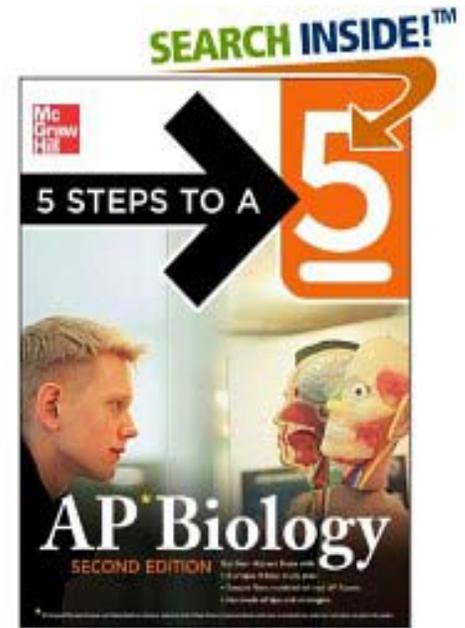


# Advanced Placement Biology

## Summer Course Preview

### Junipero Serra High School, 2011-2012

Welcome to **AP Biology**! You will be taking a course like no other. There will be indoor and outdoor laboratory experiences, analysis of case studies, journal article readings, videos, collections, student service learning and much more! To prepare you for the rigors of this course it is suggested that you obtain and review one of the study guides available in local book stores. Completion of the summer review is voluntary but will help prepare students by providing an excellent preview of the course. The suggested review guide is shown here: “**5 Steps To A 5 – AP Biology**”, 2<sup>nd</sup> Edition, McGraw Hill and will be the basis of the summer assignment. If purchased new, the cost of the book is \$18.95 plus tax. You can purchase the text online from the library page of our course website at [www.bridgestoliteracy.com](http://www.bridgestoliteracy.com). You should underline, highlight and Post-it® note the book as you complete the assignment between June 22<sup>nd</sup> and September 3<sup>rd</sup>. The assignment is **due** on or before **the First Friday of the First DAY of school** (the first day of school for maximum BONUS points). Don't wait until the last minute. Start today and do a little each week. When you have finished, you will have a document which thoroughly previews the entire AP Biology course.



## A Tour through AP Biology

### Part 1

1. Examine the Table of Contents:
  - a. Name and discuss the PARTS of the review guide.
  - b. What are the divisions of the section PART III-Comprehensive Review?
2. Examine the, *What You Need to Know About the AP Biology Exam* Section:
  - a. Who writes the AP Biology Exam?
  - b. What are the possible scores students can receive on the AP Exam and what do they mean?
  - c. How is the AP Biology Exam organized?
  - d. How is the multiple-choice and free-response answers scored?
3. Briefly explain the suggestions for taking the multiple-choice portions of the AP Biology Exam.
4. Briefly explain the suggestions for taking the free-response portions of the AP Biology Exam.
5. Please take the Diagnostic/Master Exam on pages 19-24. Be certain that you only take 45 minutes to complete the exam. Score and interpret your exam determining the raw score and the approximate AP Score using the table on page 30.

## Part 2

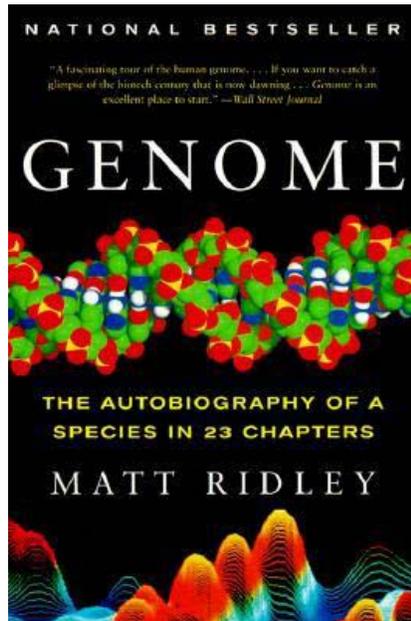
1. For **each** of the first fifteen chapters of Part III- Comp. Review complete the following:
  - a. Write the name of the chapter and then READ the entire chapter carefully.
  - b. List **all** the “key concepts” (headings in **BOLD, ALL CAPS**) found in the chapter (i.e. Chapter 1 - **ELEMENTS, COMPOUNDS, ATOMS, AND IONS, ...ENZYMES**)
  - c. Choose **one** of the key concepts and outline the topics of that concept.
  - d. List and define five key terms (**bold**) that are unfamiliar to you in each chapter.
  - e. Study **all** figures in the chapter. Write the figure number and title, then summarize the concepts displayed in each figure, diagram, or table found within the chapter.
2. Multiple-choice questions. For each chapter (except Chapter 16):
  - a. Answer any 5 questions. Write the question and your selected answer.
  - b. Check your answer.
  - c. Read the explanation for each answer. Were you correct? Explain why or why not.
3. Free-response questions. For each chapter (except Chapter 16):
  - a. Read the rapid review at the end of each chapter and use as a basis to compose your own free-response question.
  - b. Provide the official response (answer key) for the question you have created. Be on the lookout as the student generated free-response questions and answers will be used throughout the schoolyear.

