
The Callendar Effect is James Fleming’s detailed account of the life and work of Guy Stewart Callendar. This book covers in delightful detail the story of the remarkable scientist who made major contributions to the carbon dioxide theory of climate change. Fleming’s account of Callendar’s singular effort to take measurements and compile information on atmospheric temperature trends and carbon dioxide concentrations gives the reader a sense of his dedication and persistence. According to Fleming, as early as 1938, Callendar concluded that “global climate change can be attributed to an enhanced greenhouse effect due to elevated levels of carbon dioxide in the atmosphere from anthropogenic sources, primarily from the combustion of fossil fuels”. While Callendar’s name is associated with the carbon dioxide theory of global warming, Fleming makes us aware that his contributions are not widely recognized by scientists, historians, and others interested in the ongoing conversation about global warming, climate change, and anthropogenic influence, and tries to ameliorate this perception.

The author interweaves historical events including two World Wars with information from never-before-published original scientific correspondence, notebooks, family letters and photographs. The book is divided into six chapters with three chapters dedicated to each area of research that Callendar had pursued from 1930 to shortly before his death in 1964. The first two chapters are devoted to the early years of Callendar’s life with an insightful perspective on his family, his developing interest in science, and his life as a devoted husband and father. In chapters three through five, Fleming provides the reader with a comprehensive review of Callendar’s research contributions. Callendar was a talented scientist and engineer whose research spanned a range of interests from steam engineering to national defense, including projects to burn fog off runways, and climate research.

Callendar’s work related to the carbon dioxide theory of climate change is included in detail in only one chapter of this well-written and very well researched and documented book. In this chapter readers are treated to the historical background surrounding the theory of the greenhouse effect starting with the efforts of Joseph Fourier, John Tyndall, and Svante Arrhenius in the nineteenth century. The rest of the chapter is devoted to early twentieth century debates, a review of Callendar’s climate publications, and an intriguing section on the effect of his findings. The book concludes with a chapter on Callendar’s legacy: the last section sheds light on the significance of Callendar’s research efforts especially in the climate change arena. Overall, the author has composed an excellent representation of the life of a scientist who contributed greatly to society, and most notably to our understanding of anthropogenic climate change. I enthusiastically recommend this book to anyone – scientist, non-scientist, historian, and even those remaining skeptics of the global warming debate who have an interest in the process of science and wish to gain an appreciation for the endurance and persistence of early scientists in pursuit of an understanding of our environment.

Sepi Yalda


This volume of sixteen essays (plus an introduction, five commentaries, and some brief concluding remarks) constitutes the
published version of a Nobel Symposium held in Stockholm in 2002 on the relationship between science and industry in the twentieth century. The essays are grouped into seven parts: Industrial Research, the Industrialization of Research, the Physics and Chemistry of Life, Relating Science and Industry after the Linear Model, Does History of Science Have Policy Implications?, Future Histories of Science and Technology, and Concluding Remarks. Yet the boundary between history and what might perhaps be called social science analysis—between description and normative statements—in many of these essays is quite thin and porous. Many of the contributions are concerned to one extent or another with the issue of the so-called linear model of the relationship among science, technology, and society, viz., that science constitutes the source or the “push” for technological change, which in turn brings industrial growth and social prosperity. In this model, industry is dependent on academic knowledge. Several essays also touch on what Henry Etzkowitz (and others) call(s) the Triple Helix, the claim “that the interaction among university-industry-government is the key to improving the conditions for innovation in a knowledge-based society”, that is, that changed institutional relationships, more than product innovation, are “the key” to bringing forth such innovation (p. 69). Several essays also touch on the so-called New Production of Knowledge (as developed by Michael Gibbons, et al.), viz., the claim that research in traditional academic disciplines (“Mode 1”) is now being replaced by interdisciplinary and goal-oriented team research (“Mode 2”).

Most of the contributors to the present volume are historians of science or technology, but several are social scientists (including business professors), and so while some essays are strictly historical in nature others are largely social scientific or concerned with policymaking. The common link among them is the effort to understand the science-industry relationship.

The strictly historical essays are devoted to a variety of topics: the U.S. Department of Defense and industrial research (Glen R. Asner); the industrialization of radioisotopes by the U.S. Atomic Energy Commission (Angela Creager); the technological dynamics of twentieth-century biological research (Jean-Paul Gaudillière); the relationship between organization and technological change within the pharmaceutical industry (Vivien Walsh); the stunted development of science in Venezuela and its consequences (Hebe Vessuri); and the contrast between American academic (i.e., theoretical) sociology of science and empirical evidence from the shop floor of industry (Steven Shapin). These essays are well-defined and no one, I believe, could go away from them without having learned something useful about their respective topics. I learned a lot, both in empirical terms and in seeing (not surprisingly) that the various models mentioned above seem irrelevant or at least simplistic.

By contrast, the remaining essays are for the most part unhistorical and, instead, are largely concerned with methodological or theoretical issues: the shortcomings of the linear model (David Edgerton, with a blistering critique by David Hounshell); “beyond linear models” (Thomas J. Misa); the Triple Helix and the rise of the entrepreneurial university (Etzkowitz, with a strong critique by John Krieger); the effect of research tools on social science (Alexandra Waluszewski); the changing patterns of the utility of university research (Keith Pavitt); technological change as an evolutionary phenomenon (James Fleck); “reductionism in models” and its pertinence to research policy (Aant Elzinga); the role of history of science in shaping (or not) science policy in the United Kingdom (Jeff Hughes); the potentialities of Web-based historical research, in particular as done through a study of materials science research (Arne Hessenbruch); and contemporary scientific archives (Peter Harper). Finally, in his short concluding remarks, Håkon With Andersen calls for a more modest use of history of science and technology in policymaking. This second set of essays, then, will probably find greater interest from those concerned with theory or policy. Too many of them,