

Identification of Different Species of Squids in Oman Sea (Iranian Waters)

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Abstract: Identification of different species of oceanic and neritic squids in Iranian waters of Oman Sea was carried out from December 1996 to February 1997. The trawl surveys were conducted during a 12-months period. Fishing was also undertaken by Mid-water and bottom trawl for species confirmation purposes in deep (200-350m) and shallow (0-100m) waters to collect enough specimens that could be used for later species identification. The R/V Ferdows-I was used for sampling with an approximate hauling speed of 3.0 knots.

Three oegopsid species including *Ancistrocheirus lesueuri*, *Liocranchia reinhardti*, *Sthenoteuthis oualaniensis* and neritic squid, *Loligo duvauceli* were identified. Another loliginid squid different from *Loligo duvauceli* was also observed. *A. lesueuri* (Enoploteuthidae Family) and *Liocranchia reinhardti* (Cranchiidae Family) are here reported from this area for the first time. Neither was any report about these two families of oegopsid squids in Oman Sea nor Persian Gulf.

KEY WORDS: Squid, Oceanic, Neritic, Oman Sea, Iran.

Introduction

Knowledge of species composition on cephalopod fauna and their biology in Oman Sea and Persian Gulf are still poorly available. This is due to the strong swimming ability and net avoidance behavior of oceanic cephalopods, which makes them very difficult for adequate sampling. Iranian waters of Oman Sea contain large stocks of commercial aquatics such as fishes, crabs, clams, mussels, and cephalopods (Blegvad & Lopenthin, 1944). Fish catch per unit effort has gradually decreased in the Persian Gulf and Oman Sea (Mohammadkhani, 2001); however, management constrains have been more intense in recent years. Recommendation of intact resources may be a favor for prevention of reducing or overthrowing marine stocks.

Five species of oceanic (suborder Oegopsida) and neritic (suborder Myopsida) squids were signed in the cephalopod distributional maps of F.A.O. in Oman Sea (Roper *et al.*, 1984). Later, Zarshenas and Khorshidpour (1994) and Valinassab (1993) reported the above species from Oman Sea again. However, results of this survey are somewhat different from previous studies. The purpose of this study was identification of squid species in the Iranian waters of Oman Sea.

Methods and Material

Samples were obtained by the R/V Ferdows-I in Oman Sea from December 1996 to February 1997. Oegopsid samples were obtained by a midwater trawl (MWT) and neritic samples by bottom trawl (BT). The oegopsid and neritic sampling depths ranged from 200–350 m and 0–100 m respectively, and speed of the ship during hauling was approximately 3.0 knots. Stations were between 24° 13' N latitude to coastal line of Iran and 57° 00' E to 60° 07' E longitudes. The collected samples were fixed in 10% formalin and then transferred to 75% ethyl alcohol for permanent storage. Fixation, preservation, and storage of the specimens were done as described by Roper and Voss (1983).

Morphometric and meristic characteristics were studied as recommended by Kimushkin, 1963; Zuev & Nesis, 1971; Nigmatullin *et al.*, 1983; Roper & Voss, 1983; Roper *et al.*, 1984; Silas *et al.*, 1985; Augstyn and Grant, 1988; Guerra, 1992; Young *et al.*, 1992; and Nateewatrana, 1995.

Results

This report presents three oceanic and two neritic squid species in Oman Sea.

a) Suborder Oegopsida:

Ancistrocheirus lesueuri Orbigny, 1839 (Fig. 1).

Sampling position: Lat. 24° 43' N to 25° 26' N, Lon. 57° 36' E to 59° 52' E; and depths of 235 – 300 m.

Description: Body bright ocher. Ventral surface of mantle with 20 to 22 relatively large separated photophores arranged in transversal rows. Mantle long, broad, conical, thin walled, widest at anterior margin. Fins large, thin and rhomboidal; lateral lobes rather sharply pointed. Head short, dorsoventrally flattened, slightly wider than long. Eyes large and prominent covered with eyelids. Funnel stout, bluntly tapered anteriorly; funnel organ paddle-shape, like a prominent inverted V in dorsal view and stout, oval in ventral view; funnel and mantle locking by a ridged simple cartilage, having a straight groove. Arms were moderately long and unequal, with two rows of strong compact hooks, in the order of LA4>LA3>LA1>LA2. Tentacles long, robust and slender, slightly flattened, with a narrow and unexpanded club having distinct carpal cluster manus and 2 rows of sharp hooks; the 7th or 8th hook of the ventral row being larger than the 8th hook of dorsal row. Mean mantle length was 118 mm (N=84).



Figure 1: Dorsal view of *Ancistrocheirus lesueuri*

Liocranchia reinhardti Steenstrup, 1856 (Fig. 2).

Sampling position: Lat. 25° 31', Lon. 57° 15' E; depth 200 m.

