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Growth of conidia of adenine-dependent mutants of Neurospora crassa

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Abstract

Growth of conidia of adenine-dependent mutants

Meaden, R.A. and A.M. Wellman. Growth of conidia of adenine dependent mutants of Neurospora crassa.

The ad-3 mutants ad-3A, nit-2 (38701, 43002) A (FGSC #142) and ad-3B, thi-1, al-2 (35203, 56501, 15300) a (FGSC x259) and the ad-8 mutants ad-8, ylo-1 (E6, Y30539y) A FGSC#448) and ad-8, ylo-1 (E6, Y30539y) a (FGSC#449) differ in their ability to germinate on adenine-deficient medium. Spores were germinated on Fries' minimal medium which was slightly modified in that a vitamin solution was used instead of biotin alone. Germination of washed macroconidia of ad-38. thi-1, al-2 on adenine-deficient medium reacher 65-75% after 6 hours incubation at 30°C. The rate of germination is not different from that on adenine-supplemented medium but there is a l-2 hour log phase on odenine-deficient medium which is not apparent on supplemented media. Narrower diameter germ tubes are formed than on supplemented media. These may reach lengths varying between 10 and 400 μ after 24 hours' incubation. Thus a certain amount of growth, accompanied by nuclear division, occurs. (Number of nuclei is correlated with increase in germ tube length.) The germination of washed macroconidia of ad-8, ylo-1 on adenine-deficient medium was much lower, about 15% after 6 hours'incubation at 30°C; no further germination occurred after 24 hours' incubation and the narrow germ tubes were very short. Some nuclear divisions occurred.

A possible explanation for the differences in germination on odenine-deficient medium is that stock cultures of ad-3B, thi-1, al-2 maintained on supplemented media, that is, supplied with adenine, may store ATP and various imidazole compounds, as well as hypoxanthine and xanthine by a reversal of the adenine synthesis pathway, since these occur in the pathway after the ad-3 blockage. These compounds may be used to synthesize adenine when the spores are placed on odenine-deficient medium. Whereas od-8, ylo-1 mutants supplied with adenine may only store ATP and adenylosuccinic acid ribotide, and this moy be insufficient to support extensive growth of the germ tubes.

After transfer of conidia of ad-3B, thi-1, al-2 and ad-8, ylo-1, which hod been incubated on the surface of sterilized 1 cm sq dialyzing membrane on adenine-deficient medium for 24 hours, to adenine-supplemented medium, swelling of the hyphal tips

occurred in those spores which had germinated. Three hours later further growth of the germ tube beyond the point of swelling war observed. The width of this portion of the germ tube was greater than that formed on adenine-deficient medium and was equivalent to germ tube width of spores grown under optimal conditions. Ungerminated spores began to germinate and many of these showed some welling prior to germination. Swelling was not observed in the hyphal tips of wild type spores germinated on adenine-deficient medium and then transferred to adenine-supplemented medium. The relationship between adenine uptake and synthesis and growth and nuclear division is being investigated further. - - - Botany Deportment, University of Western Ontario, London, Ontario, Canada.