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Analysis of mitochondrial DNA insertions into a nuclear chromosome of the maize B73 line

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Mitochondrial DNA (mtDNA) is known to have integrated into the nuclear DNA of plants and animals. The purpose of this project is to investigate the on-going migration of mtDNA into the nuclear DNA of maize plants. Specific objectives are to discover the amount of DNA incorporated, whether it is the whole mitochondrial genome or sections, and to see if it has replicated after migration. The maize inbred line B73 has a particularly large mt DNA insert on chromosome 9. Using the fluorescent in situ hybridization (FISH) method, the arrangement of inserted mitochondrial DNA was examined. The FISH method uses fluorescently labeled mtDNA as probes for hybridization to chromosomes. Regions of the chromosomes that contain mtDNA can then be detected using a compound microscope with fluorescent attachments. Locations that contain more mtDNA are brighter. Three combinations of probes that cover different parts of the mitochondrial genome were employed. In order to analyze the arrangement of the DNA, the chromosomes were prepared from a stage of meiosis called pachynema in which the chromosomes are elongated and have not yet begun to condense. The results have confirmed the presence of all three probes within the large insertion of mtDNA on chromosome 9 of B73. The data suggest that either different parts of the mitochondrial genome are incorporated preferentially or that there is selective replication of portions of the mitochondrial genome after incorporation.