THE *JATKA* FISH OF EASTERN BENGAL AND ITS SIGNIFICANCE IN THE FISHERY OF THE SO-CALLED INDIAN SHAD, *HILSA ILISHA* (HAMILTON).

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INTRODUCTION.

De (1910, p. 17) in his 'Report on the Fisheries of Eastern Bengal and Assam' identified the *Jatka* fish of Eastern Bengal as *Clupea fimbriata*[1] and stated that:

"The smallest of the herring family is known by the name of *jātkya*, or *khair*... is found in the estuaries as high up as Goalundo from February to April. It is ... fish, with a rather dark back and silvery sides shot with gold. It cannot be ... tanks. It is very tasty, is much prized as food, and a large number are c... net called *chāpila-jāl*. From the similarity in shape, appearance and ta... men describe it as the young of the *hilsa*. I believe that the fish describe... in the Dacca Division is identical with this fish."

Investigations carried out by the Fish... and Bihar and Orissa from 1919 to 1923 brought to light ... the young of *Hilsa*. First reference to this fact is contained ... for the year ending 31st March, 1920 (Finlow, 1920, p. 3), ... Work' it is stated that:

"Much useful work has been done by the District Fishery ... Khulna in this connection. They have collected valuable data r... ... and prevalence of the *hilsa* in their respective districts, and the ... tin... ... relating to the young *hilsa*, or *jatka* (as they are locally cal'... winter

In the next Annual Report it is stated (Evans, 1921, p. 3) that:

"The winter *hilsa* enquiry was mainly confined to collecting information about the occurrence and movement of the *jatka* in the rivers of Khulna and Dacca. It is a small *clupea* supposed to be young *hilsa*, but some doubts exist as to its identity with the *hilsa*.

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[1] According to Day (1878, p. 638), *Clupea fimbriata* is found in "Red Sea, seas of India to the Malay Archipelago. It abounds in certain years off the Malabar coast." It is distinguished from *C. ilisha* by the following salient characters:—

Clupea fimbriata.	*Clupea ilisha.*
1. Teeth on tongue and palatines.	No teeth inside mouth.
2. L. tr. 11-12.	L. tr. 17-19.
3. Length of head 5 to 5¼, height of body 4 to 4⅔ in the total length.	Length of head 4¼ to 4½, height of body 3½ to 3¾ in the total length.

[2] Through the kindness of Mr. C. H. Mojumdar we obtained specimens of *Chandana-hilsa* from the Dacca District; these belong to *Hilsa toli* (Hamilton).

Specimens of *jatka* have been sent to the Zoological Survey for identification, but the result is not yet known. This is an important enquiry in so far as it is likely to throw some light on the location of the breeding grounds of the *hilsa*. Without this knowledge it is almost hopeless to expect success in the artificial culture of this species."

Unfortunately the information collected about the occurrence and movement of the *Jatka* was not published and we have not been able to trace the material stated to have been sent to the Zoological Survey of India for identification. In the next year's Report (Evans, 1922, p. 2) reference is again made to the *Jatka*:

"It was mentioned in the last year's report that specimens of a small *clupea* supposed to be young *hilsa* and locally known as *jatka* had been sent to the Zoological Survey for identification, but no definite reply has so far been received. If the *jatka* proves to be the fry of the *hilsa* then a great advance has been made towards the discovery of the breeding grounds and this will be the first step towards the artificial culture of this species. The handling of this fish is, however, so very difficult on account of its extreme delicacy that I am inclined to think that it will take some time and a highly trained staff before success can be attained in the culture of this fish by the artificial fertilization of *hilsa* eggs by stripping the male and female as is done with the shad in America."

