28.2 (25.4)
Pomadasys multimaculatum (Playfair, 1867)	17	21.5-27.3 (25.9)
Lethrinidae		
Lethrinus lentjan (Lacepède, 1802)	30	25.7-34.6 (29.3)
Lethrinus mahsena (Forsskål, 1775)	20	22.6-27.5 (26.2)
Lethrinus nebulosus (Forsskål, 1775)	20	23.9-29.4 (27.8)
Lethrinus olivaceus Valenciennes, 1830	15	19.5-28.3 (25.7)
Sphyraenidae		
Sphyraena barracuda (Edwards, 1771)	25	35.5-44.4 (39.6)
Sphyraena flavicauda Rüppell, 1838	20	32.8-39.0 (34.0)
Sphyraena jello Cuvier, 1829	20	30.5-38.5 (35.7)
Mugilidae		
Chelon macrolepis (Smith, 1846)	9	17.8-26.5 (24.5)
Liza aurata (Risso, 1810)	13	21.4-28.5 (25.8)
Moolgarda seheli (Forsskål, 1775)	24	24.0-29.4 (27.4)
Balistidae		
Abalistes stellatus (Anonymous, 1798)	17	25.7-40.0 (38.5)

Ariidae		
Netuma thalassina (Rüppell, 1837)	20	30.0-36.5 (33.7)
Plicofollis dussumieri (Valenciennes, 1840)	20	32.0-37.5 (33.0)
Scombridae		
Gymnosarda unicolor (Rüppell, 1836)	10	37.0-42.5 (40.6)
Rastrelliger kanagurta (Cuvier, 1816)	30	16.5-24.5 (18.7)
Scomberomorus commerson (Lacepède, 1800)	25	35.5-47.5 (41.8)
Scomberomorus guttatus (Bloch & Schneider, 1801)	25	34.8-42.6 (39.0)
Thunnus tonggol (Bleeker, 1851)	30	45.5-56.7 (49.3)

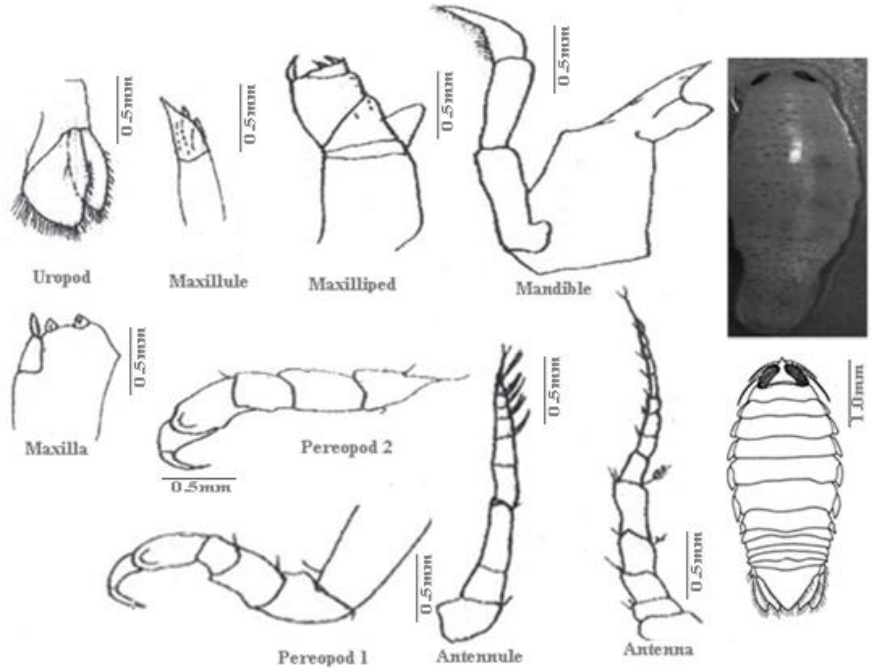

Fig. (1): Photograph and camera Lucida drawings of *Aega psora* from Red Sea fishes, Yemen coast.

