

Although monosomic 9 plants cannot be used in crosses, the gene use to mark monosomic 9 plants (wx) is expressed in the pollen itself; thus if a pollen sample were collected from the plant and stained with IKI, monosomic 9 plants could be readily recognized because all pollen would stain darkly.

The advantages of this system over others currently in use are:

1. All genes on an entire chromosome are uncovered simultaneously in a monosomic plant.
2. A single tester strain is needed to make the analysis; thus a single cross and a single testcross would be needed to locate a gene to a specific chromosome.

Disadvantages of this system are:

1. Only sporophyte-expressed, recessive mutations can be mapped in this way.
2. Two generations are necessary, whereas a single generation is sufficient with TB translocations.
3. Monosomics are produced with a relatively low frequency; thus relatively large populations would be necessary from the initial cross.

I believe that the proposed system will be extremely useful in mapping certain classes of mutations.

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1. On the quaternary structure of the temperature-sensitive mutant Adh_1^{S-1108} .

Plants homozygous for the EMS induced, temperature-sensitive, alcohol dehydrogenase allele, Adh_1^{S-1108} , show a reduced level of enzyme activity, equal to about ten percent of that in sib plants which are homozygous for a fully active, normal allele. Recent studies have revealed

a striking difference in the quaternary structure of the temperature-sensitive dimer. In the normal enzyme the two subunits in the dimer are held together by hydrogen and disulfide bonds. Cleavage of the hydrogen bonds alone, by freezing in high salt, will not dissociate the dimer into monomers. Dissociation requires the simultaneous cleavage of disulfide bonds by a high concentration of B-mercaptoethanol (0.1 M BME in the dissociation medium). On the other hand, BME is not required for the monomerization of the temperature-sensitive dimer and complete dissociation occurs when the BME is omitted from the dissociation medium. This finding points to an absence of disulfide bonds between the subunits in the temperature-sensitive homodimer. The temperature-sensitive subunits which dissociated in the absence of BME are stable and readily reassociate with other ADH subunits.

Tests with heterodimers composed of one temperature-sensitive and one normal subunit have indicated that it is not the absence of the disulfide bond which is responsible for the temperature-sensitivity of the dimer. The temperature-sensitive subunit is stabilized in the heterodimer by the presence of the normal subunit. This subunit retains full activity in the heterodimer at temperatures which completely inactivate the ts homodimers. However, the heterodimer resembles the ts homodimer in that the subunits are not interconnected by disulfide bonds. The heterodimer dissociates completely when BME is omitted from the dissociation medium. Temperature-sensitive heterozygotes form normal homodimers in addition to the heterodimer and temperature-sensitive homodimer. Only the latter two enzymes dissociate when heterozygous extracts are frozen in BME-less dissociation medium. In all of this work, dissociation is determined by the elimination of ADH activity and ADH isozyme bands in starch gels after freezing, followed by the recovery of activity and formation of the appropriate heterodimers when the dissociated extracts are subjected to reassociation conditions.

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