

Primate Evolution Answers

An exploration of how the evolution of behavioral differences between humans and other primates affected the archaeological stone tool evidence.

The evolution of human language has been discussed for centuries from different perspectives. Linguistic theory has proposed grammar as a core part of human language that has to be considered in this context. Recent advances in neurosciences have allowed us to take a new neurobiological look on the similarities and dissimilarities of cognitive capacities and their neural basis across both closely and distantly related species. A couple of decades ago the comparisons were mainly drawn between human and non-human primates, investigating the cytoarchitecture of particular brain areas and their structural connectivity. Moreover, comparative studies were conducted with respect to their ability to process grammars of different complexity. So far the available data suggest that non-human primates are able to learn simple probabilistic grammars, but not hierarchically structured complex grammars. The human brain, which easily learns both grammars, differs from the non-human brain (among others) in how two language-relevant brain regions (Broca's area and superior temporal cortex) are connected structurally. Whether the more dominant dorsal pathway in humans compared to non-human primates is causally related to this behavioral difference is an issue of current debate. Ontogenetic findings suggest at least a correlation between the maturation of the dorsal pathway and the behavior to process syntactically complex structures, although a causal prove is still not available. Thus the neural basis of complex grammar processing in humans remains to be defined. More recently it has been reported that songbirds are also able to distinguish between sound sequences reflecting complex grammar. Interestingly, songbirds learn to sing by imitating adult song in a process not unlike language development in children. Moreover, the neural circuits supporting this behavior in songbirds bear anatomical and functional similarities to those in humans. In adult humans the fiber tract connecting the auditory cortex and motor cortex dorsally is known to be involved in the repetition of spoken language. This pathway is present already at birth and is taken to play a major role during language acquisition. In songbirds, detailed information exist concerning the interaction of auditory, motor and cortical-basal ganglia processing during song learning, and present a rich substrate for comparative studies. The scope of the Research Topic is to bring together contributions of researchers from different fields, who investigate grammar processing in humans, non-human primates and songbirds with the aim to find answers to the question of what constitutes the neurobiological basis of grammar learning. Open questions are: Which brain networks are relevant for grammar learning? Is there more than one dorsal pathway (one from temporal cortex to motor cortex and one to Broca's area) and if so what are their functions? Has the ability to process sequences of a given hierarchical complexity evolved in different phylogenetic lines (birds, primates, other vocal production learners such as bats)? Is the presence of a sensory-to-motor circuit in humans a precondition for development of a dorsal pathway between the temporal cortex and Broca's area? What role do subcortical structures (Basal Ganglia) play in vocal and grammar learning?

By joining phylogenetics and evolutionary ecology, this book explores the patterns of parasite diversity while revealing diversification processes.

In this New York Times bestseller and longlist nominee for the National Book Award, "our greatest living chronicler of the natural world" (The New York Times), David Quammen explains how recent discoveries in molecular biology affect our understanding of evolution and life's history. In the mid-1970s, scientists began using DNA sequences to reexamine the history of all life. Perhaps the most startling discovery to come out of this new field—the study of life's diversity and relatedness at the molecular level—is horizontal gene transfer (HGT), or the movement of genes across species lines. It turns out that HGT has been widespread and important; we now know that roughly eight percent of the human genome arrived sideways by viral infection—a type of HGT. In *The Tangled Tree*, "the grandest tale in biology....David Quammen presents the science—and the scientists involved—with patience, candor, and flair" (Nature). We learn about the major players, such as Carl Woese, the most important little-known biologist of the twentieth century; Lynn Margulis, the notorious maverick whose wild ideas about "mosaic" creatures proved to be true; and Tsutomu Wantanabe, who discovered that the scourge of antibiotic-resistant bacteria is a direct result of horizontal gene transfer, bringing the deep study of genome histories to bear on a global crisis in public health. "David Quammen proves to be an immensely well-informed guide to a complex story" (The Wall Street Journal). In *The Tangled Tree*, he explains how molecular studies of evolution have brought startling recognitions about the tangled tree of life—including where we humans fit upon it. Thanks to new technologies, we now have the ability to alter even our genetic composition—through sideways insertions, as nature has long been doing. "The Tangled Tree is a source of wonder....Quammen has written a deep and daring intellectual adventure" (The Boston Globe).