Later some material of *Jatka* seems to have been sent for determination to Dr. C. Tate Regan at the British Museum of Natural History, London, and it is observed by Finlow (1923, p. 2) under 'Hilsa Culture' in the Annual Report for the year ending 31st March 1923 that:

"The work under this head was practically confined to the investigation of the *jatka*, a small *Clupea*. The *jatka* has since been identified by Mr. C. Tate Regan, of the British Museum, as the young of the *hilsa*. It is remarkable that the *jatka* which is so abundant in some of the Eastern Bengal rivers, is scarcely to be found in the Hughli, although large quantities of *hilsa* are caught every year in this river during the rains. The existence of the *jatka* was therefore not known to the Department until recently. Even in *Departmental Bulletin No. 11, which contains an account of the hilsa investigation* work done up to the *hilsa* season of 1917, there is no mention of the *jatka*. Very large quantities of *jatka* are destroyed every year, and now that the relationship between the *jatka* and *hilsa* is proved, it is a matter for discussion as to whether a close season would not be advisable. There appears to be a continual diminution in the supply of *hilsa*, the price of which is constantly rising. The discovery that the *jatka* is the young *hilsa*, is the first step in the life history of the latter which has been brought to light; and of course it brings us so much nearer the possibility of artificial *hilsa* culture."

With the abolition of the Fisheries Department of Bengal in 1923, the *Jatka* enquiries came to an end. In 1933, Finlow (p. 5) again directed attention to this problem and stated that "the fingerling of the *hilsa* has been identified in the *jatka*, a small fish less than 6" long, found in the Buriganga, Lakhya and Meghna rivers in Eastern Bengal in February-March. It is probable therefore that the main spawning grounds of *hilsa* are in Eastern Bengal."

In 1938, one of us (Hora, 1938, pp. 147-158) announced the discovery of the spawning grounds of *Hilsa* in the Bengal waters, but no attention was then paid to the extensive fishery of *Jatka*. Commenting on this article, Jenkins (1938, p. 252) wanted the identity of *Jatka* or *Jatkya* to be cleared up. Following this suggestion we (1940, pp. 42, 43) made investigations in East Bengal in February 1939 through Mr. M. N. Datta, who visited Barisal, Patuakhali, Galachipa, Chandpur, Narayangurj and Goalundo. Though no definite information was obtained about *Jatka*, it was ascertained that *Hilsa* breeds extensively in East Bengal and that there are in places extensive fisheries of young *Hilsa*. These investigations were continued in 1940 through the help of the district authorities and Mr. Mojumdar who had made observations on *Jatka* in his article "Culture of Hilsa" (p. 293). As the full signification of

the association between the *Jatka* and the *Hilsa* fisheries has not yet been realised, we give below some observations on the material received from different sources during March-April, 1940.

Identity and Bionomics of the *Jatka* Fish of East Bengal.

Early in January 1940, the Collectors of Faridpur and Noakhali and the Sub-Divisional Officer, Narayangunj, were requested to collect and forward *Jatka* fish as soon as they appear in the rivers of their respective areas. The first consignment of *Jatka* was received in Calcutta on the 15th February from the Circle Officer, Lakshmipur, Noakhali District. In the forwarding note it was stated that much trouble was experienced in procuring the material as that was not the season for the *Jatka* fish. The fish were received in two lots, 12 preserved in salt were the young of *Hilsa*, while of the 7 preserved in formalin 1 was young *Hilsa* and the others young of *Gudusia chapra* (Ham.). On making further enquiries regarding the precise habitat of the specimens, the following valuable information was received :—

" Since the beginning of January I made constant efforts to procure the fish called *Jatka*. I informed the Fishery Society at Bhowaniganj and requested all the presidents and members of the Union Boards in my Circle to help me in the matter and I supplied them with a copy of the description of the fish *Jatka* sent by you. After the lapse of more than a month came the collection I sent—one found as *Chapra* from Char Ramani Mohan and the other ' young Hilsa ' from Raipur. The latter specimens were purchased from Raipur Bazar and were reported to have been caught in Meghna nearby with a long net set not far off from the bank. The former, namely *Chapra*, was caught with a kind of fencing made of split up bamboos pitched on the edge of the Char during the flow tide and the fish is caught when the water goes down from inside the fencing.

