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Many animals, including zebrafish, have the ability to regenerate limbs, tails, or fins following amputation. The regeneration process is thought to faithfully reconstruct the appendage, yet it is unknown how spatial and temporal dynamics in gene expression and cell-signaling pathways control regrowth. Dr. Rocky Diegmiller will use quantitative imaging approaches to investigate morphological and patterning dynamics in regrowth of the paired zebrafish pectoral fin. Diegmiller will conduct these studies in Dr. Stefano Di Talia's and Dr. Kenneth Poss' labs at Duke University. Diegmiller will explore how gene expression patterns are re-formed following amputation, and throughout regeneration. These studies will reveal insights into the dynamics and robustness of regeneration, and will dissect how multiple signaling pathways are integrated to ensure faithful regeneration. Furthermore, these studies will generate quantitative tools for studying regeneration that can be applied to other systems.

As a graduate student, Diegmiller used mathematical models and imaging to investigate developmental biology in Dr. Stanislav Shvartsman's lab at Princeton University. Specifically, Dr. Diegmiller used the Drosophila germline cyst as a model system to investigate cell polarity and the emergence of symmetry breaking mechanisms in cell clusters. With his multidisciplinary background in developmental biology, Dr. Diegmiller hopes his research will also yield important connections and distinctions between developmental and regenerative pathways.

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