The end of geohistory?

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From Stone to Star: A View of Modern Geology. By Claude Allègre. Translated by Deborah K. Van Dam. *Harvard University Press: 1992. Pp. 300. $39.95, £31.95.*

I LIE upon the psychiatrist's couch. I listen as my present character is explained in terms of my childhood experiences. So it is, too, with our Earth. It lies there impassively while geologists clamber around like those Lilliputians who explored the recumbent Gulliver. And then all is explained — explained in terms of the geohistorical events of the telluric past. Of those events we can have no direct experiential knowledge. The past, like yesterday's dawn, is gone, never to be reclaimed. It is there to tantalize us like the crock of gold at the end of the rainbow. What lies within the grasp of the geohistorian is nothing more substantial than human beliefs about the past. Those beliefs, let it be noted, grow not out of the crust of the Earth itself, but rather out of the cerebra of that crust's Lilliputian observers.

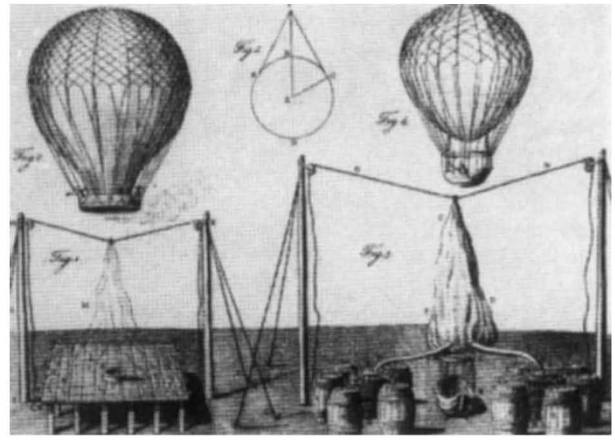
Because geohistory originates within human minds, it is hardly surprising that the accepted styles of geohistory — like the accepted styles of architecture — have varied through the ages. This point is nicely illustrated by the changing perception of the relationship between terrestrial and extraterrestrial events. During the seventeenth and eighteenth centuries, 'externalist geohistory' prevailed. Such postulated geohistorical events as the Deluge were commonly explained in terms of cometary encounter or divine intervention. During the nineteenth century, the rise of uniformitarianism engendered 'internalist geohistory' and all extraterrestrial causation was declared taboo. Even Arizona's Barringer Crater was explained in terms of volcanism rather than meteorite impact. Finally, today, we see a neocatastrophism that looks heavenward in search of external causation for all manner of geohistorical events, from marine transgressions to the extinction of the dinosaurs.

Those who seek for relationships between science and society perhaps here have grist for their mill. When we feel puny and threatened — when we feel helpless in the presence of the Plague, the Lisbon earthquake of 1755, AIDS or the greenhouse effect — do we reflect our insecurity by resorting to externalist geohistories in which we are the microcosmic victims of cosmic forces? When we feel supremely self-confident — as did so many of Queen Victoria's contemporaries — do we enthrone the sublunar world as the seat of all that is geohistorically significant?

Professor Allègre is a distinguished French geochemist and an ardent disciple of the externalist school of geohistory. In this book, he protests at the myopia that has caused geologists to rivet their attention solely upon the events of the past 600 million years. He jettisons the tools of such a miniaturist approach and mounts a scaffolding from which he applies broad brush strokes to a theatrical set of massive proportion. His drama takes us out from Antarctic meteorites and the lunar mare, on to the canyons of Mars and the helium rains of Saturn. He shows how within our terrestrial laboratories the evidence derived from our space programmes may be processed to illuminate geohistorical problems that conventional geology could only dismiss as beyond solution. In short, Allègre seeks to bridge the gulf between astronomy and the Earth sciences. If you are a traditional geologist for whom plate tectonics represents the ultimate thrill, then take your stance upon Allègre's bridge and grow giddy at the prospect revealed before you.

The author — and his translator — are to be congratulated on the production of a book that is both highly readable and deeply informative. It is an excellent introduction to the exciting geohistorical discoveries made in recent decades and it will serve alike the needs of the geologist and the general reader of science. The book should, nevertheless, carry the following health warning: 'Readers of this volume who are historians of the geosciences will find that this book may induce severe palpitations.' Its earlier chapters are riddled with historical misrepresentations and factual errors. A few specimens of these regrettable blemishes will serve to alert the reader to be *en faction*. Robert Jameson's name is misspelled (page 7). Kirwan did not discover the 'fossiliferous' Portrush sill (page 8). Steno's *Prodromus* does not date from 1671 (page 12). The Anglican church did not have "a great deal invested in geology" (page 13). Henry Cavendish was never ennobled (page 19). There is confusion over William Smith's geological cartography (page 40). It is untrue to say that Rutherford emigrated from New Zealand to Canada and thence to England (page 46). Such flaws are irritating, but their presence I forgive because I am satisfied that the volume is a useful addition to our literature.

As I read the book I was repeatedly reminded of Thomas Burnet's *Telluris Theoria Sacra*, first published in 1681. Both books ambitiously trace the history of our Earth in its cosmic setting and even some of Allègre's diagrams carry strange echoes of Burnet's illustrations. In its day, Burnet's theory earned wide currency (even Newton was impressed), yet today it lies rusting upon the scrapheap of science. In Allègre's work I detect a current of the same triumphalism that surrounded Burnet. Allègre seems to feel that the remarkable and mutually supportive discoveries made in the past few decades have brought us close to the end of our geohistorical journey. It has been reserved for us to attain the peak of that mountain where previous generations have merely strug-



EARLY hot-air (left) and hydrogen (right) balloons (1785). It was Henry Cavendish's estimate of the density of hydrogen in 1766 that led Joseph Black to suggest filling balloons with the gas, which had been made cheap by John Roebuck's commercial production of sulphuric acid. The first trial hydrogen balloon was released in Paris in 1783, and interest in balloons soon became enormous. King George III offered to subsidize 'aerostatic experiments' if they were undertaken by the Royal Society, whose rash reply was that "no good whatsoever" could come of them. Yet within years, balloons were widely used for scientific purposes, whether to calculate the "powers of ascension" or to explore "the upper regions". In 1784, the physicist John Jeffries used a balloon to collect samples of upper air for Cavendish to analyse, and James Watt and Matthew Boulton later used one to investigate the cause of the growling of thunder. Not surprisingly, within months of the balloon's invention, people had begun to suggest its use in warfare. A chapter on balloons appears in *The Chemical Revolution: A Contribution to Social History* by A. Clow and N. L. Clow, a work originally published in 1952 and now reprinted in paperback by Gordon and Breach. $28, £15.