Marine Science Center-University of Basrah

Mesopotamian Journal of Marine Sciences
Print ISSN: 2073-6428
E- ISSN: 2708-6097
www.mjms.uobasrah.edu.iq/index.php/mms

Octocoral *Euplexaura* sp. from the Breakwater of Al-Faw Grand Port, Iraqi Marine Waters

iD Huda K. Ahmed[1] , iD Aqeel A.A. Al-Waily[1] , iD Malik H. Ali[1] , iD Hanaa H. Mohammed[*2]

1-Department of Marine Biology/ Marine Science Center/University of Basrah, Basra – Iraq
2-Department of Biological Evolution of Shatt Al-Arab and N W Arabian Gulf/ Marine Science Center/ University of Basrah, Basra- Iraq
[*]Corresponding Author: *e-mail: hanaa.mohammed@uobasrah.edu.iq*

Article info.
- ✓ *Received: 14 December 2025*
- ✓ *Accepted: 3 May 2026*
- ✓ *Published: 29 June2026*

Key Words:
Al-Faw breakwater
Euplexaura
Euplexauridae
Iraq
Octocorallia

Abstract - The octocoral species *Euplexaura* sp. was recorded for the first time during a survey of benthic invertebrates conducted in 2022 from the northwest Arabian Gulf at the eastern breakwater of Al-Faw Grand Port in the Iraqi marine waters. Two branching colonies and one young colony, all attached to the remains of an iron support, at the intertidal zone. The branches were cylindrical. The specimen was recognizing from colony's branching structures and other intricate identification characteristic of sclerites such as the polyp and coenenchyma, both in surface and interior layers.

المرجان الثماني .*Euplexaura* sp من كاسر الأمواج في ميناء الفاو الكبير، المياه البحرية العراقية

هدى كاظم احمد[1] ، عقيل عبد الصاحب الوائلي[1] ، مالك حسن علي[1] ، هناء حسين محمد[2]
1- قسم الاحياء البحرية، مركز علوم البحار، جامعة البصرة، البصرة – العراق
2- قسم التطور الاحيائي، مركز علوم البحار، جامعة البصرة، البصرة – العراق

المستخلص - سجل تواجد المرجان الثماني .Euplexaura sp لأول مرة خلال مسح للافقاريات القاعية اجري في عام 2022 شمال غرب الخليج، عند كاسر الأمواج الشرقي في ميناء الفاو الكبير في المياه البحرية العراقية. عثر على مستعمرتين متفرعتين وأخرى فتية غير متفرعة، ملتصقين جميعا بأنقاض ركيزة حديدية، عند منطقة المد والجزروجرى تمييز نموذج هذا النوع اعتمادا على الهيكل المتفرع للمستعمرة والصفات التشخيصية الدقيقة للخلايا الصلبة في البوليب والنسيج المشترك.

الكلمات المفتاحية: كاسر امواج ميناء الفاو، *Euplexaura* ، Euplexauridae ، العراق ، المرجا ن الثماني.

Introduction

Octocorals are sessile organisms, mostly in colonies, belonging to the subphylum Anthozoa within the phylum Cnidaria. They comprise more than 3600 recorded species, primarily non-hard corals (such as soft corals, sea fans, and sea pens), distributed across more than 75 families (McFadden *et al.,* 2022, 2024). This group is widespread, found from shallow coastal areas to the deep sea and in all marine ecosystems (Pérez *et al.,* 2016), from the Arctic to the Southern Ocean (Fabricius and Alderslade, 2001; Samimi-Namin and Van Ofwegen, 2012; Haverkort-Yeh *et al.,* 2013), and occurring on both soft and hard substrates (Ruppert *et al.*, 1994; Bryce *et al.*, 2018. The western Indo-Pacific region is home to the richest and most diverse coral population in the world (Fabricius and Alderslade, 2001).

DOI:https://doi.org/10.58629/mjms.v41i1.426 ,

Octocorallia contribute significantly to the biodiversity and functions of many coral-dominated marine ecosystems, they perform vital ecosystem functions and provide invaluable services to human societies. They can be key species that form complex, three-dimensional habitats and serve as homes, refuges, and breeding sites for many associated organisms, which in turn contribute to increased biodiversity (Baillon *et al.,* 2012; de Pádua *et al.,* 2022). Octocorals often host a conspicuous and important organism, including sponges, mollusks, annelids, echinoderms, and fish (Reijnen *et al.*, 2011).

The defining characteristic of octocorals polyps have eight pinnate tentacles, which distinguishes them from hexacorals (Scleractinia) polyps typically have six non-pinnate tentacles. Their bodies lack a hard skeleton; instead, many taxa have an internal central axis. The axes are primarily composed of gorgonin, a hard, horn-like protein material that is often calcified to varying degrees. Their skeletons tend to consist numerous microscopic structures made of calcium carbonate called sclerites (Samimi Namin and Van Ofwegen, 2012; Conci *et al.,* 2021; Quattrini *et al.,* 2020).

The Arabian Gulf is one of the most important sea basins near the Indo-Pacific region, distinguished by its unique biodiversity, and despite being one of the harshest bodies waters in the world (Coles and Fadlallah *et al.,* 1991; Sheppard *et al.,* 1992; Bouwmeester *et al.,* 2021; Burt *et al.,* 2008), this did not prevent coral reefs from growing and adapting in this harsh environment (Coles and Fadlallah, 1991; Coles, 2003). The Arabian Gulf coral reef organisms have adapted to this climate regime for more than 6000 years and that many of the world's most crucial ocean lessons can be learned from study of this system (Riegl and Purkis, 2012; Shahbazi *et al.,* 2021).

Several studies have documented the diversity and thriving of the octocoral species in the Arabian Gulf, more than 19 genera within nine families of octacorals have been described from the Arabian Gulf to date (Samimi-Namin and Van Ofwegen, 2009, 2012). However, the rarity environmental studies may be attributed to the difficulty in identifying species in this region, which discourages many researchers not interested in studying them (Shahbazi *et al.,* 2021). Thomson and Simpson (1909) were the first taxonomy of the octocoral in Arabian Gulf, they reporting five species found in the region. Then Stiasny (1940) described materials from the Octocorallia group, but part of these was re-examined in the study of Samimi-Namin and Van Ofwegen (2012).

