Ultrastructural studies of microconidium formation

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Abstract
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The frequency of multinucleate conidia in microconidiating strains of N. crassa was determined by means of a technique employing forced heterocaryons. The strains used were of the following genotypes: ad-3A; pe, fl (38701; Y8743m, L) and lys-3; pe, fl (4545; Y8743m, L).

Heterocaryons were formed by placing drops of a mixed microconidial suspension on plates of minimal medium. The heterocaryons formed on the plates were transferred to minimal agar slants and incubated. Microconidial suspensions from three independent heterocaryons were analyzed. Each was filtered through Nitex 53 mesh and glass wool to remove conidial clumps and mycelial fragments. Aliquots of the filtered suspension were plated on minimal, adenine-supplemented, and lysine-supplemented medium. From the plate counts and by application of the binomial theorem the frequency of multinucleate conidia was determined (Table). To simplify the calculations, all multinucleate microconidios were considered binucleate. The frequency of multinucleate microconidia varied little over a wide range of nuclear ratios. These percentages probably represent the upper limits of multinucleate microconidial frequencies since an undetermined fraction of the wild type colonies formed may have had their origin as multinucleate mycelial fragments or as newly-formed heterocaryons. The percentages of multinucleate microconidia obtained were less than 0.1% in all cases, and therefore somewhat lower than those reported by Barrett and Garnjobst (1949 Genetics 34: 351).

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Lowry, R. J., T. L. Durkee and A. S. Sussman. Ultrastructural study of microconidium formation.

and show a much more extensive system of rough endoplasmic reticulum than do young vegetative hyphoe. A bulge in the hyphoe presages the start of microconidium formation, followed by the rupture of the outermost wall layers. A thick collar forms around the protruding microconidiophore due to extensive thickening of the inner wall layer of the parent hyphoe. At this stage the cytoplasm of the developing microconidiophore is still continuous with that of the hyphal cell from which it arises and is contained by a wall which is derived from the thickened collar. The microconidium is finally isolated from the cytoplasm of the microconidiophore by a centripetal extension of its wall, the material of which seems to be derived from the collar.

The present data suggest that microconidia differ from macroconidia in their smaller size, denser array of ribosomes, more extensive endoplasmic reticulum, more conspicuously layered wall, fewer mitochondria, and single nucleus. These results confirm and extend those of Dodge (1932 Bull. Torrey Botan. Club 59: 347) and Moreau and Moreau (1939 Bull. Soc. Botan. France 86: 12) whose observations with the light microscope were the principal sources of information on the subject. Department of Botany, University of Michigan, Ann Arbor, Michigan 48104.


When N. crassa, strain 69-l 113A, is grown in standing culture on liquid & medium at 24°C, the accumulation of trehalose in the vegetative mycelium begins during the second day. Rapid accumulation of this sugar follows, attaining a maximum on the third day. Conidiation begins during the third day, following which occurs. That this is closely related to conidiation normaly occurs in other strains. Moreover, trehalose levels in the conidia are much higher than those found in the vegetative mycelium as observed separately from the mycelium.

The trehalose activity per unit dry weight of the vegetative mycelium of strain 69-l 113A when grown under standard conditions remains low for three days. Beginning with the fourth day, it increases rapidly until the tenth day of growth. Concomitant with