

ON THE INCIDENCE OF THE SPOROZOAN
THELOHANIA PROX DUORARA IVERSEN AND MANNING IN
COMMERCIALY IMPORTANT PRAWNS AT MADRAS

ABSTRACT

In the commercial catches at Madras, *Penaeus semisulcatus* and *P. indicus* were seen to be affected by the sporozoan parasite *Thelohania prox duorara* Iversen and Manning. The incidence varies from 0.5 to 2%. Among the infected prawns 87% belong to *P. semisulcatus* and 13% to *P. indicus*. In both the species the infection starts after they reach a length of 130 mm. First, the parasite infests the gonad, then the liver and finally the body musculature. Both the sexes are more or less equally affected by the parasite. The infection becomes severe with advancing age. More number of diseased prawns were encountered during the night landings. A few specimens of *P. monodon* harvested at CMFRI Muthukadu Mariculture Farm near Madras were also seen to be affected by the parasite. Details regarding total length, weight, sex and degree of infection for a two-year period are discussed.

SPECIMENS of *Penaeus semisulcatus* and *P. indicus* are regularly seen to be affected by a microsporidian parasite. The prawns affected by the parasite are known as 'cotton prawns' and locally as *Chunam* prawns due to white lime-like material inside the body. These prawns are rejected by the processing plants for exports. In order to study the incidence of the parasite throughout the year in all the commercially important prawns, the work was taken up.

Thomas (1976) has reported the occurrence of the sporozoan in *P. semisulcatus* under the name *Thelohania duorara* Iversen and Manning from Mandapam. This parasite is also known from Tuticorin and Madras. Thomas (1976) states that his species shows affinities to *T. penaei* Sprague infecting the brown shrimp *P. aztecus* and white shrimp *P. setiferus* from Florida (Hutton *et al.*, 1959). He further states that his species resembles *T. duorara* clearly, but differs significantly from

the American species in the shape of spores and pansporoblasts. The present species may well belong to an undescribed species. The taxonomic position of the parasites is being investigated.

The author is grateful to Dr. E. G. Silas, Director, Central Marine Fisheries Research Institute, Cochin for the guidance and encouragement. He is thankful to Dr. P. V. Rao for the kind interest in the work and also to Shri M. S. Muthu for kindly going through the manuscript and suggesting improvements. Finally he thanks the staff at Muthukadu Farm for allowing him to examine the diseased prawns harvested from there.

Material and methods

Since the incidence of the parasite is only minor being 0.5 to 2% of the commercial catches, collection of infested specimens became a problem. This was overcome by keeping plastic containers with 5% formalin in prawn peeling sheds. The specimens rejected by them were put into the plastic containers and the same were collected once a week. On bringing the material to the laboratory, total length, weight and sex were noted. The degree of infection was examined by cutting the prawn midventrally. The prawns affected by the parasite are divided into three groups based on the degree of infection as mild, moderate and severe. In cases where the gonad alone is affected the infection is considered as mild and in cases where the gonads and liver are affected the infection is considered as moderate and lastly if the infection is seen in gonad, liver and body musculature it is considered as severe. Specimens in which infection is severe the whole body is pervaded with white material.

Results

Of the five commercially important species of prawns examined viz., *Metapenaeus dobsoni*,

M. monoceros, *Penaeus indicus*, *P. semisulcatus* and *P. monodon*, during the period of study, infestation was seen only in *P. semisulcatus* and *P. indicus*. Species of *Parapenaeopsis*, *Metapenaeopsis* and *Trachypenaeus* examined from the commercial catches also did not have any visible sporozoan infection.

During the course of this study 222 specimens of *P. semisulcatus* infected with the sporozoan (Pl. I A) were examined and studied. The total length of the infected specimens varied from 130 to 216 mm and the weight from 21 to 91 g. Most of the specimens examined were severely affected, females being more so (Table 1).

