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EPIZOIC FAUNA OF SOME PORTUNID CRABS OF THE PULICAT LAKE

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ABSTRACT

The settlement pattern of epizoic organisms on the edible crab species such as *Scylla serrata* (Forskal), ***Scylla tranquebarica* (Fabricius) and *Portunus pelagicus* (Linnaeus) of the Pulicat Lake was surveyed. Ten species, three varieties and a form of epizoa infested the external parts of the 10% of host crabs of *S. tranquebarica* and their relative incidence to the size and site and to the different regions of this brackishwater lake was studied. The external epizoites settled mostly on the easily accessible carapace of larger crabs distributed mainly around the mouth of the lake. Encrustation both on *S. serrata* (0.3%) and on *P. pelagicus* (0.2%) was strikingly insignificant.

The different gill-infesting pedunculate cirripeds were also examined as to their preferred gills and gill regions of *S. tranquebarica, S. serrata* and *P. pelagicus.* In the gill chamber the cirriped species infested largely the middle and the ventral regions of the middle gills which provided sufficient space as well as they are directly exposed to the inhalent resoiratory current of the host supplying food and oxygen to the epizoites.

Interestingly enough, no parasitic infestation was noticed on any of these crab species of the Pulicat Lake.

INTRODUCTION

THE GREEN lagoon crabs *Scylla serrata* (Forskal) and *Scylla tranquebarica* (Fabricius) and the Indian blue-swimming crab *Portunus pelagicus* (Linnaeus) support a fairly lucrative commercial fishery in the Pulicat Lake. Of these, *S. tranquebarica* by virtue of its large size offers an excellent substratum for the settlement of a variety of epizoites, including the gill-dwelling ones. The other two species viz. *S. serrata* and *P. pelagicus* because of their apparently smaller size together with their habits and habitats, incline to foster only the gill-dwelling pedunculate cirripeds in significant numbers. A study of these foulding organisms in relation to the host species would essentially shed light as to the nature of association existing between them.

Information on settlement of epizoites on lobsters (Barnes and Benegal, 1951; Dexter, 1955; Dinamani and Kurian, 1961; Deshmukh, 1964) and on crabs (Pearse, 1932; Day, 1935; Daniel, 1956; Natarajan, 1979) are fairly well documented. However, with regard to Indian waters much of the information is very scattered and fragmentary in nature and review of literature reveals that no organised study has so far been undertaken on brachyurans in particular regarding the mode of infestation by the epizoites, their biology, longivity in relation to the intermoult period of the host, relationship between the host and the epizoites and their relative abundance and significance of attachment regions of the gill or body. Hence the present study was taken up on some of these lines on the three edible portunid crabs of the Pulicat Lake.

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**The taxonomical status of this species is being published elsewhere.

