HISTOCHEMICAL STUDIES OF LIPIDS IN THE VITELLOGENESIS OF THE HERMIT CRAB, *CLIBANARIUS LONGITARSUS* (ANOMURA : CRUSTACEA)

ABSTRACT

The L_1 bodies containing phospholipids transform into L_2 bodies containing phospholipids and triglycerides, the L_2 bodies transform into L_3 bodies by a gradual attennuation of their medullae into triglyceride spheres. The mitochondria and compound yolk contain phospholipids.

THE lipids are one of the important food reserves and sources of energy in the form of yolk in the oocytes of the animals. Their origin in the vitellogenesis has been attributed to various cell organelles, *viz.*, mitochondria and Golgi bodies (Raven, 1961 ; Nath, 1968). Only one previous worker (Subramaniam, 1935) has carried out the studies on cell inclusions and organelles in *Clibanarius olivaceus*. His studies lack the histochemical studies. So the present work was taken up to study the lipids histochemically during the vitellogenesis in *C. longitarsus*.

Material and methods

The specimens of hermit crab found in the shells of molluscs were collected from the standing water of Krusadai and Shingle Islands (Tamilnadu, India).

The tissues were fixed in formaldehyde calcium and postchromated ; and fixed in weak Bouin, treated with pyridine at 60°C and postchromated after washing. The tissues were embedded in gelatin. Various tests for lipids mentioned in Pearse

(1968) were carried out. Small tissues were also fixed in Lewitsky saline and sections were stained with iron haematoxylin.

Results and discussion

During the present studies 3 types of lipid bodies (L_1, L_2 and L_3 bodies), mitochondria, and compound yolk globules containing lipids have been described.

L_1 bodies : They are in the form of granules bigger than the mitochondria lying in the juxtanuclear position in the oogonia. They contain saturated phospholipids as they are blue in Sudan black B, acid haematein (negative after pyridine extraction), Nile blue sulphate and Lewitsky saline/iron haematoxylin (Plate 1A) ; and negative in performic acid-Schiff. The L_1 bodies of the present author correspond to the so-called Golgi bodies of the earlier workers, *viz.*, Subramaniam (1935) in *C. olivaceus*, Nath *et al.* (1959a, 1959b) ; and L_1 bodies of other workers (Nath, 1968) and Guraya (1969). Subsequently they increase in number and are distributed in the ooplasm in developing oocytes.

L_2 bodies : The L_2 bodies bigger than the L_1 bodies begin to arise in the circumnuclear region, while the L_1 bodies begin to decrease in number (Plate 1B). They are in the form of spheroids and crescents. The externa of these duplex structures consist of triglycerides as they are pink in Nile blue sulphate and negative in acid haematein ; and the internal of these bodies contain phospholipids being blue in Nile blue sulphate and acid haematein (negative after pyridine extraction). They are partly fixed in Lewitsky saline. These duplex L_2 bodies are homologous with the L_2 bodies of other workers (Nath, 1968; Guraya, 1969). These duplex L_2 bodies are homologous with the Golgi vesicles of earlier workers (Nath, 1960).

L_3 bodies : They arise in the circumnuclear region by the gradual attenuation of the medullae of the L_2 bodies with triglyceride spheres. The L_2 bodies begin to disperse and get distributed in the ooplasm uniformly in between the compound yolk globules. The L_3 bodies contain unsaturated globules. The L_3 bodies contain unsaturated triglycerids as they are pink in Nile blue sulphate and performic acid-Schiff (Plate 1C). They are homologous to L_3 bodies of earlier workers (Nath, 1968; Guraya, 1969) ; and fatty yolk of Subramaniam (1935) and Nath *et al.* (1959a, b).

Nath (1967) has correlated the electron microscopical observations of Droller and Roth (1966) with the light microscopical observations of Nath and Nangia (1931) and Chopra (1958 a, b) in fishes. He states that the pallial granules, the lipid spheres circumscribed by Golgi cisternae and vesicles, the oil droplets of electron microscopy are strictly identical with the L_1 granules (or Golgi vesicles or elements), the L_2 duplex spheroids, the L_3 bodies of light microscopy respectively. But Droller and Roth (1966) were not able to explain any physiological relationship between the Golgi cisternae and vesicles forming the cortex and lipid body forming the medulla as they did not carry out histochemical studies.

Mitochondria : The mitochondria remain granular and contain phospholipids and proteins throughout the process of vitellogenesis.

Compound yolk : The compound yolk globules contain proteins, carbohydrates and phospholipids. The lipids bound to proteins have also been reported by Fautrez-Firlefyn (1957) in the oocytes of *Artemia*.

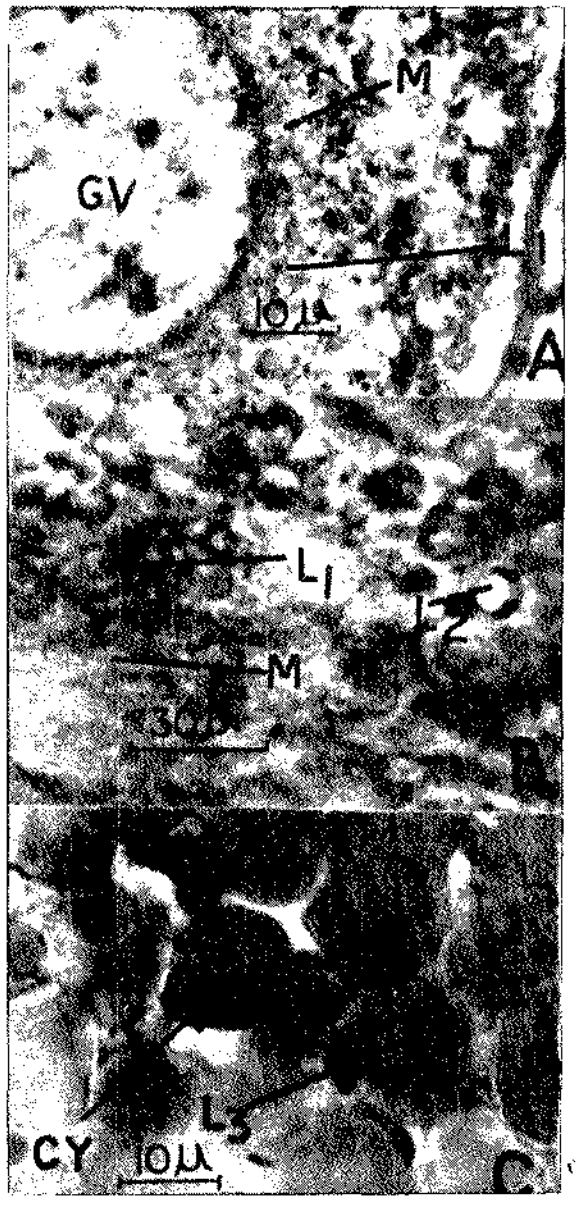

PLATE I. Distribution of lipids.

Fixation : A. Lewitsky saline/iron haematoxylin ; B. FCa/PC-NBS and C. FCa/PC-SBB.

ABBREVIATIONS

CY = compound yolk globules, FCa/PC = formaldehyde calcium/postchromated, GV = germinal vesicle, L_1 = phospholipidic granules, L_2 = phospholipidic & triglyceridic bodies, L_3 = triglyceride yolk bodies, M = mitochondria, NB = Nile blue sulphate, SBB = Sudan black B.

PLATE I. The sperm whale *Physeter catodon*: A. Dorsal view, B. Ventral view, C. Portion of the head with lower jaw and tongue, and D. Posterior portion with caudal fluke.

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