

# Sample Term Paper Topics

Biology Today: An Issues Approach, third edition

## NOTES:

1. These are examples of possible term paper topics. We urge that students be encouraged to look at these suggestions and then select topics of their own choosing. The list, in other words, is not intended to be restrictive.
2. Please also consider the thought questions at the end of each topic section in the book. Many of these thought questions can serve as the basis for a paper topic.

## Chapter 1:

The Cope-Marsh feud  
Lysenko and his legacy  
Science in 17th century England  
Traditional science and medicine in China  
Read at least two books on animal rights. Characterize each major argument in terms of either deontological or utilitarian ethics, then identify the ethical assumptions that underlie the arguments. Should hunting be banned in places where it is currently legal?

## Chapters 1 & 2:

The role of Rosalind Franklin in the discovery of DNA — interpretations of J. D. Watson and Anne Sayre

## Chapter 2:

Mendel's predecessors  
T.H. Morgan and the Columbia school of genetics  
H.J. Muller: mutations and genetic load  
Barbara McClintock  
E.E. Just's studies on fertilization

The structure of tRNA  
Klinefelter's syndrome  
Turner's syndrome  
Fragile X syndrome  
XYY syndrome

## Chapters 2 & 5:

Dobzhansky and evolutionary genetics

## Chapter 3:

The structure of tRNA  
Tay-Sachs disease  
Lesch-Nyhan syndrome  
The eugenics movement in the United States  
Chondrodystrophic dwarfism  
The use of twins in genetic research  
Ethical issues surrounding genetic testing  
Genetic testing: the stance of at least two organized religions and their ethical arguments  
The ethical and legal problems of surrogate pregnancy  
RFLPs and their uses  
Discuss the differences between the terms "human variation" and "genetic defect"  
Hemophilia  
Down's syndrome  
Newborn screening  
Is alcoholism inherited?  
Genetic screening  
Artificial insemination  
Bioethics

Duchenne muscular dystrophy  
Phenylketonuria  
Cystic fibrosis

#### Chapters 3 & 8:

Genetic control of behavior

#### Chapters 3 & 13:

Huntington's disease: molecular genetics and neurobiology

#### Chapter 4:

Gene transplants & gene therapy  
The human genome project  
DNA fingerprinting  
Thomas Jefferson's genetic legacy  
Comparing DNA sequences  
Comparing protein sequences  
Bioinformatics: why the need?  
Bioinformatics: how it's done

#### Chapters 4 & 6:

The Molecular clock hypothesis

#### Chapter 5:

The Galapagos Islands and their inhabitants  
The Scopes trial of 1925  
The Arkansas Balanced Treatment Act and Judge Overton's decision  
Paley's Natural Theology  
Geoffroy and Lamarck  
Cephalopods and their evolution  
Mimicry in insects— natural occurrence and experiments  
Symbiotic adaptations  
Imperfect adaptations  
The Irish elk  
Size and scaling in vertebrates  
Distribution of species on islands  
Birds of Hawaii  
Reproductive isolation  
Character displacement  
Imperfect speciation  
Dryopithecus

#### Chapters 5 & 6:

Archaeopteryx and the origin of birds

#### Chapters 5 & 11:

Adaptations of flowers for pollination

#### Chapter 6:

Theories of classification from Linnaeus to cladistics  
How many kingdoms? History of the problem.  
Lynn Margulis and the origin of eucaryotic cells  
The Archaeobacteria  
New classifications of bacteria  
Cyanobacteria  
Origin of angiosperms  
Foraminifera  
Corals and coral reefs  
Fungi and their life cycles  
Algae, their pigments, and their evolution  
Parasite life cycles  
The Burgess Shale  
Segmentation in body structure  
The origin of insect flight  
Early vertebrates  
The transition from water to land  
The evolution of mammals from reptiles  
The evolution of birds from dinosaurs  
New classifications of mammals  
Dryopithecus  
The life of Australopithecus  
Attempts to date the divergence between humans and apes

#### Chapter 7:

Do human differences in physique and in tolerance to extremes of heat, cold, and dryness make certain people more likely (or less likely) to excel in certain sports activities? (Be sure also to consider social factors, such as opportunities to experience certain sports and to practice and learn them.)  
Among scientists who recognize races, is there any agreement as to how many races there are?  
The IQ controversy  
The Rh blood groups  
Blood groups and other genes in religiously isolated populations (e.g., Dunkers, Hutterites, Hasidic Jews, etc.)  
Using genetics to trace human migrations of past centuries  
Favism and G6PD deficiency  
Inuit diets, health, and adaptations  
Carleton Coon and his theories  
Origin of Native Americans  
Origin of Pacific Islanders  
Thalassemia today  
Bergmann's & Allen's rules  
Published U.N. statements on race  
Select a group of people treated as a race by society (or by government), but for which you think biology offers no reason for recog-

nizing such a distinction; then document how you think the various concepts of race pertain to this group.