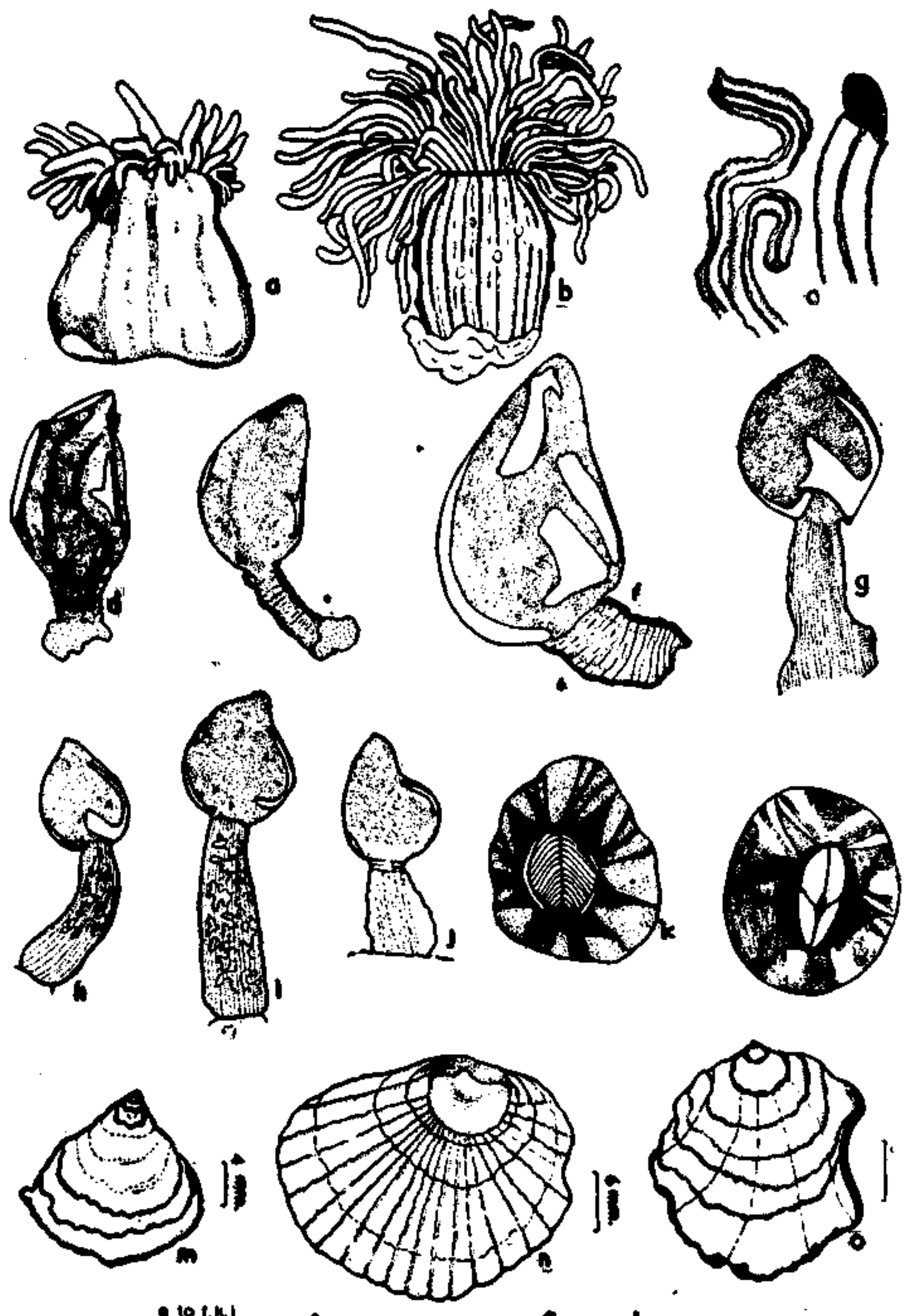

Fig. 1. Sea anemones : a. *Anemonia indicus* Parulekar – laterval view, b. *Cribrinopsis robertii* Parulekar – laterval view; Polychaete : c. Serpulid tubes (Tube-dwelling polychaete) - dorsal view; Cirripeds: d. *Conchoderma virgaatum* Spengler – side view, e. *Conchoderma virgatum* form *hunteri* Owen – side view, f. *Octolasmis war - wickii* Gray – side view, g. *Octolasmis cor* var - *a* (Aurivillius) – side view, h. *Octolasmis cor* var - *b* (Gruvel) – side view, i. *Octolasmis cor* var. *c* (Gruvel) – side view, j. *Octolasmis angulata* (Aurivillius) – side view, k. *Balanus amphitrite communis* Darwin – entire animal, l. *Chelonobia patula* Ranzani – entire animal; Bivalves: m. *Plicatua australis* Lamarck – outer view, n. *Anomia achaeus* Gray – outer view and o. *Ostrea madrasensis* Preston – outer view.

Material and Methods

From the commercial catches, 1966 individuals of *S. tranquebarica* were examined during the period 1971-1973. As the incidence of external epizoites on *S. serrata* and *P. pelagicus* was insignificant (0.3% and 0.2% respectively), for 500 crabs examined in each case, epizoites on *S. tranquebarica* alone is emphasized. Settlement of epizoites on the different parts of carapace, appendages, ventral regions and abdomen of hosts, relative abundance of each epizoite from different regions (mouth, central and northern) of the lake, percentages of crabs providing attachment site and the mean incidence on various size groups of host crabs have been worked. As for the gill-dwelling pedunculate cirripeds, the relative abundance of *Octolasmis cor* var *a*, *O. cor* var. *b* and *O. cor* var. *c* occurring both in *S. tranquebarica* and *S. serrata* and *Octolasmis angulata* (Aurivillius) occurring in *P. pelagicus* are for the sake of convenience dealt with separately from the external epizoites in some detail. The significance of the distribution pattern of these cirripeds on specific gills and gill regions, as well, were investigated.

