

STUDY OF CRUSTACEAN VITELLOGENESIS BY VITELLOGENIN ASSAY : THE PARTICULAR CASE OF A PENAEID SHRIMP.

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Introduction

Crustacean vitellogenesis is characterized by vitellin oocytic accumulation. An active uptake of a seric precursor, vitellogenin-VTG (MEUSY, 1988) and/or a intraovarian synthesis (YANO, 1987; RANKIN *et al.*, 1989) are known to be involved in this process. As a result vitellin (VTL) appears to be the major proteic component of yolky oocytes (MEUSY *op cit*).

VTG quantification has been performed in several species, nevertheless in penaeid shrimps VTG and VTL evolution throughout the ovarian development was not described up to now. The presence of cortical specialisations, an exclusive feature of penaeids, may implicate some modifications in this cycle.

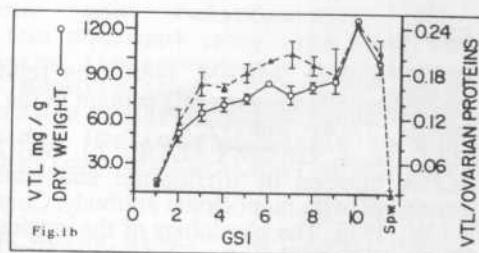
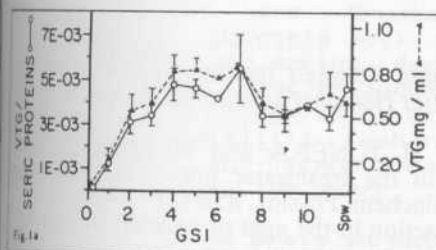
This work attempts to point out the singularity of *Penaeus indicus* vitellogenesis.

Materials and Methods

Ovaries and haemolymph of cultured *P. indicus* females at different vitellogenesis stages (determined by histology and GSI) were sampled for VTL and VTG evaluation. Cortical specialisations were separated from ripe oocytes according to Lynn's method (1976). The quantification assay was carried out by Laurell's rocket-immunoelectrophoresis, using a polyclonal antibody. Purified VTL to standardise the assay was obtained by means of gel filtration and ion exchange chromatography.

Results

Evolution of VTG and VTL titers along vitellogenesis (Fig. 1a and 1b) :



VTG was not detected until puberty was attained and once in haemolymph it undergoes cyclic variations. During the breeding period the VTG concentration varies from a basic level (0.2 mg/ml), representing 0.1 % of total seric proteins, to fourfold this value (0.9 mg/ml) reached for an intermediate GSI. After maximal concentration VTG level shows a smooth decrease returning to the basic level only after spawning.

VTL concentration rapidly increases at the onset of ovarian development and reaches a plateau (1000 mg/g) until the end of the cycle. On the other hand VTL contribution to total ovarian proteins shows a similar evolution.

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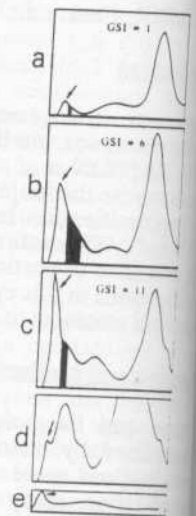
Ovarian components : Chromatographies of ovarian proteins at different stages revealed the increasing proportion of a high molecular weight protein (signaled by an arrow) different from VTL (in black traits) onward the cycle (Fig. 2 a, b, c). Notwithstanding this protein is almost inexistent in spawned rinsed eggs (Fig. 2d) and appears to be the main constituent of the isolated cortical specialisations (Fig. 2e).

Discussion

Vitellogenic process in *P. indicus* seems to be similar to that of other crustaceans, but it presents some peculiarities :

- The level of circulating VTG was found to be inferior to that of other species and furthermore it doesn't decrease shortly before spawning as reported for other decapods (DERELLE *et al.*, 1986 ; BYARD and AIKEN, 1988). The fore mentioned is explained by the fact that oocytic VTG uptake ceases in a more precocious way leading to the remaining detectable quantities until the end of the cycle.

- Another singular fact in *P. indicus*, and doubtless in other penaeids, is the weak contribution (20 %) of VTL to the total ovarian protein pool when compared to other crustaceans where it has been considered as the major constituent. This could be related to the early hatching of ontogenetically less developed nauplius larvae. The chromatographic study seems to confirm the assumption of a proteic substance accumulating in oocyte during the primary phase of vitellogenesis and afterwards concentrating in cortical rods (TOM *et al.*, 1986), which are a distinctive character of this family.



Conclusion

Distinguishing events in *P. indicus* vitellogenesis cycle are : low levels of VTG concomitantly with ovarian development as well as the limited proportion of VTL, as a consequence of endogenous protein synthesis in the ovary, though sufficient for the brief period of embryogenesis occurring in this species.

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