TABLE 1. Details of infected *P. semisulcatus* collected from the commercial catches during June 82 - March 84

| Month | Length range (mm) | Weight range (g) | Males (%) | Females (%) |
|-------------|-------------------|------------------|-----------|-------------|
| June '82 | 142-186 | 31-63 | 42 | 58 |
| July | 128-195 | 21-73 | 42 | 58 |
| August | 150-216 | 32-91 | 46 | 54 |
| September | 156-179 | 35-49 | 33 | 67 |
| October | 166-200 | 45-74 | 50 | 50 |
| November | 128-181 | 21-59 | 55 | 45 |
| December | 160-189 | 42-60 | 30 | 70 |
| August '83 | 185-200 | 57-72 | 48 | 52 |
| September | 147-181 | 31-48 | 28 | 72 |
| October | 135-184 | 24-59 | 57 | 43 |
| November | 134-201 | 18-71 | 37 | 63 |
| December | 145-200 | 24-79 | 33 | 67 |
| January '84 | 140-187 | 27-54 | 34 | 66 |
| February | 158-200 | 35-72 | 28 | 72 |
| March | 130-201 | 22-69 | 40 | 60 |

In *P. indicus* (Pl. I B) only 52 specimens which were affected could be examined. The

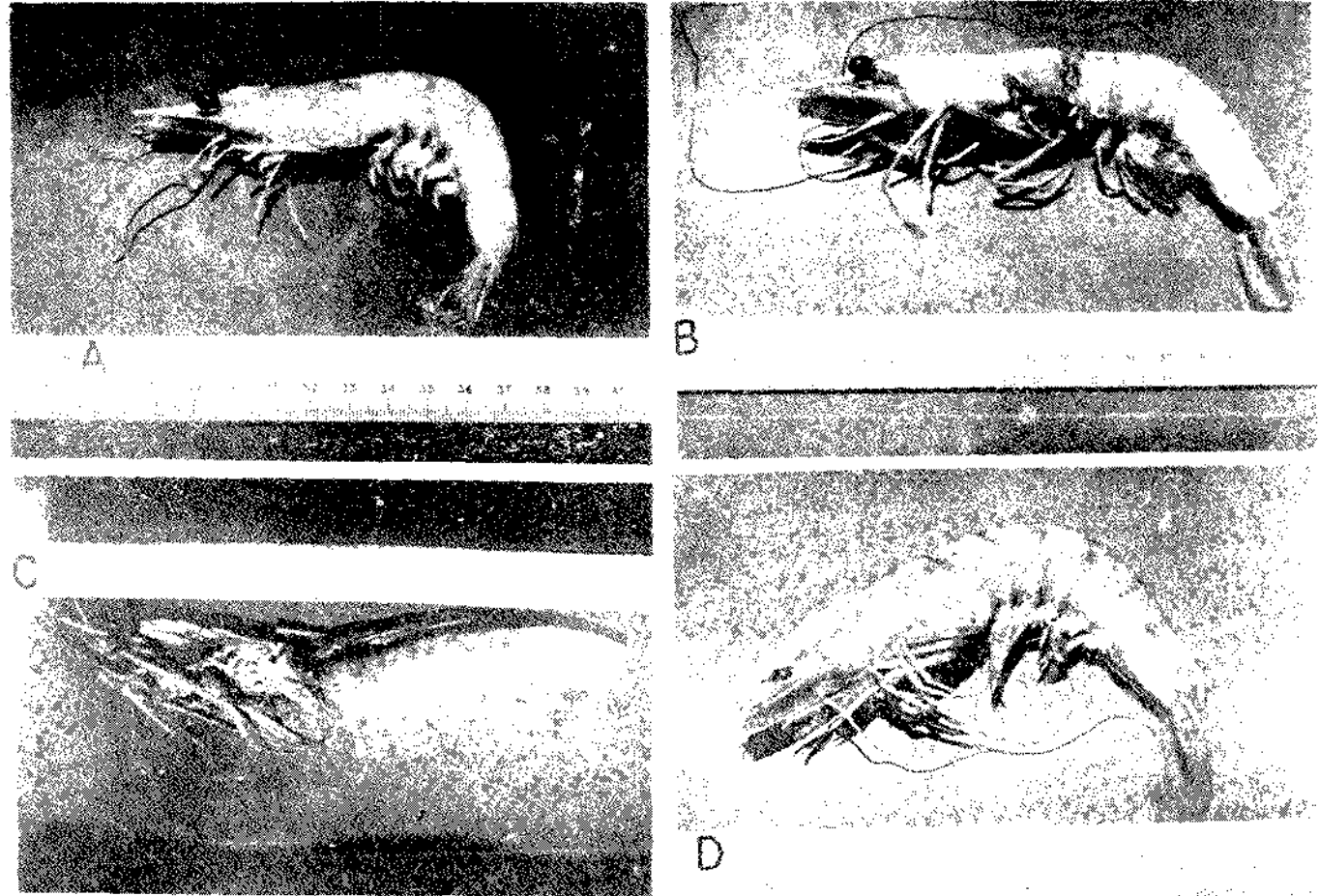


PLATE I. Prawns affected by the sporozoan parasite : A. *Penaeus semisulcatus*, B. *P. indicus*, C. Severely affected specimen of *P. semisulcatus* cut open to show the affected portion inside carapace and D. *P. monodon*.

smaller number examined indicates the low rate of incidence in the species. The total length of the specimens examined varied from 131-215 mm and the weight varied from 18-81 g. The percentage of affected female is definitely higher than males. In this species often all the infected specimens examined were found to be only mildly affected by the parasite (Table 2).

TABLE 2. Details of infected *P. indicus* collected from the commercial catches during July 82 - March 84

| Month | Length range (mm) | Weight range (g) | Males (%) | Females (%) |
|--------------|-------------------|------------------|-----------|-------------|
