

Session 66

**Human-natural coupled reef systems: integrating indigenous and western sciences for sustainable management solutions**

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# **Indigenous beliefs and divine conceptions of Red Sea black coral: a case study of the traditional fishery, Sinai Peninsula, Egypt**

**H. Nawata**

**Abstract** Precious materials such as red and black coral have gained value because they are natural living organic resources from the deep-sea environment, which has, for a long time, presented humans with considerable difficulties in efforts to collect these corals. Despite their economic and cultural importance, little is known about the basic biology and ecology of black corals (Cnidaria: Anthozoa: Hexacorallia: Antipatharia) because most species inhabit deeper-water environments (>50 m) that are logistically challenging to study (Wagner et al. 2012). In the Red Sea area, black coral has been known and valued by local people for a considerable period. Before the advent of diving, black coral was occasionally hauled up on boat anchors, and colonies were found in various relatively shallow locations such as inside natural harbors along the coast. The axial skeleton of black coral is formed by a brown or black extremely hard proteinaceous material which, when cut and polished, is used for making jewelry and prayer beads (Vine 1986). Prayer beads made of black coral are known as “yusr,” an Arabic word meaning “ease” or “well-being.” Based on my field study in the Sinai Peninsula, Egypt, fishermen of the Red Sea viewed black corals as living creatures because they “wrapped themselves” around the men when they moved close to the coral. The fishermen shaved their bodies and removed all of their clothes before diving, and recited the “basmalah” when cutting the coral. Humans believed they could only reach the precious resource and overcome their fear of water by invoking divine protection. This indigenous belief in an undersea world that lies beyond the reach of the knowledge and activities of “helpless” humans, who can only go there with divine protection, provides an important perspective on an environment that is included in marine resource

conservation or ecosystem-based management initiatives.

**Keywords:** black coral ▪ indigenous knowledge ▪ Red Sea ▪ ecosystem-based management ▪ divine protection

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## Introduction

Black corals are regulated on a global scale by the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), an intergovernmental treaty that controls international trade in animals and plants. Since 1981, all species of black coral have been listed in CITES Appendix II, which contains species vulnerable to overexploitation but not yet at risk of extinction (Wagner et al. 2012). In March 2011, Canada, China, Japan, the Republic of Korea, the Russian Federation, the United States, and Taiwan concluded negotiations on the Convention on the Conservation and Management of High Seas Fisheries Resources in the North Pacific Ocean. The interim text included a specific prohibition on the directed fishing of the order Antipatharia (Cooper et al. 2011).

Historically, precious materials, including red and black coral, have gained their value as natural living organic resources from the deep-sea environment, which has long presented humans with considerable difficulties in their efforts to collect these species. Despite their economic and cultural importance, little is known about the basic biology and ecology of black corals (Cnidaria: Anthozoa: Hexacorallia: Antipatharia) because most species inhabit deeper-water environments (>50 m) that are logistically challenging to study (Wagner et al. 2012).

This paper examines the indigenous beliefs, conceptions, and utilization of black corals based on interviews with local fishermen from the Sinai Peninsula, Egypt in the Red Sea area. This approach offers an alternative perspective to that of analyses of commercial harvesting and trading that may encourage international interest in how indigenous peoples understand, classify, harvest, utilize, and create beliefs around deep-water living creatures from a historical perspective. In this context, we can understand how the invocation of divine protection and related feelings of fear and respect have significant potential as a tool in ecosystem-based sustainable management.

### **Taxonomy, biology, and ecology of black corals**

#### *Taxonomy of black corals*

Antipatharians, commonly known as black coral, represent a taxonomic order within the Anthozoan subclass Hexacorallia, which encompasses 7 families, 43 genera, and over 235 species. The fact that the ranges of most species are unknown is due in part to the remoteness of antipatharian habitats, which renders observations and collection logistically challenging, and also to taxonomic problems within the order Antipatharia. Approximately 25% of the species have been described only in the past 20 years (Daly et al. 2007; Cooper et al. 2011; Wagner et al. 2012). For example, one of the most common species harvested as precious black coral in the Pacific Ocean was identified as *Antipathes dichotoma* (Grigg 1965, 1974), which is a species of the genus *Antipathes*, and then was redescribed taxonomically (Opresko 2003) and identified as *Antipathes griggsi* (Grigg 2010).