Despite their limited number, taxonomic studies of the octocorals in the Arabian Gulf have continued. Burchard (1979), during his survey of marine fauna, noted the presence of numerous soft corals, reporting five species in the western part of the Gulf. Sheppard *et al.,* (1992) noted the common belief that soft corals did not occur in the Arabian Gulf, but reported the presence of some in Musandam. Rezai *et al.,* (1995) also reported on the presence. Two coral species, *Sarcophyton* sp. and *Dendronephthya* sp., were found on the islands of Larak and Lesser Tunb. Rezai (2004) reported the presence of a coral species, *Subergorgia suberosa*, on Lesser Tunb Island. So far, more than 19 genera within nine families of octacorals have been described from the Arabian Gulf (Samimi-Namin and Van Ofwegen, 2009, 2012).

Euplexaura Verrill, 1869 (Octocorallia: Euplexauridae) is a genus that has been reclassified into the new family Euplexauridae (McFadden *et al.,* 2022). Previously, it belonged to the family Plexauridae (Kükenthal, 1919; Bayer, 1956), a family whose genera are now recognized as belonging to five distinct evolutionary groups. While the colony growth form and thick branches of *Euplexaura* are similar to some genera within Plexauridae, McFadden *et al.,* (2022), demonstrated that coenenchymal sclerites differ from those found in other genera within Plexauridae and are not evolutionarily related, based on Phylogenetic and phylogenomic

analyses. This genus is distributed in the tropical and subtropical waters of the Indian and Pacific Oceans, at varying depths in clear and turbid waters (Fabricius and Alderslade, 2001).

According to Namin and Van Ofwegen (2009) *Euplexaura* is the most common genera in the Arabian Gulf they reported the presence of four species: *Euplexaura* plana, E. rhipidalis, E. sp. a, and E. sp. b, in different areas from north Arabian Gulf. Shahbazi *et al.,* (2021) identified two species, one in the Lark Island and the other from Hengam Island.

The Iraqi marine waters constitute Iraq's only outlet to the Arabian Gulf and represent as unique of the waters of northwestern Arabian Gulf. Pohl *et al.,* (2014) reported the discovery of unique living coral reefs in Iraqi marine waters, are a unique ecosystem, somewhat different from the rest of the Arabian Gulf due to the impact of the Shatt Al-Arab estuary. The estuary receives sediment-laden and nutrient-rich waters, including oil-polluted waters, and is characterized by increased turbidity (Downing, 1985; Iseave and Milkhailova, 2009; Pohl *et al.,* 2014). Furthermore, it is characterized by high salinity, temperatures and turbidity. The coastline of Iraq is approximately 58 km and an area of 700 km², these waters represent a significant gap in a vital yet largely neglected region that remains understudied Exactly with regard to the species of coral reefs. The aim of this study is to document the first record of the octocoral belonging to the genus *Euplexaura* from the north west Arabian Gulf at the eastern breakwater of the Grand Faw Port in Iraqi marine waters.

Materials and Methods

Study Area

The study area is located at surrounding the newly constructed breakwater at Al-Faw Grand Port on the eastern side of Al-Faw Peninsula, south of Basrah, Iraq 29.77 22 N, 48.58 26 E, (Fig. 1). It covers a total area of 54 km² and has a depth of 19 m. The design includes two breakwaters: the eastern breakwater, is 8 km long, and the western breakwater, is 16 km long.

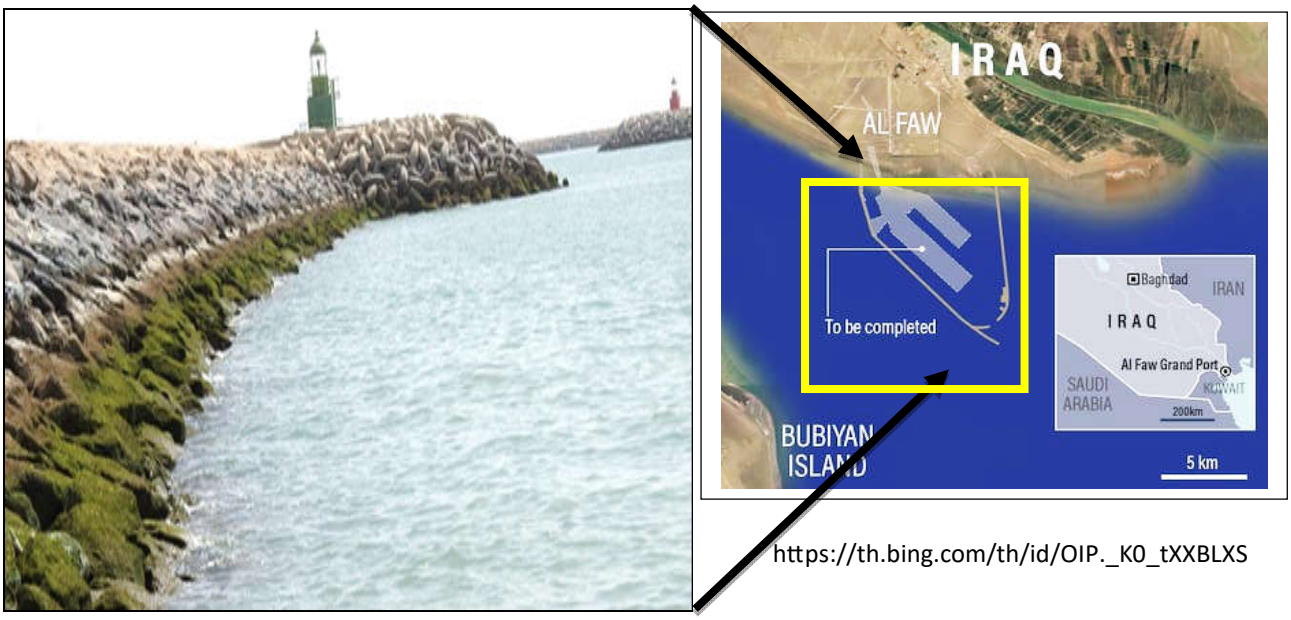

Figure 1. Site of soft coral sampling in the eastern breakwater in Al-Faw grand Port, South of Iraq.

