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Three-Dimensional Concentration Measurements around Actively Tracking Blue Crabs B.D. DICKMAN, J.L. JACKSON, M.J. WEISSBURG, D.R. WEBSTER , Georgia Tech — Many aquatic arthropods locate food, suitable habitats, and mates solely through information extracted by chemical signals in their environment. Chemical plumes detected by larger animals are influenced by turbulence that creates an intermittent and unpredictable chemical stimulus environment. To link the stimulus pattern to behavior, we have developed a measurement system to quantify the instantaneous odor concentration surrounding a freely tracking blue crab through three-dimensional laser-induced fluorescence (3DLIF). A blue crab receives chemical stimulus at several locations, including the antennules near the mouth region and the distal tips of the legs and claws. Hence, three-dimensional measurements of the concentration field are required to link behavior to plume structure. During trials, crabs began their search 150 cm downstream of a source, and walking kinematics were recording simultaneously. The crabs were reversibly "blindfolded" during tracking to prevent aversive reactions to the intense laser light. Our experiments allow us to examine how hypothesized navigational cues, such as concentration bursts at the antennules and spatial asymmetry in concentration at the distributed chemosensory organs on the legs and claws, results in particular decisions during navigation.

Donald Webster
Georgia Tech

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