

Discussion questions for ***Your Inner Fish***
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Chapter 1 – Finding Your Inner Fish

- (1.1) In general, what are the challenges faced by a field paleontologist? (list several)
- (1.2) Who is Neil Shubin? (supplement your answer with information from this page: http://pondside.uchicago.edu/oba/faculty/shubin_n.html)
- (1.2) Who is Ted Daeschler? (supplement your answer with information from this page: http://www.ansp.org/research/biodiv/vert_paleo/staff.php)
- (1.3) What is the significance of the *Tiktaalik* discovery to science? What is the significance of the *Tikaalik* to everyday people in society?

Chapter 2 – Getting A Grip

- (2.1) What did Sir Richard Owen discover/describe, and what was Darwin's explanation?
- (2.2) How do we know some fish did push-ups? What is the evidence?
- (2.3) When did most of the major human bones appear, and in what creatures?

Chapter 3 – Handy Genes

- (3.1) How does a developing body "make" hands?
- (3.2) What is ***Sonic hedgehog***, and why it is important?
- (3.3) As asked in this chapter, "how deep is our connection to the rest of life"?

Chapter 4 – Teeth Everywhere

- (4.1) Why are paleontologists excited to find teeth in the fossil record? Name three pieces of information paleontologists can learn from fossil teeth.
- (4.2) Teeth are not always easy to find in the fossil record. List three "tips" for searching for fossil teeth.
- (4.3) What is (or what do we think is) a conodont? What have we found of them in the fossil record? How do we think they lived/functioned?

Chapter 5 – Getting Ahead

- (5.1) Describe, IN YOUR OWN WORDS, the fundamental blueprint for the head.
- (5.2) What is the pattern similarity between shark and human skulls?
- (5.3) Why do college professors instruct about *Amphioxus*? Why bother learning about this creature?

Chapter 6 – The Best Laid (Body) Plans

- (6.1) Define the following: ectoderm, mesoderm, endoderm. What role do each play in embryo development?
- (6.2) What is the Organizer, and what is its importance?
- (6.3) What are the *Hox* and *Noggin* genes? What role do they play?

Chapter 7 – Adventures in Body Building

- (7.1) Describe what skeletal bone looks like and is composed of at a microscopic level, and a micro- microscopic level(!).
- (7.2) If your friend calls you a 'blob,' how far off are they from the truth? Discuss the similarities/differences between you and a 'blob.'
- (7.3) The end of the chapter discusses why/how bodies came about, how simple experiments provide one example of how it could have occurred. The book also explores why the body may not have arrived sooner. For this question, I want you to think about the future - about the military advances, environmental changes, health/diseases coming about, etc. How do you think the human "body" will develop in the future? Do not give me a ridiculous answer (no points for trying to be humorous) - please think seriously about this and provide a reason for the adaptations you think our bodies may make.

Chapter 8 – Making Scents

- (8.1) Describe the nostrils of *Tiktaalik*. Could this fish have smelled? What do you think? (read back to the section on how humans smell, if that will help you formulate your response)
- (8.2) What was the significance of Buck and Axel's work (besides winning a Nobel Prize)?
- (8.3) Why do you think humans evolved so many genes for odor? Support your thoughts with information from the book.

Chapter 9 – Vision

- (9.1) Describe the development of color vision. Why is this a significant development in mammal evolution?
- (9.2) What are the differences between the two types of animal eyes?
- (9.3) How is it possible for us to grow extra eyes on organisms, making them look like "mutants" to us?

Chapter 10 – Ears

(10.1) Describe the basic internal structure of the ear. What are the different ways the ear has developed outside the body of mammals, reptiles, etc.

(10.2) Describe the different parts of the inner ear and their purpose/function.

(10.3) What is the purpose/function of the *Pax 2* gene? Can it be found in jellyfish? Explain.

Chapter 11 – The Meaning of It All

(11.1) Do you agree with the "law of everything?" Will this hold true in the future? Don't clones even have parents? Explain.

(11.2) How has DNA technology advanced the reconstruction of one-living and currently-living organisms?

(11.3) Why does history "make us sick?"

NOTE: These questions were given as a homework assignment for an introductory-level geoscience course for non-science majors titled Earth and Life (Historical Geology).