| July '82 | 131-193 | 19-54 | 16 | 84 |
| September | 140-163 | 19-28 | 34 | 66 |
| October | 173-193 | 52-59 | 42 | 58 |
| November | 131-165 | 19-29 | 48 | 52 |
| December | 133-193 | 19-59 | 33 | 67 |
| October '83 | 134-215 | 21-78 | 35 | 65 |
| November | 134-172 | 18-49 | 16 | 84 |
| December | 142-170 | 30-46 | 38 | 62 |
| February '84 | 160-185 | 34-63 | 35 | 65 |
| March | 158-202 | 27-81 | 37 | 63 |

Penaeus monodon forms only 5 to 10% of the catch among the prawns in the commercial landings at Madras. During the course of this study not a single infected specimen of *P. monodon* could be collected from the peeling sheds. This may be due to the smaller number of the specimens landed daily. However, some of the specimens of *P. monodon* (Pl. I D) harvested from Muthukadu Farm near Madras were found to be affected by the parasite. The harvest was conducted on 7-4-83 and altogether 21 specimens were found to be affected by the sporozoan parasite. The total length of the affected specimens varied from 182-210 mm and the weight varied

from 59-78 g. It is interesting to note that all the 21 affected specimens were only females. The infection was found to be moderate in all the specimens probably as the prawns were harvested at seven months. The life history and mode of transmission of disease are not fully understood. The spread of the disease in the farm may be due to over crowding which is not the case in nature. The details of *P. monodon* examined are given in Table 3.

TABLE 3. Details of some of the infected *P. monodon* examined from Muttukadu Farm

| Total length (mm) | Weight (g) | Sex | Degree of infection |
|-------------------|------------|--------|---------------------|
| 210 | 78 | Female | Moderate |
| 193 | 59 | " | " |
| 182 | 58 | " | " |
| 190 | 59 | " | " |
| 190 | 61 | " | " |
| 197 | 63 | " | " |
| 204 | 70 | " | " |