If you have any questions, you may contact me by e-mail at: [scienceinthecity@gmail.com](mailto:scienceinthecity@gmail.com)! I will be out of town for most of the summer completing a research project at the University of Pennsylvania in Philadelphia and thus will **NOT** be available to provide immediate assistance. Although, I will review email periodically and reply to inquiries as time permits. Be mindful to put forth your **BEST** effort in order to receive bonus points for this summer course overview and to have a solid foundation for the upcoming year of excitement and discovery. Be certain to follow the directions provided and create a review that is neat (you may consider typing), orderly, well-formatted, complete, and easy to follow and review.

I will be on campus at Serra High School the week before school begins and will be available to meet with students **BY APPOINTMENT ONLY** if assistance is needed or if students would like for me to preview their assignment before submission. Please make an appointment using the email address above.

BEST WISHES,

*Dr. E. Senegar-Mitchell*



## Introduction

This is a good overview of the structure and function of DNA and RNA and the importance of the language "**Genetish**". You should desire to be extremely familiar with ALL the principles of this introduction even if it requires further reading or research.

### AP Biology Summer Assignment

*Genome: The Autobiography of a Species in 23 Chapters* by Matt Ridley. 2000. Perennial

AP Biology Summer Reading Assignment  
Chapter Focus Questions

### Chromosome 1

1. What chemical links the worlds of DNA and protein?
2. Which probably came into being first, RNA or DNA?
3. Who was Luca?
4. In what way does a "filament" impart life?

### Chromosome 2

1. Prior to 1955, scientists believed humans possessed how many nuclear chromosomes?
2. Humans normally have how many nuclear chromosomes?
3. Which ape is closest to humans genetically, sharing 98% of our genetic code?
4. What is the process by which genes change their sequences?
5. Genes are recipes for anatomy - **can they also be recipes for behavior?**

### Chromosome 3

1. Francis Crick in 1953 jumped up in Eagle Pub and shouted "We have discovered the secret of \_\_\_?\_\_\_"
2. What was Gregor Mendel's contribution to science?
3. What contribution did Watson and Crick make to the science of Genetics?

### Chromosome 4

1. According to Ridley, genes are there to cause disease. **True or False?**
2. Huntington Disease (HD) is caused by a gene in chromosome 4 that codes for what protein?
3. What is meant by saying that a disease is caused by "unstable CAG repeats?"
4. Nancy Wexler helped find the gene involved in HD, a disease her mother had. Does Nancy herself have the HD form of that gene?

### Chromosome 5

1. Are genetic characteristics usually determined by a single gene?
2. What is **pleiotropy**?
3. Can any ONE gene be called "the asthma gene"?

### Chromosome 6

1. In 1997, Robert Plomin claimed to have discovered a gene for what human characteristic?
2. Why has the study of human intelligence been so controversial?
3. Does Ridley believe that intelligence is inherited?
4. What is the **Flynn Effect**?

### Chromosome 7

1. According to Ridley, is human language inherited?
2. Is the use of grammar, or language rules, something we begin applying early or late in our experience with language (as individuals)?
3. What is evolutionary psychology and what does it have to do with genes?

