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Short Communication

ON THE SCYPHOZOA OF DIGHA COAST

INTRODUCTION

Numerous attempts have been made for collecting specimen at Digha (West Bengal) over decades, but only now, with the establishment of Marine Aquarium & Research Centre, Zoological Survey of India, opportunities have arisen for undertaking long term studies on various biological aspects of a number of organisms readily available here. Apart from the scientific interest *per se*, some of these studies are of great importance for the economics of Fisheries industries. In all advanced countries, the biology of various non-fish organisms has been investigated for the excellent reason that some of these may be beneficial or injurious to fish and as such all data pertaining to the ecology and life cycle of these "Friend or Foe" species are relevant to the economics of fisheries.

In January 1995, one of the leading newspapers in Calcutta published a series of news items with great prominance and caused a furore. This was the "invasion" of large Jelly fish in an unprecedented degree such that the fisheries industry was completly halted.

A preliminary investigation was attempted by the authors with Prof. Amalesh Chaudhury of Calcutta University and they came to the conclusion that the 'Invasion' was nothing more than the normal swarming in shallow water which takes place every year, often twice a year, and this spells no danger to fish population. Investigetions sugested a correlation of swarming and breeding (Brahmachary, unpublished). Since January 1996, a collaborative project was intiated with Prof. Brahmachary and the Marine Aquarium & Research Centre and the major findings are now being described.

Schyphozoa at Digha

Two large Scyphozoan species *Acromitus rabanchatu* Annandale and *A. flagellatus* Haeckel are well known in Digha Coast (Bharati Goswami, 1992). From the observations already made it seems likely that two more species probably occur. So far only a single specimen each of the two likely new species/genus has been found.

Seasonal abundance :—

(a) *Adult Scyphozoa* :—In 1995 during January & February huge numbers of adult scyphozoa

Table-1. Adult Scyphozoa (144-264 cm in diamter) observed in 1996.

Month	Total No.	*A. flagellatus.*	*A. rabanchatu*	Violet Banded
Jan.	136	87	48	1
Feb.	218	162	56	0
Mar.	23	21	2	0
April	No Netting throughout the month			
May	0	0	0	0
June	0	0	0	0
July	0	0	0	0
Aug.	0	0	0	0
Sept.	25	0	25	0
Oct.	24	24	0	0
Nov.	0	0	0	0
Dec.	6	0	6	0
Total	432	294	137	1

Table-2. Juvenile Scyphozoa observed during 1996.

Month	Total No.	*A. rabanchatu*	*A. flagellatus.*	Yellowish	Whitish	Diameter (cm)
Jan.	0	0	0	0	0	0
Feb.	0	0	0	0	0	0
Mar.	0	0	0	0	0	0
April	No Netting throughout the month					
May	73	5	8	60	0	21-56
June	0	0	0	0	0	0
July	0	0	0	0	0	0
Aug.	0	0	0	0	0	0
Sept.	325	135	110	0	80	13.8-26.4
Oct.	125	0	125	0	0	37-56
Nov.	0	0	0	0	0	0
Dec.	4	0	2	2	0	31-34
Total	527	140	245	62	80	

were noticed and they continued to come even in March though in declining numbers. From April to July none was noticed but in August a small number came again. None was noticed between September-November but they began to migrate in December.

Since January 3, 1996, regular observation on adult (diameter 144—264 cm) Scyphozoa, cast off on shore has been carried out within a certain zone near MARC. Most are cast out from fishing net and only a few by tidal action.

The data have been tabulated (Table 1) and Fig 1 (a & b) gives a quantitative picture of 1996.

b) *Medusa* : Only after the advent of bagda netting (1994), these small organisms could be regularly observed. Fig-2a & fig-5a shows the approximate abundance over months in 1995 and 1996.

c) *Juvenile Jelly fish* : In December 1995 a few Juvenile jelly fish were noticed. Between January to December 1996, the juveniles were observed only in May (diameter 21-56 cm), September (13.8-26.4 cm) and October (37-56 cm). Table 2 and fig 3 furnish data on the juvenile Scyphozoa.

