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HISTO-MORPHOLOGY OF SPERMATHECA OF *SPHAERODEMA* (= *DIPLONYCHUS*) *RUSTICUM* FABR (BELOSTOMATIDAE—HETEROPTERA—INSECTA)

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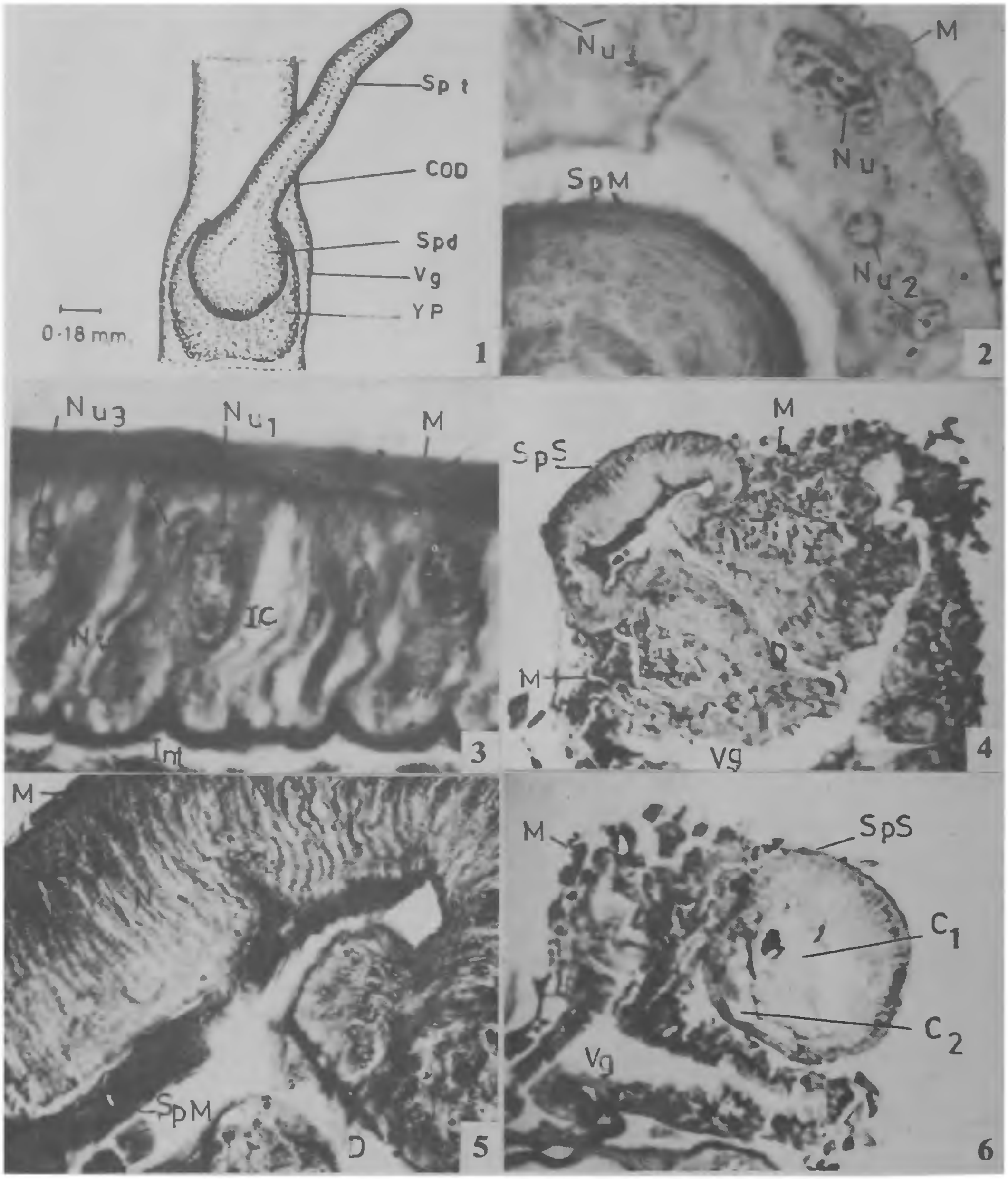
In the female reproductive system of an insect, the spermatheca which receives sperms from male during pairing, is generally associated with tabular spermathecal gland or diverticulum[1]. But in some, it is absent[2,3]. It has been suggested that, in such cases, the spermathecal epithelium becomes glandular and secretes material acting as exogenous substrate for the spermatozoa[2]. Such a condition is found in the spermatheca of *Sphaerodema rusticum*. The present note deals with the histomorphological observations of the spermatheca of the aquatic bug *S. rusticum*.

The insects were collected locally. The gravid female bugs were dissected alive in insect ringer solution. The spermatheca with genital chamber were fixed in Cornoy's fixative and with the usual procedure, the microtome sections of 7 μ were made, and stained with delafield haemotoxyline and eosin.

The spermatheca is tubular but dilated at the base into a sac-like structure (figure 1). The spermathecal sac opens into the dorsal side of the genital chamber with a fine duct, which traverses through the thick musculature of the dorsal wall of the genital chamber (figure 4). The lumen of the spermathecal tubule is full of spermatozoa. The sperms are free and not in the form of bundles or spermatophores and are darkly stained with haematoxyline (figure 2). The thick and chitinous intima in the tubular region of the spermatheca is not straight and uniform but with depressions and elevations (figure 3). In the dilated basal sac, the intima is thin. The epithelium of the tubular region of spermatheca is made up of three types of cells which can be differentiated from the nature of the nucleus. The cell boundaries are not so clear. These three types of cells are as follows:– (i) Cells with large irregular shape nucleus with reticulated granular chromatin and round nucleolus (figures 2 and 3), (ii) Cells seen below the intima with small round nuclei with granular chromatin material (figures 2 and 3), and (iii) Cells when the nuclei are elliptical.

