They came from space

John F. Kerridge

Cosmic Debris: Meteorites in History. By John G. Burke. *University of California Press*: 1986. Pp. 445. \$45, £35.95.

CONTEMPORARY books on meteoritics commonly devote little more than a few paragraphs to what went on before the twentieth century. A comment about the role of the Académie Royale des Sciences, an anecdote about Thomas Jefferson, a pat on the back for Chladni, and the reader is quickly plunged into the thicket of meteorite classification. Was there more to it than that? John Burke's meticulously researched book gives the resounding answer, yes. Here we may learn just what the Académie did or did not do, just what Jefferson did or did not say, and whether Chladni deserved his accolade — and, as the ads say, much more. The scholarship is first-rate and the style lucid. This is a book in which scientists and historians alike will find enlightenment and entertainment.

In discussing the progress towards recognition of the cosmic nature of meteorites, Burke argues that, contrary to the widely held view, the revolution was not accomplished overnight by the studies of Chladni, Howard and Biot but that "the chronicle of acceptance is...far more complex". Thus, he shows that Chladni's report on the Krasnojarsk pallasite, by eliminating local and anthropogenic origins through a series of plausible arguments, succeeded in convincing many that it, and other somewhat similar objects, had fallen to Earth as fireballs. However, despite the no less compelling logic of his contention that "it was just as reasonable to postulate small material bodies in space as to deny their presence", his proposal of a cosmic origin for such fireballs was not generally accepted until several decades later. One is reminded of the 'chronicle of acceptance' of plate tectonics, though Burke himself does not draw this parallel.

The struggle to impose a rational system of classification on the apparently chaotic and polyglot population of meteorites is described with clarity and scientific accuracy, as is the corresponding growth of sophistication in theories of their origin. Burke also brings out how improved resolution in classification proceeded at a pace set by developments in other branches of science, particularly chemistry and mineralogy. Indeed, an important message of this book is that from the eighteenth century onwards meteoritics has epitomized interdisciplinary science. Such interdependence transcends the purely

technical. Burke makes the point, for example, that acceptance of the cosmic origin of meteorites owed at least as much to the receptiveness of the prevailing cosmology as to the quality of meteoritic data. (In a similar vein, however, it is curious that the main developments in nineteenth-century geology apparently made no mark on the progress of meteoritics. Were meteorites too inherently anti-uniformitarian to fall within that emergent dogma?)

But if cosmology played a key role in fostering the scientific study of meteorites, information quickly began flowing in the opposite direction. Burke comments that, from 1860, "cosmologists could no longer disregard the evidence elicited from meteorites", though some meteoriticists doubt whether such a desirable state of affairs has been wholly achieved even by 1987. Nonetheless, the impact of meteoritics on cosmology has been considerable and nowhere is this clearer than in the emergence of certain primitive meteorites as our best exemplars of the cosmic abundances of the elements. Burke follows this exciting and fundamental line of inquiry as far as the work of Goldschmidt at which point, not unreasonably, he moves into geochemistry and models of the Earth. However, for the

continuation of the cosmic abundance story, Hans Suess's book, *Chemistry of the Solar System* (Wiley, 1987), is now available.

Burke concludes with a chapter on contemporary meteorite research and theories. In a book of this kind, such an account had to be selective. Not everyone will agree with all his choices of material, but that is inevitable and Burke nonetheless succeeds in capturing the dynamism and variety of current research. Given the historical perspective of the book, I would like to have seen some explicit discussion of the ideological context of recent studies of meteorites, in particular the dominance throughout the past 20 years of the nebular condensation paradigm. Also, in contrast to earlier chapters, this one contains some errors, albeit few in number and minor in importance.

In addition to the science, Burke supplies a wealth of cultural and sociological information to which I cannot do justice here, though it is a delightful aspect of the book. For example, how appealing it is to think that it took an H5 chondrite to end the Great Cultural Revolution! □

John F. Kerridge is at the Institute of Geophysics and Planetary Physics, University of California Los Angeles, Los Angeles, California 90024, USA.

Break-up over Bohemia — photograph taken in 1959 from a Czechoslovakian observatory at Ondrejov, near Prague, of the fragmentation of a bolide meteor. The body was estimated to be only 33,000 feet above the Earth's surface when it disintegrated.