Wastewater Treatment: The Use of Mealworm Gut Bacteria (Tenebrio molitor) to Isolate and Identify Bacteria that can Biodegrade Polystyrene

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This study was done to evaluate mealworms' (Tenebrio molitor) ability to biodegrade Polystyrene (PS) and the use of their gut bacteria to isolate and identify microbes that could metabolize PS, possibly in a wastewater treatment plant. The question was: Can mealworm gut bacteria degrade Polystyrene (PS) and if so be isolated and identified? The hypothesis was: Mealworm gut bacteria could degrade Polystyrene and the gut bacteria could be isolated and identified. The hypothesis was supported. The optical density of mealworm gut bacteria incubated with just Polystyrene was significantly higher when mealworms were fed oatmeal and Polystyrene when compared to mealworms fed only oatmeal, just Polystyrene, and worms not given any food ($p<0.038$). The microbes from the mealworm gut bacteria-fed PS and oatmeal were inoculated onto seven differential agar media plates. Ten colonies were isolated and DNA was extracted and a Polymerized Chain Reaction (PCR) was run in order to amplify the 16s rRNA gene. Next, the resulting sequences were Standard Blasted for identification and placement on their phylogenetic tree. Three strains of mealworm gut bacteria were identified--Bacillus velezensis, Staphylococcus succinus subsp. succi, and Bacillus licheniformis (matched twice). All three of these species of bacteria have been isolated from diverse environments and appear to be incredibly durable and able to survive when in the presence of Polystyrene - in a way other microorganisms can not.

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