Most likely, *Antipathes curvata*, *A. caribbeana*, *A. griggsi*, *A. grandis*, and other related species are the mostly commonly traded taxa. The main species harvested in Hawaii and Tonga is *A. griggsi* (formerly *A. dichotoma*). This may also be the most common species harvested in the Pacific Ocean (Cooper et al. 2011).

### *Biology and ecology of black corals*

Black corals have long been treasured by humans for a variety of reasons. Despite the importance of black corals in the culture and economy of numerous societies, very little is known about their basic biology and ecology. This knowledge gap is largely due to the remoteness of the environments inhabited by most species. Black corals are restricted to marine ecosystems and are found in all oceans from tropical to polar latitudes; however, they are particularly abundant in tropical and subtropical regions. Although black corals are found over a wide range of depths, more than 75% of described antipatharian species are restricted to depths below 50 m. Black corals are typically found in areas with hard substrates, weak sunlight, and strong and consistent currents. They provide habitat for suspension feeders that use direct interception as the dominant mode of food capture, with zooplankton as the major component of their diet. Slightly slower growth rates have been reported for various species from the genus *Antipathes*. Studies suggest that Antipatharians are generally slow-growing and long-lived organisms, with longevities varying from decades to millennia (Wagner et al. 2012).

Living colonies of black corals appear brown, orange, yellow, green, or white, depending mainly on the colors of the polyps (Grigg 1974). Although their living tissues are brilliantly colored, black corals take their name from the distinctive black or dark brown color of their skeleton. They are frequently arborescent in appearance and characterized by a spiny, branched skeletal axis of chitin. The black coral skeleton consists of growth rings formed by chitin layers that form part of a continuous lamellar skeletal structure. Black coral polishes well, resulting in colors ranging from black to dark brown to golden. It is “thermoplastic,” which means that it can be reshaped with heat (Juárez-de la Rosa et al. 2012; CITES Secretariat 2014).

*The Red Sea black corals: biology, ecology, and local utilization*

Three species of *Antipatharia* have been recorded in the Red Sea: *A. dichotoma*, *Cirrhopathes anguina*, and *C. spiralis*. All grow to a length of at least 2 m. *A. dichotoma* is particularly slow growing and is found on steep current-swept seaward reef slopes, usually below 30 m. *C. anguina* and *C. spiralis* grow on steep reef faces, usually below 10 m (Lieske and Myers 2004). A guide for scuba divers illustrates *A. dichotoma* inhabiting depths of below 30 to 50 m (Mojetta 2001). Although *A. dichotoma* was identified as the largest black coral species found on Red Sea reefs (Vine 1986), and black coral harvested to make prayer beads was identified by a recent biochemical study as *A. dichotoma* (Alarif et al. 2013), it is more likely to be *A. griggi* because, as mentioned above, *A. dichotoma* was redescribed taxonomically and identified as *A. griggi* (Opresko 2003; Grigg 2010).

Vine (1986) explained that black coral is usually found in relatively deep water at depths of around 50 m, or on shaded overhanging reef faces in shallower water. Black corals (genus *Antipathes*) growing together with soft corals (Alcyonarians) and sponges are found at a depth of only 5 m in a cave at a dive site located approximately 20 km south of Dahab on the eastern coast of the Sinai Peninsula (28°25.000'N–34°27.364'E). A photograph of the site clearly shows branches of black coral growing downward under shaded reef faces. At other dive sites, such as “Ras Za’atar” (27°45.860'N–34°15.364'E) and “Thomas Reef” (27°59.437'N–34°27.644'E), colonies of black coral (genus *Antipathes*) are situated with Alcyonarians and Gorgonians in addition to other Antipatharians (genus *Cirrhopathes*) with their characteristic spiral shape at a depth of approximately 25 m (Sliotti 2005). According to a monitoring report carried out in collaboration with volunteer divers in the northern Red Sea including Egypt, Sudan, and Saudi Arabia (Francesco 2013), black coral (*Antipathes* sp., *Antipatharia*, *Anthozoa*) had a sighting frequency (SF) of 27.4%, categorizing it as

“common” ( $20 > SF\% \geq 70$ ).

However, no exact ecological description exists of local utilization of black coral, other than Vine’s (1986) observation: “Black coral has been known to, and valued by, local people for a considerable period. Before the advent of diving it was hauled up occasionally on boat anchors and colonies were also found in some relatively shallow locations such as inside natural harbours along the coast” (Vine 1986: 33).

