

A simple Neurospora recombination system for teaching

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Abstract

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TEACHING NOTE

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Recombination between the ad-3 and al-2 loci on Linkage Group I can be measured in random ascospore cultures by simple inspection of the culture tubes†. Each culture can be scored as parental Or recombinant merely on the basis of conidial pigmentation. The gene combinations are as follows:

<u>Genotype</u>	<u>Appearance</u>	<u>Pigments</u>
<u>ad-3</u> ⁺ , <u>al-2</u> ⁺	pink/orange	carotenoids
<u>ad-3</u> ⁺ , <u>al-2</u> ⁻	white	none
<u>ad-3</u> ⁻ , <u>al-2</u> ⁻	mauve	purple compound *
<u>ad-3</u> ⁻ , <u>al-2</u> ⁺	brown	carotenoids plus purple compound

(* a polymerized purine pathway intermediate occurring before the ad-3 block).

Several student projects are possible. Two examples are:

1. Determining if the genes are linked. The recombinant frequency (RF) is quite variable, depending on background, but its Usually between 30 and 50%. A null hypothesis of independent assortment can be tested.
2. Comparison of recombination frequency (RF) in normal and rearranged stocks. In a cross, say ad-3 x al-2, a constant al-2 strain may be crossed with a standard sequence ad-3 strain and also a rearranged ad-3 strain. I will deposit in the FGSC an ad-3 strain which reduces the RF in the ad-3 to al-2 to about 3%. Thus, a striking contrast is seen compared with the control cross. The simplest explanation is a paracentric inversion; in fact the rearrangement is probably more complex (see Griffiths et al. 1974 Can. J. Genet. Cytol. 16: 805). Astute students will note the high proportion of white ascospores in the rearrangement cross, and this in conjunction with the RF data in most cases enables the inversion to be inferred.

In these experiments each student should isolate a small number of black ascospores, establish random ascospore cultures, and pooled class data should be used for discussion. The system has the advantage that no culture manipulation is necessary to test genotypes. Students should make their own crosses so that the parental phenotypes are obvious to them (the double inoculation technique described in Newcombe and Griffiths, 1973, Neurospora Newsletter 20: 32, is recommended because of its simplicity).

†For media used see (Vogel's minimal; Westergaard and Mitchell synthetic crossing medium with adenine supplement) Neurospora Newsl. 10: 34 -35 (1966). - - - - Department of Botany, University of British Columbia, Vancouver, British Columbia, Canada V6T 2B1.