

1. Spread of Mutational Change Along the Chromosome

When Ds is inserted just to the left of Sh₁ in chromosome 9, it can subsequently effect mutational change in genetic materials located to either side of it. These occur only when Ac is also present in the nucleus. These effects appeared following 2 independent insertions of Ds at this location. A total of 56 mutational changes were examined. Seven affected the action of genetic materials located to the left of Ds and including I, 37 affected the action of Sh₁, located just to the right of Ds, and 12 affected the action of both Sh₁ and Bz₁, the latter located to the right of Sh₁. The origin and general patterns of behavior of some of these mutants were reviewed in recent issues of the Year Book of the Carnegie Institution of Washington. In all 56 cases of mutational change, Ds was present and apparently unaltered in location by the event that produced the mutation. In many of these cases, however, it could be shown that the Ac present underwent a transposition at the time that the mutation producing change occurred at 9s. Some of the changes affecting only Sh action are unstable in that the recessive mutant) sh, reverts to Sb but on when Ac is also present in the nucleus. These reversions are not accompanied by loss of Ds or by its transposition to a new location. The dominant, Sh, so produced may again mutate to sh, and again, only when Ac is present in the nucleus.

In one of the 12 examined cases of simultaneous change in action of both Sh and Bz (to sh and bz), the bz component of the double mutant proved to be mutable. Mutations to Bz occurred but only when Ac was present. The action of the sh component remained unchanged. It could be shown that Ds was located to the left of the mutable bronze locus and that reversions to Bz were not accompanied by loss or transposition of Ds. No evidence of crossing over within the sh to bz^m interval was obtained. Crossing over to either side of the double mutant was either normal or increased in frequency in comparison with the standard frequency.

In all of the 56 examined cases of Ds initiated mutations, Ds remained unaltered in location. This suggests that loss of Ds from this particular location, following its initial insertion just to the left of Sh₁, results in some lethal action. Some of these mutants have shown that the effects Ds induces on the action of genetic materials located close to it are not confined to local inhibitions of genic action. Some of the mutational changes that spread some distance along the chromosome not only produce an inhibition of the action of genetic materials within the affected segment, but also give rise to a dominant effect that produces a marked distortion in the morphology of the kernel and plant. Such altered growth patterns do not appear in kernels and plants that are hemizygous for the affected segment.