Fungal Genetics Reports

Volume 11 Article 22

Ascospore arrangements in the aberrant asci of a Neurospora crassa mutant

R. L. Phillips

A. M. Srb

Recommended Citation

Phillips, R. L., and A.M. Srb (1967) "Ascospore arrangements in the aberrant asci of a Neurospora crassa mutant," *Fungal Genetics Reports*: Vol. 11, Article 22. https://doi.org/10.4148/1941-4765.1987

Ascospore arrangements in the aberrant asci of a Neurospora crassa mutant

Abstract

Ascospore arrangements in aberrant asci of *N. crassa* mutant

Phillips, R. L. and A. M. Srb. Ascospore arrangements in the aberrant asci of a Neurospora crassa mutant.

Murray and Srb (1962 Can. J. Bot. 40: 337) described the morphology of the aberrant asci produced by the peak-2 mutant when selfed. The peak ascus measures approximately 105-115μ long x 24-29μ wide compared with 176μ x 15μ for wild type asci (Personal communication: G. Pinchaim, Cornell Univ.). The spindles of the second meiotic division in an aberrant ascus are obliquely oriented and sometimes overlapped such that the four resultant nuclei occur in various arrangements within the ascus instead of in a linear sequence. The purpose of this study was to ascertain the degree of consistency of spore arrangement by genotype in the peak ascus.

A new mutant strain was utilized which produced colorless ascospores when selfed. Crosses with wild type show a simple segregation of spore color. The mutation was found following treatment of the St. Lawrence standard wild type strain 74A with dimethyl

sulfate. Genetic and biochemical studies of this mutant are currently in progress. The double mutant of the colorless ascospore and peak-2 markers was obtained and crossed with peak-2 *a* and the St. Lawrence standard wild type strain 77*a*. This permits the comparison of first- and second-division segregation frequencies for the colorless ascospore marker in crosses giving aberrant, versus those giving linear, asci.

Camera lucida drawings were made of 128 aberrant asci segregating for the colorless ascospore marker. The classes to which the asci were assigned and the frequencies obtained are: (1) distinct first-division segregation, 26; (2) distinct second-division segregation, 29; (3) most likely first-division segregation, 10; (4) most likely second-division segregation, 33; and (5) impossible to classify as first- or second-division segregation, 30.

These data indicate that the segregation pattern can be distinguished with absolute certainty in 43% and with a high degree of certainty in an additional 34% of the aberrant asci. The frequency of second-division segregation in the aberrant asci was 53% (based only on classes 1 and 2). It was apparent, from studying the drawings, that a slight departure from the distinct first-division segregation pattern resulted in an ascospore arrangement that was difficult to classify. However, a slight departure from the distinct second-division segregation pattern usually remained recognizable as a second-division segregation pattern. This aspect biases the frequency of class 3 downwards and the frequency of class 5 upwards.

The cross of the colorless ascospore and peak-2 double mutant strain with the wild type strain yielded 149 first-division segregation patterns and 221 second-division segregation patterns. Therefore, the second-division segregation frequency in linear asci was 60%. This value compared favorably with the frequency of second-division obtained in aberrant asci (53%) although the following factors concerning the observed frequency of second-division segregation in the aberrant asci may make such a comparison invalid: (1) the frequency would be increased by overlapping second-division spindles; and (2) the frequency would be decreased if a greater proportion of asci with first-division segregation than with second-division segregation remained in a distinct pattern after the third division.

It is concluded that the ascospores in an aberrant ascus are highly ordered in approximately 77% of the asci and that a reliable estimate of the gene-centromere distance was obtained for the colorless ascospore marker utilized.

Research supported by Grants TIGM 1035 and 12953 from the National Institute of General Medical Sciences, U. S. Public Health Service. - - - Genetics, Development and Physiology Section of Cornell University, Ithaca, New York 14850.