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A New Record of the Squid *Loligo forbesii* Steenstrup, 1856 (Cephalopoda, Myopsida, Loliginidae) from the Coastal Waters of Iraq

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ABSTRACT: The present study included the collection of 50 squids using trawls net from two sites in the coastal waters of Iraq, northwest Arabian Gulf. The first site located in Khor Abdullah and the second site located in Khor Al-Umaiya. The samples are part of the marine biology materials of the Basrah Pearling cruse carried by the Marine Science Centre, University of Basrah, during the period from June 20th to July 4th 2012.Based on morphometric characters, and the recent taxonomic keys, it was verified that the squid species is *Loligo forbesii* Steenstrup, 1856 (Cephalopoda, Myopsida, Loliginidae). The species is a new record of the Iraqi marine waters and the northwest Arabian Gulf in general.

KEYWORDS: Iraq, *Loligo forbesi***,** Marine, New record, Squid.

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INTRODUCTION

There is little and limited knowledge about the ecology, distribution and diversity of many groups of macro-benthic invertebrates in the Iraqi marine waters, northwest Arabian Gulf (Ali *et al*., 2021). For example, although the squids were usually appeared in significant numbers in the by- catch of marine trawl nets (personal observations), they were often not classified scientifically (Phol *et al*., 2014). In general, there is a lack of information about cephalopods in Oman Sea and the ROPME Sea Area (Rajabipour *et al*., 2001; Al-Yamani *et al*., 2012). However, these invertebrates characterized by their strong swimming and avoiding fishing nets.On the other side, they are significant predators for small organisms and play a key role in the food webs in different marine habitats (Piatkowski *et al*., 2001; Rajabipour, 2001; McBride *et al*., 2022).

The squid family Loliginidae, to which the genus *Loligo* belongs, includes 500 species spread worldwide and many of them are of commercial importance (Emam *et al*., 2014).

The morphological features and the morphometric indices are usually used in the systematic studies of these squids, but authors in this regard have demonstrated that squid in general and the family Loliginidae in particular, appear considerable morphometric inconsistencies (DeBose and Vecchione, 2005; Granodos- Amores *et al*., 2014), which causes principal problem in their identification.

The family Loliginidae known includes about 47 species distributed in temperate and subtropical regions, from shallow to deep (over zoom) water. And its size ranges varied from very small squid (2.5 cm) as the species *Idiosepius pymaeus,* to large species (150 cm) such as the squid *Architeuthis* sp. (Jereb *et al*., 2010; McFarland *et al*., 2022).

However, none of these Squids, i.e. those belong to the family Loliginidae, have been recorded in the nearby Kuwaiti waters (Jones, 1986; Al- Yamani *et al*., 2012), nor was it recorded in Iraqi waters previously.

This study reported the first existence of the squid *Loligo forbesii* from the Marine waters of Iraq, and gives the most important morphometric and diagnostic characteristics of it.

MATERIAL AND METHODS

The squid *Loligo forbesii* collected in the course of our study of macro- invertebrates in the Iraq coastal waters, as a part of the Basrah Pearling cruse, that was carried out by the Marine Science Center/ University of Basrah, on board the research boat "Albahith", for the period from June 20th to July 4th 2012.The aim of the cruse was to study the state of the Iraqi marine environment (MSC, 2012). Trawl net was used by the research boat to collect fish and other marine invertebrates, and through them, squids were

obtained from two sites, the first was from Khor Abdullah [29° 54" 49.8 N 48° 19" 38.7 E] and the second was from Khor Al-Umaiya [29° 43" 17.0 N 48° 46.0" 36.0 E] (Figure 1).