Epizoites of *Scylla tranquebarica*

Only 195 of 1966 crabs were infested with the external epizoites which included ten species, three varieties and a form as listed below (Fig. 1):

Sea anemones

Anemonia indicus Parulekar

Cribrinopsis robertii Parulekar

Polychaete

Serpulid tubes

Cirripeds

Conchoderma virgatum Splengler

Chonchoderma virgatum forma *hunteri* Owen

Octolasmis warwickii Gray

O. cor var. *a* (Aurivillius)

O. cor var. *b* (Gruvel)

O. cor var. *c* (Gruvel)

Balanus amphitrite communis Darwin

Chelonibia patula Ranzani

Bivalves

Plicatula australis Lamarck

Anomia achaeus Gray

Ostrea madrasensis Preston

Major epizoites

Anemonia indicus, *B. amphitrite communis*, *C. patula* and *O. madrasensis* were categorised as major epizoites owing to their frequent and higher incidence. By and large, the infested

Table 1. *Mean number of major epizoites at different size groups of* S. tranquebarica

Size range (cm)	*A. indicus*	*B. amphitrite communis*	*C. patula*	*O. madrasensis*
7—8	2.0	—	—	—
8—9	—	6.0	5.0	—
9–10	1.8	3.33	2.66	11.33
10–11	1.28	3.0	1.5	—
11–12	1.5	8.7	1.0	2.0
12–13	2.0	2.87	9.8	14.75
13–14	2.0	3.57	1.33	4.25
14–15	2.4	1.87	1.5	2.2
15–16	1.42	5.42	2.2	6.2
16–17	5.14	7.25	3.0	21.0
17–18	1.0	10.33	1.0	8.25
18–19	—	79.20	8.66	48.00

host crabs ranged from 7.4 to 19.0 cm across the carapace. The site of attachment was mostly the carapace, although a few epizoites settled on limbs, ventral and abodminal regions also (Fig. 2). The brackishwater sea anemone *A. indicus* infested 3.7% of the crabs examined and its highest incidence was on crabs between 16.0 and 17.0 cm across the carapace (Table 1). Crabs harbouring this anemone were found dispersed over the entire lake. The acorn barnacle *B. amphitrite communis* infested 3.6% of the crabs ranging from 8.0 to 19.0 cm of carapace breadth. This epizoan like *A. indicus* enjoyed a fairly wide distribution in the lake except the northern extremity. *C. patula* attacked only 2.4% of the total crabs and the most opted size range was 12-13 cm. This was invariably restricted to the bar mouth region signifying its marine habitat. Spats of the edible oyster *O. madrasensis* occurred on 1.6% of crabs of 18-19 cm size group. Though the attachment of this oyster was more on the carapace, invasion of ventral regions with a view to spacing out was also noticed.

