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LIFE CYCLE AND SEASONAL FLUCTUATION OF CHAETOGNATHA IN ENNORE ESTUARY, MADRAS

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ABSTRACT

Seasonal fluctuation in abundance of *Sagitta bedoti* Beraneck, *S. inflata* Grassi and their life cycle in Ennore estuary based on the samples collected during 1975 and 1976 are discussed.

INTRODUCTION

Estuaries play a main role as nursing grounds in the life cycle of many marine organisms. Several marine fishes and prawns periodically visit the estuaries for breeding, as it is a safe place, that ensures the life of young ones. So, the studies on estuarine habitats have become important and nowadays great attention is given towards the same. In this account the seasonal fluctuation and breeding habits of chaetognaths collected in Ennore estuary during 1975 and 1976 are dealt with.

Chaetognaths are one of the important constituents of marine plankton, play a vital role in food cycle and are good indicator organisms of watermasses. Though they are marine inhabitants, a few species are also seen in estuaries (Devasundaram and Roy, 1954 ; Dutta *et al.* 1954 ; George, 1958 ; Nair, 1972, 1973, 1978 ; Srinivasan, 1972, 1977 ; Srinivasan and Raghunathan, 1978).

TOPOGRAPHY

The estuary is situated at 15 km. north of Madras city. It is 3 km. long 1 km. wide and the depth ranges from 1.5 to 2.5 metres. During high tide the depth of the estuary increases due to the inflow of sea water through the narrow mouth of the estuary, which is mechanically kept open throughout the year by the dredging operations of the Ennore Thermal Station. The topography and hydrobiology of this estuary have been well studied by previous workers (Chacko, 1956, 1963 ; Chacko and Rajagopal, 1962 ; Evangeline and Subbiah, 1969 ; Srinivasan, 1977 ; Srinivasan and Raghunathan, 1978). But none of the earlier workers has studied the seasonal fluctuation and life cycle of the chaetognaths present in the estuary. So, an attempt is made here to study these aspects.

MATERIAL AND METHODS

The Chaetognatha sorted out from 50 zooplankton samples collected from two

stations (Fig. 1) one near the bar mouth, and the other 1 km. away from the bar mouth, during May, 1975 to September 1976 were utilised for this investigation. These two stations were periodically visited once in a fortnight and zooplankton and water samples were regularly collected except during January and February, 1976 due to some unforseen circumstances. The samples were collected by towing a half meter nylon ring net from a country boat, at the surface for ten minutes, between 7 and 8 A.M. The collected samples were preserved in 5% formalin and after determining the volume by displacement method, the entire volume of the sample was analysed for Chaetognatha. They were sorted out, identified species wise, stage-wise and total number in each species was determined.

Chaetognaths of the Estuary

The examination of the samples have revealed the presence of *Sagitta bedoti* Beraneck, *S. inflata* Grassi and *S. pluchra* Doncaster, in Ennore estuary. 1437 specimens of chaetognaths were sorted out from these 50 samples

