Since many fertile plants were observed in one of the crosses, one would expect to recover the complementary semisterile class which carries both interchanges on the same two chromosomes. The recombination values were similar to those in the check, but the data are limited, since only part of the crosses segregated for the 3 markers.

C. R. Burnham
J. Stout

10. A new method of using interchanges as chromosomal markers.

The single interchange stocks that have been used in the past for genetic analysis of complex characters require a large number of stocks for an adequate coverage of the chromosomes. In the test with each interchange only two of the four arms of the chromosomes involved in the interchange are marked with breakpoints. If the two chromosomes had a second interchange with breaks in the other two arms (breakpoints in each of the four arms of the two chromosomes), one should be able to detect the presence of any gene located in those two chromosomes. A method of developing such stocks is as follows: Cross two interchange stocks that involve different arms of the same two chromosomes and then cross the F_1 with a standard normal stock. Progeny that come from crossovers in the two differential segments, and which bring the two interchanges together in the same two chromosomes, would be semisterile. They could be distinguished from the semisterile noncrossover sibs by testcrosses with the parental interchange stocks, and established as a double interchange stock that is homozygous. These could be used in linkage tests in a manner similar to that used for the single interchange stocks. In backcross linkage tests, the parental classes would be semisterile or fertile. Single crossovers in either of the differential segments would not be recovered. Also even when single crossovers occur in both differential segments, both complementary crossover classes are semisterile, and hence only one is recognizable as a recombinant. This should furnish a more efficient test for linkage.

A set of five such double interchange stocks, e.g. 1-2, 3-4, 5-6, 7-8 and 9-10 should completely test the ten chromosomes and narrow the location of a major gene to two chromosomes. A set of nine such double interchange stocks in which one of the two chromosomes interchanged was the same, e. g. 1-9, 2-9, 3-9, 4-9, 5-9, 6-9, 7-9, 8-9 and 9-10, should locate a major gene to an individual chromosome. If on 9, it should show linkage with all or most of the stocks in the series.

An extension of the method to 3-chromosome interchange stocks is possible also. As an illustration, if there are three interchange stocks T1-2 (1S-2L), T1-7 (1L-7L), and T2-7 (2S-7S), the cross of T1-2 x T1-7 will have a ⊙ 6 at meiosis. Crossing over in the differential segment of chromosome 1 can give rise to a combination of chromosomes (T1-2 + T1-7) that includes both interchanges. This stock marks arms 1S, 2L and 7L, but does not mark arms 2S and 7S. If T2-7 (S-S) could be added, all arms of the three chromosomes would be marked. This can be accomplished by producing a second 2-interchange stock, e. g. 1-7 + 2-7. If

Tl-2 + 1-7 is crossed with Tl-7 + T2-7, crossing over in the differential segment in chromosome 2 will produce a new chromosome which in one combination of chromosomes will include the three chromosomes with the six arms marked by interchanges.

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1. On the status of the Stadler-Uber "r-x_2" deficiency.

The "r-x_2" deficiency is known to be transmitted only through the egg and includes the r locus. What has not been established is whether it is terminal or intercalary, and what other loci are situated in the segment concerned. Individuals having the constitution G R Sr_2/ ? r-x_2 were employed as female parents in a cross involving g r sr_2 males. None of the plants obtained from the colorless aleurone kernels was striate or golden. Thus the genetic data indicate that this deficiency is intercalary and does not include the g and the sr_2 loci.

Gary Y. Kikudome

2. Aleurone color intensity.

During the course of an experiment to synthesize altered abnormal chromosomes 10 through the action of maleic hydrazide, the following observations were made: When R Sr_2 K10/ r Sr_2 k10 females were pollinated by yg c sh wx/ yg c sh wx; R/R and wd C Sh wx/wd C Sh wx; R/R pollen, both deeply colored and pale colored aleurones were obtained. The frequency with which the pales were obtained was in agreement with the expected value for r transmission through the female. In fact all of the pales appear to exhibit a mottling phenotype. The pales will be tested for verification. When the R K10 chromosome was involved in the production of r/r/R aleurone, the color produced was deep.

One possible reason for the appearance of the pale colored aleurone is the existence of several R (S component) alleles, each having a different degree of efficiency in color production or expression. Not to be ignored is the possibility of induction of factor(s) by maleic hydrazide which influences color expression. Tests are being constructed to determine the cause of paleness.

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