" The ' young Hilsa ' is known to the local people by the name *Jatka*. *Chapra* is called by some to be *Jatka*. But majority of the people call *Chapra* to be *Chapila*. There is no such division of opinion with regard to the name given to ' young Hilsa ', namely *Jatka*. Both the forms go up the river. *Jatka* is said to occur in greater quantity than now sometime towards the end of Falgoon (February-March) and beginning of Chaitra (latter half of March) but the quantity will never be so great as to fill a tin."

The young *Hilsa* from Lakshmipur (Table I) were from 85 to 141 mm. in length, average size 114 mm., and were marked with series of black spots on the sides which are so characteristic of the juvenile stages of *Hilsa*. The length of head was contained from 4·0 to 4·3 times and the depth of body from 3·5 to 3·9 times in the total length. An examination of the stomach-contents of these examples showed that they were feeding heavily. In every individual the intestine was filled with a green pulpy matter which seemed to comprise half digested algae of a filamentous type. Copepods and bits of algae were also present in the stomach. A fair quantity of sand grains was also found in the alimentary canal. The edges of the scales, except in a few lateral scales of one individual, showed that growth was taking place.

The second consignment of *Jatka* (Table II) was sent by the Sub-Divisional Officer, Narayanganj, on the 16th March, 1940. It comprised 30 specimens of young *Hilsa* ranging in length from 116 to 165 mm., average length being 143 mm. All the specimens were marked with black spots on the sides. The length of head was contained from 3·9 to 4·3 times and the depth of the body from 3·6 to 4·1 times in the total length. An examination of their stomach-contents showed that they had been feeding heavily. In some specimens the stomach and intestine were very much distended. In specimens with an empty stomach the intestine

contained a pulpy matter. Bits of algae of the *Spirogyra*-type as well as those of a light brown colour formed the bulk of the gut-contents though copepods were also found in good numbers. Sand grains in fair quantities were also present. The edges of the scales with the exception of a few lateral scales in two specimens showed the growing phase.

On the 29th March, 1940, the Sub-Divisional Officer, Goalundo, sent a consignment of 29 specimens of *Jatka* (Table III) and stated that these had been procured by the Thana Officer, Goalundo Ghat. All of these proved to be young *Hilsa* ranging in length from 86 to 163 mm., with an average length of 107 mm. The length of head varied from 4·0 to 4·5 times and the depth of body from 3·7 to 4·1 times in the total length of the fish. The specimens were marked with black spots, and had been feeding mostly on algae. Copepods also formed a small part of their food. The edges of the scales showed a growing phase.

Through the kindness of Mr. Mojumdar, three consignments of *Jatka* (Tables IV, V and VI), all of which proved to be young *Hilsa*, were received on the 20th March, 11th April and 14th May respectively. The March lot comprised 20 specimens, ranging from 95 to 142 mm. in length, with an average length of 122 mm. The length of head was contained from 4·0 to 4·2 times and the depth of the body from 3·6 to 4·1 times in the total length. The specimens were mostly without any spots or had only one anterior spot. Most of the specimens had been feeding mainly on diatoms, but copepods, algae and sand particles were also present in the stomach in fair numbers. The edges of the scales in the majority of specimens showed a growing phase, but in a few specimens some of the lateral scales showed the beginning of the stoppage phase.

On making enquiries regarding the relative abundance and the methods of fishing of *Jatka*, Mr. Mojumdar informed us that *Jatka* move in shoals against the current and are caught in very large numbers by means of a small meshed seine net locally known as *Berjal* which is about ½ mile in length, 20 to 25 cubits in breadth. He also observed that shoals of *Jatka* prefer parts of the channel where the current is somewhat stronger.