Sample Collection

Two octocorals colonies and a third small colony, were attached to the remains of a hard iron cattail (Figure 2 a). It was found on the rocks of the eastern breakwater in the Grand Faw Port, within the intertidal zone between November 2021 and March 2022. The colonies preserved in 75% ethanol. Water temperatures ranged from 16.0 °C to 33.0 °C, while salinity levels varied between 39.6 and 44.0 psu

Identification of specimens

The specimens were identified using morphological characteristics of the colony and sclerites. The sclerites were extracted by 10% sodium hypochlorite and examined under Wild stereo dissecting microscope and the images of sclerites were taken by the light microscope (Zeiss), with camera (Axio Cam iCc3). To determine the species, taxonomic comparisons were performed using authoritative references for Octocorallia (Grasshoff 2000; Fabricius and Alderslade 2001; Samimi-Namin and Van Ofwegen, 2009, 2012; McFadden *et al.*, 2022). The genus identification was also confirmed by Dr. K. Samimi-Namin at the Naturalis Biodiversity Centre in Leiden.

One of the three colonies is deposited in the National Museum of Natural History, formerly Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands (RMNH), the other specimens were deposited under No. 233 in the marine biology laboratory and museum, Marine Science Center, University of Basrah.

Results:

Phylum: Cnidaria (Hatschek, 1888)

Subphylum: Anthozoa (Ehrenberg, 1834)

Class: Octocorallia (Haeckel, 1866)

Order: Malacalcyonacea (McFadden, Van Ofwegen and Quattrini, 2022)

Family: Euplexauridae (McFadden, Van Ofwegen and Quattrini, 202٤) (new Fam.)

Genus: *Euplexaura* Verrill, 1869

Euplexaura sp.

Materials: RMNH Coel. 40001, colony fragment, 29.77 22 N, 48.58 26 E, at the intertidal zone of eastern breakwater of Al-Faw. 2022

Another colony deposited MSC no. 233 in the marine biology laboratory Marine Science Center, University of Basrah.

Description of RMNH Coel. 40001. The colony was 8.8 cm high, 4.6 cm width and 4mm. base dimeter for both colonies

The MSC, no. 233. The colony was 8.5 cm high and 4.5 cm width. They were characterized by cylindrical branches, with irregular swellings along the branches and at the tips (Fig. 2a, b, c).

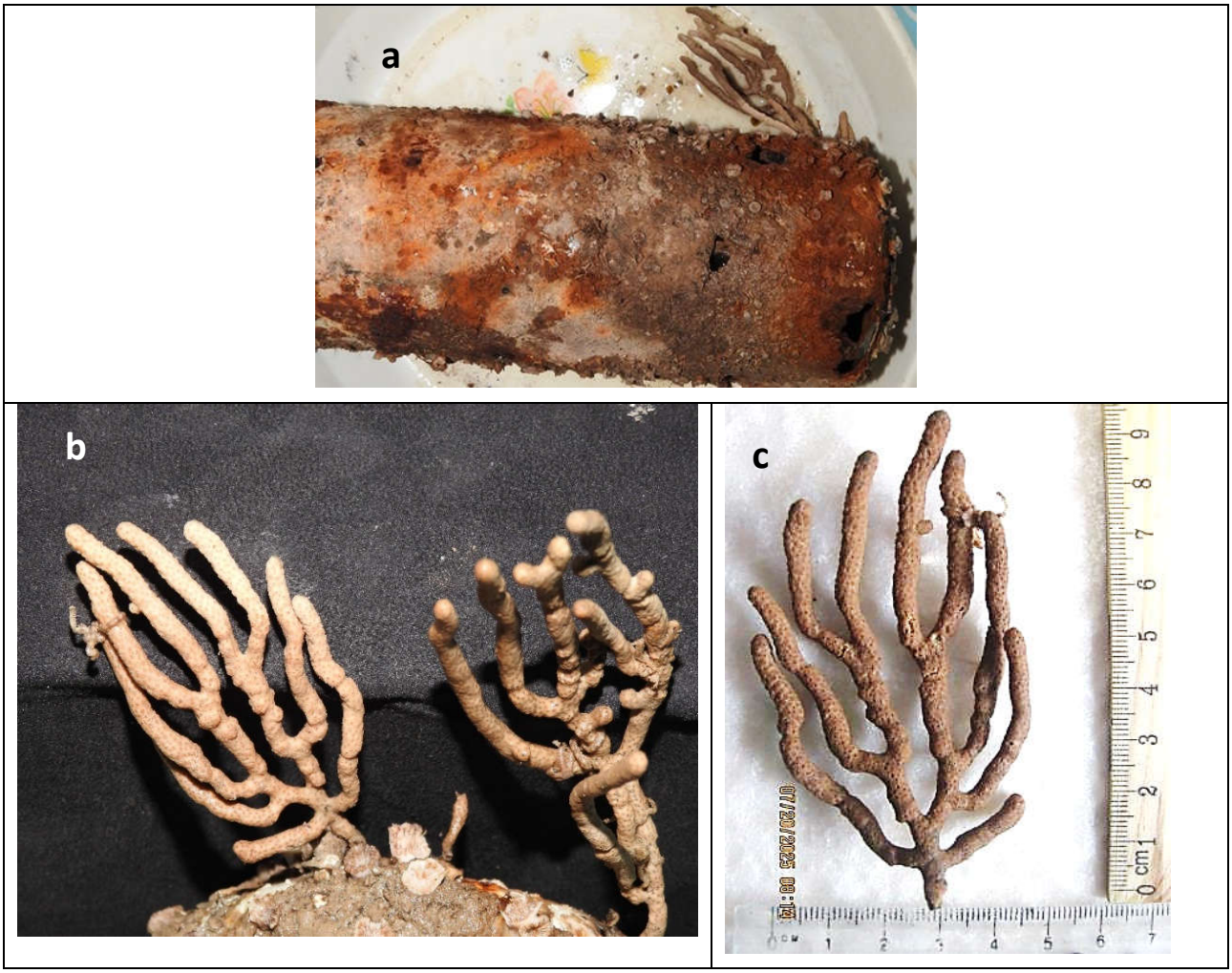

Figure 2. **a**, Colonies of *Euplexaura* sp. attached to the remains of a hard iron cattail; **b,** Three colonies attached; **c**, MSC, no 233

The calyces are low, evenly distributed along the branches and the colony's axis. The polyps is monomorphic, retractable and the tentacles having flat and relative smooth rods of up to 0.08 mm (Figure 3 b), and points with flattened spindles, up to 0.24 mm long (Figure 3 a), a collaret not present.

