

## THE VIRTUAL EVOLUTION STICKLEBACK LAB

As you complete each part of the virtual lab, answer the questions below in the space provided.

### QUESTIONS

#### INTRODUCTION

1. Define "model organism."
2. How do spines protect ocean stickleback fish?
3. How did ancestral populations of ocean-dwelling fish come to live in freshwater lakes?
4. Watch the video about pelvic reduction in freshwater stickleback. The loss of stickleback pelvic spines is similar to the loss of which body parts in some other four-legged vertebrates?
5. From a researcher's perspective, what is the benefit of having access to hundreds of postglacial lakes?
6. Watch the video with evolutionary biologist Dr. Michoel Bell. Why is the threespine stickleback a model organism for studies in evolution? (List at least two reasons.)
7. Watch the video with Dr. David Kingsley explaining hind-limb reduction. Name two other vertebrate animals whose evolutionary histories included the loss of hind limbs.

#### OVERVIEW

1. Click on the interactive stickleback fish. Describe where its spines are located.
2. What is the difference between marine, sea-run, and freshwater stickleback fish populations? Be specific.
3. Watch the video about the stickleback fish armor.
  - a. In addition to the spines, what is another component of the "armor" of a stickleback fish?
  - b. Explain how the stickleback armor protects the fish from some predators.

#### TUTORIAL 1

1. Describe the following structures:

# Evolution Lab Handout

**M Mosston**



## **Evolution Lab Handout:**

**Issues in Human Evolution Lab Manual** Marilyn Norconk, 2014-08-22 [Issues in Human Evolution Lab Manual](#)  
Marilyn Norconk, Anthony Tosi, 1753-01-01 [Argument-driven Inquiry in Biology](#) Victor Sampson, 2014-04-01 Are you interested in using argument driven inquiry for high school lab instruction but just aren't sure how to do it? You aren't alone. This book will provide you with both the information and instructional materials you need to start using this method right away. **Argument Driven Inquiry in Biology** is a one-stop source of expertise, advice, and investigations. The book is broken into two basic parts: 1. An introduction to the stages of argument driven inquiry from question identification, data analysis, and argument development and evaluation to double-blind peer review and report revision. 2. A well-organized series of 27 field-tested labs that cover molecules and organisms, ecosystems, heredity, and biological evolution. The investigations are designed to be more authentic scientific experiences than traditional laboratory activities. They give your students an opportunity to design their own methods, develop models, collect and analyze data, generate arguments, and critique claims and evidence. Because the authors are veteran teachers, they designed **Argument Driven Inquiry in Biology** to be easy to use and aligned with today's standards. The labs include reproducible student pages and teacher notes. The investigations will help your students learn the core ideas, crosscutting concepts, and scientific practices found in the Next Generation Science Standards. In addition, they offer ways for students to develop the disciplinary skills outlined in the Common Core State Standards. Many of today's teachers like you want to find new ways to engage students in scientific practices and help students learn more from lab activities. **Argument Driven Inquiry in Biology** does all of this even as it gives students the chance to practice reading, writing, speaking, and using math in the context of science.

**Team Teaching** Kathryn M. Plank, 2023-07-03 For those considering adopting team teaching or interested in reviewing their own practice, this book offers an overview of this pedagogy, its challenges and rewards, and a rich range of examples in which teachers present and reflect upon their approaches. The interaction of two teachers, both the intellectual interaction involved in the design of the course and the pedagogical interaction in the teaching of the course, creates a dynamic environment that reflects the way scholars make meaning of the world. The process naturally breaks down the teacher-centered classroom by creating a scholarly community in which teachers and students work together to understand important ideas and where students don't just learn content but begin to understand how knowledge is constructed, grasp the connections between disciplines, as well as their different perspectives, see greater coherence in the curriculum, and appreciate how having more than one teacher in the classroom leads naturally to dialogue and active learning. Each of the five examples in this book shares the story of a course at a different institution, and each is designed to reflect a number of different variables in team-taught courses. They represent courses in a variety of different disciplines, including the sciences, social sciences, humanities, and the arts, and at a range of levels from first-year seminars to graduate courses. They also illustrate a number of different models for instructional teams.