On the 10th April, Mr. Mojumdar sent 41 *Jatkas* from Dacca and observed, " It is really a pity that such promising fry are killed and disposed of, say a score for a pice or two " He also stated that " Since I wrote to you last, *Jatka* came in the market in good numbers for a day or two. And the *Hilsha* supply which generally ceases, in normal years, by this part of the season, is continuing on, though the quantity has undergone a decrease." All the specimens proved to be young of *Hilsa*, ranging from 91 to 122 mm. in length, with an average length of 113 mm. The length of the head is contained from 3·8 to 4·5 times and the depth of the body from 3·4 to 3·9 times in the length. The food consisted mainly of diatoms, but a small quantity of copepods was also present. No algae were found among the stomach-contents, and the intestines were practically empty. Though in about 30 per cent. of the specimens the edges of all the scales showed a growing phase, in a great majority of scales on the sides the growth had ceased.

On the 18th April, Mr. Mojumdar informed us that " Jatka supply is showing a tendency towards increase in the local markets at the preser t

time" Again on the 13th May, Mr. Mojumdar procured a few specimens and observed that " Supply of Jatkas in Dacca markets has undergone a great decrease at the present time. The supply was big for 15 days approximately from the date I sent you the second consignment" This final consignment of *Jatka* comprised 8 young *Hilsa* ranging from 118 to 143 mm. in length, average length being 129 mm. The length of the head was contained from 4·1 to 4·3 times and the depth of body from 3·4 to 3·8 times in the total length. Most of the specimens possessed one lateral spot while a few were devoid of any markings. In three specimens the stomach was empty but the intestine contained some pulpy matter. Some of the lateral scales showed stoppage of growth while the others were in a growing phase. In the remaining specimens the stomach was full of algae and copepods. The intestine contained greenish pulp and all the scales showed a growing phase.

The *Jatka* season ended with the May lot and according to the information supplied by Mr. Mojumdar, the *Hilsa* season at Dacca commenced from the 8th June, when large-sized fish became available in the local markets.

From the foregoing account there is not the slightest doubt that *Jatka* represent the young of *Hilsa*. Of the 138 specimens examined, the smallest, 85 mm. in length, was obtained at Lakshmipur in February, while the largest specimen, 164 mm. in length, was received from Narayangunj. From the evidence already adduced about the rate of growth of *Hilsa* (Hora & Nair, 1940, pp. 36-41), it may be surmised that *Jatka* represent 2 to 5 months old young of *Hilsa*. If this surmise is correct, the *Jatka* individuals must be regarded as the progeny of the late breeders who had not yet gone down to the sea and were, prior to their ascent up-river, feeding in the estuaries. Though there is no definite evidence to show the actual direction of the movements of the shoals of *Jatka*, the fact that they appeared at Lakshmipur in February, at Narayangunj and Dacca about the middle of March and at Goalundo about the end of March is very significant and shows that the shoals probably move from the estuaries upstream. In this connection attention may be directed to the following observations of Mr. Stanley Howard (1938) :

" The young fish after about two months stay in the sea, add considerably to their size and weight, and towards the end of December they return to the estuaries (Sunderbans) in shoals. The fish at about this time are about 7 to 9 inches long and in search of new feeding grounds."

The object of this up-river migration of *Jatka* is feeding and our studies of their stomach-contents fully bear out this contention. Prashad, Hora and Nair (1940, p. 540) have already observed that young *Hilsa* at Chandipore stop feeding towards the end of February and presumably at this time plankton food is scarce in the sea. Impelled by this scarcity of food in the sea the young invade rivers in shoals to reach their inland feeding grounds. The edges of the scales also show that the fish grows during the *Jatka*-phase of its life. Only in April and May the growth is somewhat retarded. During February and March algae constitute the bulk of the food while during the nor'-westers (March-April) diatoms form the bulk of the food. In May algae begin to predominate again. The variation in the number of lateral blotches generally depends upon the size of the *Jatka*, and in our opinion does not constitute a character

of specific or racial value. Hamilton's drawing of *Clupanodon ilisha* (pl. xix, fig. 73) shows 5 lateral spots and presumably represents a young *Hilsa*. Day (1878, p. 640) had also observed that young *Hilsa* possess lateral blotches.