The surface layer of coenenchyme has blunt ellipsoids and spindles, up to 0.27 mm, with complex tubercles (Fig. 4). The interior (subsurface layer) has spindles and small rods up to 0.12 mm long (Fig 5). Several brittle stars were attached to the colony (Fig.2 b,c).

Colour: The two live colonies were pink, and in preservation they were grey and brown. The sclerites were pale and colorless.

Remarks: Moreover, this species distinguished from *E. plana* and *E. rhipidalis*, by having cylindrical branches. It differs from other *Euplexaura* described in the Arabian Gulf, in presenting the tentacles small rods, and swellings in some areas of the colony's branches and their tips. In general, it has relatively smaller sclerites.

Discussion:

The increased sedimentation due to Shatt al-Arab estuary, a characteristic feature of Iraqi marine waters, is a significant factor in altering the composition of the coast and seabed. This affects the environment of the region, where reduces the availability of solid substrates for coral polyps to grow on. Consequently, coral in this area appears sparse and scattered, suggesting its discovery was in chance (see Pohl *et al*., 2014)

The recent construction of the two massive breakwaters for the Grand Faw Port, and their rocks, have facilitated the extensive colonization of the solitary hard coral *Paracyathus stokesii* (Ahmed *et al.,* 2023). Researchers have also recently recorded observations growth of the sea-fan colonies on the breakwater rocks (Mohammed *et al.* in press).

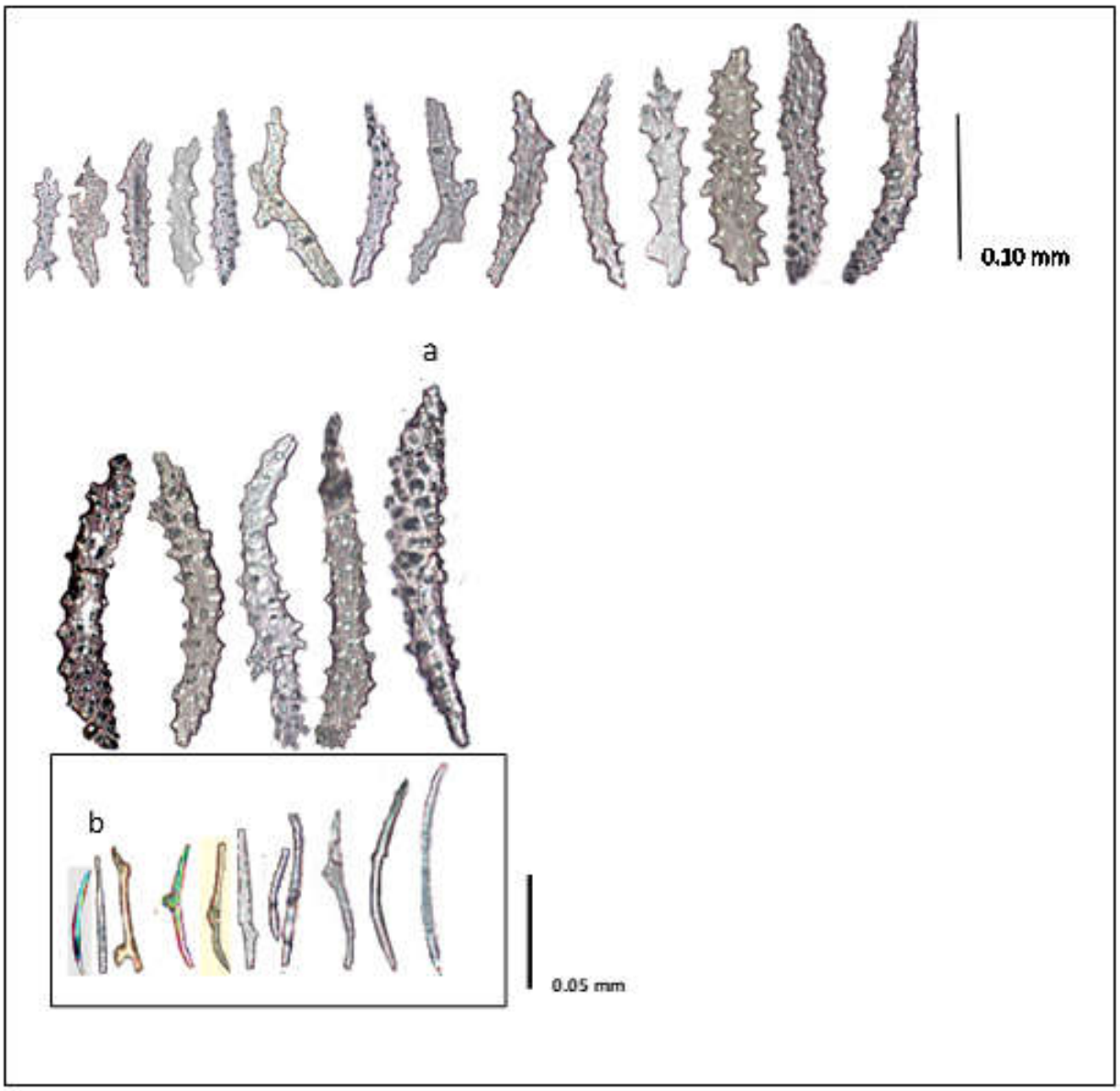

Figure 3. *Euplexaura* sp. from northwest Arabian Gulf. a, point spindles; b, tentacle sclerites.

