Asci of bis X bis crosses for chromosome cytology

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Abstract

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Perkins, D.D. Asci of _bis_ X _bis_
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In perithecia of crosses homozygous for the group-V morphological mutant _bis_: biscuit (B6), developing asci become greatly swollen, and early in growth assume the shape of pears or balloons. In squashes of _bis_ X bis material, asci at pachytene and later stages are easily ruptured, and nuclei from the ruptured asci are greatly flattened merely by the pressure of a coverglass, so as to give workable figures and well spread chromosomes far more frequently than are ordinarily obtained using the same procedures with standard materials. (Paraphysoid cells are also swollen in crosses homozygous for _bis._)

Chromosome behavior appears to be normal in Prophase I of B6 X B6 crosses, and pairing was normal at the most fully extended pachytene stage in one nucleus where all seven bivalents could be traced. Ascospores are not linearly arranged in maturing asci, however, and spore formation is frequently irregular and abnormal. Eight-spored asci are most frequent, but asci are found with four spores, with odd numbers less than eight, and occasionally with more than eight spores. Ascospore size varies. Giants and dwarfs are found. In some asci, nuclear material remains outside the spore walls.

These observations were made with two B6 strains of 74A background, Fungal Genetics Stock Center numbers 277 and 278. Observations are now being extended to homozygous crosses and intercrosses involving all available presumed bis alleles, including B6, B12, D12, B30, D312, C-1670 and C-1810-1, and to B6 X wild. (In crosses heterozygous for B6, asci are presumably normal. B6 has been widely used as a marker for investigating linkage and crossing over, with no evidence of aberrant behavior.)

J.C. Murray (1960. Cornell Ph.D. thesis) and Murray and Srb (1962. Canad. J. Bot.) have reported that mature asci are non-linear in crosses that are homozygous for the group V mutants C-1810-1 or C-1670, called _pk-1_: peak-1 and _pk-2._ Intercrosses between C-1810-1 and _bis_ (B6) indicate that the two are allelic (no wild-type recombinants were observed among 8181 segregants by W.N. Strickland, unpublished). Murray and Srb do not mention any irregularities other than the absence of linearity.

In homothallic fungi, a homozygous effect on ascus morphology would immediately be apparent in every selfed perithecium. Mutants have been reported in the homothallic Sordaria macrospora that resemble bis in their effect on ascus development. (Heslot 1958. Rev. Cytol. et Biol. Veg.; Esser and Straub 1958. Zeits. Vererb.) Possibly these, like _bis_, may prove favorable for chromosome cytology. In heterothallic

fungi a special effort must be made to determine recessive homozygous effects on ascus development. Most of the known morphological mutants in Neurospora have never been examined in this respect. Some of them might well prove to have favorable cytological effects. Our prior knowledge of the observations of Murray and Srb made <u>bis</u> a natural first choice in the search for strains that would be technically superior for the observation of meiotic prophase chromosomes. ---Department of Biological Sciences, Stanford University, Stanford, California.