ON THE BREEDING OF PENAEIDS AND THE RECRUITMENT OF THEIR POSTLARVAE INTO THE BACKWATERS OF COCHIN

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As far as known most of the penaeid prawns spawn in the deeper waters of the sea and use the adjacent shallow areas, usually the backwaters, as their nursery grounds. The only exception to this are the observations of Dakin (1946) and Muriel and Bennet (1952) when one of the species was observed to breed in the coastal lakes of New South Wales. The Cochin backwaters are found to be the nursery grounds of three of the commercially important species of penaeids of the area. All these species are noticed to enter the backwaters at very early postlarval stages and the occurrence of these postlarvae in large numbers in these backwaters has been recorded and the data made use of for determining the breeding season of two of them, *viz.*, *Metapenaeus dobsoni* by Menon (1955) and *Metapenaeus monoceros* (George, 1959). In the present study the entry of the postlarvae of the three different species has been followed for a period of five years from 1956–60 by exami-

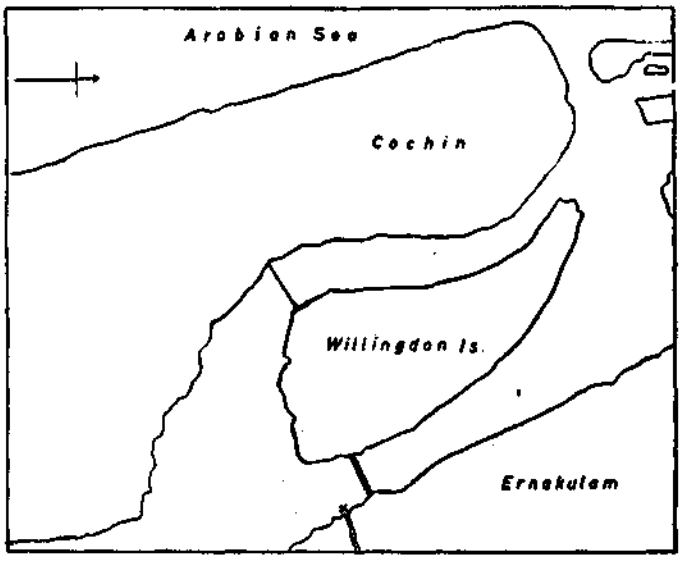

FIG. 1. Showing the location of the plankton collection station (*x*)—Plankton station.

nation and estimation of their numbers in weekly plankton samples, with a view to confirm the earlier observations on the breeding season of the different species and to estimate from the quantitative studies how larval recruitment in the backwaters is reflected in the commercial fishery and if possible to find out whether this factor could be used as an indicator to predict the magnitude of the respective fisheries in the area.

A total of 230 weekly samples of plankton were analysed and the number of postlarvae in these estimated during the course of the five years. The methods of collection and estimation of the number of postlarvae in the samples of plankton are the same as described by George (1958). The plankton collections were made from a station near the mouth of the Thevara canal (Fig. 1), a canal opening into the backwaters and running perpendicular to Ernakulam channel, except for a few weeks in the end of 1960 when the collection site was shifted to a station slightly north in the Ernakulam channel.

Breeding Season

Metapenaeus dobsoni

The monthly averages of postlarvae of the species *M. dobsoni* are shown in Fig. 2. The average numbers for the five years are shown in black bars

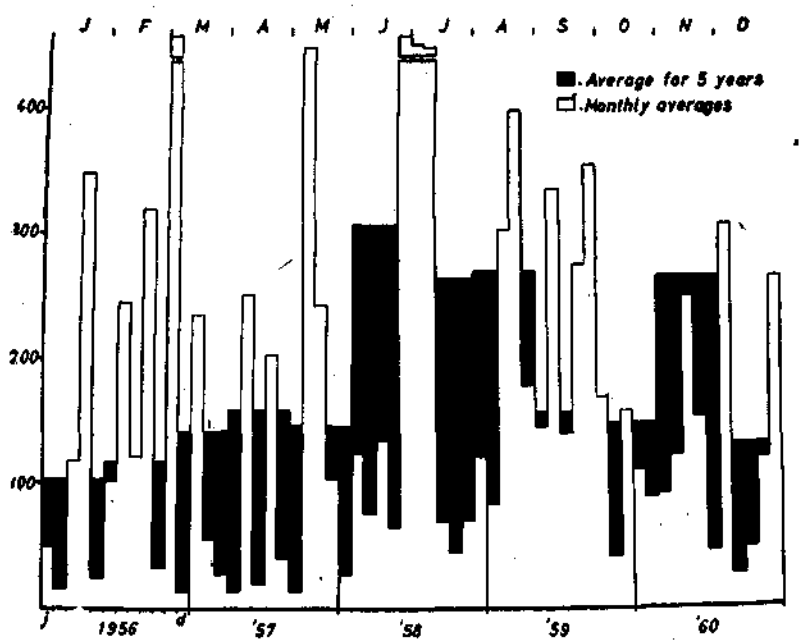

Fig. 2. Monthly average numbers of postlarvae of *Metapenaeus dobsoni* for the years 1956–60.

in the figure. The presence of postlarvae in fairly large numbers in all the months tends to show almost year-round breeding for the species. The average for the five years shows two peaks, one in the months June through August and another in November. From a similar study but using the data for only one year Menon (1955) recorded a prolonged breeding season for the species in the same area from May to December. Even though from the present study it is difficult to agree with this view, the two peak seasons suggested here fall within the breeding season pointed out by Menon (1955). Year-round breeding for the species has been recorded by Kesteven and Job (1957).

