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DE BARY BUBBLES IN ASCOSPORES OF SORDARIA FIMICOLA

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At the request of Dr. B. O. Dodge, whose recent paper on this subject appeared in this journal (1957). I have applied to *Sordaria fimicola* his technique for producing de Bary bubbles in ascospores and am submitting this note containing my observations on these structures.

When Shear's Mounting Fluid (SMF) is added to clusters of mature asci of *S. fimicola,* de Bary bubbles appear very readily in the ascospores, as described by Dodge for other ascomycetes. These bubbles reach full size within about a minute after SMF is added, at which time they generally extend across the breadth of the spore, bounded by the inner walls. A single bubble appears in each spore. Spores dried in the air very quickly develop similar bodies. These bubbles undoubtedly add to the buoyancy of the spores as they are discharged from the asci. When spores dried in air or treated with SMF are returned to water, the bubbles disappear in a minute or so. If the spores are again transferred to SMF the bubbles reappear.

The components of the mounting fluid (glycerine, alcohol, potassium acetate in aqueous solution) either do not enter the spores or do so in non-toxic concentrations, for spores transferred to water and then to agar after several minutes in SMF germinate readily.

When hybrid asci containing four gray and four wild-type ascospores are placed in SMF, de Bary bubbles appear only in the wild-type spores, while the gray spores collapse (fig. 1). The latter, which normally germinate somewhat earlier than wild-type spores, probably have less resistant walls. Immature spores, like the gray ones, fail to form de Bary bubbles.

There has been some question among observers as to the nature of these structures within treated spores. Since the present experiments have shown them to be decidedly of a gaseous nature, I have not hesistated to call them bubbles. They have the characteristic dark periphery and light center. But even more convincing is the fact that when pressure is firmly applied to the cover slip so as to crack the spore walls, the bubbles may be forced out into the mounting fluid where they disappear at different rates, some within a few seconds after being pressed out, the majority within a minute. Some larger ones formed by coalescence gradually diminish and disappear after several minutes. If the spore wall is cracked gently so as to retain the bubble within the spore, the bubble disappears rather rapidly *in situ.*

Some spore clusters were transferred from SMF to mineral oil and ma-

chine oil, respectively, and when the bubbles were pressed out of these spores thy behaved in much the same manner as in SMF.

If pressure is applied to the spores in SMF in such a way as to temporarily compress but not crack the walls, the bubbles disappear but do not pass out of the spores. When the pressure is suddenly released the

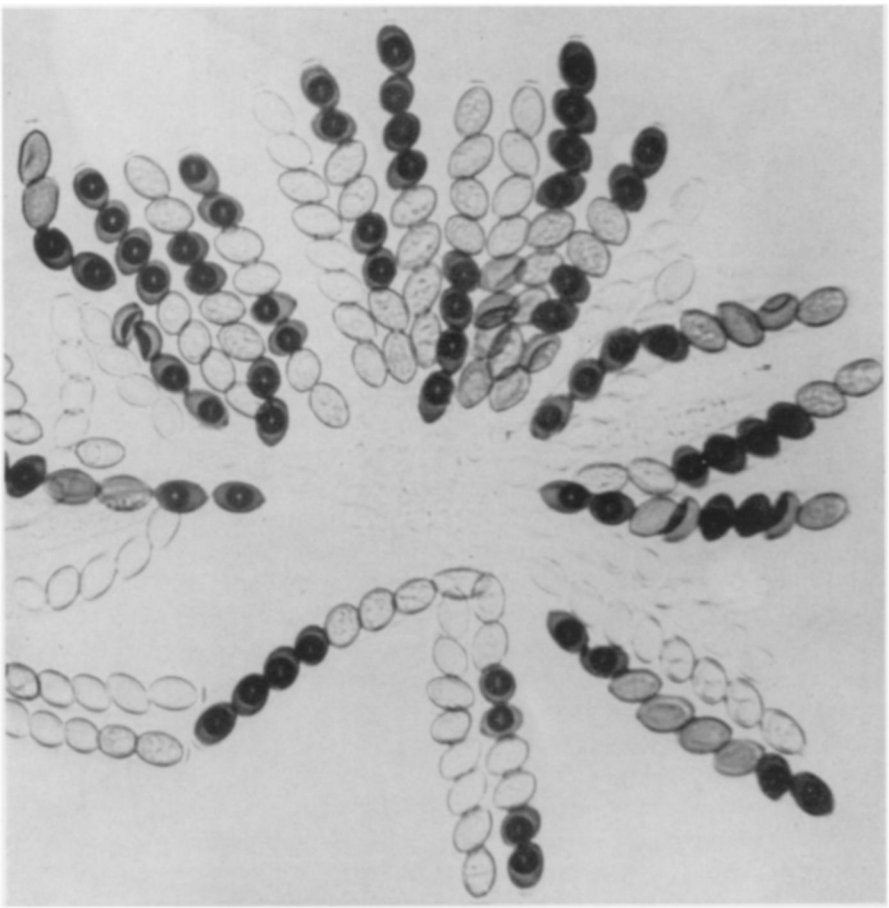

FIG. 1. Hybrid asci from cross of gray-spored mutant with wild-type after transfer to Shear's Mounting Fluid. Note collapsed walls of gray spores and de Bary bubbles in wild-type spores.

spore walls quickly expand back to their normal position and the bubble in each spore simultaneously reappears. Therefore, in view of the collapsing of the gray spores and the behavior of the bubbles within the wild-type spores, it would appear that SMF (or air-drying) causes a rapid extraction of water from the spores, tending to create a vacuum, and that the de Bary

bubbles probably represent partial vacuums containing expanded gases. C. T. Ingold (1956) has suggested that the gas may be water vapor. I should think that other gases, particularly carbon dioxide, might also be present. However, it is not within the scope of this brief study to make a detailed analysis of the composition of de Bary bubbles.

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