Oogenesis in the drone fly, *Eristalis Cerealis* Fabricius (Diptera; Syrphidae)

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The drone fly, *Eristalis cerealis* Fabricius, has practically been used as a pollinator. An artificial mass rearing of this species has been successful. However, fundamental studies of reproductive system including the oogenesis has remained to be done. For understanding of the changes in oogenesis at a low temperature during breeding season, the histological study was done on following problems: 1) normal oogenesis at a moderate temperature (25°C), 2) changes in oogenesis at a low temperature (15°C), 3) recovery of the normal oogenesis in the females transferred to 25°C from 15°C.

1. *Morphology of ovaries and normal oogenesis at 25°C*

The ovary of this species consists of about 116 polytrophic type ovarioles and the oogenesis progresses synchronously in almost all ovarioles. In the vitellarium of a full grown ovariole, three successive growing egg follicles were observed. The second and third egg follicles, however, were in the early previtellogenic stage when the basal or first egg-follicle reached maturity with the chorion. Since the female adults had very short life span (7-10 days at 25 °C) , the only basal egg follicles were oviposited and the remaining young egg follicle did not mature.

An egg follicle is composed of seven nurse cells and an oocyte covered with a single follicular epithelium. In the early oogenesis the follicular cells began to surround at first the oocyte and later the nurse chamber to form a uniform epithelium.

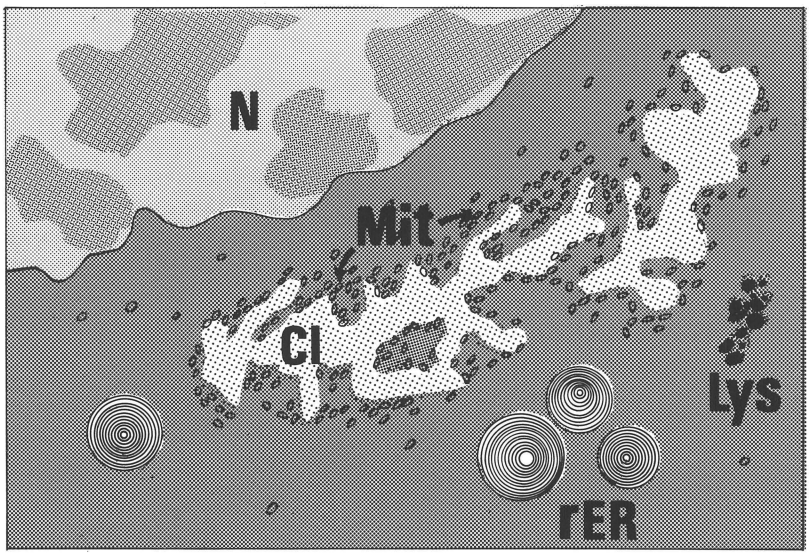

Fig. 1 Illustration of electron microscopic degenerative symptons of a nurse cell at low temperature (15°C) in *Eristalis cerealis* F. CI: Cytoplasmic island, Lys: Lysosome, Mit: Mitochondria, N: Nucleus, rER: rough-surfaced endoplasmic reticulum.

However, at the mid-vitellogenic stage, the follicular epithelium surrounding the nurse chamber became very thin, while the follicle cells covering the oocyte develop well ever since. At 25°C, the basal oocytes began to deposit protein yolk spheres at about 36 hours of adult emergence and the oocyte volume rapidly increased. At 96 hours, vitelline membrane formation was initiated, and subsequently the chorion was deposited. It was particular of this species that the formation of the vitelline membrane started at first from both lateral and posterior surface of the oocyte and then extended to the boundary between the nurse chamber and the oocyte.

2. *Changes in oogenesis at a low temperature (15°C)*

In all egg follicles from the previtellogenic to the vitellogenic stage, a specific degenerative symptom appeared immediately after the females were transferred to 15°C. Typical degenerative symptoms were as follows: 1) appearance of "cytoplasmic islands" with decreasing stainability for haematoxylin and toluidine blue, (electron microscopically, these islands were lower in the ribosomal density than the normal) in nurse cells, 2) large aggregates of mitochondria distributed in the perinuclear cytoplasm and in surroundings of "cytoplasmic islands" of the nurse cells, 3) appearance of whorled rER in the cytoplasm of the oocyte and the nurse cells (Fig. 1).

The females with such degenerating egg follicles died after several days without further degeneration of egg follicles.

3. *Reversibility of oogenesis at 25°C*

The females with the early degenerating egg follicles described above, were transferred again to 25°C. In these egg follicles, any degenerative features were not observed. Namely, the cytoplasmic islands and whorled rER disappeared, and moreover, mitochondria distributed normally throughout the cytoplasm of the nurse cells. These changes indicate that the early degenerating egg follicles may develop reversibly if the females were restored at the moderate temperature for oogenesis.