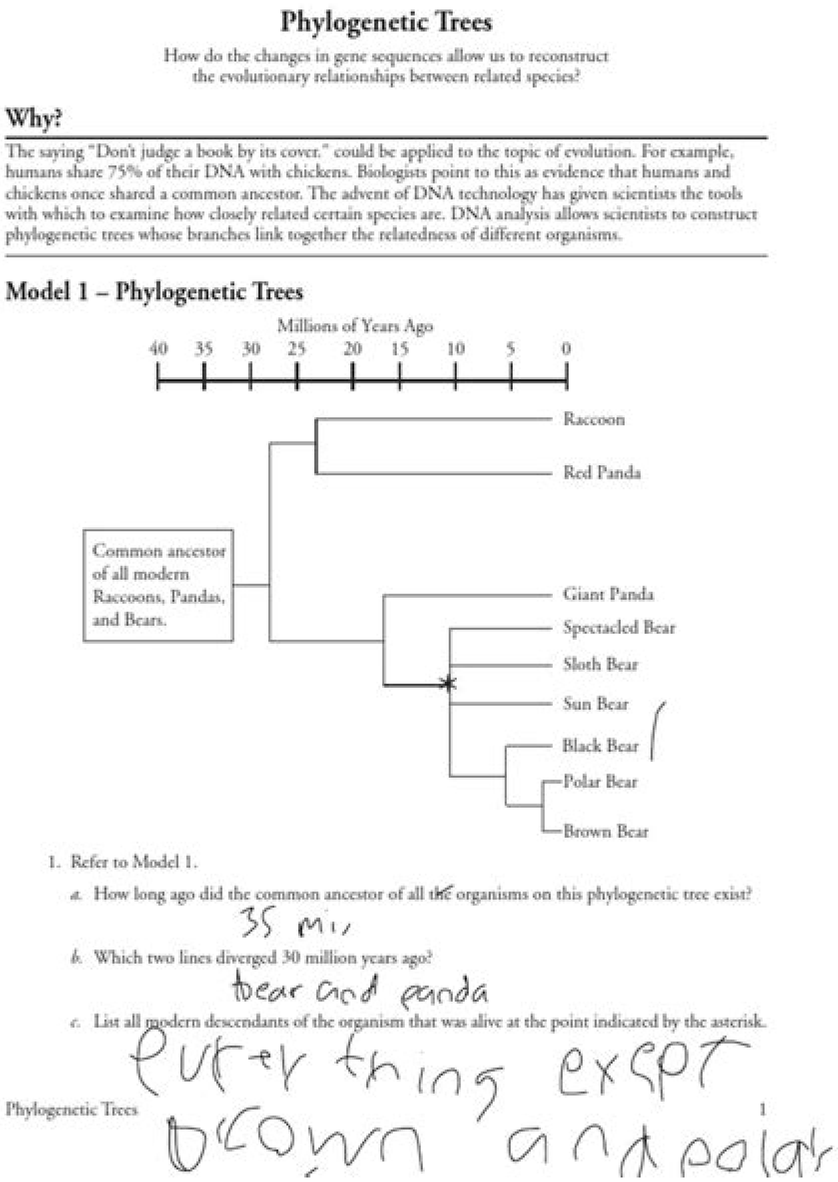
Phylogenetic Trees Pogil Answer Key



Phylogenetic Trees

How do the changes in gene sequences allow us to reconstruct
the evolutionary relationships between related species?

Why?

The saying "Don't judge a book by its cover." could be applied to the topic of evolution. For example, humans share 75% of their DNA with chickens. Biologists point to this as evidence that humans and chickens once shared a common ancestor. The advent of DNA technology has given scientists the tools with which to examine how closely related certain species are. DNA analysis allows scientists to construct phylogenetic trees whose branches link together the relatedness of different organisms.

