STUDIES OF AUTOLYTIC ENZYMES 
IN FUNGI 

based on works by 

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All fungi produce enzymes capable of autolysing their own walls. These enzymes tend to accumulate in mycelium and medium during long-term growth of the fungus. Although they break down the walls of the older mycelium, there is no clear evidence that the products are re-cycled as nutrients for the fungus (cf. Gooday et al., this Volume).

Here follow two studies on the production and action of autolytic chitinase and β-N-acetylglucosaminidase during submerged culture of an Aspergillus and a Penicillium species.

DEGRADATION OF CELL WALL CHITIN FROM THE FUNGUS ASPERGILLUS NIDULANS DURING AUTOLYSIS 

(F. Reyes, M. J. Martinez, J. Calatayud and R. Lahoz) 

INTRODUCTION 

Autolysis in filamentous fungi is a natural degradative process which starts after the exhaustion of the external carbon supply. The fungus starts to metabolize the reserve substances and then a degradation of the cytoplasmic material and cell wall polysaccharides takes place (3, 10). Autolysis occurs by the lytic enzymes that the fungus has or synthesizes (5, 11) during the degradative process. These enzymes show increased activity in the culture fluid and decreased activity in the mycelium during autolysis (6). Each fungus is able to produce the necessary lytic enzymes to carry out its own cell wall degradation. The scope of this work was to investigate which enzymes were implicated in the degradation of cell wall chitin of Aspergillus nidulans (Eidam) Wint, and possible regulation among them.

MATERIALS AND METHODS 

The experiments were performed with A. nidulans (CECT-2544, Coleccion Espanola de Cultivos Tipo, Valencia, Spain). The growth, obtention of enzymatic complex from autolyzed cultures and wall preparations were made as described before (9). Chitin was obtained from prawn shell and A. nidulans cell wall (1, 4). Oligosaccharides from chitin hydrolyzate with concentrated HCl (12) were purified by Bio-Gel P 2. Carboxymethylchitin (CMC) was obtained with a 43 % degree of substitution (14). β-N-Acetylglucosaminidase
HPLC analysis of hydrolysis of chitotriose (1.4 mM) by β-N-acetyl-
glucosaminidase at 0, 15, 28, 41 and 53 min of incubation at 37° C.

HPLC analysis of degradation of colloidal prawn shell chitin (A, B)
and A. nidulans cell wall chitin (H, I) by pure endochitinase (B, I)
and endochitinase in presence of chitin deacetylase (A, H) after
72 h of incubation.

HPLC analysis of joint action of both purified enzymes on colloidal
prawn cell chitin (G) and A. nidulans chitin (M) after 72 h of incu-
bation.

Peak identification: 1 = N-acetylglucosamine; 2 = chitobiose; 3 = chitotriose;
4 = chitotetrose; 5 = chitopentose; A = buffer, and X = dimer of N-acetyl-
glucosamine and glucosamine.