### Chromosomes X and Y

1. Do all vertebrates determine the gender of their offspring by the presence or absence of the Y chromosome?
2. Do X and Y chromosomes usually swap genes during cell division, as do other chromosome pairs in the nucleus?
3. Why do recessive "X-linked" genetic characteristics show up more often in men than women?
4. Why does Ridley say that there is a genetic war between X and Y?
5. What are DAX and SRY genes? Why does Ridley call them "antagonists"?
6. The gene Xq28 is famous for its possible association with what human characteristic?
7. Why does Ridley discuss the X and Y chromosomes between the discussions of Chromosomes 7 and 8? **Why not just wait until the end?**

### Chromosome 8

1. In *The Selfish Gene*, author Richard Dawkins explains what he means by his reference to genes being "selfish." **Explain this idea in your own words.**
2. Within a gene, what is the role of an **exon**? An **intron**?
3. What percentage of the human genome is made up of true genes?
4. Of what importance is the human gene that encodes for reverse transcriptase?
5. What are **pseudogenes**?
6. How did the discovery of minisatellites lead to the development of DNA fingerprinting?

### Chromosome 9

1. How can genes that cause diseases such as sickle-cell anemia or cystic fibrosis actually impart disease resistance to some individuals?
2. What does Ridley mean by stating that there is "no human genome" and that the Human Genome Project is founded upon a fallacy?

### Chromosome 10

1. What does Ridley mean by the phrase, "no gene is an island?"
2. Why does Ridley state that "cortisol and stress are virtually synonymous?"
3. How do "monkeys hold the clue" to understanding how behavior affects genes?

### Chromosome 11

1. In the study of genetics, what is meant by "a chopstick gene?"
2. How do genes that affect neurotransmitters also affect personality?
3. Does Ridley believe that our essential personality is embedded in our genetic code?
4. How can cholesterol-reducing drugs and diets also increase violent behavior?

### Chromosome 12

1. What is a **homeotic gene**?
2. What is a **homeobox**?
3. Why does Ridley state the knowledge of the fruit fly genome, specifically the set of Hox homeotic genes on our Chromosome 12, shine a bright light on the human genome?

### Chromosome 13

1. What is "genetic geography"?
2. How does Ridley use "genetic history" to explain why native Americans tend to be less tolerant of alcohol than Europeans?

### Chromosome 14

1. What enzyme, encoded by the TEP<sub>1</sub> gene on chromosome 14, is needed to prevent senescence (aging) in cells?
2. How does the DNA prevent loss of important code at its beginning and end each time the DNA molecule is copied?
3. What is a **telomere**?
4. What is the job of telomerase in normal human function?
5. Would long telomeres or short telomeres be most likely to be associated with long-lived individuals?

### Chromosome 15

1. What is meant by saying that a gene has a **paternal imprint** or **maternal imprint**?
2. Is it the maternal or paternal gene that stimulates development of the placenta?
3. Is it the maternal or paternal gene that stimulates development of the cerebral cortex?
4. Which parent is most likely responsible for an offspring's genes for mood?
5. Which parent is most likely responsible for an offspring's genes for advanced thinking?
6. Do gender roles have an innate, genetic basis?

### Chromosome 16

1. How is learning different from instinct?
2. Are most human behaviors instinctual (inherited) or learned?
3. What is the role of the **synapse** in learning and memory?
4. Animals without the CREB protein cannot do what?

### Chromosome 17

1. How does the idea of "mutiny" provide a good model of a cell becoming cancerous?
2. What effect do **oncogenes** have in cells?
3. Under what circumstances would oncogenes be beneficial?
4. What is the role of **tumor suppressor genes**?
5. Why is the p53 protein called "Guardian Angel of the Genome"?
6. What happens when cancer cells have a damaged TP53 gene (the gene that makes p53 protein)?
7. What is **apoptosis**?

### Chromosome 18

1. In "cutting and pasting" genes in genetic engineering, [what enzymes?] is the "scissors" and [what enzyme?] is the "glue."
2. In the thirty year history of genetic engineering, about how many environmental or public health accidents/incidents have occurred worldwide?
3. What is **gene therapy**?
4. What was the first disease treated with gene therapy?
5. What is a **transgenic** animal? Why might a transgenic animal be useful to humans?
6. According to Ridley, "Genetic diagnosis followed by \_\_\_?\_\_\_ cure is the genome's greatest boon to medicine."

### **Chromosome 19**

1. The APOE gene is important in what group of diseases?
2. There are three variants of the APOE gene in the human population. Are they distributed equally worldwide?
3. Does Ridley advocate testing for genetic disorders, even when there is no cure?
4. According to Ridley, who owns your genetic information, you or the government?

### **Chromosome 20**

1. The PRP gene codes for what substance in the body?
2. How does this protein cause disease?
3. What human diseases are caused by these proteins?

