

# Fluctuations in Species Composition of Penaeid Prawns in Estuaries

By

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## INTRODUCTION

During a study of the distribution of penaeid prawns in Ceylon waters a difference was noticed in the species composition from one estuary to another. Moreover, a marked monthly fluctuation in the relative abundance of the different penaeid species was also observed. This indicated migratory behaviour. In order to study this phenomenon in the different species of prawns, regular samples of prawns were collected from two estuaries on the south-west coast of Ceylon, namely at Moratuwa/Panadura and at Negombo. The investigation was spread over a period of three years from 1957-1959.

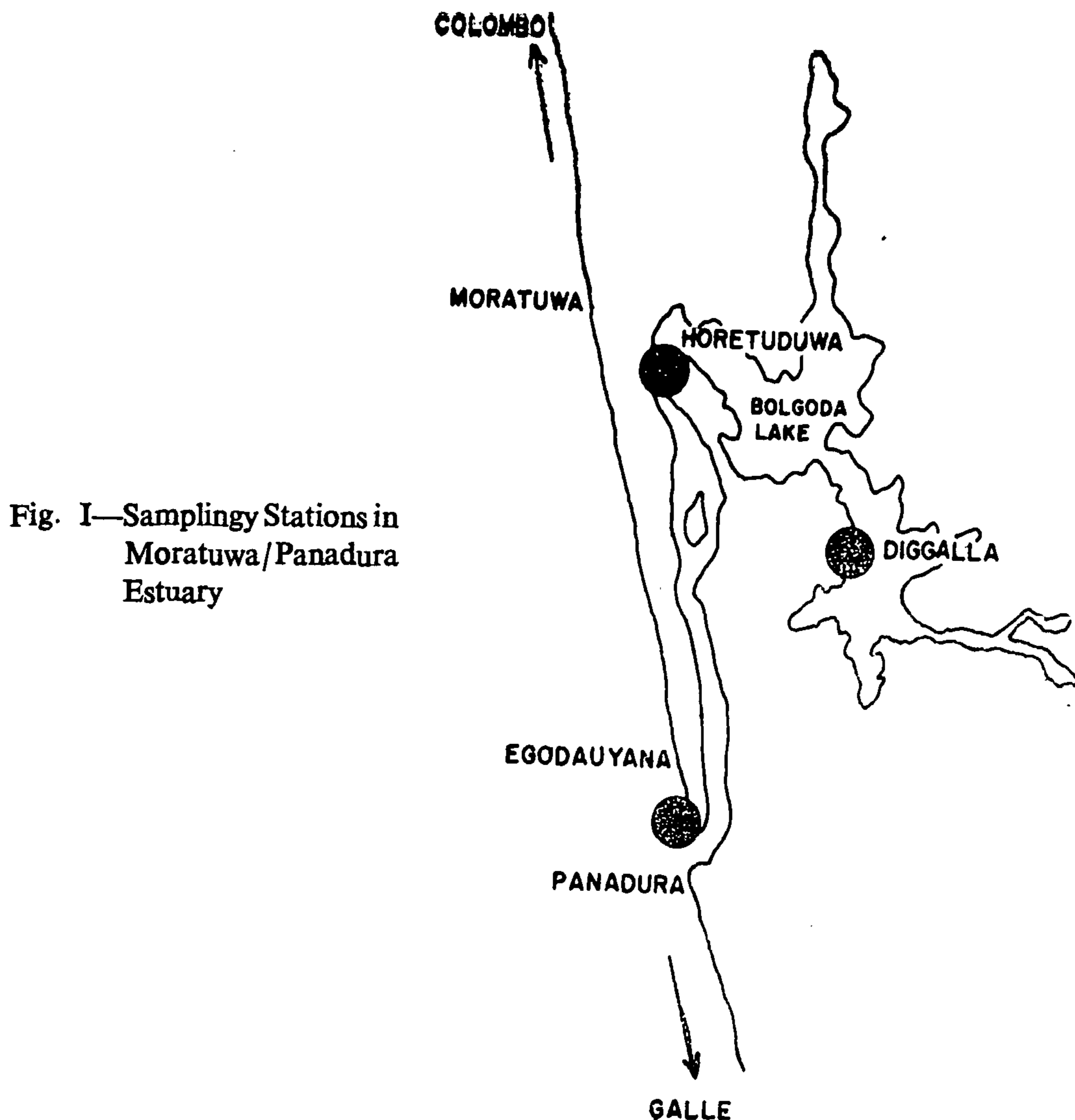


Fig. I—Sampling Stations in  
Moratuwa/Panadura  
Estuary

### Sampling—Moratuwa-Panadura Estuary

In the Moratuwa-Panadura estuary the most popular method of prawn capture is the rattan trap or "Ja-kottu" which is erected across the length of the water body. This passive fishing gear is used throughout the estuarine system from the mouth to as much as fifteen miles inland. Prawns and fish captured in these traps are removed for disposal every morning by small dip-nets.

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Weekly samples of prawns were collected from these traps at three points in the estuarine system. (1) at the mouth of the estuary, at Egodaunya ; (2) at a point four miles from the mouth, at Horetuduwa and (3) at a point six miles from the mouth, at Diggalla. These collecting stations are indicated in the map of the estuarine system (Figure 1).