Description: Body yellow with brown spots. Mantle elliptical, tapers gradually at the post to a narrow point; mantle wall thin and leathery, with a row of small tubercles on dorsal mantle along the midline of gladius; ventral mantle with two pairs of moderately long cartilaginous strips diverge from the apex of funnel mantle, fused as an inverted V. Fins oval, with slight indentation at the midline. Head broad and round. Eyes prominent, with oval photophores around the eyeballs; eyelids very small and round. Funnel large, oval, broad based, tapering anteriorly and reaching beyond anterior margin of the eyeballs, free in its anterior third length; dorsal funnel organ inverted V-shaped, with three longitudinal strips and a broad triangular opening; ventral funnel large, stout and crescent shaped. Arms short and unequal, in the order of III > IV > II > I; arms I and III connected basally by a medium sized web; a lateral keel present on arm IV. Biserial suckers present in all arms and cover nearly the entire length of the arms; sucker ring smooth to slightly rough, with tooth on distal suckers. The right arm IV modified into hectocotylus; enlarged and elongate, with two rows of suckers, joining as a single ventral row of enlarged fleshy suckers at the base; lateral suckers curved end. Tentacles short, stalks round with slightly expanded clubs. Carpal suckers in two rows, alternatively in pairs or in a single row of suckers; with pads extending $\frac{1}{2}$ to $\frac{2}{3}$ length of stalk; suckers with carpal knobs, the largest one on mid manus rings with sharp conical tooth around it. Mean mantle length was 50 mm (N=1).



Figure 2: Dorsal view of *Liocranchis reinhardti*

Sthenoteuthis oualaniensis Lesson, 1830 (Fig. 3).

Sampling position: Lat. 24° 43' N to coastal line, Lon. 57° 00' E to 60° 00' E; depth 250–300m.

Mean mantle length: Males 154.8 mm (N=77), females 219.4 mm (N=14).

S. oualaniensis from Gulf of Oman and Arabian Sea was previously described (Chesalin, 1994; Zuev *et al.*, 1993; and Zuev *et al.*, 1985).

b) Suborder Myopsida:

Loligo duvauceli Orbigny, 1884 (Fig. 4).

Sampling position: Lon. 57° 36' E to 59° 52' E; all latitudes at depths 0 – 100 m.

Mean mantle length: Males 109.8 mm (N=694), females 110.6 mm (N=587).

L. duvauceli from the Persian Gulf, Gulf of Oman, and Arabian Sea was previously described (Zarshenas and Khorshidpour, 1994; Valinasab, 1993; and Roper *et al.*, 1984).