#### *Prayer beads, called “yusr” in Arabic*

The rosaries, or strings of prayer beads, used by Muslims are generally called “subḥa” or “misbaḥa” in Arabic, and more often “sibḥa” in Egyptian colloquial pronunciation, and “tasbīḥ” in Persian and Muslim Indian usage. They are held between the fingers in ritual prayer for counting the reception of divine names or sacred phrases. Prayer beads are made from wood, bone, mother of pearl, stones, or plastic (Wensinck 1997; Kosugi and Katakura 2002).

One type of prayer beads made of precious stones is known as “sibḥat al-yusr” or just “yusr,” an Arabic word meaning, “ease,” “well-being,” or “relief,” are thought to be made from black coral.

## **Methods**

### **Semi-structured interviews using color pictures of invertebrates**

Fieldwork was conducted in the Sinai Peninsula, Egypt, in August 2003.

Semi-structured interviews, in which some questions are determined beforehand and others arise during the course of the convention (Martin 1995), were made with seven highly experienced local fishermen in major ports in South Sinai: al-Ṭūr, Jubayr, Dahab, Nuwayba‘, and Ṭābā. A book with color pictures of invertebrates of the Red Sea (Vine 1986) was used to list vernacular names for each species and invoke their indigenous

knowledge. Semi-structured interviews were also carried out with three craftsmen who make prayer beads and a rosary store owner in Khān al-Khalīlī, Cairo, in September 2003. A tape recorder was used to record and transcript interviews in Arabic and to translate them into English later with the help of a native Arabic speaker, Mr. Ḥāfiẓ Muḥammad Fathī Qūrah. The average length of interviews was an hour for each person.

## **Results**

### **Indigenous beliefs and differentiation of “yusr”: black, brown, red, orange, and white**

A 40-year-old fisherman from the Badara tribe living in the port of al-Ṭūr, harvests *yusr*. In 1998, while fishing in his boat beside a wrecked ship near Sha‘b ‘Alī, he accidentally collected black coral with the anchor from below 18–19 m, although he normally finds the coral below depths of around 30 m, where the current is strong. He showed me the *yusr* from 1998, which was framed on the wall of his fish store (Fig. 1).

According to him, there are four types of *yusr*, categorized by color as black, brown, red, or orange. Only the black variety is used to make prayer beads. The *yusr* that he had was orange, but appeared more white than orange due to the occurrence of a bloom at the time of harvesting. He had heard that black *yusr*, in addition to prayer beads, is crafted into necklaces made with gold and sold in Khān al-Khalīlī in Cairo. He told me that he thought that such necklaces would be expensive.

When I showed him a book with color pictures of invertebrates (Vine 1986) and asked him which pictures would be classified as *yusr*, he identified black or brown Antipatharians as well as the fan or branched shapes of yellow, orange or red Subergorgiidae, Melithaeidae, and Plexauriidae. A 56-year-old fisherman from the Mzayna tribe living in Dahab, also identified the pictures showing the fan or branch shapes of Subergorgiidae, Melithaeidae, or Plexauriidae as *yusr*, instead of the





**Fig. 1** A local fisherman showing *yusr* framed on the wall of his fish store [photograph taken in al-Ṭūr, Sinai Peninsula, Egypt, on 10th August 2003, by the author]

comparatively small Antipatharians.

It was also confirmed that craftsmen who manufacture prayer beads from *yusr* in Cairo have a certain degree of knowledge about the different types of *yusr* and where they are collected, which they have learned from conversations. A goldsmith in Khān al-Khalīlī, told me, “*Yusr* comes from the sea. It comes from the Red Sea. But I have never had a chance to see it being collected. Tradesmen bring it and sell it to us. It has been passed from person to person, but I don’t have any right now.”

A lathe worker, also from Khān al-Khalīlī, explained, “*Yusr* doesn’t come from the Gulf, but the Red Sea, because of its high salinity. *Yusr* from other seas is easily broken. That’s why prayer beads manufactured in China are cheaper, because of the different natural environment. Chinese people export thousands of prayer beads, probably from *yusr* that’s farmed there. I heard that *yusr* can grow only one centimeter in fifty years.” Regarding the different varieties, he also said that “*murjān aswad*” (which literally means “black corals” in Arabic) can be found in the deep sea, and occurs as black, red, and white types. According to him, only the black type is called *yusr*. The white variety can also be found in the deep sea, and its shape is similar, but it has a “fishy” smell. The most common type is black. “I have not worked in the sea, but information comes from divers. The black type looks like the swinging branches of trees. Then, a fishing net would be thrown over them. Once landed, it would be dried. The white type has a rock-like shape and is also collected from the deep sea.”

