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The Crucible of Creation
A Geoscience Guide to the Burgess Shale
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The Runes of Evolution
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Improbable Destinies

DULCE KELLEY

Rocks of Ages Vintage
Since its discovery in 1909 by Charles Doolittle Walcott, then Secretary of the Smithsonian Institution, the Burgess Shale in the Canadian Rocky Mountains has fascinated both scientists and the public with its plethora of weird wonders - life forms of the past so unfamiliar they cannot easily be assigned to known taxonomic groups. This century's most significant invertebrate fossil discovery, the Burgess Shale provides an unprecedented window into the explosive evolution during the Cambrian period that began about 540 million years ago, one of the most enigmatic episodes in the history of life. This book provides the first comprehensive set of illustrations of the extraordinary life forms revealed in the Burgess Shale. In addition to the more common fossilized hard skeletons, the Burgess Shale preserved the soft parts of these organisms, which provide a key to understanding the early evolution of the major groups of animals that inhabit the earth today. The Fossils of the Burgess Shale shows much remarkable detail - including digestive tracts and other internal organs - of creatures preserved in particles of mud fine enough to penetrate every crack and unevenness. The book begins with the history of exploration and research in the Burgess Shale, the geologic setting and preservation of the fossils, and a discussion of the Cambrian radiation, the period when almost all the major phyla of animals evolved. These introductory chapters are followed by 199 high-quality photographs and line drawings with detailed species accounts that describe important features of each specimen, as well as the ecology and taxonomy of each group. A complete list of all currently accepted species described from the Burgess Shale and a comprehensive bibliography follow the illustrations. The Fossil of the Burgess Shale is a compendium of fascinating Cambrian treasures that offer a rare glimpse into the nature of early life on our planet. They have figured prominently in recent evolutionary debates. The National Museum of Natural History, which houses more than 65,000 fossils collected by Walcott from the Burgess Shale, will open a new exhibition of the specimens in 1995.
Trilobite Templeton Foundation Press
How did human beings acquire imaginations that can conjure up untrue possibilities? How did the Universe become self-aware? In The Runes of Evolution, Simon Conway Morris revitalizes the study of evolution from the perspective of convergence, providing us with compelling new evidence to support the mounting scientific view that the history of life is far more predictable than once thought. A leading evolutionary biologist at the University of Cambridge, Conway Morris came into international prominence for his work on the Cambrian explosion (especially fossils of the Burgess Shale) and evolutionary convergence, which is the process whereby organisms not closely related (not monophyletic), independently evolve similar traits as a result of having to adapt to similar environments or ecological niches. In The Runes of Evolution, he illustrates how the ubiquity of convergence hints at an underlying framework whereby many outcomes, not least brains and intelligence, are virtually guaranteed on

any Earth-like planet. Conway Morris also emphasizes how much of the complexity of advanced biological systems is inherent in microbial forms. By casting a wider net, The Runes of Evolution explores many neglected evolutionary questions. Some are remarkably general. Why, for example, are convergences such as parasitism, carnivory, and nitrogen fixation in plants concentrated in particular taxonomic hot spots? Why do certain groups have a particular propensity to evolve toward particular states? Some questions lead to unexpected evolutionary insights: If bees sleep (as they do), do they dream? Why is that insect copulating with an orchid? Why have sponges evolved a system of fiber optics? What do mantis shrimps and submarines have in common? If dinosaurs had not gone extinct what would have happened next? Will a saber-toothed cat ever re-evolve? Cona Morris observes: “Even amongst the mammals, let alone the entire tree of life, humans represent one minute twig of a vast (and largely fossilized) arborescence. Every living species is a linear descendant of an immense string of now-vanished ancestors, but evolution itself is the very reverse of linear. Rather it is endlessly exploratory, probing the vast spaces of biological hyperspace. Indeed this book is a celebration of how our world is (and was) populated by a riot of forms, a coruscating tapestry of life.” The Runes of Evolution is the most definitive synthesis of evolutionary convergence to be published to date.