There are intracellular canals leading to dilations. These canals are at right angle to the long axis of the lumen (figures 2 and 3). On the outer side of epithelium, there is a layer of muscle (figure 3). The duct which connects the spermathecal sac with genital chamber is lined by cuboidal epithelium. The epithelial cells of spermathecal sac are very tall and columnar, with wedge-shaped apical ends. The nuclei of these cells are basal, large and oval in shape with granular reticulated chromatin and are all of the same size. The intracellular canals in the epithetical cells of spermathecal sac are more uniformly arranged giving a longitudinal striated appearance (figure 5). The lumen of the posterior end of the spermathecal sac is divided into two chambers by a non cellular septum (figure 6).

Pendergrast[4], while describing the spermatheca of *S. rusticum* states that vaginal wall may be raised to form vaginal pouch, but in the present study, it is observed that the basal dilated region of the spermatheca is not a vaginal pouch raised from the vaginal wall. The spermathecal duct which joins the spermathecal sac and the vagina is completly embedded in the muscles of the dorsal side of the vaginal wall, and hence the spermathecal sac may be mistaken for a dilated pouch raised from the dorsal wall of the vagina (figure 4). The ridges and folds in the intima of the tubular region may enable the shortening and lengthening of the tubule with corresponding movement of the musculature[5]. Two



Figures 1–6 **1.** Freehand sketch of spermatheca with genital chamber (vagina); **2.** T. S. of tubular region of spermatheca (× 2100); **3.** L. S. of tubular region of spermatheca (× 2100); **4.** T. S. of spermathecal sac showing its opening into genital chamber (vagina) (× 210); **5.** T. S. of spermathecal sac enlarged (× 945); **6.** T. S. of Posterior region of the spermathecal sac (× 210); C_1C_2 – Chambers in the lumen of spermathecal sac in posterior region. COD – Common Oviduct; D – spermathecal duct; IC – intracellular duct; Int. – Intima; M – Muscles Nu_1 Nu_2 Nu_3. Types of nuclei in the epithelium of the tubular region of spermatheca. vg – vagina; SPS – spermathecal sac. SPM – sperm mass.

types of cells have been found in the spermathecal epithelium[6–8]. In the present study in the tubular region of spermatheca, there is a third type of cells observed which may be similar to the third type of cells mentioned as core cells by Kugler *et al*[9]. According to them these cells extend inside the epithelium in the form of ductule, through the intervening cells. Joshi[7] observed ovoid bulb, the spherical vesicle and intracellular channels in the epithelial cells of the ampula in the spermatheca of *Odontopus nigricornis*; however in the present study, only intracellular canals with dilated ends are observed. Bonhag and Wick[6] and Kugler *et al*[9] do not refer to these structure. But Pontecorvo[10] reported a large secretory vacuole in connection with intracellular ductules. According to Smith[11] each glandular cell of the spermathecal epithelium at the level of light microscope appears to be furnished with a intracellular duct as found in the present study.

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A MERCURIAL FUNGICIDE-INDUCED NUCLEAR CHANGES IN THE OOCYTE OF THE TELEOST, *CHANNA PUNCTATUS* (BLOCH)

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MERCURY is one of the most toxic non-essential, ubiquitous heavy metal widely distributed in the earth's crust, sea and other water systems. In recent years, rapid progress achieved in industrial and agricultural sectors resulted in widespread mercury contamination due to indiscriminate use of mercurial fungicides in agriculture and discharge from the industrial wastes and factory effluents into rivers. In general, mercurials are well-recognized neurotoxins inducing neuronal necrosis and constitute an important gamut of pollutants because of their high toxicity; immutable, nonbiodegradable and persistent nature and tendency to undergo food chain biomagnification[1]. However, reports on the toxic effects of long-term exposure to mercurials on the endocrine physiology of reproduction are meagre in fish[2]. The present investigation reports a mercurial fungicide Emisan, induced changes in the early maturing oocyte of the teleost fish *Channa punctatus*.

For various experimental studies, over forty adult *C. punctatus* weighing 45.0 ± 2.5 g and measuring 14.5 ± 2.0 cm in length were divided into two equal groups and kept in 60 litre glass aquaria containing chlorine-free well water. Group I was exposed to a toxicologically 'safe concentration' (0.20 ppm) of a commercially used methoxy ethyl mercury chloride fungicide, Emisan (MeEHgCl) containing 6% (w/w) mercury, in the first week of January. Group II served as untreated controls. Aquaria water with fungicide was changed every alternate day after feeding fish with minced goat liver. In the last week of June, after continuous exposure of 6 months (January to June), specimens were sacrificed by decapitation and the required tissues were dissected for investigations. Ovaries were fixed in Bouin's fluid and 5 μ thick paraffin sections were stained with Ehrlich haematoxylin using eosin as counterstain (H&E).

At the end of the experiment in the last week of June, the control ovaries were fully matured with a large number of mature and maturing oocytes. But in the treated fish, significant ovarian growth