Model 1 – Phylogenetic Trees

1. Refer to Model 1.
   a. How long ago did the common ancestor of all the organisms on this phylogenetic tree exist?
   35 mi,
   b. Which two lines diverged 30 million years ago?
   bear and panda
   c. List all modern descendants of the organism that was alive at the point indicated by the asterisk.
   evrey thing exspt brown and polar

Phylogenetic Trees 1

Phylogenetic Trees Pogil Answer Key: Mastering Evolutionary Relationships

Are you struggling to decipher the intricacies of phylogenetic trees? Feeling lost in the branches and nodes of evolutionary history? This comprehensive guide provides a deep dive into understanding phylogenetic trees, using the popular Pogil activities as a springboard. We won't just give you the answers; we'll equip you with the knowledge and skills to confidently interpret and construct phylogenetic trees yourself. This post offers explanations, strategies, and a deeper understanding of the concepts behind the Phylogenetic Trees Pogil answer key, ensuring you truly grasp the material rather than just memorizing solutions.

Understanding Phylogenetic Trees: A Foundation

Before we dive into specific Pogil answers, let's establish a strong foundation in phylogenetic tree terminology and interpretation. Phylogenetic trees, also known as cladograms or evolutionary trees, visually represent the evolutionary relationships between different species or groups of organisms. They depict the hypothesized evolutionary history, showing how organisms are related through common ancestors.

Key Components of Phylogenetic Trees:

Nodes: These represent common ancestors where lineages diverge.
Branches: These represent lineages evolving over time. Branch length can sometimes, but not always, indicate the amount of evolutionary change.
Tips/Taxa: These are the terminal ends representing the extant (currently living) or extinct organisms being compared.
Root: This indicates the most recent common ancestor of all the organisms in the tree. Not all trees have a clearly identified root.

Deciphering the Pogil Activities: A Step-by-Step Approach

The Pogil activities on phylogenetic trees are designed to be challenging, encouraging critical thinking and problem-solving. They often present data, such as morphological characteristics or molecular sequences, and require you to construct or interpret a phylogenetic tree based on that information. Instead of providing a simple "answer key," this guide focuses on the process of answering the questions.

Analyzing Character Data:

A common type of Pogil activity involves analyzing character data (shared characteristics). The key is to identify shared derived characteristics (synapomorphies), traits that evolved in a common ancestor and are shared by its descendants. These characteristics are crucial for grouping organisms together on the tree. Look for patterns – which characteristics are unique to certain groups, and which are shared among multiple groups?

Constructing a Phylogenetic Tree:

Once you have identified shared derived characteristics, you can start building the tree. Begin by grouping organisms with the most shared derived characteristics. As you add more organisms and characteristics, the tree will become more complex, reflecting the evolutionary relationships. Remember that there might be multiple equally valid ways to construct a tree, depending on the data and the assumptions made.

Interpreting Existing Phylogenetic Trees:

Some Pogil activities will present you with a pre-constructed phylogenetic tree and ask you to interpret it. Focus on the branching patterns. What groups are closely related? What are the evolutionary relationships between different organisms? Understanding the meaning of nodes and branches is essential for this type of activity.

Beyond the Answers: Developing Critical Thinking Skills

The true value of the Pogil activities lies not in finding the "answer key" but in developing your critical thinking skills related to phylogenetic analysis. By actively engaging with the data and the challenges posed by the activities, you’ll significantly improve your understanding of evolutionary relationships and scientific reasoning.

Addressing Common Challenges in Phylogenetic Tree Analysis

Understanding the limitations of phylogenetic trees is crucial. Phylogenetic trees are hypotheses, not definitive statements of evolutionary history. The tree's accuracy depends on the quality and completeness of the data used. Missing data or incorrect interpretations of characters can lead to inaccurate trees. Furthermore, the evolutionary processes themselves are complex and can result in ambiguous relationships.

Conclusion

Mastering phylogenetic trees requires a combination of theoretical understanding and practical application. While this guide doesn't provide a direct "Phylogenetic Trees Pogil answer key," it offers a framework for tackling the activities effectively. By focusing on understanding the concepts, analyzing data critically, and developing problem-solving skills, you'll not only successfully complete the Pogil activities but also gain a deep appreciation for the fascinating world of evolutionary biology.

Frequently Asked Questions (FAQs)

Q1: Where can I find the Pogil activities on phylogenetic trees?

A1: Pogil activities are often available through educational institutions or online resources. Search for "Phylogenetic Trees Pogil Activities" to find relevant materials.

Q2: What if I get a different phylogenetic tree than the "answer key"?

