C. elegans learning and decision making in T-shaped mazes

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Broadly supported findings illustrate *C. elegans* ability to exhibit associative, non-associative and imprinted memory in the context of chemical stimuli. Here we demonstrate that *C. elegans* nematodes are capable of learning related to navigation in a structured environment (maze). We use 3D-printing technology to build the custom-made Worm-Maze platform, a novel and versatile behavioral arena. We show that *C. elegans* young adults can locate food in T-shaped mazes and they can learn which way to turn to find it again, after a single training session. Results indicate that learning experience is sufficient to introduce bias in the decision-making process, even in the presence of conflicting environmental cues. We provide evidence that *C. elegans* successful navigation in the maze requires tactile input and propriosensation, and that learning depends on chemosensation and mechanosensation. We also show that CREB-like transcription factor and dopamine signaling pathway are involved. *C. elegans* learning in the maze environment shares certain properties with the working memory mechanism. This is the first time that navigation-related learning is established and characterized in *C. elegans*, and the underlying mechanism is explored.