The details of degree of infection in case of *P. semisulcatus* and *P. indicus* are given in Tables 4 and 5 respectively. It is interesting to note that most of the specimens of *P. semisulcatus* examined were severely affected while most of the *P. indicus* examined were mildly affected. Apparently that may be due to older forms of *P. semisulcatus* being trawled as compared to *P. indicus* since the infection was found to become severe with age. It is seen that in both the species specimens more than 130 mm in total length alone were found to be affected by the parasite. In many hundreds of juvenile specimens examined from the backwaters not a single specimen was found to be affected by the parasite. This clearly

shows that infection starts only in specimens in which gonads are developed.

brought on board the vessel it looked normal as if with fully mature green ovary. Mistaking

TABLE 4. *Details of infection in percentage in P. semisulcatus during July 82 - March 84*

| Month | Degree of infection in percentage | | |
|---------------|-----------------------------------|----------|------|
| | Severe | Moderate | Mild |
| July '82 | 39 | 19 | 42 |
| August | 56 | 28 | 16 |
| September | 100 | - | - |
| October | 62 | 38 | - |
| November | 33 | 11 | 56 |
| December | 76 | - | 24 |
| September '83 | 100 | - | - |
| October | 57 | 35 | 8 |
| November | 62 | 29 | 9 |
| December | 80 | 20 | - |
| January '84 | 66 | 34 | - |
| February | 100 | - | - |
| March | 80 | 20 | - |

Remarks

Specimens affected by the parasite apparently look normal. On one occasion a large female specimen (210 mm in total length) of *P. semisulcatus* (Pl. I C) which was severely affected by the parasite was trawled from 10 metres depth off Madras by Research Vessel Cadalmin III. When the specimen was

TABLE 5. *Degree of infection in percentage in P. indicus during September 82 - March 84*

| Month | Degree of infection in percentage | | |
|---------------|-----------------------------------|----------|------|
| | Severe | Moderate | Mild |
| September '82 | - | - | 100 |
| October | - | - | 100 |
| November | - | - | 100 |
| December | - | - | 100 |
| October '83 | 26 | 8 | 66 |
| November | - | - | 100 |
| December | - | 100 | - |
| February '84 | - | 100 | - |
| March | 62 | 13 | 25 |

this for a good breeder it was put in a polythene trough having sea water. It was freely swimming in the water like any normal specimen. It was only after death and preservation in formalin that the white colour became evident indicating that the specimen was severely affected by the sporozoan.

The specimens affected by the parasite and rejected by the export market are not thrown out, but given to persons who go on trawlers. They are consumed after thoroughly washing the lime-like material with apparently no ill effects.

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COMPARATIVE HYDROLOGICAL STUDY OF FIVE PONDS NEAR MANDAPAM AND THE ADJOINING INSHORE WATER OF THE PALK BAY

ABSTRACT

Variation in salinity, temperature and dissolved oxygen of the five experimental ponds adjoining to the sea near Mandapam from November 1979 to December 1980 were studied. The temperature, salinity and pH decreased during Northeast Monsoon while dissolved oxygen was high. Large seasonal variation in salinity was observed. The low salinity during November to December (19.02 to 20.94‰) mainly due to rainfall during Northeast Monsoon. Higher salinity in July-August was due to evaporation and seepage. Salinity values of the ponds were compared with the adjoining sea.

THE Low lying coastal lagoon which periodically get flooded with sea water, but usually with a low biological productivity have been proved for development of fish farm (Tampi, 1960). Attempts at fish culture and utilising the coastal lagoons are receiving increased attention in our country. In order to determine to what extent these apparently low productive areas can be brought under effective utilisation for fish culture purpose, the CMFRI has undertaken the fish culture project. The studies which dealing the ecological characteristics of the salt water lagoon near Mandapam (Tampi, 1959), the results of experimental fish culture (Tampi, 1960) and hydrological factors and primary production in marine fish ponds (Udaya varma, 1963) are notable contributions in this line. A study of physico-chemical properties of water of fish pond is an essential prerequisite of culture system. The hydrological parameters facilitate the selection of species to be cultured and also avoid and minimise catastrophies due to depletion of oxygen of the water. However, there is a general dearth of data on the water characteristics of fish ponds. Hence, a study

of these was undertaken and the results are presented here.