What does it mean to be female? Sarah Blaffer Hrdy--a sociobiologist and a feminist--believes that evolutionary biology can provide some surprising answers. Surprising to those feminists who mistakenly think that biology can only work against women. And surprising to those biologists who incorrectly believe that natural selection operates only on males. In *The Woman That Never Evolved* we are introduced to our nearest female relatives competitive, independent, sexually assertive primates who have every bit as much at stake in the evolutionary game as their male counterparts do. These females compete among themselves for rank and resources, but will bond together for mutual defense. They risk their lives to protect their young, yet consort with the very male who murdered their offspring when successful reproduction depends upon it. They tolerate other breeding females if food is plentiful, but chase them away when monogamy is the optimal strategy. When "promiscuity" is an advantage, female primates--like their human cousins--exhibit a sexual appetite that ensures a range of breeding partners. From case after case we are led to the conclusion that the sexually passive, noncompetitive, all-nurturing woman of prevailing myth never could have evolved within the primate order. Yet males are almost universally dominant over females in primate species, and *Homo sapiens* is no exception. As we see from this book, women are in some ways the most oppressed of all female primates. Sarah Blaffer Hrdy is convinced that to redress sexual inequality in human societies, we must first understand its evolutionary origins. We cannot travel back in time to meet our own remote ancestors, but we can study those surrogates we have--the other living primates. If women --and not biology--are to control their own destiny, they must understand the past and, as this book shows us, the biological legacy they have inherited.

Animals.

Taking an ecological approach to our evolution, Clive Finlayson considers the origins of modern humans within the context of a

drying climate and changing landscapes. Finlayson argues that environmental change, particularly availability of water, played a critical role in shaping the direction of human evolution, contributing to our spread and success. He argues that our ancestors carved a niche for themselves by leaving the forest and forcing their way into a long-established community of carnivores in a tropical savannah as climate changes opened up the landscape. They took their chance at high noon, when most other predators were asleep. Adapting to this new lifestyle by shedding their hair and developing an active sweating system to keep cool, being close to fresh water was vital. As the climate dried, our ancestors, already bipedal, became taller and slimmer, more adept at travelling farther in search of water. The challenges of seeking water in a drying landscape moulded the minds and bodies of early humans, and directed their migrations and eventual settlements. In this fresh and provocative view of a seven-million-year evolutionary journey, Finlayson demonstrates the radical implications for the interpretation of fossils and technologies and shows that understanding humans within an ecological context provides insights into the emergence and spread of *Homo sapiens* worldwide.

A comprehensive response to the many thousands of calls and letters the Smithsonian receives regarding questions related to monkeys, apes, lemurs, tamarins and their relatives. What are primates? How closely related are humans to other primates? How strong is a gorilla? Why do primates spend so much time grooming? Why can't apes talk? These and almost 100 other questions are addressed with clear, thorough answers.

Welcome to Explorations and biological anthropology! An electronic version of this textbook is available free of charge at the Society for Anthropology in Community Colleges' webpage here: www.explorations.americananthro.org

Johanson, the discoverer, in 1974, of "Lucy"--the oldest skeleton of an erect-walking human yet found--reports the story of his internationally acclaimed find

To most people it seems obvious that there are major mental differences between ourselves and other species, but there is considerable debate over exactly how special our minds are, in what respects, and which were the critical evolutionary events that have shaped us. Some researchers claim language as a solely human, even defining, attribute, while others claim that only humans are truly conscious. These questions have been explored mainly by archaeologists and anthropologists until recently, but this volume aims to show what psychologists have to say on the evolution of mind. The book begins with a thorough overview of what is known of the non-primate mind and its evolution. Following this, an international range of experts discuss in temporal sequence the human mind at various stages of evolution, beginning with the pre-hominids of 20 million years ago and ending with contemporary human behaviour. Accessible to students and researchers alike in psychology, anthropology, evolution, archaeology, and ethology, *The Descent of Mind* provides a range of provocative answers to the timeless question of what it means to be human.

A biography of three generations of the Leakey family of paleo-anthropologists recounts the personal lives of the Leakeys and describes their discoveries, publications, and impact on our understanding of human origins and evolution.

The author dispels some of the myths about the nature of females and female sexuality, and suggests new hypotheses about the evolution of women.