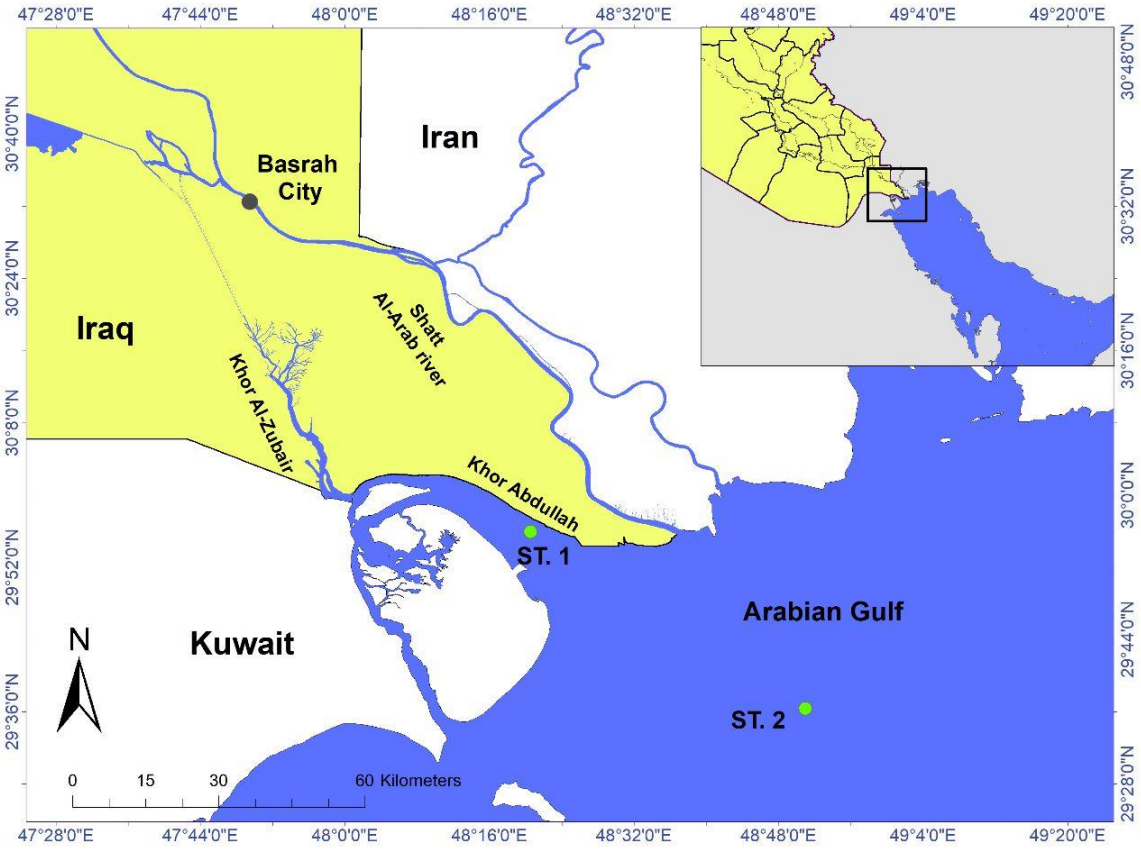


Figure (1): A map showing the locations of squid samples collected from the Iraqi marine waters.