Thus, recognition and knowledge of black corals by local fishermen can be interpreted as follows: The fishermen categorize species of Gorgonians as well as Antipatharians as *yusr* as based on the branch and fan shapes of colonies. They recognize *yusr* as having different colors, black, brown, red, orange, yellow, and white, because the surface of Antipatharians can be covered with white, red-brown, or yellowish color when landed, or maybe because the live colonies have these colors in the deep sea. However, some people differentiate between Antipatharians and other

types using the names *murjān aswad* and *yusr*. Although *murjān aswad* literally means “black corals” in Arabic, it can include Antipatharians, Gorgorians, and other species. The word *yusr* can also be applied only to Antipatharians that can be made into prayer beads. In addition, craftsmen or lathe workers who process and manufacture prayer beads from black corals have not themselves been to the Red Sea, but have various levels of knowledge concerning source locality, habitat, quality, and types are obtained through their interactions with traders.

I was unable to find any fishermen who had actually dived into the deep sea for black corals. However, a few fishermen told me stories of such experiences that they had heard from divers of their father’s or grandfather’s generations.

#### **Divine conceptions and utilization of black corals: “yusr” as a living creature**

The above-mentioned fisherman from al-Ṭūr recounted a story told by his grandfather who was born in 1907. He told me that his grandfather had said, “A *yusr* tree is a living creature in the deep sea. Whenever somebody moves close to them and makes them angry, they wrap themselves around him and send him to his death. If somebody tries to cut their branches with a saw, they can move by themselves and escape. I am sure that it is not because of currents. So I recited the ‘basmalah,’ meaning ‘In the name of Allāh, the most Gracious, the most Merciful’ in Arabic, while I was cutting *yusr*.”

A 30-year-old from the Turābīn tribe who lives between Nuwayba‘ and Ṭābā told another story about *yusr* as a living creature, which he heard from his uncle, who was born around 1923. His uncle told him, “I used to harvest *yusr* along the Red Sea coast in the Sudan, particularly around Port Sudan and Yemen, but not in the Gulf of ‘Aqaba. *Yusr* could be found below around 10–11 m there. We shaved our bodies and removed all of our clothes before diving. We tried to cut them when they were sleeping. If they were awake, we could not cut them at all.” In addition, the above-mentioned lathe worker from Khān al-Khalīlī also said, “Divers cannot just dive and collect *yusr*. They have to first recite

the ‘basmalah’ and then throw a rope and anchor to pick up the trees from under the water.”

From the oral tradition and practices of local fishermen, we are able to gain insights into their belief that *yusr* is a living creature that moves and escapes, or sleeps and wakes up. This is probably because black corals are found in areas of continuous, strong currents, and skin divers are faced with difficulties and fears when harvesting them in deep water. Indeed, they consider it impossible without invoking divine protection by shaving body hair, purifying themselves, and reciting sacred phrases.

However, local craftsmen and storekeepers in Khān al-Khalīlī in Cairo have a slightly different understanding, regarding *yusr* as a living creature due to the way in which it easily peels off. The above-mentioned goldsmith said that *yusr* is alive and never dies because it peels off and changes its color, according to traders. In contrast, the above-mentioned lathe worker said, “Some people like to say that *yusr* comes into being, but doesn’t really. It has seven layers. Depending on the natural conditions and weather, it dries up and peels off. That’s why it’s thought to be born. All of our products are made of natural colors.”

One of the reasons that black corals are called *yusr*, which, as mentioned above, means “ease” or “relief,” is that counting the layers of growth rings when *yusr* are used as prayer beads is interpreted as peeling away layers of hardship and as a sign of the end of anguish and beginning of ease (Black coral rosaries website 2013).

A Muslim rosary store owner in Khān al-Khalīlī, showed me various products made from black coral (Fig. 2). He explained that one of the reasons that *yusr* is prized is because it has a pleasant smell when rubbed between the fingers, and he then demonstrated this by rubbing the base of branches of *yusr*. This is because of the thermoplasticity of black coral, which allows it to be reshaped by heat. It smells a slightly sweet odor, which may help people to clear their minds, feel calm, and concentrate on praying.



