# *Three-spined Stickleback Resources on HHMI BioInteractive*

## Short Film

**Making of the Fittest: Evolving Switches, Evolving Bodies** (http://www.hhmi.org/biointeractive/making-fittest-evolving-switches-evolving-bodies) (15:27) After the end of the last ice age 10,000 years ago, populations of marine stickleback fish became stranded in freshwater lakes dotted throughout the Northern Hemisphere in places of natural beauty like Alaska and British Columbia. These remarkable little fish have adapted and thrive, living permanently in a freshwater environment drastically different than the ocean.

## Classroom Activities

**Activity: Using Genetic Crosses to Analyze a Stickleback Trait** (http://www.hhmi.org/biointeractive/using-genetic-crosses-analyze-stickleback-trait). Students analyze the results of genetic crosses between stickleback fish with different traits. Students can conduct an optional Chi-squared analysis.

**Activity: Modeling the Regulatory Switches of the Pitx1 Gene in Stickleback Fish.** (http://www.hhmi.org/biointeractive/modeling-regulatory-switches-pitx1-gene-stickleback-fish). Students interpret molecular diagrams and build physical models of eukaryotic gene regulation.

**Film Guide: Evolving Switches, Evolving Bodies.** (http://www.hhmi.org/biointeractive/film-guides-evolving-switches-evolving-bodies). Classroom-ready resources, including background, key concepts and a quiz, complement the short film.

## Virtual Lab

**Virtual Lab: Stickleback Evolution** (http://www.hhmi.org/biointeractive/stickleback-evolution-virtual-lab). The virtual lab lets students learn firsthand the methods for analyzing body structure in stickleback collected from lakes and fossils recovered from a quarry. Students measure, record, and graph their results to discover evolutionary patterns.

**Activity: Worksheet for the Stickleback Evolution Virtual Lab** (http://www.hhmi.org/biointeractive/worksheet-stickleback-evolution-virtual-lab). A worksheet that guides students through The Stickleback Evolution Virtual Lab.

## Animations

**Animation: DNA Transcription (basic detail)** (http://www.hhmi.org/biointeractive/dna-transcription-basic-detail). The first phase of the process of reading DNA information to make proteins starts with a molecule unzipping the DNA. The molecule then copies one of the strands of DNA into a strand of RNA, a close cousin of DNA. This process is called transcription.

**Animation: DNA Transcription (advanced detail)** (http://www.hhmi.org/biointeractive/dna-transcription-advanced-detail). The process of copying DNA into messenger RNA (mRNA) is called transcription. Transcription factors assemble at the promoter region of a gene, bringing an RNA polymerase enzyme to form the transcription initiation complex. Activator proteins at the enhancer region of DNA then activate the transcription initiation complex. RNA polymerase unzips a small portion of the DNA and copies one strand into an mRNA molecule.