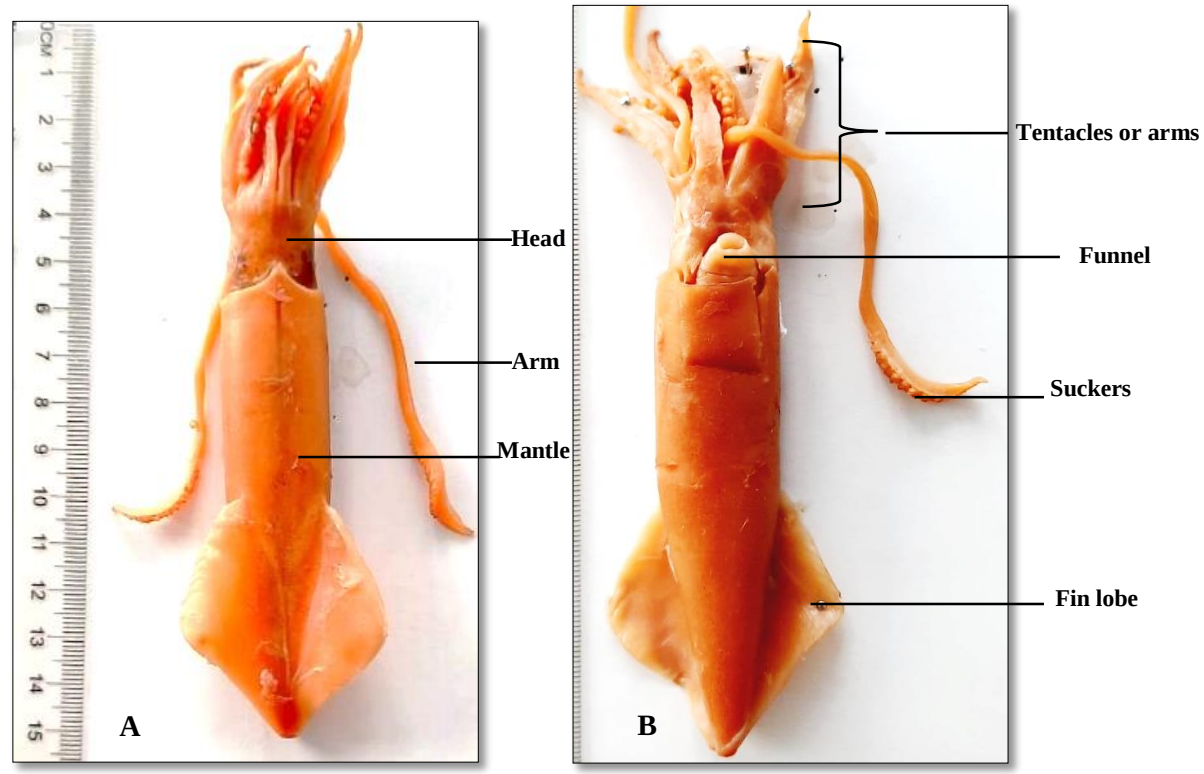
Nearly fifty Squids were caught from the two sites, preserved directly in 85% alcohol solution for laboratory examination. Vouchers were deposited in the Museum and Marine Biology Laboratory, Department of Biological Development in Shatt Al-Arab & N.W. Arabian Gulf, Marine Science Centre (MSC), University of Basrah, Basrah-Iraq, with collection voucher number (25).

Species identification was based on morphometric characters of the squid body given by Granados- Amores (2014) and Guo *et al*. (2021). Morphometric measurements were carried out using Vernier- Caliper to the nearest 0.05mm, relative to the length of the mantle. An anatomical dissecting microscope was used to examine the specimens.

RESULTS AND DISCUSSION

Taxonomic status

Kingdom: Animalia
Phylum: Mollusca
Class: Cephalopoda
Subclass: Coleoidea
Superorder: Decapodiformes
Order: Myopsina D'orbigny, 1841
Family: Loliginidae Rafinesque, 1815
Genus: Loligo Lamarck, 1798- long finned squid
Species: *Loligo forbesii* Steenstrup, 1856- veined squid
Frequent synonyms: *Loligo fusus* Risso, 1854, *Loligo moulinsi* Lafont, 1871.
The dorsal, ventral views and the arm's suckers of mature male *Loligo forbesii* from Iraqi coastal waters are shown in (Figure 2).



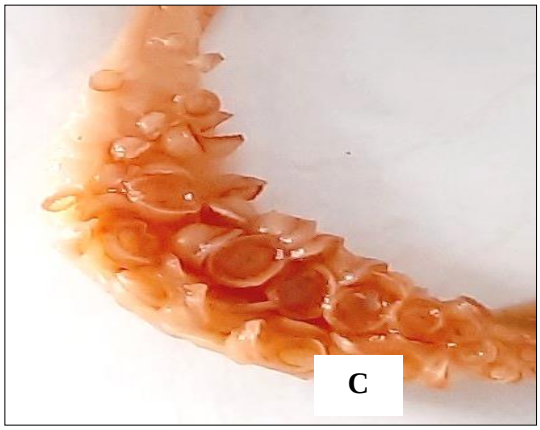


Figure (2): (A) Dorsal view, (B) Ventral view, (C) Arm's suckers of mature male *Loligo forbesii* from the coastal waters of Iraq.

