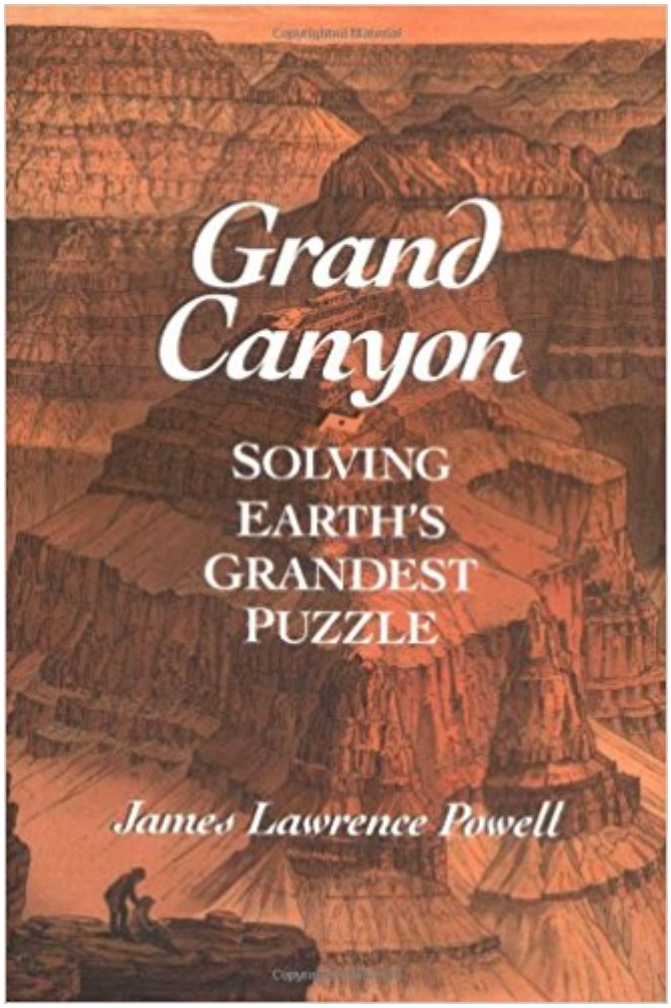
Grand Canyon: Solving Earth's Grandest Puzzle



Synopsis

Vast and majestic, the Grand Canyon represents one of science’s most challenging puzzles: How did this massive canyon come to be? This is the story of the search for the answers, and the first account of the consensus geologists have reached in the last few years. A scientific detective tale packed with colorful characters, Grand Canyon follows the explorers, adventurers, and geologists whose efforts led to the understanding of the canyon’s mysteries. Modern scientists have revealed that the Colorado River once ran in the opposite direction—and for many years flowed hundreds of feet beneath the ground. These efforts also led directly to the discovery of tectonic plates, one of the most important advancements in the history of geology. An eloquent, breathtaking narrative, Grand Canyon is a fascinating true story that is as epic as its subject. --This text refers to an out of print or unavailable edition of this title.

Book Information

Hardcover: 320 pages

Publisher: Pi Press; 1st edition (March 25, 2005)

Language: English

ISBN-10: 013147989X

ISBN-13: 978-0131479890

Product Dimensions: 6.3 x 1.1 x 9.3 inches

Shipping Weight: 1.2 pounds (View shipping rates and policies)

Average Customer Review: 3.7 out of 5 stars 8 customer reviews

Best Sellers Rank: #2,559,481 in Books (See Top 100 in Books) #29 inÃ Â Books > Science & Math > Earth Sciences > Geology > Plate Tectonics #557 inÃ Â Books > Science & Math > Earth Sciences > Geophysics #3081 inÃ Â Books > History > Americas > Mexico

Customer Reviews

The centerpiece of scenic grandeur in the American West is the Grand Canyon, one of the great natural wonders of the world. How it came to be has captured the imagination not only of millions of visitors to the canyon, but for over 135 years, the best American geologists as well. They recognized that the Colorado River carved this scenic masterpiece, but exactly when and how it did so eluded them. Only in the last few years has a consensus begun to emerge and now, for the first time, author James Lawrence Powell tells the fascinating story of how the mystery came to be solved.Not only have geologists discovered the reasons for the majestic width and depth of the Canyon, they have found that at one time the Colorado River ran through it in the opposite direction.