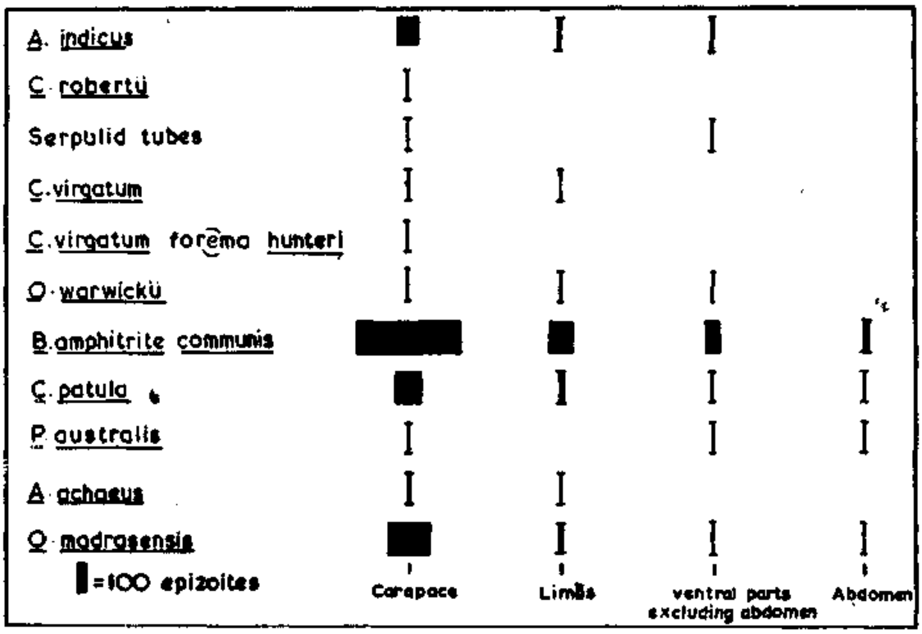

Fig. 2. Density of epizoites at different parts of *S. tranquebarica.*

Minor epizoites

Epizoic species of marine habitat showing relatively low and occasional encrustation were grouped as minor epizoites. Incidentally these were found distributed at the bar mouth region. Thus only two individuals of the sea anemone *C. robertii* were observed on the carapace of a single host crab. The tube-dwelling serpulid worms were observed in association with the epizoic *O. madrasensis* on two host crabs caught at the oysterbeds. Harbouring of three individuals of *C. virgatum* and 13 numbers of its form, *C. virgatum* form *hunteri* on its carapace was also recorded. Yet another epizoite *O. warwickii* merely hung to the arthrodial membranes of walking legs and posterior border of a single host.

Varieties of *O. cor* in *S. tranquebarica*

The branchial chambers of twenty five crabs ranging from 14 to 17.5 cm, of a hundred crabs examined at random were found to contain the three varieties of *O. cor*.

It was further observed that *O. cor* var. *c* was more dense in number and more widely distributed, *O. cor* var. *b* was the least dense, but less in the extent of its distribution and *O. cor* var. *a* although denser than *O. cor* var. *b*, its settlement was confined to less number of gills (Fig. 3).

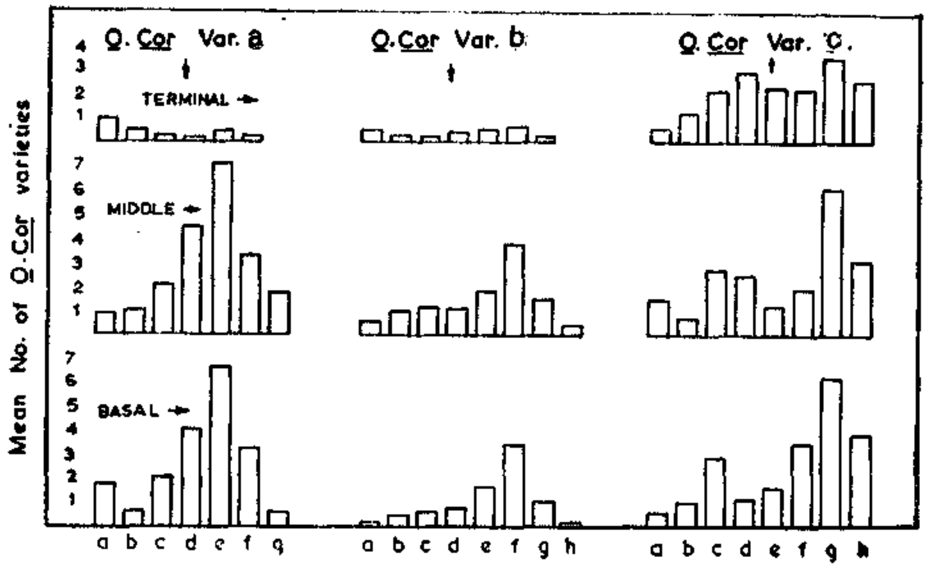

Fig. 3. Distribution of *O. cor* varieties on the gill regions of *S. tranquebarica* : a. Podobranch of II maxilliped; b. Arthrobranch of II maxilliped; c. Anterior arthrobranch of III maxilliped; d. Posterior arthrobranch of III maxilliped; e. Anterior arthrobranch of cheliped; f. Posterior arthrobranch of cheliped; g. I Pleurobranch and h. II Pleurobranch.