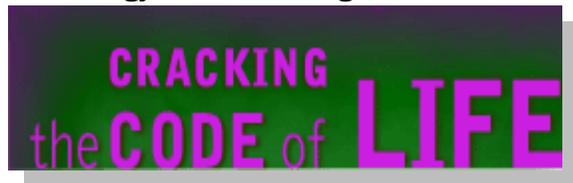
### **Chromosome 21**

1. What is the cause of Down syndrome?
2. What is **eugenics**?
3. Why is "eugenics" often now considered to be a "dirty word?"
4. Does Ridley see the problems of eugenics as "letting science get out of control?"

### **Chromosome 22**

1. What is the HFW gene?
2. Why does Ridley scorn environmental explanations of behavior as much as genetic explanations?
3. How is human behavior an example of the chaotic nature of biology?

## AP Biology Summer Assignment



View the PBS Series *Cracking the Code of Life* and compose a 50-word abstract (summary) for **EACH** of the 16 chapters using the prompts provided. Access the video series from the AP Biology page at [www.bridgestoliteracy.com](http://www.bridgestoliteracy.com) under the Links & Resources menu.

### Composing an Abstract

Abstracts are **NOT** summaries, they are concisely synthesized bodies of information extracted from a larger scientific article, lecture, experiment, etc. Abstracts are created **NOT** "found", so they do not include direct quotes and are always completely in the author's (that would be you) own words. You will be composing a 50-word abstract for each of the sixteen chapters found within this video series. You must address the writing prompts found beneath each chapters heading when composing your abstracts. The abstracts must be **EXACTLY** 50 words and it may help to number either above or below the words. This is an opportunity to show off your literary prowess and your ability to manipulate the language of science.

#### 1. Instructions for a Human Being running time 09:06

- Explain the storybook metaphor
- DNA's 4 billion years of history
- DNA - describe structure, chemical makeup, and function

#### 2. Getting the Letters Out running time 05:52

- Goal of the Human Genome Project (HGP)
- "1000 letters a second"
- Explain the critical use of technology

#### 3. One Wrong Letter running time 08:57

- What is Tay Sachs?
- What makes it an "incurable" disease?
- Explain what it means to be a carrier for a rare condition and why is important to know if you are a carrier?

#### 4. The Sequencing Race Begins running time 06:29

- Introduce scientist, Craig Venter
- Discuss an automated DNA-reading process
- Role of Celera Genomics in the HGP

#### 5. Ramping up running time 07:48

- How government teams responded to Venter's announcement
- Use of the internet in the dissemination of laboratory data
- **Question:** Is the HGP a necessary public investment? Why or why not?

#### 6. Genetic Variation running time 06:33

- Whose code is it?
- How similar are humans?
- Sharing genes with a banana...**Explain?**

**7. Who Owns the Genome?** running time 07:52

- Making history
- Discuss arguments for and against patenting the genomic code
- The effects of patenting on drug companies

**8. The Business of Science** running time 04:06

- Who is "profiting" from the genome?
- Discuss Celera's business plan
- Describe recent changes in the viewpoints of members of the scientific community

**9. Finding Cures is Hard** running time 08:07

- What is cystic fibrosis (CF)?
- Explain how genes determine proteins
- Function of proteins influenced by their 3-dimensional shapes

**10. Complexity in Proteins** running time 07:44

- An atypical CF patient
- What is the proteome?
- Only twice as many genes as a fruit fly?

**11. The Finish Line** running time 04:32

- All 3 billion letters
- The effects of the pressure of competition
- A new beginning and direction in science

**12. Finding Disease Genes** running time 04:06

- Scientific process involved in identifying the genes responsible traits like baldness
- Iceland and "all in the family"....**Explain?**
- Use of DeCODE's giant DNA database

**13. DNA Databases** running time 04:14

- DNA or genetic testing reveals passages written in our "*future diary*"...**describe how?**
- What is GATTACA?
- Gene chips + newborns?

**14. A Family Disease** running time 08:05

- Link between ovarian and breast cancer
- Discuss BRCA 1 and 2 mutations
- Explain the results of Lissa's & Lori's tests

**15. Genetic Modification** running time 04:27

- Enhancing your kids...Would **YOU??**
- Safety of genetically modified foods
- Explain what it means to take genetic modification too far

**16. Contemplating the Message** running time 07:58

- Again, who owns the genome?
- Genes are unevenly distributed
- **Conclusion:** All life is connected!! Cite information from this summer's reading and viewing to support your positions.