

Intrayeast Hyphae in *Paracoccidioides brasiliensis*

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The occurrence of a live hypha inside a dead yeast during the transformation from yeast to mycelium of *Paracoccidioides brasiliensis* is described.

The process by which live hyphae penetrate inside a dead hypha and subsequently grow within it has been called intrahyphal hyphae (2), self-parasitism (3), or self-penetration (4). This process, however, is not frequently observed in yeasts.

This report deals with some intrayeast hyphae which were observed when the transformation of *Paracoccidioides brasiliensis*, from the yeast form to the mycelium stage, was studied with an electron microscope.

Yeast were inoculated into a GGY medium (glycine, 1%; glucose, 2%; yeast extract, 0.2%; adjusted to pH 7.2 to 7.4 with KOH) and were grown at room temperature (23 to 24 C) in 500-ml Erlenmeyer flasks which were placed in a reciprocal shaker. Material harvested after 36 hr was prefixed in glutaraldehyde, fixed in osmium tetroxide, and embedded in Maraglas.

The yeasts were identified by their size and by the increased electron density of the cell wall at the site of budding (1), which is typical of yeasts.

Within the yeast, there was an oval or elongated structure (Fig. 1 and 2) having the cell wall and shape characteristic of a hypha. Glycogen, cytoplasmic membrane, vacuoles, some endoplasmic reticulum, ghost mitochondria, and fragmentation of the cytoplasmic membrane were also observed. This latter structure resembled the one found previously in the intrahyphal hyphae of a dead hypha (2). The hypha inside the dead yeast had the same characteristics as live hyphae: well-delimited nucleus, intracytoplasmic membrane

systems, cytoplasmic organelles, and a higher electron-dense background than the yeast (2).

Lowry and Sussman (5) suggested that intrahyphal hyphae are probably induced by a wound or by intoxication, with subsequent death of the hyphae. The fact that in this study the yeast died when it changed to the mycelium stage (because of adverse conditions) suggests that breakage of the yeast could be the main factor that elicits the formation of these structures. However, the mechanism by which the live hypha is attracted towards the dead yeast (or vice versa) remains obscure. A common feature of the intrahyphal hyphae and intrayeast hyphae is that the dead organism (yeast or hypha) has inside of it a live one, hypha(e). A structure that could be named intrayeast yeast, a live yeast inside a dead one, has not been described until now.

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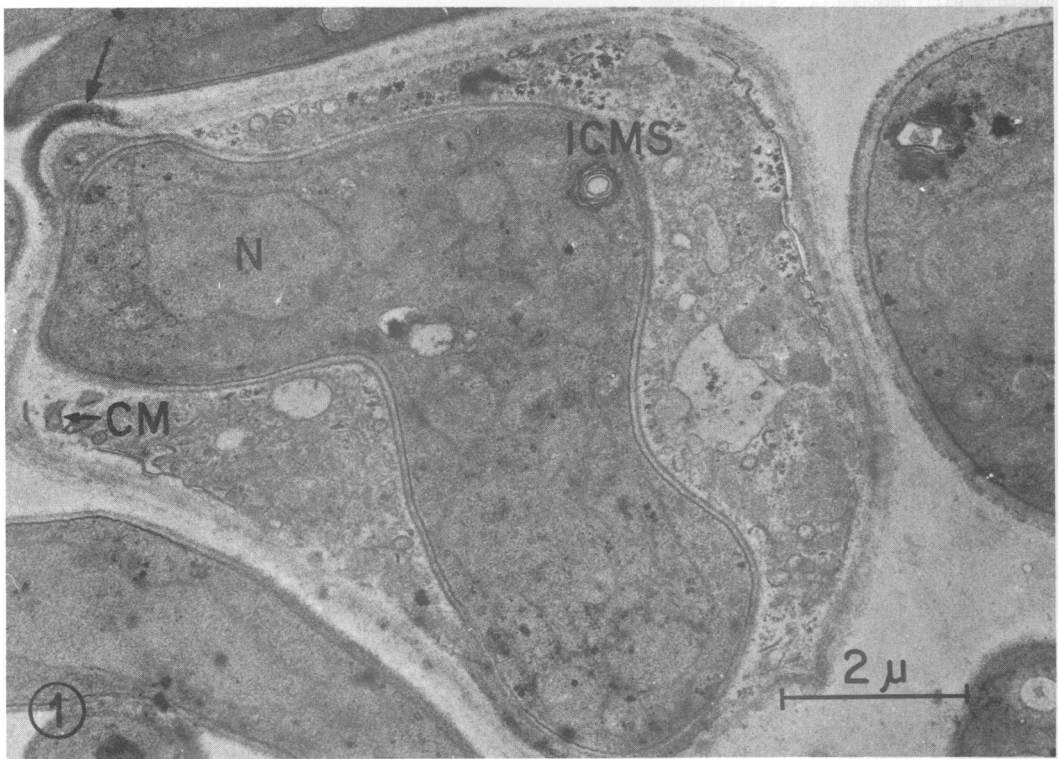


FIG. 1. Longitudinal section of a live hypha, inside a dead yeast, which shows the beginning of a bud (arrow) and fragmentation of the cytoplasmic membrane. N, nucleus; ICMS, intracytoplasmic membrane system. $\times 12,300$.
 FIG. 2. Transverse section of a live hypha, with mitochondria (m), inside a dead yeast. It is difficult to recognize the cytoplasmic organelles of the yeast. Note the normal hyphae outside the yeast form. $\times 11,100$.