STUDIES ON MARINE EDIBLE (TELEOSTII) FISHES

Part 1.—Distribution of Oil and Vitamin A in the Skin, Flesh and Liver of Edible Fishes of Karachi Waters

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Introduction

In the course of earlier work on the utilisation of shark liver oil as a source of vitamin A,[1] it was noted that the liver oil of sharks caught around the Karachi and the Mekran coast was several times richer in its vitamin A content than that from sharks landed around Bombay. This has been attributed to the super-abundance of prawns and shrimps on the Karachi coast.[2] It was, therefore, considered of importance to extend this study to the edible marine fishes of these waters, specially because these fishes constitute a major item in the diet of the indigenous population around these coasts. Statistical data collected by the Department of Fisheries, Government of Pakistan, Karachi, indicate that the annual landing of edible fishes around the Karachi coast is approximately 33 thousand tons out of which 7,000 tons are consumed by the local population and the rest is either cured or utilised for manufacturing fishmeal. With regard to their palatability, these fishes have been grouped into the following three main classes:—

Class	*Local names*
A	Surmai, rawas, white pomfret and black pomfret.
B	Sua, aal, boi, palla, hira, dothar and dawan.
C	Mushka, khagga and kund.

Fishes belonging to class "A" are the most delicious, but also the most expensive.

Table 1.—The Distribution of Vitamin 'A' in Liver, Flesh and Skin Oil.

Name of the species	English popular name	Local name	Liver		Flesh		Skin	
			p.c. of oil	Vit. A per g. of oil I. U.	p.c. of oil	Vit. A per g. of oil I. U.	p.c. of oil	Vit. A per g. of oil I. U.
Clroinemeus Tolooparah	Leather jacket	Aal, Mathiyamach.	4.2	343,390	0.12	4,683	0.8	5610
Mugil Speigleri	Grey Mullet	Boi	2.3	5,616	0.806	500	3.0	193
Thynnus thunnina	Tuna	Dawan	3.7	201,058	0.9	1,07	1.3	5000
Pristipoma olivaceum	Pomadasid	Dhother	2.4	75,000	0.42	870	2.6	traces
Lutianus Rivulatus	Snapper	Hira or Muyyo	7.5	100,000	0.7	267	3.7	7842
Clupea Ilisha	Shad or Hilsa	Palla	9.9	620	12.8	354	15.4	nil
Sciaena Dicanthus	Drums or Croakers	Sua	18.2	26,476	1.2	nil	5.7	nil
Pelamys Chilensis	Striped Mackeral	Surmai or Kergan	1.5	10,140	0.08	nil	0.607	2637
Polynumus Indicus	Threadfin	Rawas or Luckwa	2.5	156,437	0.055	3145	1.3	545
Stromateus Sinensis	White Pomfret	Achchopitho or Paplet	2.9	20,900	1.3	negligible	5.8	nil
Parastromateus Niger	Black Pomfret	Kalapitho or Kalachanda	3.9	16,213	2.8	65	11.3	nil
Arius Serratus	Cat fish	Khagga	2.2	21,000	0.105	nil	0.49	nil
Platycephalus Scaber	Flathead	Khokker	24.9	2,836	0.14	negligible	0.4	45,819
Otolithas Ruber	Drums or Croakers	Mushka	3.08	20,900	0.66	770	4.2	traces

Investigation of some of the important fishes, belonging to all the three groups mentioned above, is of particular significance in so far as the data obtained can be used in regulating the composition of our daily diets with respect to vitamin A, proteins and fats, etc.

The present paper deals with the distribution of vitamin A in the skin, flesh and liver of the fishes. Although the skin represents a very small portion of the body it has been included in the analysis because of a possible concentration of the oil and vitamin A in the skin.

Extraction of Oils

The oil was obtained by grinding the appropriate tissue with anhydrous sodium sulphate and repeatedly extracting with ether. The solvent was completely distilled off, the last traces being removed under vacuum.

Estimation of Vitamin A

A portion of the fresh oil was saponified, the unsaponifiable matter after the removal of the alkali was taken up in isopropyl alcohol and the vitamin A was estimated spectrophotometrically.[3]

The quantity of vitamin A was also estimated by means of the Carr-Price[4] (antimony trichloride) colour reaction, the blue colour produced being measured in a Hilger photoelectric colorimeter using filter 70.

Results for the distribution of vitamin A in the oil from the skin, the flesh, and the liver of 14 very common *teleostii* fishes are given in Table 1, while Table 2 shows the amount of vitamin A per 100 g. of flesh and per g. of the liver in various fishes.

TABLE 2— SHOWING THE VITAMIN 'A' CONTENT OF THE FLESH AND THE LIVER.

Name of the species	Local name	Vitamin A in flesh I.U./ 100 g.	Vitamin A in liver I.U./g.
Clroinemus Tolooparah	Aal	421	14422
Mugil Speigleri	Boi	400	129
Thynnus Thunnina	Tuna or Dawan	963	7439
Pristipoma olivaceum	Dother	345	1800
Lutianus Rivulatus	Hira	186	7500
Clupea Ilisha	Palla	4531	61
Sciaena Dicanthus	Sua	—	4818
Pelamys Chilensis	Kergan	—	152
Polynumus Indicus	Rawas	172	3910
Stromateus Sinensia	Achchopitho	—	606
Parastromateus Niger	Kalapitho	182	632
Arius Serratus	Khagga	—	462
Platycephalus Scaber	Khokker	—	706
Otolithes Ruber	Mushka	508	643

Discussion

The results in Table 1 show that some of the fishes examined, *e.g.*, aal, khokar, sua, etc., have oily livers, the muscle being very low in fat. On the other hand, some fishes such as palla have relatively small livers with little oil in them, but have very oily muscle tissue. This observation has also been made by other workers, who have noted that fishes like cod, haddock, etc., have fairly large livers rich in oil, but their flesh is very poor in oil content, while salmon has a relatively small liver and very oily muscle tissue.[5]

The livers of aal, dawan, dothar, hira and rawas, have an exceptionally high vatamin A content, the liver oil from aal having as much as 300,000 I. U. of vitamin A per g. As with sharks, this can most probably be attributed to the eating habits of these fishes. For instance, aal, dawan, hira, etc., with high vitamin A contents are mainly carnivorous, while boi, mushka etc. with low amount of vitamin A are plankton eaters.

It will be seen from Table 2 that, the flesh of 'A' class fishes is poor in vitamin A, while their livers are quite rich in it. On the other hand, 'B' and 'C' class fishes have most of their vitamin A in their flesh, the livers containing very little of it. The flesh of palla has a very high vitamin A content with 4531 units per 100 g. of flesh, as

against 963 units in tuna, which is the next lower in this respect (*vide* Table 2). It is also significant that palla is very popular amongst the poorer classes of Sind.

The abnormally high values of vitamin A in the skin of some of the fishes is rather peculiar and is being further investigated. Since in most fishes fat is found in a thin tissue immediately under the skin, and also in the liver and the flesh, it is possible that the high amount of fat in the skin of these fishes might account for greater vitamin A content (Table 1). Further work on *teleostii* fishes of Karachi waters is in progress.

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