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Serine-induced formation of aerial hyphae and conidia

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Serine-induced formation of aerial hyphae and conidia

Abstract

Serine-induced formation of aerial hyphae and conidia

Louie, S., A. Chan and G. Sojka. Serine-induced formation of oeriol hyphae and conidia by a Neurospora mutant.

ser-2 (isolate #65004) is a very "leaky" serine brodytroph. It grows rapidly on minimal medium but does not form abundant oeriol hyphoe or pigmented conidio unless supplemented with L-swine. It also responds to glycine, but no other amino acid, or intermediate in the serine biosynthetic pathway, con substitute for serine. The addition of swine to cultures growing on solid media causes the mutant to form aerial hyphoe and pigmented conidio at approximately the some rate as do wild type strains on minimal medio. This property was examined by comparing growth rates of ssr-2 and a wild type strain (STA4), employing a variety of growth parameters.

Figure 1 shows the results of on experiment designed to compare the rate of hyphal elongation on solid Vogel's minimal medium (2% sucrose as carbon source). This method ignores penetration of hyphae into the agar and oeriol hypha formation (Zolokar 1959 Am. J. Botany 46:555). Under these conditions STA4 and ser-2 show identical growth rates in the absence of serine.

When these strains ore grown in Vogel's minimal liquid medium with vigorous agitation, dry weight increases logarithmically for at least 24 hours (luck 1963 J. Cell Biol. 16:483). Formation of oeriol hyphoe and conidio is minimized in submerged culture, yet Figure 2 (which is representative of many such experiments) indicates thot ser-2 grows more slowly thon does STA4 under these conditions.

Growth in stationary liquid culture is essentially unrestricted and 3-dimensional (Marshall ond Alexander 1960 J. Bacteriol. 80:412) and can best be expressed as the cube root of the increase in dry weight (Emerson 1950 J. Bacteriol. 60:221). After approximately two doys of incubation, wild type organisms begin to form oeriol hyphoe above the mycelial mot. The appearance of these structures is delayed at least one week in ser-2. The defect con be completely overcome by addition of 0.1 M L-serine to the growth medium. From Figure 3 it con be seen that ser-2 and STA4 on minimal and serine-supplemented msdio hove-- lo, growth rates for approximately 2 doys, while the mycelial mot is being formed across the surface of the liquid. The failure of ser-2 cultures on minimal medium to form aerial hyphae results

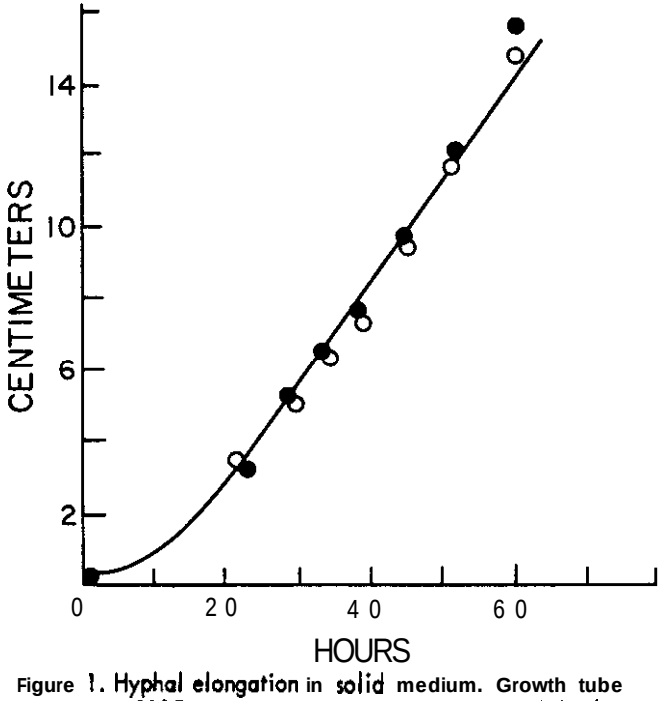

Figure 1. Hyphal elongation in solid medium. Growth tube culture at 30°C in constant darkness on Vogel's minimal medium. (STA4 open circles; ser-2 darkened circles).