The essential guide to successfully designing, conducting and reporting primatological research.

Why are humans so fond of water? Why is our skin colour so variable? Why aren't we hairy like our close ape relatives? A savannah scenario of human evolution has been widely accepted primarily due to fossil evidence; and fossils do not offer insight into these questions. Other alternative evolutionary scenarios might, but these models have been rejected. This book explores a controversial idea – that human evolution was intimately associated with watery habitats as much or more than typical savannahs. Written from a medical point of view, the author presents evidence supporting a credible alternative explanation for how humans diverged from our primate ancestors. Anatomical and physiological evidence offer insight into hairlessness, different coloured skin, subcutaneous fat, large brains, a marine-type kidney, a unique heat regulation system and speech. This evidence suggests that humans may well have evolved, not just as savannah mammals, as is generally believed, but with more affinity for aquatic habitats – rivers, streams, lakes and coasts. Key Features: Presents the evidence for a close association between riparian habitats and the origin of humans Reviews the "savannah ape" hypothesis for human origins Describes various anatomical adaptations that are associated with hypotheses of human evolution Explores characteristics from the head and neck such as skull and sinus structures, the larynx and ear structures and functions Corroborates a novel scenario for the origin of human kind '... a counterpoint to the textbooks or other books which deal with human evolution. I think readers will see it as a clearly written, well-supported discussion of an alternative perspective on human origins'. —Kathlyn Stewart, Canadian Museum of Nature, Ottawa 'There is a pressing need to expand discussions of human evolution to include non-anthropocentric narratives that use comparative data. Dr Rhys-Evans' specific expertise and experience with the human head, neck, ears, throat, mouth and sinuses, provides him with a distinct perspective from which to approach the subject of human evolution. Moreover, his understanding of non-anthropocentric views of human evolution (water-based models), allow him to apply a biological approach to the subject, missing in more traditional (savannah-based) models'. —Stephen Munro, National Museum of Australia

The story of Primate Evolution, as we know it in the later days of the twentieth century, begins humbly with small, innocuous quadruped AI creatures scampering across the nighttime forests of ancient continents, and ends with large-brained, ubiquitous bipedal creatures of the nuclear age of modern nation states.

Shaping Primate Evolution is an edited collection of papers about how biological form is described in primate biology, and the consequences of form for function and behavior. The contributors are highly regarded internationally recognized scholars in the field of quantitative primate evolutionary morphology. Each chapter elaborates upon the analysis of the form-function-behavior triad in a unique and compelling way. This book is distinctive not only in the diversity of the topics discussed, but also in the range of levels of biological organization that are addressed from cellular morphometrics to the evolution of primate ecology. The book is dedicated to Charles E. Oxnard, whose influential pioneering work on innovative metric and analytic techniques has gone hand-in-hand with meticulous comparative functional analyses of primate anatomy. Through the marriage of theory with analytical applications, this volume will be an important reference work for all those interested in primate functional morphology.

Today many school students are shielded from one of the most important concepts in modern science: evolution. In engaging and conversational style, *Teaching About Evolution and the Nature of Science* provides a well-structured framework for understanding and teaching evolution. Written for teachers, parents, and community officials as well as scientists and educators, this book describes how evolution reveals both the great diversity and similarity among the Earth's organisms; it explores how scientists approach the question of evolution; and it illustrates the nature of science as a way of knowing about the natural world. In addition, the book provides answers to frequently asked questions to help

readers understand many of the issues and misconceptions about evolution. The book includes sample activities for teaching about evolution and the nature of science. For example, the book includes activities that investigate fossil footprints and population growth that teachers of science can use to introduce principles of evolution. Background information, materials, and step-by-step presentations are provided for each activity. In addition, this volume: Presents the evidence for evolution, including how evolution can be observed today. Explains the nature of science through a variety of examples. Describes how science differs from other human endeavors and why evolution is one of the best avenues for helping students understand this distinction. Answers frequently asked questions about evolution. Teaching About Evolution and the Nature of Science builds on the 1996 National Science Education Standards released by the National Research Council--and offers detailed guidance on how to evaluate and choose instructional materials that support the standards. Comprehensive and practical, this book brings one of today's educational challenges into focus in a balanced and reasoned discussion. It will be of special interest to teachers of science, school administrators, and interested members of the community.