Significance of *Jatka* in the Fishery of *Hilsa*.

The question of the bearing of the destruction of the young *Jatka* on the main fishery of *Hilsa* may next be considered. In this connection attention may be directed to observations made by one of us (Hora, 1938, p. 156) regarding the establishment of hatcheries for *Hilsa*. It was then stated that :

> " In view of the fact that after the floods millions of young *Hilsa* are caught from the river Hooghly, it seems that there is no need at present to augment the numbers of this fish through artificial fecundation. There would, however, seem to be an urgent necessity to preserve the natural stock by prohibiting the catching of young *Hilsa* through legislation during the months of October and November."

In October and November very young specimens of *Hilsa* up to about 50 mm. in length are caught while migrating down-stream to the estuaries. In the estuaries and on the foreshore young ones of 7 to 9 inches are caught in large numbers during the cold months of November to January. Afterwards when these young move up-stream for feeding purposes, there are extensive fisheries of *Jatka* in inland waters during March-April. The fishery of young *Hilsa* at all these stages leads to the depletion of the natural stock and with the increasing demand for fish, there is a corresponding activity in catching fish of all sizes. However, in legislating for regulating the unproductive fishery of the young, some alternate mode of subsistence will have to be found for the fishermen, otherwise it may mean great hardship to those poor people. In view of the existing extensive fisheries of the young *Hilsa* in Bengal waters, however, there is hardly any necessity for establishing *Hilsa* hatcheries. All the same the question of the *Hilsa* fishery in Bengal is of such vital importance that it requires very thorough investigation before any remedial measures can be suggested.

Cause of the Absence of *Jatka* from the river Hooghly.

Finlow (1923, p. 2) observed that " It is remarkable that the *Jatka* which is abundant in some of the Eastern Bengal rivers, is scarcely to be found in the Hughli, although large quantities of *Hilsa* are caught every year in this river during the rains" This is due to the fact that the Hooghly has silted up and deteriorated to such an extent, especially in its upper reaches, that, except during the monsoon, it receives little water from the main stream of the Ganges, and is, therefore, not comparable to the rivers of Eastern Bengal which flow throughout the year. In March, 1937, one of us (S. L. H.) made a survey of the fish-fauna of the river Hooghly above Calcutta as far as Nadia, a distance of about 100 miles. The river above the town of Hooghly was found to be only a foot or so deep at low tide. This silting up of the bed is probably the result of the lack of any freshwater current from above. The upper reaches of the river seemed almost like a stationary pool and the fish-fauna collected therefrom was composed of a large number of pool-dwell-

ing forms. The occurrence of bottom fishes of marine or estuarine genera, such as *Platycephalus, Cynoglossus, Pseudorhombus, Taenioides, Pseudapocryptes* and *Apocryptes* far inland above the tidal influence also showed that for lack of adequate flow from above the bottom wedge of brackish water had penetrated to a considerable extent inland. In several respects the Hooghly during the dry season may be compared to a lagoon. As the *Jatka* prefer a fast current of water, the Hooghly during March-May is not suitable for their inland migration. Only during and immediately after the monsoon the current is of sufficient intensity to induce the adult *Hilsa* and its young to migrate upstream in this river.

Summary.

A detailed summary of the earlier records of the occurrence of the *Jatka* fish in the rivers of East Bengal is given, and from a study of several lots of *Jatka*, comprising 138 specimens, received from Lakshmipur in February, Narayangunj and Dacca about the middle of March and Goalundo about the end of March it is concluded that (i) *Jatka* represent the young of *Hilsa* 2 to 5 months old, (ii) the migration of *Jatka* from the estuaries into fresh waters is for feeding purposes, and (iii) during the *Jatka* phase the *Hilsa* feed and grow and it is only in April-May that the feeding is stopped and, in consequence, the growth inhibited. Attention is directed to the significance of *Jatka* in the fishery of *Hilsa* and it is concluded that for the proper conservation and augmentation of the *Hilsa* fishery it is not necessary to have hatcheries, but to devise suitable means for protecting the young of *Hilsa* from destruction. The cause of absence of *Jatka* from the river Hooghly is attributed to the silting up of its upper reaches and, in consequence, to a general deterioration of the river.