Eight Little Piggies: Reflections in Natural History Random House India

More than any other modern scientists, Stephen Jay Gould has opened up to millions the wonders of evolutionary biology. His genius as an essayist lies in his unmatched ability to use his knowledge of the world, including popular culture, to illuminate the realm of science. Ever Since Darwin, Stephen Jay Gould's first book, has sold more than a quarter of a million copies. Like all succeeding collections by this unique writer, it brings the art of the scientific essay to unparalleled heights.

Some Assembly Required W. W. Norton & Company

The assassin's bullet misses, the Archduke's carriage moves forward, and a catastrophic war is avoided. So too with the history of life. Re-run the tape of life, as Stephen J. Gould claimed, and the outcome must be entirely different: an alien world, without humans and maybe not even intelligence. The history of life is littered with accidents: any twist or turn may lead to a completely different world. Now this view is being challenged. Simon Conway Morris explores the evidence demonstrating life's almost eerie ability to navigate to a single solution, repeatedly. Eyes, brains, tools, even culture: all are very much on the cards. So if these are all evolutionary inevitabilities, where are our counterparts across the galaxy? The tape of life can only run on a suitable planet, and it seems that such Earth-like planets may be much rarer than hoped. Inevitable humans, yes, but in a lonely Universe.

Oracles of Science W. W. Norton & Company

An exciting and accessible new view of the evolution of human and animal life on Earth. From the author of national bestseller, Your Inner Fish, this extraordinary journey of discovery spans centuries, as explorers and scientists seek to understand the origins of life's immense diversity. “Fossils, DNA, scientists with a penchant for suits of armor—what’s not to love?”—BBC

Wildlife Magazine Over billions of years, ancient fish evolved to walk on land, reptiles transformed into birds that fly, and apelike primates evolved into humans that walk on two legs, talk, and write. For more than a century, paleontologists have traveled the globe to find fossils that show how such changes have happened. We have now arrived at a remarkable moment—prehistoric fossils coupled with new DNA technology have given us the tools to answer some of the basic questions of our existence: How do big changes in evolution happen? Is our presence on Earth the product of mere chance? This new science reveals a multibillion-year evolutionary history filled with twists and turns, trial and error, accident and invention. In Some Assembly Required, Neil Shubin takes readers on a journey of discovery spanning centuries, as explorers and scientists seek to understand the origins of life's immense diversity.

The Highlands Controversy Wonderful Life: The Burgess Shale and the Nature of History

Rarely has a scholar attained such popular acclaim merely by doing what he does best and enjoys most. But such is Stephen Jay Gould’s command of paleontology and evolutionary theory, and his gift for brilliant explication, that he has brought dust and dead bones to life, and developed an immense following for the seeming arcana of this field. In Time’s Arrow, Time’s Cycle his subject is nothing less than geology’s signal contribution to human thought—the discovery of “deep time,” the vastness of earth’s history, a history so ancient that we can comprehend it only as metaphor. He follows a single thread through three documents that mark the transition in our thinking from thousands to billions of years: Thomas Burnet’s four-volume Sacred Theory of the Earth (1680–1690), James Hutton’s Theory of the Earth (1795), and Charles Lyell’s three-volume Principles of Geology (1830–1833). Gould’s major theme is the role of metaphor in the formulation and testing of scientific theories—in this case the insight provided by the oldest traditional dichotomy of Judeo-Christian thought: the directionality of time’s arrow or the immanence of time’s cycle. Gould follows these metaphors through these three great documents and shows how their influence, more than the empirical observation of rocks in the field, provoked the supposed discovery of deep time by Hutton and Lyell. Gould breaks through the traditional “cardboard” history of geological textbooks (the progressive march to truth inspired by more and better observations) by showing that Burnet, the villain of conventional accounts, was a rationalist (not a theologically driven miracle-monger) whose rich reconstruction of earth history emphasized the need for both time’s arrow (narrative history) and time’s cycle (immanent laws), while Hutton and Lyell, our traditional heroes, denied the richness of history by their exclusive focus upon time’s arrow.

Wonderful Life W. W. Norton & Company

Gould shows why a more accurate way of understanding our world is to look at a given subject within its own context, to see it as a part of a spectrum of variation and then to reconceptualize trends as expansion or contraction of this “full house” of variation, and not as the progress or degeneration of an average value, or single thing.