Discovery of sickle cell anemia

Treatment of sickle cell anemia

Measuring human gene flow

Joseph Greenberg's family tree of human languages

Do language groups correspond to genetically different groups?

Khoisan (Bushmen & Hottentot) peoples

## Chapter 8:

The opposition to sociobiology— what motivates it?

Can sociobiology findings be applied from other species to humans?

How far?

Konrad Lorenz: his work and his theories

Territorial behavior in various species

Alarm signals as altruism

Varieties of social organization among birds

Instinct: what evidence exists for various behaviors so labeled?

Studies of social behavior in gulls

Social behavior in stickleback fish

Stages by which social behavior evolved among Hymenoptera

Species in which sexual and asexual generations both occur

Mating systems among mammals

Adult size differences between male and female vertebrates

Infanticide among nonhuman primates

Is feminism compatible with sociobiology? (Some early feminists were hostile to sociobiology, while others, like Sarah Hrdy, have more recently developed feminist lines of research within sociobiology.)

Sarah Hrdy's studies on langur monkeys

Do humans have instincts?

Importance of reflexes in babies

Sociobiological explanations of altruism

Social ants

Termites

Polygyny among animals

Monogamy among animals

Hermaphroditism

K-selected species

Size of social units (herds, etc.)

Social organization of whales

Social organization among ungulates

Social organization among birds

Fish schooling

Jane Goodall's studies of chimpanzees

A review of Hrdy's book, *The Woman who Never Evolved*, and the issues it raises

Is alcoholism inherited?

Is sexual orientation genetic?

Alloparental behavior

The Cinderella syndrome

Rape: why it occurs, why it is as uncommon as it is, and why every society condemns it and punishes rapists

## Chapter 9:

China's efforts at population control

India's population control program

Margaret Sanger— a complex person

Gandhi's influence on the birth control movement

Malthus and the sources of his ideas

Zero population growth— can it be attained?

Vasectomy and vasectomy reversal

What keeps  $r$  so much higher in Africa and the Middle East than in East Asia or Latin America? (You might wish to compare some specific countries from these regions.)

Birth control pills and their side effects

RU-486: a controversial drug

The educational status of women in poor countries, and its effect on population growth

Population growth and colonialism

Annie Besant

Isaiah Berlin's studies

IUDs

Misoprostol

The complexities of *Roe v Wade*

New hormonal patches

## Chapter 10:

The structure of cell membranes in various types of cells

Membrane fluidity: the role of cholesterol and of different types of fatty acids

How membrane channel proteins were discovered

Internal structure of the small intestine

The liver's many functions

High blood pressure and its possible causes

Atherosclerosis

Sugar as a nutritional villain— both sides of the issue

Starches and other complex carbohydrates

What makes fat people fat? (Examine at least 2-3 theories)

How Hans Krebs figured out the Krebs cycle

Niacin and pellagra

Christiaan Eijkman and the discovery of thiamine

Albert Szent-Georgyi's work on vitamin C. (You might broaden this topic to include British naval history and the long interval between discovery and implementation of experimental results.)

What do we really know about vitamin E?

Iodine and goiter

Fluoride and the fluoridation controversies of the 1960s

Lactose intolerance in different parts of the world  
Anorexia and its causes  
Agriculture, famine, and malnutrition in Africa  
Nutritional effects of poverty in countries with adequate food supplies  
Vitamin pills: waste or necessity?  
Food preservatives  
Cholesterol  
Vegetarian diets  
Should we stop eating meat?  
Vitamin A and beta-carotene  
Food fads  
Food additives  
Dietary fiber  
Sugar and hyperactivity  
Organically grown foods: are they really better?  
Obesity  
Bulimia  
Antioxidants  
Testing “alternative” medicines  
The “French Paradox”— testing the hypotheses

### Chapter 11:

The variety of photosynthesis systems among bacteria  
Photosynthetic pigments among algae and algal classification  
C3, C4, and CAM plants  
How roots absorb water  
Alkaloids  
Symbiosis among lichens  
Introducing leguminous plants to new places  
Conserving soil  
Developing better pesticides  
The Green Revolution  
Genetically engineered fruits & vegetables  
How photosynthesis is studied  
Mycorrhizae  
Hydroponics  
Drip irrigation  
Plasmids in plant genetic engineering  
Biodegradable pesticides  
Uses for corn stalks and other nonedible plant parts  
George Washington Carver  
Potatoes and history  
Flavr-Savr tomatoes  
Jeremy Rifkin and his objections to plant genetic engineering

### Chapter 12:

Growth factors and other cytokines important in cell division  
Anchorage dependence and how it works

Receptor proteins and second messengers  
What promoter sequences look like  
Cancer rates in different countries  
The geography of cancers in the U.S.  
Cancer rates among African-Americans— unraveling possible causes  
Risk factors in breast cancer  
At what age should women receive regular mammograms? How has this guideline been established? What evidence should be used?  
Protooncogenes  
The Ames test— its uses and its limitations, and what Bruce Ames thinks about how it is used  
The two-hit theory  
The Laetrile controversy— how should such drugs be evaluated?  
Prostate cancer  
Leukemia