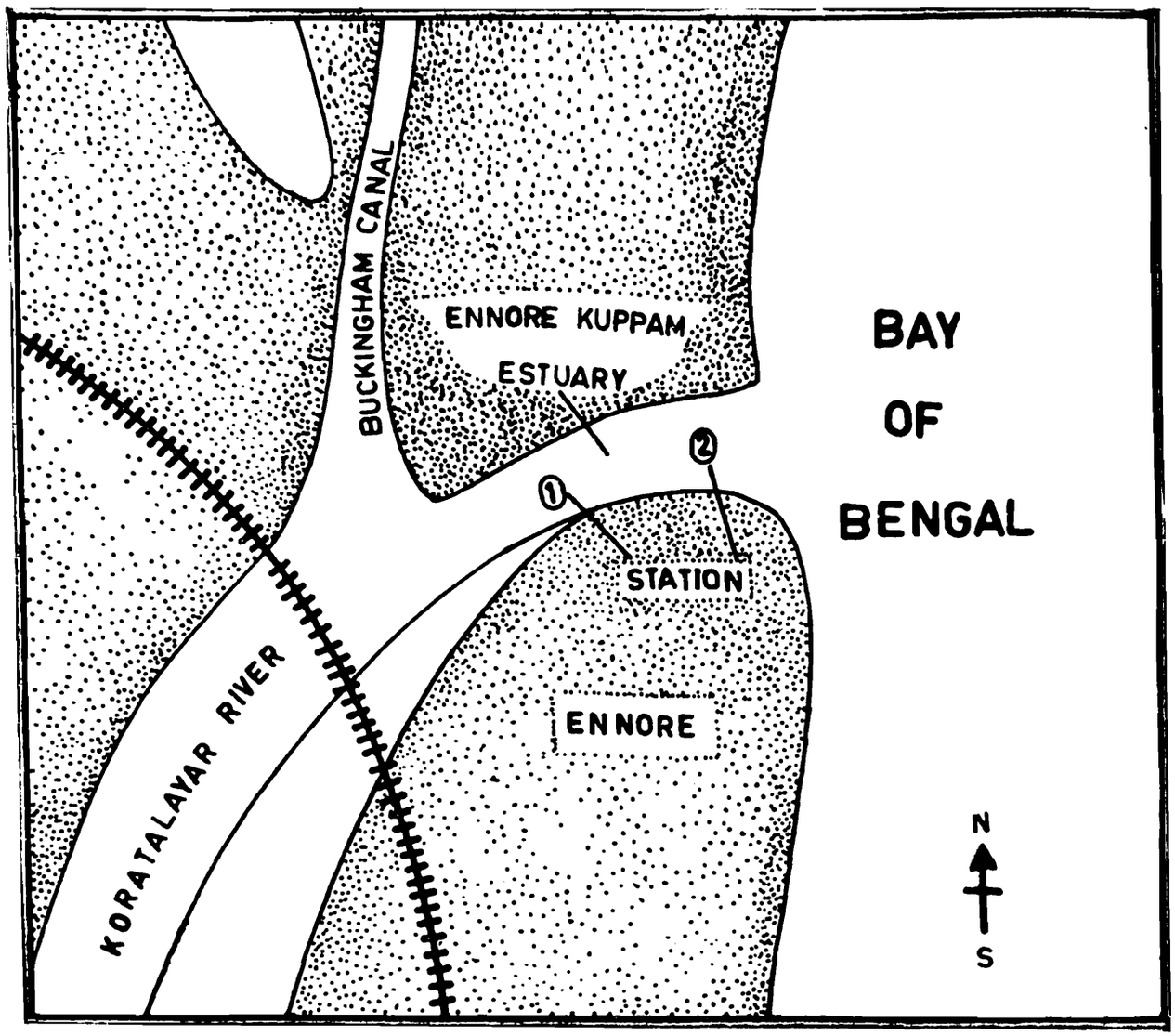

Fig. 1. Map of Ennore estuary, showing the station position.

and among these, 789 specimens are (55%) *S. bedoti* and 647 are (45%) *S. inflata*. *S. pulchra* is represented by only one specimen. Among chaetognaths *S. bedoti* and *S. inflata* are the most common estuarine species, that are seen in abundance (Nair, 1972, 1973, 1978; Srinivasan, 1972, 1977; Srinivasan and Raghunathan, 1978). Here *S. bedoti* ranks first in the order of abundance followed by *S. inflata*.

