

## FOOD AND FEEDING ACTIVITY OF *ILISHA MEGALOPTERA* LARVAE IN SHATT AL-ARAB ESTUARY

S.M.AHMED,\* M.T.AL-OKAILEE AND \*\*N.A.HUSSAIN

*Dep. of Fisheries, Coll. of Agriculture, Univ. of Basrah*

*Marine Science Center, Univ. of Basrah.*

*\*\*Dep. of Biology, Coll. of Science, Univ. of Basrah.*

### ABSTRACT

The guts of 110 specimens of *Ilisha megaloptera* larvae ranging in length between 6-21mm were examined. The study showed that *I. megaloptera* in the larval stage is phytoplankton feeders, consume mainly centric and pinnate diatoms, with centric diatoms being more important than pinnate especially in the smaller size larvae. Spatial and seasonal variations showed that there were no differences in the incidence of feeding during the survey in all stations sampled. This study showed that larval *I. megaloptera* appear to select food of a certain type (diatoms), which do not vary with the larval size.

### INTRODUCTION:

Clupeidae are pelagic fish usually migrating in shoals in coastal waters. Commercially they are very valuable fish in tropical, subtropical seas of the world. There are more than 15 species of Clupeidae in the Arabian Gulf (Kuronuma and Abe, 1972), while eight species were recorded in Iraqi marine waters, which *Ilisha megaloptera* was recorded as a common and regular species in Khor Al-Zubair during summer time (Hussain and Naama, 1989)

It has been found that *I. megaloptera* spawn almost throughout summer time from April to July mostly in near shore area of the Iraqi marine waters (near Fao peninsula) (Ahmed and Hussain, 2000).

There are many local studies concerning the biology and ecology of *I. megaloptera* in Iraqi marine waters

which have been attributed considerably to our knowledge of the life history of this species. These studies include Ahmed and Al-Mukhtar (1983); Ali (1993); Hussain *et al.*, (1993); Abdulla (2000) and Younis (2000).

Some of the above-mentioned studies were concerning the food and feeding habits of this species including the study of Ahmed and Al-Mukhtar (1983), Younis (2000) and Abdulla (2000). These studies concerning the food of juveniles and adult *I. megaloptera* and found that the juveniles and adult of this species are carnivorous fish, consume mainly shrimp, copepods and fish.

However, little is known of the feeding niche occupied by larval *I. megaloptera* in the plankton community of the Shatt Al-Arab Estuary. So, the purpose of this study is to investigate the food and feeding

habits of the larval stage of *I. megaloptera*, to understand its role in the economy of the estuary of Shatt Al-Arab.

#### MATERIAL AND METHODS:

Ichthyoplankton sampling was conducted in Shatt Al-Arab Estuary during April 2000 till March 2002. Three sampling stations were chosen: Al-Fao, Al-Ameeq and Al-Krean (fig.1). Sampling was done using 75 cm plankton net (330  $\mu$ m mesh size). Flow meter was used also to determine the volume of filtered water. The plankton samples were preserved using 10% seawater-formalin.

Sorting and identification of *I. megaloptera* larvae was done according to Okiyama (1988). 110 larvae ranging in length between 6-21mm were examined. Each specimen was measured to the nearest 0.1mm standard length (SL) (after forming the caudal fin) or neurocord length (NL) (before forming the caudal fin) with

the aid of ocular micrometer. Alimentary tract was removed and initial examination for the degree of fullness was estimated (at low magnification 10x) as a number of points, which arranged in 5 categories: 0 (empty), 5, 10, 15, 20 (full). Sorting and identification of the food organisms was done with the aid of compound microscope referring to Al-Handal (1988).

The presence of each food item was presented by a percentage by weighted points (P %), calculated from the sum of points given for each food item divided by the total number of points. Estimation of the occurrence of the different food organisms in each specimen was presented by a percentage occurrence (occ%) calculated from the number of guts which contain the organism in question out of the total number examined (Hyslop, 1980).

