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The detection of irreparable mutants in Neurospora

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Abstract

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The heterokaryon system used by Atwood and Mukai (1953 Proc. Natl. Acad. Sci. U. S. 39:1027) for the detection of irreparable mutants in Neurospora is open to two main criticisms: first, the heterokaryotic component in which irreparable mutants are scored carries the amycelial and methionineless genetic markers, and, second, the tests for reparability are made with medium containing sorbose. Both the genetic background and the plating environment are probably unfavorable for the detection of reparable mutants (Horowitz 1963 NN#3:5).

In an attempt to obviate these criticisms, an entirely new heterokaryon has been prepared. Both the components of the heterokaryon have been derived from the K3/17 strain of Kølmark (Kølmark and Kilbey 1962 Zeit. für Vererbungslehre 93:356). This strain carries a complex of colonial determinants and requires adenine and inositol for growth. The components of the heterokaryon are:

A	adenineless	inositolless	albino	+
B	adenineless	+	+	lysineless

The mutations involved are adenineless (ad-3A 3870l), inositolless (inos 3740l), albino (undetermined but induced with U. V.) and lysineless (undetermined but induced with X-rays). All the components of the system possess an identical colonial growth pattern.

Heterokaryotic colonies develop on Fries' minimal medium supplemented with adenine. Recessive lethal mutations are scored in the A component of the heterokaryon by the absence of albino colonies when the heterokaryotic colonies are streaked out on minimal medium supplemented with adenine and inositol. Recessive lethals can be tested for reparability by their ability to give albino colonies on complete medium. An additional feature of this heterokaryon is the facility for scoring adenine reversions along with recessive lethal mutations. This feature was included in order that certain problems of mutagen specificity might be studied.

The advantages of this system can be listed as follows: (1) Since the K3/17 strain is associated with high viability, it is unlikely that the reparable mutations will be adversely influenced by the genetic background. (2) The need for sorbose at any stage in the experiment has been eliminated. (3) In contrast to the amycelial marker, the albino marker permits scoring to be done without recourse to the microscope. (4) The technique described by Atwood and Mukai can be abbreviated since the punch tube stage in the experiment is eliminated. (5) Reversion can also be studied with this heterokaryon.

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