

How to establish parentage in reciprocal crosses.

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Background

Perithecial wall tissue is maternal in origin. When a protoperitheciating lawn is used as female parent, all the perithecia that appear promptly are of maternal origin. However, perithecia continue to be formed, and there is always a possibility that late-forming perithecia might have originated from the fertilizing parent. In situations where determination of parentage is critical, as when distinguishing the nuclear or mitochondrial basis of a trait or determining whether a strain is female-fertile, presence of the *per-1* mutation in one parent or the other will provide assurance regarding which strain functioned as female (protoperithecial) parent and which as male. *per-1* protoperithecia and perithecia are unable to form black pigment, and any progeny from nonblack perithecia are known to have been mothered by the *per-1* parent.

The *per-1* mutant has been used effectively to demonstrate the parentage of perithecia on opposite sides of a barrage in confrontations between strains of opposite mating type. (See Figure 37 in Perkins *et al.* 2001.)

Procedure

A strain carrying a type-1 allele of *per-1* is used as one parent. (Type 2 is more difficult to score.) Lawns of opposite mating type are fertilized reciprocally after protoperithecia are present. Color of the perithecial wall reveals which parent served as maternal parent. Regardless of which parent was maternal, half of the ascospores will be *per-1* and hence unpigmented. Special precautions must be taken if it is desired to obtain *per-1* progeny in pure culture, because *per-1* ascospores germinate without heat shock. See "*How to obtain uncontaminated progeny from crosses involving per-1*".

References

Howe, H. B., Jr., and E. W. Benson. 1974. A perithecial color mutant of *Neurospora crassa*. *Mol. Gen. Genet.* 131: 79-83.

Howe, H. B., Jr., and T. E. Johnson. 1976. Phenotypic diversity among alleles at the *per-1* locus of *Neurospora crassa*. *Genetics* 82: 595-603.

Johnson, T. E. 1978. Isolation and characterization of perithecial development mutants in *Neurospora*. *Genetics* 88: 27-47.

Perkins, D. D., A. Radford, and M. S. Sachs. 2001. *The Neurospora Compendium: Chromosomal Loci*. Academic Press, San Diego.