**Fig. 2** Muslim rosary store owner [photograph taken in Khān al-Khalīlī, Cairo on 16th September 2003, by the author]

## **Discussion**

### **Invoking divine protection and the related feelings of fear and respect as a traditional management strategy**

Similar to many other corals, antipatharians can develop dense assemblages that form

important structural habitats (Roberts et al. 2006) and represent key habitats for numerous associated organisms, including polychaetes, barnacles, ophiuroids, copepods, crabs, shrimp, anemones, zoanthids, hydroids, crinoids, bryozoans, snails, bivalves, tunicates, and fish (Wagner et al. 2012). Due to the numerous symbiotic associations involving black corals (especially those with crabs, shrimp, and fish), they should be considered a keystone group in the structure of tropical coral reefs (Tazioli et al. 2007).

When Wagner et al. (2012) reviewed the biology and ecology of antipatharians, they concluded that, given the remoteness of the environments inhabited by most black corals, our understanding of these organisms depends on our ability to effectively sample and study them. Despite the inherent difficulties of studying these habitats, there is an urgent need for reliable information to inform the extension of marine protection initiatives to large areas of the deep sea and the development of long-term management plans (Roberts et al. 2006). Precious corals are caught in some deep-sea fishing operations. Deep-sea corals are also landed in large quantities as unwanted by-catch in other fisheries (Norse et al. 2012). However, most of the world's deep-sea ecosystems are located in international waters, where all nations have the right to engage in fishing as an open-access commons (UN 1982), and where the sustainability of deep-sea fisheries hinges on a more complex web of interdependent actors (Norse et al. 2012). Therefore, the process of applying protected area status to the deep-sea environment represents a different set of challenges than those faced in terrestrial and coastal ecosystems. The immediate protection of sensitive areas such as cold-water coral ecosystems may be a first step to developing a network of protected areas that extends throughout the oceans (Davies 2007).

A key question that arises is whether the sustainable management of deep-sea living resources is feasible (Santos et al. 2012). One possible approach is to create marine reserves that are entirely off-limits to fishing (Roberts 2002) to prohibit deep-sea bottom trawling, one of the most physically damaging fishing methods, which causes

benthic habitat degradation and has detrimental effects on the local biodiversity and biomass of the benthic species (Davies 2007; Santos et al. 2012). An alternative is to protect coral beds from overfishing through selective harvesting using, for example, SCUBA or submersibles (Grigg 2002). The deep-sea ecosystem has been considered both an unexplored wilderness and a resource frontier. The potential resources of the deep sea are significant, whereas our scientific understanding of the natural processes in this ecosystem is limited, which renders it particularly vulnerable (Glover and Smith 2003).

A study concerning the evolutionary history of the giant clam (*Tridacna costata*) along the Sinai Peninsula, reported a sharp decline in proportion and shell size in this species starting at ~130 kya. This is interpreted as the earliest depletion reported so far of a shallow-water megafaunal invertebrate associated with the dispersal of anatomically modern humans (AMH) out of Africa into the Red Sea and adjacent regions 110 to 90 kya. *T. costata* is the likely earliest victim of anthropogenic degradation of coral reefs (Richter et al. 2008). The earliest well-dated evidence for coastal adaptation and a systematic large-scale exploitation of marine shellfish beds by AMH has been reported from South Africa, at the site of Pinnacle Point dating to 164 kya (Marean et al. 2007). Since then, it seems that few areas along the coasts have been inaccessible to AMH throughout the existence of the species. Therefore, marine ethnobiology that specifically comprises the study of the relationships of present and past human societies to marine biota and ecosystems can offer deep insights into our species' environmental adaptation capabilities and provide us sound guidelines for applied research (Narchi et al. 2014).

This case study of the traditional black coral fishery before the development of scuba diving equipment and techniques in the Red Sea suggests that humans have been able to reach this precious resource in the deep-sea environment only through invoking divine protection and with feelings of fear and respect. We could benefit from learning from the indigenous knowledge and utilization of the precious coral, and apply their

attitude toward such objects outside the limits of normal human observation and beyond their understanding. People have believed that they could only reach the precious material, and overcome their fear of deep water, by invoking divine protection, and this traditional management strategy in times of free diving that relies only on divers' physical ability still holds significant value, particularly in its potential application to conserving deep-sea habitats and living resources through sustainable ecosystem-based management.

The tradition of invoking divine protection and feeling fear and respect offers the potential to encourage stakeholders to maintain the deep sea as an inaccessible area, and to minimize the damage caused by fishing, harvesting, and other anthropogenic activities that use advanced technologies in an environment that lies out of reach of the knowledge and activities of “helpless” humans but that is included in current marine resource conservation and ecosystem-based management initiatives.

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