Ohanian has no doubts on the matter. Newton is worth several Einsteins, he tells us, although it would have been more in keeping with the frequently pedantic spirit of his book if he had let us know exactly how many Einsteins—three? four and a quarter?—stack up to one Newton. At one point, Ohanian even suggests that Einstein wasn't quite up to the level of Max Planck, the founder of quantum theory, but by the end of *Einstein's Mistakes* he has restored Einstein to the number two position. Putting Einstein in his place seems, at any rate, to be Ohanian's main purpose.

Though recent biographies have largely dispelled the cherished myth that Einstein was a dunce at school, it is true that the great physicist was not a natural mathematician. After making the enormous conceptual leap that connected the phenomenon of gravitation to the fact that space-time is curved, it took Einstein many excruciating years to find the appropriate mathematical expression for this idea and thereby create the theory of general relativity. Einstein's earlier attempts, some published, some abandoned, contained deep flaws. In his other revolutionary achievements too, Einstein's first pronouncements were rarely the last word. Over the years, those original insights were painstakingly polished to become the scientific theories we know today, and often it was other physicists—more rigorous than Einstein, if less imaginative—who filled in the gaps and supplied the finishing touches.

This, by and large, is nothing more than how science ordinarily progresses, but Ohanian, a former editor at the *American Journal of Physics* and author of several textbooks, seems intent on finding in the missteps and fudges of Einstein's papers a new and shocking portrait of the man. Einstein's pre-1905 efforts "have faded into the obscurity they richly deserve." He made blunders in his great works of 1905 because he "was not thinking like a physicist, but like a patent clerk." A mistake in the first attempt to prove that $E = mc^2$ "is the sort of thing every amateur mathematician knows to watch out for." And so on.

There is, to be sure, the germ of an interesting story here. Einstein's arguments were often makeshift and occasionally shoddy, but most of the time he knew where he wanted to go and found a way to get there. That, as Ohanian admits, is one definition of genius, but he shows little interest in pursuing the thought. Instead, facing up to the evident truth that Einstein repeatedly hit on answers to difficult puzzles before he could figure out a convincing justification for them, Ohanian can only throw up his hands and declare that Einstein was "a mystic in the throes of a revelation." In his minute analysis of Einstein's works, Ohanian reveals himself to be the kind of strictly logical, step-by-step physicist that Einstein plainly was not, and Ohanian's inability to cope with that difference almost seems to have turned into a personal animosity.

This is a scientific rather than a personal study, but still, Ohanian finds time to mention the less attractive aspects of Einstein's character: his shabby treatment of his first wife, his neglect of his children, his tendency to slight his colleagues' scientific contributions, his dreadful sartorial sense, his love of certain disgustingly heavy German foods. Only in the later chapters, when the aging Einstein has come to America to spend his final years working fruitlessly on a "theory of everything," does the tone soften. An eccentric, rather lonely figure, Einstein turns at last into a dotty old uncle whom Ohanian can regard with pity instead of scorn.

David Lindley is the author, most recently, of *Uncertainty: Einstein, Heisenberg, Bohr, and the Struggle for the Soul of Science* (2007).

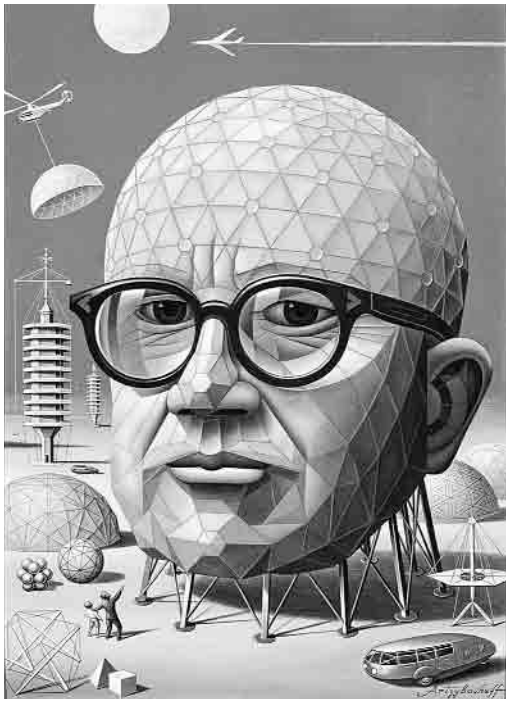
Fuller's Earth

Reviewed by Edward Tenner

BUCKMINSTER FULLER: Starting With the Universe.

Edited by K. Michael Hays and Dana Miller. Yale Univ. Press. 258 pp. $50

When he died in 1983, Buckminster Fuller was the world's most beloved designer, a pioneer of bold new geometric concepts in transportation (the streamlined Dymaxion Car), housing (the geodesic dome, a lightweight



Among those whom the visionary R. Buckminster Fuller inspired was Boris Artzybasheff, creator of this 1964 *Time* cover.

hemisphere of connected polygons), and urbanism (a supersized dome proposed to cover central Manhattan), a best-selling author and mesmerizing speaker, and a prophet of environmental stewardship. Two years later, investigators named a newly discovered spherical carbon molecule, with a structure like the dome's, the "Buckminsterfullerene" in his honor. The Nobel Prize in Chemistry they received for this work in 1996 helped create a new generation of Fuller admirers. But their prolific hero is hard to know.

