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

retardation was evident by the presence of large number of immature stage I and a few early maturing stage II oocytes, and corroborative reduction in the gonadosomatic index. Some of the stage II oocytes exhibited nuclear degeneration which initially started by disruption of nuclear membrane, and nucleolar necrosis and its irregular distribution (figure 1). In a later phase, the entire nucleus degenerates leaving its remnant, and oocyte exhibited atretic changes like cytoplasmic liquefaction, swelling of the follicular wall and its separation from the cytoplasm (figure 2). Ultimately such oocytes degenerate, as part of a degenerated oocyte is also seen in figure 1. Binucleated stage II oocytes are also seen in ovaries of two fish among the treated group (figure 3), which may be due to the abnormal cell division induced by Emisan.

In *C. punctautus* exposed to mercuric chloride for 6 months, Ram and Sathyanesan[2] reported inhibition of gonadal growth and comparable changes in the pituitary gonadotrophs, suggesting the impairment of 'pituitary-gonadal axis' without any obvious sign of gonadal degeneration. In the present investigation, Emisan-induced degenerative changes observed in stage II oocytes are suggestive of its direct action on ovary. Methyl mercury (MeHg) compounds have been reported to disturb mitosis *in vivo* and *in vitro* studies[3]. Skerfving *et al*[4] reported an increased frequency of chromosomal breaks, and the presence of extra fragments and sister-chromatid fragments that lack centromeres in Swedish fishermen on a high dietary intake of fish contaminated with MeHg. In the ovaries of *C. punctatus*, the occurrence of some binucleated stage II oocytes might be due to methoxy ethyl mercury chloride (MeEHgCl) induced abnormal cell division during oogenesis in which nuclear division may not be followed by cytokinesis. These observations suggest that MeEHgCl may act directly on ovary inducing adverse nuclear changes in the oocyte of this species.

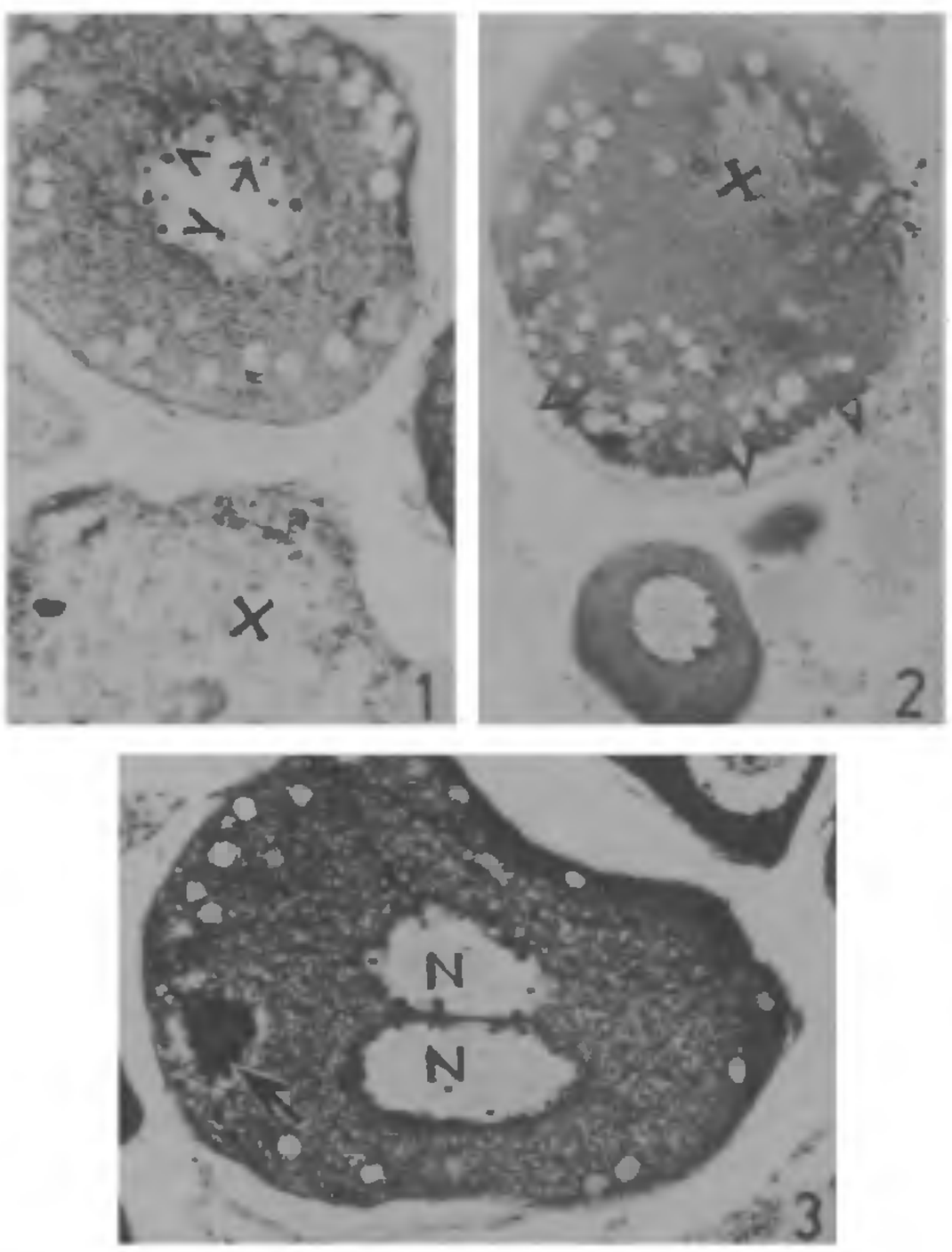

Figure 1–3. 1. Emisan (MeEHgCl) treated fish stage II oocyte, showing degenerative changes in periphery of the nucleus. **2.** Treated fish stage II oocyte. **3.** Binucleated stage II oocyte of treated fish.

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GAMMA-RAY-INDUCED MEIOTIC ABNORMALITIES IN MULBERRY (*MORUS* L)

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ARTIFICIAL induction of mutation for the improvement of mulberry has been investigated by many workers[1–3]. The present investigation deals with the