The settlement of the three varieties of *O. cor* indicated that *O. cor* var. *a* preferred the anterior arthrobranch of cheliped, *O. cor* var. *b* the posterior arthrobranch of cheliped and *O. cor* var. *c* the I pleurobranch. Further examination of the infested gill region revealed that *O. cor* var. *a* opted the middle portion of gills to either the basal or the terminal portions. The complete absence of this variety on I and II pleurobranchs was noteworthy. *O. cor* var. *b* was also choosy of the middle region of gills and it was, however, found distributed on all regions of all gills except the terminal portion of II pleurobranch. As for *O. cor* var. *c* the greater incidence was both on the basal and middle regions of gills and it invaded all the gills and every gill region.

In this connection it is worth recording here the number of individuals of various species that were found on a heavily infested sponge-bearing *S. tranquebarica* (18.3 cm) as listed below:

External epizoites	No. of individuals	
B. amphitrite communis	(< 4 mm broad) -	221
	(> 4 mm broad) -	158
O. madrasensis	(< 7 mm broad) -	28
	(> 7 mm broad) -	18
C. paiula		19
P. australis		4
A. achaeus		4

Gill-dwelling epizoites	No. of individuals
O. cor var. *a*	172
O. cor var. *b*	137
O. cor var. *c*	267

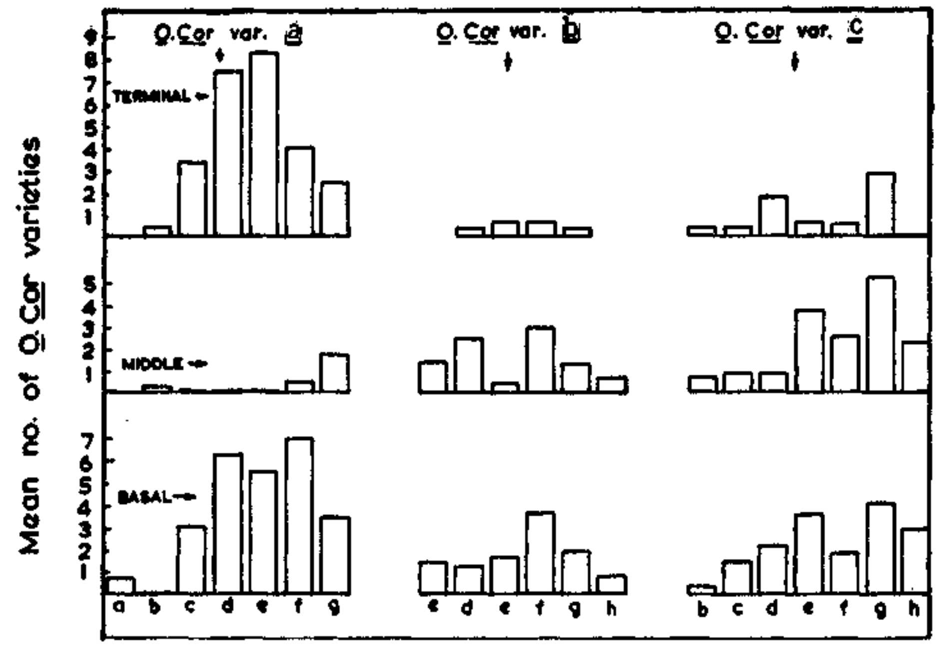

Fig. 4. Distribution of *O. cor* varieties the gill regions of *S. serrata.*

Varieties of O. cor *in* S. serrata

Although a hundred numbers of *S. serrate* were examined yet only four crabs measuring between 8.6 and 11.3 cm harboured the varieties of *O. cor* in their branchial chambers. The middle gills were opted best and the highest incidence of *O. cor* var. *a* was on the basal and terminal regions of anterior arthrobranch of cheliped, *O. cor*, var. *b* on the basal and middle portions of posterior arthrobranch of cheliped and *O. cor* var. *c* on the basal