Both these species do not show any definite pattern of fluctuation in abundance as it is evident from Fig. 2, that there are several peaks and downs. *S. bedoti* is absent in the

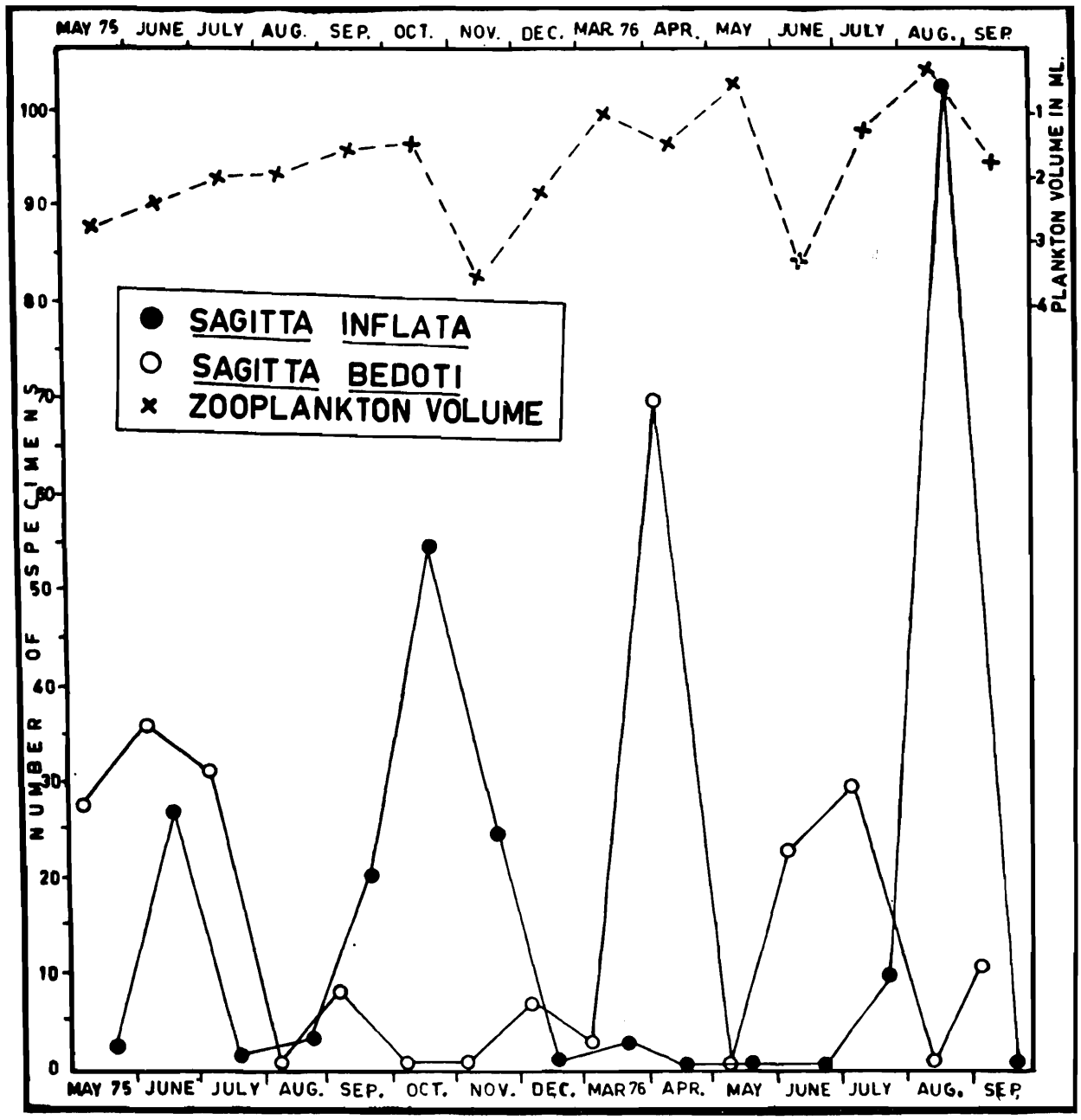

Fig. 2. Fluctuation of Zooplankton volume, *Sagitta bedoti and Sagitta inflata* in Ennore estuary.

samples collected from the estuary during the start of the North East monsoon (Oct.-Nov.), whereas *S. inflata* is not found in the samples during the start of South West monsoon period (April-June). Maximum number of specimens of *S. bedoti* was noted during April, 1976 and for *S. inflata* the maximum was during August, 1976. As both the species contain specimens of various maturity stages, it was possible to study the life cycle of both the species. Similar to the findings of Nair (1973) in Cochin Backwaters, in the samples collected from Ennore estuary also, matured specimens (Stage-IV) of *S. bedoti* and *S. inflata* are tolally absent and