The Fossil Book Smithsonian

An illustrated natural history of the Earth and its denizens combines paintings, drawings, and computer-generated images with a chronicle of the world's variegated organisms and species.
Scientific Metaphysics Oxford University Press
"There is no scientist today whose books I look forward to reading with greater anticipation of enjoyment and enlightenment than Stephen Jay Gould."—Martin Gardner Among scientists who write, no one illuminates as well as Stephen Jay Gould doesthe wonderful workings of the natural world. Now in a new volume of collected essays—his sixth since Ever Since Darwin—Gould speaks of the importance of unbroken connections within our own lives and to our ancestralgenerations. Along with way, he opens to us the mysteries of fish tails, frog calls, and other matters, and shows once and for all why we must take notice when a seemingly insignificant creature is threatened, like the land snail Partula from Moorea, whose extinction he movingly relates.
The Burgess Shale W. W. Norton & Company
A masterpiece of analysis and imagination...It centres on a sensational discovery in the field of palaeontology - the existence, in the Burgess Shale... of 530-million-year-old fossils unique in age, preservation and diversity...With skill and passion, Go
The Mismeasure of Man (Revised and Expanded) Harvard University Press
Few places have been as influential as the Indian subcontinent in shaping the course of life on Earth. Yet its evolution has remained largely unchronicled. Indica: A Deep Natural History of the Indian Subcontinent fills this gap. From the oldest rocks, formed three billion years ago in Karnataka, to the arrival of our ancestors 50,000 years ago on the banks of the Indus, the author meticulously sifts through wide-ranging scientific disciplines and through the layers of earth to tell us the story of India, filled with a variety of fierce reptiles, fantastic dinosaurs, gargantuan mammals and amazing plants. Beautifully produced in full colour, with a rare collection of images, illustrations and maps, Indica is full of fascinating, lesser-known facts. It shows us how every piece of rock and inch of soil is a virtual museum, and how, over billions of years, millions of spectacular creatures have reproduced, walked and lived over and under it.
The Structure of Evolutionary Theory University of Chicago Press
The Highlands Controversy is a rich and perceptive account of the third and last major dispute in nineteenth-century geology stemming from the work of Sir Roderick Murchison. The earlier Devonian and Cambrian-Silurian controversies centered on whether the strata of Devon and Wales should be classified by lithological or paleontological criteria, but the Highlands dispute arose from the difficulties the Scottish Highlands presented to geologists who were just learning to decipher the very complex processes of mountain building and metamorphism. David Oldroyd follows this controversy into the last years of the nineteenth century, as geology was transformed by increasing professionalization and by the development of new field and laboratory techniques. In telling this story, Oldroyd's aim is to analyze how scientific knowledge is constructed within a competitive scientific community—how theory, empirical findings, and social

factors interact in the formation of knowledge. Oldroyd uses archival material and his own extensive reconstruction of the nineteenth-century fieldwork in a case study showing how detailed maps and sections made it possible to understand the exceptionally complex geological structure of the Highlands An invaluable addition to the history of geology, The Highlands Controversy also makes important contributions to our understanding of the social and conceptual processes of scientific work, especially in times of heated dispute.

Wonderful Life W. W. Norton & Company
Collects forty-four key segments from the late paleontologist and evolutionary biologist's books, papers, and essays, in a collection that includes an assortment of previously unpublished articles and speeches.

Time's Arrow, Time's Cycle Harvard University Press
By one of Britain's most gifted scientists: a magnificently daring and compulsively readable account of life on Earth (from the "big bang" to the advent of man), based entirely on the most original of all sources--the evidence of fossils. With excitement and driving intelligence, Richard Fortey guides us from the barren globe spinning in space, through the very earliest signs of life in the sulphurous hot springs and volcanic vents of the young planet, the appearance of cells, the slow creation of an atmosphere and the evolution of myriad forms of plants and animals that could then be sustained, including the magnificent era of the dinosaurs, and on to the last moment before the debut of Homo sapiens. Ranging across multiple scientific disciplines, explicating in wonderfully clear and refreshing prose their findings and arguments--about the origins of life, the causes of species extinctions and the first appearance of man--Fortey weaves this history out of the most delicate traceries left in rock, stone and earth. He also explains how, on each aspect of nature and life, scientists have reached the understanding we have today, who made the key discoveries, who their opponents were and why certain ideas won. Brimful of wit, fascinating personal experience and high scholarship, this book may well be our best introduction yet to the complex history of life on Earth. A Book-of-the-Month Club Main Selection With 32 pages of photographs