A2: Multiple valid phylogenetic trees can exist, depending on the data used and the assumptions made. If your tree is supported by the data and the analysis, it's likely correct.

Q3: How do I deal with ambiguous characters in phylogenetic analysis?

A3: Ambiguous characters can be addressed by using additional data, employing different analytical methods, or acknowledging the uncertainty in the tree.

Q4: Are branch lengths always proportional to evolutionary time?

A4: No, branch lengths sometimes represent the amount of evolutionary change, not necessarily time. This depends on the method used to construct the tree.

Q5: What software can I use to create and visualize phylogenetic trees?

A5: Various software packages are available, including free and open-source options like MEGA X and online tools like iTOL.

phylogenetic trees pogil answer key: Tree Thinking: An Introduction to Phylogenetic Biology David A. Baum, Stacey D. Smith, 2012-08-10 Baum and Smith, both professors evolutionary biology and researchers in the field of systematics, present this highly accessible introduction to phylogenetics and its importance in modern biology. Ever since Darwin, the evolutionary histories of organisms have been portrayed in the form of branching trees or “phylogenies.” However, the broad significance of the phylogenetic trees has come to be appreciated only quite recently. Phylogenetics has myriad applications in biology, from discovering the features present in ancestral organisms, to finding the sources of invasive species and infectious diseases, to identifying our closest living (and extinct) hominid relatives. Taking a conceptual approach, Tree Thinking introduces readers to the interpretation of phylogenetic trees, how these trees can be reconstructed, and how they can be used to answer biological questions. Examples and vivid metaphors are incorporated throughout, and each chapter concludes with a set of problems, valuable for both students and teachers. Tree Thinking is must-have textbook for any student seeking a solid foundation in this fundamental area of evolutionary biology.

phylogenetic trees pogil answer key: The Beak of the Finch Jonathan Weiner, 2014-05-14 PULITZER PRIZE WINNER • A dramatic story of groundbreaking scientific research of Darwin's discovery of evolution that spark[s] not just the intellect, but the imagination (Washington Post Book World). “Admirable and much-needed.... Weiner’s triumph is to reveal how evolution and science work, and to let them speak clearly for themselves.”—The New York Times Book Review On a desert island in the heart of the Galapagos archipelago, where Darwin received his first inklings of the theory of evolution, two scientists, Peter and Rosemary Grant, have spent twenty years proving that Darwin did not know the strength of his own theory. For among the finches of Daphne Major, natural selection is neither rare nor slow: it is taking place by the hour, and we can watch. In this remarkable story, Jonathan Weiner follows these scientists as they watch Darwin's finches and come up with a new understanding of life itself. The Beak of the Finch is an elegantly written and compelling masterpiece of theory and explication in the tradition of Stephen Jay Gould.

phylogenetic trees pogil answer key: Preparing for the Biology AP Exam Neil A. Campbell, Jane B. Reece, Fred W. Holtzclaw, Theresa Knapp Holtzclaw, 2009-11-03 Fred and Theresa Holtzclaw bring over 40 years of AP Biology teaching experience to this student manual. Drawing on their rich experience as readers and faculty consultants to the College Board and their participation on the AP Test Development Committee, the Holtzclaws have designed their resource to help your students prepare for the AP Exam. Completely revised to match the new 8th edition of Biology by Campbell and Reece. New Must Know sections in each chapter focus student attention on major concepts. Study tips, information organization ideas and misconception warnings are interwoven throughout. New section reviewing the 12 required AP labs. Sample practice exams. The secret to success on the AP Biology exam is to understand what you must know and these experienced AP teachers will guide your students toward top scores!

