Halicampus zavorensis Dawson, 1984 (Syngnathidae): new record for Iraqi marine waters and for the Arabian Gulf area

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Halicampus zavorensis Dawson, 1984 (Syngnathidae): new record for Iraqi marine waters and for the Arabian Gulf area

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Abstract: New record of one fish species from the Arabian Gulf coast of Iraq is reported: the zavora pipefish *Halicampus zavorensis*. A single specimen was collected from the Iraqi marine waters of the Arabian Gulf during an ichthyologic survey on the 15th of September 2015. This record from the Iraqi water represents the first record for the Arabian Gulf area.

Résumé : Halicampus zavorensis *Dawson, 1984 (Famile: Syngnathidae): nouveau signalement pour les eaux marines iraquiennes et de la région du Golfe Arabique.* Le nouveau signalement d'une espèce de poisson de la côte du Golfe Arabique en Irak est rapporté : le poisson *Halicampus zavorensis*. Un seul spécimen a été récolté lors d'une campagne ichtyologique le 15 septembre 2015. Ce signalement est le premier de la région du Golfe Arabique.

Keywords: New record ● Basrah ● Range extension ● Syngnathidae ● Pipefish ● Arabian Gulf

Introduction

In the spite of the previous (Khalaf, 1961; Mahdi, 1971; Al-Daham, 1982; Al-Hassan & Al-Badri, 1986; Al-Hassan & Miller, 1987; Hussain et al., 1988) and recent (Jawad et al., 2014; Jawad, 2015; Jawad & Al-Badri, 2015) research studies, the marine ichthyofauna of Iraq is still not fully investigated and much taxonomic work needs to be done (Jawad, 2012). Recently, several programs have been started to survey the Iraqi waters of the Arabian Gulf in order to study the fish biodiversity of this area and aiming to build up a list of species that are present in the northwestern part of the Arabian Gulf.

In the present study one species are recorded from the waters of the Arabian Gulf of Iraq for the first time: the zavora pipefish *Halicampus zavorensis* Dawson, 1984. This record is important because it represents the 1st record for both the Iraqi marine waters and the Arabian Gulf area. Also, it considered the northernmost extension for this species.

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Materials and Methods

Collection area

The Iraqi coastal area at the northern coast of the Arabian Gulf is a narrow strip of 58 km (29°47'55.71"N-48°43'32.9"E). This area includes the coastal area of the Fao City, Khor Abdullah and Khor al Zubair. The area is dominated by the presence of a large swampy river delta formed by the Euphrates, Tigris and Karun rivers, merging into the Shatt alArab, which represents the main outflow in the Arabian Gulf. It distinguished in having an arid climate and a small annual rainfall of the order of 150 mm.year^{-1} and high rates of evaporation (< 2000 mm.year^{-1}). Most evaporation occurs during winter owing to the strong winds (Reynolds, 1993).

The Iraqi coast has a mild slope relative to a higher one along the Kuwaiti coast. The average depth is 10 m in this area. The deepest longitudinal area of the channel is 40 km in the direction of the Arabian Gulf with a width between 617 km (Darmoian & Lindqvist, 1988). Salinity values between 32 to 38 suggest the area is a saline lagoon. A semidiurnal tidal system is present, which is the same as in the northern part of the Gulf. Tidal range values are 23 m at spring tide.

The geological history, temporal and geographical positions at the top of the Arabian Gulf, and the physiographical complexity have helped shape the character of Iraqi marine biodiversity.

Samples and sampling method

On 15th of September 2015, a single specimen of of zavora pipefish *H. zavorensis* (n = 1, 77.4 mm TL) was collected from the coasts of the city of Basrah at the northwestern corner of the Arabian Gulf (Fig. 1). Morphometric and meristic details were recorded following Dawson (1986); data is presented in table 1. Eschmeyer (2017) and Fricke (2017) were used for the taxonomic status of the species, spelling of species names, and taxonomic references respectively. The specimen was deposited in the fish collection of the Marine Science Centre, University of Basrah, Iraq.

The specimen was obtained by a small stern trawler operating in the marine waters of Iraq for ichthyological purposes (Fig. 2). The trawler was operating at depth of 15 meters for 1.5-2.0 nautical miles at a speed of approximately 3 knots, 0.5 h tows, with a 40 mm cod end. There were 10 sampling localities were usually visited during the ichthyological explorations by the vessel of the Marine science Centre, University of Basra, Iraq. In the sampling area, there were at least five small and medium sized demersal trawlers were operating at a time.

