General Biology

OBSTACLE PERCEPTION AND AVOIDANCE DURING UPWIND ODOR TRACKING IN THE MALE COCKROACH, *PERIPLANETA AMERICANA,*

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In many insect species, including cockroaches and hawkmoths, the male is cued to search for the female by release of attractant pheromone into the wind. The male cockroach, *Periplaneta americana*, tracks a pheromone plume upwind through a series of internally generated zigzags and loops, and locates the source a large proportion of the time in our laboratory. This study is aimed at discovering how the cockroach prioritizes incoming sensory information to support a specific task and how those priorities change as the task at hand changes. We presented male cockroaches with an obstacle that does not significantly affect the structure of the pheromone plume in the wind tunnel, but forces them to change their behavior from odor tracking to obstacle avoidance in order to locate the source. When the roaches are forced to navigate the obstacle, they must change the priority of olfactory input, and reassign higher priorities to visual and tactile senses. We categorized and documented the way in which the roach's behavior changes in the presence of an obstacle, and the way that the insect assigns importance to the task of both odor tracking and navigating around the obstacle. Our experimental obstacle was large enough to force the roaches to leave the edge of the pheromone plume by at least 2 inches in each direction, including vertically, in order to get around it. Fifty-six percent of the males presented with the obstacle did not navigate around it, apparently due to an inability to leave the pheromone plume long enough to negotiate the obstacle. The remaining 44% of the individuals did track the plume all the way to the source, but only after spending variable periods of time reiteratively looping in the plume downwind of the obstacle. Preliminary analyses suggest that during pheromone plume tracking olfactory inputs override all other sensory inputs, including vision. Further analysis of the antennal encounters with the obstacle will be presented in the future.