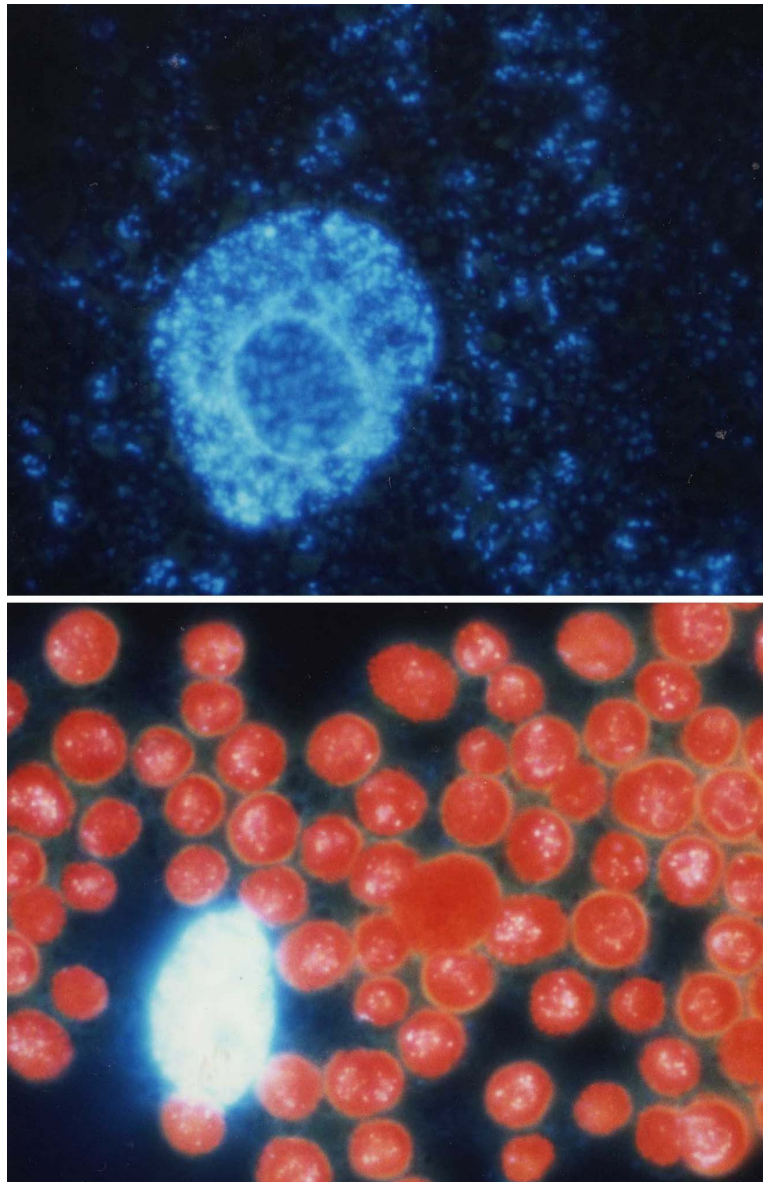


Physiological and biochemical studies on the proliferation and differentiation of plant organelles

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Undifferentiated cultured tobacco cells (top) and photosynthetically active tobacco leaf cells (bottom). Cells were enzymatically treated to remove cell walls, stained with DNA-specific fluorochrome DAPI, and observed by fluorescence microscopy. DNA-bound DAPI emits blue-white fluorescence under UV excitation. Large blue-white fluorescent ovoids, nuclei; small blue-white fluorescent spots, organelle nucleoids; red fluorescent ovoids in leaf cells, chloroplasts. Note that Red fluorescence is originating from chlorophyll, and that cultured cells only contain undifferentiated plastids (proplastids) without chlorophyll.

Plant cells contain two types of energy-converting organelles, chloroplasts (plastids) and mitochondria. DNAs of these organelles are compactly folded, through interaction with specific DNA-binding proteins, to form DNA-protein complexes called nucleoids, in which various functions of organelle genomes, such as replication and transcription, are conducted. We are studying on the modes and regulatory mechanisms for compact organization of organelle nucleoids, as well as for replication and transcription of organelle genomes in the nucleoids.

Keywords : Chloroplasts, mitochondria, nucleoid, DNA replication, transcription