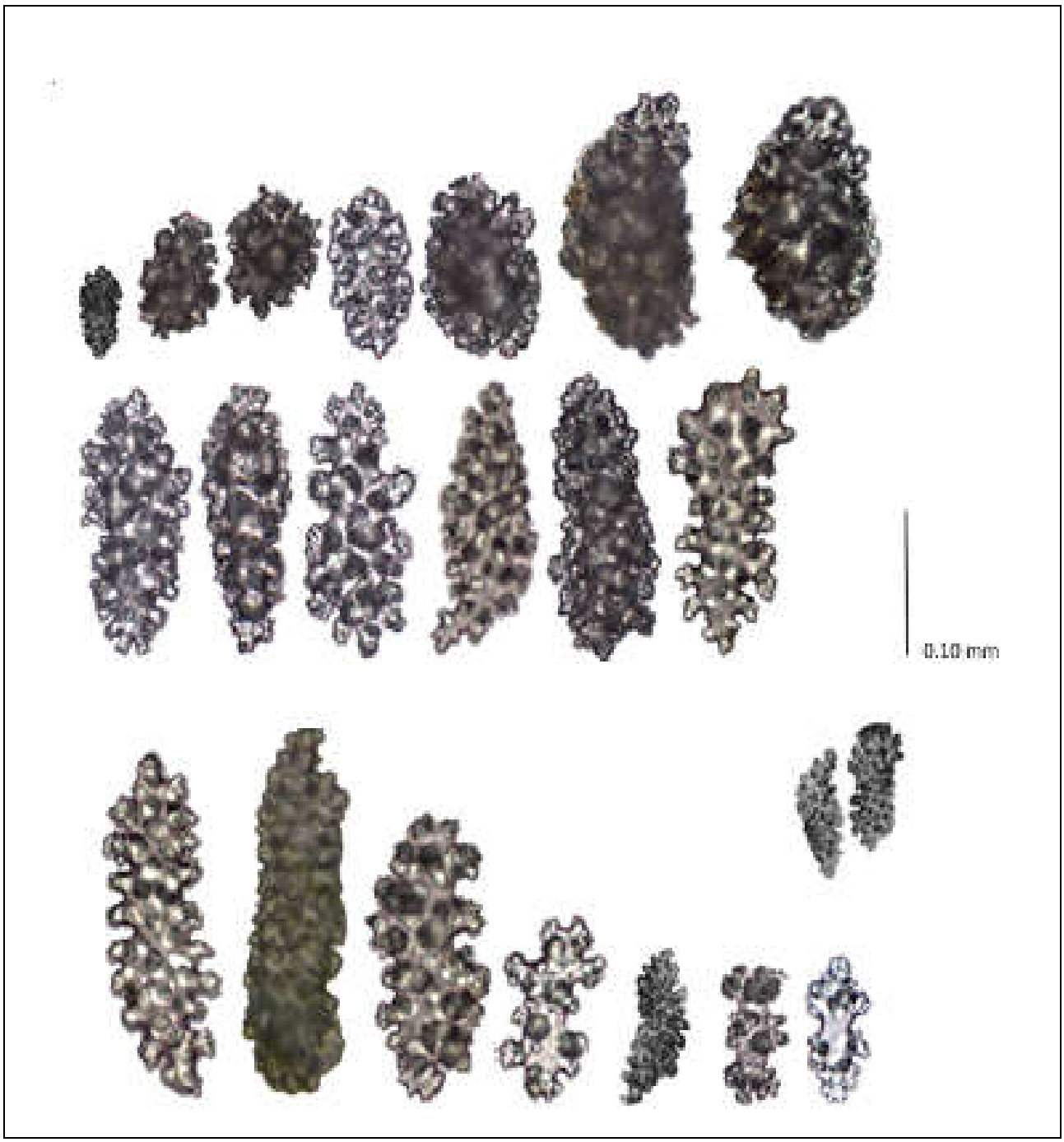

Figure 4. *Euplexaura* sp. from northwest Arabian Gulf, shows the ellipsoids and spindles of surface layer.

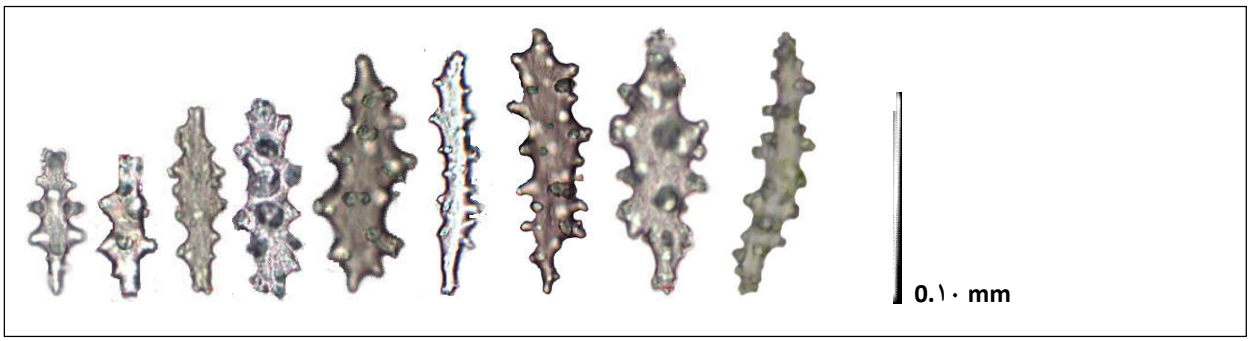

Figure 5. *Euplexaura* sp. from northwest Arabian Gulf, shows spindles of the subsurface layer

Samimi-Namin and Van Ofwegen (2012) also showed that the octocorals are the most abundant animals' component on steep or vertical rock walls.