Material examined: Mean mantle length 32.2mm- 120.2mm (N= 17).

Data of morphometric measurements of 17 individuals are presented in Table (1). The two values in (mm) of each character represent the largest and smallest specimen of squid, respectively as follows: mantle length (ML) 120.2- 32.2; mantle width (MW) 20- 27.3; right fin length (RFL) 19.4- 63.5; left fin length LFL (LFL) 20.0- 68.10; fin width (FW) 31.5- 61.7; head length (HL) 8.0- 14.7; head width (HW) 14.2- 31.0; eye diameter (ED)14.0; funnel length (FL) 28.4; funnel width (FW) 11.0; arm I length (IAL) 18.0- 22.0; arm II length (IIAL) 25.5- 31.3; arm III length (IIIAL) 38.7- 44.0; tentacle length (TL) 5.8- 100.1; ventral arm length (IVAL) 27.0- 48.3 mm.

The mean values are shown at the bottom of the Table (1). Some characters were not taken because of their damage so they were excluded from the mean calculation.

The squid family Loligolidae in general, including the species *Loligo forbesii*, is characterized by many taxonomic problems, especially the lack of stability of morphometric characters between different geographical locations (Emam *et al*., 2014; Granados-Amores *et al*., 2014). For example, there were clear differences in the species *L. forbsii* from the Azores and those from the UK for the majority of morphometric variables, and this was evident in both sexes as well (Granados- Amores *et al*., 2014).

However, based on the descriptive data form the materials of present study, the squid is *Loligo forbesii* Steenstrup, 1856, because it is very close to the original description of the species given by (Steenstrup, 1856; Jereb *et al*., 2010 and 2016).

There is confusion in the name of the species in various references, in some of them it is given the name *forbesi*, but the original description of Steenstrup's the name ended in "ii" (Jereb *et al*., 2010).

Table (1): Squids *Loligo forbesii* morphometric measurements from Iraq marine waters. [Measurements in mm., X are mean values, Mantle length (ML), Fin length (FL), Mantle width (MW), fin width (FW), Eye diameter (ED), Tentacle length (TL), Fourth arm (AL) and width Head (HW)].

MML	MW	RFL	LFL	FW	HL	HW	ED	IAL	IIAL	IIIAL	TL	TCL	IVAL	FUL	FUW	
42.02	20.02	22.23	28.8	39.01	15.7	/	14.1	14.1	20.0	26.44	60.1	/	27.9	/	/	
120.2	27.3	63.5	68.1	61.7	14.7	31.0	14.0	22.0	25.5	44.0	100.1	28.5	48.3	28.4	16.3	
90.53	22.0	46.91	50.7	40.91	14.9	18.8	10.5	21.3	37.3	38.5	98.0	19.5	40.8	24.05	12.8	
94.5	23.0	49.5	50.4	45.4	14.0	18.54	13.3	29.3	35.0	37.0	104.4	27	35.6	24.3	14.34	
39.2	16.45	27.0	25.3	33.0	7.4	14.1	7.6	14.4	30.4	35.78	68.7	7.54	35.3	14.0	12.5	
37.34	19.7	24.78	23.7	32.7	9.2	15.3	9.8	13.5	28.0	21	67.7	5.8	31.1	16.5	13.3	
39.12	19.3	27.0	27.1	36.4	8.45	13.9	8.6	15.4	31.4	36.4	75.0	7.0	35.3	13.46	13.7	
35.7	21.5	28	27.5	38.7	8.4	14.3	9.0	13.3	35.8	37	10.2	12.8	34.7	15.5	11.5	
38.0	20.2	26.2	26.6	36.7	8.1	17.0	6.5	12.5	24.0	31.2	50.9	/	40.6	16.0	12.35	
32.2	20.0	19.4	20.0	31.5	/	/	/	18.0	31.3	38.7	81.5	/	40.0	/	/	
36.5	19.23	22.5	21.0	31.0	9.5	16.0	8.3	13.5	27.6	30.0	67.0	/	27.0	15.0	12.3	
43.5	21.5	27.4	26.3	30.3	9.1	15.7	8.5	11.7	27.5	33.1	116.5	22.0	37.0	14.5	10.8	
45.0	21.5	31.5	31.0	37.0	9.6	16.5	7.0	20.0	29.0	35.5	93.0	13.0	29.5	17.0	14.2	
32.3	19.0	20.6	22.0	31.6	8.0	14.2		18.0	23.5	32.5	72.0	/	35.5	/	/	
37.8	19.0	22.3	21.5	19.0	9.2	15.0	/	19.5	29.3	33.6	85.0	/	35.5	16.5	11.0	
34.0	17.5	23.0	23.5	32.3	8.2	13.5	/	19.0	30.0	39.5	80.5	/	37.1	13.0	11.0	
33.7	17.8	21.3	25.0	/	/	13.5	/	9.6	28.0	32.6	61.0	/	35.0	/	/	
48.9	20.29	29.6	31.3	34.2	10.3	16.5	9.8	16.77	19.45	34.3	71.75	15.9	35.6	17.2	13.1	= X

