NOTES

OBSERVATIONS ON THE BREEDING PERIODS OF CERTAIN INTERSTITIAL NEMATODES, GASTROTRICHS AND COPEPODS OF THE SOUTH-WEST COAST OF INDIA*

ABSTRACT

In the present study an attempt has been made to determine the breeding periods of 14 species of nematodes, three species of gastrotrichs and two species of copepods, based on the incidence of gravid females and the preponderance of juveniles in the samples collected and examined during the course of one year. Interesting correlation has been noticed between the data on the occurrence of gravid females and the incidence of juveniles in various samples. Based on their breeding periods these species have been classified into distinct categories.

THE information regarding the reproductive habits of the interstitial fauna of India is meagre. Studies hitherto made in other areas are chiefly concerned with the observations on the number of eggs produced (Swedmark, 1959), the peculiarities in the early development (Jagersten, 1952; Wilke, 1954; Swedmark, 1954, 1959, 1964; Remane 1952; Jouin 1962) and the methods of fertilisation (Swedmark, 1964). Regarding the reproductive periods of the interstitial fauna, there are only a few references. According to Swedmark (1964) the reproductive periods covering the greater part of the year occur in many species and seem to be the rule for the forms with a low production of gametes. In the tropical habitats this aspect has been left practically untouched. However, investigations made on other marine and brackish water animals (Panikkar and Aiyar 1939; Paul, 1942) of the Indian waters have shown the existence of different patterns of breeding cycles. In the present study, an attempt has been made to delineate the breeding periods of some common species of nematodes, gastrotrichs and copepods, which were collected from four different stations along the Kerala coast (Govindankutty and Nair, 1966).

Results and Discussion

The breeding periods of the animals investigated during the present study have been determined on the basis of the occurrence of gravid females as well as the incidence of juveniles in the population. Samples were collected regularly every month from different stations and the number of gravid females and juveniles were counted and represented as percentages of the samples during different months of the year. The temperature and salinity of the sea water at the four stations were recorded (Table 1).

The present study involved fourteen species of nematodes, three species of gastrotrichs and two species of copepods. On the basis of the occurrence of gravid females (Hermaphrodite in the case of gastrotrichs) in the samples collected during different months of the year, these species could be classified into distinct categories.

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TABLE 1. *Temperature of the sea water and salinity recorded from stations* 1 *to* 4

	Pre-monsoon				Monsoon				Post-monsoon			
Month	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.
Station 1												
T°C	29.0	29.5	31.9	31.5	28.0	27.8	27.9	28.0	28.3	29.0	29.5	28.9
S‰	33.42	33.79	33.95	33.95	24.43	15.32	22.47	25.95	21.99	24.92	29.47	32.33
Station 2												
T°C	30.5	31.0	30.9	30.5	29.0	28.5	27.8	29.0	28.9	29.0	29.0	28.5
S‰	31.15	31.74	32.81	33.00	22.85	10.52	13.46	16.32	15.24	19.48	21.24	30.26
Station 3												
T°C	30.0	30.5	31.5	30.9	30.5	27.6	26.5	28.0	28.5	29.0	29.2	29.0
S‰	29.15	30.45	31.70	32.22	21.95	6.20	4.06	5.98	10.99	16.00	20.25	29.00
Station 4												
T°C	29.0	29.0	30.6	31.0	28.8	26.9	27.5	28.0	28.5	29.5	29.9	28.0
S‰	30.10	31.50	32.68	33.22	19.00	2.00	0.57	2.38	5.39	16.53	21.36	28.06

TABLE 2. *Incidence of—gravid females : juveniles—expressed in percentage of the population in the samples collected in respective months*