Most studies that have dealt with the biodiversity of coral reefs in the Arabian Gulf have focused on the order Scleractinia (Rosen, 1971; Basson, 1977; Burchard, 1979; Sheppard and Sheppard, 1991; Fadlallah *et al*., 1993; Carpenter *et al.,* 1997; Riegl, 1999; Rezai *et al.,* 2010; Riegl *et al.,* 2012; Samiei *et al.,* 2013; Alidoost-Salimi *et al.,* 2018;) and other hexacorals (Koupaei et al., 2014, 2016; Darvishi *et al.,* 2018). whereas, few studies have been conducted on the order Octocorallia (Samimi-Namin and Van Ofwegen, 2009; Shahbazi *et al.,* 2019). The reason may be due to the difficulty in species identification, which makes many researchers uninterested in studying them as a result of the differences in sclerites' appearance in colonies and even within the same species (Shahbazi *et al.,* 2021).

The genus *Euplexaura* is widespread in the Indo-Pacific Ocean, has been recorded in shallow and deep waters exceeding 100 meters (Fabricius and Alderslade, 2001; Matsumoto and Van Ofwegen, 2016). And it appears to be one of the most common genera in the Arabian Gulf (Samimi-Namin and Van Ofwegen, 2009).

The present study revealed, for the first time, the presence of the genus *Euplexaura* in the intertidal zone. It appears that water currents and waves are the most impact factors determining its abundance and distribution. It seems to tolerate high turbidity and exposure to high temperatures similar to air temperatures during low tide.

The presence of three *Euplexaura* colonies in good health is clear evidence that this region is suitable for the growth of more octocoral colonies, especially given the solid substrates provided by thousands of breakwater rocks. It is certain that this region will witness a high density of colonization of this species and perhaps other species in the future.

This study contributed to expanding the distribution range of the genus *Euplexaura* in the Arabian Gulf and in an area with harsh and extreme conditions, such as Iraqi marine waters. The identification of octocorals is often based on colony morphology and sclerites characteristics (Bayer 1961). These characteristics are essential for determining genus and species (Kükenthal, 1919; Madsen, 1944; Bayer, 1981; Daly *et al.,* 2007).

Although molecular studies have significantly improved the accuracy of higher classifications, such as families and orders, the currently available molecular indicators often lack the sensitivity to distinguish between closely related genera and species. As a result, at finer taxonomic scales,

many morphologically similar taxa remain unresolved (Altuna and Poliseno, 2019; Enrichetti *et al.,* 2026).

There are some differences between the species under study and species of the genus *Euplexaura* recorded in the Arabian Gulf in previous studies, such as those by Samimi-Namin and Van Ofwegen (2009) and Shahbazi *et al.,* (2019, 2021). Grasshoff, (1999) confirmed that species of *Euplexaura* are distinguished only by differences in the size of the sclerites in combination with different growth forms (Samimi-Namin and Van Ofwegen, 2009). The results of this study indicate that the presence of tentacles sclerites (small rods) could be useful character to distinguish between *Euplexaura* species

Conclusions

This study documents the first record of genus *Euplexaura* in the northwestern Arabian Gulf, at the intertidal zone of the Grand Faw Port breakwater, affected by Shatt Al-Arab estuary sediments and characterized by turbid water. This species was identified based on the morphology of the sclerites of the polyp and coenenchyme, both in surface and interior layers. The species in this study appeared to be different from the species that have previously been recorded in the northern Arabian Gulf and off the Kuwait coast by Samimi-Namin and Van Ofwegen, (2009) and Shahbazi *et al.*, (2021), due to swellings in some areas of the colony's branches and their tips, and the tentacles having small rods that are usually flat and relatively smooth. Globally, because many octocoral genera urgently require taxonomic revision, the species historically identified as *Euplexaura* sp. cannot be accurately classified at present. All old specimens and their sequence data need to be thoroughly re-evaluated before these corals can be definitively identified.

Acknowledgements:

The authors are grateful to Dr. K. Samimi-Namin at Naturalis Biodiversity Center, Leiden for recording the colony in RM NH and confirmation the identification it to genus level. We appreciate and thankful to the General Company of Iraqi Ports and Al-Seraj Al-Mudee Compony for support and facilities during field trips to the Iraqi marine waters.

References:

Ahmed, H.K., Mohammed, H.H., Ahmed, A.R., Aqeel A. A. Al-Waeli, Abbas, M. F. and Ali, M. H. 2023. First record of the stony coral *Paracyathus stokesii* Edward and Haime. 1848 (Caryophylliidae) in the Eastren Breakwater of the New Al-Faw Grand Port, Basrah, Iraq. Journal Biological and Applied Environmental Research (BAER), 7 (1): 1-9.URL

Alidoost Salimi, P., Mostafavi, P.G., Chen CA, Fatemi, S.M.R. and Pichon M. 2018. The Scleractinia (Cnidaria: Anthozoa) of Abu-Musa and Sirri Islands, Persian Gulf. Zoological Studies, 57: 1-34. https://doi.org/10.6620/ZS.2018.57-56.

Altuna, A. and Poliseno, A. 2019. Taxonomy, genetics and biodiversity of mediterranean deep-sea corals and cold-water corals. In: Orejas C, Jiménez C (ed) Mediterranean cold-water corals: past, present and future. Coral Reefs of the World, Vol 9. Springer, Cham. https://doi.org/10.1007/978-3-319-91608-8_14.

Baillon, S., Hamel, J.F., Wareham, V.E. and Mercier, A. 2012. Deep cold-water corals as nurseries for fish larvae. Frontiers in Ecology and Evolution 10 (7): 351–356. https://doi.org/10.1890/120022.

Basson, P., Burchard, J.H., Hard, J.T. and Price, A. 1977. Biotopes of the western Arabian Gulf. Aramco Department of Loss Prevention and Environmental Affairs, Dharhan, Saudi Arabia, 284 pp.

Bayer, F.M. 1956. Octocorallia. In: Moore RC, editor. Treatise on invertebrate paleontology. Part F. Coelenterata. Lawrence (KS): U. Kansas Press; 166-231.