Fish as Food for scyphozoa : 426 adult scyphozoa were examined for detecting fish or shrimps caught by them, if any. A total of 10 fish as found in only 5 of these 426 individuals. The largest, a ribbon fish, measured about 6 inches (18 cm) in length. None of these fish was significantly digested and it is possible that pressure exerted in crowded net might have forced the fish deep inside the gastrovascular cavity (coelenteron) of the scyphozoa.

Rearing medusae in Laboratory : In view of studying various aspects of the life history including growth rate, the longevity of medusae was determined in the laboratory and artificial feeding was attempted.

a) *Longevity* : Table 3 shows the longevity of medusae, ranging from 30 hours to more than 146 hours, under different conditions.

Table-3. Longevity of Schyphomedusae under laboratory condition

Description	Condition of aeration & Container	Longevity
Very small	no aeration, Small container	30 Hours
Very small	no aeration Larger tray	30 Hours
Small	Aeration Larger tray	50-52 Hours
Slightly larger	Aeration Larger tray	146 Hours

b) *Artificial feed* : Freshly collected sea water was put in small and large containers once or twice per day and in this manner a very small supply of plankton was ensured as food for medusae. Newly hatched brine shrimp (*Artemia*) and *Sepiella inermis* were put in the container and seen to be consumed by the medusae.

Pulsatile System of Medusae : Isolated tentacles with a portion of bell executed pulsatory movements. These were also maintained in pasteurized sea water in the refrigerator. After 23 hours they were brought back to normal temperature and observed to pulsate rhythmically as in normal intact condition. This system may further be studied in connection with the interesting problem of biological clocks.

Abundance of Fish vis a vis that of Scyphozoa : 'Sarini' netting within a certain area of the beach (from Hospital Ghat to New Digha Ghat) and the fish catches (Kg/month) were noted, Fig-4 shows that fish catch is independent of the presence or absence of adult Scyphozoa.

Discussion: Various species of jelly-fish are known to congregate in large numbers (Harson, 1991) and some of these assemblages are for breeding in relatively shallow water. Jelly fish are known to reproduce in two different modes*, one of which is direct development from planula to medusa to adult and relatively a small number of scyphozoan species follows this pathway (Foutin, 1889): Apparently the scyphozoan species of Digha belongs to the same category.

The present findings reveal that scyphozoans at Digha assemble twice a year in shallow water. The peak period occurs in January and February and a second minor peak takes place around September (August-October). Interestingly only during these periods medusae are available and this correlation (Fig 2 and Fig 5) suggests the possibility that, as in some other species in various parts of the world, the scyphozoa at Digha congregate for spawning and development follows from medusae.

Without running sea-water, some of he medusae could be reared for at least 30 hrs even in small containers and with aeration at least one larger specimen could be kept alive for 146 hrs. During captivity they also fed on hatchlings of brine shrimp and the cuttle fish *Sepiella inermis*. Thus it may be possible to rear medusae in the laboratory if running sea-water be available. As certain fragments of medusae continue to execute well defined biological rhythms in small vessels containing pasteurized sea-water, these may also serve as a system for studying such rhythms.

The interaction of fish and Scyphozans, if any, is of interest in connection with fisheries ; fishermen may well be scared at the sight of the huge congregation of scyphozoa but adult scyphozoa are not known to feed on fish even if their juveniles do so (Hardy, 1958; Nandi, 1984). The present data show hardly any record of predation of fish by adult scyphozoa at Digha.

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* Cnidarian follow a complex life history, which be devided under two categories, sexual and asexual. In most scyphozoa, sexual union of the gamates give rise to planula larva which metamorphose to settled scyphistoma, which produce asexually immature medusae and ultimately turn into adult.

In some scyphozoa, planula directly metamorphose into medusa.

