

AP Biology
Summer Assignment 2021-2022
Survival of the Sickest by Dr. Sharon Moalem



Greetings fellow biologists and AP students!

It is important to acknowledge that the course you are about to embark upon is equivalent to an introductory, college level Biology class. With that said, there is a lot of information to cover. Why not get a jump start? This summer, I have assigned *Survival of the Sickest*, a book that re-introduces you to topics such as evolution, ecology, proteins, disease and many others. (You can pick up a book at BHS to borrow for the summer, or purchase a copy for yourself.)

Before starting your assignment, please make note of the following guidelines:

1. I encourage you to read each chapter first before completing its corresponding assignment. This will make the assignment that much easier to complete.
2. This assignment will be due on the FIRST DAY back to school, **September 2, 2021**.

Part I.

For each chapter, including the introduction, you will:

1. List at least TWO of the chapter's big ideas
2. List at least FIVE questions you had while reading the chapter
3. Quote one line from the chapter that stood out to you
4. Summarize your favorite anecdote from the chapter

Part II.

In addition, you will answer the following questions correlated with each chapter:
(There are no questions for the introduction)

*Unless otherwise stated, questions should be answered in complete sentences

Chapter 1 Questions: “Ironing it Out”

1. Describe the condition known as Hemochromatosis.
- 2a. Define the term *negative feedback*. (*You will need to look this up).
- 2b. How does this concept relate to the amount of iron found in the body?
3. How does natural selection work?
4. What are the responsibilities of iron? (You may list.)
5. What is the ‘Geritol Solution’?
6. What are your body’s iron “no-fly zones”? Name FIVE.
- 7a. What are chelators?
- 7b. How and why do they help to regulate iron levels in the body?
8. Why were men more susceptible to the plague than women?/Why are women less susceptible?
 - 9a. What does a macrophage do?
 - 9b. Distinguish between macrophages of a hemochromatotic and non-hemochromatotic person.
 - 9c. Which macrophage would have the “leg-up” when facing an infection?
10. Summarize the evolutionary advantage to Hemochromatosis.

Chapter 2 Questions: “A Spoonful of Sugar Helps the Temperature Go Down”

1. Distinguish between Type 1, Type 2 and Gestational Diabetes. (You should be able to come up with 2-3 distinctions for each.)
2. What is climate change?
3. Explain how the younger dryas is evidence of climate change.
 - 4a. Who derived the theory of uniformitarianism?
 - 4b. What did this theory state?
 - 5a. Explain the concept of Homeostasis.
 - 5b. Discuss how humans maintain homeostasis when cold.
 - 5c. How might differences in ancestry result in different responses to cold?
6. Explain how the following species differ in their methods of adapting to the cold:

- i. Bullfrog
- ii. Antarctic Cod

- c. Woolly Bear Caterpillar
- d. Woodfrog

7. Summarize the evolutionary advantage to Diabetes.

Chapter 3 Questions-“The Cholesterol Also Rises”

1. State the roles of the following in the body:

- a. Vitamin D
- b. Folic Acid
- c. Cholesterol

2. Describe the relationship(s) among Vitamin D, Cholesterol, Sunlight and Folic Acid.

3. What is the role of the APOE4 gene in Vitamin D production?

4. Discuss the evolutionary advantages and disadvantages of light and dark skin.

Chapter 4 Questions-“Hey, Bud, Can You Do Me a Fava?”

1. Describe the relationship between favism, fava beans and G6PD.

2. Describe the relationship between G6PD and malaria.

3. The author discusses *other* relationships between the plant and animal kingdoms. Plants have actually evolved ways to protect themselves against the animal kingdom. Explain what defensive techniques the following plants have developed:

- a. Euro Clover
- b. Cassava Plant
- c. Indian Vetch
- d. Nightshade
- e. Habanero Pepper
- f. Celery

Chapter 5 Questions-“Of Microbes and Men”

1a. What is the “Barrier Effect”?

1b. Describe the relationship between the Barrier Effect and Probiotics.

1c. Why aren’t Probiotics harmful to us?

2. The author names several microbial relationships humans have been a part of.

a. What is “Host Manipulation”?

b. Discuss TWO examples of host manipulation when we, humans, are the host.

3. Explain the concept of molecular mimicry.

4. What TWO things do all organisms seek to do?

Chapter 6 Questions-“Jump Into the Gene Pool”

- 1a. Who is Edward Jenner?
- 1b. Discuss the relationship between cowpox and smallpox.
- 1c. Explain how vaccinations work.

2. State the Endosymbiont Theory. (*You will need to look this up.)

3. Discuss when DNA mutations occur and how they may be prevented by the body.

4. What is the Weismann Barrier?

5. Explain the role(s) of B cells in the Immune System.

6. What is meant by the term “junk DNA”?

Chapter 7 Questions-“Methyl Madness: Road to the Final Phenotype”

1. How may epigenetic be partially responsible for the epidemic of childhood obesity? Provide evidence from the Duke University study to support this.

- 2a. What is DNA methylation? What does it do?
- 2b. Explain the role of DNA methylation in:
 - a. Vole coats
 - b. Mice size

3. Discuss the relationship between methylation and cancer.

Chapter 8 Questions-“That’s Life: Why You and Your iPod Must Die”

- 1a. What is the role of lamin A?
- 1b. What is the connection between lamin A and progeria?

2. Describe the relationship between telomeres, cancer, telomerase and apoptosis.

3. What are stem cells?

4. Why does evolution favor adaptations that make the birthing process more risky with humans?

5. Compare and contrast the Savanna and Aquatic Ape hypotheses.