ONE-MINUTE WRITE 2/3/00

QUESTION: Succinate dehydrogenase (*sdh*) catalyzes the conversion of succinate to fumerate under aerobic conditions. Fumerate reductase (*fdr*) catalyzes the conversion of fumerate to succinate under anaerobic conditions.

Mutants defective for succinate dehydrogenase are unable to use succinate as a carbon source. It is possible to isolate suppressors of a *sdh* mutant that allow growth on succinate as a carbon source aerobically. List 6 different types of suppressors that might be obtained and describe how each suppressor would restore the *sdh*⁺ phenotype.

ANSWER: Some examples include the following:

- (i) Informational suppressor -- e.g. a <u>missense</u> suppressor tRNA which would occasionally misread the *sdh* mRNA and produce a functional protein. [Note that if you begin with one mutation, it is unlikely that you will find multiple classes of tRNA suppressors.]
- (ii) An allele specific, intragenic interaction suppressor with a mutation at a second site in the *sdh* gene that restores the structure and function of the Sdh protein.
- (iii) A <u>non</u>-allele specific, intragenic suppressor with a mutation at a second site in the *sdh* gene that increases the stability or activity of the Sdh protein.
- (iv) An allele specific, interaction suppressor in another protein that interacts with the Sdh protein that restores the structure and function of the Sdh protein.
- (v) A bypass suppressor -- e.g. a mutation that allows the *fdh* gene product to catalyze the synthesis of succinate under aerobic conditions. [Such mutations were actually found using this approach.]
- (vi) An overexpression suppressor that increases the amount of the mutant Sdh protein to sufficient levels that it allows cell growth.
- (vii) A true revertant that restores the wild-type sdh DNA sequence.