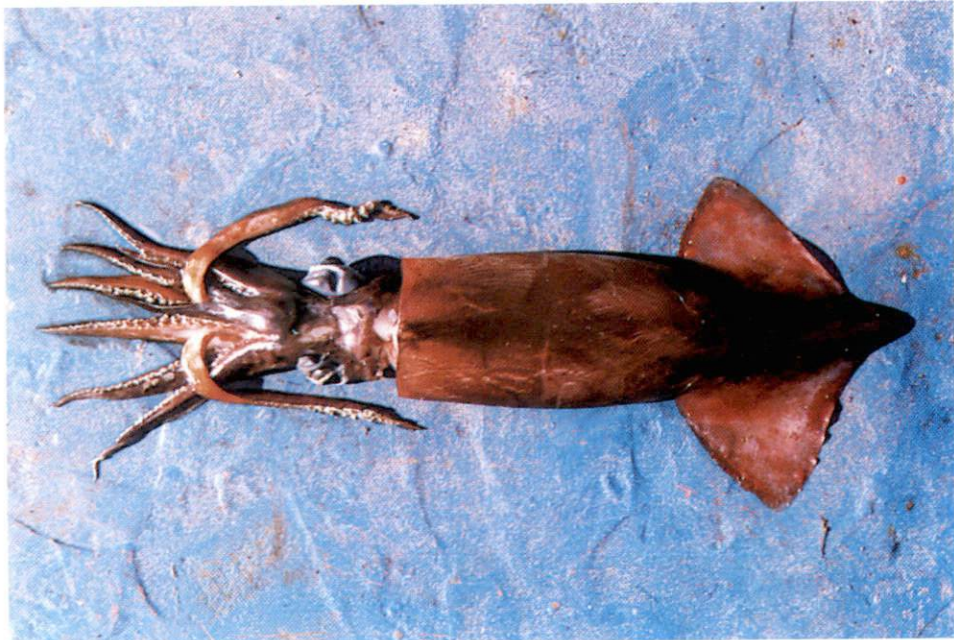


Figure 3: Dorsal view of *Sthenoteuthis oualaniensis*

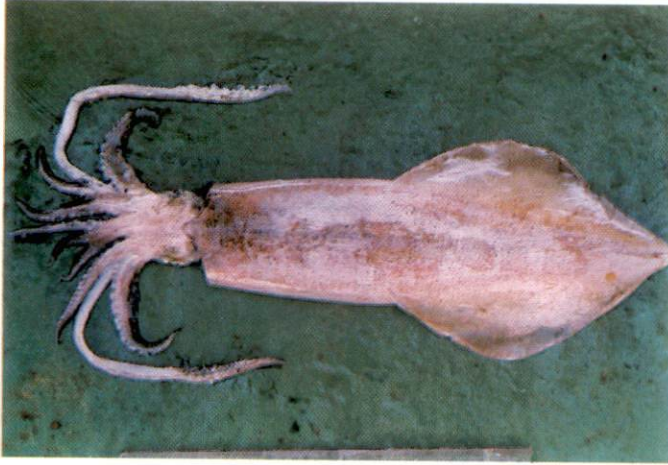


Figure 4: Dorsal view of *SLoligo duvauceli*

Loligo sp. (Fig. 5).

Sampling position: Lat. 25° 32' N, Lon. 58° 30' E; depth 40 m.

Description: Body yellow, with pink spots. Mantle elongate, thin walled. Ventral mantle with two pairs of modified cartilages. Fins rhombic and nearly 70% of mantle length. Head small and broad. Eyes entirely covered with eyelids. Funnel a little broad and conical. Arms short. Sucker ring of arm different from suckers of tentacular club; mid manus suckers enlarged. Left arm IV hectocotilized. Tentacular club sucker ring having unequal teeth. Mantle length: 293 mm (N=5).



Figure 5: Dorsal view of *Loligo* sp.

Discussion

In this study, five species of oceanic and neritic squids consisting of *Ancistrocheirus lesueuri* (Enoploteuthidae Family), *Liocranchia reinhardti* (Cranchiidae Family), *Sthenoteuthis oualaniensis* (Ommastrephidae Family), *Loligo duvauceli* and *Loligo* sp. (Loliginidae Family) were identified in Iranian waters of Oman Sea and reported. Three species of five squids were signed in the cephalopod distributional maps of F.A.O. in Oman Sea (Roper *et al.*, 1984) including: *Thysanoteuthis rhombus* (Thysanoteuthidae Family), *Onychoteuthis banksi* (Onychoteuthidae Family), *Sepioteuthis lessoniana* (Loliginidae Family) were not observed in our study, however.

A. lesueuri and *L. reinhardti* and their families, also *Loligo* sp. are reported from this area for the first time. Piatkowski and Welsch (1991) had previously reported para larval specimens (Cranchiidae family) from Arabian Sea. *A. lesueuri* is an epipelagic and mesopelagic species that lives in the midwater areas of the open ocean and near slopes (Nateewatrana, 1995). *L. reinhardti* is a cosmopolitan meso-bathypelagic species that is common and numerous in all tropical seas (Nesis, 1988; Okutani, 1974; Clarke, 1996). Reportedly, it was observed several times from the Indian Ocean (Nesis, 1986) and Arabian Sea (Piatkowski and Welsch, 1991). Definition of population differences of each species and exact distinction of imminence species such as *Loligo duvauceli* and *Loligo* sp. needs more molecular and genetic studies.

There are indications of large concentrations of *S. oualaniensis* in Gulf of Aden and Arabian Sea (Silas *et al.*, 1985), which make it an interesting species for commercial fishery in northwest Indian Ocean (Piatkowski and Welsch, 1991). This species is characterized by a wide ecological valence, complex intra-specific structure, high fecundity, short life cycle, large size, and significant production (Zuev & Nesis, 1971; Voss, 1973; Nesis, 1977; Zuev *et al.*, 1985; Nicolson and Nyensi, 1990). These characters make it practically and commercially important. *Loligo duvauceli* that is distributed in Indopacific area (Roper *et al.*, 1984), is abundant in southern Iranian waters, too. That is one of the most important species for fisheries in the world due to its increased commercial value (Mohammed, 1996).

Iranian waters of Oman Sea and Persian Gulf contain large resources of oegopsid and myopsid squids. Ommastrephidae and Loliginidae families consist commercial squid species. Because of high depths (up to 3000 m and more) of Oman Sea, Ommastrephids are mainly found in this area. However, loliginid stocks are distributed all over the continental shelf in north part of Oman Sea. It is recommended that fishing programs be designed to improve managed catching of these valuable resources based on biological studies.

