Influence of CNP ratio on diosgenin and sterol production: The increase of carbon in relation to N and P (table 1, treatment 2) influenced marginal increase in diosgenin percentage, but the total yield of diosgenin was higher than in the other treatments tested. On this medium sterol synthesis on percentage basis increased two-fold over the control and on absolute basis the yield was four-fold. Such a beneficial effect of raising initial sucrose level on metabolite production has been reported for other plant cell cultures[8]. In the presence of 4% sucrose the cells of Paul's Scarlet Rose accumulate 150% more polyphenols than at 2% sucrose[9].

Increased nitrogen level alone (treatment 3) inhibited diosgenin synthesis but sterol synthesis was promoted. Similar results were obtained with increased phosphate concentration (treatment 4). It is interesting to note that low phosphate to C and N ratio (treatment 5) had a highly beneficial effect on diosgenin and sterol percentage. These results agree with the results of Mantell *et al*[8] for increased nicotine production.

The present results have brought to light the interplay of CNP ratio and also the nutritional requirements for growth of *D. deltoidea* callus (MS salts with double concentration of KH_2PO_4 plus 6% sucrose) and for diosgenin production (MS salts with double concentration of nitrates and 6% sucrose). These results are useful for adoption in the two-stage culture system for *in vitro* diosgenin production.

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CYTOMIXIS IN A MAIZE TRISOMIC

