

Altered phenotype of phen

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Abstract

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Newmeyer, D. Altered phenotype of phen.

phen (H6196) was originally reported to grow essentially like wild type on phenylalanine, and slightly more slowly on other aromatic amino acids, or leucine, or ethyl-acetoacetate (Barratt and Ogata, A. J. Bot. 41, 763 (1954)). However, several workers have noticed that isolates of this mutant often lose their ability to respond well to phenylalanine (Barratt, Perkins, Barry, St. Lawrence, and Maling, personal communications). While such isolates are still clearly mutant, being unable to grow on minimal, their occurrence presents a scoring problem in crosses in which other nutritional or slow-growing types are segregating. The following results were obtained during an attempt to solve the scoring problem. They are based on tests in 3" tubes at 25°; no quantitative tests have been done.

1. "Fast" phen isolates (the original phenotype) regularly give fair to good growth in 2 days on minimal plus phenylalanine. Growth on leucine is somewhat slower.

2. "Slow" phen isolates (the altered phenotype) give negligible growth in 2 days on minimal plus phenylalanine; fair growth may occur in 3 days but usually takes 4 to 7 days. Increasing the phenylalanine concentration from .1 to .5 mg/cc does not help. On leucine, fair to good growth usually occurs in 3 days but occasionally takes 4 to 7 days. A combination of leucine plus phenylalanine is perhaps slightly better than leucine alone. On all 3 media, the length of the lag period is quite variable in repeated tests with the same isolate. Scoring is possible (although tedious) because no slow phen has yet been found to grow on minimal in 7 days.

Preliminary tests indicate that growth of slow phen's on ethyl acetoacetate is not impaired.

3. The growth of slow phen's on glycerol complete is strongly inhibited by the addition of 1% sucrose. This inhibition is usually outgrown after a variable lag. With fast phen's, the inhibition is usually (but not always) considerably weaker. Of eight other biochemical mutants tested, none has shown such an inhibition. A series of 45 isolates from a cross of phen x arg-1, previously scored for phen by growth on phenylalanine and leucine, gave identical results when scored by sucrose inhibition.

4. Since it seemed that the delayed growth on phenylalanine might be due to inhibition by the sucrose in the medium, several isolates were tested on minimal plus phenylalanine with various carbon sources. It was found that using dextrose, or lowering the sucrose concentration to 0.25%, did not help, but that using glycerol caused a much more rapid response. The substitution of glycerol for sucrose in minimal medium reduces the growth rate slightly even for wild type; however, all slow and fast phen's tested grew at least as fast as the wild type controls on glycerol minimal plus phenylalanine.

It thus seems that the difference between fast and slow phen's may be a matter of differing sensitivity to sucrose. It is not known why this sensitivity should be more serious when the supplement is phenylalanine rather than leucine or ethylacetoacetate. The question arises whether these compounds are needed solely to combat the sucrose inhibition; preliminary tests indicate that this is not the case.

5. It has not been determined whether the change from fast phen to slow phen is due to a modifier or to a change at the phen locus itself. --Department of Biological Sciences, Stanford University, Stanford, California.