

## NOTES

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### OBSERVATIONS ON THE INDIAN SHORT-FINNED EEL *ANGUILLA BICOLOR BICOLOR* McCLELLAND CAUGHT FOR THE FIRST TIME AT SEA DURING SPAWNING MIGRATION

K. DORAIRAJ AND G. NANDAKUMAR

Central Marine Fisheries Research Institute, Cochin 682018

#### ABSTRACT

One migrant Indian short-finned female silver-eel, *Anguilla bicolor bicolor* McClelland, measuring 866 mm in total length and 1150 g in weight, caught alive for the first time from the inshore area off Karwar in July 1980, is recorded. Salient morphological, morphometric and gonadal characteristics of the migrant eel, compared with those of non-migrant and partially spawned female eels, confirmed that the eel was in a maturing stage and was on its way to oceanic spawning ground.

Several reports exist on the European eel, *Anguilla anguilla* L., the American eel, *A. rostrata* LeSueur, the Japanese eel, *A. japonica* Temminck and Schlegel and the New Zealand eel, *A. dieffenbachi* Gray, caught at sea during migration to their oceanic spawning grounds (Schmidt 1906, Svardson 1949, Rasmussen 1951, Bertin 1956, Honma 1966, Todd 1973, Wenner 1973, Tesch 1977), but no such records are found about the Indian eels. For the first time, an Indian short-finned female silver-eel, *Anguilla bicolor bicolor* McClelland (Fig. 1) was caught alive on 31-7-1980 at 10 a.m. in a shore seine on the west coast of India (Lat. 14° 18' N and Long. 74° 07' E) at 6-7 m depth in the inshore area off Karwar during its migration to spawning ground. At the time of collection the weather was foggy and it was raining heavily. The kali river, which is about 4 km north of the collection site, was in floods. The details of observations\* made and the significance of this collection in elucidating the reproductive biology of Indian eels are briefly presented in this note.

*Description of the specimen:* Total length 866 mm; weight 1150 g; anodorsal length 1.04; head length 13.97; snout to dorsal 41.69 and snout to anus 42.73

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\* The observations presented here on the migrant eel and the primary data on non-migrant and partially spawned eels are those of the senior author while the migrant eel was collected by the junior author.

percent in total length. Inter-orbital 24.79; snout to eye 17.36; eye diameter, horizontal 9.92, vertical 9.09; upper jaw 24.79; lower jaw 27.27 and pectoral length 38.02 percent in head length.

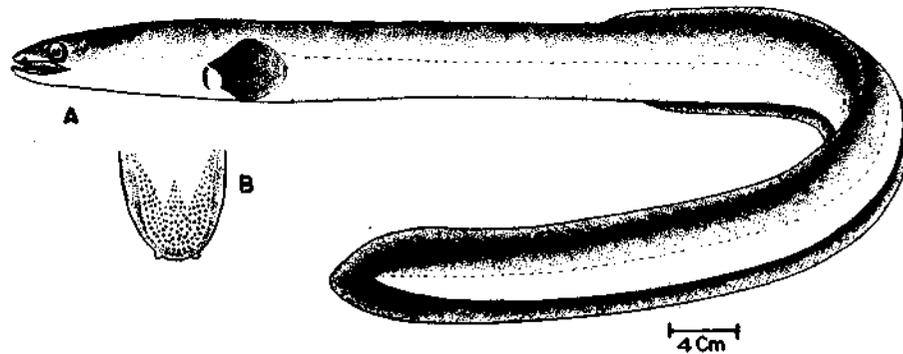


FIG. 1. A. The Indian short-finned female eel, *Anguilla bicolor bicolor* McClelland (866 mm in length) caught at Karwar sea on 31-7-1980 during the spawning migration. B. Dentition.

Head flat with a small muscular dome on the dorsal side; snout broad and round. Eyes large slightly oval in shape. Lower jaw slightly projecting beyond of upper jaw, lips thin. Pectoral fins long, broad with round edges. Dorsal fin commences above vent. The dorsal surface grey in colour; ventral surface and sides below the lateral line silvery white with tinges of golden yellow. Pectoral fins dark black except at the origin where it is golden yellowish in shade. Lateral line prominent.

**Other features:** The gut was empty. The ovaries weighed 34 g. The gonadosomatic index (GSI) was 2.96. The left ovary was longer (281 mm) and lighter in weight (16 g) as compared to the right ovary (268 mm; 18 g). The greatest width of the left and right ovaries measured 23 mm and 24 mm, respectively. One side of the ovary facing the intestine was pinkish and the other side facing the body wall was whitish in colour. The size of the ovarian eggs ranged from 0.13 mm to 0.27 mm in diameter with an average of 0.21 mm in diameter.

