

22

Descent with Modification: A Darwinian View of Life

KEY CONCEPTS

- 22.1** The Darwinian revolution challenged traditional views of a young Earth inhabited by unchanging species.
- 22.2** Descent with modification by natural selection explains the adaptations of organisms and the unity and diversity of life.
- 22.3** Evolution is supported by an overwhelming amount of scientific evidence.

AP® **Big Idea 3:** The study of biological evolution, with its study in a variety of disciplines, is supported by a combination of data collection, its support by scientific evidence from many disciplines, the use of mathematical models (Big Idea 1) and DNA technology (Big Idea 2).

▲ Figure 22.1 How is this caterpillar protecting itself from predators?

Endless Forms Most Beautiful

A hungry bird would have to look very closely to spot this caterpillar of the moth *Synchlora ornata*, which blends in well with the flowers on which it feeds. The disguise is enhanced by the caterpillar's flair for “decorating” itself. It gives pieces of flower petals to its body, transforming itself into its own background (Figure 22.1).

This distinctive caterpillar is a member of a diverse group, the more than 120,000 species of lepidopteran insects (moths and butterflies). All lepidopterans go through a juvenile stage characterized by a well-developed head and many chewing mouthparts: the ravenous, efficient feeding machines we call caterpillars. As adults, all lepidopterans share other features, such as three pairs of legs and two pairs of wings covered with small scales. But the many lepidopterans also differ from one another. How did there come to be so many different moths and butterflies, and what causes their similarities and differences? The self-decorating caterpillar and its many close relatives illustrate three key observations about life:

- the striking ways in which organisms are suited for life in their environments*
- the many shared characteristics (unity) of life
- the rich diversity of life

*I have said throughout this AP® Biology course that evolution refers to other organisms as well as to the genetic and DNA of an organism's surroundings.



Biology Guide Descent With Modification Key

William John Dakin



Biology Guide Descent With Modification Key:

Instructor's Guide for Campbell's Biology Nina Caris, Harold T. Underwood, 1996 **Your Inner Fish** Neil Shubin, 2009-01-06 The paleontologist and professor of anatomy who co discovered Tiktaalik the fish with hands tells a compelling scientific adventure story that will change forever how you understand what it means to be human Oliver Sacks By examining fossils and DNA he shows us that our hands actually resemble fish fins our heads are organized like long extinct jawless fish and major parts of our genomes look and function like those of worms and bacteria Your Inner Fish makes us look at ourselves and our world in an illuminating new light This is science writing at its finest enlightening accessible and told with irresistible enthusiasm **Bio Class Notes** Nina Caris, Nina Chris, 1993 **Behavior and Culture in One Dimension** Dennis Waters, 2021-03-08 Behavior and Culture in One Dimension adopts a broad interdisciplinary approach presenting a unified theory of sequences and their functions and an overview of how they underpin the evolution of complexity Sequences of DNA guide the functioning of the living world sequences of speech and writing choreograph the intricacies of human culture and sequences of code oversee the operation of our literate technological civilization These linear patterns function under their own rules which have never been fully explored It is time for them to get their due This book explores the one dimensional sequences that orchestrate the structure and behavior of our three dimensional habitat Using Gibsonian concepts of perception action and affordances as well as the works of Howard Pattee the book examines the role of sequences in the human behavioral and cultural world of speech writing and mathematics The book offers a Darwinian framework for understanding human cultural evolution and locates the two major informational transitions in the origins of life and civilization It will be of interest to students and researchers in ecological psychology linguistics cognitive science and the social and biological sciences **Mapping Our Ancestors** Stephen Shennan, 2017-07-12 Much of what we are comes from our ancestors Through cultural and biological inheritance mechanisms our genetic composition instructions for constructing artifacts the structure and content of languages and rules for behavior are passed from parents to children and from individual to individual Mapping Our Ancestors demonstrates how various genealogical or phylogenetic methods can be used both to answer questions about human history and to build evolutionary explanations for the shape of history Anthropologists are increasingly turning to quantitative phylogenetic methods These methods depend on the transmission of information regardless of mode and as such are applicable to many anthropological questions In this way phylogenetic approaches have the potential for building bridges among the various subdisciplines of anthropology an exciting prospect indeed The structure of Mapping Our Ancestors reflects the editors goal of developing a common understanding of the methods and conditions under which ancestral relations can be derived in a range of data classes of interest to anthropologists Specifically this volume explores the degree to which patterns of ancestry can be determined from artifactual genetic linguistic and behavioral data and how processes such as selection transmission and geography impact the results of

phylogenetic analyses Mapping Our Ancestors provides a solid demonstration of the potential of phylogenetic methods for studying the evolutionary history of human populations using a variety of data sources and thus helps explain how cultural material language and biology came to be as they are **Symposium** ,2009 *Biology/science Materials* Carolina Biological Supply Company,1991 The Evolution of Cultural Diversity Ruth Mace,Clare J Holden,Stephen Shennan,2016-09-16 Virtually all aspects of human behavior show enormous variation both within and between cultural groups including material culture social organization and language Thousands of distinct cultural groups exist about 6 000 languages are spoken today and it is thought that a far greater number of languages existed in the past but became extinct Using a Darwinian approach this book seeks to explain this rich cultural variation There are a number of theoretical reasons to believe that cultural diversification might be tree like that is phylogenetic material and non material culture is clearly inherited by descendants there is descent with modification and languages appear to be hierarchically related There are also a number of theoretical reasons to believe that cultural evolution is not tree like cultural inheritance is not Mendelian and can indeed be vertical horizontal or oblique evidence of borrowing abounds cultures are not necessarily biological populations and can be transient and complex Here for the first time this title tackles these questions of cultural evolution empirically and quantitatively using a range of case studies from Africa the Pacific Europe Asia and America A range of powerful theoretical tools developed in evolutionary biology is used to test detailed hypotheses about historical patterns and adaptive functions in cultural evolution Evidence is amassed from archaeological linguist and cultural datasets from both recent and historical or pre historical time periods A unifying theme is that the phylogenetic approach is a useful and powerful framework both for describing the evolutionary history of these traits and also for testing adaptive hypotheses about their evolution and co evolution Contributors include archaeologists anthropologists evolutionary biologists and linguists and this book will be of great interest to all those involved in these areas **Biodiversity Assessment Review** Anthony Clive Jermy,Great Britain. Dept. of the Environment,1996 This manual represents a working tool for those who wish to develop national strategies to conserve and sustainably use biodiversity in their own countries It shows the resources available in the UK in terms of specimens and resources **The Tangled Bank** Carl Zimmer,2010 Carl Zimmer carlzimmer.com is one of the countrys leading science writers A regular contributor to the New York Times and magazines like Scientific American and Discover he is the author of six books including Evolution The Triumph of an Idea and Parasite Rex He has won numerous awards from institutions including the National Academy of Sciences the American Association for the Advancement of Science and the American Institute of Biological Sciences EO Wilson says The Tangled Bank is the best written and best illustrated introduction to evolution of the Darwin centennial decade and also the most conversant with ongoing research It is excellent for students the general public and even other biologists *The American Biology Teacher* ,1993 Handbook for Critical Reading Don Meagher,1997 The Handbook for Critical reading is designed to teach students

how to understand a piece of writing and to think about it analytically Although it gives examples and models of each reading skill it allows students to use their own reading materials textbooks newspapers anthologies and novels to practice their reading skills The student or teacher can determine the reading practice that is most relevant to each student and use that to practice reading skills This unique book has some of the best available coverage of inference figurative language fact opinion author bias and argument analysis

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