phylogenetic trees pogil answer key: Lizards in an Evolutionary Tree Jonathan B. Losos, 2011-02-09 In a book both beautifully illustrated and deeply informative, Jonathan Losos, a leader in evolutionary ecology, celebrates and analyzes the diversity of the natural world that the fascinating anoline lizards epitomize. Readers who are drawn to nature by its beauty or its intellectual challenges—or both—will find his book rewarding.—Douglas J. Futuyma, State University of New York, Stony Brook This book is destined to become a classic. It is scholarly, informative, stimulating, and highly readable, and will inspire a generation of students.—Peter R. Grant, author of How and Why Species Multiply: The Radiation of Darwin's Finches Anoline lizards experienced a spectacular adaptive radiation in the dynamic landscape of the Caribbean islands. The radiation has extended over a long period of time and has featured separate radiations on the larger islands. Losos, the leading active student of these lizards, presents an integrated and synthetic overview, summarizing the enormous and multidimensional research literature. This engaging book makes a wonderful example of an adaptive radiation accessible to all, and the lavish illustrations, especially the photographs, make the anoles come alive in one's mind.—David Wake, University of California, Berkeley This magnificent book is a celebration and synthesis of one of the most eventful adaptive radiations known. With disarming prose and personal narrative Jonathan Losos shows how an obsession, beginning at age ten, became a methodology and a research plan that, together with studies by colleagues and predecessors, culminated in many of the principles we now regard as true about the origins and maintenance of biodiversity. This work combines rigorous analysis and glorious natural history in a unique volume that stands with books by the Grants on Darwin's finches among the most informed and engaging accounts ever written on the evolution of a group of organisms in nature.—Dolph Schluter, author of The Ecology of Adaptive Radiation

phylogenetic trees pogil answer key: Biology Workbook For Dummies Rene Fester Kratz, 2012-05-08 From genetics to ecology — the easy way to score higher in biology Are you a student baffled by biology? You're not alone. With the help of Biology Workbook For Dummies you'll quickly and painlessly get a grip on complex biology concepts and unlock the mysteries of this fascinating and ever-evolving field of study. Whether used as a complement to Biology For Dummies or on its own, Biology Workbook For Dummies aids you in grasping the fundamental aspects of Biology. In plain English, it helps you understand the concepts you'll come across in your biology class, such as physiology, ecology, evolution, genetics, cell biology, and more. Throughout the book, you get plenty of practice exercises to reinforce learning and help you on your goal of scoring higher in biology. Grasp the fundamental concepts of biology Step-by-step answer sets clearly identify where you went wrong (or right) with a problem Hundreds of study questions and exercises give you the skills and confidence to ace your biology course If you're intimidated by biology, utilize the friendly, hands-on information and activities in Biology Workbook For Dummies to build your skills in and out of the science lab.

phylogenetic trees pogil answer key: Discipline-Based Education Research National Research Council, Division of Behavioral and Social Sciences and Education, Board on Science Education, Committee on the Status, Contributions, and Future Directions of Discipline-Based Education Research, 2012-08-27 The National Science Foundation funded a synthesis study on the status, contributions, and future direction of discipline-based education research (DBER) in physics, biological sciences, geosciences, and chemistry. DBER combines knowledge of teaching and learning with deep knowledge of discipline-specific science content. It describes the discipline-specific difficulties learners face and the specialized intellectual and instructional resources that can facilitate student understanding. Discipline-Based Education Research is based on a 30-month study built on two workshops held in 2008 to explore evidence on promising practices in undergraduate science, technology, engineering, and mathematics (STEM) education. This book asks questions that are essential to advancing DBER and broadening its impact on undergraduate science teaching and learning. The book provides empirical research on undergraduate teaching and learning in the sciences, explores the extent to which this research currently influences undergraduate instruction, and identifies the intellectual and material resources required to further develop DBER. Discipline-Based Education Research provides guidance for future DBER research. In addition, the findings and recommendations of this report may invite, if not assist, post-secondary institutions to increase interest and research activity in DBER and improve its quality and usefulness across all natural science disciples, as well as guide instruction and assessment across natural science courses to improve student learning. The book brings greater focus to issues of student attrition in the natural sciences that are related to the quality of instruction. Discipline-Based Education Research will be of interest to educators, policy makers, researchers, scholars, decision makers in universities, government agencies, curriculum developers, research sponsors, and education advocacy groups.

phylogenetic trees pogil answer key: Phylogenetic Trees Made Easy: CD ROM Barry G. Hall, 2004

phylogenetic trees pogil answer key: Phylogeny Mike Steel, 2016-09-29 Phylogenetics is a topical and growing area of research. Phylogenies (phylogenetic trees and networks) allow biologists to study and graph evolutionary relationships between different species. These are also used to investigate other evolutionary processes?for example, how languages developed or how different strains of a virus (such as HIV or influenza) are related to each other. This self-contained book addresses the underlying mathematical theory behind the reconstruction and analysis of phylogenies. The theory is grounded in classical concepts from discrete mathematics and probability theory as well as techniques from other branches of mathematics (algebra, topology, differential equations). The biological relevance of the results is highlighted throughout. The author supplies proofs of key classical theorems and includes results not covered in existing books, emphasizes relevant mathematical results derived over the past 20 years, and provides numerous exercises, examples, and figures.