Speculates on man's specific evolution into the "promising primate"--a paradoxical combination of endless potential and a vulnerable need to exchange promises and, thus, establish social, familial, and cultural ties

In paleoanthropology the group of hominids known as the "robust" australopithecines has emerged as one of the most interesting. Through them we have the opportunity to examine the origin, natural history, and ultimate extinction of not just a single species, but of an entire branch in the hominid fossil record. It is generally agreed that the human lineage can be traced back to this group of comparatively small-brained, large-toothed creatures. This volume focuses on the evolutionary history of these early hominids with state-of-the-art contributions by leading international authorities in the field. Although a case can be made for a "robust" lineage, the functional and taxonomic implications of the morphological features are subject to vigorous disagreement. An area of lively debate is the possible causal relationship between the presence of early Homo and the origin, evolution, and virtual extinction of "robust" australopithecines. This volume summarizes what has been learned about the evolutionary history of the "robust" australopithecines in the 50 years since Robert Broom first encountered the visage of a new kind of ape-man from Kromdraai. New discoveries from Kromdraai to Lomekwi have served to keep us aware that the paleontological record for hominid evolution is hardly exhausted.

Because of such finds no single volume can hope to stand as a summary on the "robust" australopithecines for very long, but this classic volume comes close to achieving this goal. The book sheds new light upon some old questions and also acts to provide new questions. The answers to those questions bring us closer to a fuller understanding and appreciation of the origins, evolution, and ultimate demise of the "robust" australopithecines. Since the "robust" australopithecines most likely stand as our closest relatives, a better understanding of their origin, history, and demise serves to provide heightened appreciation of the course of human evolution itself. This definitive volume addresses the questions and problems surrounding this important lineage. Frederick E. Grine is professor and chairperson in the department of anthropology at the State University of New York at Stony Brook. He has published many scientific articles in books and international journals, and he is co-editor of Primate Phylogeny and Scanning Microscopy of Vertebrate Mineralized Tissues and author of Regional Human Anatomy.

In this stunningly original book, Richard Wrangham argues that it was cooking that caused the extraordinary transformation of our ancestors from apelike beings to Homo erectus. At the heart of *Catching Fire* lies an explosive new idea: the habit of eating cooked rather than raw food permitted the digestive tract to shrink and the human brain to grow, helped structure human society, and created the male-female division of labour. As our ancestors adapted to using fire, humans emerged as "the cooking apes". Covering everything from food-labelling and overweight pets to raw-food faddists, *Catching Fire* offers a startlingly original argument about how we came to be the social, intelligent, and sexual species we are today. "This notion is surprising, fresh and, in the hands of Richard Wrangham, utterly persuasive ... Big, new ideas do not come along often in evolution these days, but this is one." -Matt Ridley, author of *Genome*

Where did we come from? What were our ancestors like? Why do we differ from other animals? How do scientists trace and construct our evolutionary history? *The Evolution of Our Tribe: Hominini* provides answers to these questions and more. The book explores the field of paleoanthropology past and present. Beginning over 65 million years ago, Welker traces the evolution of our species, the environments and selective forces that shaped our ancestors, their physical and cultural adaptations, and the people and places involved with their discovery and study. It is designed as a textbook for a course on Human Evolution but can also serve as an introductory text for relevant sections of courses in Biological or General Anthropology or general interest. It is both a comprehensive technical reference for relevant terms, theories, methods, and species and an overview of the people, places, and discoveries that have imbued paleoanthropology with such fascination, romance, and mystery.

Each chapter of the study guide features learning objectives, chapter outlines, key terms, extended applications, Internet activities, and practice tests consisting of 25-40 multiple choice questions and 5-10 true/false questions with answers and page references, in addition to several short answer and essay questions.