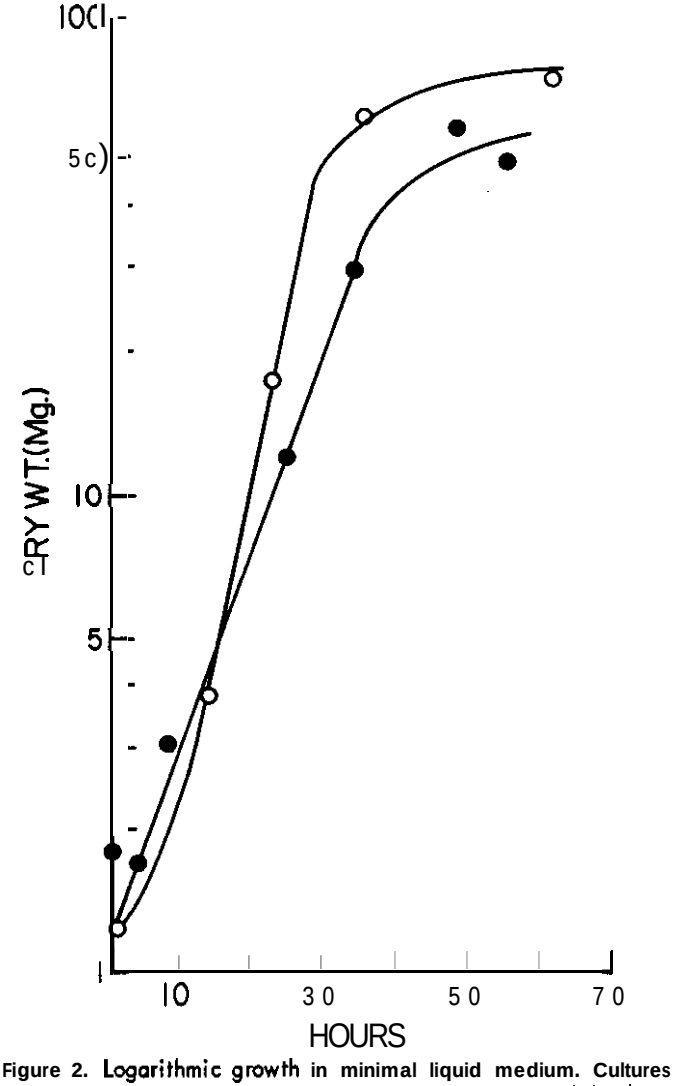

Figure 2. Logarithmic growth in minimal liquid medium. Cultures grown at 30°C in constant darkness. 30 ml. Vogel's minimal medium in 125 ml. Ehrlenmeyer flasks agitated at 150 rpm.

in a premature cessation of "cube root growth".

We feel *that* these data *suggest that* rer-2 is a biochemical-developmental mutant which requires additional serine only for the production of aerial hyphoe and pigmented conidia. This mutant is obviously able to synthesize sufficient serine to support *normal* growth of the basal mycelial mat. The conidia formed on ser-2 (either by supplementation with serine or prolonged incubation) appear to be similar to those of the wild typ in size, shape and carotenoid pigment content. - - -

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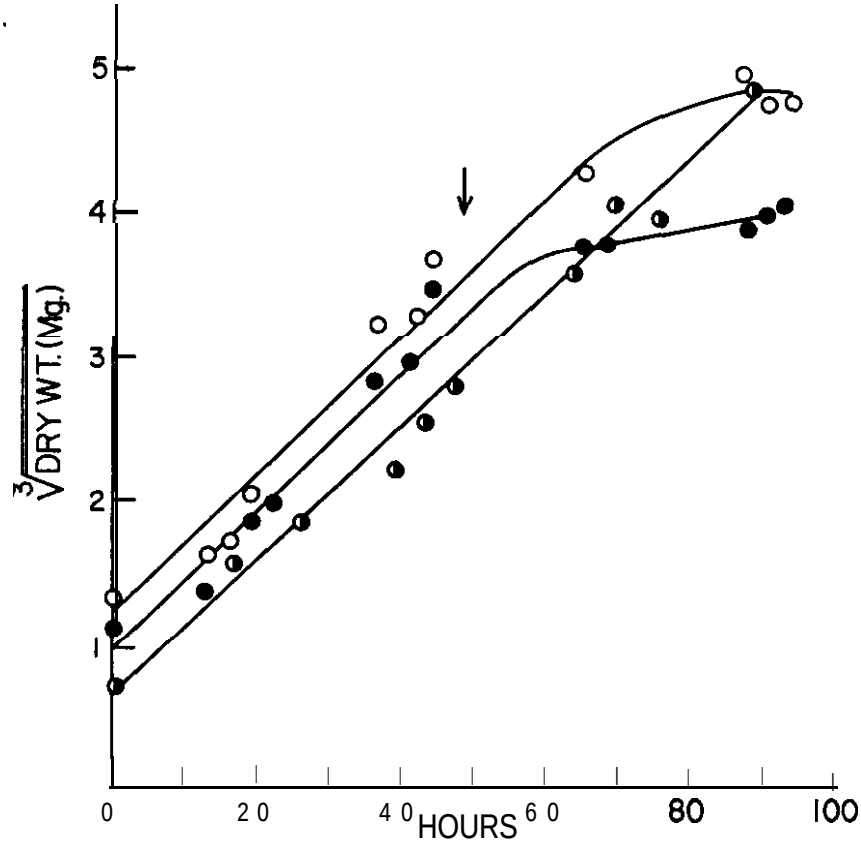

Figure 3. "Cube root growth" in stationary liquid cultures. 125 ml *Ehrlenmeyer flasks* containing 25 ml of liquid medium were incubated at 30°C. The results of the experiment were not affected qualitatively by a wide range of inoculum sizes of filtered conidia. (STA4 on minimal medium, open circles; ser-2 on minimal medium, darkened circler; ser-2 on 0. 1M L-serine-supplemented medium, half-darkened circler).