### Species Composition

All samples collected at the three points in the estuarine system were then analysed for their species composition. The species composition of the total number of samples at each sampling station is given in Table I.

TABLE 1

Species composition of penaeid prawns from the Moratuwa-Panadura Estuary : 1957-1959

	<i>P. indicus</i>	<i>P. monodon</i>	<i>P. latisulcatus</i>	<i>M. elegans</i>	<i>M. dobsoni</i>	<i>M. monoceros</i> and <i>M. affinis</i>	No. of Samples
Egodaunya	282	5	67	—	408	903	13
Horetuduwa	3,257	32	—	11,310	11,101	—	55
Diggalla	3,339	253	—	22,956	4,942	—	98

It is clear from Table 1 that *P. indicus* and *M. dobsoni* are found throughout the estuarine system, *Metapenaeus elegans* is found only in the less saline inland waters and is absent at the mouth of the estuary while *Metapenaeus monoceros*, *Metapenaeus affinis* and *Penaeus latisulcatus* are found only in the more saline waters of the estuary.

### Fluctuations in Species Composition

#### a) DIGGALLA

The monthly fluctuation in species composition of samples taken at Diggalla are illustrated in Figure 2. This shows that *Metapenaeus elegans* is present in the estuary throughout the year while *Penaeus indicus* is present only during January to May. *Metapenaeus dobsoni* is available in the estuary throughout the year but only in very small numbers during the months of May, June and July. *Penaeus monodon* is found only in very small numbers through out the year.