Biodiversity--the genetic variety of life--is an exuberant product of the evolutionary past, a vast human-supportive resource (aesthetic, intellectual, and material) of the present, and a rich legacy to cherish and preserve for the future. Two urgent challenges, and opportunities, for 21st-century science are to gain deeper insights into the evolutionary processes that foster biotic diversity, and to translate that understanding into workable solutions for the regional and global crises that biodiversity currently faces. A grasp of evolutionary principles and processes is important in other societal arenas as well, such as education, medicine, sociology, and other applied fields including agriculture, pharmacology, and biotechnology. The ramifications of evolutionary thought also extend into learned realms traditionally reserved for philosophy and religion. The central goal of the *In the Light of Evolution (ILE)* series is to promote the evolutionary sciences through state-

of-the-art colloquia in the series of Arthur M. Sackler colloquia sponsored by the National Academy of Sciences and their published proceedings. Each installment explores evolutionary perspectives on a particular biological topic that is scientifically intriguing but also has special relevance to contemporary societal issues or challenges. This tenth and final edition of the In the Light of Evolution series focuses on recent developments in phylogeographic research and their relevance to past accomplishments and future research directions.

This book presents a series of integrated papers on the latest techniques and concepts for understanding the fossil record of primates; including humans. Papers review the dating of primate fossil finds from many areas of the world, as well as the status and importance of recent discoveries of fossils linking the monkeys and apes to humans. Further contributions compare the anatomy and growth of living primates to that of the ancestral animals in order to give an understanding of trends in evolution. A final section discusses the application of recently developed genetic techniques to interpret and explain the evolution of primates. By presenting the most recent research, this volume provides a valuable synthesis of the new developments in primate and human evolution.

Each chapter of the study guide features learning objectives, chapter outlines, key terms, extended applications, Internet activities, and practice tests consisting of 25-40 multiple choice questions and 5-10 true/false questions, all with answers and page references, in addition to several short-answer and essay questions.

Draws on recent discoveries about human evolution to examine whether violence among men is a product of their primitive heritage, and searches for solutions to the problems of war, rape, and murder

Primate Evolution and Human Origins compiles, for the first time, the major ideas and publications that have shaped our current view of the evolutionary biology of the primates and the origin of the human line. Designed for freshmen-to-graduate students in anthropology, paleontology, and biology, the book is a unique collection of classic papers, culled from the past 20 years of research. It is also an important reference for academicians and researchers, as it covers the entire scope of primate and human evolution (with an emphasis on the fossil record). A comprehensive bibliography cites over 2000 significant articles not found in the main text.

Nature has published news about the history of life ever since its first issue in 1869, in which T. H. Huxley ("Darwin's bulldog") wrote about Triassic dinosaurs. In recent years, the field has enjoyed a tremendous flowering due to new investigative techniques drawn from cladistics (a revolutionary method for charting evolutionary relationships) and molecular biology. Shaking the Tree brings together nineteen review articles written for Nature over the past decade by many of the major figures in paleontology and evolution, from Stephen Jay Gould to Simon Conway Morris. Each article is brief, accessible, and opinionated, providing "shoot from the hip" accounts of the latest news and debates. Topics covered include major extinction events, homeotic genes and body plans, the origin and evolution of the primates, and reconstructions of phylogenetic trees for a wide variety of groups. The editor, Henry Gee, gives new commentary and updated references. Shaking the Tree is a one-stop resource for engaging overviews of the latest research in the history of life on Earth.

"An unforgettable journey through this twisted miracle of evolution we call 'our body.'" —Spike Carlsen, author of *A Walk Around the Block*
From blurry vision to crooked teeth, ACLs that tear at alarming rates and spines that seem to spend a lifetime falling apart, it's a curious thing that human beings have beaten the odds as a species. After all, we're the only survivors on our branch of the tree of life. The flaws in our makeup raise more than a few questions, and this detailed foray into the many twists and turns of our ancestral past includes no shortage of curiosity and humor to find the answers. Why is it that human mothers have such a life-endangering experience giving birth? Why are there entire medical specialties for teeth and feet? And why is it that human babies can't even hold their heads up, but horses are trotting around minutes after they're born? In this funny, wide-ranging and often surprising book, biologist Alex Bezzlerides tells us just where we inherited our adaptable, achy, brilliant bodies in the process of evolution.