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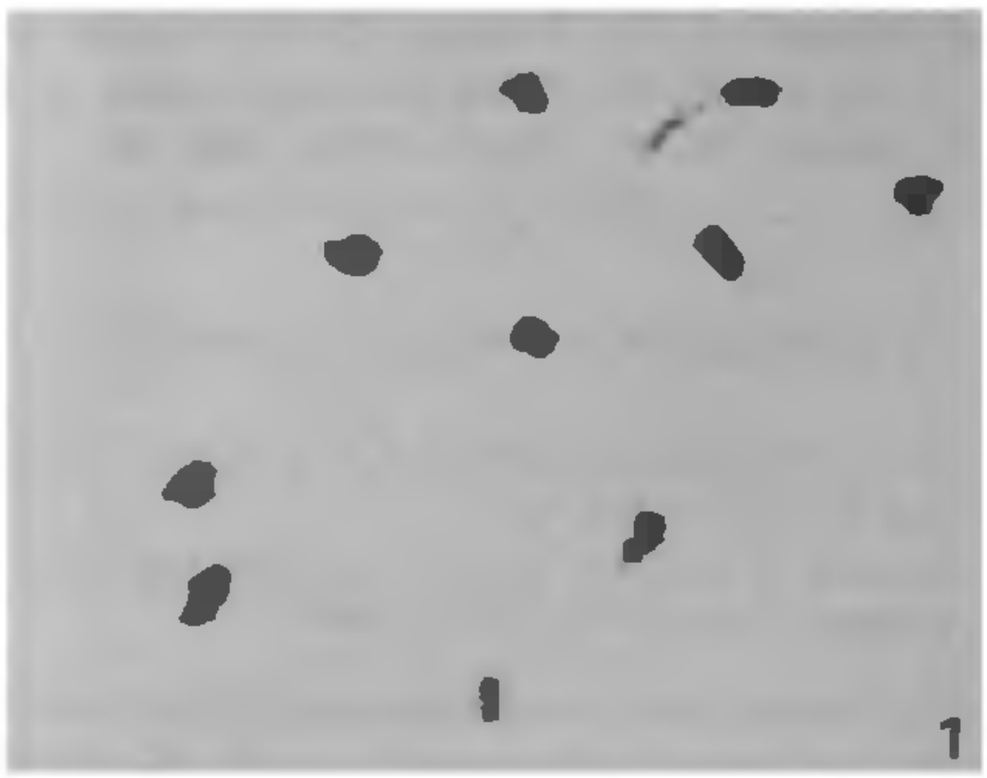
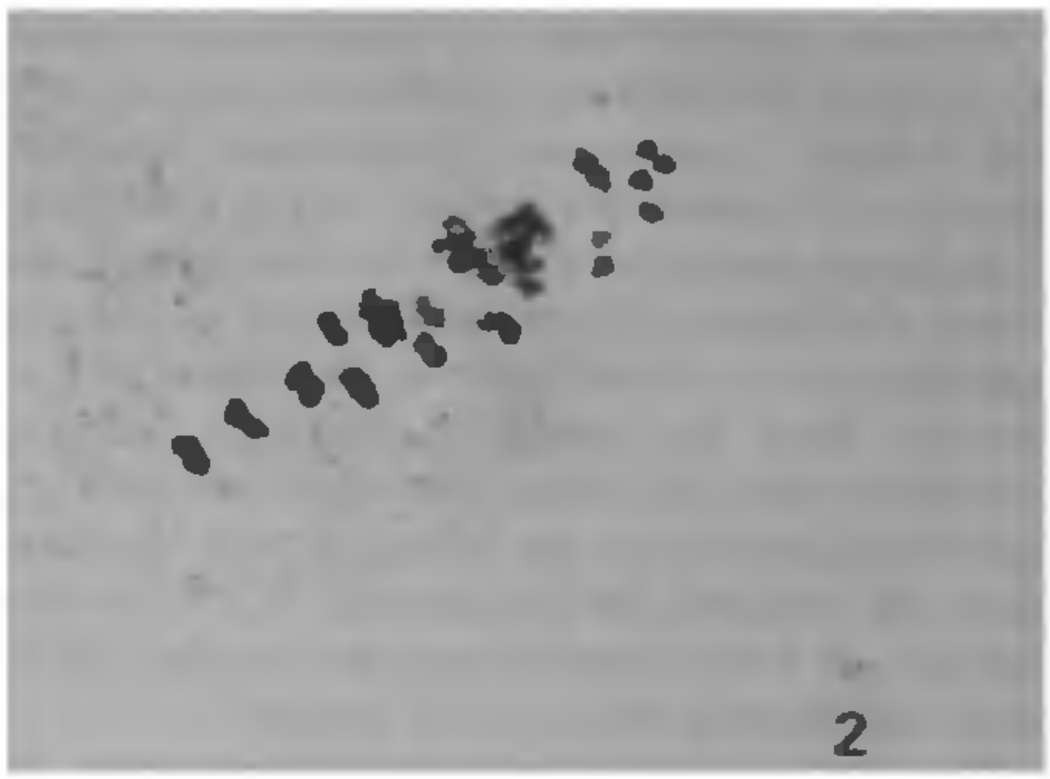
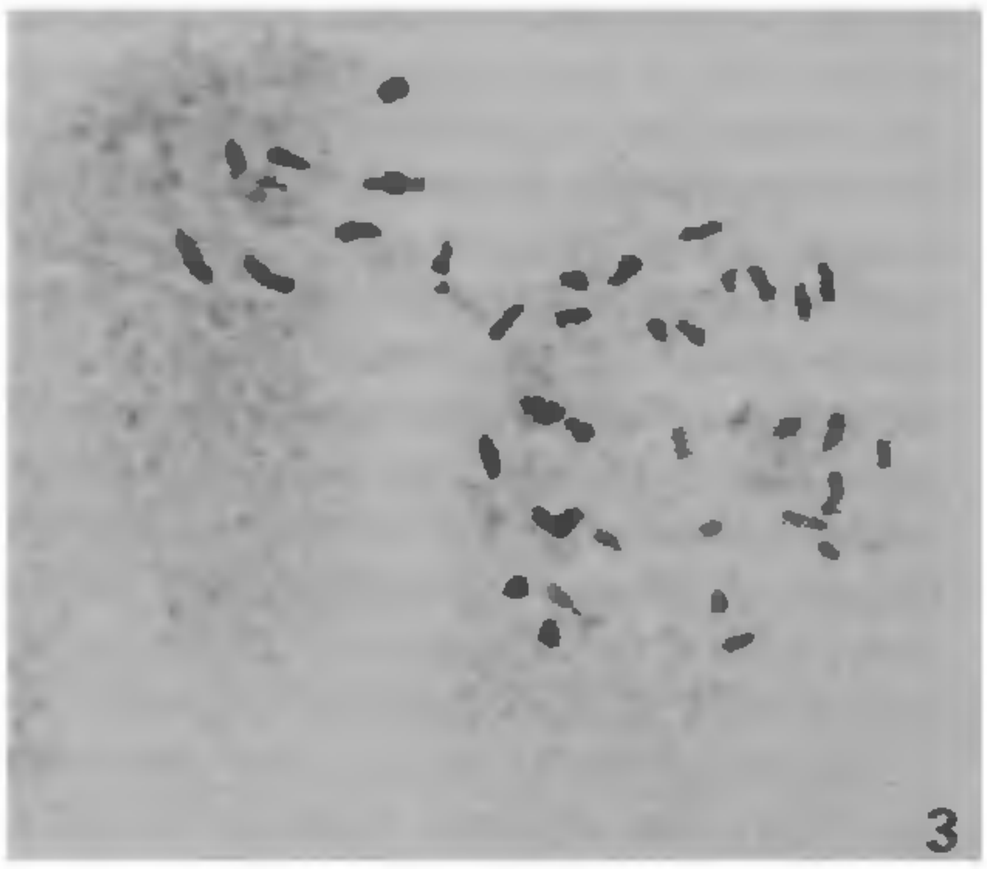
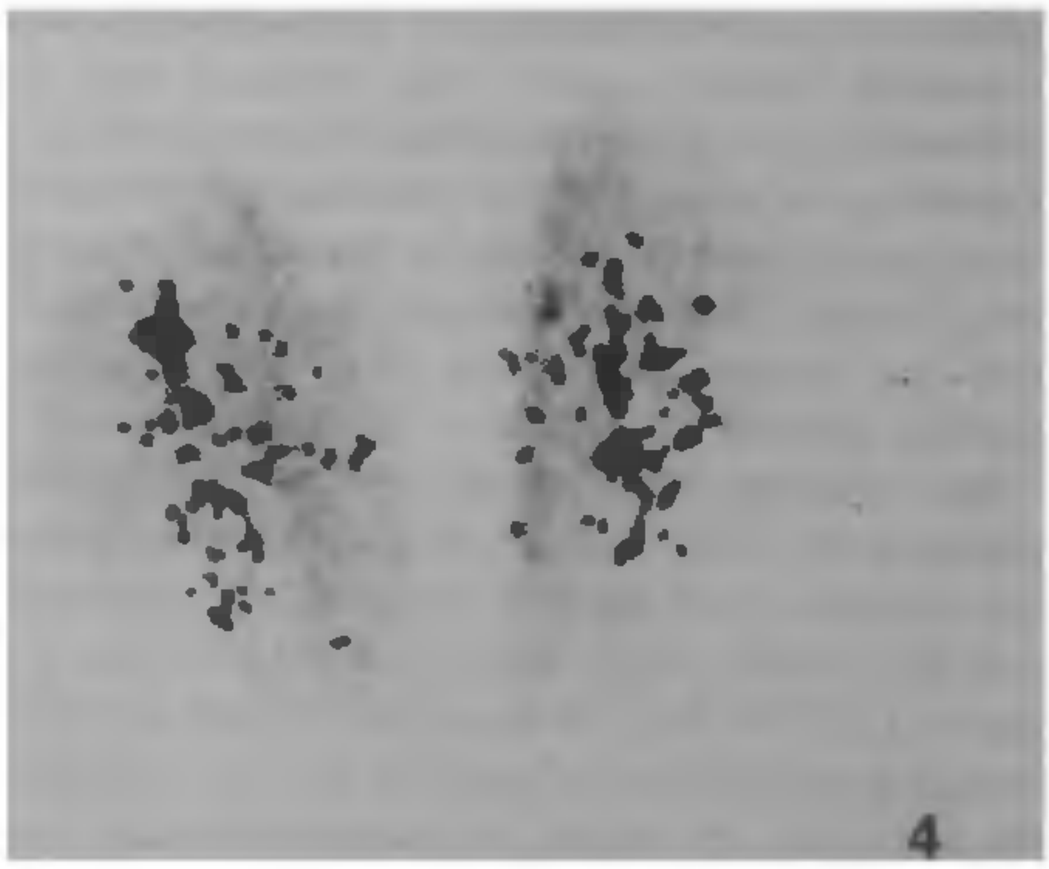
THE intrusion of chromatin material from one cell to another through cytoplasmic connections — referred to as cytomixis — is observed in mitotic and meiotic cells of many plant species[1]. Cytologically, and hence physiologically and biochemically, imbalanced plants like haploids, triploids, aneuploids, hybrids and apomicts show cytomixis more often than normal cytogenetically balanced and established plants[2,3]. Temperature fluctuations during the growth period are also considered to be a factor leading to cytomixis[4]. In maize (*Zea mays* L.) cytomixis was reported in the triploid and its hyperploid progeny by McClintock[5]. The present paper reports the occurrence of cytomixis in pollen mother cells of maize trisomic for chromosome 5.