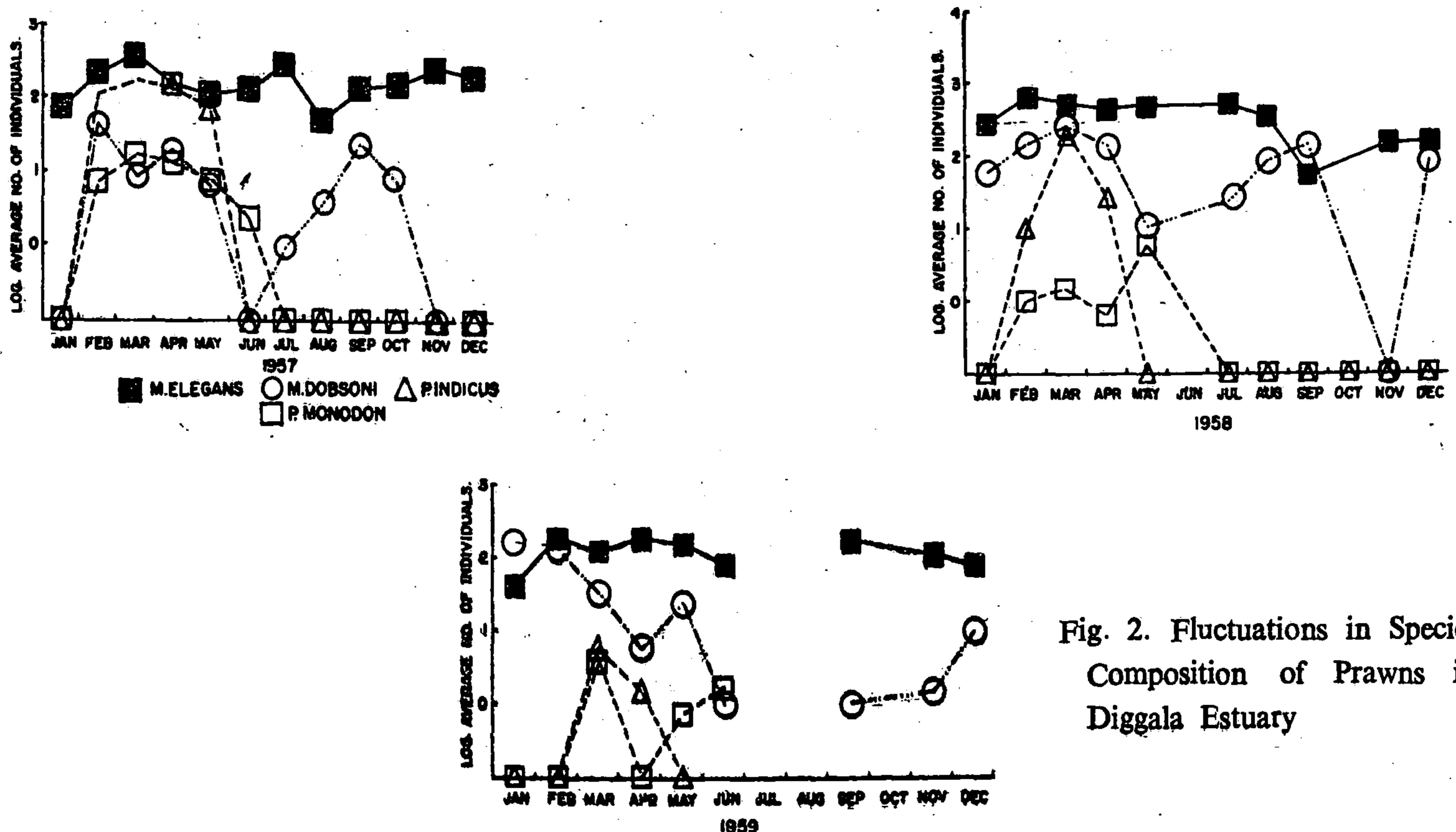


Fig. 2. Fluctuations in Species Composition of Prawns in Diggalla Estuary



It is obvious that *P. indicus* leaves the estuary at the end of May each year and that fresh recruits enter the estuary in November or December. *M. dobsoni* also leaves the estuary in May and fresh recruits enter the estuary in August. The evidence indicates that *M. elegans* may not be leaving the estuary at any time of the year.

(b) HORETUDUWA

The fluctuations in the species composition of samples taken at Horetuduwa are illustrated in Figure 3. The fluctuations in the species composition of these samples follow a pattern similar to that observed at Diggalla.