The authors express their thanks to Dr. E. G. Silas, Director, Central Marine Fisheries Research Institute, Cochin for his kind encouragements. They are grateful to Dr. A. V. S. Murty, Fishery Environment Management Division for critically going through the manuscript and offering valuable suggestions for its improvement.

Material and methods

Weekly water samples collected from five experimental ponds during November 1979 to December 1980 were the material for this study. The five ponds, part of the lagoon on the Palk Bay side near Mandapam, which lay within 2 km from CMFRI are fed with the sea water from the Palk Bay by means of 5 HP oil engine. The water levels in the ponds were found to fluctuate throughout the year, with 80 to 102 cm during Northeast Monsoon months and 40 to 59 cm during the summer

months. The samples were collected between 0700 and 0730 hrs in the ponds, simultaneously samples from the adjoining sea in the Palk Bay.

Results

The temperature was low during December to February (26.3 to 27.8°C) when the Northeast monsoon was more active. The temperature increased from March (28.2°C) and attained a peak during April (30.1°C). After that it lowered slightly from May to July and reached higher values in October (30.2°C). The maximum temperature recorded was in September (30.2°C) and the minimum was in January (26.3°C).

Fig. 1 shows the monthly mean salinity and dissolved oxygen for each of the experimental ponds together with the ranges for each month respectively. Salinity of all the ponds showed a similar trend as the salinity of the Palk Bay with primary peak in August, secondary peak in March and low values in November and December. It is evident from Fig. 1 the salinity difference between the ponds are small during all the calendar months except July and August. The salinity minima was observed during November and December. The mean salinity value of five experimental ponds in November, 1979 ranged from 19.26 to 20.94‰, while in the adjoining Palk Bay it was 29.01‰. In December salinity ranged from 19.02 to 20.07‰, while in the sea it was 25.66‰. It is clear that salinity in all the ponds from November to December period is considerably lower than the sea, which was mainly due to varying amount of rainfall during Northeast Monsoon. The data on rainfall was collected from meteorological station, Pam-ban and maximum rain was observed in November (330.2 mm) followed by December (201.9 mm).

From January (25.03 to 26.85‰) and February (28.98 to 32.22‰) onwards the salinity in all the ponds increased steadily, when compared with the adjoining sea. March to May salinity values in the experimental ponds were more or less equal to that of the Palk Bay. Rainfall in April (64.0 mm) lowered the salinity 0.68‰, 2.72‰, 3.78‰, 3.51‰ and 3.87‰ respectively in the ponds according to the size and maximum of salinity was in the biggest pond No. VI (3.87‰). The cultured fishes in the ponds were harvested at the end of June 1980 and salinity in the ponds started to increase steadily and it remained above the salinity of the sea and in July one of the ponds it was 43.21‰. Further rise in salinity was observed which was mainly due to not pumping the seawater into the ponds and due to evaporation and seepage from the ponds. In August the values went up as high as 65.00‰ in one of the ponds agree with the observation of Udaya varma *et al.* (1963) who observed salinity in one of the ponds 51.0‰ in summer. For restocking purpose, from September onwards sea water from the sea was pumped, yet salinity in the ponds remained above that of the sea during September and October.

The onset of Northeast Monsoon in the end of October 1980 resulted in a rainfall of 92.9 mm followed by continuous rain in November (88.5 mm) and December (26.4 mm) which lowered the salinity considerably in the ponds. Therefore the summer months of July to September recorded the highest salinity while minimum values were in monsoon months (Fig. 1).