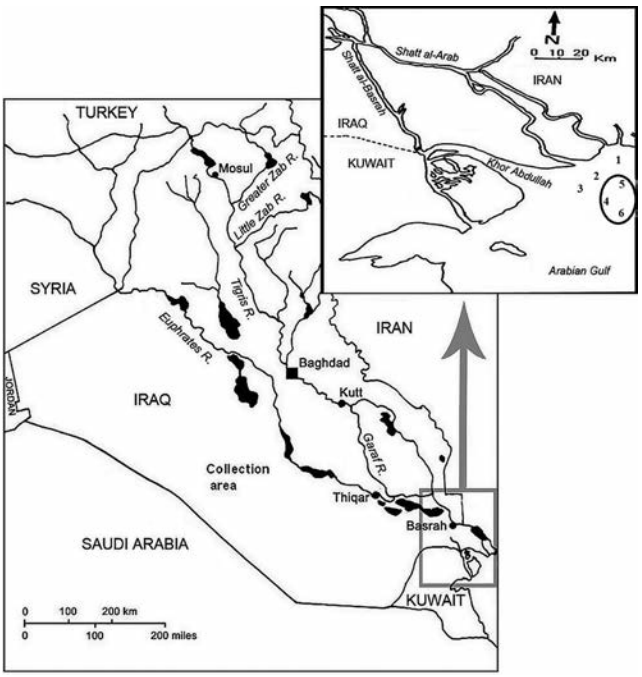

Figure 1. Map showing the sampling location. Numbers 1-6 representing sampling stations, those in a circle are with higher fish biodiversity. .

Table 1. *Halicampus zavorensis*. Morphometric (mm) and meristic characters of collected from the Iraqi marine waters

Morphometric characters (mm)	
Total length	74.4
Maximum body height	4.95
Maximum body width	5.61
Pectoral fin length	2.8
Dorsal fin base	1.7
Head length	13.36
Occipital height of head	5.28
Mouth height	1.65
Mouth width	1.61
Eye diameter	1.90
Snout width	2.47
Snout length	4.9
Snout depth	3.0
Meristic counts	
Dorsal rays	22
Pectoral rays	13
Trunk rings	14
Tail rings	36

Figure 2. *Halicampus zavorensis.* 77.4 mm TL collected from the marine waters of Iraq.

Results

The collected specimen is well match description of *Halicampus zavorensis* (Dawson, 1986; Randall, 1995). It is characterized by the following features: body elongate, head and snout short; body surface with ridges, the superior trunk and tail are discontinuous, inferior terminates at anal ring and lateral confluent with inferior tail ridge; snout with continuous spinous ridges; body mainly pale grey with 14 dispersed dark bars; irregular brown spots present on the ventral sides of head and body arranged as one per ring on trunk and tail. The last dark band on tail is the smallest on body. The three penultimate dark patches are larger than those on trunk. Dorsal fin over the 13th-22nd body rings. Pectoral fin extended to the 4th body ring. Morphometric and meristic characters are given in table 1.

The fish diversity in the collecting area was high, where fish samples contained both cartilagenous and bony fish species. Sharks and rays were represented by a small number of species, but with abundant number of individuals. There were 6 species belonging to 5 and 4 genera and families respectively. For bony fishes, there were 41 species belonging to 38 genera and 30 families (Table 2). The fish biodiversity increased in the station towards the southern edge of the Iraq marine waters boarders (Stations 4, 5 and 6, Fig. 1), where the specimen of *H. zavorensis* was collected.

Discussion

The zavora pipefish *Halicampus zavorensis* was known only from one specimen from Zavora, Mozambique (Dawson, 1986) and two from Sur, Oman (Randall, 1995). Therefore, this is the 4th specimen of this species that have been collected since its original description by Dawson in 1986. This record extends its range to the northwest, to the Arabian Gulf coasts of Iraq where it considered as a new record to Iraqi marine waters and the Arabian Gulf area as well.

The congener *H. mataafa*e (Jordan & Seale, 1906) was chosen for both its presence in the nearby Omani waters and for its similarity with *H. zavorensis*. This species is distinguished from *H. mataafa*e by the following set of characters: distinctive coloration with presence of dark bands on pale background, no tentacles on head, fewer dorsal-fin rays and more tail rings.

The specimen of *H. zavorensis* was collected from the station no. 6 at the southernmost edge of the Iraqi marine waters (Fig. 1). The total length of our specimen (77.4 mm) falls near the maximum size (100 mm) given by Dawson (1986) obtained from Mozambique (Table 1).

