Horowitz, N.H. Irreparable mutants in Neurospora.

Continued interest in the problem of "indispensable" gene functions in Neurospora (Curtis, NN #2, 7) prompts the following comments. The frequency of occurrence of irreparably lethal mutations has been estimated by two methods: the temperature-mutant method (Horowitz, Adv. in Genetics 3, 33, 1950; Horowitz & Leupold, Cold Spring Harbor Symp. 16, 65, 1951) and the heterocaryon method (Atwood & Mukai, P.N.A.S. 39, 1027, 1953). As is well known, there is a large discrepancy between the two estimates, the temperature-mutant method giving the lower estimate. Atwood & Mukai explained the difference by postulating a class of genes which does not yield temperature alleles and which controls only indispensable functions. A simple calculation shows that approximately 85% of the genes of Neurospora would have to belong to this class in order to account for the discrepancy.

It has always seemed to me that a more plausible explanation exists. In the temperature-mutant experiments, the frequency of irreparable mutations was determined against a wild-type genetic background and on standard complete medium. In the heterocaryon method, however, this frequency was measured in nuclei which carried the mutants amycelial and methionineless, and counts were made on sorbose-complete. One may reasonably ask whether all mutations that are scored as reparable by the temperature-mutant method would be so scored if placed in any amycelial-methionineless background and on sorbose medium. I strongly suspect that this would not be found to be the case, but that many morphologicals and reparable auxotrophs would be registered as irreparable lethals under the conditions of the heterocaryon method. This could be tested by extracting mutants from the amycelial-methionineless background and testing them on standard (sorbose-free) complete. About half of the "irreparable lethals" should prove to be recoverable if the view expressed here is correct. ---California Institute of Technology, Pasadena, California, U.S.A.