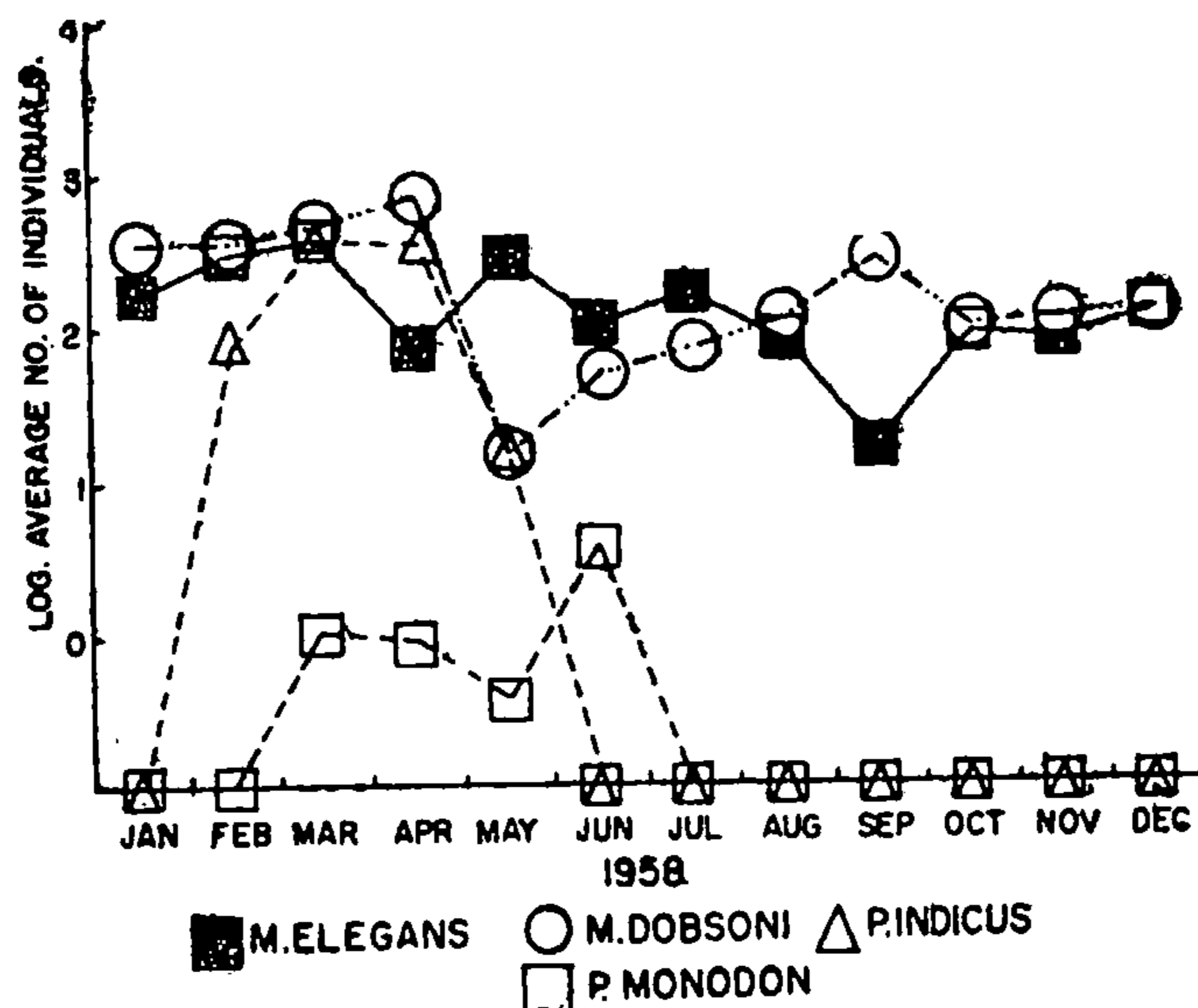


Fig. 3. Fluctuations in Species Composition in Horetuduwa Estuary

(c) EGODAUAYANA

Only a few samples were obtained at this point in the Moratuwa-Panadura estuarine system and as such very little can be said about fluctuations in their species composition.

**Species Composition of Penaeid Prawns in Negombo Estuarine System**

Samples of penaeid prawns from the Negombo estuary were collected at random. The most popular method of capture in this estuary is the stake-seine net or "kattu-dela"—a passive fishing device erected at the bottom that collects prawns swept into it by the tide. Samples were collected at regular weekly intervals from these nets.

