

**Cold Spring Harbor Laboratory
WORKSHOP ON CEREAL GENOMICS
September 13 – 19, 2005**

MaizeGDB Mastery Exercise to be completed on your own, to the best of your ability.

In this, the third (*optional!*) exercise intended to familiarize you with how to use MaizeGDB, you will use the MaizeGDB website along with your copy of Mutants of Maize and the attached paper (Park et al. *Genes Dev.* 2000 Apr 15; 14(8):1005–16) and Chapter 51 from The Maize Handbook to determine a reasonable explanation for observations made in your field of maize this past summer. This exercise demonstrates that MaizeGDB is a tool to be used in conjunction with other resources to investigate maize genetics. The MaizeGDB session Thursday afternoon will walk you through methods that could be used to find reasonable answers to questions 1–6, and Carolyn Lawrence will be around Monday through Friday to help with this exercise. Try to answer questions in the order that they are listed.

There are a lot of tricks to this one, so good luck!

Genotypes and phenotypes of plants in the field:

Range 1.

r-X1 (N10) *Sr2* /*R-nj* (N10) *sr2* ~1.2 % striped plants, but none with narrow leaves.

Range 2.

r-X1 (N10) *Sr2* /*R* (N10) *sr2* No striped plants, but ~1.0 % have narrow leaves.

Range 3.

r-X1 (N10) *Sr2* / *R-nj* (Ab10) *sr2* ~1.3 % striped plants, but none with narrow leaves.

Notes: N10 is the normal copy of chromosome ten and Ab10 (also known as K10) is the "Abnormal Chromosome 10".

Name: _____

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MaizeGDB Mastery Exercise

1. What does the navajo kernel phenotype look like? Draw a picture. (Hints: do a phenotype search at MaizeGDB using *navajo as your search term, also try searching all records using the same search term. Look also at the discussions of the *R1* locus in your copy of Mutants of Maize.)

2. In question 1, why did you put an asterisk (*) in front of your search term, but not behind? (Hint: click on the ? box to the left of the search box at the top of any page at MaizeGDB.)

3. Who originally isolated the *r-x1* variation? (Hint: *r-x1* is an allele (a type of variation) of the *R1* locus. Do a variation search at MaizeGDB. Note that *r-x1* is also called *r1-x1*.)

4. If plants in all ranges are *Sr2/sr2* heterozygotes, how is it that *any* of the plants turned out striped? (Hint: read the attached copy of Chapter 51 in The Maize Handbook.)

5. What could cause plants in ranges 1 and 3 to have a striped phenotype, but would not cause this phenotype in range 2? (Hint: look up *striate2* (*sr2*) and related loci in Mutants of Maize and also read carefully the Park et al. paper, especially the beginning of the results section.)

6. If all plants in all ranges are crossed by $r(N10)/r(N10)$ males, why would the striped plants in ranges 1 and 3 all end up bearing ears with only navajo kernels (i.e., no colorless kernels)?

Bonus For plants in range 3 that are not striped and that are crossed by $r(N10)/r(N10)$ males, the ears have ~70% navajo kernels and ~30% colorless kernels whereas those in range 1 ended up at ~50% navajo and ~50% colorless. What is the explanation for this observation?