phylogenetic trees pogil answer key: Eco-evolutionary Dynamics Andrew P. Hendry, 2020-06-09 In recent years, scientists have realized that evolution can occur on timescales much shorter than the 'long lapse of ages' emphasized by Darwin - in fact, evolutionary change is occurring all around us all the time. This work provides an authoritative and accessible introduction to eco-evolutionary dynamics, a cutting-edge new field that seeks to unify evolution and ecology into a common conceptual framework focusing on rapid and dynamic environmental and evolutionary change.

phylogenetic trees pogil answer key: On the Origin of Species Illustrated Charles Darwin, 2020-12-04 On the Origin of Species (or, more completely, On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life),[3] published on 24 November 1859, is a work of scientific literature by Charles Darwin which is considered to be the foundation of evolutionary biology.[4] Darwin's book introduced the scientific theory that populations evolve over the course of generations through a process of natural selection. It presented a body of evidence that the diversity of life arose by common descent through a branching pattern of evolution. Darwin included evidence that he had gathered on the Beagle expedition in the 1830s and his subsequent findings from research, correspondence, and experimentation.

phylogenetic trees pogil answer key: Reconstructing the Tree of Life Trevor R. Hodkinson, John A.N. Parnell, 2006-12-26 To document the world's diversity of species and reconstruct the tree of life we need to undertake some simple but mountainous tasks. Most importantly, we need to tackle species rich groups. We need to collect, name, and classify them, and then position them on the tree of life. We need to do this systematically across all groups of organisms and b

phylogenetic trees pogil answer key: Phylogenetic Supertrees Olaf R.P. Bininda-Emonds, 2004-05-31 This is the first book on phylogenetic supertrees, a recent, but controversial development for inferring evolutionary trees. Rather than analyze the combined primary character data directly, supertree construction proceeds by combining the tree topologies derived from those data. This difference in strategy has allowed for the exciting possibility of larger, more complete phylogenies than are otherwise currently possible, with the potential to revolutionize evolutionarily-based research. This book provides a comprehensive look at supertrees, ranging from the methods used to build supertrees to the significance of supertrees to bioinformatic and biological research. Reviews of many the major supertree methods are provided and four new techniques, including a Bayesian implementation of supertrees, are described for the first time. The far-reaching impact of supertrees on biological research is highlighted both in general terms and through specific examples from diverse clades such as flowering plants, even-toed ungulates, and primates. The book also critically examines the many outstanding challenges and problem areas for this relatively new field, showing the way for supertree construction in the age of genomics. Interdisciplinary contributions from the majority of the leading authorities on supertree construction in all areas of the bioinformatic community (biology, computer sciences, and mathematics) will ensure that this book is a valuable reference with wide appeal to anyone interested in phylogenetic inference.

phylogenetic trees pogil answer key: Phylogenetic Trees Made Easy Barry G. Hall, 2001-01-01 A brief overview. Learn more about the principles. Computer programs discussed and where to obtain them. Programs that are not discussed but that might be useful. Download files and utilities from the web site. Some conventions used in this book. Tutorial: create a tree. Why create phylogenetic trees. Otaining related sequences by a BLAST search. Creating the multiple alignment. Phylogenetic analysis. Methods for constructing phylogenies. Using PAUP* to create a tree. Additional methods for creating trees. Presenting and printing your trees. Fine-tuning alignments. Using MrBayes to reconstruct ancestral DNA sequences. Dealing with some common problems. File formats and their interconversion using PAUP*. Printing alignments. Index to major program discussed. Subject index.

phylogenetic trees pogil answer key: The Origin of Species by Means of Natural Selection, Or, The Preservation of Favored Races in the Struggle for Life Charles Darwin, 1896

phylogenetic trees pogil answer key: *Principles of Biology* Lisa Bartee, Walter Shiner, Catherine Creech, 2017 The Principles of Biology sequence (BI 211, 212 and 213) introduces biology as a scientific discipline for students planning to major in biology and other science disciplines. Laboratories and classroom activities introduce techniques used to study biological processes and provide opportunities for students to develop their ability to conduct research.

