



Clade A

Clade D

Fig. S2. The phylogram of GH28 enzyme evolution. Clades A, B and C are three fungus-specific clades with strong bootstrap support. Clade D includes sequences mainly from fungi along with multiple copies from oomycetes *Phytophthora* and *Saprolegnia*. Branches in red refer to sequences from extant or ancestral fungal species, while branches in black are sequences from non-fungal taxa. Terminal branches with asterisks are the sequences from the early diverging taxa of *Gonapodya* or *Allomyces*. The numbers by the branches are bootstrap support. Only values over 70 are shown.