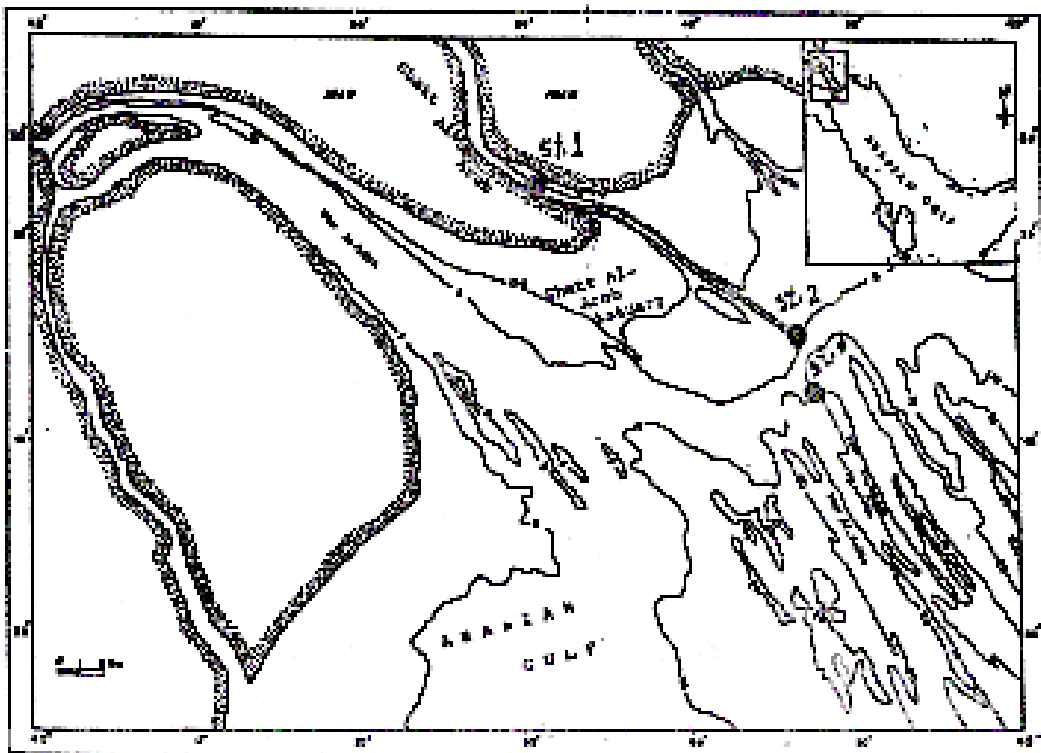


Fig. 1. Sampling stations for Ichthyoplankton showing depth contours in meters (m)

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## RESULTS:

### FOOD COMPOSITION:

A summary of the food items found in the gut of 110 specimens of *I. megaloptera* larvae was given in table 1. This table showed that diatoms (both centric and pinnate) represented the major food of *I. megaloptera* during the larval stage. Centric diatoms made up the bulk of the diatoms eaten in all size groups of larvae, while pinnate diatoms were less important for the smaller size larvae (6-10 mm), as its percentage weight was only 15.31%. While the percentage weight of pinnate diatoms was increased to 35.6% in the larger size group (16-21 mm). However, the percentage of occurrence (occ %) of pinnate and centric diatoms increased with increasing the size of the larvae. Table (2) showed the most abundant species of diatoms found in the gut of *I. megaloptera* larvae. It was recognized that *Navicula spp.* (pinnate diatom) being the most consumed species followed by *Coscinodiscus spp.* (centric diatoms).

Digested matter also was recorded in the gut of the larvae of all size groups, although its percentage weight was decreasing with increasing the size of the larvae (table 1).

### INCIDENCE OF FEEDING:

The percentage of feeding larvae or the incidence of feeding was given in table 1. This table showed that 94.14% of the larvae examined have food in their alimentary tract.

