Teaching Guide for: Finding Tiktaalik

Speaker: Neil Shubin
Video link: https://www.ibiology.org/evolution/tiktaalik/

Major topic

- Evolution

Overview

Ever since he was a graduate student, Neil Shubin has been obsessed with finding fossils of the creature that marked the transition from fish to land-dwelling animals. He explains how he scoured maps to find rocks of the right age and type that were accessible at the earth's surface. This led him to the Canadian arctic where, in 2004, Shubin and his colleagues found Tiktaalik, a fossil of a creature with traits found in both fish and tetrapods. Tiktaalik was the link between fish and land animals.

Sub topic

- History of life

Multiple-choice questions

1. Dr. Shubin was interested in finding fossils representing the transition between fish and terrestrial tetrapods. Which of the criteria below did he **NOT** use to define where he would search for these fossils?

a. Regions with geologic layers the same age as the transition from fish to tetrapods
b. Regions with geologic layers that commonly produce fossils (sedimentary rock)
c. Regions where geologic layers of the time period of interest are exposed (not underground)
d. Regions where other scientists had found similar fossils in the past
e. Dr. Shubin used all of the above criteria

2. Dr. Shubin's first field season in 1999 focused on the western portion of the exposed Devonian rock beds in Canada. Why were the transitional fossils Dr. Shubin sought not present in these rocks?

a. The rockbeds were marine in origin and the transitional organisms likely lived in rivers
b. The rockbeds were volcanic in origin and so unlikely to hold fossils of any kind
c. The rockbeds were early-Devonian in age and so not old enough to contain transitional fossils
d. The rockbeds were not exposed, but covered over by glaciers and so not accessible

3. Below is a list of the identifying traits found in *Tiktaalik*. Which of these traits are more similar to fish than to tetrapods?

a. Flat conical head with eyes on top
b. Head separated from the shoulder by a neck
c. Wrist bones in the forelimbs
d. Scales along the body
e. All of the above are fish-like traits

Relevant literature

Shubin, N. H., Daeschler, E. B., & Coates, M. I. (2004). The early evolution of the tetrapod humerus. *Science*, *304*(5667), 90-93.

Ahlberg, P. E., & Clack, J. A. (2006). A firm step from water to land. *Nature*, *440*(7085), 748-749.

Daeschler, E. B., Shubin, N. H., & Jenkins, F. A. (2006). A Devonian tetrapod-like fish and the evolution of the tetrapod body plan. *Nature*, *440*(7085), 757-763.

Shubin, N. H., Daeschler, E. B., & Jenkins, F. A. (2006). The pectoral fin of Tiktaalik roseae and the origin of the tetrapod limb. *Nature*, *440*(7085), 764-771.

Related resources

This video is included in Session 3 of iBiology's Evolution Flipped Course, which has additional downloadable teaching guides and recommended videos. We encourage educators seeking more materials to visit the course page.

Acknowledgments

We thank Dr. Laci Gerhart-Barley for sharing her multiple-choice questions for this video. For more information on how to implement this video in your teaching through homework assignments, check out Dr. Gehart Barley's publication and webinar with Dr. Brittany Anderton, Associate Director of iBiology.