

Taking the Temperature of Cosmos and Culture

A Matter of Degrees: What Temperature Reveals About the Past and Future of Our Species, Planet, and Universe

Gino Segrè
Viking, New York, 2002. \$24.95
(300 pp.). ISBN 0-670-03101-1

Reviewed by Peter Salamon

Gino Segrè's *A Matter of Degrees*, a thoroughly entertaining book, is a tour of science with a focus on temperature. That focus, unusual for a popular presentation, shapes the content of a book that will intrigue a general audience. Physicists will enjoy the chance to learn, in broad strokes, the history and recent results of such related fields as geology and extremeophile biology (the biology of microbes that thrive in extreme conditions).

Segrè deftly weaves throughout the book an appreciation of temperature as a parameter in human and cosmological history. He makes a convincing point that the range of temperature extremes that humans were able to create is a better index than time for the evolution of civilization. For example, increases in the highest reachable temperature mark such epochal developments as the Bronze Age, the Iron Age, and the Atomic Age.

Given that the book is a popularization, Segrè succeeds remarkably well in pointing to open questions related to temperature. For example, he cites our incomplete and controversial knowledge of the history of Earth's temperature. Furthermore, he links that incomplete knowledge to the greenhouse effect and carbon-dioxide emissions, including separate sections on the basic science, the history, and the politics of the effect.

Segrè avoids taking a clear posi-

tion on controversial topics. Nevertheless, his views color the narrative. The greenhouse effect receives a far more skeptical treatment in *Taken by Storm*, by Christopher Essex and Ross McKittrick (Key Porter Books, 2002). On the other hand, the role of fevers in human disease receives a far less skeptical treatment in *Why We Get Sick*, by Randolph Nesse and George Williams (Vintage Books, 1995). There are many ways to say "we really don't know, but . . ."

The author's style is comfortably informal. After all, he is discussing physics, which he aptly calls his family business. The narrative is always in terms of focused stories—a fact Segrè credits to his wife, who kept telling him to revise each portion until it read like a story. Each of the six chapters represents a different foray, and the combined breadth is very impressive. My favorite chapters are the nicely coupled pair, Reading the Earth and Life in the Extremes. His conjectures on the origins and survival of life on Earth, which he discloses through stories about bathyspheres and thermal vents, make excellent reading.

I found the two chapters on conventional physics good but less inspired. Perhaps the problem is only that in these areas I am too familiar with comparable stories that would have served just about as well. In Measure for Measure, a survey of thermodynamics, Segrè develops the history of the gas laws in a nicer story than I have read before, but I missed some mention of early heat-capacity ideas. In all, the chapter is no better or more accessible than, say, Laszlo Tisza's introductory chapter in *Generalized Thermodynamics* (MIT Press, 1966). Similarly, the book's account of the history of quantum mechanics does not outshine numerous other popular accounts. However, Segrè's observation that low temperature is the door to macroscopic manifestations of quantum mechanics is a powerful insight, and he uses that insight to discuss high- T_c superconductors. I would have liked a more thorough follow-up on Bose-Einstein condensates than the mere mention he gives them.

A subtheme in the book is old versus young contributors to science. Segrè subscribes to the usual belief

that major theoretical contributions generally come from the young. However, he points to the vital role played by older members of the scientific enterprise. Here, he distinguishes between experimental and theoretical physics. He points out that it takes years to accumulate techniques, materials, and personnel for experiments on the scale carried out by Ernest Rutherford or Heike Kamerlingh Onnes. For theoretical work, he points to the importance of running a research group that mentors young talent and gives easy access to the important questions in a field. I found this discussion interesting and would have liked to see it developed earlier and more extensively than the few paragraphs he affords it in the later chapters.

In summary, *A Matter of Degrees* is an excellent and thoroughly readable introduction to science. Segrè ends on an upbeat note by reiterating that much is left to discover and by conveying a sense of adventure that makes the reader eager to set out on the quest. I expect the book will inspire many budding scientists. It is a welcome and important addition to the literature.

In War and Peace: My Life in Science and Technology

Guy Stever
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In War and Peace is the autobiography of Guy Stever (H. Guyford Stever), a remarkable scientist and university and government administrator. While still in his twenties, Stever mused, "In summing up my life in Britain, after those first few months in 1943, I realized that I had grown in my capability to help in large scientific affairs. I had worked with impressive people, particularly great leaders, in science, engineering, and government, in both countries [the US and Britain]" (p. 32). Indeed he had, and much more was to come.

Stever has probably served on and chaired more committees, commissions, and high-level panels than any

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