



Henry Frankel is receiving the 2014 Mary Rabbitt Award in recognition of his lifetime achievement in researching and writing about the controversy over continental drift and its evolution into plate tectonics. He is the first philosopher of science to win it.

Hank received a BA in zoology from Oberlin College and a PhD from Ohio State University in Philosophy, where he learned to appreciate the history of philosophy from Robert Turnbull and was introduced to philosophy of science by Peter Machamer, himself a philosopher and historian of science. In 1971, Hank began teaching in the Philosophy Department of the University of Missouri at Kansas City. The University strongly supported his research projects with numerous grants. He also won support from the National Science Foundation, American Philosophical Society, and the National Endowment for the Humanities, the latter a difficult agency to crack.

For three decades, Hank presented papers on the history of continental drift at scholarly meetings, including the American Geophysical Union, Geological Society of America, History of Science Society, Philosophy of Science Association, American Association for the Advancement of Science, and INHIGEO. One would have to be a hermit not to know that this project was afoot.

Hank's papers document the growth and change of his methods and conclusions across time. Initially, some of the papers followed traditional philosophy format, rapid fire framing of a model followed by use of drift as a test. Early on, Hank argued that Thomas Kuhn's account of scientific change failed to explain the plate tectonics revolution. He argued that Imre Lakatos' account fared better while Larry Laudan's offered the best fit.

Gradually, Hank found himself not just gathering but also creating the evidence he needed to write the history of drift. This led to detailed studies of marine geology and arguments over seafloor spreading, paleomagnetism and their role in drift controversy, and the development of plate tectonics itself. Yes, he consulted archival collections of scientists' letters and he read their published papers. But he went beyond that to do extensive interviews with many of the characters in the story and to correspond over many years with central figures to analyze and clarify what happened at crucial junctures. And he continually mulled over what to do with this huge body of material to make it available to future scholars.

The project culminated in Hank's magisterial 4-volume history of drift published in 2012 by Cambridge University Press. The books have already won awards including the journal *Choice's* designation as an outstanding academic title, the Friedman award of the Geological Society of London, and the Geoscience Information Society's 2013 Best Reference Book Award for his first volume, *The Continental Drift Controversy: Wegener and the Early Debate*, and now the Rabbitt Award of GSA (although this is more than a book prize).

Hank's books have been reviewed in several places. All reviews are strongly positive. We mention four here, Anthony Hallam's in *Isis*, David Miller's in *Contemporary Physics*, Robert Mayhew's in *Progress in Physical Geography*, and Paul Hoffman's in *EOS*, the journal of the American Geophysical Union. Hoffman's is the most thorough and informative; he summarizes what Hank covers, and identifies Frankel's most important findings. Hallam chose to emphasize the contrast between American and British reception of drift. Hank builds much of his story on regional differences in geological research

and thinking, but not as a way to say one is better than the other, as Hallam does. Mayhew hopes that Frankel and Cambridge University Press produce a single-volume work on the controversy that is affordable to students. We concur. Miller and Hallam imply that Hank thinks the plate tectonics revolution fits Kuhn's view of scientific growth and change.

In our remaining time, we will explain why we and Hank believe that Kuhn's model does not work. Drift and classical geology coexisted as "paradigms" or mega-theories for over fifty years, an impossibility for Kuhn given his insistence that no science can have co-existing paradigms. In our view, the only way the history of geology fits Kuhn is if you view everything before plate tectonics as preparadigmatic and make plate tectonics the first real paradigm. But, as historians of geology, we know that this is false. Kuhn himself viewed Lyell as offering a previous paradigm. We add Hutton and Suess. The history of geology is not the only bad fit for Kuhn. Historians of biology have trouble with it, and so do historians of economic thought, who have to cope with Marxism coexisting with classical theory and then Keynesian economics. If Hank writes a short book on the drift controversy, we think he should return directly to philosophical issues about scientific change and the plate tectonics revolution.

Hallam and Hoffman proclaim that Hank's books are the definitive work on the subject. Does this imply that nothing more need be done? It is true that other scholars are unlikely to redo all the interviews and undertake correspondence with the same characters, many of whom are now deceased. But we see the books as a starting point. After all, even Darwin's *Origin of Species* was a starting point, and like Darwin, Hank will be remembered for a long time to come for his extraordinary accomplishment.

Here are some topics we think warrant investigation, mostly inspired by his fourth volume, *Evolution into Plate Tectonics*:

1. The application of plates to continents. This is an exciting story. Hank ends his story with the development of plate tectonics and its initial application to ocean floors. We need regional studies of the reception and modification of plate tectonics to the continents.
2. More detailed studies are needed on the regional (i.e., Europe, South America, etc.) reception of drift from the 1920s through the 1950s.
3. Permian glaciation. The story actually begins in the mid-1860s. Hank has some materials on later works that need to be pulled together and analyzed as a topic in itself to respond to such questions as How did pre-drift geologists handle it? What use did drifters make of it? How did anti-drifters deal with it?
4. Petroleum geologists' reaction to plate tectonics. We've heard anecdotes that they were slow, but that may have been a projection from the rejection in the 1930s.
5. Drift and plate tectonics in college textbooks. What did they say about drift? Were some specialties more receptive than others? Are there differences among nationalities?
6. Drift and plate tectonics in college classrooms. When, where, and how?

Hank has thrown open the door for which we are most grateful. He has laid out the "Yellow Brick Road", and shown us that there's still lots to do.

*Michele L. Aldrich and Alan E. Leviton*