Preppy nerd and buttoned-down bohemian, green guru and globe-trotting jet fuel consumer, a college expellee who relished honorary degrees, Buckminster Fuller (b. 1895) proclaimed a new cosmos of structural lightness and left a personal archive of 45 tons about it. It is indicative of Fuller's paradoxes that the cocurator of the Whitney Museum's exhibition of his work that closed earlier this fall, Harvard Graduate School of Design professor K. Michael Hays, should open and close his introduction to this catalog by underscoring that Fuller was *not* an architect.

So what was he, then? Hays shows how Fuller's "lightful" plans of the 1920s and '30s for new housing suspended from vertical masts were part of a Modernist reaction against the values of weight and solidity that had prevailed from antiquity to World War I. Fuller's designs reflected the propagandistic architecture of the Soviet avant-garde before Socialist Realism's triumph, as well as the expansive vision of the Swiss master of self-invention and self-promotion, Le Corbusier. What distinguished Fuller from these contemporaries, Hays says, were a lack of "reflexivity" (conscious references in design to architecture's heritage), de-emphasis of stability in favor of dynamic relationships, and a denial that nature, humanity, and technology are distinct entities. While a massive challenge to the uninitiated, Hays's chapter clarifies Fuller's complex symbiosis with Establishment architects and critics.

Buckminster Fuller was a preppy nerd and buttoned-down bohemian, green guru and globe-trotting jet fuel consumer; he proclaimed a new cosmos of structural lightness and left a personal archive of 45 tons about it.

An essay on Fuller as scientist-artist, by Whitney associate curator Dana Miller, is more illuminating about the man himself, showing how much of Fuller's secret was his gift for friendship. This magnetism helped make Fuller exceptionally resilient, and a catalyst of colleagues' work. The chairs he designed for an avant-garde Greenwich Village bar collapsed on opening night in 1929 and were replaced by benches built by a carpenter. But his renown among the tavern's bohemian customers suffered not a bit; one patron, Isamu Noguchi, painted his studio silver following Fuller's plans, and created a chrome-plated bronze portrait head of Fuller

echoed 35 years later in Boris Artzybasheff's illustration for a 1964 *Time* cover. Elizabeth Smith, a curator at the Museum of Contemporary Art in Chicago, brings the story of Fuller's legacy in contemporary art up to date, seeing his influence in the work of artists such as Olafur Eliasson and Irit Batsry.

Antoine Picon, also of Harvard, makes the case for Fuller as a prophet of today's digital utopianism, as a brilliant innovator in the visual presentation of data (especially his geodesic projection of the globe), and as a progenitor of general-systems approaches to resource management. But Picon also rightly observes that Fuller was "at heart a traditional humanist." Megastructures such as the planned Manhattan dome, in Fuller's view, were not opposed to human scale but a means of liberation from "the mechanical enslavement of the industrial era."

The great attraction of this book is the 175 plates and the other illustrations, superbly reproduced, that show the many sides of Fuller: geometric visionary, practical designer, and super salesman. But Fuller's contradictions remain unresolved, and some of his greatest predecessors and successors are absent from the book. For example, Walther Bauersfeld, developer of the Zeiss projection planetarium, patented a geodesic dome for it three decades before Fuller received his own dome patent in 1954. Hays reprints a 1928 photograph by László Moholy-Nagy of a Zeiss dome under construction, without citing Bauersfeld.

As chronological documentation and visual inspiration, *Starting With the Universe* will be an entry point for the study of this most unusual man. But the successors of the publics that responded so warmly to Fuller's many sides during his lifetime, from Pentagon technocrats to Haight-Ashbury hippies, will have to wait for a work that sets the real man in his own time.

Edward Tenner, a contributing editor of *The Wilson Quarterly,* is the author of *Why Things Bite Back: Technology and the Revenge of Unintended Consequences* (1996) and *Our Own Devices: How Technology Remakes Humanity* (2003).

RELIGION & PHILOSOPHY

Saints and Sinners

Reviewed by T. R. Reid

MASSACRE AT MOUNTAIN MEADOWS.

By Ronald W. Walker, Richard E. Turley Jr., and Glen M. Leonard. Oxford Univ. Press. 430 pp. $29.95

If history is written by the victors, church history is usually written by the vicars. Naturally, these captive chronicles—generally churned out by priests, bishops, and in-house archivists—tend to accentuate the positive and gloss over errors and excesses.

So it is both surprising and admirable that the Church of Jesus Christ of Latter-day Saints provided extensive official support to a new warts-and-all history of the Mountain Meadows Massacre, one of the darkest moments in the 180-year history of the Mormon Church. The church opened century-old archives for this account of the infamous mass murder in a high Utah meadow in 1857.

The church was not always so helpful. For nearly a century after some 120 California-bound emigrants were killed by local Mormons, church leaders relied on the stonewall. As late as 1990, when a memorial was unveiled at the massacre site—at the foot of the Mormon Range, in the desert corner where Utah, Nevada, and Arizona meet—descendants of the victims complained that the church was still concealing basic information about the crime.

Massacre at Mountain Meadows is not a formal Mormon publication, but its authors include an assistant church historian (Richard E. Turley Jr.) and a former director of the church's Museum of Church History and Art (Glen M. Leonard). Ronald W. Walker is an independent historian and a writer of Mormon history.

Their unparalleled archival access has not produced any major new conclusions. But in addition to a thorough account of the state of