Several factors can explain the previous non-record of *H. zavorensis* from the Arabian Gulf waters of Iraq in particular and the Arabian Gulf area in general. Specimens of *H. zavorensis* might be rare in the marine waters of Iraq, as the routine fish sampling in this area during the last decade (Al-Badri & Jawad, 2014) did not reveal the presence of this species. On the other hand, a global change such as sea water temperature may have caused a recent natural colonisation along the northern coast of the Indian Ocean. Vincent et al. (2011) suggested that the climatic changes, i.e., temperature, rainfall patterns, atmospheric CO_2, oceanographic pattern and the state of coastal habitats might affect syngnathid fish species. Syngnathids may be indirectly affected by coral reef bleaching due to ocean acidification. On the other hand, they gave an example on how the rise in water temperature and draught to a certain limits can cause death in syngnathids individuals (Russell, 1994; Power & Attrill, 2003).

Halicampus zavorensis has been reported from the Sea of Oman (Randall, 1995), which is the nearest area to the Iraqi marine water. There are aspects of climatic, hydrological and ecological differences between the Sea of

Table 2. *Halicampus zavorensis*. Fish species and their availability collected at the same catch from the Iraqi marine waters. Rare: < 10 individuals; common: 10 - 20 individuals; abundant: > 20 individuals.

Family/ Scientific name	Availability	Family/ Scientific name	Availability
Hemiscylliidae		*Lutjanus russellii* (Bleeker, 1849)	Rare
Chilloscyllium arabicum (Gobanov, 1980)	Abundant	**Haemulidae**	
Triakidae		*Diagramma pictum* (Thunberg, 1792)	Abundant
Mustelus mosis Hemprich & Ehrenberg, 1899	abundant	*Plectorhinchus sordidus* (Klunzinger, 1870)	Common
Carcharhinidae		*Pomadasys olivaceus* (Day, 1875)	Common
Carcharhinus dussumieri Müller & Henle, 1839	Abundant	**Sparidae**	
Rhizoprionodon acutus (Rüppell, 1837)	Abundant	*Acanthopagrus bifasciatus* Forsskål, 1775	Common
Rhizoprionodon oligolinx Springer, 1964	Abundant	*Argyrops spinifer* (Forsskål, 1775)	Abundant
Myliobatidae		*Rhabdosargus haffara* Forsskål, 1775	Rare
Brevitrygon imbricata (Bloch & Schneider, 1801)	Abundant	**Lethrinidae**	
Gymnuridae		*Lethrinus borbonicus* Valenciennes, 1830	Rare
Gymnura poecilura (Shaw, 1804)	Common	*Lethrinus lentjan* (Lacepède, 1802)	Rare
Ariidae		*Lethrinus nebulosus* (Forsskål, 1775)	Rare
Netuma bilineata (Valenciennes, 1840)	Abundant	**Nemipteridae**	
Clupeidae		*Nemipterus bipunctatus* (Valenciennes, 1830)	Rare
Nematalosa nasus (Bloch, 1795)	Abundant	**Pomacanthidae**	
Sardinella albella (Valenciennes in Cuvier & Valenciennes, 1847)	Abundant	*Pomacanthus maculosus* (Forsskål, 1775)	Rare
Chirocentridae		**Ephippidae**	
Chirocentrus dorab (Forsskål, 1775)	Abundant	*Platax teira* (Forsskål, 1775)	Rare
Engraulidae		**Siganidae**	
Thryssa hamiltonii Gray, 1835	Rare	*Siganus canaliculatus* (Park, 1797)	Rare
Synodontidae		**Sphyraenidae**	
Saurida tumbil (Bloch, 1795)	Abundant	*Sphyraena putnamae* Jordan & Seale, 1905	Abundant
Belonidae		**Triacanthidae**	
Strongylura leiura (Bleeker, 1851)	Rare	*Triacanthus biaculeatus* (Bloch, 1786)	Rare
Fistularidae		Scomberidae	
Fistularia commersonii Rüppell, 1838	Rare	*Rastrelliger kanagurta* (Cuvier, 1816)	Abundant
Platycephalidae		**Psettodidae**	
Platycephalus indicus (Linnaeus, 1758)	Common	*Psettodes erumei* (Bloch & J. G. Schneider, 1801)	Rare
Epinephelidae		**Bothidae**	
Epinephelus areolatus (Forsskål, 1775)	Rare	*Bothus pantherinus* (Rüppell, 1838)	Rare
Teraponidae		Soleidae	
Terapon puta Cuvier in Cuvier & Valenciennes, 1829	Rare	*Euryglossus orientalis* (Bloch & Schneider, 1801)	Common
Sillaginidae		**Cynoglossidae**	
Sillago sihama (Forsskål, 1775)		*Cynoglossus arel* (Bloch & Schneider, 1801)	Abundant
Carangidae		**Triacanthidae**	
Carangoides chrysophrys (Cuvier, 1833)	Common	*Triacanthus biaculeatus* Bloch, 1786	Common
Scomberoides commersonnianus Lacepède, 1801	Rare	**Tetraodontidae**	
Trachinotus baillonii (Lacépède, 1801)	Rare	*Arothron stellatus* (Bloch & Schneider, 1801)	Common
Lutjanidae		*Lagocephalus lunaris* (Bloch & Schneider, 1801)	Common
Lutjanus fulviflamma (Forsskål, 1775)	Rare		

