

ascus mutants in N. tetrasperma.

of N. crassa described by M. Mitchell (1966 Neurospora Newsl. 10:6). Crosses in which both parents carry the round spore mutation are infertile. Each spore from a four-spored ascus germinates from two germ pores. In the infrequent case of a three-spored ascus, the exceptionally large round spore has four germ pores and presumably can germinate from all four pores. Germination from more than two pores has been observed in multi-porate spores derived from single-spored tetrasperma asci and also in the "giant" spore (gsp) mutant of N. crassa described in the note above by Leary and Srb.

Unlike the N. crassa round spore which Cameron has mapped as one of the outermost mutants in I R, segregating independently of mating type (1967 Neurospora Newsl. 11:6), N. tetrasperma round spore is in linkage group I and shows close linkage to the mating type locus (approx. 12 mop units). However, the linkage of round spore to mating type in N. tetrasperma need not be taken to mean that round spore is located closer to mating type in N. tetrasperma than in N. crassa, nor can it be assumed that more than one gene on linkage group I, when mutated, is capable of producing round spores. These reservations are based on evidence that in N. tetrasperma crossing over is greatly reduced, at least in linkage group I. Adenine purple, and several other N. tetrasperma linkage group I markers obtained in our lab, have never shown recombination with the mating type locus.

Normal N. tetrasperma spores average $16\mu \times 31\mu$ while "round" spore dimensions average $18\mu \times 21\mu$. Round spores show a slight elongation near the germ pores and the 21μ is measured along a line drawn between the two germ pores. Unlike normal spores, round spores usually do not fill the length of the ascus, yet the volume of a round spore is calculated to be about 85-90% that of a wild type spore.

An occasional non-genetic reversal of dominance occurs; that is, in a cross heterozygous for round spores, one or two asci in a given perithecium may contain four phenotypically normal spores. However, given the absence of second division segregation in such exceptional asci, each of the normal heterocaryotic spores upon germination give rise to a self-fertile mycelium which produces perithecia containing round-spored asci. Asci have never been observed to contain mixtures of round and normal spores. Thus the dominance effects are observed for the ascus as a whole and not for individual spores.

Ascus mutants: The vegetative mycelium of both the dominant and the recessive abnormal ascus mutants is colonial. The dominant ascus mutant has the effect of producing abnormal asci when crossed to a wild type parent, whereas with the recessive, only mutant x mutant crosses have an effect on the ascus. The type of ascus produced by these mutants is similar to that produced by the peak-2 (pk-2, also called bis) mutant isolated in N. crassa (Pincheira and Srb 1969 Am. J. Botany 56:846).

The dominant N. tetrasperma ascus mutant is allelic to the pk-2 N. crassa ascus mutant. Allelism could be tested for directly since the pk-2 gene has been transferred from N. crassa into N. tetrasperma. The recessive N. tetrasperma ascus mutant is not allelic with pk-2 but this is not surprising since recessive mutants affecting ascus morphology in N. crassa have been found for at least seven different loci (Srb and Basl 1969 Genet. Res. 13: 303). It is interesting to note that at present all dominant ascus mutants so far obtained in N. crassa map at the pk-2 locus.

The transfer of genes between two evolutionarily distinct species of Neurospora is a valuable tool and has led to interesting observations. One cannot accurately predict that morphological mutants - particularly those affecting the sexual reproductive apparatus - derived in a heterothallic species of Neurospora such as N. crassa will have an identical expression in a pseudohomothallic species (N. tetrasperma). The pk-2 N. crassa mutant has undergone fifteen backcrosses to the N. tetrasperma wild type parent. Although in N. crassa pk-2 has an effect on the ascus only when homozygous, in N. tetrasperma the mutant has a partial dominant effect; that is, although the asci produced in a pk-2 x wild (N. tetrasperma) cross are linear, a high frequency of them contain more than four spores. Only 1-2% of the asci in the corresponding wild type N. tetrasperma cross contain more than four spores. (DRN is supported by Grant T1 GM 1035, the research program by Grant GM 12953, National Institute of Health, USPHS) ■ ■ ■ Section of Genetics, Development and Physiology, Cornell University, Ithaca, New York 14850.