phylogenetic trees pogil answer key: Reaching Students Nancy Kober, National Research Council (U.S.). Board on Science Education, National Research Council (U.S.). Division of Behavioral and Social Sciences and Education, 2015 Reaching Students presents the best thinking to date on teaching and learning undergraduate science and engineering. Focusing on the disciplines of astronomy, biology, chemistry, engineering, geosciences, and physics, this book is an introduction to strategies to try in your classroom or institution. Concrete examples and case studies illustrate how experienced instructors and leaders have applied evidence-based approaches to address student needs, encouraged the use of effective techniques within a department or an institution, and addressed the challenges that arose along the way.--Provided by publisher.

phylogenetic trees pogil answer key: POGIL Activities for AP Biology , 2012-10

phylogenetic trees pogil answer key: Phylogenetic Trees and Molecular Evolution David R. Bickel, 2022-09-29 This book serves as a brief introduction to phylogenetic trees and molecular evolution for biologists and biology students. It does so by presenting the main concepts in a variety of ways: first visually, then in a history, next in a dice game, and finally in simple equations. The content is primarily designed to introduce upper-level undergraduate and graduate students of biology to phylogenetic tree reconstruction and the underlying models of molecular evolution. A unique feature also of interest to experienced researchers is the emphasis on simple ways to quantify the uncertainty in the results more fully than is possible with standard methods.

phylogenetic trees pogil answer key: Scientific Teaching Jo Handelsman, Sarah Miller, Christine Pfund, 2007 Seasoned classroom veterans, pre-tenured faculty, and neophyte teaching assistants alike will find this book invaluable. HHMI Professor Jo Handelsman and her colleagues at the Wisconsin Program for Scientific Teaching (WPST) have distilled key findings from education, learning, and cognitive psychology and translated them into six chapters of digestible research points and practical classroom examples. The recommendations have been tried and tested in the National Academies Summer Institute on Undergraduate Education in Biology and through the WPST. Scientific Teaching is not a prescription for better teaching. Rather, it encourages the reader to approach teaching in a way that captures the spirit and rigor of scientific research and to contribute to transforming how students learn science.

phylogenetic trees pogil answer key: *Foundations of Phylogenetic Systematics* Johann Wolfgang Wägele, 2005 Phylogeny inference and the classification of organisms are indispensable for all fields of biology. On the basis of a well corroborated tree of life it is possible to understand the evolution of structure and function, of genomes, of gene families, of cascades of developmental genes, and the origin of genes of medical importance. Ecologists need a stable classification of organisms to identify organisms, to find their correct names and thus further information on relevant species. This book offers an introduction to the theory of Phylogenetic Systematics and is a companion for all biologists who want to analyze morphological or molecular data with classical methods or with modern computer programs. The first part of the book explains the epistemological basis that is independent of the type of method used to construct phylogenetic trees. Unlike other empirical sciences, the estimation of data quality in phylogenetics is still little developed and very often neglected. Here a theoretical basis is presented that enables the systematist to assess critically and objectively the quality of different data sets and to make statements on the plausibility of results. This requires a conception of the notions of information content, probability of homology, probability of cognition, probability of events, the principle of parsimony, the differentiation of phenomenological and modelling methods. Willi Hennig's original method is compared with modern numerical systematics and an updated Hennigian procedure of data analysis is discussed. The difference between phenetic and phylogenetic cladistics is explained. Popular tools for data evaluation implemented in computer programs are explained including their axiomatic assumptions, sources of error and possible applications. For the more common tools the mathematical background is explained in a simple, easy-to-understand way.Johann-Wolfgang Wagele was until recently head of the Department for Animal Systematics (Lehrstuhl fur Spezielle Zoologie) at the University of Bochum and is now director of the Museum Alexander Koenig in Bonn (Germany). His main research interests are the taxonomy, phylogeny and biodiversity of Isopoda, which implies observations of life history, biogeography and ecology in combination with phylogeny inference. Further subjects include arthropod phylogeny and tools for explorative data analyses. The author is president of the Gesellschaft fur Biologische Systematik, a Central European society of systematists, and he is actively promoting biodiversity research.

