***Zoology*, 11th edition by Miller and Tupper—Answers to chapter questions**

**Chapter 1 Answers**

Thinking beyond the Facts

1.2 Evolutionary relationships are ideally reflected in taxonomy. Closely related animals share taxonomic classification categories. These relationships are ultimately based on shared DNA. Organisms that are more closely related have more DNA in common. Since most morphological characteristics are genetically based, when taxonomists study morphology they are studying genetic relationships. Both DNA and morphology can be used in establishing taxonomic relationships.

1.3 There are many examples. One example is the introduction of the zebra mussel (*Dreissena polymorpha*) into the United States in the 1980’s, probably being carried here in the ballast water of ships coming from Europe. The zebra mussel is a small bivalve native to southeast Russia. It lives as a filter feeder attached to firm substrates by strong protein (byssal) threads. In the United States the zebra mussel has become a serious threat to native mussels as it out-competes native mussels for food and substrate. The zebra mussel will often use the shells of other mussels as substrate for attachment, killing the native mussel. They also clog factory cooling intake pipes. These invaders first appeared in the Great Lakes in 1988 and have spread throughout the Great Lakes and into the Mississippi River drainage.

Concept Review Questions

1. e

2. b

3. d

4. c

5. d

6. b

Analysis and Application Questions

1. Biology is the study of life. Zoology is the study of one of the major kingdoms of life, the Animalia. In addition to evolution and ecology, all life (thus biology and zoology) is united by common genetic molecules (DNA and RNA), and a common unit of organization—the cell.

2. Current issues that involve both zoology and questions of ethics and public policy are far reaching. These issues include species preservation, habitat destruction, human population growth, the teaching of evolution in public schools, animal rights, and many others. Zoologists are united as scientists. Zoologists can inform public policy debates by providing accurate information on animals, the environment, evolutionary processes, and many other topics. Zoologists have a responsibility to convey information and application strategies as clearly and as accurately as possible to the public and public institutions. At the same time, zoologists are a diverse group of scientists with different world views. We can expect differences of opinion among zoologists in the light of insufficient data and differing world views.

3. Some solutions to environmental problems seem simpler than they really are because most of us live in countries where the standard of living makes ecological choices either easy or at least not a matter of immanent life or death. In many less developed countries, day-to-day survival choices are not necessarily ecologically minded. Cultures that have been sustained by hunting species that are now endangered or clearing tropical forests for agricultural use will not change simply because zoologists in developed countries tell them they need to change. Partnership with less developed countries can show how preservation will provide resources that will benefit these countries.

4. The story of cichlids in Lake Victoria documents how issues of day-to-day survival in less developed countries can lead to wide-ranging environmental degradation. It emphasizes the interconnected nature of ecological systems and how disturbing these systems can have consequences that are more severe than the original problem. We can all learn from this account and not repeat it in the future.

**Miller/Tupper: Zoology 11e**

**Instructor’s Manual**

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**Chapter Summary**

Zoology, the study of animals, is a subset of the broad discipline of biology. Animals demonstrate incredible diversity which necessitates numerous sub disciplines for their study. Within the subdisciplines of Zoology, scientists may further specialize to study the functional, structural, or ecological aspects of particular groups. Later lectures will cover animal cells and whole animals in more detail.

An awareness of the common evolutionary origin of all animals allows us to explain the structures and functions of animals living now. The first living organisms possessed certain features that they passed on to their descendants; the descendant populations maintained some of these characteristics and others were modified through evolution. Subsequent populations of descendants evolved in different ways, changing size, shape and many other features in response to natural selection. The animals living today possess some features maintained from the distant past (often referred to as plesiomorphic characters), as well as certain sets of more recently evolved characters (synapomorphic characters).

The particular features that are shared among groups of animals (similar morphological features or DNA sequences, to name two) are used as the basis for animal classification. The current classification scheme is based on the work of Carl von Linne: his binomial nomenclature is used to give a genus (first word) and species epithet (second word) for every living organism (referred to as a taxon). The names used in classification above the genus level (e.g., family, class, or phylum) group organisms together according to the degree of shared ancestry as indicated by shared features. Taxonomic groups should reflect the evolutionary relationships among and between taxa.

Zoology encompasses many sub-disciplines, ranging from entomology to ornithology.

The sub-disciplines may be created on the basis of particular taxa (e.g., ichthyology is the study of fishes) or by particular approaches (e.g., physiology is the study of the functions of organisms and their parts).

Animals are intimately linked to their environment. The interaction between animals and their environment, in the broadest sense of the term, is studied in ecology. Many animals share an environment, using it as a source of resources such as shelter, food, water and mates. Human populations grow very rapidly, so humans have spread to most parts of the earth, impacting the environments of almost all living things. Data on the major contributors to anthropogenic greenhouse gas emissions demonstrate the impacts of individual countries on the total CO2 produced across the planet. As humans use and degrade the environment, fewer resources are available to the myriad of other life forms on earth (collectively referred to as biodiversity).