
K- Symbol for knob
 O- Knobless
 L- Long arm of the chromosome
 S- Short arm of the chromosome

This table shows that knobs are relatively abundant in both plants and that differences are expected to occur in plants of the same family. Knob analysis of the remaining plants could not be undertaken. Most of the bivalents at pachytene stick together by their knobs making impossible their identification. However, this, in itself may be evidence of a heavily knobbed karyotype.

Production of nucleolar substance is frequently observed in association with heterochromatin. In maize the nucleolus is normally associated with a large heterochromatic piece, the nucleolar organizer. From the facts above described, the suggestion is made that other heterochromatic parts, as for instance knobs and B fragments, can also be activated under special genotypic conditions. This particular genotype is probably provided by the abnormal 10 segment. Influence of this segment on the neocentric activity of the other chromosomes, assumed to be localized on the knobs, is already known. We believe that detection of the persistent nucleoli and of the mechanism presumably causing them to arise was only possible due to the heterochromatin charged background in the PNCs of these plants that made possible the full expression of the abnormal nucleolar activity.

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1. The effects of teosinte chromosomes on mutation rate at specific loci.

In previous News Letters we have reported a general mutagenic effect of teosinte chromosomes which have been incorporated into A158. The present report concerns their effect on mutation rates at specific loci. A test of a homozygous chromosome-4 stock on mutation to sugary during pollen formation yielded 1 proven su mutation in 84,329. When this individual was grown out, it was found to be semi-sterile. In another test in which mutation rate was tested in the female rather than the male and in which the teosinte chromosomes were made heterozygous by outcrossing to a cytoplasmic male-sterile inbred (C106) no mutants were observed to either s or y in 136,227 kernels involving about 68,113 gametes bearing teosinte chromosomes. A similar test for sh₂ in the female of teosinte derivati

also made heterozygous with the cytoplasmic male-sterile inbred produced only 3 mutations in 1,718,989 kernels. It is significant that all three of these mutations came from a single family (57,879 kernels) and that this family involved several teosinte chromosomes (3,4, and 9).

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2. Mutations at the A locus in teosinte derivatives.

Although mutations at specific loci in teosinte derivatives are rare in the controlled experiments reported immediately above they may be more common in certain other stocks. In 1956, 241 ears were grown from crosses of an inbred strain of the genotype A C R with respect to aleurone color and an inbred strain homozygous for the unstable defective endosperm mutant de^{t5} and having the genotype A c r. The F₁ ears from this cross would be expected to segregate for colored and noncolored seeds in a ratio of 9:7 and all but two did segregate in this manner. The two exceptions had 57.0 and 53.4% of noncolored seeds. These percentages suggested a 27:37 ratio. The colored seeds from one of these ears were grown in Florida in the winter of 1957-58 and produced ears segregating for colored and noncolored seeds in ratios of 27:37, 9:7, and 3:1. Some of the colorless seeds from the second ear when grown in the summer of 1958 proved, when tested, to be of genotype Aa, showing that a mutation from A to a had occurred.

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3. Peculiar behavior of the C locus in crosses of teosinte derivatives.

A third ear from the population described in the section above segregated in a ratio of 9:7 in the F₂ endosperm generation but produced an ear segregating in a ratio of 27:37 in the F₃ generation. Colored seeds from one of these ears produced 27:37, 9:1, and 3:1 ratios in the following generation. All selfed plants were also tested for A, C, and R. Plants producing 27:37 ratios in selfed ears proved either to be heterozygous for A, C, and R or homozygous for A and heterozygous for R, C, and an unidentified color gene. Three of the plants segregating in a 9:7 ratio proved to be homozygous for both A and R and heterozygous for C and an unidentified color gene. In test crosses on the C tester all of the plants which were segregating for the unidentified color gene produced 1:3 ratios instead of 1:1 ratios of colored and noncolored seeds. Apparently this stock which originally was heterozygous for the C factor is now heterozygous for two C factors both of which are required to produce aleurone color. The significance of this situation is not yet clear and the presently known facts are being presented here only as a matter of record.

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