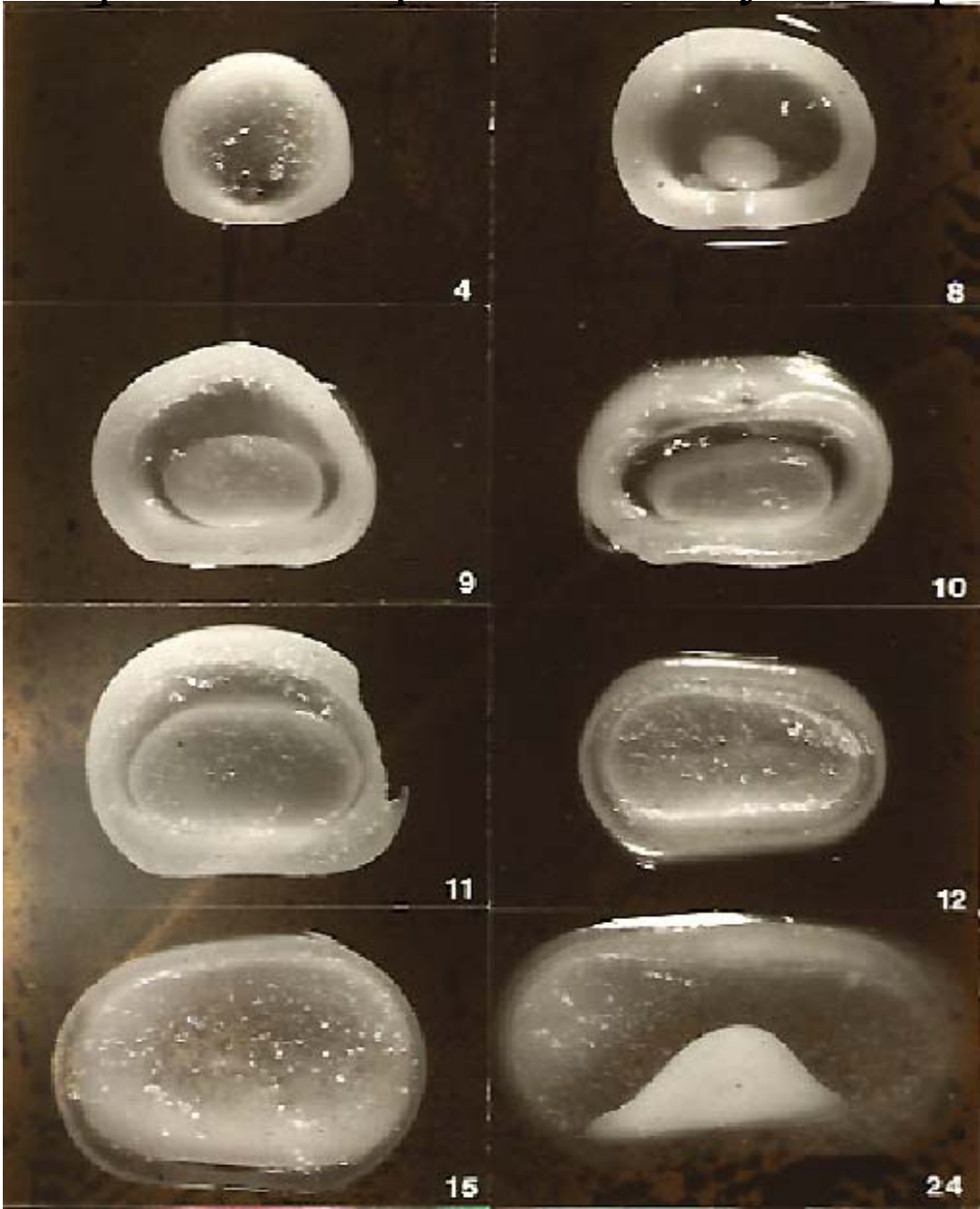


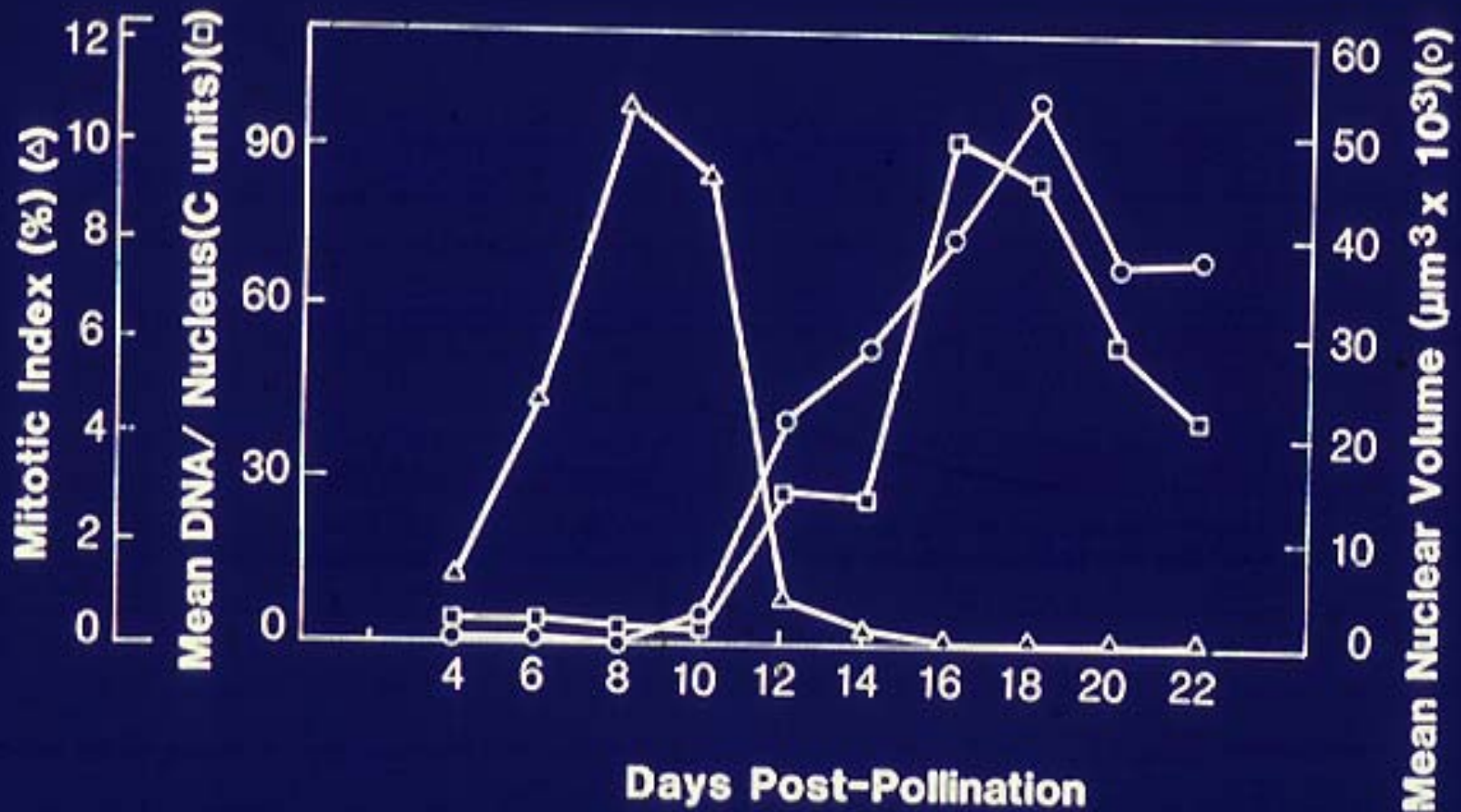
DNA Endoreduplication During Maize Endosperm Development



- endosperm is a triploid tissue
- 2 maternal : 1 paternal genomes
- provides nourishment for the embryo
- “dead-end” tissue