Fig. (2): Photographs of *Natatolana insignis* from Red Sea fishes, Yemen coast.

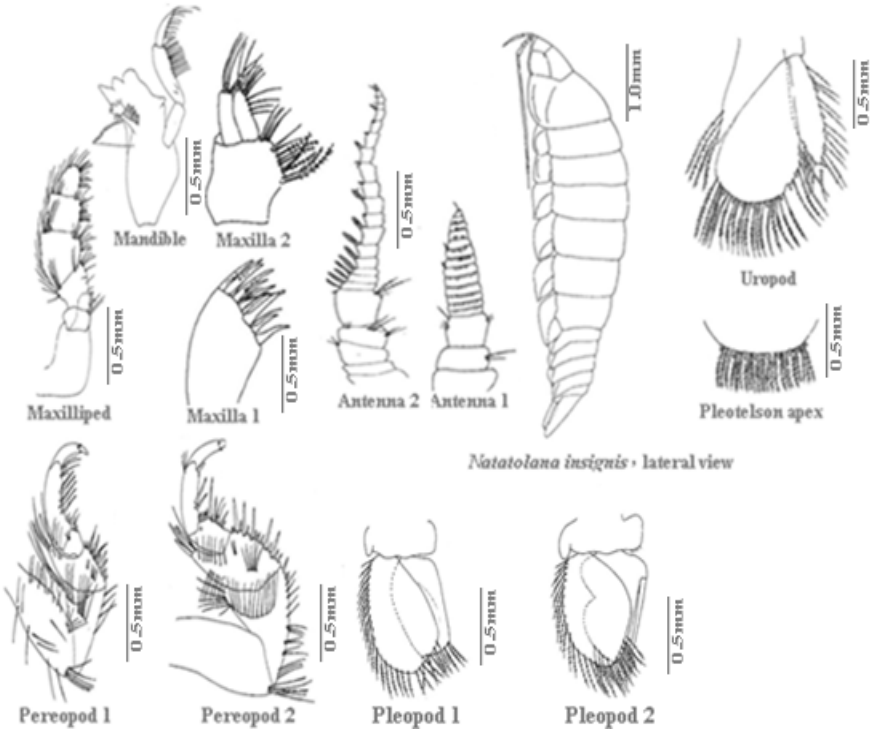

Fig. (3): Camera Lucida drawings of *Natatolana insignis* from Red Sea fishes, Yemen coast.

Fig. (4): Photographs of *Excorallana tricornis* from Red Sea fishes, Yemen coast.

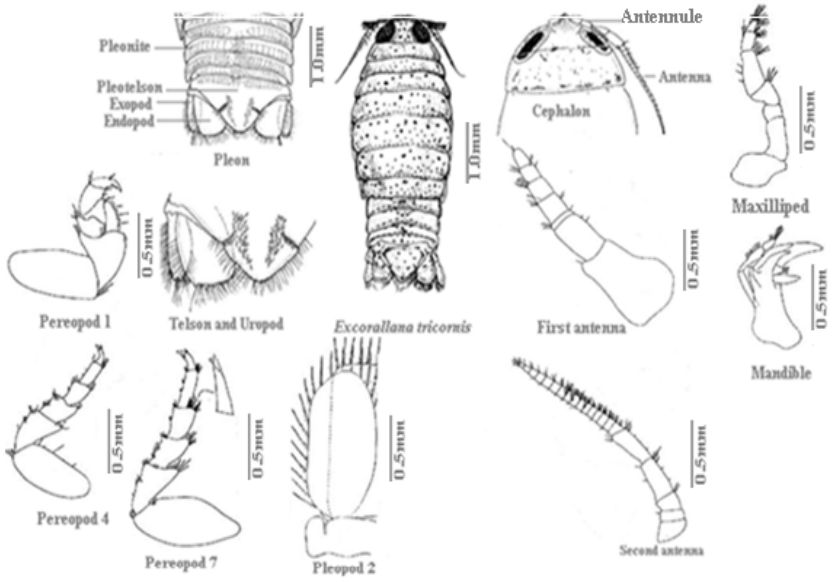

Fig. (5): Camera Lucida drawings of *Excorallana tricornis* from Red Sea fishes, Yemen coast.