Full House Vintage
Original essays by leading philosophers of science explore the question of whether metaphysics can and should be naturalised - conducted as part of natural science. They engage with a range of approaches and disciplines to argue that if metaphysics is to be capable of identifying objective truths, it must be continuous with and inspired by science.

Indica CreateSpace
The world's most revered and eloquent interpreter of evolutionary ideas offers here a work of explanatory force unprecedented in our time—a landmark publication, both for its historical sweep and for its scientific vision. With characteristic attention to detail, Stephen Jay Gould first describes the content and discusses the history and origins of the three core commitments of classical Darwinism: that natural selection works on organisms, not genes or species; that it is almost exclusively the mechanism of adaptive evolutionary change; and that these changes are incremental, not drastic. Next, he examines the three critiques that currently challenge this classic

Darwinian edifice: that selection operates on multiple levels, from the gene to the group; that evolution proceeds by a variety of mechanisms, not just natural selection; and that causes operating at broader scales, including catastrophes, have figured prominently in the course of evolution. Then, in a stunning tour de force that will likely stimulate discussion and debate for decades, Gould proposes his own system for integrating these classical commitments and contemporary critiques into a new structure of evolutionary thought. In 2001 the Library of Congress named Stephen Jay Gould one of America’s eighty-three Living Legends—people who embody the “quintessentially American ideal of individual creativity, conviction, dedication, and exuberance.” Each of these qualities finds full expression in this peerless work, the likes of which the scientific world has not seen—and may not see again—for well over a century.
The Book of Life Field, B.C. : Burgess Shale Geoscience Foundation
An accomplished paleontologist describes the amazing Cambrian fossils of the Burgess Shale, a deposit in Western Canada, recreates the diversity of life as it existed when the fossils were formed, and critiques Stephen Jay Gould's observations on the find. UP.
Life W. W. Norton & Company
With Trilobite, Richard Fortey, paleontologist and author of the acclaimed Life, offers a marvelously written, smart and compelling, accessible and witty scientific narrative of the most ubiquitous of fossil creatures. Trilobites were shelled animals that lived in the oceans over five hundred million years ago. As bewilderingly diverse then as the beetle is today, they survived in the arctic or the tropics, were spiky or smooth, were large as lobsters or small as fleas. And because they flourished for three hundred million years, they can be used to glimpse a less evolved world of ancient continents and vanished oceans. Erudite and entertaining, this book is a uniquely exuberant homage to a fabulously singular species.
W. W. Norton & Company
Centring on the discovery in the Burgess Shale of 530 million year old fossils unique in age, preservation and diversity, this book challenges perceptions about man's place in the history of life.
The Hedgehog, the Fox, and the Magister's Pox Springer Science & Business Media
"[An] extraordinary book. . . . Mr. Gould is an exceptional combination of scientist and science writer. . . . He is thus exceptionally well placed to tell these stories, and he tells them with fervor and intelligence."—James Gleick, New York Times Book Review High in the Canadian Rockies is a small limestone quarry formed 530 million years ago called the Burgess Shale. It hold the remains of an ancient sea where dozens of strange creatures lived—a forgotten corner of evolution preserved in awesome detail. In this book Stephen Jay Gould explores what the Burgess Shale tells us about evolution and the nature of history.

- A Soul Of Ash And Blood: A Blood And Ash Novel (blood And Ash Series)
- Fahrenheit 451
- It Starts With Us: A Novel (2) (it Ends With Us)
- Tomorrow, And Tomorrow, And Tomorrow: A Novel By Gabrielle Zevin
- A Court Of Mist And Fury (a Court Of Thorns And Roses, 2)
- It's Not Summer Without You By Jenny Han
- Ugly Love: A Novel By Colleen Hoover