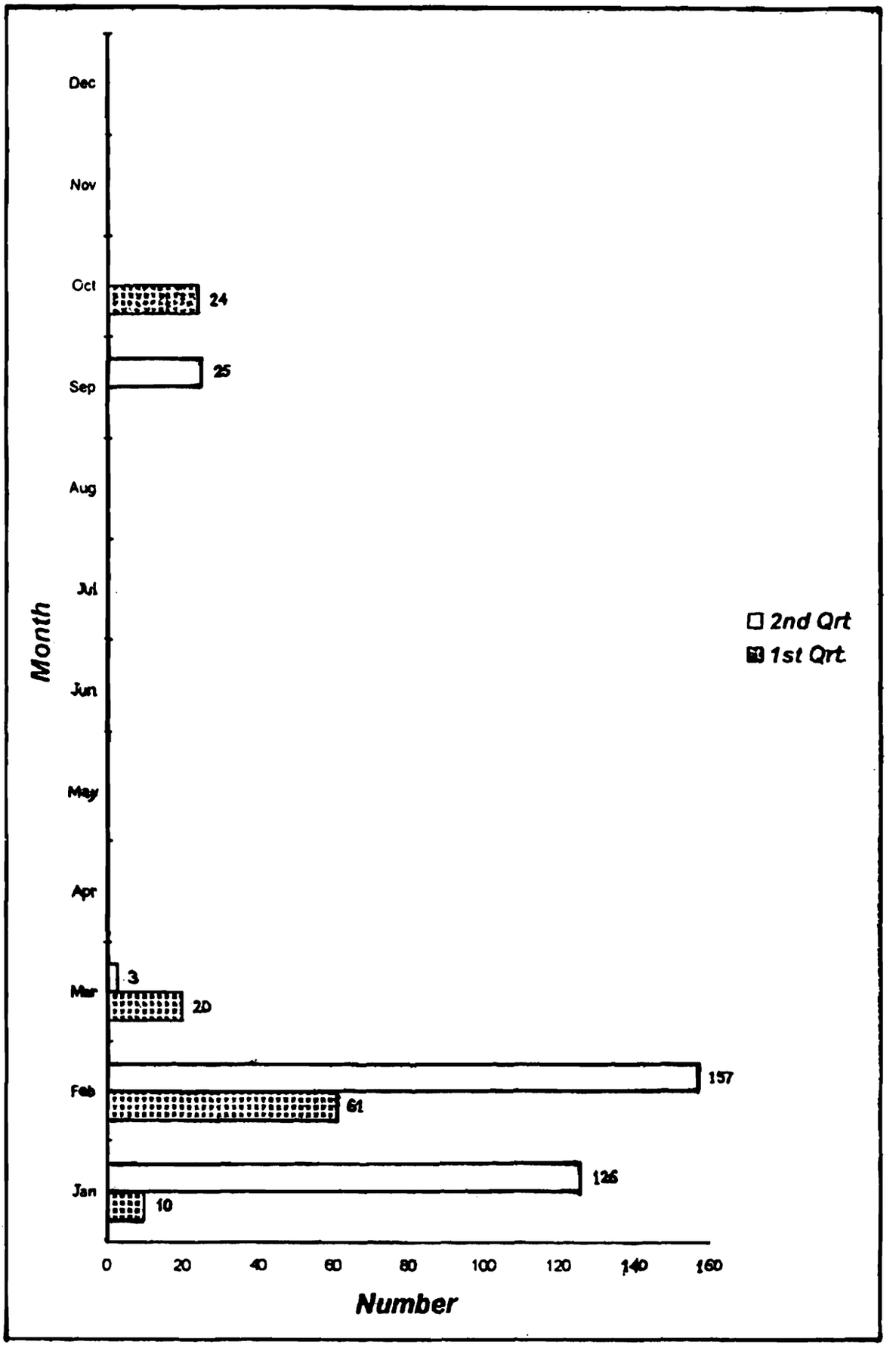

Fig : 1. Fortnightly abundance of adult Scyphozoa, 1996

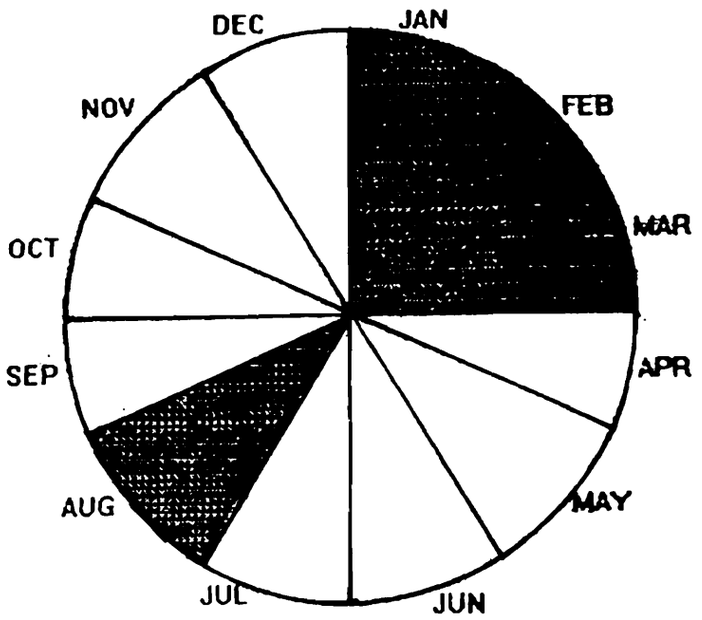

Fig. 2a