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References

- Augstyn, C.J. and Grant, W.S. , 1988. Biochemical and morphological systematics of *Loligo v. vulgaris* and *Loligo v. reinhardti* Nov comb (Cephalopoda: Myopsida). *Malacologia*, No. 29, pp.215-233.
- Blegvad, H. and Lopenthin, B. , 1944. Transl. By : B. Mokhayyer & E. Etemad (1985). *Fish of the Iranian Gulf*. Tehran Univ. Press. Tehran. Iran.
- Chesalin, M.V. , 1994. Distribution and biology of the squid *Sthenoteuthis oualaniensis* in the Arabian Sea. *Hydrobiological Journal*, **30 (2)**, pp.61-73.
- Clarke, M.R. , 1996. A review of the systematics and ecology of oceanic squids. *Advanced Marine Biology*. No, 4, pp.91-300.
- Guerra, A. , 1992. *Cephalopod resources of the world: A present day review*. Madrid, Agra Europe, London. pp.1-14.
- Kimushkin, A. , 1963. *Cephalopods of the seas of the USSR*. Mir. Pub. 650 P.
- Mohammadkhani, H. , 2001. Stock assessment of some commercial species in Oman Sea. Iranian Fisheries Research Organization (IFRO) Pub. (in Persian).
- Mohammed, S. , 1996. Estimates of growth, mortality and stock of the Indian squid *Loligo divauceli*, explited of Mangalore, southwest coast of India. *Bulletin of Marine Science*. Vol. 58. No.2. pp.393-403.

- Nateewatrana, A. , 1995. New record of oceanic squids from Thai. Waters, the Andaman Sea. Phuket Marine Biological center Research Bulletin. Vol. 60. pp.1-19.
- Nesis, K.N. , 1977. Population structure of the squid *S. oualaniensis* in the tropical western pacific. Tr. In-ta Okeanologii AN USSR. Vol. 107. pp.15-29.
- Nesis, K.N. , 1986. Cephalopods of seamounts in the western Indian Ocean. Oceanology. No. 26. pp.91-96.
- Nesis, K.N. , 1988. Cephalopods of the world. T.F.H. Publications. 351 P.
- Nicolson, S.E. and Nyensi, B.S. , 1990. SSTs in the tropical Atlantic and Indian Oceans, Meteorol. Atmos. Phys. No. 42. pp.1-17.
- Nigmatullin, C.M. ; Tsygankov, V.Y. and Sabirov, R.M. , 1983. The Taxonomic Status of (Lesson) Systematics and Ecology of Cephalopod Mollusks. Zin An USSR, Leningrad. pp.94-96.
- Okutani, T. , 1974. Epipelagic decapod cephalopods collected by micronekton tows during the EASTROPAC expeditions, 1967-1968 (Systematic Part). Bull. Tokai Reg. Fish Res. Lab. No. 80. pp.29-118.
- Piatkowski, U. and Welsch, W. , 1991. On the distribution of pelagic cephalopods in the Arabian Sea. Bull. Mar. Sci. **49 (1-2)**:pp.186-198.
- Roper, C.F.E. ; Sweeney, M.J. and Nauen, C.E. , 1984. FAO species catalogue, Vol. 3., Cephalopods of the world, an annotated and illustrated catalogue of species interest to fisheries FAO fisheries synopsis. **125 (3)**: 277 P.
- Roper, C.F.E. and Voss, G.L. , 1983. Guidelines for taxonomic description of cephalopod species. Memoirs of the museum of Victoria. No. 44. pp.49-63.
- Silas, E. ; Sarvesan, R. ; Sathyanarayana, K. ; Prabhakaran, K. and Meiyappan, M. , 1985. Identity of common species of cephalopods of India. C.M.F.R.I. Bulletin. Vol. 37. pp.13-37.
- Valinassab, T. , 1993. A biological survey of cuttlefish at coastal waters of Sistan-o-Balouchestan province. Iranian Fisheries Bulletin. No. 2. pp.56-69. (in Persian).
- Voss, G.L. , 1973. Cephalopod resources of the world. FAO Fish. Circ., No.10. 75 P.

- Young, R.E. ; Mangold, K. M. and Vecchione, M. , 1992. The enoplothid group of families. Larval and juvenile cephalopods, a manual for identification. Smithsonian contribution to zoology. No. 513, 55 P.
- Zarshenas, G. and Khorshidpour, B. , 1994. Biology and processing of cuttlefishes. Iranian Fisheries Research Organization (IFRO) Pub. 41 P. (in Persian).
- Zuev, G.V. ; Nikolsky, V.N. and Chesalin, M.V. , 1993. The biology and resources of the purpleback flying squid, *Sthenoteuthis oualaniensis* in the Arabian Sea. Biochemical processes in the Arabian Sea. US-CIS. Arabian sea workshop. pp.167-172.
- Zuev, G.V. ; Nigmatullin, C.M. and Nikolsky, V.N. , 1985. Nektonic oceanic squids genus *Sthenoteuthis* Moscow: Agropromizdat. 224 P. (in Russian).
- Zuev, G.V. and Nesis, K.N. , 1971. Kal'mary (squid) Pishch. Prom-st, Moscow.