Bouwmeester, J., Riera, R., Range, P, Ben- Hamadou, R. And Samimi Namin, K. 2021. Coral and Reef Fish Communities in the Thermally Extreme Persian/Arabian Gulf: Insights into Potential Climate Change Effects, in Perspectives on the Marine Animal Forests of the World, S. Rossi and L. Bramanti، Editors., Springer International Publishing: Cham. p. 63-86. https://doi.org/10.1007/978-3-030-57054-5_3

Bryce, M., Radford, B. and Fabricius K. 2018. Soft coral and sea fan (Octocorallia) biodiversity and distribution from a multitaxon survey (2009–2014) of the shallow tropical Kimberley, Western Australia. Record of Western Australia Museum, 85: 45–73.

Burchard, J.E. 1979. Coral fauna of the Western Arabian Gulf. Arabian American Oil Co., Dhahran, 128pp.

Burt, J.; A. Bartholomew, and Usseglio, P. 2008. Recovery of corals a decade after bleaching in Dubai, United Arab Emirates. Marine Biology, 154: 27–36. https://doi.org/10.1007/s00227-007-0892-9.

Carpenter, K.E., Harrison, P.L., Hodgson, G., Alasaffar, A.H. and Alhazeem, S.H., 1997. The corals and coral reef fishes of Kuwait, Kuwait institute for scientific research. Environment public authority, P:166.

Coles, S.L. 2003. Coral species diversity and environmental factors in the Arabian Gulf and the Gulf of Oman: a comparison to the Indo-Pacific region. Atoll Research Bulletin 507: 1–19. https://repository.si.edu/server/api/core/bitstreams/c6cbf1ea-63bc-4aec-be93-4331ecc2b719/content

Coles, S.L. and Fadlallah, Y.H. 1991. Reef coral survival and mortality at low tempe-ratures in the Persian Gulf. new species-specific lower temperature limits. Coral Reefs 9: 231-237.

Conci, N. Vargas, S. and Wörheide, G. 2021. The biology and evolution of Calcite and Aragonite Mineralization in Octocorallia. Frontiers in Ecology and Evolution 9: 623774: 1–15. https://doi.org/10.3389/fevo.2021.623774.

Daly, M., Brugler, M.R., Cartwright, P., Collins, A.G., Dawson, M.N., Fautin, D.G., France, S.C., McFadden, C.S., Opresko, D.M. and Rodriguez, E. 2007. The phylum Cnidaria: A review of phylogenetic patterns and diversity 300 years after Linnaeus. Zootaxa.;1668: 127-182. https://doi.org/10.11646/zootaxa.1668.1.11.

de Pádua, S.M.F., Botter-Carvalho, M.L., Gomes, P.B., de Oliveira, C.S., dos Santos, J.C.P. and Pérez, C.D. 2022. The alien octocoral *Carijoa riisei* is a biogenic substrate multiplier in artificial Brazilian shipwrecks. Aquatic Ecology. 56: 183–200. https://doi.org/10.1007/s10452-021-09908-8 .

Downing, N. 1985. Coral reef communities in an extreme environment: the Northwest Arabian Gulf. Proceedings of the 5th international coral reef congress. Tahiti, pp. 343-348.

Enrichetti, F., Bavestrello, G. and Bo, M. 2026. Deep-sea octocorals from bathyal canyons and seamounts of the Ligurian Sea (NW Mediterranean Sea). Coral Reefs 45: 395–427. https://doi.org/10.1007/s00338-025-02744-4.

Fabricius, K. and Alderslade, P. 2001. Soft corals and sea fans: a comprehensive guide to the shallow-water genera of the Central-West Pacific, the Indian Ocean and the Red Sea. Australian Institute of Marine Science, URL.

Fadlallah, Y.H., Eakin, C.M., Allen, K.W., Estudillo, R.A., Rahim, S.A., Reaka-Kudla, M. and Earle, S.A. 1993. Reef coral distribution and reproduction, community structure and reef

health (Qatar, Bahrein, Saudi Arabia, Kuwait). Results of the Mt. Mitchell Cruise, May 1992. Final report of the workshop on scientific workshop results RV Mt Mitchell Cruise in ROPME Sea Area, Kuwait, Annex III, pp 1–27.

Grasshoff, M. 2000. The gorgonians of the Sinai coast and the Strait of Gubal, Red Sea (Coelenterata, Octocorallia). Courier Forsch Inst Senckenberg 224: 1–123.

Haverkort-Yeh, R.D., McFadden, C.S., Benayahu, Y., Berumen, M., Halász, A. and Toonen, R.J. 2013. A taxonomic survey of Saudi Arabian Red Sea octocorals (Cnidaria: Alcyonacea). Marine Biodiversity 43: 279–291. https://doi.org/10.1007/s12526-013-0157-4.

Isaev, V.A. and Mikhailova, M.V. 2009. The hydrography, evolution, and hydrological regime of the mouth area of the Shatt Al-Arab River. Water Resources, 36: 380–395. https://doi.org/10.1134/S0097807809040022.

Koupaei, A.N., Mostafavi, P.G., Mehrabadi, J.F. and Fatemi, S.M.R. 2014. Molecular diversity of coral reef-associated zoanthids off Qeshm Island, northern Persian Gulf. International Aquatic Research, 6: 64. https://doi.org/10.1007/s40071-014-0064-8.

Koupaei, A.N., Mostafavi, P.G., Mehrabadi, J.F., Fatemi, S.M.R. and Dehghani, H. 2016. Diversity of shallow water zoantharians in Hengam and Larak Islands, in the Persian Gulf. Journal of the Marine Biological Association of the United Kingdom 96: 1145–1155.

Kükenthal, W. 1919. Gorgonaria. Wiss Ergebn Deutsch Tiefsee-Exped "Valdivia" 1898–1899 13: 1–946, pls 30–89.

Madsen, F.J. 1944. Octocorallia (Stolonifera – Telestacea - Xeniidea - Alcyonacea - Gorgonacea). Danish Ingolf-Expedition, V. Bianco Luno A/S. 5 (13): 1-65.

