

## BIOCHEMICAL AND TAXONOMICAL STUDIES OF SEA SQUID FROM PAKISTANI WATERS

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(Received July 9, 1989; revised January 6, 1990)

The coastal waters of Pakistan abound in conventional and non-conventional varieties of fish. Among the non-conventional varieties squids are found in quite appreciable quantities. In this study 5 species of sea squids were identified and evaluated chemically. *Loligo duvacelli* was found to be the main species forming the bulk of the total catch. Squid meat is rich in protein content ranging from (19.27%-2.84%), while its fat content is low ranging (1.65%-2.31%). Minimum moisture and maximum fat and protein were recorded in *Sepia pharaonis*.

**Key words:** Sea Squid, Taxonomical, Biochemical study.

### Introduction

The search for inexpensive sources of world protein frequently concentrates on marine resources. One of the potential but unutilized sources of non-conventional food in Pakistan being sea squid. The landing of sea squids reported from all continental shelves has been estimated to be about 12 million tonnes. If ocean cephalopodes are also included, the catch would be about 60 times greater [1].

In view of the vital importance of sea squids, investigations on this group of animals have been started in the PCSIR Labs, Karachi regarding the available varieties, their occurrence and food value, in joint collaboration with the Marine Fisheries Dept. Govt. of Pakistan (MFD).

**Recent exploitation of resource.** Since there is no separate statistics on cephalopodes landings by local fishery is recorded anywhere, it is difficult to estimate the total annual landings by local fishery marketing, mode of disposal and value etc. The current record on catch and export of cephalopodes is the only quantity recorded by joint venture vessels. During the period from 1982-1987, the average annual landing by these vessels are given in Table 1.

TABLE 1.

Year	Total catch (ton)	Fish (%)	Cephalopodes (%)
1982	2314	97.9	2.1
1983	3109	95.1	4.9
1984	9400	99.3	0.7
1985	9986	99.2	0.8
1986	5015	88.1	1.9
1987	1657	83.1	16.9

**Biomass and Potential yield of cephalopodes.** During diurnal fish resource survey by the MFD research vessel *Machera* at depths of 10-200 m., the total standing stock of coastal cephalopodes was estimated at approximately 10,000

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tonnes in shelf area. The current catch from the estimated biomass, a potential yield of 5000 tons/year be estimated (Table 1).

In addition, a vast fishing potential of cephalopodes exist in offshore waters. During experimental fishing for deep sea shark by the FAO demonstration boat *Rehbar* under Marine Fisheries Development Project a sizeable stock of oceanic squid ommastrephidae (Giant flying squid) has been located at a depth of 1000 -2000 m and were caught by jigging.

### Materials and Methods

Fresh samples of sea squids were procured from Karachi Fish Harbour, through Marine Fisheries Department (MFD), Govt. of Pakistan. The characters used in the species identifications were the shape of mantle tube, the shape of dorsal fin and the percentage ratio of mantle with fin length, the number and shape of teeth and its arrangement on sucker rings of circumeral appendage. The identified samples together with other physical data were brought to the Marine Resources Section of the PCSIR Labs, Karachi for Biochemical analysis. The samples were washed thoroughly in the stream of fresh water and were divided into groups according to size and sex, and their weights were noted. Ink Sac was removed which is a characteristic of this animal [1]. They were minced with the help of a mincing machine and subsequently dried at 70° in a drying oven for 48 hrs. The dried material was then ground to a consistency of 40 mesh powder. The material thus obtained was used for the analysis of crude protein by Kjeldhal method. Fat by CHCl<sub>3</sub> extraction, ash at 600° and moisture was determined at 105°, according to standard techniques described by the AOAC [2].

### Results and Discussion

About 264 samples of sea squids were collected from Karachi, Makran and Somiani coast. On the basis of the above meroustric feature the following species of loliginidae and



sepidae were identified. Loliginidae (netritic squid).

