

2023-2024 AP BIOLOGY SUMMER ASSIGNMENT

“Science and everyday life cannot, and should not, be separated.”

-- Rosalind Franklin

Dear AP Biology Student,

Welcome to AP Biology! I am so glad that you’ve decided to challenge yourself this year!

The course is demanding and challenging, and will require a lot of time outside of the classroom. In order to maximize the time that we have together, you will complete the following assignment over the summer.

Remember: Work smart, have fun, and get ready to hit the ground running on August 30!

Have a great summer!

Ms. Dolce

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PART 1: Basic Biology Refresher on AP Classroom

Please log into AP Classroom (<https://myap.collegeboard.org/login>) and use the join codes:

Period 3 JZREV6

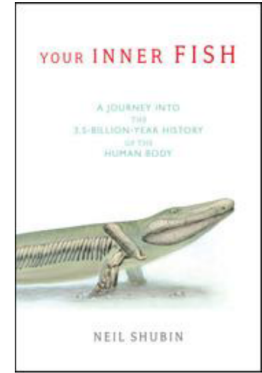
Period 7 MQ43NR

You will complete the Summer Assignment that is posted there. The assignment consists of 60 AP-style multiple choice questions. You will be able to access the answers once you have submitted the assignment on AP Classroom. This will enable you to identify areas of strength and areas where you need to review further. The assignment will count as a **formative grade** (based on completion) and is due on August 30.

We will review this material briefly and you will be tested on this material within the first week or two of school. The test will count as a **summative grade**.

PART 2: Your Inner Fish

You will read “Your Inner Fish” by Neil Shubin (ISBN-13:9780307277459, Knopf Doubleday Publishing Group). You can find the book at your local library or it can be purchased (relatively inexpensively) from Amazon, Barnes & Noble, or any other book store. You may use a hard copy or a digital copy of the book. **Please type the answers to the following questions and submit them on Google Classroom by Thursday August 31. The answers to these questions will count as a formative grade and will be the basis for discussion within the first few days of school.**



Chapter 1 - Finding Your Inner Fish

1. Explain why the author and his colleagues chose to focus on 375 million year old rocks in their search for fossils. Be sure to include the types of rocks and their location during their paleontology work in 2004.
2. Describe the fossil Tiktaalik . How does this fossil confirm a major prediction of paleontology?
3. Explain why Neil Shubin thinks Tiktaalik says something about our own bodies? (in other words, why is “ Your Inner Fish” a good title for the book?)

Chapter 2 - Getting a Grip

1. Describe the “pattern” to the skeleton of the human arm that was discovered by Sir Richard Owen in the mid - 1800s. Relate this pattern to his idea of exceptional similarities.
2. How did Charles Darwin’s theory explain these similarities that were observed by Owen?
3. What did further examination of Tiktaalik’s fins reveal about the creature and its lifestyle?

Chapter 3 - Handy Genes

1. Many experiments were conducted during the 1950s and 1960s with chick embryos and they showed that two patches of tissue essentially controlled the development of the pattern of bones inside limbs. Describe at least one of these experiments and explain the significance of the findings.
2. Describe the hedgehog gene using several animal examples. Be sure to explain its’ function and its’ region of activity in the body.

Chapter 4 - Teeth Everywhere

1. Teeth make great fossils - why are they “as hard as rocks?” What are conodonts?
2. Shubin writes that “we would never have scales, feathers, and breasts if we didn’t have teeth in the first place.” (p. 79) Explain what he means by this statement.

Chapter 5 - Getting Ahead

1. Why are the trigeminal and facial cranial nerves both complicated and strange in the human body?
2. List the structures that are formed from the four embryonic arches (gill arches) during human development.
3. What are Hox genes and why are they so important?
4. Amphioxus is a small invertebrate yet is an important specimen for study – why? Be sure to include characteristics that you share with this critter!

Chapter 6 - The Best Laid (Body) Plans

1. Early embryonic experiments in the 1800s led to the discovery of three germ layers. List their names and the organs that form from each.
2. Describe the blastocyst stage in embryonic development.
3. What is meant by “ontogeny recapitulates phylogeny?”
4. What type of gene is Noggin and what is its function in bodies?
5. Sea anemones have radial symmetry while humans have bilateral symmetry but they still have “similar” body plans – explain...

Chapter 7 - Adventures in Bodybuilding

1. Refer to the timeline on p.121 in Your Inner Fish – what is most surprising to you about the timescale? Explain your choice.
2. What is the most common protein found in the human body? Name it and describe it.
3. Explain how cells “stick” to one another; give at least one example.
4. How do cells (generally) communicate with one another?
5. What are choanoflagellates and why have they been studied by biologists?
6. What are some of the reasons that “bodies” might have developed in the first place? Include any environmental conditions that might have favored their evolution.

Chapter 8 - Making Scents

1. Briefly explain how we perceive a smell.
2. Jawless fish have a very few odor genes while mammals have a much larger number. Why does this make sense and how is it possible?

Chapter 9 - Vision

1. Humans and Old World monkeys have similar vision – explain the similarity and reasons for it.
2. What do eyeless and Pax 6 genes do and where can they be found?

Chapter 10 - Ears

1. List the three parts of the ear; what part of the ear is unique to mammals?
2. An early anatomist proposed the hypothesis that parts of the ears of mammals are the same thing as parts of the jaws of reptiles. Explain any fossil evidence that supports this idea.
3. What is the function of the Pax 2 gene?

Chapter 11 - The Meaning of It All

1. What is Shubin’s biological “law of everything” and why is it so important?
2. What is the author trying to show with his “Bozo” example?
3. This chapter includes many examples of disease that show how humans are products of a lengthy and convoluted evolutionary history. Choose three (3) of the problems listed below and briefly explain how ancient ancestors’ traits still “haunt” us:
 - Obesity
 - Heart disease
 - Hemorrhoids
 - Sleep apnea
 - Hiccups
 - Hernias
 - Mitochondrial diseases

Afterword (new findings re: Tiktaalik)

1. Tiktaalik was a fish that lacked an operculum – what does this tell us about the animal?
2. Tiktaalik had a true neck – what did this allow the animal to do (advantages?)
3. How was Tiktaalik able to survive in the cold Arctic environment?