Matsumoto, A.K. and van Ofwegen, L.P. 2016. Species of *Elasmogorgia* and *Euplexaura* (Cnidaria, Octocorallia) from Japan with a discussion about the genus *Filigella*. Zookeys. (589): 1-21. https://doi.org/10.3897/zookeys.589.8361

McFadden, C.S., Ofwegen, L.P. and Quattrini, A.M. 2022. Revisionary systematics of Octocorallia (Cnidaria: Anthozoa) guided by phylogenomics. Bulletin of the Society of Systematic Biologistis, 1 (3): 8735. https://doi.org/10.18061/bssb.v1i3.8735.

McFadden, C.S., Cordeiro, R., Samimi-Namin, K., Williams, G. and Van Ofwegen, L. 2025. World List of Octocorallia. *Euplexaura* Verrill, 1869. Accessed through: World Register of Marine Species. URL.

Pérez, C.D., de Moura Neves, B., Cordeiro, R. T., Williams, G. C. and Cairns, S.D. 2016. Diversity and distribution of Octocorallia. in The Cnidaria, Past, Present and Future: The World of Medusa and Her Sisters, eds. S. Goffredo and Z. Dubinsky (Cham: Springer International Publishing), 109–123.

Pohl, T., Al-Muqdadi, S.W., Ali, M.H., Fawzi, N.A., Ehrlich, H. and Merkel, B. 2014. Discovery of a living coral reef in the coastal waters of Iraq. Science Report, 6: 4.4250: 4 pp. https://doi.org/10.1038/serp04250.

Quattrini, A.M., Rodríguez, E., Faircloth, B.C., Cowman, P.F., Brugler M.R., Farfan G.A., Hellberg, M.E., Kitahara, M.V., Morrison, C.L., Paz-García, D.A., Reimer, J.D. and McFadden, C.S. 2020. Palaeoclimate ocean conditions shaped the evolution of corals and their skeletons through deep time. Nature Ecology and Evolution, 4: 1531–1538.

Reijnen, B.T., Van der, M.S. and Van Ofwegen, L.P. 2011. Fish, fans and hydroids: host species of *pygmy seahorses*. ZooKeys 103: 1–26.

Rezai, H. 1995. Observation of some corals in shallow waters of several remote Iranian islands in the Persian Gulf. Abzeeyan, 7: 4-11.

Rezai, H., Wilson, S., Claereboudt, M. and Riegl, B. 2004. Coral reef status in the ROPME Sea Area: Arabian/ Persian Gulf, Gulf of Oman and Arabian Sea. In: Wilkinson, C. (ed.). Status of

coral reefs of the world Australian Institute of Marine Science, Australia, Queensland, Townsville: 155-170. https:// nsuworks.nova.edu/occ.fac.reports/45.

Rezai, H., Samimi, K., Kabiri, K., Kamrani, E., Jalili, M. and Mokhtari, M. 2010. Distribution and abundance of the corals around Hengam and Farurgan islands, the Persian Gulf. Journal of the Persian Gulf 1: 7–16.

Rosen, B.R. 1971. The distribution of reef coral genera in the Indian Ocean. Symposia of the Zoological Society of London, 28: 263-299.

Riegl, B.M. 1999. Corals in a non-reef setting in the southern Persian Gulf (Dubai, UAE): fauna and community structure in response to recurring mass mortality. Coral Reefs 18: 63–73.

Riegl, B.M. and Purkis, S.J. 2012. Coral reefs of the Gulf: adaptation to climatic extremes in the world's hottest sea. In Riegl BM and Purkis SJ (eds), Coral Reefs of the Gulf. Cham: Springer, pp. 1–4. https://doi.org/10.1007/978-94-007-3008-3_1.

Ruppert, E.E., Barnes, R.D. and Fox, R.S. 1994. Invertebrate Zoology, vol 6. Saunders College Publishing, Fort Worth, pp 950–966.

Samiei, J.V., Dab, K., Ghezellou, P. and Shirvani, A. 2013. Some scleractinian corals (Scleractinia: Anthozoa) of Larak Island, Persian Gulf. Zootaxa, 3636: 101–143. https://doi.org/10.11646/zootaxa.3636.1.5.

Samimi-Namin, K. and Van Ofwegen, L. 2009. Some shallow water ctocorals (Coelenterata: Anthozoa) of the Persian Gulf. Zootaxa 2058: 1–52. https://doi.org/10.11646/zootaxa.2058.1.1

Samimi-Namin, K. and Van Ofwegen, L. 2012. The octocoral fauna of the Gulf. In Riegl B.M. and Purkis S.J. (eds), Coral Reefs of the Gulf. Cham: Springer, pp. 225–252.

Shahbazi, S., Sakhaei, N., Zolgharnein, H. and McFadden, C.S. 2019. First record of *Viminella* sp. (Anthozoa: Alcyonacea: Ellisellidae) in the Persian Gulf. Biodiversity Data Journal 7: e33089. https://doi.org/10.3897/BDJ.7.e33089.

Shahbazi, S., Sakhaei, N., Zolgharnein H., McFadden C.S. 2021. Species composition and distribution of Alcyonacea (Octocorallia) in the northern Persian Gulf. Journal of the Marine Biological Association of the United Kingdom, 101: 535–543. https://doi.org/10.1017/S0025315421000527.

Sheppard, C.R.C. and Sheppard, A.L.S. 1991. Corals and coral communities of Arabia. In: Fauna of Saudi Arabia, vol 12. Natural History Museum, Basle.

Sheppard C., Price A. and Roberts C. 1992. Marine ecology of the Arabian region. London: Academic Press. 359pp.URL.

Stiasny, G. 1940. Gorgonides et alcyonides des collections du Muséum National d'Histoire Naturelle (Première partie). Archive Museum Natural History Nat Paris 16 (6): 109–145. https://sciencepress.mnhn.fr/fr/periodiques/archives-serie6/16/1/5

Thomson, J.A. and Simpson J.J. 1909. An account of the alcyonarians collected by the Royal Indian Marine Survey Ship Investigator in the Indian Ocean; with a report on the species of *Dendronephthya* by W.D. Henderson. II. The alcyonarians of the littoral area. Calcutta, The Indian Museum, i–xviii 1–319.