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TABLE I.

Measurements, gut-contents and scale readings of "Jatka" caught at Lakshmipur during February, 1940.

Serial No.	Length.	Height.	Gut-contents.	No. of rings on scale.	Condition of edge of scale.
	mm.	mm.			
1	85	24	Plenty of copepods, algal bits and digested green pulp.	*Nil.*	Growing phase.
2	93	24	Ditto.	Do.	Ditto.
3	94	25	Ditto.	Do	Ditto.
4	113	31	Ditto.	Do.	Ditto.
5	115	31	Ditto.	Do.	Ditto.
6	117	32	Ditto.	Do.	Growing phase in majority, 'A' phase in few.
7	124	33	Ditto.	Do.	Growing phase.
8	125	35	Ditto.	Do.	Ditto.
9	132	38	Ditto.	Do.	Ditto.
10	141	38	Ditto.	Do.	Ditto.

TABLE II.

Measurements, gut-contents and scale readings of "Jatka" caught at Narayangunj during March, 1940.

Serial No.	Length.	Height.	Gut-contents.	No. of rings on scale.	Condition of edge of scale.
	mm.	mm.			
1	116	31	Plenty of green and brown algal bits, copepods and sand.	1	Growing phase.
2	118	32	Ditto.	1	Ditto.
3	128	34	Ditto.	1	Ditto.
4	129	35	Ditto.	1	Ditto.
5	129	34	Ditto.	1	Ditto.
6	131	36	Ditto.	1	Ditto.
7	133	35	Ditto.	1	Ditto.
8	133	35	Ditto.	1	Ditto.

TABLE II—*contd.*

Serial No.	Length.	Height.	Gut-contents.	No. of rings on scale.	Condition of edge of scale.
	mm.	mm.			
9	133	35	Plenty of green and brown algal bits, copepods and sand.	1	Growing phase.
10	136	35		1	Ditto.
11	136	36	Ditto.	1	Ditto.
12	137	36	Ditto.	1	Ditto.
13	138	37	Ditto.	1	Ditto.
14	138	36	Ditto.	1	Ditto.
15	142	39	Ditto.	1	Ditto.
16	142	36	Ditto.	1	Ditto.
			Ditto.		
17	145	40	Ditto.	1	Ditto.
18	146	40	Ditto.	1	Ditto.
19	146	40	Ditto.	1	Ditto.
20	147	36	Ditto.	1	Growing phase in majority, 'A' phase in few.
21	148	39	Ditto.	1	Growing phase.
22	149	39	Ditto.	1	Ditto.
23	150	38	Ditto.	1	Ditto.
24	151	40	Ditto.	1	Ditto.
25	155	42	Ditto.	1	Growing phase in majority, 'A' phase in few.
26	156	41	Ditto.	1	Growing phase.
27	158	42	Ditto.	1	Ditto.
28	160	40	Ditto.	1	Ditto.
29	161	42	Ditto.	1	Ditto.
30	164	43	Ditto.	1	Ditto.

TABLE III.

Measurements, gut-contents and scale readings of "Jatka" *caught at Goalundo during March, 1940.*

Serial No.	Length.	Height.	Gut-contents.	No. of rings on scale.	Condition of edge of scale.
	mm.	mm.			
1	86	22	Plenty of green algae and copepods.	*Nil.*	Growing phase.
2	90	23	Ditto.	Do.	Ditto.
3	90	23	Ditto.	Do.	Ditto.
4	91	22	Ditto.	Do.	Ditto.
5	91	23	Ditto.	Do.	Ditto.
6	95	24	Ditto.	Do.	Ditto.
7	95	24	Ditto.	Do.	Ditto.