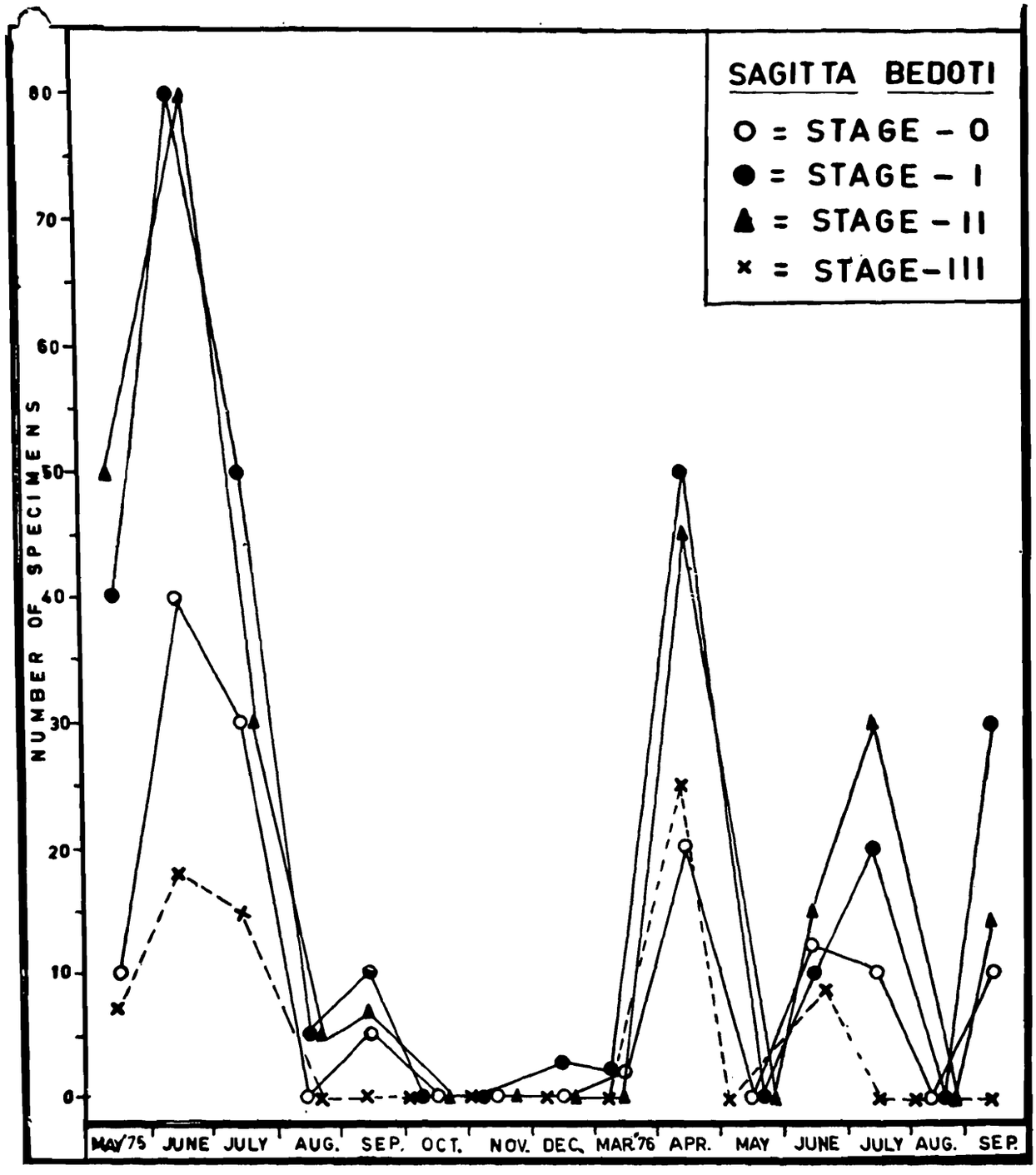

Fig. 3. Life cycles of *S. bedoti* in Ennore estuary during 1975 and 1976.

hence the specimens of other maturity stages (Stage 0 to III) are considered for life cycle studies.