phylogenetic trees pogil answer key: *The Phylogenetic Handbook* Marco Salemi, Anne-Mieke Vandamme, 2003-08-27 Sample Text

phylogenetic trees pogil answer key: Major Events in the History of Life J. William Schopf, 1992 Major Events in the History of Life, present six chapters that summarize our understanding of crucial events that shaped the development of the earth's environment and the course of biological evolution over some four billion years of geological time. The subjects are covered by acknowledged leaders in their fields span an enormous sweep of biologic history, from the formation of planet Earth and the origin of living systems to our earliest records of human activity. Several chapters present new data and new syntheses, or summarized results of new types of analysis, material not usually available in current college textbooks.

phylogenetic trees pogil answer key: Maximum Likelihood Methods in Molecular Phylogenetics Korbinian Sebastian Strimmer, 1997

phylogenetic trees pogil answer key: Excerpts from MacClade Wayne P. Maddison, 1992 MacClade is a computer program for graphic and interactive analysis of phylogeny and character evolution for Apple Macintosh computers. It displays a cladogram and paints the branches to indicate reconstructed character evolution. The user can manipulate cladograms on screen as MacClade gives diagnostic feedback. Systematics and other evolutionary biologists can use its flexible and analytical tools to examine phylogenies or interpret character evolution in a phylogenetic context, yet its ease of use should allow students to grasp phylogenetic principles in an interactive environment. This is chapters 3-6 of the user's manual.

phylogenetic trees pogil answer key: The Ancestor's Tale Richard Dawkins, 2004 A renowned biologist provides a sweeping chronicle of more than four billion years of life on Earth, shedding new light on evolutionary theory and history, sexual selection, speciation, extinction, and genetics.

phylogenetic trees pogil answer key: Archaea Frank T. Robb, A. R. Place, 1995

phylogenetic trees pogil answer key: The Galapagos Islands Charles Darwin, 1996

phylogenetic trees pogil answer key: *Mathematics of Evolution and Phylogeny* Olivier Gascuel, 2005-02-24 Table of contents

phylogenetic trees pogil answer key: Uncovering Student Ideas in Science: 25 formative assessment probes Page Keeley, 2005 V. 1. Physical science assessment probes -- Life, Earth, and space science assessment probes.

phylogenetic trees pogil answer key: Innovative Strategies for Teaching in the Plant Sciences Cassandra L. Quave, 2014-04-11 Innovative Strategies for Teaching in the Plant Sciences focuses on innovative ways in which educators can enrich the plant science content being taught in universities and secondary schools. Drawing on contributions from scholars around the world, various methods of teaching plant science is demonstrated. Specifically, core concepts from ethnobotany can be used to foster the development of connections between students, their environment, and other cultures around the world. Furthermore, the volume presents different ways to incorporate local methods and technology into a hands-on approach to teaching and learning in the plant sciences. Written by leaders in the field, Innovative Strategies for Teaching in the Plant Sciences is a valuable resource for teachers and graduate students in the plant sciences.

phylogenetic trees pogil answer key: *Reconceptualizing STEM Education* Richard A. Duschl, Amber S. Bismack, 2016-01-08 Reconceptualizing STEM Education explores and maps out research and development ideas and issues around five central practice themes: Systems Thinking; Model-Based Reasoning; Quantitative Reasoning; Equity, Epistemic, and Ethical Outcomes; and STEM Communication and Outreach. These themes are aligned with the comprehensive agenda for the reform of science and engineering education set out by the 2015 PISA Framework, the US Next Generation Science Standards and the US National Research Council’s A Framework for K-12 Science Education. The new practice-focused agenda has implications for the redesign of preK-12 education for alignment of curriculum-instruction-assessment; STEM teacher education and professional development; postsecondary, further, and graduate studies; and out-of-school informal education. In each section, experts set out powerful ideas followed by two eminent discussant responses that both respond to and provoke additional ideas from the lead papers. In the associated website highly distinguished, nationally recognized STEM education scholars and policymakers engage in deep conversations and considerations addressing core practices that guide STEM education.