Oman and the Iraqi marine waters. With the presence of such differences, the importance of the present record arises for the understanding of the zoogeographical patterns in this part of the world.

The coastal zones are more vulnerable to human mediated impact than other marine regions. As a consequence, the maintenance and conservation of their biodiversity and function are, in many cases, problematic. In the developing countries, due to government regulatory controls being less stringent or lacking compared to those of most developed countries, more impacts than currently present will likely emerge, such as those in the other countries (Kennish, 2002). In those countries, there are priorities that often come before environmental conservation, the threat of such impacts is expected to continue to increase in all aquatic systems (Bronmark & Hansson, 2002).

Various types of impacts can be detected in the Iraqi coastal area. Such events may range in their effect from local to open sea extensions, depending on their origin and source. Examples of common local impacts are watershed, chemical contamination by heavy metals and pesticides, introduction of non-indigenous species, fisheries overexploitation and ghost fishing, all of which lead to habitat loss and alteration, placing the function and conservation in this area at risk.

Conservation of the coastal areas in Iraq will depend upon management based conservation practices, which need to involve interdisciplinary scientific advisory governmental officials and public commitment (Barbosa et al., 2004). Scientific cooperation between distinct environmental disciplines such as geomorphology, hydrology and oceanography, is needed, since it has the potential to combine information about specific local biological dynamics with long-term ecosystem level geomorphological processes. Such information can be used through a management interface of engineers to fit urban projects, such as shoreline development and watershed channelization or restoration strategies, such as sediment dredging into a more sustainable fashion or into a less impacting practice.

Cooperation between traditional local societies such as fishermen and civil servants in human sciences fields such as geography, sociology and anthropology can stimulate and coordinate all-inclusive, transparent discussions between municipalities and nongovernmental organizations. Such discussions can provide local governance with social, cultural and economic information, which, when combined with environmental knowledge, will provide workable solutions for local coastal management. Finally, initiatives that raise public awareness and participation by increasing links between schools, colleges, universities and the general public, such as environmental education programs, should also be followed since public commitment is an essential aspect of any conservation practice (Bozelli et al., 2004; Lopes, 2004).

Management based conservation is considered the most realistic method to preserve coastal area functions in Iraq. They are more than just the food that they produce or the environmental services that they provide. Hence, more restriction of natural reserves that conserve the regional unspoiled characteristics of this area as much as possible is also important, since the coastal zones are rare physiographic ecotones and support species adapted to thrive under high spatiotemporal environmental heterogeneity (Attayde & Bozelli, 1998; Laque, 2006: Santangelo et al., 2007). Such characteristics stress that coastal areas are worth conserving in their own right because they harbour a number of environmentally flexible species, which may be of key relevance to the maintenance of coastal biodiversity in a globally changing scenario (Barbosa et al., 2004).

In Iraq as in other Arab world countries, the State is the main mediator in the process of environmental management. In this process of mediation, the State is responsible for the organization and control of the use of environmental resources, such as create economic and fiscal mechanisms to compel the repairing of actual damage to the environment and many other inherent actions of its controlling function. Such a system is in use in Brazil (Quintas et al., 2005). It may be the best approach in orienting the relationship between man and nature because there is always the competition for resources generating problems and usually producing conflicts.

It has been known for some time now that environmental protection can be attained through the implementation of protected areas and specific management practices. This is most certainly true in developing countries, where the basic needs of the population still have to be fulfilled (Bronmark & Hansson, 2002). Therefore, conserving coastal zones in Iraq, at least, is far from a simple task, since control of this rural area is nearly impossible and people using coastal zones as a source of living find it difficult to comply with environmental protection laws. In cases when it is possible to create a protected area, this is not a decision that should be taken without considering society's expectations and what is already established in national environmental policy.

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