Incidence of feeding however, changed with the size of the larvae. Higher incidence (100%) was recorded in the largest size group (16-21 mm) comparing with the other size groups,

as no empty gut was recorded in the largest size group (16-21mm)

Table 3 showed that there were no seasonal variations in the incidence of feeding, which was high during all seasons, with higher incidence of feeding (98.47) recorded in summer, comparing with spring (92.85%) and autumn (91.1%).

### SEASONAL AND SPATIAL VARIATION IN INCIDENCE OF FEEDING:

Seasonal and spatial differences in the gut content showed that diatoms (centric and pinnate) was dominant throughout the year and in all stations sampled (table 4). There were no significant differences ( $P < 0.05$ ) in the degree of fullness of larvae between the three sampled stations, nor there were any difference in the food composition. This is evident from the high weighted point recorded especially in Ameeq and Kreaan stations during May, June, July and August.

### DISCUSSION:

Results obtained showed clearly that different larval stages of *I. megaloptera* feed on certain food items (centric and pinnate diatoms), which did not vary with the larval size.

Thus *I. megaloptera* larvae seems to select food of a certain type (diatoms). The selectivity of food organisms according to size was also recorded in anchovy larvae *Thryssa mystax* (Ahmed, 1994) and in mullet larvae *Liza carinata* (Ahmed, 2005).

The result of high incidence of feeding recorded means that there appeared to be an adequate supply of the appropriate quality and quantity of food available to the larvae of *I.*

*megaloptera* in Shatt Al-Arab estuary. That was evident as only 5% of the larvae examined had empty gut. Also the high primary productivity, which was, recorded in Shatt Al-Arab estuary (Al-Zubaidy, 1997; Al-Shaban, 1998) supports the above idea.

Although copepods in all developmental stages was found in a high density in the plankton samples collected, this food item was not recorded in any gut examined, which means that larval *I. megaloptera* do not eat it. Nevertheless, the major food for the juvenile's stage of *I. megaloptera* (less than 130mm total length) consists mainly of different larval stage of shrimp, copepods and crab (Abdulla, 2000; Younis, 2000). While the adult stage of *Ilisha* (more than 130mm total length) consume mainly fish and adult shrimp (Ahmed and Al-Mukhtar, 1983).

This shifting in feeding habits from phytoplankton feeding in the larval stage to zooplankton feeding in the juveniles stage then to predation on other fish and shrimp was recorded also by Ahmed and Al-Mukhtar (1983); Barak *et al.*, (1994); Marcus (1996) and Blaber *et al.*, (1998).

This change in feeding regime may be related to the developmental changes in the digestive tract and in the number and length of the gill rakers and changing in the position of the mouth opening (Ciechomski, 1967; Heckling, 1970; Abdulla, 2000).

The high incidence of feeding and the absence of seasonal variation in the incidence of feeding recorded in this study can be related to the blooming of diatoms during the fish larvae development period (spring, summer and fall seasons).

The dominance of centric diatoms in the gut of most *I. megaloptera* larvae examined, may be due to the dominance of this diatom in the estuary area (Al-Handal, 1988) or due to its suitable size and shape, which can be easily ingested by the larvae comparing with the pinnate diatoms which are larger in size and most of it contain spines in their structures which made it difficult to be ingested by the fragile *I. megaloptera* larvae.

In conclusion *I. megaloptera* larvae seem to select food according to its type, which did not vary with the size of the larvae.

Table 1: Food items found in the gut of larval *I. megaloptera* of different size. % W.p.: percentage by weighted points; % occ.: percentage by occurrence.