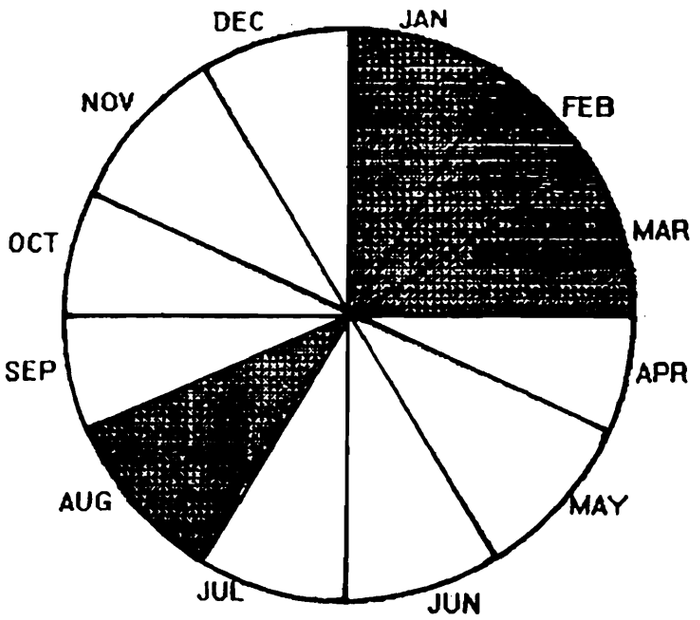

Fig. 2b

Fig : 2a. Availability of Medusa, 1995.

Fig : 2b. Availability of adult Scyphozoa, 1995.

