Gait Analysis of Periplaneta americana Cockroaches Exposed to Limonene

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This project investigates the effect of the natural insecticide limonene applied externally to Periplaneta americana (the American cockroach) on walking patterns. The cockroach's tripod gait is fast and efficient, contributing to the insect's efficacy as a household and agricultural pest. To measure gait, roaches had their legs and bodies marked with colored paint, and then were placed on a track under a video camera to record their movement. Using OpenCV in Python, the film of roaches before and after limonene spraying was analyzed frame by frame to determine the location of the colored leg markings. Graphs of the legs' positions in relation to the body showed decreased synchronization in movement, with an average Pearson's correlation value of 0.61 for control trials and average value of 0.31 for experimental trials. Qualitative observations characterized the treated cockroaches as disoriented, confused, and uncoordinated. The hypothesis that limonene’s neurotoxic capabilities have destabilizing effects on the walking patterns of cockroaches is tentatively confirmed.

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