phylogenetic trees pogil answer key: Perspectives on Biodiversity National Research Council, Division on Earth and Life Studies, Commission on Life Sciences, Committee on

Noneconomic and Economic Value of Biodiversity, 1999-10-01 Resource-management decisions, especially in the area of protecting and maintaining biodiversity, are usually incremental, limited in time by the ability to forecast conditions and human needs, and the result of tradeoffs between conservation and other management goals. The individual decisions may not have a major effect but can have a cumulative major effect. Perspectives on Biodiversity reviews current understanding of the value of biodiversity and the methods that are useful in assessing that value in particular circumstances. It recommends and details a list of components-including diversity of species, genetic variability within and among species, distribution of species across the ecosystem, the aesthetic satisfaction derived from diversity, and the duty to preserve and protect biodiversity. The book also recommends that more information about the role of biodiversity in sustaining natural resources be gathered and summarized in ways useful to managers. Acknowledging that decisions about biodiversity are necessarily qualitative and change over time because of the nonmarket nature of so many of the values, the committee recommends periodic reviews of management decisions.

phylogenetic trees pogil answer key: *The Phylogenetic Handbook* Marco Salemi, Anne-Mieke Vandamme, Philippe Lemey, 2009-03-26 A broad, hands on guide with detailed explanations of current methodology, relevant exercises and popular software tools.

phylogenetic trees pogil answer key: Microbiology Nina Parker, OpenStax, Mark Schneegurt, AnhHue Thi Tu, Brian M. Forster, Philip Lister, 2016-05-30 Microbiology covers the scope and sequence requirements for a single-semester microbiology course for non-majors. The book presents the core concepts of microbiology with a focus on applications for careers in allied health. The pedagogical features of the text make the material interesting and accessible while maintaining the career-application focus and scientific rigor inherent in the subject matter. Microbiology's art program enhances students' understanding of concepts through clear and effective illustrations, diagrams, and photographs. Microbiology is produced through a collaborative publishing agreement between OpenStax and the American Society for Microbiology Press. The book aligns with the curriculum guidelines of the American Society for Microbiology.--BC Campus website.

phylogenetic trees pogil answer key: Phylogenetics E. O. Wiley, Bruce S. Lieberman, 2011-10-11 The long-awaited revision of the industry standard on phylogenetics Since the publication of the first edition of this landmark volume more than twenty-five years ago, phylogenetic systematics has taken its place as the dominant paradigm of systematic biology. It has profoundly influenced the way scientists study evolution, and has seen many theoretical and technical advances as the field has continued to grow. It goes almost without saying that the next twenty-five years of phylogenetic research will prove as fascinating as the first, with many exciting developments yet to come. This new edition of Phylogenetics captures the very essence of this rapidly evolving discipline. Written for the practicing systematist and phylogeneticist, it addresses both the philosophical and technical issues of the field, as well as surveys general practices in taxonomy. Major sections of the book deal with the nature of species and higher taxa, homology and characters, trees and tree graphs, and biogeography—the purpose being to develop biologically relevant species, character, tree, and biogeographic concepts that can be applied fruitfully to phylogenetics. The book then turns its focus to phylogenetic trees, including an in-depth guide to tree-building algorithms. Additional coverage includes: Parsimony and parsimony analysis Parametric phylogenetics including maximum likelihood and Bayesian approaches Phylogenetic classification Critiques of evolutionary taxonomy, phenetics, and transformed cladistics Specimen selection, field collecting, and curating Systematic publication and the rules of nomenclature Providing a thorough synthesis of the field, this important update to Phylogenetics is essential for students and researchers in the areas of evolutionary biology, molecular evolution, genetics and evolutionary genetics, paleontology, physical anthropology, and zoology.

phylogenetic trees pogil answer key: *Probability and Stochastic Processes* Roy D. Yates, David J. Goodman, 2014-01-28 This text introduces engineering students to probability theory and stochastic processes. Along with thorough mathematical development of the subject, the book presents intuitive explanations of key points in order to give students the insights they need to apply math to practical engineering problems. The first five chapters contain the core material that is essential to any introductory course. In one-semester undergraduate courses, instructors can select material from the remaining chapters to meet their individual goals. Graduate courses can cover all chapters in one semester.

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