

Sample Term Paper Topics

Biology Today: An Issues Approach, third edition

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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
Kleinfelter'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

Sample Term Paper Topics

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 recognizing 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 Hardy, have more recently developed feminist lines of research within sociobiology.)
 Sarah Hardy'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 Hardy'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

Sample Term Paper Topics

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

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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

Sample Term Paper Topics

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 CO₂ and global temperatures
Attitudes on global warming in rich versus poor nations