

2014 MEDALS & AWARDS

MARY C. RABBITT HISTORY AND PHILOSOPHY OF GEOLOGY AWARD

Presented to
Henry Robert Frankel



Henry Robert Frankel
University of Missouri - Kansas City

Citation by Alan Leviton and Michele Aldrich

Henry Frankel received the 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.

For three decades, Hank presented papers on the history of continental drift at scholarly meetings, including the AGU, GSA, History of Science Society, Philosophy of Science Association, AAAS, and INHIGEO.

Hank's papers document the growth and change of Frankel's methods and conclusions across time. Initially, some of the papers

followed traditional philosophy format, 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 creating as well as gathering 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. He consulted archival collections and 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.

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*. 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.

However, we and Hank think that Kuhn's model does not work. Drift and classical geology coexisted as "paradigms" or mega-theories for over fifty years. 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 Kuhn himself viewed

uniformitarianism as offering a previous paradigm. 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. 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 '50s.
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?

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Response by Henry Frankel

I am greatly honored to receive the 2014 Mary C. Rabbit History and Philosophy Geology Award from the History of Geology Division of the Geological Society of America, especially because my own work has been in philosophy and history of science, and concentrated almost entirely on geology and geophysics. Nonetheless, I've been an outsider to the community of historians of geology; your honoring me with this award is a tribute to your broad-mindedness. An undergraduate zoology/chemistry major at Oberlin College, I studied philosophy of science at Ohio State where I worked with Peter Machamer. Five years after taking a position in the philosophy department at the University of Missouri – Kansas City (UMKC), I learned of the plate

tectonics revolution. I'm a slow learner! What a grand opportunity for a philosopher of science to test philosophical accounts of scientific change. It took no imagination to see that here was a post-Kuhnian revolution ripe for philosophical and historical analysis. After finding that Kuhn's model did not fit, while I. Lakatos', and L. Laudan's fared better, I discovered to my surprise that I wanted to know what happened during the controversy quite independently of testing various accounts of science change. I wanted to find out why various participants claimed what they did when they did. Epistemology was still central to my task, but by 1985 I had become more a historian than a philosopher of science. For the next thirty years, longer than the span between the rise of paleomagnetism and acceptance

of plate tectonics, I tried to figure out what happened during the drift controversy. I could not have done so without the generous input from major and minor participants in the revolution. A few not only wanted to help me get their contributions right, but wanted me to get the entire story right. Here I have in mind especially Edward Irving, Dan McKenzie, Robert Fisher, and Fred Vine. I also thank Nanette Biersmith, former Administrative Assistant of the Philosophy Department at UMKC. She edited all my works; her judicious suggestions greatly improved them. Finally, I've been so lucky that Paula, my spouse of 45 years, who has had only slight interest in the plate tectonics revolution, has put up with me, often telling me to quit complaining and get back to work.