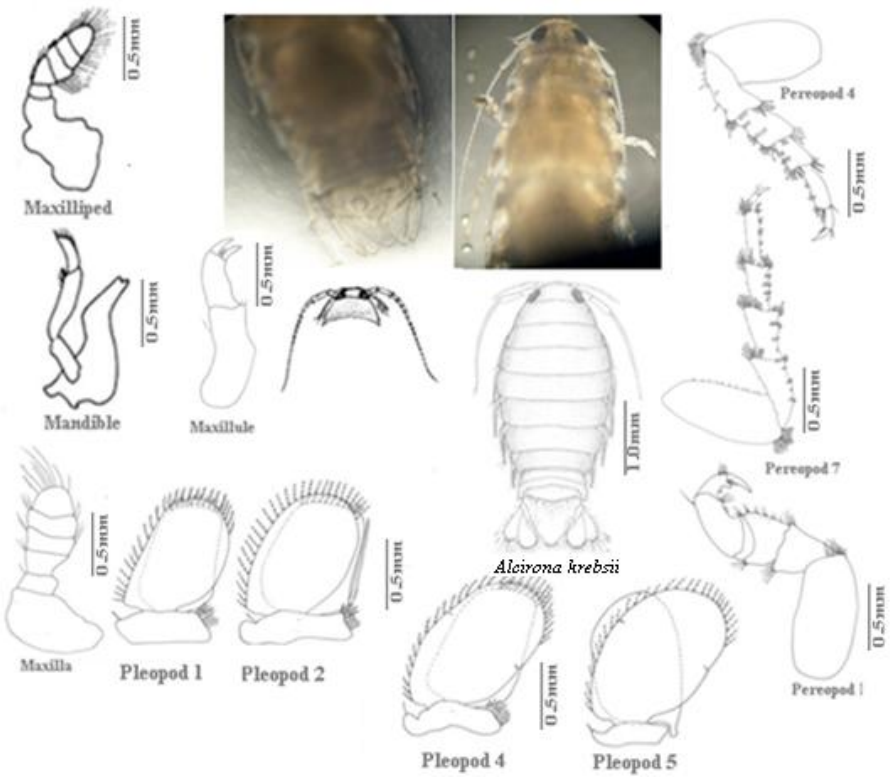

Fig. (6): Photographs and camera Lucida drawings of *Alcirona krebsii* from Red Sea fishes, Yemen coast.

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أول تسجيل لأربعة أنواع من القشريات متشابهة الأقدام من بعض أسماك البحر الأحمر، المياه الساحلية اليمنية

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الخلاصة

تم فحص مامجموعه 680 نموذجا من الأسماك العائدة لـ 31 نوعا من المياه الساحلية اليمنية للبحر الأحمر لغرض دراسة الإصابات بالقشريات متشابهة الأقدام. تم تشخيص أربعة أنواع من تلك القشريات تعود لثلاث عوائل من تحت رتبة سيموثويدا Cymothoida. وهذه الأنواع هي: *Aega psora* (Linnaeus, 1758) من سمكة *Lethrinus lentjan*، النوع *Natatolana insignis* Hobbins and Jones, 1993 من سمكة *Abalistes stellatus*، والنوع *Excorallana tricornis* (Hansen, 1890) من سمكة *Epinepheles fuscoguttatus*وسمكة *E. guttatus* وسمكة *E. tauvina* والنوع *Alcirona krebsi* Hansen, 1890 من سمكة *Epinephelus microdon*. كل هذه الأنواع من متشابهة الأقدام سجلت هنا لأول مرة من المياه الساحلية اليمنية للبحر الأحمر.