

Review of “A Matter of Degrees” by Gino Segre

Gino Segre has succeeded in writing a thoroughly entertaining “science book intended for the general public”. The book is a tour of science viewed from the perspective of temperature. This is an unusual perspective for popular books on science and results in an unusual list of topics of interest to a broad audience. Even physicists will enjoy this chance to learn, in broad strokes, the history and recent results of such related fields as geology and extremeophile biology.

The appreciation of temperature as a parameter in human and cosmological history is woven through with remarkable effectiveness. For example, Segre makes a convincing point that the extreme of temperature humans were able to create is in many ways as good a parameter as time for the history civilization.

For a book at this level, Segre succeeds remarkably well in pointing to open problems related to temperature. For example, he cites our very incomplete and controversial knowledge of the history of the temperature of the earth. Furthermore, he links this incomplete knowledge to issues surrounding the greenhouse effect and CO₂ emissions, including separate sections on the basic science, the history, and the politics of the effect.

In mentioning the controversial, Segre does not take an open stance. Nevertheless, his views color the narrative. The greenhouse effect receives a very different treatment in Taken by Storm, a recent book by Christopher Essex and Ross McKittrick (Key Porter Books 2002). Similarly, the discussion of the role of fevers in human disease receives a very different 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 has a very comfortable style. After all, he is discussing physics, which he aptly calls his family business. The narrative is always in terms of focused stories -- a fact that he credits to his wife who kept telling him to revise each portion until this was the case. Each of the six chapters represents a different foray and the breadth is very impressive. My favorites were the nicely coupled pair of chapters entitled “Reading the Earth” and “Life in the Extremes”. His conjectures concerning the origins and survival of life on earth told through stories about bathyspheres and thermal vents make excellent reading.

I found the two chapters on real 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 well to communicate the material. “Measure for Measure” is a survey of thermodynamics. Although Segre develops the history of the gas laws in a nicer story than I have read before, 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 “The Evolution of the Concepts of Thermodynamics” in Generalized Thermodynamics (MIT Press, 1966). Similarly, there are numerous popular accounts of the history of quantum mechanics. Viewing low temperature as the key to macroscopic manifestations of quantum effects is a powerful point of view and Segre does use it to discuss high T_c.

superconductors. I would have liked to see a more thorough follow-up regarding Bose-Einstein condensates than the mere mention he affords them.

A subtheme in the book is old versus young contributions to science. Segre subscribes to the usual belief that major theoretical contributions generally come from the young. He also points however to the very important role of the older members of the scientific enterprise. I found this 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, the book is an excellent and thoroughly readable introduction to science. Segre ends on an upbeat note, which leaves the reader thirsting for more. I expect the book will inspire many budding scientists and consider it a welcome and important addition to the literature.

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