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Preliminary histological study of the ovarian development of the giant tiger prawn, *Penaeus monodon*

H. Motoh

There is a great demand for spawning females of *Penaeus monodon* to be utilized in various hatcheries for artificial seed production. However, no papers on the histological study of this species based on wild samples are presently available.

Santiago, Jr. *et al.* (1976) presented four microphotographs of ovarian maturities I to IV which were obtained from unilaterally ablated females of *P. monodon*. Unfortunately they did not explain the histological interpretation in detail. Villaluz *et al.* (1969) adopted five categories in ovarian development which were temporarily cited from Rao (1968).

This paper deals with information on histology of ovarian development of wild *P. monodon* Fabricius.

This study was undertaken to determine structural characteristics within the gonads which might serve as an index to age and longevity and furnish information on the frequency of spawning of an individual.

The prawns used for the present study were obtained from fish corrals located at the mouth of Batan Bay, and commercial trawlers off Batan Bay (water depth 5 to 36 m). Prawns collected from fish corrals were fixed within one hour in either Bouin's fluid or 10% neutralized formalin solution while those from commercial trawlers were kept in crushed ice for a maximum of one day and then brought to the laboratory where they were dehydrated with alcohol and imbedded in paraffin and stained with Heidenhain's hematoxylin and eosin (1% in dioxane). Paraffin sections were cut at 6 to 8 micron thickness. Permanent slides have been made using Canada balsam.

Male prawns were not used to indicate spawning activity because a satisfactory method for determining the stage of sexual maturity has not yet been devised. Also, the testes which is entirely within the cephalothorax is difficult to observe.

Maturation of female: Size of ova is not significantly different among the anterior, middle and posterior portions of the ovary.

The maturation process has been arbitrarily categorized into four successive stages of development for the purpose of describing the degree of sexual maturity.

1. Undeveloped and spent stage: Ovaries in this stage are very small in relation to other organs. They are translucent, very flaccid, difficult to remove and invisible through exoskeleton. Only the largest eggs reveal a nucleus and yolk granules.

2. Developing stage: Developing ovaries can easily be differentiated from other tissues. They are flaccid and relatively larger than undeveloped ovaries. Fresh ovaries are white to pale olive buff. As the ova develop, more protein accumulates and the tissue becomes opaque. Developing ova have yolk granules and cells believed to be nutritive bodies.

By definition, the developing stage begins when a separate group of developing eggs separates from the stock of small eggs.

3. Nearly ripe stage: This stage may be determined with certain accuracy in the field because fresh ovaries are glaucous color, which is darker in more mature ovaries. Preserved ovaries are dark buff. Nearly ripe ovaries of fresh materials are visible through the exoskeleton and are large and turgid.

4. Ripe stage: The ripe stage is recognized only by the presence of a characteristic margin of peripheral rod-like bodies, the apexes of which appear to radiate from the center of the egg. It is believed that this is the final stage before spawning, since prawns of this stage contained the largest ova encountered. Literature on other penaeids reported the presence of peripheral bodies as indicative of the ripe stage (Hudinaga, 1942, King, Liao, 1973).

At field, the selection of spawners is usually based on color changes, relative size particularly that under the first abdominal segment, texture and turgidity of the ovary through the exoskeleton. In this case, it is impossible to recognize the difference between undeveloped and spent stages as well as the difference between sometimes ripe and nearly ripe stages. Thus for the convenience of field activities, the ovarian stage was classified into two: stage I involving undeveloped, developing and spent and stage II nearly ripe and ripe stages, the latter which is used in the hatchery as spawner.

There was no difference (quantitatively and qualitatively) found between ripe ovaries of the prawns from fish corrals located at the mouth of the bay and those from commercial trawlers off shore. This might suggest that the spawning of *P. monodon* takes places not only offshore but also near the mouth of the bay where offshore water penetrates. In other words, the spawning does not require any certain water depth.

In the ripe ova, the rod-shaped bodies commonly observed by Hudinaga (1942) on *P. japonicus*, by King (1948) on *P. setiferus*, by Cummings (1961) on *P. duorarum*, by Subrahmanyam (1965) on *P. indicus*, and by Liao (1973) on *P. penicillatus*, were named jelly-like substances, rod-like bodies, peripheral rod-like bodies, marginal bodies and jelly-like substances, respectively.

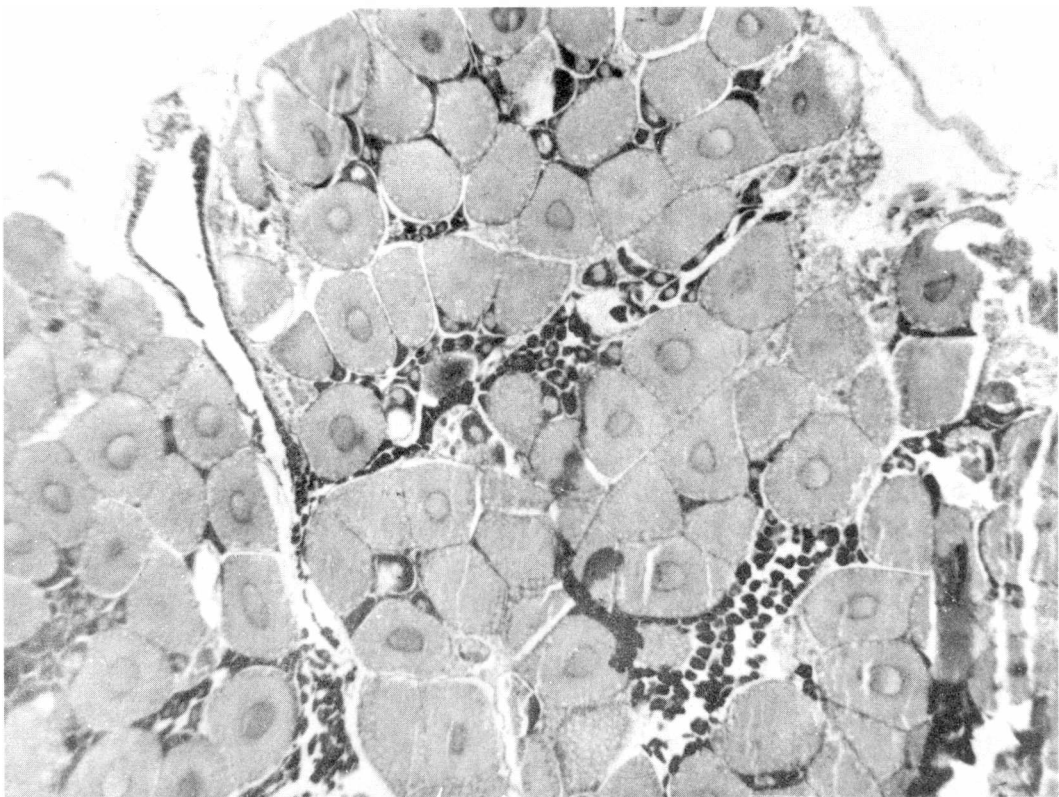


Fig. 1. Ripe ova of *Penaeus monodon*.

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