Plant Genome:

- Plant genome more complex than other eukaryotic organisms

- Examine two ways complexity expressed:
  - Polyploidism
  - Genomic organization

Polyploidism

- Definition = duplication of # chromosomes
- Plant kingdom has HUGE number of polyploids
- Review: poplyplodism can arise in two ways:
  - Autopolyploidism:
    - two or more pair of chromosomes derived from same species (often same individual) AA + AA = AAAAA
    - process facilitated by self-fertilization of plants
  - Allopolyploidism:
    - one pair of chromosomes from each of two or more species AA + BB = AABB
    - not same a hybrid A + B = AB (usually sterile)
    - asexual reproduction and self fertilization facilitate process
Plant Genomes

• Plants contain >> DNA than “needed”

• DNA sequences present in low, medium, or high copy-numbers
  – low-copy genes (1-2 copies) code for specific enzymes
  – medium-copy (100’s-1000’s copies) encode rRNA
  – high-copy (10,000’s copies) ????

• Plant Model systems
  – Effort to map entire genome of several plant species
  – allow understanding of function of each gene!
  – *Arabidopsis* (wild mustard) genome now complete
  – rice genome soon to be complete

Plant Genomes

• Chloroplast genome

• Recall origin of chloroplasts
  – endosymbiotic prokaryotic organisms
  – contain own DNA (circular, very much like that of bacteria)

• Chloroplasts inherited from female parent

• DNA in chloroplast much more conservative than chromosomal DNA

• Provide powerful tool for understanding evolutionary relationships among species
Tissue Culture

• Totipotency:
  – mature plant cells retain ability to express entire genome
  – any plant cell can, under appropriate conditions, act like a fertilized egg and produce an entirely new organism!

• Tissue culture:
  – any of several techniques for taking mature plant cells and re-creating entire plants

• Tissue culture uses
  – allows propagation of 1000’s of genetically identical individuals
  – widely used in horticulture and agriculture

Plant Biotechnology

• “genetic engineering” = insert genes from other organism (any eukaryotic organism) into plant

• Huge agriculture applications
  – tomatoes that don’t get “mushy”
    • fruit ripening caused by production of ethylene
    • insert genes which block production!
  – Herbicide resistant plants
    • glyphosate = effective herbicide that kills all plants
    • insert genes that make plant immune to glyphosate
    • now spray fields and only weeds die!
  – Nitrogen fixation
  – Insect resistance
Plant Biotechnology

– Plants with increased nutritional value
  • modify amino acid composition of grains
  • add vitamins (A, B-12, C, betacarotene, etc)

– Plants with increased economic value
  • change quality of oils from products
  • Program at UNT (Dr. Ken Chapman) to modify quality of cotton-seed oils!
  • Production of biodegradable plastics!

DULL ROAR
TALENT SHOW
April 21

Auditions Monday 16, Tuesday 17, Wednesday 18
5-7 pm in MAC

Sign-up sheets are in the Activities Binder!!
Call 6691 for Questions