Maize endosperm development 4-24 days after pollination



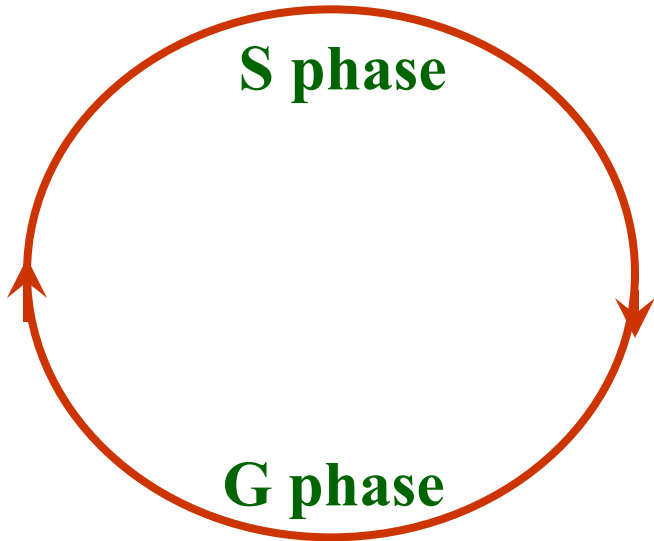


Attributes of endoreduplicating nuclei

- ✓ Cell cycle consists of alternating G and S phases
- ✓ Chromosome condensation does not occur
- ✓ No strand separation
- ✓ No karyokinesis
- ✓ No cytokinesis