such as faculty from the same disciplines from related disciplines from two very different disciplines from different institutions and one pairing of a faculty member and a staff member This book provides insight into the impact of team teaching on student learning and on faculty development It also addresses the challenges both pedagogical and administrative that need to be addressed for team teaching to be effective *Lab Manual for Biology Labs On-line* Robert A. Desharnais, Jeffrey Bell, Michael A. Palladino, 2000 **Human Evolutionary Biology Lab Manual** Nicole Michelle Webb, Ryan Raaum, 2021-07-13 **Exploring Physical Anthropology Laboratory Manual & Workbook** Suzanne E. Walker-Pacheco, 2017-02-01 Exploring Physical Anthropology is a comprehensive full color lab manual intended for an introductory laboratory course in physical anthropology It can also serve as a supplementary workbook for a lecture class particularly in the absence of a laboratory offering This laboratory manual enables a hands on approach to learning about the evolutionary processes that resulted in humans through the use of numerous examples and exercises It offers a solid grounding in the main areas of an introductory physical anthropology lab course genetics evolutionary forces human osteology forensic anthropology comparative functional skeletal anatomy primate behavior paleoanthropology and modern human biological variation [Lab Manual for Biology Labs On-Line](#) Robert A. Desharnais, Jeffrey Ray Bell, Michael A. Palladino, 2000 Demonstrates adaptation by natural selection A lab manual and password is included with every student copy of the text **Biological Investigations Lab Manual** Warren Dolphin, David Vleck, Linda Westgate, James Colbert, 2010-01-27 The lead author of eight successful previous editions has brought together a team that combined has well over 60 years experience in offering beginning biology labs to several thousand students each year at Iowa State University Their experience and diverse backgrounds ensure that this extensively revised edition will meet the needs of a new generation of students Designed to be used with all majors level general biology textbooks the included labs are investigative using both discovery and hypothesis based science methods Students experimentally investigate topics observe structure use critical thinking skills to predict and test ideas and engage in hands on learning Students are often asked what evidence do you have that in order to encourage them to think for themselves By emphasizing investigative quantitative and comparative approaches to the topics the authors continually emphasize how the biological sciences are integrative yet unique An instructor's manual available through McGraw Hill Lab Central provides detailed advice based on the authors experience on how to prepare materials for each lab teachings tips and lesson plans and questions that can be used in quizzes and practical exams This manual is an excellent choice for colleges and universities that want their students to experience the breadth of modern biology [Lab Manual and Workbook for Physical Anthropology](#) Diane L. France, 2004 By emphasizing human osteology forensic anthropology anthropometry primates human evolution and genetics this lab manual written by Diane France provides students with hands on lab assignments to help make the concepts of physical and anthropology more clear It contains short answer questions identification problems and observation exercises The Lab Manual provides a wealth of

solid information that is invaluable in supporting the labs that accompany physical anthropology courses     Catalog ... St. John's University (Collegeville, Minn.),1909     **Chemical Abstracts** ,1916     **Labs for Vertebrate Zoology** Erik W. A. Gergus,Gordon W. Schuett,2000     Biology ,1996     *Catalogue of Copyright Entries* Library of Congress. Copyright Office,1919     Merrill Earth Science Ralph M. Feather,Susan Leach Snyder,Dale T. Hesser,1995     **Evolutionary Theory** ,1989     **El-Hi Textbooks and Serials in Print** ,2006     Monitoring the Future ,2003 Questionnaire responses from the nation s high school seniors     **Instructor's Manual for Perry and Morton's Laboratory Manual for Starr and Taggart's Biology, the Unity and Diversity of Life and Starr's Biology, Concepts and Applications** Joy B. Perry,1992

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boxes. Vocabulary: air track, approach velocity, conservation of energy, conservation of momentum, elasticity ... Air Track Gizmos\_ All answers correct\_ 2021 - Stuvia Nov 18, 2021 — Respond to the questions and prompts in the orange boxes. Vocabulary: air track, approach velocity, conservation of energy, conservation of ... Air Track B and C | PDF | Collision | Kinetic Energy Approach velocity = separation velocity:  $v_1 - v_2 = v_2' - v_1'$  ... then substitute this expression into the first equation.) ... check your answers. (The Gizmo cannot ...