Length (mm)	6 – 10 mm		11 – 15 mm		16 – 21 mm	
No. Larvae	62		30		18	
No. Empty gut	3		3		0	
% Empty gut	4.84%		10%		0	
Incidence of feeding (%)	95.16		90.0		100	
	% w.p.	% occ.	% w.p.	% occ.	% w.p.	% occ.
<b>Diatoms:</b>						
<b>Pinnate</b>	15.31	68.96	29.26	94.34	35.6	100
<b>Centric</b>	45.6	98.18	42.3	94.34	46.6	100
<b>Digested matter</b>	39.09	98.18	28.44	94.37	17.8	100

Table 2: Kind of diatoms found in the guts of *I. megaloptera* larvae.

PHYLUM	CLASS	SPECIES
Bacillariophyta (green algae) (Diatoms)	Coscinodiscophyceae (Centric Diatoms)	<i>Coscinodiscus</i> spp.
		<i>Rhizosolenia</i> spp.
	Fragilariophyceae (Pennate Diatoms)	<i>Fragilaria</i>
		<i>Navicula</i> sp.
		<i>Pleurosigma</i> sp.
		<i>Gyrosigma</i> sp.
		<i>Nitzschia</i> sp.

Table 3: Seasonal incidence of feeding of *I. megaloptera* larvae.

	Spring	Summer	Autumn	Total
No. of larvae	10	78	22	110
% Feeding	92.85	98.47	91.1	94.14

**Table 4:** Seasonal and spatial variation in the food content, percentage of weighted point (%w.p.), percentage of occurrence (%occ.), incidence and intensity of feeding of larvae of *I. megaloptera*.

Month	Station	Method of food analysis	Food content			No. of larvae	No. of feeding larvae	W. Point	Incidence of feeding %
			Pinnate diatoms	Centric diatoms	Digested matter				
April 2001	Fao	w.p. %	22	34	24	7	6	80	85.7
		Occ. %	100	100	100				
May	Fao	w.p. %	1	3	1	1	1	5	100
		Occ. %	100	100	100				
	Krean	w.p. %	71	97	100	20	19	210	95
		Occ. %	100	42	100				
	Ameeq	w.p. %	13	65	52	15	16	130	86.6
		Occ. %	69.2	100	100				
June	Krean	w.p. %	44	83	58	17	17	185	100
		Occ. %	88.5	100	100				
July	Ameeq	w.p. %	4	42	64	10	10	110	100
		Occ. %	40	100	100				
August	Ameeq	w.p. %	19	66	75	15	15	160	100
		Occ. %	66.6	100	100				
October	Fao	w.p. %	2	8	10	2	2	20	100
		Occ. %	50	100	100				
	Krean	w.p. %	55	69	46	15	14	170	93.3
		Occ. %	100	100	100				
	Ameeq	w.p. %	9	18	8	5	4	35	80
		Occ. %	100	100	100				
March	Fao	w.p. %	25	20	10	3	4	55	100
		Occ. %	100	100	100				

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## طبيعة غذاء وتغذي يرقات اسماك أبو عوينة *Ilisha megaloptera* من مصب شط العرب

سميه محمد أحمد ، \* منى طه العكيلي \* \* ونجاح عبود حسين

قسم الأسماك والثروة البحرية، كلية الزراعة ، جامعة البصرة\*مركز علوم البحار ، جامعة البصرة.  
\* \* قسم علوم الحياة ، كلية العلوم ، جامعة البصرة.

### الخلاصة

فحصت محتويات معد 110 عينة من يرقات *Ilisha megaloptera* تراوحت أطوالها ما بين 6-21 ملم. بينت هذه الدراسة أن يرقات هذه السمكة هي آكلة هائمات نباتية ؛ تتغذى بصورة أساسية على الدباتومات القرصية بالدرجة الأساس خاصة في اليرقات الصغيرة و تليها الدباتومات العصوية. بينت الدراسة كذلك عدم وجود فروق في شدة التغذية بين مناطق جمع العينات وبين اشهر تواجد اليرقات. أظهرت يرقات *I. megaloptera* نمطا من اختيار الغذاء تبعا لنوعه والذي لم يتأثر أبدا مع طول اليرقات.