TABLE 2

Species composition of samples of penaeid prawns from the Negombo Estuary : 1957-1959

Species	<i>P. indicus</i>	<i>P. monodon</i>	<i>P. latiusulcatus</i>	<i>M. elegans</i>	<i>M. dobsoni</i>	<i>M. monoceros</i> and <i>M. affinis</i>	<i>M. burkenroadi</i>	<i>P. cornuta</i>	<i>P. semisulcatus</i>
No. of Species	.. 15,587	.. 507	.. 268	.. 6,110	.. 73,168	.. 45	.. 138	.. 765	.. 7,020

The species composition of the total number of samples collected at Negombo during 1957-1959 are given in Table 2. Species which were absent at Moratuwa, Panadura are present in this estuary, namely, *P. semisulcatus*, *Metapenaeus burkenroadi* and *Perapeneopsis cornuta*. The numerically most abundant species in the Negombo estuary are *M. dobsoni*, *P. indicus*, *P. semisulcatus* and *M. elegans*. The other species are caught in negligible quantities and are present in the estuary only during a few months of the year.

### Fluctuations in the Species Composition in Negombo Estuary

The fluctuations of the abundant species for these years is shown in Figure 4. This fluctuation is shown in greater detail for one year in fig. 5 which also includes the fluctuation of the less abundant *P. latisulcatus*.

