

## **GENES TO JEANS: A GREEN SOLUTION TO BLUE DENIM**

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Dyeing jeans to produce the classic blue tones we love is an extremely dirty process. In addition to the hazardous chemicals involved in indigo synthesis, excess reducing agent is required to solubilize the crystals for dyeing the cotton fibers. Despite many efforts to circumvent the need for this reducing agent to limit cost and environmental damage, it remains instrumental to the current dye mill process. We are implementing a fermentation strategy where the air-reactive indigo precursor indoxyl is biosynthesized from tryptophan. Indoxyl is stabilized in a soluble form by glucosylation. Upon treatment of the glucoside to cotton, a betaglucosidase can be added to reform the air-reactive indoxyl that oxidizes to indigo crystals in the fibers. We have replaced the glucose biochemical protecting group with other biochemical protecting groups for altering the chemical behavior of the product in the production host and the ease of deprotection on cotton. We have also explored this strategy of adding biochemical protecting groups for controlled reactivity for other molecules of interest