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Elucidating Molecular Events Underlying Learning with Fluorescence Microscopy[1] BETHE SCALETTAR, Department of Physics, Lewis & Clark College, MARIYA CHAVARHA, JANIS LOCHNER, Department of Chemistry, Lewis & Clark College — Unraveling the molecular processes that underlie learning remains one of the most intriguing, unresolved problems in science. Learning and memory formation are believed to reflect alterations in the connections among nerve cells. These alterations are driven in part by proteins that are secreted from the surface of nerve cells. The secreted proteins act locally to mediate changes in nerve cell connectivity. Molecular processes, such as protein secretion, that underlie learning can be studied in living cells using high-resolution, time-lapse fluorescence microscopy. In this technique, proteins of interest, such as those mediating learning, are fluorescently labeled using genetic engineering, and then living cells containing the labeled proteins are imaged as a function of time using high-resolution fluorescence microscopy. In this talk, we will discuss both our biophysical approach and some recent insights that we have obtained using this approach into pivotal processes that underlie learning.

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