Description

Long cylindrical mantle, fins of a diamond- shape dorsally, the LFW is slightly longer than the RFL, 31.3 mm and 29.6 mm respectively, the left fin length (LFL), nearly two- thirds 64% of the mantle. Head broad (mean: 16.6 mm.) and well developed with large eyes (mean: 9.76 mm.), eyes completely covered with eyelids (Corneal membrane). Inverted V- shaped funnel. Tentacular clubs expanded, with suckers on manus in 4 series, subequal in size and enlarged at mid manus; sucker rings of largest arm with 7-8 teeth (conical) and different in shape from suckers of tentacular club; left ventral arm hectoclized. No rostrum on gladius, posterior mantle without extreme elongation and tail- like. Tentacle elongated, mostly longer than mantle 1.6%. Colour: Longitudinal strips of purple chromatophores on the dorsal and ventral surfaces of the mantle.

DIAGNOSIS AND DISTRIBUTION

Despite the morphometric variability that exists in the species, it is possible to distinguish between it and the closest species *Loligo vulgaris* Lamarck, 1798. The main difference between the two species lies in the number and arrangement of the suckers on the manus of tentacular clubs and the number of teeth on the sucker rings. In *L. vulgaris*, there are 4 series of suckers and the sucker

rings on the manus with approximately 30 irregularly- sized and distributed teeth, whereas in *Loligo forbesii*, suckers of tentacular club subequal in size and sucker rings with 13-18 large, sharp and conical teeth regularly distributed around the rings (Jereb *et al*., 2010). However, there is misidentification between the two species by multiple authors.

Loligo forbesii, commonly known as veined squid, globally distribution species in subtropical and temperate waters; whereas it avoids cold waters below 8.5 ^{0}C. It can be found at depths ranging from less than 50 to 700 m, and often prefers deep water and 24 ^{0}C, whereas they move inshore less than 50m during winter and during the spawning period (Cheung *et al*., 2013; Torres *et al*., 2017).

Globally the size (Mantle length) of *Loligo forbesii* reaches 937mm and large quantities of it are commercially consumed (Raj and Fleming, 2014). Therefore, the sizes of *Loligo forbesii* squid observed in this study, which reach a maximum size of 12mm, and most of them are less than 40mm, are therefore considered small and immature, and this seems to be compatible with the low depth of the coastal marine waters of Iraq< 50m, which characterized by its sandy, muddy nature preferred by the young squids.

In conclusion, the squid under study is belong to the species *Loligo forbesii* of the family Loligidae, Suborder Myopsina, which is a species of squids reported for the first time in Iraqi marine waters as well as in the northwest Arabian Gulf.

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