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CHANGES IN DNA CONTENT IN GAMMA-IRRADIATED NUCLEI OF *CHARA ZEYLANICA*

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RADIATION-INDUCED changes in Charophyceae have been studied by many workers regarding cytological, morphological and reproductive behaviour[1-5]. In the present study changes in the DNA content was measured cytophotometrically in *Chara zeylanica* var. and f. *zeylanica* irradiated with gamma-radiation.

C. zeylanica Klein ex Willd. var. and f. *zeylanica* was cultured in soil water biphasic medium. Gamma-irradiation was given from a ^{60}Co source at the rate of 2 Kr per min for 2 min. The dose of 4 Kr was chosen because the plant could survive at this dose with varied morphological changes[6]. The irradiated plants were allowed to grow further for 15 days. After 15 days, the nuclei were stained by Feulgen stain following the standard method[7]. Cytophotometric analysis was done in a Reichert Zetopan microspectrophotometer following single wavelength (550 nm) method. The nuclear DNA amount was measured on the basis of optical density in terms of arbitrary units of relative absorbances.

The DNA content of amitotically dividing nuclei in internodal cells increased after irradiation (table 1). The size of the amitotic nuclei also increased 3 to 4 times than the controlled one (1500 μm^3 to 5000 μm^3).

The interphase and mitotic metaphase of antheridial filament cells did not show any remarkable differences in the DNA content between the controlled and the irradiated plants. The antheridial filamentous cells in which DNA content remained unchanged after the irradiation were only able to enter into mitosis; hence, the DNA content of prophase nuclei of control and irradiated plants was similar and normal metaphase started with the same amount of DNA for both the control and the irradiated metaphases. A remarkable differences in the DNA content between the telophasic nuclei of control and irradiated plants were noted (table 1) in the antheridial filament cells.

Table 1 *DNA content (arbitrary units) of control and irradiated nuclei at different stages of cell division in C. zeylanica*

Nuclei of different stages	Control	Irradiated (4 Kr)
Amitotic nuclei of internodal cell	4.61 ± 0.006	6.39 ± 0.009
Prophase of antheridial filament cell	1.01 ± 0.002	1.01 ± 0.002
Metaphase of antheridial filament cell	1.08 ± 0.004	1.01 ± 0.002
Telophase of antheridial filament cell	0.36 ± 0.002	0.25 ± 0.002

The increased DNA content in vegetative nuclei of the plant body was due to the formation of giant nucleus. Irradiation-induced giant cell formation in algae has been observed by many workers[8-12]. It has been observed that the giant cell formation in yeast cells after treatment with X-radiation is due to non-formation of septum without hampering the DNA synthesis[13]. In the present case, amitotically dividing nuclei became gigantic, and the increased DNA content implied an endomitotic reduplication of the DNA of the nuclei. Giant cells in *Mougeotia* are reported to be polyploid[14]. In the case of reproductive cells, i.e., antheridial filamentous cells of *Chara*, no change in DNA content was observed in interphase and prophase nuclei (1.01 ± 0.002). In other words, those cells in which DNA content did not undergo any appreciable change due to irradiation were only able to enter into mitosis. A remarkable differences in DNA amount between the telophasic nuclei of control (0.36 ± 0.002) and irradiated plants were noted (0.25 ± 0.002). This was probably due to loss of small quantity of DNA during abnormal cell cycle of post-irradiated nucleus.

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XENO-DISSIMILATORY PLASMIDS

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MICRO-ORGANISMS play a key role in the dissimilation of natural and synthetic aromatic substances. Synthetically produced insecticides, fungicides, herbicides[1], styrene[2], nylon oligomers[3], etc. are increasingly used and bacterial plasmids have been implicated in their dissimilation. Pemberton and Fisher demonstrated that a strain of *Alcaligenes eutrophus* possessed a transmissible plasmid conferring the ability to degrade both 2,4-D and 2-methyl-4-chlorophenoxyacetic acid (MCPA), two widely used pesticides. Since then, plasmids pJP2, pJP3, pJP4, pJP5, pJP7, pJP9 from *Alcaligenes paradoxus* and *A. eutrophus* for 2,4-D dissimilation[1], pCMS1 from *Pseudomonas diminuta* for parathion dissimilation[5], pEG for styrene dissimilation[2], pOAD2 from *Flavobacterium* for nylon oligomer dissimilation[3], pUO1 from *Pseudomonas* sp., *Moraxella* and *Hyphomicrobium* sp. for fluoro-, chloro- and bromoacetate[6], chloromethane and chloroethane dissimilation, pRA500 for 3,5-xylenol from *P. putida*[7], and pTMB from *P. putida* for 1,2,4-trimethylbenzene dissimilation[8] have been reported.

Plasmids associated with the dissimilation of both natural and synthetic aromatic substances have recently been termed "dissimilatory plasmids"[9]. With the increasing number of synthetic substances, more dissimilatory plasmids await discovery. To distinguish plasmids involved in the dissimilation and detoxification of synthetic aromatic substances from those that degrade natural aromatic substances, we propose to call the former "xeno-dissimilatory plasmids". In our opinion, plasmids of this group will be more useful in understanding the functional role attributed to the plasmid.

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