Alleles of *pink scutellum1* with no visible kernel phenotype
--Stinard, PS; Jackson, JD

The Maize Genetics Stock Center has been maintaining two independently isolated seedling mutants (*peach-albino-mutable*-87-2209-30* and *peach-albino*-N1983B*) with a unique peach-tinged albino phenotype. Because of their similar phenotype, tests of allelism were performed and these two mutants were found to be allelic. Rescued seedlings from viviparous alleles of *pink scutellum1* are described as being white with a pink flush. *ps1* mutant alleles are blocked in the production of carotenoids and the pink color is due to the accumulation of lycopene. Many *ps1* mutant alleles are also viviparous due to ABA deficiency. Several dormant alleles of *ps1* have been described which produce pink seedlings with varying degrees of greening (Faludi-Daniel et al., Acta Agron. Hung. 16:1-6, 1967; Bai et al., Genetics 175:981-992, 2007). However, these dormant *ps1* alleles produce kernels with visibly altered endosperm carotenoids that are pinkish in color, also due to the accumulation of lycopene. The *peach albino* mutants do not have visibly altered endosperm carotenoids and mutant kernels are indistinguishable from nonmutant kernels in a *Y1* background. Nevertheless, due to the similar mutant seedling phenotype, allelism tests were performed between the *peach albino* mutants and a viviparous *ps1* allele (*ps1-8205*). From the allelism test crosses, ears were obtained that segregated for pink endosperm kernels with dormant embryos. Seedlings grown from pink kernels had the seedling phenotype of their respective *peach albino* parent (Figure 1). It is interesting to note that although the double heterozygote *peach albino*/*ps1* kernels retained the embryo dormancy of the *peach albino* parent, they retained the endosperm carotenoid expression of the *ps1* parent. We conclude that the *peach albino* mutants are dormant alleles of *ps1* that have a unique nonmutant endosperm phenotype.

Figure 1. Seedlings grown from allelism test cross ears of *peach-albino*-N1983B* (middle row) and *peach-albino-mutable*-87-2209-30* (right) with *ps1-8205*, pink kernels planted. Note the sectors of greening on the plants on the right. They are not revertant sectors but rather represent an allele-specific epigenetic phenomenon. On the left are albino *lemon white1* seedlings for purpose of comparison.

Two point linkage data for *Og1* and *oy1* on chromosome 10
--Stinard, PS

Classic maize genetic linkage maps (e.g., Mutants of Maize, Neuffer et al., Cold Spring Harbor Laboratory, New York, 1997) show a separation of 4 centiMorgans between the *og1* and *oy1* loci on chromosome 10. These data appear to be based on indirect mapping with respect to other markers; no direct mapping between these loci has been reported in the literature. Since dominant *Og1* mutant alleles condition green and yellow/yellow-green striping and there exist dominant mutant alleles at the *oy1* locus that condition yellow-green plants, the possibility exists that *og1* and *oy1* may represent the same locus. We conducted direct mapping experiments between a dominant *Og1* mutant and a recessive *oy1* mutant to try to get at this question.

Homozygous *Og1 Oy1* (*Old gold1* single mutant) plants were crossed to homozygous *og1 oy1* (single mutant *oil yellow1*) plants and the resulting double heterozygotes were backcrossed by a homozygous *og1 oy1* tester. Kernels from testcross ears were planted and the resulting plants scored for *Og1* and *oy1*. 206 green seedling/Old gold striped parental type plants (*Og1 Oy1*) and 186 oil yellow seedling/green parental type plants (*oy1 og1*) were observed. No double mutant *Og1 oy1* plants were observed. Five potential double nonmutant green seedling/green plants were self-pollinated and evaluated one additional generation to confirm genotypes; all five turned out to be single mutant parental class *Og1 Oy1* plants. Thus no crossovers were obtained from a total of 397 plants scored, indicating a separation of less than 0.25 +/- 0.25 centiMorgans. These are not enough data to draw a definitive conclusion, but these two loci are certainly tightly linked if not identical.

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Genetic evidence of an unexpected kind of chromosome 9 aberration induced by the B chromosome in maize
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The maize B chromosome has been associated with induction of late knob replication in A chromosomes resulting in bridge-breakage, loss of acentric fragments and production of terminal-deficient chromosomes. B chromosomes have no effect upon the viability of the organism, inasmuch as they are not essential for growth and development. The B chromosome has been so far best studied in maize, and causes several interesting genetic effects. One of these effects, discovered by Rhoades et al. (1967), is the so-called “high-loss phenomenon”, in which B chromosomes interact with the knobs of A-complement chromosomes, inducing breakage. Since different kinds of chromosome aberrations, besides the single terminal deficiency, have been genetically described and were not included in the Rhoades and Dempsey hypothesis, they demand more investigation aimed at a better understanding of the whole effect of the B chromosome in inducing breakage in chromosomes of the A-complement. With this purpose in mind, this study was conducted in order to genetically analyze an aberrant plant with deficiency induced by B chromo-