DNA endoreduplication

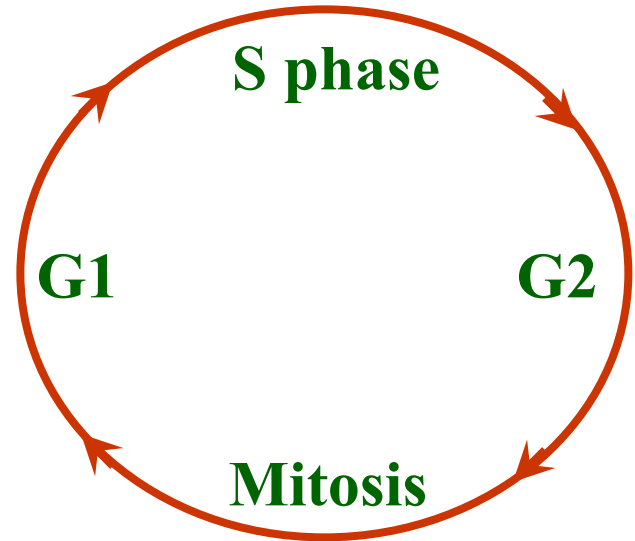
- ✓ Entire genome replicates
- ✓ Results in exact doubling of DNA content from one round to another
- ✓ Altered cell cycle consisting of only S and G phases
- ✓ Leads to polytenization of the chromosomes



