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Construction and Testing of a Biological Breathalyzer

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Joint project with Herman Armstrong, Brian Pink, Morgan Schiermeier and Jackie Schneider

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Construction and Testing of a Biological Breathalyzer

The ultimate goal of this research was the construction of a biological breathalyzer using methods of synthetic biology. The metabolic pathways of *Pichia taxa* were utilized for this research. This yeast is able to metabolize both ethanol and methanol present in the environment. The first known by-product of methanol metabolism is the AO enzyme from the AOX gene. When both ethanol and methanol are present, the yeast preferentially metabolizes ethanol and the AOX gene is not expressed. By fusing the AOX gene promoter with a fluorescence protein gene, the expression of the AOX gene may be visually detected. When the organism is supplied with both ethanol and methanol, the amount of time before fluorescence will correspond to the amount of ethanol fed to the cell. In this way, the concentration of ethanol can be determined.

Rachel Klapper is from Murray, Kentucky. She is a junior majoring in chemical engineering with a biological emphasis. She is a member of the International Genetically Engineered Machines team and also participates in campus organizations such as the American Institute of Chemical Engineers and the university bands and orchestras.