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Towards the contribution of follicular epithelium in the growing oocyte of *Poekilocerus pictus* (Orthoptera) A cytochemical study

With 2 text figures

Introduction

In recent years, insect oogenesis has gone under an extensive studies to explore the cytochemical nature and the most probable role of the egg architecture by autoradiographic and electronmicroscopic techniques and convincing evidences have been produced to show that the egg envelop plays a vital role in the various synthetic activities of the growing oocyte (TELFER, 1975, RAMAMURTY, 1964, 1968, RAMAMURTY and ENGELS, 1977 & FILLI, 1978). But the exact role of the egg envelope in the physiology of the growing oocyte of *P. picta* is still poorly understood and that is why an attempt is made here to describe the functional significance of follicular epithelium in *P. picta* having panoistic type of ovary.

Materials and method

The nymph of the insect were collected from the field of Saugar (M. P.) India and were reared in the laboratory. The adult of different aged groups were dissected out in insect's ringer and ovarian tissue were fixed immediately in 1% osmic acid for cytochemical study. Blocks were cut at 1 μ thickness. Osmium/ethyl gallate method (WIGGLESWORTH, 1957, 1959) was used for the present study.

Observation and discussion

By using various cytochemical techniques, it was noticed that the egg envelop in *P. picta* mainly comprises of follicular epithelium, vitelline membrane and the adjoining region of the cortical ooplasm goes under various histomorphological changes with the growth & development of oocyte. In earlier stages of oocyte development, the follicular epithelium is less developed and shows a very less affinity to various cell components while during the later stages, it reaches to the maturity, becomes thick and the epithelial cells get packed with mitochondrial and small lipid granules. The vitelline membrane and the cortical ooplasm also shows a feeble reaction to proteins, carbohydrates, mitochondria and lipids.

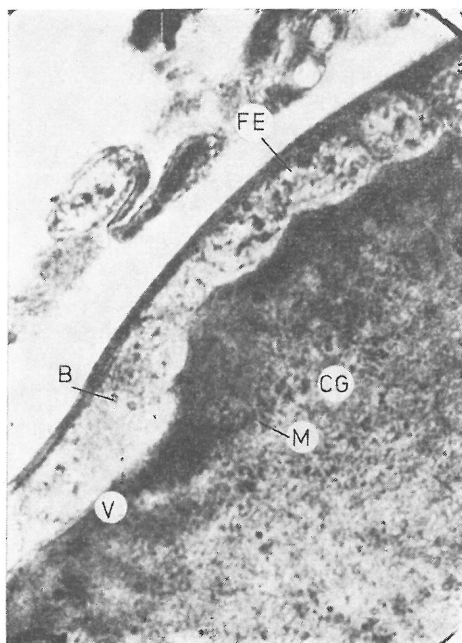


Fig. 1

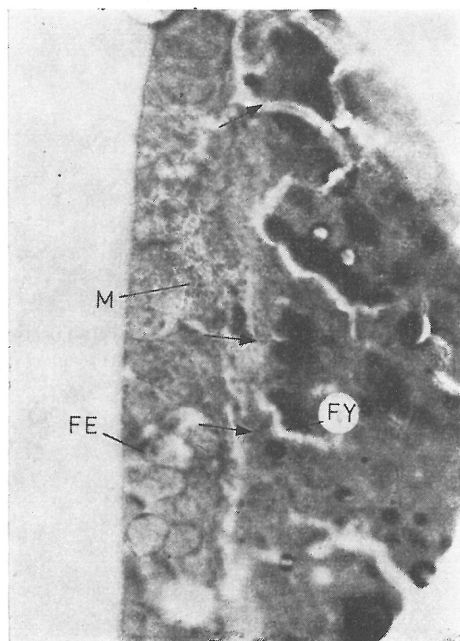


Fig. 2

Fig. 1. Section of previtellogenic oocyte of *P. picta* showing the follicular epithelium with binucleate epithelial cells, the surrounding cortical ooplasm & vitelline membrane is dark and showing mitochondrial granules in the cortical ooplasm. (Osmium/ethyl gallate, X 450)

Fig. 2. Section of vitellogenic oocyte of *P. picta* showing well developed follicular epithelium with elongated epithelial cells. The epithelial cells are packed with mitochondrial and lipid granules and the transport of these into the cortical ooplasm is indicated by arrow. Some fatty yolk granules are also seen in the cortical ooplasm. (Osmium/ethyl gallate, X 1000)

But the vitellogenic stage of the oocyte in *P. picta* is accompanied by several changes. The follicular epithelium is well developed and the epithelial cells become binucleate in the beginning of this stages and are packed with mitochondria and lipid granules. Nuclei becomes more picnotic, increase in size and the terminal part of the cells are filled with substances. These events are related to the active phase of follicular epithelium. Later on these cells loose their compactness and their contents are also gradually decreases while the surrounding cortical ooplasm is densely packed with mitochondrial and lipoidal substances and a sudden decline was noticed in the cell components of cortical ooplasm with the start of yolk synthesis in the oocyte.

It appears therefore that certain substances might have transported through the follicular epithelium into the cortical ooplasm which initiate the various synthetic activities of the oocyte according to its physiological needs in *P. picta*. There are number of evidences in various insects that the proteins, lipids and other nutritive substances which are synthesised in blood haemolymph, fat body and other extra ovarian sites are incorporated through the follicular epithelium into the cortical ooplasm of the oocyte by 'pinocytosis' and 'intercellular bridges' like structure (BONHAG 1953, HILL 1962, KULKARNI & MALHOTRA 1970, PRABHU & NAYAR 1971, TELFER 1975, RAMAMURTY & ENGELS 1977, FILLI 1978, SAXENA & TIWARI 1981).

Secondly, the most probable role of the various cell constituents of the follicular

epithelium and the cortical zone consisting of proteins and various types of lipid including phospholipid, triglycerides and its ester may be the formation of various coverings of the oocyte including the "Chorion formation".

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Zusammenfassung

Das Follikel­epithel im wachsenden Oozyten von *P. picta* spielt eine sehr wichtige Rolle in verschiedenen Synthesen. Es trägt auch zur Ausbildung des „Chorion“ oder der „Eihülle“ beim reifen Oozyten bei. Außerdem wachsen bei *P. picta* die Epithelzellen während der Vitellogenese, werden zweikernig und synthetisieren Vitellin, das vom Oozyten entsprechend seinen physiologischen Bedürfnissen genutzt wird.

Summary

The follicular epithelium in the growing oocyte of *P. picta* plays a very significant role in the various synthetic activities. It also contributes towards the formation of 'Chorion' or 'egg envelop' in a mature oocyte. In addition to this, in *P. picta* during vitellogenesis stage, the epithelial cells grow in size and become binucleate and synthesise vitelline which is utilized by the oocyte according to its physiological needs.

Резюме

Фолликулярный эпителий в растущем ооците *P. picta* играет очень важную роль при разных синтезах. Он также способствует формированию „хориона“ или „яйцевой оболочки“ у зрелого ооцита. Кроме того, у *P. picta* клетки эпителия растут во время вителлогенеза, становятся двухядерными и синтезируют вителлин, который используется ооцитом в соответствии с его физиологической потребностью.

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Key Words

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|----------------------------|--------------------------|
| B — Binucleate | L — Lipid granules |
| CG — Cortical granules | M — Mitochondria |
| FE — Follicular epithelium | V — Vitelline membrane |
| FY — Fatty yolk | FY — Fatty yolk granules |