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## Giant spore, a new developmental mutant of *N. crassa*

### Abstract

Giant spore, a new developmental mutant of *N. crassa*

Leary, J.V. and A.M. Srb. Giant spore,  
a new developmental mutant of N. crassa.

turned out to be a double mutant, inasmuch as by recombination the alteration in spore size could be obtained independent of colonial morphology. Further genetic analysis of the mutant ascospore attribute, designated "giant spore" (grp), revealed that it segregates as a single gene difference. Linkage data indicate that grp is situated on the left arm of linkage group I. Although a polygenic system controlling ascospore size has been reported for linkage group I by Lee and Pateman (1961 *Heredity* 14: 223 ), the characteristics of gsp appear to be distinct from those of the strain described by these workers.

With reference to phenotypic expression, gsp behaves as a zygote recessive; i.e., asci produced by +/gsp zygotes have the normal 8 spores while asci produced by gsp/gsp zygotes include giant spores. The phenotypic expression of gsp/gsp is variable. Perithecia resulting from the appropriate cross produce some asci containing 8 normal-sized spores, asci containing both normal-sized spores and one or more large spores, and asci containing a single giant spore, approximately the size of the ascus. The ratio of normal to abnormal asci from one perithecium to another appears to be irregular, even in the same crossing tube.

Cytological investigation of gsp/gsp asci suggests that the variant phenotype is accounted for by disruption of the normal timing of nuclear divisions vis-a-vis the initiation of ascospore wall formation. Mature mutant asci seem always to include the normal number of 16 nuclei, but spore walls may be formed when only 2 or 4 rather than 8 nuclei are present.

In the course of a mutation run utilizing N-methyl-N'-nitro-N-nitrosoguanidine to induce colonial mutants of N. crassa, a colonial isolate was obtained that produced giant ascospores when colonials of opposite mating type were crossed. The original isolate

Also, in **asci** where the first mitosis **has** been completed but **nuclear migration has** not, examples of prematurely forming spore **walls** have been observed. At least in the **case** of the largest giant spores, which **are approximately whole-ascus size and** include the **total of the nuclear** complement, the system **that** designates the **outline** of spores **seems either to be at the cell mem-**brane or is being substituted for by the membrane or something **associated** with it. This hypothesis **is** based on **observations** of **asci that are double mutant for giant spore and for peak (also called biscuit).** Typical **peak asci** are balloon- or pew-shaped structures that include **8 normal ascospores.** In the double **mutants,** the **giant** spores are **pear or balloon-shaped,** the **wall** following essentially the outline of the ascus itself.

Initial **data** from experiments designed to study the **effects** of different environmental conditions on spore production in **gsp/gsp** crosses indicate that the **mutant** is much more sensitive both to **elevated** temperature (**31°C**) and to **sorbose supple-**mentation of the medium than is the **+/+** cross. **In addition, gsp/gsp** crosses on Wertergoord-Mitchell crossing medium produce a significantly **greater** number of giant **spores** than is **produced by** similar crosses on corn meal agar. (JVL is on NIH **Postdoctoral** Fellow and previously has been supported as a postdoctoral trainee by Grant T1 GM 1035; the research **program** is supported by Grant GM 12953, National Institutes of Health, **USPHS**) - Section of Genetics, Development and Physiology, Cornell University, **Ithaca, New York 14850.**