

AARON F. ROBINSON, COLLEEN J. NOLAN, and CAROL ZYGAR PLAUTZ, Dept of Biology, Shepherd University, Shepherdstown WV, 25443. The Effects of Roundup and its Chemical Constituents on Learning and Long-Term Memory Consolidation in *Lymnaea palustris*.

Environmental contamination from herbicide use is a prevalent problem. Roundup is a widely used herbicide that consists of two active ingredients: Glyphosate and Diquat Dibromide (DD). Previous work has shown that these compounds have negative impacts on development, fecundity, and other processes. We analyzed the effects of chronic exposure to Roundup, Glyphosate, and DD on learning and memory in the pond snail, *Lymnaea palustris*.

*L. palustris* was treated with Roundup, Glyphosate, or DD for 1-2 weeks. Snails were operantly conditioned according to standard procedures. The results indicated that at concentrations of Roundup and DD legally allowed in human drinking water for a 1-week treatment, learning was not inhibited; however, memory formation was impaired. At the same concentration for 2 weeks, or at a 5-fold higher concentration for 1- and 2-week treatments, both learning and memory are significantly impaired. A 1-week treatment with Glyphosate impairs memory but not learning.

Western Blot analysis was conducted to detect changes in Protein Kinase C (PKC) abundance, which has been shown to be linked to learning and memory. Previous work in our laboratory has shown a positive correlation between the abundance of PKC and memory consolidation in control snails; this increase is abolished upon exposure to Roundup or its constituents.

Our findings suggest that Roundup and its constituents have damaging effects on learning and memory in invertebrates. Similar effects may occur in vertebrates because of the high level of conservation of learning and memory processes across species.