Mutants of *Arabidopsis*

Doctoral Professor, David Meinke, has conducted research to determine a large number of genes with necessary functions during the seed development of the plant, *Arabidopsis*. This is a flowering plant with thousands of mutants known and previously studied. Dr. Meinke’s focus is on the natural variation in the embryonic development within mutants malfunctioning in chloroplast translation. It has been evaluated that chloroplasts have sustained the 100-200 genes of the ancestral endosymbiont in their genomes that have gotten them to where they are today.

The research conducted in the laboratory at Oklahoma State University proves to be nationally recognized through Dr. Meinke’s research grant with the NSF (National Science Foundation.) “481 genes and 888 mutants are in the database for a seed phenotype when disrupted by a loss of function mutation.” Professor Meinke and the students that work very close with him have diligently analyzed well over 60% of these mutants.

In further detail of different research, the embryonic processes tested include: morphogenesis, maturation, and cell differentiation. Morphology is the makeup of something. There were morphological defects in the mutant embryos; they then became apparent during the heart stage of growth when embryos customarily begin the rapid cell division and enlargement necessary for the completion of morphogenesis.

Some of Dr. Meinke’s most recent work was about *Arabidopsis* diverging in their capability to endure a loss of chloroplast translation. The gene studied is called, *ACC2*. The null alleles with *ACC2* nonsense mutations, small deletions, frameshift mutations, genomic rearrangements, and imperfections in RNA splicing are included among the most sensitive accessions examined. A null allele is a mutant copy of a gene at a specific locus that does not have that gene’s original function. These are all types of mutations that cause a change within the allele, most of the time it is not a good change that occurs. Think of it as a healthy person eating a hamburger versus eating granola and yogurt. The hamburger is going to make that individual sick because their body is in a state of solitude with being healthy, which is what a mutation does to an allele. In contrast to the mutations listed prior, a missense mutation will more than likely fail to eradicate the purpose of the *ACC2*.

All of this sums up results in the determination of the role of *ACC2* in facilitating *Arabidopsis* response to a loss of chloroplast translation. It can now be studied that the future submissions of this system are to investigate chloroplast protein importation.

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Parker N, Wang Y, Meinke D (2014) Natural variation in sensitivity to a loss of chloroplast translation in Arabidopsis. Plant Physiol 166:2013-2027.

Vernon, D. M. and Meinke, D. W. (1995), Late embryo-defective mutants of Arabidopsis. Dev. Genet., 16: 311–320. doi:10.1002/dvg.1020160404