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Conidial germination in scon^{c}

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Abstract

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Conidial germination in $scon^{c}$.

Developmental mutants that affect conidial germination con be placed in two major classes. The first class includes those mutations that have a defect in the de novo synthesis during conidial germination of some gene product that is specifically necessary far germination. The second class includes those mutation; that produce defective conidio during conidiotion. These could be of two types: either a gene product necessary for germination is not incorporated into the conidio, or a product is incorporated which is detrimental to germination. These mutants can also be classified as either phase-specific or phase-critical. "Phase specific" mutations are those that affect gene products that are used only in one phase of the life cycle. "Phase critical" mutations are those that affect products needed for many phases but which are more crucial to a particular phase.

The *scon*^{c} strain contains a regulatory mutation which results in the constitutive production of the enzymes of sulfur metabolism. It was also reported that *scon*^{c} could not be recovered efficiently from heterocaryons and that ascospores containing this mutation germinated poorly (Burton and Metzenberg 1972 J. Bacteriol. 109: 140). These observations indicate that the *scon*^{c} strain has a defect in spore germination, in addition to its metabolic effects during the vegetative phase. This report gives the details of additional studies on conidiol germination in this strain.

In these studies, the *scon*^{c} strain grew as fast as a wild-type strain, RL3-8A, on minimal glucose agar and conidiated abundantly. The conidia produced by this strain had "normal" morphology, but germination was defective. On sorbose plates, only 2 to 8% of the conidio that were plated from the *scon*^{c} strain formed colonies. The colony forming efficiency of conidio from the wild-type strain was greater than 50% under the some conditions. In liquid shake cultures (Fig. 1), the germination and growth of the *scon*^{c} strain lagged considerably behind that of the wild-type strain. Thus, the only phase of the asexual cycle that was morphologically defective was conidiol germination. In a developmental sense, the *scon*^{c} strain contains a phase-critical mutation.

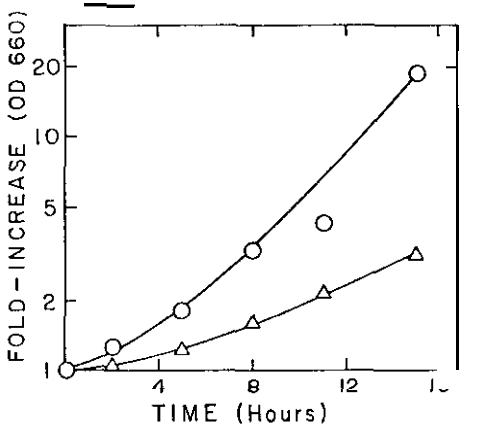
The apparent reason for the defective conidiol germination in *scon*^{c} strain is that it forms osmotically fragile conidio. A large amount of UV-absorbing material was released when conidio from *scon*^{c} were suspended in water (Table 1). In addition, the total amino acid pool dropped from 500 μmoles/g residual dry weight in the dry-harvested conidia of the mutant strain to 95 μmoles/g in water-washed conidio. Conidia from the wild-type strain lost much less UV-absorbing material (Table 1) and essentially none of its amino acid pool when suspended in water. Sucrose, 20%, prevented the loss of UV-absorbing material from the mutant strain (Table 1). In addition, the colony forming ability of conidio from the *scon*^{c} strain was improved 4-fold when the conidia were suspended in sucrose rather than water.

Table 1. Release of UV-absorbing material from conidio of *scon*^{c} and wild type RL3-8A.

Strain	Suspending medium[a]	OD 260nm/ml/mg
scon^c	water	1.715
	20% sucrose	0.344
RL3-8A	water	0.190
	20% sucrose	0.289

[a] about 15 mg of conidio were shaken vigorously in 5 ml of suspension medium at 23°C for 5 min. The conidio were removed by filtration on Millipore filters and optical density was measured.

Figure 1. Germination of conidia from the wild type and *scon*^{c} strains



Growth was determined in shake cultures (Vogel's minimal medium with 2% glucose) at 23°C by measuring the optical density at 660 nm. The initial optical density for wild-type conidia was 0.061 and for *scon*^{c} was 0.100. The symbols are: o—o wild type; Δ—Δ *scon*^{c}.

Conidial germination in *scon*^{c} apparently was defective because the conidio lost a large proportion of their cytoplasmic material when suspended in water. Thus, the *scon*^{c} strain has a defect in germination because it produces defective conidia, and not because of a defect in de novo synthesis of a germination-specific product. It is not clear what relationship exists between spore formation and the *constitutive* sulfur enzyme production. Of the many possibilities, perhaps, excess *sulfhydryl* production during conidiation alters the structure of the plasma membrane to such an extent that it becomes osmotically fragile.

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