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col-3: colonial-3 is an allele of bn: button in Neurospora

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Abstract

col-3: colonial-3 is an allele of *bn*: button in Neurospora

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The mutant B40, with restricted colonial morphology, was mapped near the centromere of linkage group VII and named button (bn) (Perkins 1959 Genetics 44:1185-1208; see also Newmeyer 1957 J. Gen. Microbiol. 16:449-462). Two morphologically similar mutants, col-2 (Y5531) and col-3 (Y5296), had been described and assigned to separate loci on the basis of complementation tests by Barratt and Garnjobst (1949, Genetics 34:351-369), but col-2 and col-3 remained unmapped until 1962, when they were shown to be linked near the VII centromere (Perkins et al. 1962, Can. J. Genet. Cytol. 4:187-205). Tests for allelism with bn could not be carried out at that time because all three mutants were female-sterile and because bn, having originated in a different background, was heterokaryon-incompatible with strains of the other two mutants that were then available.

Allelism tests have now been carried out. bn recombines to produce wild-type progeny and complements to form wild-type heterokaryons with col-2, but not with col-3.

Intercrosses were carried out using phenotypically wild-type heterokaryons constructed by combining each colonial with inactive mating type strain a^m1 ad-3B cyh-1 of Griffiths and DeLange as helper (FGSC No. 4564), as described by Perkins (1984, NN 31:41-42). Both col-2 and col-3 originated in strains genetically unlike the Oak Ridge strains from which the helper strain was derived. It was therefore necessary to derive heterokaryon-compatible colonial stocks by successive backcrosses to Oak Ridge wild types. When colonial isolates were obtained that were fully heterokaryon-compatible with the a^m1 helper, it followed that they must also be heterokaryon-compatible with one another, and the stage was set for testing complementation in heterokaryons. The a^m1 helper component of the heterokaryon does not participate in fertilization or production of progeny. Crosses between helper heterokaryons thus behave genetically as though the a^m1 component did not exist, and the crosses that follow only the active components are shown, which functioned as parents.

Helper-aided crosses of col-3(Y5296) x col-2 and bn(B40) x col-2 are equally fertile, producing perithecia with beaks from which ascospores are ejected. Mass platings of ascospores from bn x col-2 produced many colonies with wild-type morphology. Two phenotypically wild progeny from among 19 random ascospores from bn x col-2 were progeny tested and shown to be true crossovers, not pseudowild types.

Crosses of col-3 and col-3 (both as heterokaryons with the helper) quickly produce many perithecia, but these fail to mature or produce normal beaks, and ascospores are not produced. Crosses of col-3 x bn are also infertile, with exactly the same behavior

Heterokaryon tests between the different colonial mutants were carried out on slants in 15 cm tubes, inoculating by needle so as to superimpose small fragments of the strains being tested. The combinations bn + col-2 and col-2 + col-3 grew out promptly, filled the slant, and conidiated like wild-type, while bn + col-3 remained colonial. I conclude that bn(B40) and col-3(Y5296) are alleles.

The name bn: button has priority, since B40 was mapped several years earlier than Y5296. According to nomenclature conventions (Barratt et al. 1965, NN 8:23-24), col-3 therefore becomes an inactive synonym of bn, and col-3 (Y5296) should henceforth be called bn.

Heterokaryons of these slow-growing colonial mutants with the inactive-mating-type helper are useful both because they enable the mutant to be used as a female parent and because they greatly facilitate stock preservation. Heterokaryons of col-2 and of bn with the a^m1 helper have been deposited with the Fungal Genetics Stock Center. -- Dept. of Biological Sciences, Stanford University, Stanford, California 94305.