# Histopathological Effect of Thiourea on the Ovarian Tissues of *Sarcophaga ruficornis* (Fabr.)

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*Summary.* The primary target of thiourea in female *Sarcophaga* are the follicles in the ovarioles. The follicle cells as a result become syncytial and their nuclei get pycnotic, inhibiting the transport of nutrient material into the nurse cells and of yolk into the oocytes. The subnormal eggs produced are not viable.

Knipling[1] suggested a new method for tackling the problem of insect population by sterilizing them with the help of chemicals. Following his work, during recent years considerable interest has developed in the use of chemosterilants and their effect on various aspects of insect reproduction.

It has been reported that in *Musca domestica*, besides damage to the germarium, condensation and pycnosis of nuclei, vacuolization of cytoplasm, and atrophy of follicular epithelium occur with tepa, thiotepa and apholate[2,3]. More or less similar observations were also recorded with metepa and hempa in *Culex pipiens*[4]. According to Matolin[5], the effect of hempa varies from complete inhibition of ovarian development through reduction in oviposition to the formation of normally developing eggs, whereas Morgan[6] reported complete degeneration of egg chambers in the housefly. Reduction in the number of basal oocytes along with gradual disintegration of ovaries was also recorded in houseflies after treating them with antimetabolites, steroids and other compounds[7]. In *Drosophila*, irregular clustering of the chromatin and complete degeneration of the egg chambers has been observed after apholate treatment[8]. In view of the meagre information available on the subject, the effect of thiourea on the ovarian development of *Sarcophaga ruficornis* has been presented in this paper.

*Material and method.* A group of newly emerged virgin female flesh flies were obtained from the culture maintained in the laboratory. Some of these flies were fed on a diet of bread soaked with milk containing 1.5% thiourea. Whereas others, used as controls, were fed on similar food but without thiourea.

Flies from both (treated and control) groups were dissected in normal saline after 24, 48, 72 and 96 h. Their ovaries were taken out and fixed in alcoholic Bouin's solution and serial sections 6 µm thick, stained with Heidenhain's iron-alum haematoxylin, were prepared.

*Observations.* The ovariole of *Sarcophaga* is polytrophic type in which both the developing oocyte and nurse cells are enveloped by a single layered columnar follicle cells having dense cytoplasm and a mesially placed subglobular nucleus containing a number of irregularly distributed nucleoli, which later on (after 48 h) become clumped together to form a single large round nucleolus. The developing oocyte which lies in the posterior portion of the follicle enlarges in size and after 96 h it occupies more than half the follicular space (Figures 1–3). The yolk deposition in the ooplasm starts after 72 h (Figure 2), and in 96-h-old individuals the entire ooplasm gets densely packed with large spherical darkly stained yolk bodies (Figure 3). The triangular-shaped nurse cells, occupying the rest of the follicular space, also increase in size and attain their maximum growth in 72 h and thereafter exhibit slight reduction. Their nuclei show fine reticular network of chromatin material on which are present irregularly distributed minute chromioles. The follicle cells surrounding the nurse cells after 72 h

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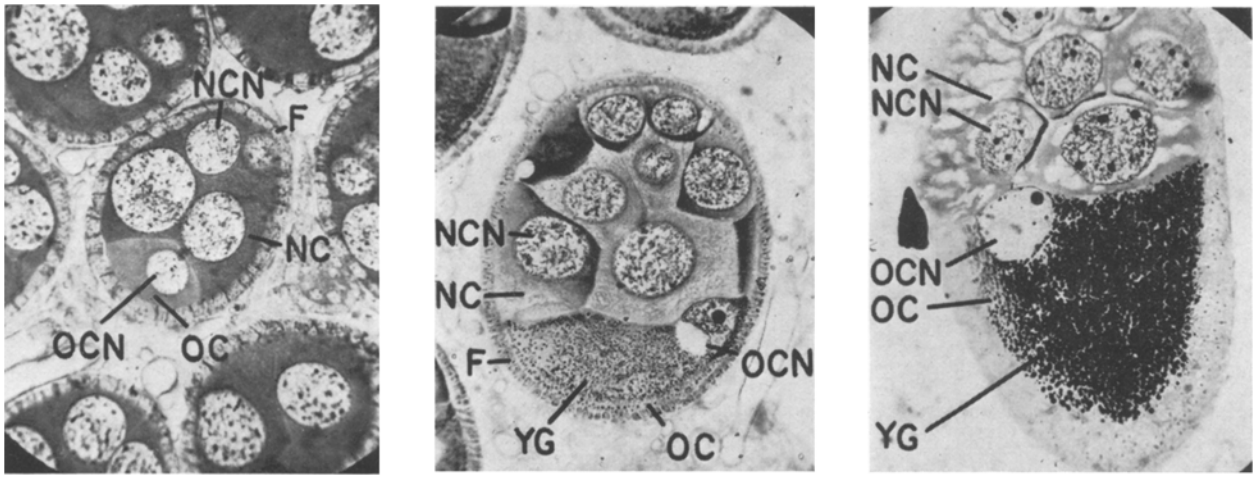
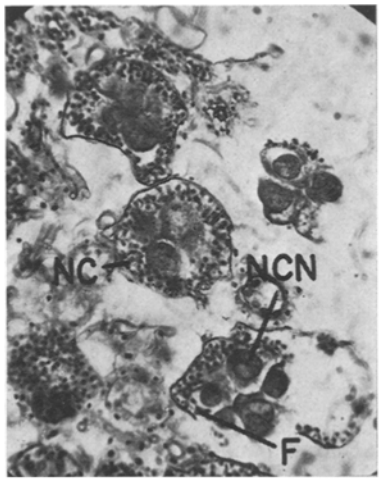
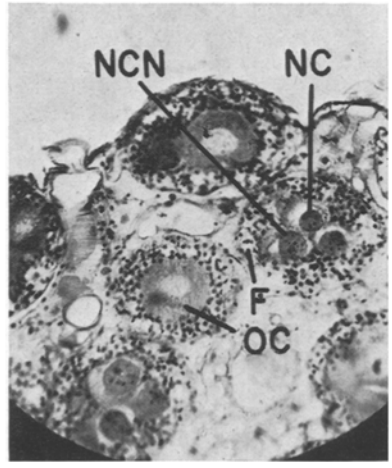