A comparison of some of the salient morphological, morphometric and gonadal characteristics of this migrant female eel with those of a non-migrant female collected on an earlier occasion from Veeranam lake (South Arcot district) and a partially spawned female, which had been induced to maturity through hormone injections, revealed some interesting features. The head of the non-migrant eel had a big muscular dome on the dorsal side. The lips were very thick. The dorsal and ventral sides were brownish; the latter slightly lighter in shade. The stomach contained little quantity of food. The head of the partially spawned eel was flat without muscular dome and the lips were thin. The dorsal side was light brownish while the entire lower half of the body below the lateral

line was silvery white. The length-width ratio of the pectoral fin shows a gradual increase from the non-migrant through migrant to partially spawned eel (Table 1). A similar gradual increase is also noted both in respect of horizontal and vertical diameter of the eye of the eels. The length of the ovary is more or less constant, whereas the weight shows a slight increase (about 0.5%) from the non-migrant to migrant eel and about 21% and 24% increase from migrant to partially spawned eel in respect of their right and left ovaries. The gonadosomatic index and oocyte diameter also show similar increases from the non-migrant through migrant to partially spawned eel. It is thus evident that the female eel collected from the sea off Karwar is in a maturing stage and may have just commenced its migration to the spawning ground.

TABLE. 1. Comparison of some salient characters of the non-migrant, migrant and partially spawned female eel, *A. bicolor bicolor*.

Charaters	Non-migrant (Veerananm Lake)	Migrant (Karwar)	Partially Spawned (thro' hor- mone injec- tion)
Total length mm	800	866	625
Width of ovary in % of length	1:0.78	1:0.85	1:
Weight g	1360	1150	625
<i>Eye diameter in % of head length</i>			
a) Horizontal diameter	9.26	9.92	13.25
b) Vertical diameter	8.33	9.03	10.84
<i>Length of ovary in % of total length</i>			
a) Left ovary	32.00	32.45	32.00
b) Right ovary	28.25	30.95	30.40
<i>Weight of ovary in % of total weight</i>			
a) Left ovary	0.96	1.39	25.62
b) Right ovary	0.93	1.57	22.52
<i>Width of ovary in % of length of respective ovary</i>			
a) Left ovary	7.81	8.19	36.00
b) Right ovary	10.71	8.96	32.11
Gonadosomatic Index (GSI)	1.89	2.96	48.10
Average oocyte diameter mm	0.10	0.21	0.91

**Remarks:** The present collection of *A. bicolor bicolor* from the sea gives an authentic evidence as to the season of migration and the gonadal condition of the eel at the time of its entrance into the sea. The silver eels of *A. anguilla* undertake migration from June to December with a peak in October-November months; *A. rostrata* from November to December; *A. japonica* from October to April; and *A. dieffenbachi* in May (Todd 1973, Tesch, 1977). The present observation reveals that *A. bicolor bicolor* undertakes migration in the end of July when the oocytes measure 0.13 mm to 0.27 mm with an average of 0.21 mm in diameter which are within the range of the other eel species.

The silver-eels are known to undertake spawning migration from their place of dwelling during flood time (Lowe 1952, Deelder 1945, Sina and Jones 1975, Tesch 1977). In the present case the eel was collected in the nearshore region off Karwar, about 4 km south of the estuary mouth of the Kali river, which was in spate at the time of collection. Elvers are also reported to occur in this river (personal communication from Dr. M. V. Pai). These circumstantial evidences suggest that the eel may have descended from the Kali river into the sea and started its southward migration. The probable spawning grounds for *A. bicolor bicolor* are in the eastern Indian Ocean near Sumatra in Mentavene deep between 4° S and 2° N latitudes and in the western Indian Ocean near the north east of Malagasy between 10° S and 20° S latitudes and 60° E and 65° E longitudes (Fig. 2) (Jesperson 1942, Tesch 1977). Judging from the gonadal condition and the site of collection, the eel apparently was on its way to the oceanic spawning ground 3000-4000 km away from the place of collection. The interesting question arising out of this study is whether the Indian eels also

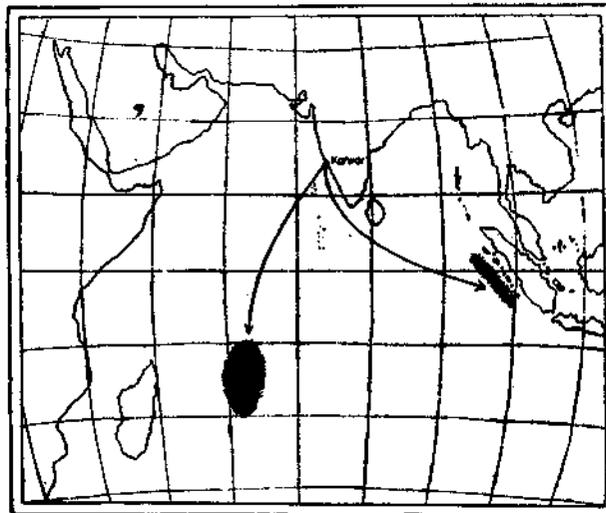


FIG. 2. Map showing the place of collection of the Indian short-finned eel, *Anguilla bicolor bicolor* McClelland and the spawning (shaded area) grounds in the Indian Ocean.

undertake a long-distance migration like the European eels for spawning, or whether there are yet unlocated spawning grounds close to the coasts of India. Detailed studies are necessary to throw more light on this aspect.

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