The maize stock trisomic for chromosome 5 ($2n = 21$) was obtained from Dr G. G. Doyle, University of Missouri, USA. The young male inflorescence of plants, grown in the field during July–August 1987 at New Delhi, was fixed in 3:1 ethanol–acetic acid. Acetocarmine smear preparations of anthers were made to observe the meiosis in pollen mother cells. The normal diakinesis and metaphase I stages had ten bivalents and one univalent (10 II + 1 I) or one trivalent and nine bivalents (1 III + 9 II) (figure 1). Certain pollen mother cells were found to have double the number of chromosome i.e. 20 II 2 I or 1 III + 19 II + 1 I (figure 2). Some pollen mother cells at anaphase I also had double the number of chromosomes. The increase in chromosome number was due to cytomixis (figure 3). The absence of quadrivalents or multivalents at diakinesis or metaphase I in cells with double the number of chromosomes indicates that cytomixis occurred in early prophase after initiation of chromosome pairing. Chromosome fragmentation occurred in some pollen mother cells at first meiotic division leading to the formation of diads with a high number of chromosome fragments (figure 4). The disturbance in the rhythm of development of the pollen mother cells giving rise to









Figures 1–4. 1. Diakinesis in normal cell of trisomic 5 of maize showing 1 III + 9 II; **2.** Metaphase I with double the number of chromosomes; **3.** Chromatin material from one cell passes to another, and **4.** Dyad with many chromosome fragments.

different stages of meiosis, from early prophase to tetrads, in the same anther, was similar to that observed by Levan[2] in haploids of *Phleum pratense*.

In triploids and its F_1 descendents including trisomics of maize, McClintock[5] observed double the number of chromosomes at metaphase I, which was presumed to be the result of fusion of nuclei in the early prophase or even premeiotic fusion. Several anaphase I cells with chromosome fragmentation were also observed. But the chromosomes which are in trisomic condition in plants showing cytomixis were not identified in that study[5].

Aneuploidy and the imbalance caused by the extra chromosome in the trisomic may be a factor responsible for the cytomixis observed in trisomic 5 of maize and the chromosome fragmentation may be an after effect of cytomixis.

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GENOTOXICITY OF DORMIN-5 IN DROSOPHILA SEX-LINKED RECESSIVE LETHAL AND FEMALE GERM LINE MOSAIC TESTS

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SINCE the discovery of benzodiazepines in 1950's, their use as sedative-hypnotic, antianxiety, anti-