	Pre-monsoon				Monsoon				Post-monsoon			
	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
Anticoma quadriseta	19 : 0	32 : 2	54 : 10	60 : 11	10 : 53	2 : 42	0 : 31	0 : 11	0 : 9	0 : 8	5 : 10	10 : 0
Thoracostoma trichodes	5 : 18	31 : 31	0 : 19	0 : 16	0 : 14	0 : 0	20 : 0	31 : 1	40 : 8	55 : 15	41 : 22	18 : 32
Oncholaimus flexus	7 : 39	6 : 19	0 : 18	0 : 14	0 : 9	0 : 8	10 : 1	25 : 1	42 : 11	43 : 14	23 : 49	14 : 53
Enoploides paralabiatus	1 : 9	0 : 5	0 : 5	0 : 2	0 : 0	1 : 0	18 : 11	49 : 15	32 : 18	17 : 25	9 : 51	2 : 12
Enoplus michaelseni	12 : 18	18 : 15	23 : 14	41 : 20	10 : 40	4 : 47	8 : 60	4 : 52	25 : 31	20 : 18	18 : 11	11 : 9
Dolicholaimus acutus	11 : 1	31 : 11	39 : 9	43 : 12	10 : 51	0 : 52	0 : 26	0 : 23	0 : 13	1 : 9	2 : 8	5 : 1
Desmodora inflexa	26 : 14	31 : 13	38 : 11	49 : 19	8 : 48	2 : 49	3 : 38	10 : 8	21 : 3	23 : 11	22 : 10	25 : 19
Chromadora indica	3 : 13	1 : 19	0 : 14	0 : 0	0 : 0	9 : 0	29 : 0	62 : 0	59 : 21	23 : 59	19 : 60	11 : 42
Nygmatonchus fossiferus	16 : 9	18 : 0	19 : 0	24 : 0	4 : 19	0 : 32	0 : 40	0 : 32	0 : 15	1 : 9	3 : 8	8 : 7
Cyatholaimus ocellatus	11 : 8	9 : 1	15 : 2	19 : 1	20 : 2	11 : 42	8 : 31	9 : 10	12 : 9	15 : 9	19 : 4	10 : 9
Paracanthonchus hawaiiensis	23 : 9	31 : 10	43 : 1	61 : 2	21 : 10	8 : 72	7 : 42	5 : 31	1 : 75	3 : 19	14 : 14	19 : 8
Steineria cobbi	0 : 0	0 : 0	3 : 0	19 : 0	45 : 11	43 : 12	1 : 43	19 : 51	14 : 32	11 : 14	9 : 19	1 : 0
Cynura papillata	0 : 1	0 : 0	0 : 0	6 : 0	10 : 0	25 : 11	7 : 19	19 : 42	23 : 31	8 : 53	4 : 32	0 : 8
Sphaerolaimus campbelli	18 : 21	19 : 19	20 : 41	29 : 28	18 : 19	9 : 21	12 : 11	53 : 9	55 : 31	41 : 49	23 : 32	21 : 26
Pseudostomella roscovita	0 : 0	0 : 1	0 : 0	1 : 1	42 : 1	51 : 18	53 : 13	41 : 14	19 : 34	5 : 18	3 : 20	2 : 11
Macrodasys indicus	10 : 1	32 : 0	45 : 0	55 : 23	19 : 21	0 : 42	0 : 34	0 : 8	0 : 11	0 : 8	0 : 12	1 : 3
Pleurodasys megasoma	12 : 0	50 : 0	56 : 15	66 : 19	13 : 20	0 : 25	0 : 40	1 : 52	0 : 10	0 : 1	1 : 8	5 : 1
Arenosetella balakrishnani	20 : 25	21 : 26	30 : 32	32 : 40	40 : 46	40 : 50	30 : 37	36 : 42	8 : 40	10 : 9	12 : 11	20 : 8
Arenosetella acantha	40 : 5	30 : 20	60 : 30	70 : 60	11 : 40	8 : 18	0 : 19	0 : 20	14 : 9	8 : 18	20 : 20	21 : 9

Species which breed almost uninterrupted throughout the year

This category includes species such as *Enoplus michaelseni, Desmodora inflexa, Cyatholaimus ocellatus, Paracanthonchus hawaiiensis, Sphaerolaimus campbelli, Arenosetella balakrishnani* and *Arenosetella acantha.* Of these, *E. michaelseni, D. inflexa, P. hawaiiensis* and *A. acantha* show greater breeding activity during April and May. Breeding is inhibited or reduced during June, July and August in the case of *E. michaelseni,* and *D. inflexa* and during October and November in the case of *P. hawaiiensis.* In *Cyatholaimus ocellatus* the highest percentage of gravid females occurred during May, June and December, while in August and September a decline in the number of gravid females was evident. *S. campbelli* showed a peak in the incidence of gravid females during September and October and a fall during July and August.

Species in which breeding is restricted to some definite part of the year

The majority of the species investigated during the present study come under this category. This group may be discussed under two subheads.

1. Those species which breed during the highly saline periods with peak reproductive activity during the hottest part of the year when salinity reaches the maximum values :

Species such as *Anticoma quadriseta, Dolicholaimus acutus, Nygmatonchus fossiferus, Macrodasys indicus* and *Pleurodasys megasoma* showed little or no evidence of breeding during the low saline period that extended from August to November. They apparently started breeding when salinity of the ambient water showed an upward trend during the post-monsoon period. Breeding activity reached a peak during the pre-monsoon period, especially during March, April and May.

2. Species which generally breed during the low or medium saline periods with little or no breeding during the rest of the year.

Thoracostoma trichodes, Enoploides paralabiatus, Oncholaimus flexus, Chromadora indica, Steineria cobbi, Cynura papillata, and *Pseudostomella roscovita* come under this category. In these species, breeding was apparently confined to the low saline period of the monsoon as well as the medium saline period of the post-monsoon. Gravid females of *Thoracostoma trichodes* and *Oncholaimus flexus* could

TABLE 3. *Maximum occurrence of gravid females of the species in the different seasons*

Pre-monsoon	Monsoon	Post-monsoon
Anticoma quadriseta	*Enoploides paralabiatus*	*Thoracostoma trichodes*
Nygmatonchus fossiferus	*Chromadora indica*	*Oncholaimus flexus*
Dolicholaimus acutus	*Steineria cobbi*	*Sphaerolaimus campbelli*
Desmodora inflexa	*Pseudostomella roscovita*	*Enoploides paralabiatus*
Paracanthonchus hawaiiensis	*Cynura papillata*	*Chromadora indica*
Macrodasys indicus		
Pleurodasys megasoma		
Arenosetella balakrishnani		
Arenosetella acantha		

be collected in maximum numbers during the post-monsoon period while the percentage of gravid females of *Steineria cobbi, Cynura papillata* and *Pseudostomella roscovita* was highest during the monsoon period. However, in *Enoploides parala-*

biatus and *Chromadora indica*, there was a preponderance of gravid females both during the monsoon and the post-monsoon periods. As the salinity increased during the hot pre-monsoon months (Table 1), the breeding activity was either reduced, or completely stopped. The maximum breeding activity of the different species is shown in Table 3.

The data pertaining to the incidence of gravid females and juveniles expressed as percentages of the total population are presented in Table 2. It is noteworthy that there is general agreement and correlation between the data on the occurrence of gravid females and the incidence of juveniles in the various samples examined. A preponderance of juveniles in the populations was usually preceded by a peak in the occurrence of the gravid females. The data on the incidence of juveniles thus serve as confirmatory evidence to the data obtained on the incidence of gravid females.

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