Fig. 1–3. Sections of ovaries of 48-, 72- and 96-h-old *Sarcophaga ruficornis*.
All photomicrographs same magnification. F, follicle; OC, oocyte; OCN, oocyte nucleus; NC, nurse cell; NCN, nurse cell nucleus; YG, yolk granules.



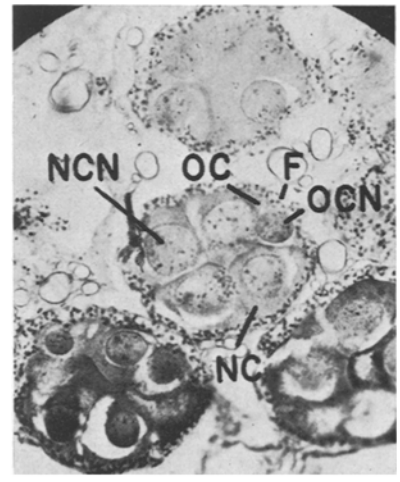




Fig. 4–6. Sections of ovaries of 48-, 72- and 96-h-old *Sarcophaga ruficornis* treated with thiourea.

become smaller in size and finally after 96 h they get squamous.

After 24 h of treatment with 1.5% thiourea, a slight general decrease in the size of ovaries and their components has been recorded. The follicle cells become more columnar and their nuclei get somewhat oval-shaped, showing only 1 or 2 irregularly placed nucleoli. The nurse cells and the developing oocyte do not undergo any marked histological change. After 48 h the follicle cells appear to have lost their cellular arrangement. Their intervening walls disappear, giving rise to a syncytial condition. The nuclei get pycnotic and appear as darkly stained round masses. The developing oocyte and nurse cells show a further decrease in size. The nurse cell nuclei also show some loss of chromatin material (Figure 4). After 72 h the most conspicuous change recorded was the total absence of yolk granules from the ooplasm. The nurse cells and the developing oocyte show a further general decrease in size (Figure 5). The ovaries of *Sarcophaga*, after being treated with thiourea for 96 h, show well marked histological changes. The size of the ovary and ovarioles was greatly reduced as compared to those treated for 72 h. The oocyte now occupies only less than half the follicular space. The nurse cells also get considerably smaller, with great reduction of the chromatin material in their nuclei. No trace of yolk granules was visible in the ooplasm (Figure 6).

*Discussion.* It has been shown by BORKOVEC[9] that, depending upon dosage and concentration of the chemosterilant used, insects either do not oviposit or the eggs remain infertile. In *Sarcophaga ruficornis* the application of thiourea impairs the development of the ovary, resulting in the formation of inviable eggs.

The primary target of thiourea in the ovary of *Sarcophaga* is the follicle. The transformation of the columnar follicle cells to a syncytial condition with pycnotic nuclei is very significant of their morphological and functional degeneration. It is well known that the follicular epithelium plays an important role in the formation of yolk granules in the ooplasm[10]. The histological damage caused to the follicle cells by thiourea in *Sarcophaga* must, therefore, be acting adversely on the physiological activity of the oocytes. The total disappearance of the chromatin material from the nuclei of the nurse cells in the thiourea treated *Sarcophaga* further indicates the disruption of yet another source of egg nutrition. Such nurse cells, deficient in their nutrient material, obviously do not attain their full morphological and physiological development and thereby impair the normal development of the oocyte as well. The consequent result is that the oocyte remains under-developed in size and cytological organization.

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## Nuclear Pores in the Spermatozoon of the Rat

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*Summary.* The paper describes a hexagonal array of nuclear pores in a non-redundant region of the nuclear envelope underlying the basal surface of the rat spermatozoon head. It is concluded that intranuclear material protruding through these pores is the cause of the characteristic rows of circular 'bumps' found in surface replicas of this region.

WOOLLEY[2] described a region of the postacrosomal surface of the rat spermatozoon whose appearance in surface replicas (as more or less regular rows of circular protruberances about 90 nm in diameter) distinguished it from the postnuclear sheath, from which it was separated by the 'posterior ring'. In this region, which was termed the 'basal surface', there was no cytoplasmic element between the nuclear envelope and the plasma-

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