BREEDING OF *SAGITTA* IN ENNORE ESTUARY

Details of breeding of *S. bedoti* and *S. inflata* in the Cochin backwaters along the West coast of India are known (Srinivasan, 1972 ; Nair, 1973). Along the east coast of India, Rao and Kelly (1962) had reported about the breeding habits of *S. inflata* in Lawson's Bay. All these earlier studies have reached a universal conclusion that *S. inflata* and *S. bedoti* are continuous breeders, because they are inhabitants of tropical waters. In this present investigation

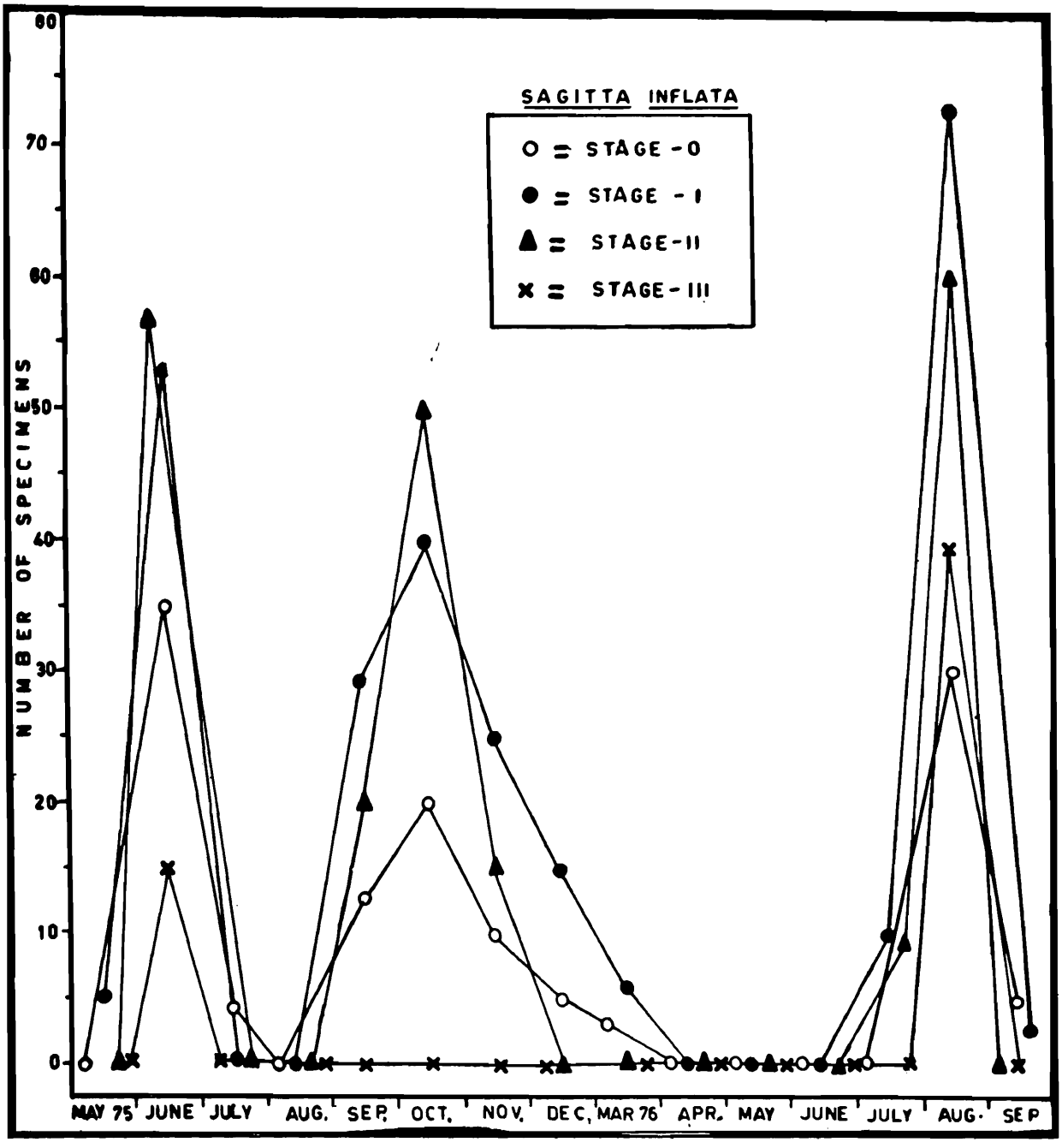

Fig. 4. Life cycles of *S. inflata* in Ennore estuary during 1975 and 1976.

the specimens included belong to 4 maturity stages (Stages 0, I, II, III).

Sagitta bedoti (Fig. 3) :—

Specimens of this species collected from this estuary range between 3 and 5 mm. in total length. The tail segment varies from 27 to 28.8% of the total length, whereas in the marine forms which measure 7 to 13 mm in total length the tail segment will be 23 to 25% of the animal length. The specimens of these collections ranged from 0 to III stages and the fully matured specimens (Stage-IV) are not found. From the Fig. 3 it is clear that there are two peaks followed by a small peak in the life cycle of *S. bedoti* during the period of investigation. Further, specimens of stages I and II are always higher in number than stages 0 and III during the period of observation.

Sagitta inflata : (Fig. 4) :—

Total length of the specimens varies from 3.6 to 9.2 mm and the tail length varies from 19 to 20% of the animal length. The specimens of stage IV are absent. During the period of study 3 peaks are noticed as seen in Fig. 4 during July, August and October. Throughout the period of observation the specimens of Stage I and II are higher in number followed by stage 0 and III as in *S. bedoti.* Specimens of stage III were noted in the collections made only during June and August and was absent in all the other month's samples.

Discussion

