Title

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Fungi of the phylum Basidiomycota (basidiomycetes), make up some 37% of the described fungi, and are important in forestry, agriculture, medicine, and bioenergy. This diverse phylum includes the mushrooms, wood rots, symbionts, and plant and animal pathogens. To better understand the diversity of phenotypes in basidiomycetes, we performed a comparative analysis of 35 basidiomycete fungi spanning the diversity of the phylum. Phylogenetic patterns of lignocellulose degrading genes suggest a continuum between the white rot and brown rot modes of wood decay. Patterns of protein kinases, secondary metabolic enzymes, and secreted proteins shed additional light on the broad array of phenotypes found in the basidiomycetes. We suggest that the lignocellulose gene content of an organism can be used to predict its nutritional mode, and predict *Dacryopinax sp*. as a brown rot; *Botryobasidium botryosum* and *Jaapia argillacea* as white rots.