

ANALYSIS OF SEMIGAMOUS COTTON USING STAIN-CLEARED NUCELLI

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Abstract

Semigamy (*Se*) is an abnormal type of fertilization where syngamy, the union of the sperm and the egg, occurs but synkaryon formation, fusion of their nuclei, does not. Initially *semigamy* was reported in recurrently apomictic species in which there is a failure of synkaryon formation, and the sporophyte arises from a 2n female gamete. Nonrecurrent *semigamy* has been reported in *Gossypium*. In mutant *Gossypium* that undergo semigamous reproduction both gametes are haploid, and the sperm nucleus takes part in development of the sporophyte. Progeny families include normal hybrid plants as well as maternal and paternal haploids. In addition, progeny can include chimeras with haploid maternal and paternal, and/or hybrid tetraploid tissue. It was suggested that polyspermy might be involved in chimeras with hybrid sectors, but cytological investigations were not reported. It has been proposed *semigamy* resulted from a dominant allele that conferred facultative semigamous reproduction or that *Se* is incompletely dominant, and that it is expressed sporophytically in both parents. Given the unusual effects of the *semigamy* mutation and the uncertainties regarding specific cytological mechanisms involved, a cytological investigation of this mutant was conducted, with emphasis on fertilization and early embryogenesis. *Semigamy* was completely expressed in zygotes homozygous for *Se*. Polyspermy was not observed. The various products arose from zygote division producing embryos that were tetraploid, or chimeric. Chimeric embryos contained a maternal and a paternal haploid sector or a maternal haploid, a paternal haploid and a tetraploid sector.