TABLE III—*contd.*

Serial No.	Length.	Height.	Gut-contents.	No. of rings on scale.	Condition of edge of scale.
	mm.	mm.			
8	95	24	Plenty of green algae and copepods.	*Nil.*	Growing phase.
9	96	24	Ditto.	Do.	Ditto.
10	96	24	Ditto.	Do.	Ditto.
11	98	24	Ditto.	Do.	Ditto.
12	99	25	Ditto.	Do.	Ditto.
13	99	25	Ditto.	Do.	Ditto.
14	100	25	Ditto.	Do.	Ditto.
15	102	26	Ditto.	Do.	Ditto.
16	103	26	Ditto.	Do.	Ditto.
17	103	27	Ditto.	Do.	Ditto.
18	105	27	Ditto.	Do.	Ditto.
19	106	26	Ditto.	1	Ditto.
20	109	27	Ditto.	1	Ditto.
21	109	27	Ditto.	1	Ditto.
22	111	29	Ditto.	1	Ditto.
23	115	30	Ditto.	1	Ditto.
24	118	30	Ditto.	1	Ditto.
25	131	35	Ditto.	1	Ditto.
26	133	36	Ditto.	1	Ditto.
27	134	36	Ditto.	1	Ditto.
28	158	41	Ditto.	1	Ditto.
29	163	44	Ditto.	1	Ditto.

TABLE IV

Measurements, gut-contents and scale readings of "Jatka" caught at Dacca during March, 1940.

Serial No.	Length.	Height.	Gut-contents.	No. of rings on scale.	Condition of edge of scale.
	mm.	mm.			
1	95	26	Small quantity of diatoms, copepods, bits of green algae, sand and pulp.	*Nil.*	Growing phase in majority, 'A' phase in few scales.
2	103	27	Ditto.	Do.	Ditto.
3	111	30	Ditto.	Do.	Growing phase.
4	112	31	Ditto.	Do.	Ditto.
5	113	31	Ditto.	Do.	Ditto.
6	115	31	Ditto.	Do.	Growing phase in majority, 'A' phase in few.
7	115	32	Ditto.	Do.	Ditto.
8	118	30	Ditto.	Do.	Growing phase.

TABLE IV—*contd.*

Serial No.	Length.	Height.	Gut-contents.	No. of rings on scale.	Condition of edge of scale.
	mm.	mm.			
9	118	29	Small quantity of diatoms, copepods, bits of green algae, sand and pulp.	*Nil.*	Growing phase in majority, 'A' phase in few.
10	121	32	Ditto.	Do.	Ditto.
11	122	33	Digested pulp.	Do.	Growing phase.
12	124	34	Small quantity of diatoms, copepods, bits of green algae, sand and pulp.	Do.	Growing phase in majority, 'A' phase in few.
13	126	33	Ditto.	Do.	Ditto.
14	130	35	Ditto.	Do.	Ditto.
15	131	32	Ditto.	Do.	Growing phase.
16	131	33	Digested pulp.	Do.	Ditto.
17	133	35	Small quantity of diatoms, copepods, bits of green algae, sand and pulp.	Do.	Ditto.
18	137	37	Ditto.	Do.	Ditto.
19	137	35	Ditto.	Do.	Ditto.
20	142	36	Digested pulp.	Do.	Growing phase in majority, 'A' phase in few.

TABLE V.

