

First record of *Asperoteuthis acanthoderma* (Lu, 1977) (Cephalopoda: Oegopsida: Chiroteuthidae), from the Arabian Sea

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Abstract- The deep sea squid *Asperoteuthis acanthoderma* (family: Chiroteuthidae) is reported here for the first time from the Arabian Sea of the India. A single specimen was collected while conducting a trial fishing with 49.5m Cosmos mid water trawl onboard FORV Sagar Sampada between latitude 11o 47.767'N and longitude 73o 39.065'E at a depth range of 350 to 400 m during the month of October 2013. The morphometric measurements of the specimen are described and are compared with the same species reported from the North Atlantic Ocean. The female specimen measured 788 mm in standard length, 22.50 mm in mantle length, 89.26 mm fin length and weighed 85.38 gm.

Index Terms- Deep sea squid, *Asperoteuthis acanthoderma*, Arabian Sea, first record

I. INTRODUCTION

Asperoteuthis acanthoderma (Lu,1997) (family: Chiroteuthidae) commonly known as thorny chiroteuthid squid is generally distributed in the Indo-West Pacific; Celebes Sea, Ryuku Islands, Molucca Sea, New Guinea, Southern Africa; eastern Gulf of Mexico, Gulf Stream Florida and South Atlantic Ocean (FAO, 2010). The first species of *Asperoteuthis* was originally described as *Chiroteuthis acanthoderma* by Lu (1977) from the tropical western Pacific. Nesis (1980) placed this species to the current genus *Asperoteuthis*. Family Chiroteuthidae consist of four genera viz., *Chiroteuthis*, *Asperoteuthis*, *Planctoteuthis* and *Grimalditeuthis*, with about 20 species reported worldwide, 2 or 3 as yet undescribed. The species level taxonomy is poorly understood and the group is very much in need of a comprehensive monograph. Chiroteuthids are bathypelagic or meso-bathypelagic squids and occasionally occur on or in association with the bottom at bathyal depths. Chiroteuthid species are very important as prey of odontocete cetaceans, e.g. sperm whales, Frasier's dolphin, pygmy and dwarf sperm whales, pilot whales, as well as blue sharks, tunas, toothfish and seabirds (FAO, 2010). Judkins et al (2009) discovered the presence of *A. acanthoderma* from the North Atlantic Ocean, Straits of Florida and reported the morphometric measurement and internal anatomy of two samples collected from southwest of Key West, Florida and from Straits of Florida during February 2007 and June 2007 respectively. In this paper, the morphometric measurements of the specimen collected from the Arabian Sea were described and are compared with the same species reported from the North Atlantic Ocean.

II. MATERIALS AND METHODS

A single specimen of *Asperoteuthis acanthoderma* (Fig. 2) was collected from the Arabian Sea while conducting a trial fishing with 49.5m Cosmos mid water trawl with Thyboron trawl door (Type-7) onboard FORV Sagar Sampada between latitude 11o 47.767'N and longitude 73o 39.065'E at a depth range of 350 to 400 m (Fig.1). Before operation, Deep Scattering Layer (DSL) indicating the presence of mesopelagic fishes was scanned using SIMRAD EK60 and EA60 echo sounder and observed between 350 to 400 m depth. Fishing operation was carried out for 2 hr duration with the help of echo integrator ITI (Integrated Trawling Instrument) interfaced with GPS which enables to know the latitude and longitude positions and two sensors interfaced with net which interpret the fishing depth and temperature at the trawling depth.

Once captured, specimen were frozen and later brought to the laboratory where the sample were identified and the morphometric parameters were noted as described by FAO (2010). The morphometric measurements were measured with a Mitutoyo digital vernier calliper with an accuracy of 0.5 mm. Morphometric characteristics were compared with the specimen reported from the straits of Florida, 16 mi east of Marathon, Florida (UMML 31.3212), which is deposited in the Marine Invertebrate Museum at the Rosenstiel School of Marine Atmospheric Sciences, University of Miami, Florida and with another specimen reported from southwest of Key West, Florida, which is kept in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. Immediately after the observation, the sample were kept in 5% formalin solution for further reference.

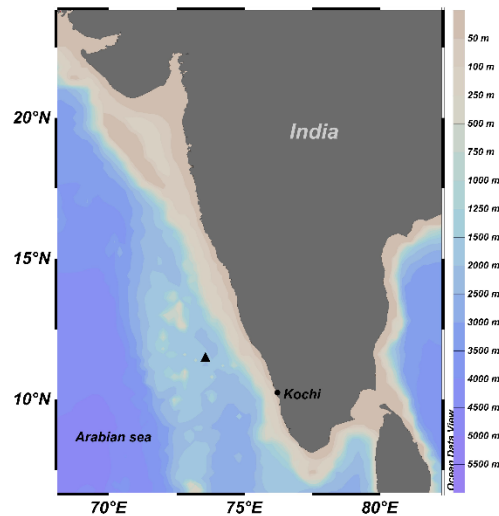


Fig 1. Map showing the study area and triangle mark indicating the sight where *A. acanthoderma* were caught

III. MATERIAL EXAMINED

A single specimen *A. acanthoderma* (CMFRI, MFD) was caught on the oceanic fishing ground in Arabian Sea (11o 47.767'N 73o 39.065'E)

DESCRIPTION

Systematics

Kingdom Animalia
Phylum Mollusca
Class Cephalopoda
Subclass Coleoidea
Order Teuthida
Suborder Oegopsina
Family Chiroteuthidae
Genus *Asperoteuthis*
Asperoteuthis acanthoderma Lu, 1977

Synonyms: *Asperoteuthis famelica* (Berry, 1909), *Chiroteuthis acanthoderma* (Lu, 1977)

Peculiar characteristics of *Asperoteuthis acanthoderma* which makes it different from other species are Y-shaped funnel locking apparatus, sucker ring form and dentition, beak morphology, photophore patch configuration on ventral surface of eyeballs, and numerous small cartilaginous tubercles that cover the mantle, head and the aboral surface of the arms (Judkins et al., 2009). Even though the present specimen collected from Arabian Sea is comparatively smaller in size, the characteristic features are similar to the samples reported by Judkins et al (2009). The mantle is long, narrow, semi gelatinous with dark purple pigmentation. Numerous, minute cartilaginous tubercles cover the mantle, head, and arms. The fins together form an elongate oval shape and are estimated to have been 89.26 mm long. The width of the fins is 75.38 mm at their widest part. Arm formula was III>II>I>IV.