Dominance and Aggression in Humans and Other Animals: The Great Game of Life examines human nature and the influence of evolution, genetics, chemistry, nurture, and the sociopolitical environment as a way of understanding how and why humans behave in aggressive and dominant ways. The book walks us through aggression in other social species, compares and contrasts human behavior to other animals, and then explores specific human behaviors like bullying, abuse, territoriality murder, and war. The book examines both individual and group aggression in different environments including work, school, and the home. It explores common stressors triggering aggressive behaviors, and how individual personalities can be vulnerable to, or resistant to, these stressors. The book closes with an exploration of the cumulative impact of human aggression and dominance on the natural world. Reviews the influence of evolution, genetics, biochemistry, and nurture on aggression Explores aggression in multiple species, including insects, fish, reptiles, birds, and mammals Compares human and animal aggressive and dominant behavior Examines bullying, abuse, territoriality, murder, and war Includes nonaggressive behavior in displays of respect and tolerance Highlights aggression triggers from drugs to stress Discusses individual and group behavior, including organizations and nations Probes dominance and aggression in religion and politics Translates the impact of human behavior over time on the natural world
Primate Adaptation and Evolution Academic Press

Travel back in time eight million years to explore the roots of the human family tree. Interweaving latest discoveries, maps, and incredible illustrations, *Evolution* tells the story of our origins and helps us better understand our species, from tree-dwelling primates to modern 21st-century humans. Renowned Dutch paleoartists the Kennis brothers bring our ancestors to life with their beautiful, accurate reconstructions that visually trace each step in our evolutionary history. Combined with clear prose, this comprehensive yet accessible book provides a rich history of each stage of human evolution, from human anatomy and behaviour to the environment we live in. It also explains how *Homo sapiens* originated, evolved, and then migrated and colonized the entire planet. Written and authenticated by a team of experts and with a foreword by Dr Alice Roberts, *Evolution* is a sweeping account of humans and our place in it.

Primate Adaptation and Evolution is the only recent text published in this rapidly progressing field. It provides you with an extensive, current survey of the order Primates, both living and fossil. By combining information on primate anatomy, ecology, and behavior with the primate fossil record, this book enables students to study primates from all epochs as a single, viable group. It surveys major primate radiations throughout 65 million years, and provides equal treatment of both living and extinct species.
• Presents a summary of the primate fossils
• Reviews primate evolution
• Provides an introduction to the primate anatomy
• Discusses the features that distinguish the living groups of primates
• Summarizes recent work on primate ecology

This volume features a collection of essays by primatologists, anthropologists, biologists, and psychologists who offer some answers to the question of what makes us human, i. e. , what is the nature and width of the gap that separates us from other primates? The chapters of this volume summarize the latest research on core aspects of behavioral and cognitive traits that make humans such unusual animals. All contributors adopt an explicitly comparative approach, which is based on the premise that comparative studies of our closest biological relatives, the nonhuman primates, provide the

logical foundation for identifying human universals as well as evidence for evolutionary continuity in our social behavior. Each of the chapters in this volume provides comparative analyses of relevant data from primates and humans, or pairs of chapters examine the same topic from a human or primatological perspective, respectively. Together, they cover six broad topics that are relevant to identifying potential human behavioral universals. Family and social organization. Predation pressure is thought to be the main force favoring group-living in primates, but there is great diversity in the size and structure of social groups across the primate order. Research on the behavioral ecology of primates and other animals has revealed that the distribution of males and females in space and time can be explained by sex-specific adaptations that are sensitive to factors that limit their fitness: access to resources for females and access to potential mates for males.

A world of categories devoid of spirit waits for life to return. Saul Bellow, *Humboldt's Gift* The stock-in-trade of communicating hypotheses about the historical path of evolution is a graphical representation called a phylogenetic tree. In most such graphics, pairs of branches diverge from other branches, successively marching across abstract time toward the present. To each branch is tied a tag with a name, a binominal symbol that functions as does the name given to an individual human being. On phylogenetic trees the names symbolize species. What exactly do these names signify? What kind of information is communicated when we claim to have knowledge of the following types? "Tetonius mathewzi was ancestral to Pseudotetonius ambiguus." "The sample of fossils attributed to *Homo habilis* is too variable to contain only one species." "Interbreeding populations of savanna baboons all belong to *Papio anubis*." "Hylobates lar and *H. pileatus* interbreed in zones of geographic overlap." While there is nearly universal agreement that the notion of the species is fundamental to our understanding of how evolution works, there is a very wide range of opinion on the conceptual content and meaning of such particular statements regarding species. This is because, oddly enough, evolutionary biologists are quite far from agreement on what a species is, how it attains this status, and what role it plays in evolution over the long term.

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