At another time, hundreds of feet of gravel buried an ancestor of today's Colorado River. Then erosion removed the gravel and resurrected the river, in what James Lawrence Powell has dubbed the Lazarus Theory.Readers of this book will discover and rediscover a great American river—one of astonishing energy and power, a majestic rival to the celebrated Mississippi. Beginning in the Colorado Rockies, the river cuts its way first across the Colorado Plateau and then the Basin and Range Province, finally to reach the sea in the Gulf of California. This river of "liquid sandpaper" today sometimes drops 15 feet per mile; by contrast, the gentle Mississippi rolls across the plains to the Gulf of Mexico at a gradient of a few inches per mile. Ultimately, the waters of the Colorado are not only key to understanding the geology of the West, but also to the management of our most precious western resource. What makes James Lawrence Powell's narrative so compelling, apart from the grandeur of its subject, is the richness of the characters who participated in this detective story. John Wesley Powell, the most famous of the nineteenth-century Canyon expedition leaders, the man for whom Lake Powell is named, discovered key geologic principles that helped to crack the puzzle. His two brilliant assistants, Grove Karl Gilbert and Clarence Dutton, built on Major Powell's findings to make historic scientific advances. Indeed, James Lawrence Powell shows how Dutton's work in the Grand Canyon led directly to our modern understanding of Continental Drift and Plate Tectonics. Twentieth-century geology of the Canyon culminated at a meeting in 2000 on the Canyon rim at which geologists debated the Lazarus Theory and other ideas far into the night. The solution on which they converged resonated around the world.The 16 pages of photographs Powell collected for this sweeping tale bring to life the people and places of the story. The maps and geological time charts are useful references as to when and where the action took place. James Lawrence Powell has created a work of nonfiction that is an eloquent, educating, and exciting ride down to the bedrock of the American West and its most spectacular sight. Praise for Grand Canyon"The Grand Canyon's beauty, grandeur, and striking form have made it one of the greatest tourist attractions in the U.S., and also one of the greatest intellectual challenges to geologists. James Powell's exciting account of the Canyon's development is worthy of the excitement that the canyon itself inspires."—Jared Diamond, Professor of Geography, UCLA, and Pulitzer-Prize-winning author of Guns, Germs, and Steel and CollapseAn engaging and lucid account of one of geology's greatest monuments. The story of how the Colorado River cut the Grand Canyon turns out to be a remarkable detective story, complete with red herrings and innocent suspects. The tale of the Grand Canyon encapsulates features of the growth in our knowledge over the whole of the earth sciences."—Richard Fortey, FRS, Natural History Museum, London, author of Trilobite! and

Earth "Grand Canyon reads like a detective novel as Powell traces the work of the generations of geologists trying to understand our most majestic landscape. In the process, his fascinating book reveals not just how the Grand Canyonhas taken shape, but our planet as a whole."—Carl Zimmer, author of Soul Made Flesh and Evolution: The Triumph of an Idea "John Wesley Powell, the pioneer explorer of the Grand Canyon, believed that science could reveal a deeper history of America, one that we should know for our own survival. As this excellent book shows, that prophecy has come true: modern science indeed has revealed just how fragile our civilization is—as vulnerable as the rocks that water has relentlessly washed away in the Canyon. A clear, dramatic, and humbling story of continental discovery."—Donald Worster, Hall Distinguished Professor of American History, University of Kansas"As important to the professional scientist as it is to those who simply are bewitched by the Grand Canyon. An expertly woven tale of scientific intrigue."—Richard A. Young, Dept. of Geological Sciences, SUNY College>

James Lawrence Powell is Executive Director of the National Physical Science Consortium, and former Director and President of the Los Angeles County Museum of Natural History. He taught geology for twenty years at Oberlin College, where he also served as Acting President. The author of Night Comes to the Cretaceous and Mysteries of Terra Firma, he lives in Buellton, California with his wife, five horses, three cats, two dogs, and a burro.>

