

## Brain regeneration in the acoel *Symsagittifera roscoffensis*

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*Symsagittifera roscoffensis* is a small green marine flatworm which belongs to the phylum Xenacoelomorpha, known to be in a key position to study evolution within the bilaterians due to its early divergence from other clades. This species can regenerate a centralized nervous system within 24 days after head amputation. In this study, I use immunohistochemistry to mainly visualize the nervous system and EdU, which is a method marking the cells that are actively synthesizing DNA, to assess distribution and rate of proliferation in homeostatic and amputated animals. Pharmacological methods are used to inhibit proliferation and target specific pathways such as Notch, Wnt and BMP. The results show that *S. roscoffensis* can survive after amputation and initiate head, tail and longitudinal regeneration which demonstrate the ability to perform whole-body regeneration. Cell proliferation is shown to be important to fully regenerate, but its inhibition still allow the animals to close the wound and recreate connections between the nerve cords. Morphallaxis and epimorphosis are both shown to be necessary to accomplish full regeneration and signaling molecular pathways are shown to play a role in regeneration.

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