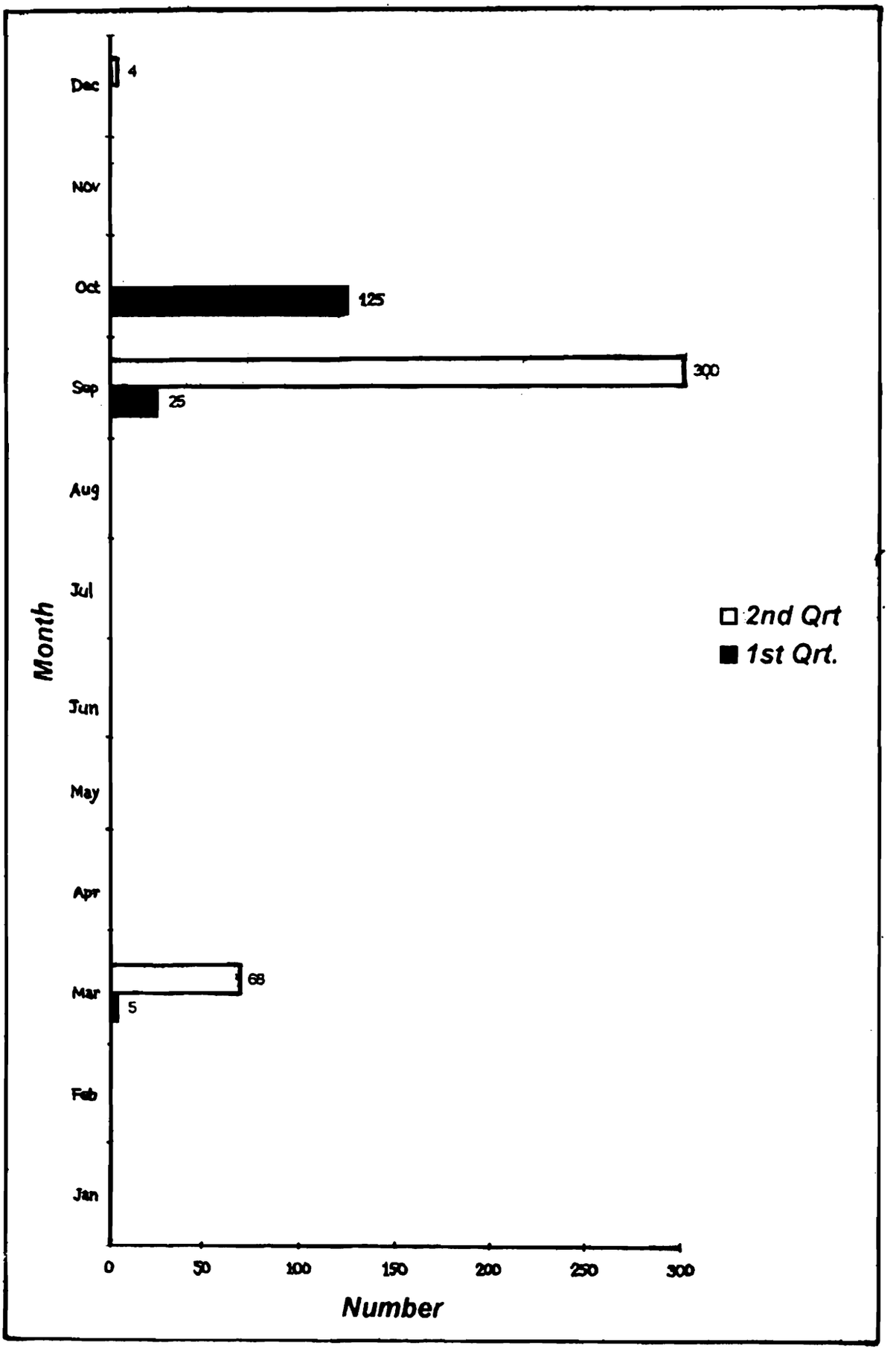

Fig : 3. Fortnightly abundance of juvenile Scyphozoa, 1996.