James Powell (no relation to John Wesley Powell) is one of the best authors of popular geology writing today. His previous books, "Night Comes to the Cretaceous" and "Mysteries of Terra Firma", provide fascinating accounts of important ideas in modern geology, such as the age of the Earth, plate tectonics, and the extinction of the dinosaurs. In this book, Powell tackles the complex geology of the Grand Canyon within the broader context of the Green-Colorado River systems. The focus is not on a description of the canyon but on understanding how it was formed.As Jim Powell tells us, the Colorado Plateau has played a major role in the history of American geology. Much of his book follows the lives and work of the great geologists of the nineteenth century, such as Powell, Gilbert, and Dutton. It was they who gradually came to an understanding of how rivers carve canyons, canyons that sometimes cut right through mountain ranges. Before their work, many people thought that the great canyons were rifts created by other forces, through which rivers later flowed. Most of the first half of the book is a fascinating mix of history and science, using the adventures of men like Powell to illustrate the birth of modern geology.The second half of the book takes on the more challenging task of explaining the complexities of the Grand Canyon story. As twentieth-century

scientists looked more closely at the canyon and measured the ages of rocks through which it cuts, they saw that the simple and elegant theories of the nineteenth century broke down. Perhaps the Colorado River of today did not exist when parts of the canyon were cut. Perhaps the river flowed south-east rather than west, exiting the canyon via the Little Colorado and draining into the Rio Grande. Possibly two separate canyons joined to form the Grand. Maybe the canyon was carved, then filled with gravel and sediment, then cut again within the past few million years. Some of this is heavy going for the geological novice, but the rewards of reading this book are ample. It teaches us that the Earth and its geology are indeed complex, and the process of advancing science is a very human affair. It is sobering to realize that even such a huge geological feature as the Grand Canyon still holds its mysteries and stymies efforts to fit it into a single neat framework.

This is a lovely overview of the Grand Canyon, its discovery by Europeans, and its study by scientists from the mid 19th century to the present time. It is sort of a history of a history.While the author discusses early Spanish visits to or near misses of the Canyon, he spends most of the first several chapters discussing John Wesley Powell’s voyage of discovery and his documentation of the Colorado River’s course to the Gulf of California. This is almost an adventure story in itself, and serves to capture the imagination in a way that most geological works don’t. Although the quotes from Powell’s work seemed a little over-the-top, I still felt like getting a copy of his work to read it for myself. Certainly the discussion of his later life produces a much more rounded and engaging portrait of the man than most texts provide.Succeeding chapters deal with the careers of Powell and his various coworkers and successors and the development of theories regarding the Grand Canyon’s origins. In the process, the author also discusses the history of geology and of the theory of earth history, covering among other things, the work of Nicholas Steno, James Hutton, Louis Agassiz, Charles Lyell, and Alfred Wegener. For the geology student these names will already be familiar; for others the brief introduction will offer a quick recitation of the Who’s Who of geology without belaboring the point.Professor Powell’s discussion makes it apparent that the science of geology is as much a work in progress as the Grand Canyon itself, since the concept of the canyon building processes have been reshaped as geology itself has matured as a field. He carries the reader through the thought processes of each of the researcher’s contributions, ending the book with a final summation of his own on the subject that he admits is thoroughly tentative but is still a best approximation. Among the most interesting points on the Canyon is the fact that, while on first glance it seems so obvious with respect to its structure, dynamics and age, it is in fact much more complex than it appears.The author’s style is very readable, although there were places where I got

rather lost in the descriptions of channels, directions, etc. along the course of the river. Anyone intimately familiar with the terrain, however, will have little difficulty following the discussion, but those of us less familiar with the Canyon will find it somewhat confusing. The gist of the information is, however, quite clear.Those not familiar with geology will find the author provides explanations of terms in context, and will also find a glossary of terms at the back of the book. For the most part, the description of erosional and depositional processes is quite clear and does not require any background in the subject. It would probably serve as a good book for high school libraries, since its presentation of science as a profession and a discipline is quite clear.A thoroughly enjoyable book for those interested in the history of geology, history of science, history of the West, John Wesley Powell's expeditions and contributions, structural geology and geomorphology, the Colorado River, the Grand Canyon, and hydrodynamics.

Excellent review of the geology and the history of science of the making of the Grand Canyon. Reading it enriched my recent backpacking trip there.

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