**Endoreduplicating
cell cycle**



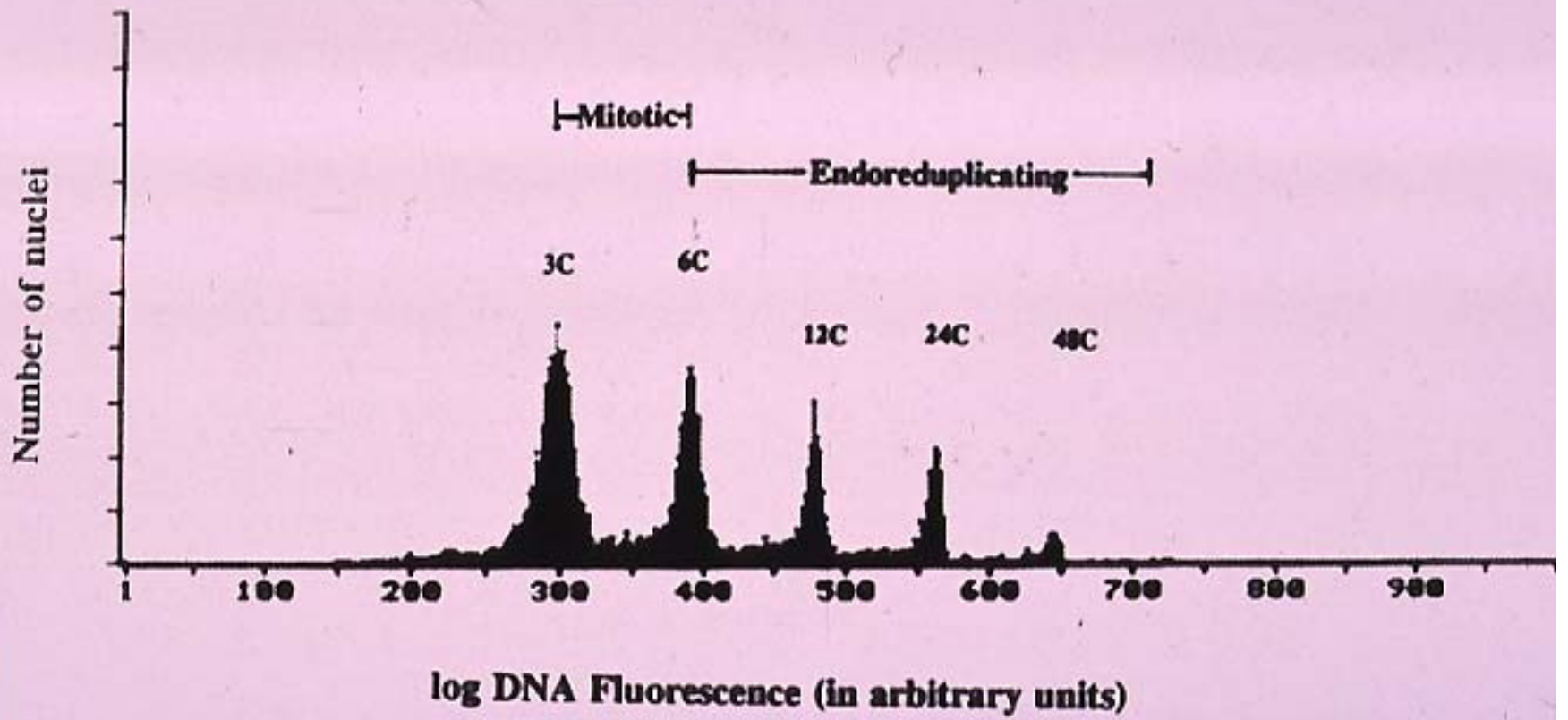
polytene



**Mitotic Cell
Cycle**



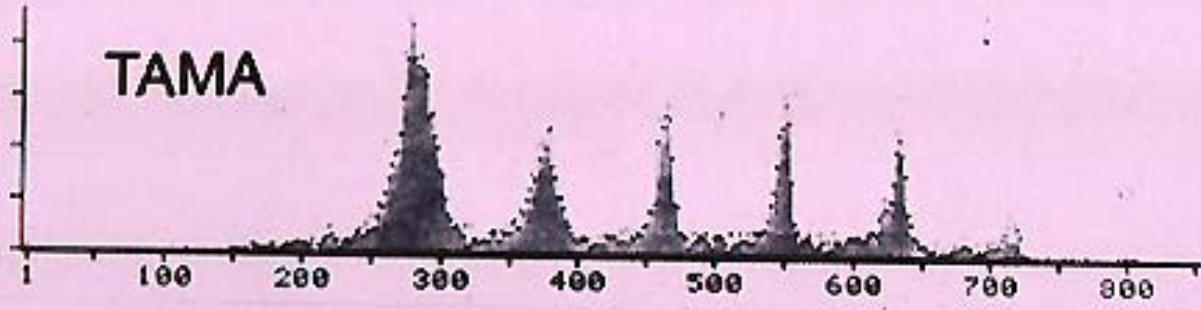
Normal



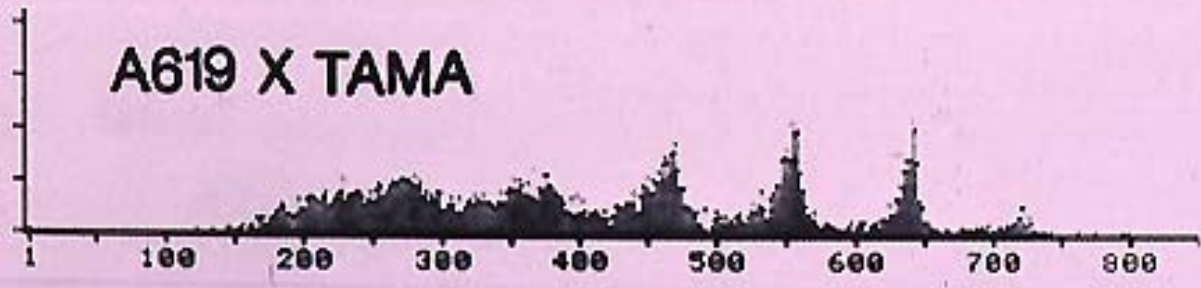
A619



TAMA



A619 X TAMA



TAMA X A619



Endoreduplication in Maize Endosperm

- ✓ All 153 lines evaluated had increase DNA content per nucleus
- ✓ Some individual nuclei reached levels of 384C (7 rounds of endoreduplication)
- ✓ Mean DNA content per nucleus in the central region of the endosperm is 90C in some inbred lines 15dap
- ✓ Mean DNA content per nucleus across the entire endosperm is 12.8C at 15dap

Allele-specific DNA degradation during maize endosperm development

**HindIII Digest of Maize Endosperm DNA Probed with UMC 131
Located on Chromosome 2 Near Centromere on Long Arm**



Allele Specific Loss and Methylation

- ✓ Test for methylation status indicated that regions undergoing allele loss were hypermethylated

Hypthesis

- ✓ Regions of chromatin no longer needed for transcription are targeted/marked for degradation, and the resulting nucleotides form a reserve for use by the developing and germinating embryo and perhaps the emerging seedling

Glossary of terms

Microsporogenesis: A process of microspore formation that leads to the first cell of the male gametophyte generation.

Spermatogenesis: A process by which microspore develops into a male gametocyte or sperm (pollen).

Karyokinesis: Nuclear division without the event of cytokinesis (cytoplasmic division).

Megasporogenesis: A process of megaspore formation that leads to the first cell of the female gametophyte generation.

Double fertilization: The process by which two sperm nuclei enter the embryo sac, one fuses with the egg cell to form the zygote ($2n$), and the other fuses with the fusion nucleus to form the endosperm nucleus ($3n$).