The funnel locking apparatus is in an inverted Y-shape but the measurement of funnel locking apparatus could not be taken as it was in a detached condition. The head is small with 55.34 mm in length and 26.66 mm in breadth. The arms are long and the length ranges from 373 mm to 445 mm. Dorsal and ventral mantle length was recorded as 22.50 mm whereas the mantle breadth was recorded as 37.86 mm and 41.76 mm respectively. Eye diameter was noted as 9.59 mm in the present sample in which is much lesser than the 28 mm eye diameter reported in the specimen collected from Key West by Judkins et al (2009). Outer diameter of mouth of the present sample was measured as 8.29 mm. Total weight of the present sample is 85.38 gm and the standard length was measured as 788 mm. The actual total length of the sample could not be measured as the tentacle was in broken condition. The sucker diameter ranged from 0.70 mm to 1.48 mm. As the present specimen is in smaller in size and the internal organs of the present specimen are significantly in



Fig. 2. *Asperoteuthis acanthoderma* specimen collected from Arabian Sea.

deteriorated condition, detailed analysis of internal anatomy of the sample could not be conducted. The presence of nidamental gland shows this is a female species (Fig. 3).



Fig. 3. Internal organs of the specimen collected from Arabian Sea

The morphometric measurements of the present sample were compared with that of specimens obtained from Key West and Marathon reported by Judkins et al (2009) (Table 1.)

Table. 1. Morphometric measurements (mm) of the Specimen

Character	Arabian Sea*	Key west	Marathon
Maximum length of fin	89.26	Est. 220	460
Maximum width of fin	75.38	340	330
Dorsal Mantle length	22.5	620	1630
Dorsal Mantle width	37.86	190	210
Ventral Mantle length	22.5	n/a	n/a
Ventral Mantle width	41.76	n/a	n/a
Head Length	55.34	230	n/a
Head Width	26.66	35	50
Eye diameter	9.59	28	n/a
Outer diameter of mouth	8.29	n/a	n/a
Arm length 1 R	435	880 (ti)	845
Arm length 2 R	440	895	1030
Arm length 3 R	445	1000	760+
Arm length 4 R	373	560	520
Arm length 1 L	425	655	810
Arm length 2 L	426	680	970
Arm length 3 L	402	897	1100
Arm length 4 L	428	870 (ti)	825
Tentacle length R	243 +	100 +	1560+
Tentacle length L	369 +	n/a	780
Standard length	788 +	n/a	n/a
Total length	788 +	1817	3420
Sucker diameter I R	0.70	4.3	5.3
Sucker diameter II R	1.45	n/a	n/a
Sucker diameter III R	1.44	n/a	n/a
Sucker diameter IV R	1.22	n/a	n/a
Sucker diameter I L	1.22	n/a	n/a
Sucker diameter II L	1.48	n/a	n/a
Sucker diameter III L	1.33	n/a	n/a
Sucker diameter IV L	1.21	4.3	4.5
Secondary fin width	n/a	n/a	235

+ = Features incomplete/broken; ti = to tip, complete; n/a = not determined

*From the current study

IV. CONCLUSION

The occurrence of this species in the Arabian Sea will widen the known distribution of this species to the Indian waters. Very little information is available on the distribution, biology and migratory characteristics of deep-sea squids especially about meso-bathypelagic squids. Therefore, reporting the limited and fragmentary information regarding the occurrence of rare species from different parts of the world would supplement necessary information to understand the life history of the species.

ACKNOWLEDGMENT

The study was carried out as part of the project “Myctophid Resource assessment in the Arabian Sea and Development of Harvest and Post-harvest Technologies” financed by Centre for Marine Living Resources & Ecology, Ministry of Earth Science, Govt. of India and the financial assistance is gratefully acknowledged. The authors are thankful to the Director, Central Institute of Fisheries Technology (ICAR), Cochin-29 for providing the necessary facilities and granting permission to publish this paper. Also thankful to the Captain and Crew of FORV Sagar Sampada.

REFERENCES

- [1] FAO (2010). Cephalopods of the World. FAO Species Catalogue for Fishery Purposes No. 4, Vol. 605 p.
- [2] Judkins, H., Debra A. I. and Clyde F. E. R. (2009). First records of *Asperoteuthis acanthoderma* (Lu, 1977) (Cephalopoda: Oegopsida: Chiroteuthidae), from the North Atlantic Ocean Straits of Florida. In Proceedings of the biological society of Washington 122 (2): pp. 162-170.
- [3] Lu, C. C. (1977). A new species of squid, *Chiroteuthis acanthoderma*, from the Southwest Pacific (Cephalopoda: Chiroteuthidae). Steenstrupia, Zoological Museum of University of Copenhagen 4: 179-188.
- [4] Nesis, K. N. (1980). Taxonomic position of *Chiroteuthis famelica* Berry (Cephalopods, Oegopsida). Byulleten Moskovskogo Obsestva Ispytatelei Prirody (Otdel Biologicheskii) 85: 59-66.

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