1. *Loligo duvacelli*  
(*Ommastre phidae* (Oceanic squid))
2. *Dosidicus gigas*  
*Sepudat*
  1. *Sepiella inermis* (orbigny, 1848)
  2. *Sepia, prashadi* (winck worth, 1936)
  3. *Sepia pharaonis* (Ehrenberg 1831)

It was observed that *Loligo duvacelli* (common Indian squid) identified earlier [3] and *Dosidicus gigas* respectively were the main species, constituting the bulk of commercial landing.

During dissection, different undigested marine biota have been found underfold of shell of squid such as shrimps, small fishes, crabs, annelids and other unidentified marine fauna. It shows squids are active predators of the above fauna.

The chemical composition of squid was grouped on male and female basis. Water content of female was found to be

higher than the males (Table 3). Water content of squid meat (73-77%) is almost the same as that of white meat such as Cod and Flat fish [4]. This water content does not affect the body weight. Kawata *et al.* [5] reported that no seasonal variation occur in the ratio of weight of various parts of body except the viscera. *Loligo duvacelli* and *Sepiella inermis* were almost equivalent in their moisture and protein contents. *Sepia pharaonis* was containing highest quantity of crude protein (21.84%) as well oil (2.31%) among the 5 identified species. The change in lipid content was less conspicuous and was found in the range of (1.65-2.31%). No significant difference in oil content of male and female squid was observed. The oil content 1-1.5% was noted by Borgstrom [6]. Squid were found to be a rich source of protein with a low oil content and so they could be grouped into lean fishes as described by Takashi [7], such as cod, pollock, rock fish etc. containing 78-83% moisture, 15-20% of protein, 1-4% fat and 1-1.3% mineral matter.

TABLE 2. PHYSICAL CHARACTERISTICS OF CEPHALOPODES COLLECTED DURING PRESENT STUDY.

Species	No. of sample	Place of collection	Month of collection	Weight of squid (g)	Mantle length (cm)	Fin length (cm)	Sex
1. <i>Loligo duvacelli</i>	120	Karachi-38 coast	Jan-Dec.	5-1450	6.9-23.5	3.5-15.0	♂
	55	" "	"	19-9000	6.1-24.5	4.0-5.0	♀
2. <i>Dosidicus gigas</i>	60	Makran coast	Oct/Nov.	45-1000	4.21-30.0	3.0-27.0	♀
	20	" "	"	51-1500	6.25-80.0	5.1-28.1	♂
3. <i>Sepiella inermis</i>	3	" "	Mar-Apr.	17-6000	3.9-7.5	17.27-0.0	♀
	1	" "	"	18.9-75000	8.0-9.5	19.5-29.2	♂
4. <i>Sepia Prashadi</i>	2	Makran coast	May, June	575-980	7.0-9.0	19.0-18.0	♀
5. <i>Sepia Pharaonis</i>	3	Sind Sominani coast	July-Aug.	179.7	11.2-0.0	4.28-0.0	
				190.8	13.0-0.0	12.0-0.0	♂

TABLE 3. CHEMICAL COMPOSITION OF CEPHALOPODES FOUND AROUND KARACHI AND MAKRAN COASTS.

S.No.	Species	Moisture (%)	Fat (CHCl <sub>3</sub> ext) (%)	Crude protein (N x 6.25)	Ash (%) (600°C)	Food calories (%)
1.	<i>Loligo duvacelli</i>					
	(M)	76.62	1.78	19.35	1.31	100
	(F)	76.82	1.65	19.53	1.42	100
2.	<i>Dosidicus gigas</i>					
	(M)	74.72	1.84	20.23	1.46	104
	(F)	75.82	1.75	20.10	1.43	103
3.	<i>Sepiella inermis</i>					
	(M)	75.64	2.00	19.27	1.75	100
	(F)	76.91	1.98	19.29	1.56	99
4.	<i>Sepia prashadi</i>					
	(F)	74.27	2.18	20.75	1.48	107
5.	<i>Sepia pharaonis</i>					
	(M)	73.03	2.31	21.84	1.84	112

### Conclusion

Data obtained from the present study show that squid meat may be considered nutritionally perfect protein and equivalent to other commonly known edible fish in Pakistan in its nutritional value, squid meat may supplement the already deficient supply of animal protein. Further its low fat content is advantageous for elderly people and those suffering from cardiovascular diseases as well as weight-watchers.

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