The dissolved oxygen content of all the ponds showed definite pattern of seasonal variation which was more or less similar to that of the sea, the Palk Bay. Maximum values of dissolved oxygen were observed in monsoon months

particularly in November (6.04 ml/l) and December (5.58 ml/l) in 1979 and similar con-

dition was observed in 1980 also. Thereafter it decreased to March (2.24 to 3.12 ml/l) and

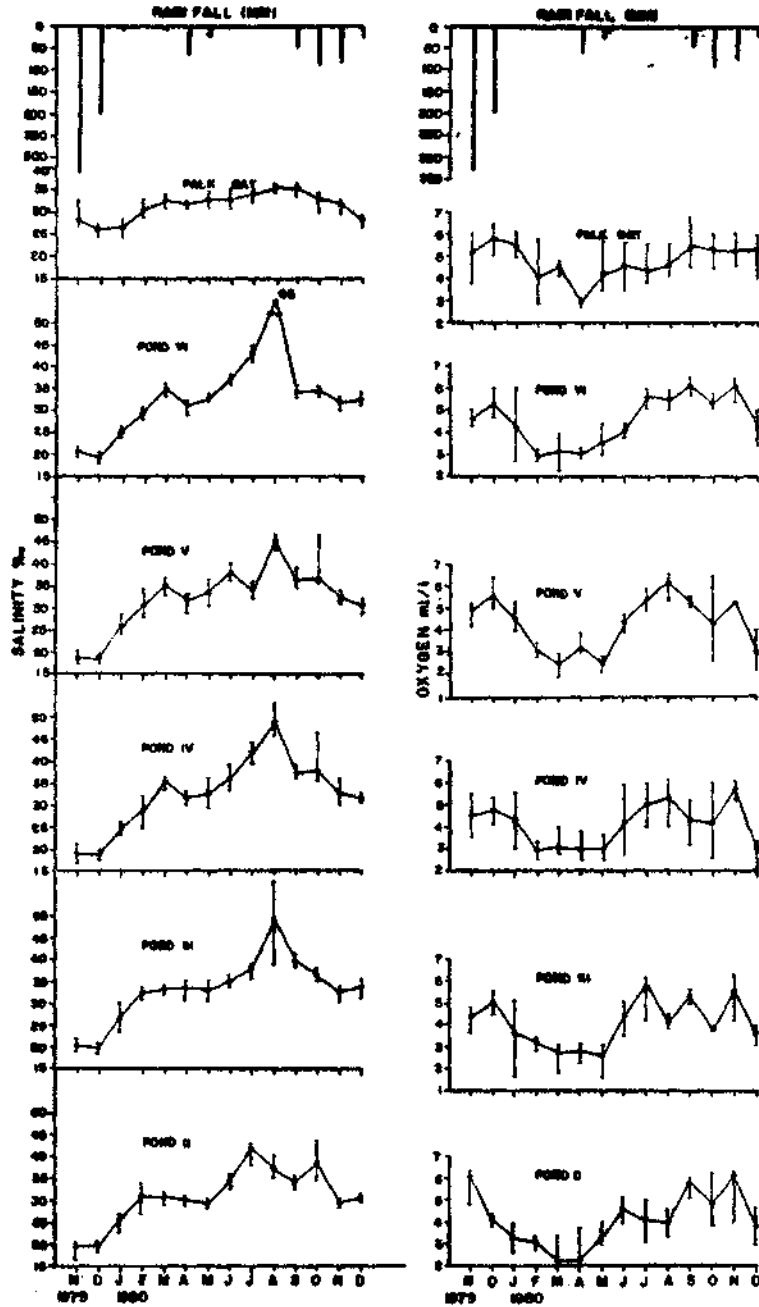


Fig. 1. Mean and range value of salinity and dissolved oxygen of five ponds and Palk Bay, near Mandapam.

April (2.21 to 3.20 ml/l). Again in July - September (summer months) it increased steadily and during monsoon months it reached the maximum in November (5.26 to 6.15 ml/l). In general all the ponds recorded maximum values during November and December whereas minimum were in March-May. An inverse relationship between oxygen, salinity, pond surface water temperature were observed during Northeast Monsoon months. In the ponds pH ranged from 7.8 - 8.7 and low pH values

recorded during Monsoon months and high values during summer months.

The present study reveals that during monsoon months rainfall have considerable effect on the lowering of salinity in the ponds. It is also evident that low value of salinity during November - December is determined primarily by the extent of rainfall and higher salinity in summer is due to evaporation and seepage.

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