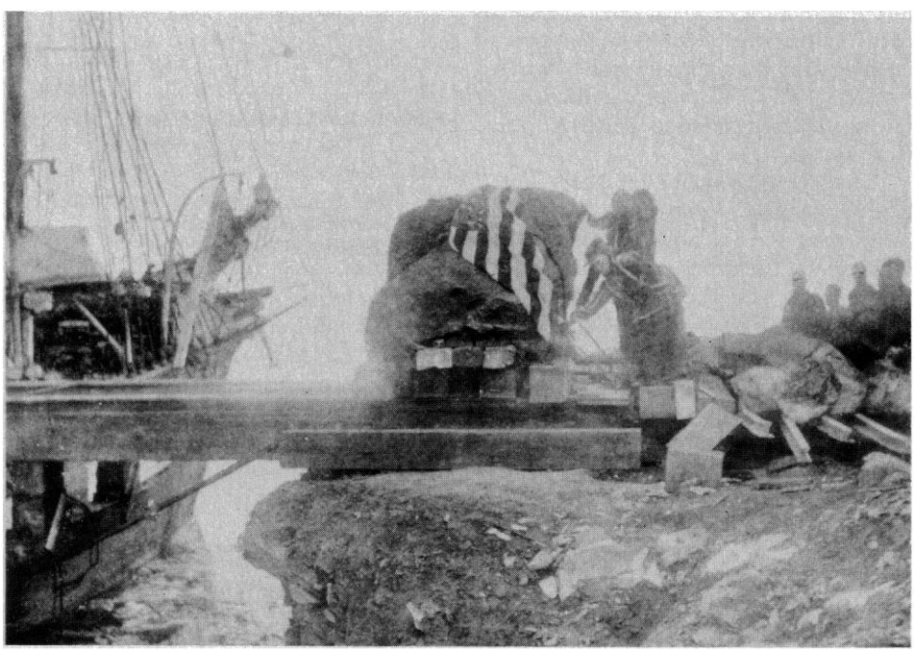
Ideas About Meteorites

Cosmic Debris. Meteorites in History. JOHN G. BURKE. University of California Press, Berkeley, 1986. x, 445 pp., illus., + plates. $45.

This book fills in splendid fashion a need that has existed since the advent of the space age. Thirty years ago, meteorites and impact phenomena were topics of serious interest only to a few scattered scientists and museum curators. Today, thousands of scientists are analyzing meteorites in laboratories around the world for new insights into the origin of the solar system, the character of radiation in space, and the composition of meteorite parent bodies—now believed to include asteroids, the Moon, and probably also extinct comets and Mars. Meteorite impact has recently been recognized as a geologic process of fundamental importance that has modified the surfaces of all the terrestrial planets and may have triggered massive extinctions on Earth. The large and diverse community of scientists studying these subjects has, in effect, grown like Topsy, with no coherent sense of its own history. John Burke has filled the void by presenting a history of ideas on meteorites, and a broad range of related topics, in a clear, elegant style that keeps a reader turning pages. Though the narrative appears to flow unhurriedly, Burke packs each chapter with an enormous amount of information, meticulously researched from original sources. The text is basically complete and self-sufficient, but 39 pages of notes and 53 pages of references are provided for benefit of the scholarly.

Meteoritics began to emerge as a modern scientific discipline at about the turn of the 19th century, a period that also saw the birth of geology. Both sciences experienced difficulties casting off shackles of the past. Geologists had to wrestle with the Flood, an inheritance from theology; savants investigating reports of fallen stones worked with a body of thought derived from Aristotle's *Meteorologica*, which viewed fiery, watery, and airy "meteors," and objects fallen from the skies, as atmospheric phenomena. In his first two chapters, entitled "Disbelief" and "Acceptance," Burke traces the observations, ideas, and events that led certain scientists to undergo a dramatic change in their beliefs respecting meteorites in 1803. He points out, however, that a number of respected scientists had never disbelieved in meteorites and sets the record straight on certain widely repeated errors and half-truths. For example, the French Academy never voted that meteorites did not exist, and Burke cites evidence that Thomas Jefferson had already read Joseph Izarn's *Lithologie Atmosphérique*, published in 1803, years before he is supposed to have said, in response to news of the fall at Weston, Connecticut, that it would be easier to believe that two Yankee professors would lie than that stones would fall from heaven. Jefferson may have said, "It is all a lie," but there is no documentary evidence that he maligned Yankee professors.



The 31-ton "Tent" or Ahnighito meteorite, which was the largest of the meteorites found at Cape York in the Arctic Circle by Captain Robert Peary's expedition and which had served as a source of iron for Eskimo artifacts, being loaded onto Peary's ship *Hope*, 1897. The 370-ton ship "was stabilized to withstand the heavy weight. . . . A 100-ton floating crane at the Brooklyn Navy Yard lifted it from the hold of the vessel, and there it rested until 1904," when it, along with the "Woman" and "Dog" meteorites from Cape York, was purchased for $40,000 and donated to the American Museum of Natural History. [Reproduced in *Cosmic Debris* from Peary's *Northward over the "Great Ice"* (New York, 1914)]

Burke describes the development of ideas on meteors and orbits, comets, and asteroids, traces the applications of analytical chemistry to meteorites, discusses the observations of thin-section petrologists and the efforts that were made in the 19th and 20th centuries to classify meteorites and compare them with rocks of Earth's interior. As a result, we are treated, in no small measure, to histories of inorganic and organic chemistry, of metallurgy, and of petrography. The topics with long histories and those, such as isotopic dating, with relatively short ones are brought up to date (through 1985) in a chapter on contemporary meteorite research and theories. Along the way, Burke provides a wealth of information on myths and folklore respecting meteorites, on the building of the great meteorite collections, on changing ideas about prices and exchange values of specimens, and on the uses of iron meteorites as beads, dagger blades, and other artifacts. Also included are sections on tektites, Antarctic meteorites, and meteorite impact craters, with a detailed account of the controversy over the Barringer Meteorite Crater in northern Arizona. Burke concludes with a section entitled "matters of life and death," in which he discusses the unsuccessful search for biologic materials in meteorites and lunar samples and the implications of iridium and other siderophile elements, which may represent fallout from an enormously energetic meteorite impact, at the Cretaceous-Tertiary boundary.

This book is The Compleat History of Meteoritics. An attractive volume, generously illustrated with prints and diagrams and several pages of color plates, it will be welcomed as a prime source of information by planetary scientists, many types of earth scientists, geochemists, and historians of science. To students, graduate and undergraduate, and to many nonspecialists, the book will serve as an authoritative but wholly accessible introduction to a fascinating body of knowledge.

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