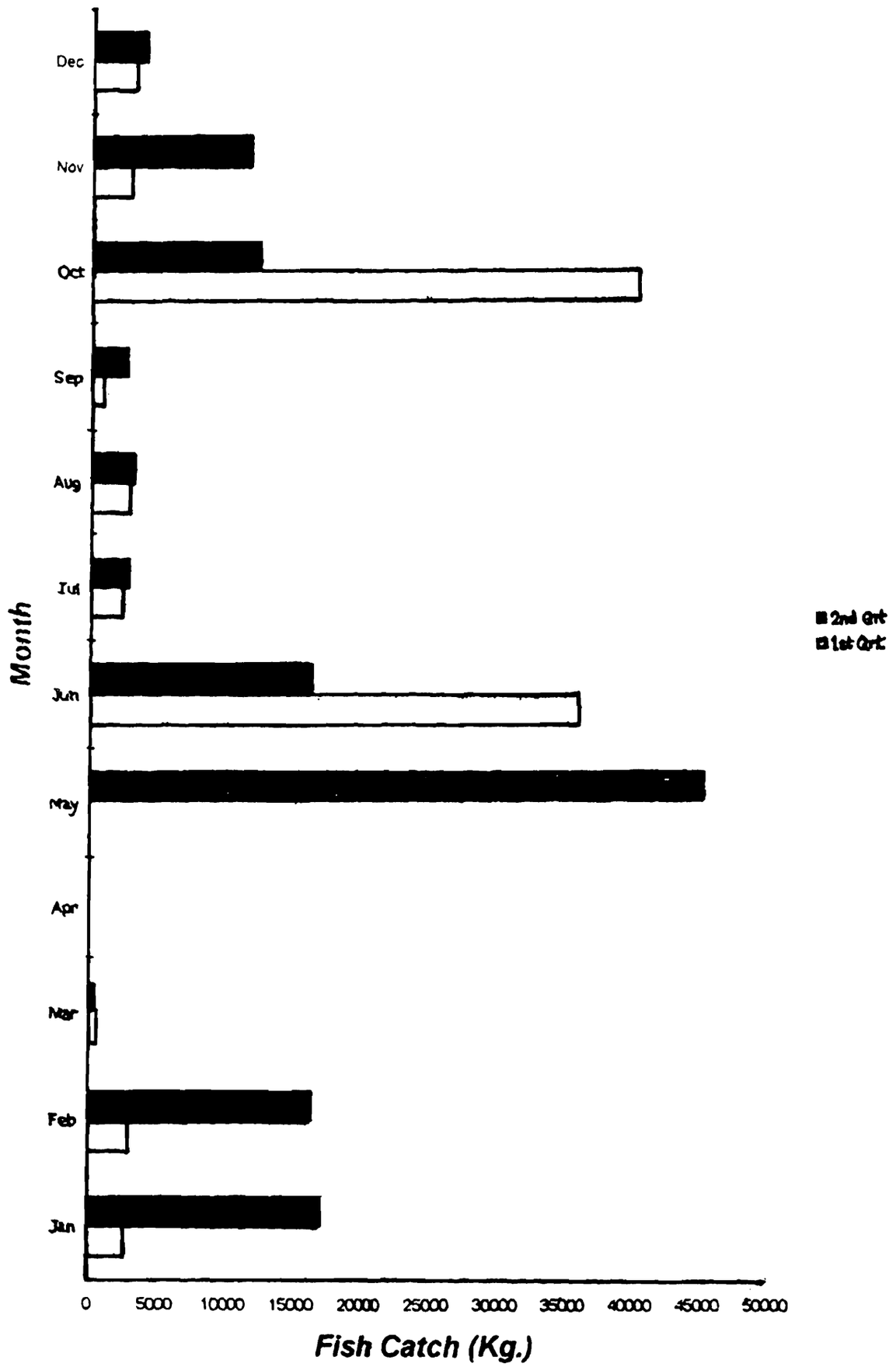

Fig : 4. Fortnightly landing pattern of commercial fishes by shore net, durng 1996.