Metapenaeus monoceros

From the monthly averages and average for 5 years of postlarvae of this species shown in Fig. 3 it can be seen clearly that in the case of this species also breeding takes place more or less throughout the year with two peaks, first in July, August and second in November, December. George (1959) recorded only the November, December peak breeding season for the species, probably due to the limited number of years' data available then.

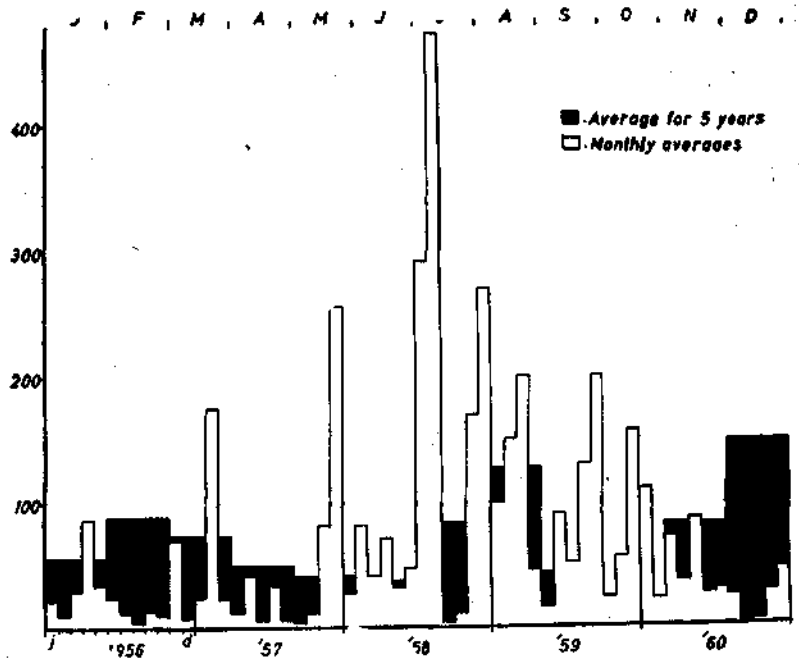

FIG. 3. Monthly average numbers of postlarvae of *Metapenaeus monoceros* for the years 1956–60.

Penaeus indicus

In the case of this species fairly good number of postlarvae are found in the plankton except during the period June to September as can be seen in Fig. 4, showing the monthly averages and also the average for the 5 years. So the spawning season may be said to be from October to May. Two peaks are noticed, one during February to April and the other in November-December.

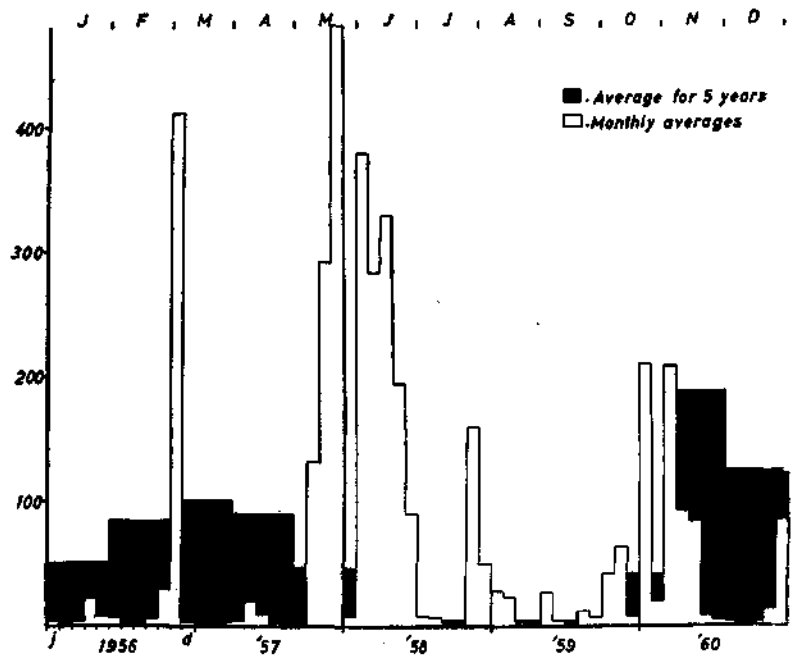

FIG. 4. Monthly average numbers of postlarvae of *Penaeus indicus* for the years 1956–60.