### Chapter 13:

The cerebellum and its functions  
The basal ganglia and their functions  
The blood-brain barrier  
The sodium-potassium pump and the evidence for its existence  
The use of fetal tissue in Parkinsonism  
Drugs to treat Parkinsonism— what are their limitations?  
Why is depression more common in women than in men?  
Drugs to treat depression: why are they so controversial?  
Experiments on REM sleep and sleep deprivation  
Circadian rhythms and isolation experiments  
The hippocampus and its role in memory  
How nerve impulses are studied  
Inhibitory neurotransmitters  
Chemistry of neurotransmitters  
What causes Alzheimer’s disease?  
Language areas in the brain  
Brain asymmetry  
What causes depression?  
What causes schizophrenia?  
Can we alter our sleep rhythms?  
Melatonin: can its claimed benefits be substantiated?  
The neuroglia  
Strokes  
Are men’s and women’s brains the same?  
The ear and its function

### Chapter 14:

Social factors, economics, and gender in cigarette smoking  
Alcohol prohibition in the U.S.— a model for other drugs?  
History of marijuana use

Opium abuse and the opium wars  
Harm reduction programs in Europe  
Chocolate— food of the gods  
Why different penalties for different forms of cocaine?  
Genetic differences in alcohol metabolism among people  
Effects of caffeine during pregnancy  
Reprogramming the brain's pleasure centers  
Fetal alcohol syndrome  
Metabolism of drugs  
Nicotine as a drug  
Laws about classifying drugs  
Giving up addictive drugs  
Can addiction be suppressed?  
The controversy over methadone  
British (and Swiss, and other European) heroin laws  
Newborn addictions  
Possible medical uses of marijuana  
The legal status of marijuana around the world and around the U.S.

#### Chapter 15:

The process of phagocytosis  
How the great variety of antigen receptors is generated  
Evidence for the theory of population selection in immunity  
How is an immune response "turned off"?  
How do vaccines work?  
Why don't all countries require the same vaccinations?  
How long do the benefits of vaccination last?  
Do vaccinations have harmful consequences? How do we balance risks and benefits?  
Elie Metchnikoff and his work  
Autoimmune diseases  
Hans Selye and his work  
The relaxation response  
"Fight or flight" in men versus women  
Stress and its effects on health  
Allergies  
Immunological effects of alternative healing methods and of prayer

#### Chapter 16:

T-cell leukemia viruses  
Monoclonal antibodies and their many uses  
Robert Koch and his work  
Peter Duesberg's objections to the theory that HIV causes AIDS  
Different kinds of viral life cycles  
Changing patterns of AIDS incidence  
The AIDS epidemic in different countries  
Theories of the evolution of virulence

Educating the public about AIDS: what works and what doesn't?  
Public health campaigns against diseases in earlier eras: polio or tuberculosis or yellow fever compared with AIDS  
Possibility of an AIDS vaccine  
Availability of anti-HIV drugs in Africa  
Trends in AIDS rates in various populations  
Diseases that make AIDS more likely

#### Chapter 17:

Bubonic plague  
The Influenza epidemic of 1917-1918  
Ebola and its discovery  
SARS and how it spread  
The return of tuberculosis  
Legionnaire's disease  
Antibiotic resistance in bacteria

#### Chapters 17 & 19:

Giardia  
Cryptosporidium  
Cyclospora

#### Chapter 18:

Ecosystem stability and the concept of keystone species  
Mass extinctions and their possible causes  
How do we know which species are endangered?  
Where have people succeeded in preventing rainforest destruction?  
How did they do it? Can they do it elsewhere?  
How can desertification be halted?  
Sustainable agriculture in the tropics  
Ecotourism done right and ecotourism done wrong  
Natural history of snakes  
Rainforest amphibians  
Beneficial insects  
Dinosaurs and their extinction  
Elephants: will they become extinct?  
Passenger pigeons  
Natural history of whales  
The Florida Everglades  
Aquaculture  
Should clearcutting be banned?  
Should predators (like wolves and grizzly bears) be protected?  
Wildlife in the suburbs (deer, raccoons, coyotes, other species)  
Biomes  
Fishing and overfishing in Atlantic waters  
Hummingbirds  
Orchids  
Symbiotic associations

Coral reefs

Cretaceous extinctions

Extinctions caused by humans

## Chapters 18 & 19:

Preserving water resources

## Chapter 19:

The Rowell-Molina theory of ozone depletion

Alexander Oparin and his theory

The oldest fossils

Acid rain and other forms of acid deposition

Airborne pollution across political borders

Bioremediation of oil spills

Wastewater treatment past and present

The Antarctic ozone hole

Monitoring CO<sub>2</sub> and global temperatures

Attitudes on global warming in rich versus poor nations