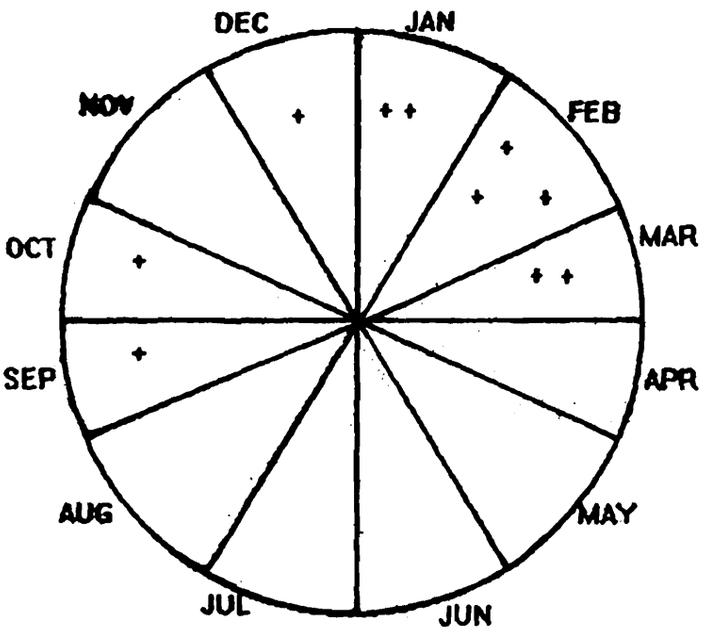

Fig. 5a

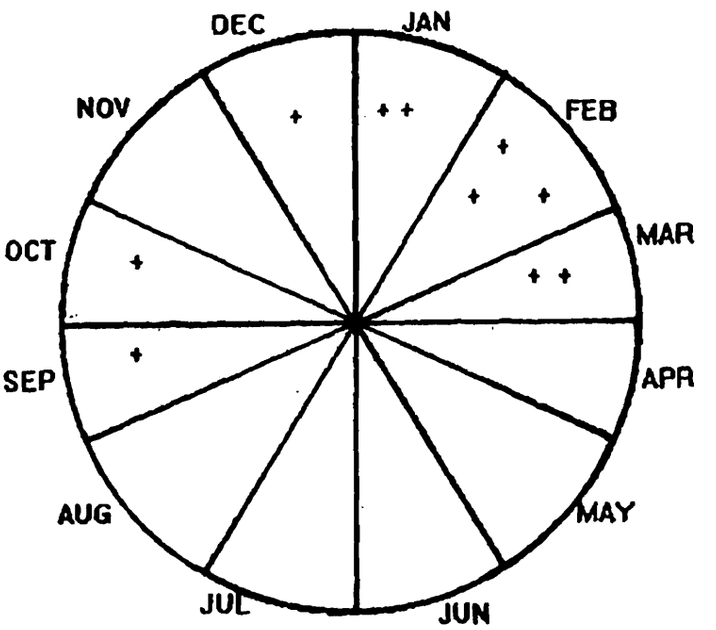

Fig. 5b

Fig : 5a. Availability of Medusa, 1996.
Fig : 5b. Availability of adult Scyphozoa, 1996.

Again, the data on fish catch by sarini nettings in the beach indicate that there is no correlation, positive or negative, between the invasion of Scyphozoans and fish yield. The socalled decline in fisheries business experienced by motorized vessels may be due to overfishing.

SUMMARY

It seems resonable to assume that adult Scyphozoa at Digha congregate in shallow water in order to breed as is known in a number of species. These Scyphozoa of Digha appear to reproduce by spawning & production of Medusae. A minority of Scyphozoan species is indeed known to do so. The same was also suggested by Nandi (1984) for Scyphozoa in the Sunderbans. The principal breeding phase seems to be in January-February with a second, minor peak in August-October. Adult Scyphozoa do not feed on fish. Fish catches indicate no correlation, positive or negative, between the presence of Scyphozoa and fish yield. The partial success achieved in rearing and feeding medusae in laboratory can be improved if the facility of running sea-water be available.

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REFERENCES

Bharati Goswami, B. C. 1992. Marine fauna of Digha coast of West Bengal, India. *J. Mar. Biol. Ass. India,* **31** (1&2) : 115-137

Foutin, D.G., Spaudling, J. G. and Chia, F. 1989, In *Reproductive Biology of Invertebrates* Vol. IV, Part-A, Eds. K.G. Adiyodi & R.G.Adiyodi, Oxford (India) & IBH Publ. co.

Harson, R. 1991. *R. Nat. Hist.* No. 10, pp. 66-71

Hardy, A. 1958. *The Open Sea*–1. Collins (London).

Nandi, N.C. 1984. *J. Indian Soc. Coastal agric. Res.* 2(2), 103.

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