The November-December peak spawning season is common to all the three species. But in the case of *P. indicus* the second peak is in the hot months February to April while in the case of the other two species it is in the monsoon months. Based on the occurrence of some early ripe pink shrimp *Penaeus duorarum* throughout the year in Florida waters Cummings (1961) has suggested the possibility of the prawn spawning throughout the year.

RECRUITMENT OF THE POSTLARVAE INTO THE BACKWATERS

The recruitment of postlarvae of all the three species in varying numbers is taking place all the year through as evidenced by the presence of these postlarvae in the plankton samples throughout the year. The breeding season

of the different species is determined by the peak seasons of recruitment and is dealt with in the previous chapter.

The total number of postlarvae of the various species for the 5 years and the size ranges of these are shown in Table I and Fig. 5.

TABLE I

Total number of postlarvae of three species and their size ranges for the years 1956–60

Year	*M. dobsoni*		*M. monoceros*		*P. indicus*	
	No.	Length in mm.	No.	Length in mm.	No.	Length in mm.
1956	2253	3·0–10·0	162	4·0–8·0	496	9·0–12·0
1957	1653	3·5–10·0	339	4·5–9·0	946	8·5–14·0
1958	2955	3·0–10·0	763	3·5–9·5	1504	8·0–13·0
1959	2582	2·5–11·0	610	4·0–9·0	207	9·0–12·0
1960	1626	3·0–11·5	243	4·0–8·0	726	8·0–12·0

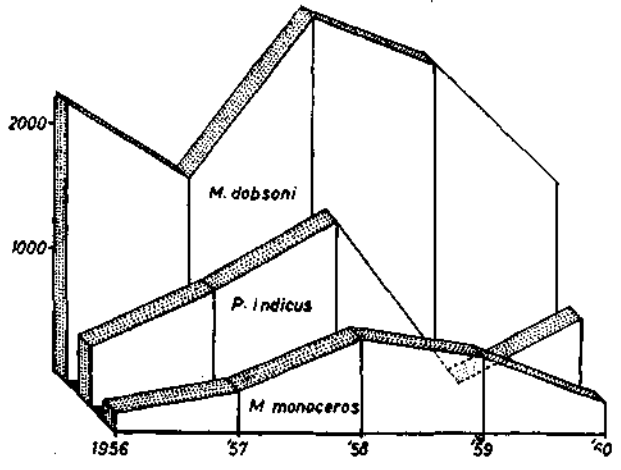

FIG. 5. Total number of postlarvae of *M. dobsoni*, *M. monoceros* and *P. indicus* for the years 1956–60.

A study of the table and figure will show that in the case of *M. dobsoni* maximum recruitment of postlarvae is seen in 1958 and minimum in 1957

as well as 1960. The sizes of these postlarvae range from 2·5–11·5 mm., with the majority measuring between 3·0 and 6·0 mm. (measurements from the tip of the rostrum to the tip of the telson), which agrees with the observation of Menon (1955) on the same species. The postlarvae of *M. monoceros* also show the same maximum recruitment in 1958. But the minimum in this case is in 1956. The size of this species range from 4·0–9·5 mm. with the majority falling in the 4·0–7·0 mm. group. In *P. indicus* also the maximum number of postlarvae is noticed in 1958. But here the minimum recruitment activity is seen in 1959. The range of size in this species is from 8·0–14·0 mm. with the majority of the specimens measuring between 9·0 and 12·0 mm.

The probable reasons for the wide fluctuations in the total yearly recruitment of postlarvae can only be conjectures since no attempts were made to correlate these with environmental or any other factors. But the sugges tion that the prevailing current pattern of the area and some of the hydrographical features of the water might have some influence in the recruitment of the postlarvae into these backwaters may be useful for future studies in the field. It may be worthwhile to mention here that in the seasonal fluctuations in the recruitment of the postlarvae a correlation with salinity is noticed. Taking the average for the five years in the case of *M. dobsoni* the peak season of recruitment, namely June to August and November, are months of low salinity. (Salinity values for these years from the same area are given by George and Krishna Kartha, 1963.) In *M. monoceros*, however, this relationship with salinity is not very prominent, but in the case of *P. indicus* the postlarvae are almost absent in the months of low salinity, June through September, having the peak recruitment in the following months of high salinity.

A relationship is noticed between the total entry of postlarvae into the backwaters during a particular year and the prawn fishery of the area in the following year, especially in the case of *M. dobsoni* since the 1st year groups are represented mostly in the fishery. The relationship between these two noticed in these few years of study is too striking that it is tempting to suggest that this factor could probably be made use of in predicting the fishery. In other words it is felt that the success or failure of the fishery in a year could be foreseen in the magnitude of postlarval recruitment of the previous year. However, since correlating the strength of postlarvae entering the backwater and the fishery for the following year has to be treated with caution, as several other factors like natural mortality and survival of the postlarvae and juveniles, predatory mortality, fishing mortality, etc., have also to be taken into