Measurements, gut-contents and scale readings of "Jatka" *caught at Dacca during April, 1940.*

Serial No.	Length.	Height.	Gut-contents.	No. of rings on scale.	Condition of edge of scale.
	mm.	mm.			
1	91	25	Plenty of diatoms, few copepods and small quantity of digested pulp.	*Nil.*	Growing phase in majority, 'A' phase in few.
2	97	26	Ditto.	Do.	Ditto.
3	98	26	Small quantity of diatoms, copepods.	Do.	Ditto.
4	100	26	Plenty of diatoms and copepods.	Do.	'A' phase in majority, growing phase in few.
5	100	28	Ditto.	Do.	Growing phase in majority, 'A' phase in few.
6	100	29	Alimentary canal empty.	Do.	Growing phase.
7	101	28	Small quantity of diatoms and copepods.	Do.	Growing phase in majority, 'A' phase in few.
8	101	27	Ditto.	Do.	Growing phase.
9	101	28	Plenty of diatoms and copepods.	Do.	Growing phase in majority, 'A' phase in few.
10	101	27	Alimentary canal empty.	Do.	Ditto.
11	102	26	Small quantity of diatoms and copepods.	Do.	Ditto.
12	102	27	Alimentary canal empty.	Do.	Ditto.

TABLE V—*contd.*

Serial No.	Length.	Height.	Gut-contents.	No. of rings on scale.	Condition of edge of scale.
	mm.	mm.			
13	102	28	Small quantity of diatoms and copepods.	*Nil.*	Growing phase in majority, 'A' phase in few.
14	102	27	Ditto.	Do.	Ditto.
15	103	28	Plenty of diatoms and copepods.	Do.	Ditto.
16	103	28	Ditto.	Do.	Ditto.
17	104	29	Ditto.	Do.	Ditto.
18	105	29	Small quantity of diatoms and copepods.	Do.	Ditto.
19	105	28	Ditto.	Do.	Growing phase.
20	105	28	Plenty of diatoms and copepods.	Do.	Growing phase in majority, 'A' phase in few.
21	106	29	Small quantity of diatoms and copepods.	Do.	Growing phase.
22	106	29	Ditto.	Do.	Ditto.
23	107	28	Ditto.	Do.	Ditto.
24	107	28	Plenty of diatoms and copepods.	Do.	Growing phase in majority, 'A' phase in few.
25	107	29	Small quantity of diatoms and copepods.	Do.	Growing phase.
26	107	29	Ditto.	Do.	'A' phase.
27	108	29	Plenty of diatoms and copepods.	Do.	Growing phase in majority, 'A' phase in few.
28	108	29	Ditto.	Do.	Ditto.
29	109	29	Small quantity of diatoms and copepods.	Do.	Ditto.
30	109	29	Plenty of diatoms and copepods.	Do.	Growing phase.
31	109	30	Small quantity of diatoms and copepods.	Do.	Ditto.
32	110	29	Ditto.	Do.	Ditto.
33	110	29	Plenty of diatoms and copepods.	Do.	Growing phase in majority, 'A' phase in few.
34	112	32	Ditto.	Do.	Ditto.
35	112	29	Ditto.	Do.	Growing phase.
36	112	30	Ditto.	Do.	Growing phase in majority, 'A' phase in few.
37	112	33	Ditto.	Do.	Ditto.
38	113	29	Ditto.	Do.	Ditto.
39	117	31	Ditto.	Do.	Growing phase.
40	118	32	Ditto.	Do.	Growing phase in majority, 'A' phase in few.
41	122	32	Ditto.	Do.	Growing phase.

Table VI.

Measurements, gut-contents and scale readings of "Jatka" caught at Dacca during May, 1940.

Serial No.	Lengtn.	Height.	Gut-contents.	No. of rings on scale.	Condition of edge of scale.
	mm.	mm.			
1	118	31	Digested pulp	*Nil.*	Majority in growing phase, few in 'A' phase.
2	119	34	Ditto.	Do.	Ditto.
3	120	33	Ditto.	Do.	Ditto.
4	132	38	Plenty of algae, copepods and greenish digested pulp.	Do.	Growing phase.
5	134	39	Ditto.	Do.	Ditto.
6	134	36	Ditto.	Do.	Ditto.
7	137	38	Ditto.	Do.	Ditto.
8	143	40	Ditto.	Do.	Ditto.