This investigation has clearly revealed that *S. bedoti*, and *S. inflata* are continuous breeders with 2 to 3 intensive broods followed by normal broods. It has already been pointed out (Dunbar, 1941) that the number of generations produced in each year increases with the distance from the poles. The presence of immature forms throughout the year in the estuary confirms the earlier conclusion that these species are continuous breeders. The fluctuations in abundance of the immature and fully matured forms indicating the periods of peak and lean breeding seasons further corroborates the conclusion that they belong to continuous breeding forms.

Another interesting feature that was noted during this investigation is the absence of fully matured specimens of both the species in the collected samples. In Cochin backwaters also (Nair, 1973) the same condition of rare occurrence of matured specimens of *S. bedoti* and *S. inflata* has been reported. So these interesting coincidence of absence of matured specimens of these species, throughout the period of observation, in the estuaries, suggests one to think the possibility of migration of these forms to the seas for spawning and re-entry of the young ones to the estuary. Intensive studies based on regular and frequent samples collected for several successive years are necessary before arriving at a definite conclusion regarding the breeding migration.

Specimens of *S. bedoti* and *S. inflata* present in the samples collected measured from 3 to 5 mm. and 3.6 to 9.2 mm. respectively. Total length of the specimens of both the species are very small, when compared to the specimens of the marine habitat. *S. inflata* of the coastal waters will be usually between 5 and 20 mm. or more in total length and *S bedoti* will be 7 to 13 mm. or more. This was already noted in the specimens of Cochin backwaters

(Srinivasan, 1972). The specimens of the same species that are living in estuarine waters, are smaller in size because the habitat in which they are living is controlled by a wide fluctuation of salinity conditions, as pointed out by Kinne (1964) that marine organisms are known to exhibit a reduction in final size in areas of their distribution, where the salinity is significantly reduced.

Further studies on the ecology of Ennore ecosystem based on several parameters are in progress and that are bound to give us a comprehensive knowledge on the life cycle, and on the breeding behaviour of these species.

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