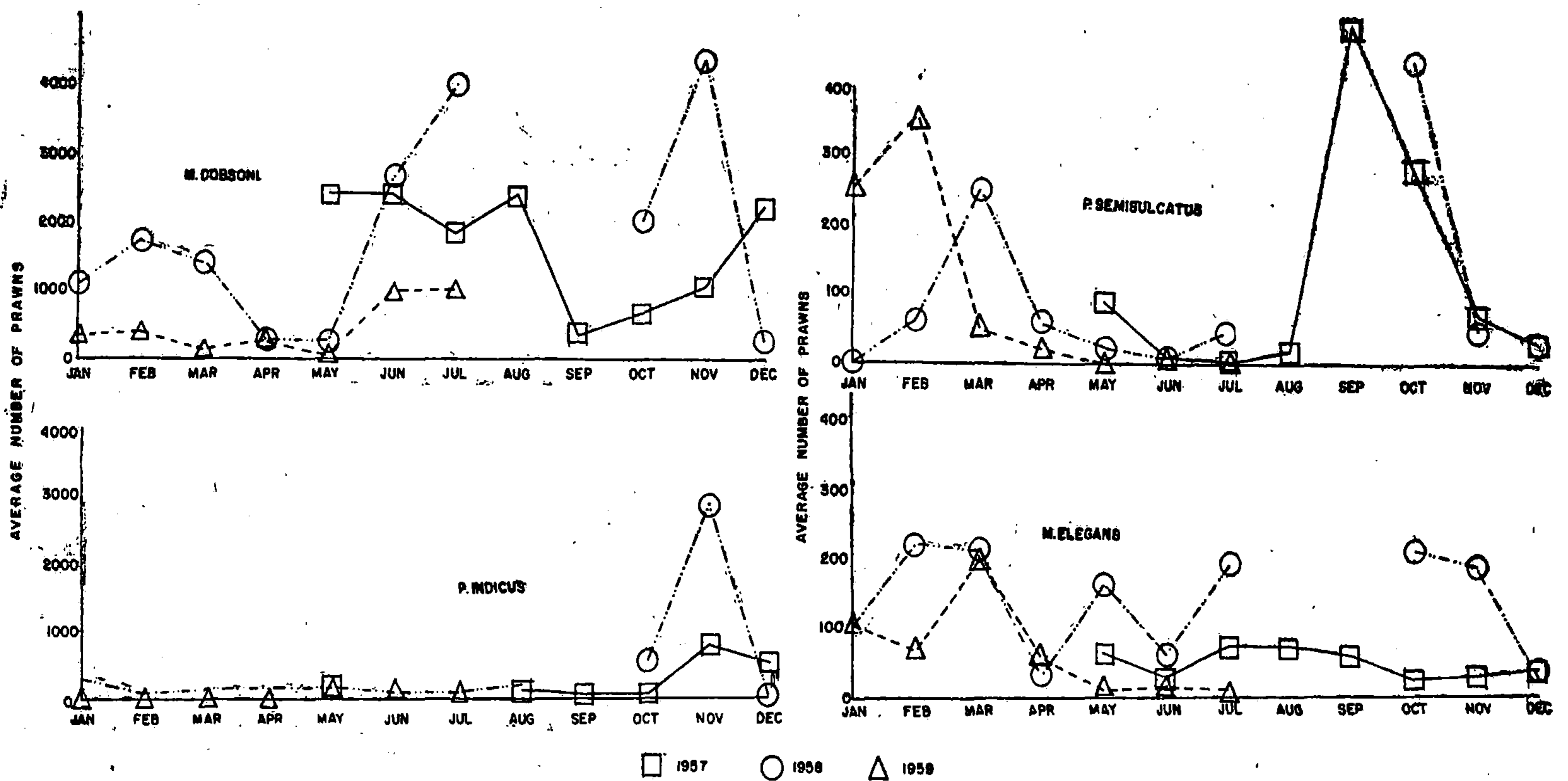


Fig. 4. Fluctuations in composition of abundant species in Negombo.

It can be observed from Figures 4 and 5. that there is a marked fluctuation in the abundance of the different penaeid species in the Negombo estuary. This is particularly true for the numerically most abundant species, namely, *Metapenaeus dobsoni*, *Penaeus indicus* and *Penaeus semisulcatus*. *Metapenaeus elegans*, however, shows the least amount of fluctuation throughout the year. This indicates that the former three species are extremely migratory, especially since the instrument of capture is a passive device fixed near the mouth of the lagoon and the amount captured depends to a large extent on the intensity of active migration from the lagoon. The evidence indicates that *M. elegans* may not be a migratory species.