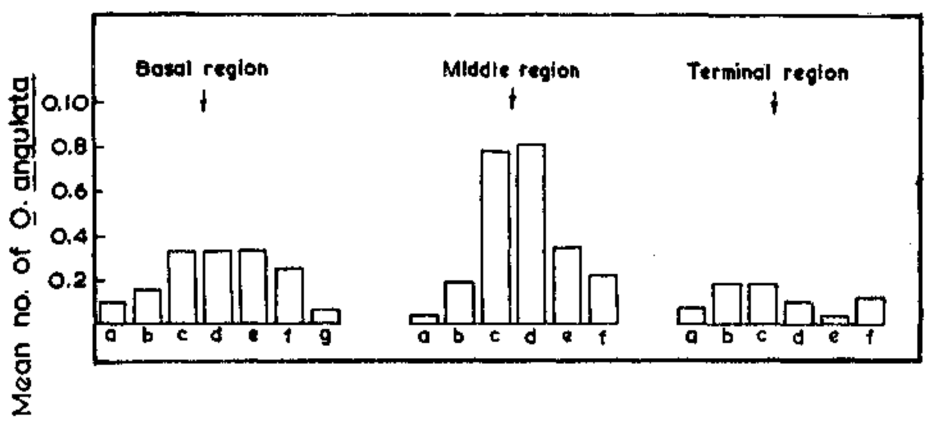

Fig. 5. Distribution of *O. angulata* on the gill region of *P. pelagicus.*

and middle regions of 1st pleurobranch (Fig. 4). As noticed in *S. tranquebarica, O. cor* var. *b* was far less dense than either *O. cor* var. *a* or *O. cor* var. *c*.

Octolasmis angulata *in* P. pelagicus

Examination of branchial chambers of 100 crabs of *P. pelagicus* revealed an infestation of 19.0% of crabs ranging from 10.4 to 15.3 cm. The middle regions of gills situated at the middle of the gill-chamber possessed the largest number of this cirriped (mean 2.35), the basal portion (mean 1.53) and the terminal portion the least (mean 0.59) (Fig. 5). Further analysis of the basal, middle and terminal regions revealed that the infestation was confined mostly to the anterior and posterior arthrobranchs of 3rd maxillipeds and that of the chelipeds.

Discussion

Deshmukh (1964) has recorded only 1% epizoic infestation on Bombay spiny lobster in a random sample whereas it is 10% for *S. tranquebarica* in Pulicat Lake. This higher epizoic infestation may be because of the fact that the bottom of the whole of the Pulicat Lake is muddy and is devoid of any hard substratum. As a consequence, the large and hard carapace of *S. tranquebarica* seems to provide a suitable site of attachment. It was also observed, as reported by Deshmukh (1964), that carapace was the most preferred site to walking legs and ventral side.

Epizoic infestation of *S. tranquebarica* progressively increased as the host specimens increased in size from 7.4 to 19.0 cm. This suggests that the relatively small carapace of both *S. serrata* and *P. pelagicus* may be one of the causes for the insignificant number of external epizoites on them. In addition *P. pelagicus* is an active swimmer and *S. serrata* lives mostly in burrows or crevices in relatively shallow waters and hence these habits may not be conducive for the settlement of the epizoites.

Day (1935) observed that crabs bearing barnacles and serpulid tubes have not much vitality. However, Barnes and Benegal (1951) and Deshmukh (1964) have contradicted this view. In fact, heavy fouling on crabs is considered an indication of good meat content in Pulicat. Nonetheless any additional load of these epizoans would obviously act only hamper normal movements, but also likely to tax more energy. This might also be much pronounced in crabs harbouring the gill-dwelling pedunculate cirripeds which cluster along the path of the inhalent respiratory current. Apart from filtering their food from this protected area, these associates are bound to consume much of the oxygen from the inhalent respiratory water current, intended for the host animal. Therefore extra energy has to be expended to meet the normal oxygen demand of the host animal.

The host carbs under laboratory conditions to get rid of the food remnants from their mouth parts send a fast respiratory current to flush these food particles away. The external epizoites at such times especially the acorn barnacles and the seaanemones get excited probably to feed upon these food particles. This is in agreement with the finding of Deshmukh (1964) on the Bombay spiny lobster. The host animal in return may benefit from the attachment and association of the branchial epizoites, in getting rid of the unwanted organic material that may get into the gill-chamber along with the respiratory water currents.

Recently moulted soft crabs were never found to harbour any epizoite, external or branchial, since attachment sites such as gills, appendages and carapace are periodically cast off. This is a serious setback for the epizoic organisms. However, Barnes and Benegal (1951) reports that spawning of the epizoites coincided with the moulting of the host animals. This was found to be true in crabs also. Further, Paul (1940) observed that the fouling organisms of Madras Harbour breed throughout the year. Hence infesting freshly moulted crabs may not be a problem, provided the epizoites in the Pulicat Lake which is so close to Madras, also follow similar breeding periodicity.

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