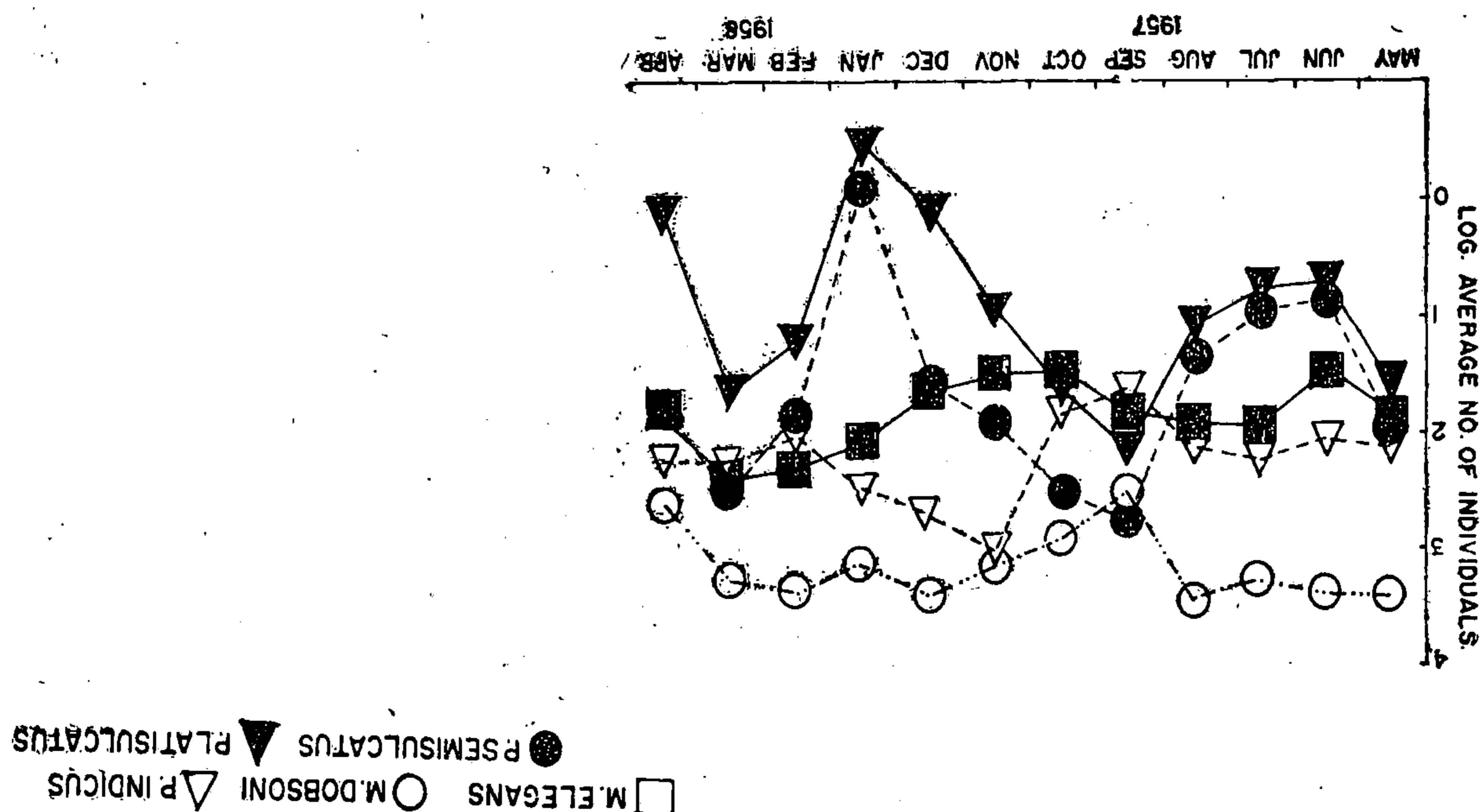


Fig. 5. Fluctuations in abundance of five species in Negombo.



In the Negombo lagoon a significant decrease in the abundance of *Mdobsoni* was observed in April and September. Small numbers of *P. indicus* were observed to be present throughout the year but a colossal increase was noticed in November, the month during which this species probably migrates "en masse" away from the lagoon into the sea. *P. semisulcatus* was found in its greatest abundance in the catches during March and September. The migratory season from the lagoon into the sea for both *P. indicus* and *P. semisulcatus* thus seems to be the inter-monsoonal period.

### SUMMARY

All, but one species of penaeid prawn, are migratory as judged from the fluctuations in the species composition of samples obtained from estuaries at Moratuwa, Panaduara and Negombo. The exception is *Metapenaeus elegans* which appears to complete its life-cycle within the estuarine system.

In the Panadura-Moratuwa estuary *P. indicus* is present in the upper reaches of the estuary only during the months of January-April after which it appears to migrate towards the mouth of the estuary finally into the sea. *Metapenaeus dobsoni* seems to leave the estuary in April but fresh recruits enter the catches in May. *Penaeus monodon* is present only in small numbers and also shows evidence of migration between the estuary and the sea.

In the Negombo estuary, the numerically most abundant species are *Penaeus indicus*, *Penaeus semisulcatus*, *Metapenaeus dobsoni* and *Metapenaeus elegans*. The former three species appear migratory as there is an enormous fluctuation in their relative abundance for different months of the year. As in the Panadura-Moratuwa estuary a significant decrease in abundance of *M. dobsoni* was noticed in April but catches rose again in May, showing that fresh recruits may be entering the estuary in this month. A colossal increase in numbers of *Penaeus indicus* was noticed in November and the numbers of *P. semisulcatus* rose significantly in March and September. The time of migration of *P. indicus* and *P. semisulcatus* seems to be the inter-monsoonal period.

The least fluctuation in numbers throughout the year was displayed by *M. elegans* which appears to be a non-migratory species.

### REFERENCES

- DE BRUIN, G. H. P., 1965. Penaeid prawns of Ceylon, Crustacea, Decapoda (Penaeidea). *Zool. Mededel. Deel. 41* No. 4, pp.73-104.