Gordon Gould and the brothers-in-law Charles Townes and Arthur Schawlow. The dispute's skeleton is summarized by Bromberg: "Gould filed a patent application in April 1959. When the Schawlow and Townes patent . . . , filed in July 1958, was granted in March 1960, Gould . . . brought a challenge against it before the [courts] on the grounds that although [he] had filed later, he had conceived of the invention first."

Although this challenge failed when it was first filed in 1960, in a legal battle not reviewed in this book (properly, I think), it finally led to the issuance of four patents to Gould some 25 years later. The pertinent documents were Gould's notebooks and the scientific papers of Schawlow and Townes, which, with their fantastic physics, stimulated people and institutions into an almost frenzied commitment to design and produce the first working laser. The race was won by Ted Maiman at Hughes Research Laboratory with his successful operation of a ruby laser in mid-1960. The contributions of Schawlow and Townes to the genesis of the laser and indeed to the creation of quantum optics itself will always comprise one of the truly seminal works of science.

The more than one hundred pages of the Gould notebooks were all written before the actual Schawlow and Townes publications and well before the construction of the first successful lasers. In these notebooks Gould discusses open-sided Fabry–Perot resonators, Brewster-angle windows, "Q-switching," exchange pumping (the He–Ne system is specifically referenced) and optically pumped laser media (ruby and some of the rare-Earth candidates are explicitly identified). In his discussion of applications for the not-yet-extant lasers, Gould speaks of frequency and length standards, profilometers, materials processing, machining, chemical activation and thermonuclear fusion. Quite a remarkable set of notes!

Schawlow and Townes brought fantastically good science and great inventiveness to the birth of the laser. Gould, on the other hand, proved himself one of the most outstanding and insightful inventors of this century.

There is far, far more to Bromberg's book than the birth pains of the laser. Her account of the veritable orgy of discovery and invention throughout the 1960s is a "must read" for those who are interested in the processes of scientific and engineering evolution. And her first chapter, recounting detonative maser developments of the 1950s, is simply superb. Townes, Robert Dicke, and Nicolaas Bloembergen are just a few of the scientists blended into her fascinating history of the early "maser days."

The epilogue, "The Laser Now and in the Future," was written by Arthur Guenther, Henry Kressel and William Krupke. It is a very nice piece that in its style and substance simply underscores the remarkable triumph of Bromberg's book.

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Too Hot to Handle: The Race for Cold Fusion

Frank Close
Princeton U. P., Princeton, N. J., 1991. 376 pp. $24.95 hc ISBN 0-691-08591-9

After agreeing to review Frank Close's book, I was concerned about wasting more time on cold fusion than I had already spent doing research in this "field." However, two months and a long airplane flight later I concluded that the book was entertaining and that Close did a reasonable job describing the history of cold fusion.

It all started on 23 March 1989, when Martin Fleischmann of the University of Southampton and Stanley Pons of the University of Utah announced to the press that they had attained nuclear fusion—a phenomenon that for over 60 years had eluded physicists—in a jar. As Close points out, their claims were based on data that had undergone no peer review. Even today much of the data has not yet been shared with the scientific community. Close describes the relations between the University of Utah and Brigham Young University that precipitated the press conference: After Fleischmann and Pons had found that BYU scientists were planning to present their own results on neutron emission at the upcoming Americal Physical Society meeting in Baltimore, they broke off all agreements between the two groups on joint publication.

Close follows quite carefully the scientific events that took place after this news conference, focusing on only a few of the laboratories that systematically showed how the Fleishmann–Pons results were flawed and discussing some of the positive results that other groups obtained immediately following the initial announcement. The BYU group, also involved in the early hysteria, produced its own positive results (which have since been shown to be wrong by at least a few orders of magnitude). However, the claims from BYU were more modest as pointed out by Close.

I found Close to be protective throughout the book of the positive results from well-established laboratories and institutions. Well after the dust had settled there were still, to put it modestly, believers at these laboratories, but Close glosses over that story. He emphasises, however, the crucial observation that the scientific community is robust in correcting bad science, even though many events described in the book were personal and unprofessional attacks, not scientific debates.

All in all, if you are interested in learning how experiments should *not* be done or if you want to know a little more of the history of the events surrounding cold fusion, I recommend reading *Too Hot to Handle*. An undergraduate could learn some basic nuclear physics from this entertaining story. I am sure more books on this topic will further elucidate this surprising event in science.

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Fractal Physiology and Chaos in Medicine

Bruce J. West
World Scientific, Teaneck, N. J., 1990. 278 pp. $58.00 hc ISBN 981-02-0127-3

In his preface, the author describes this book as being "concerned with the application of fractals and chaos (as well as other concepts from nonlinear dynamics systems theory) to bio-medical phenomena," evidently addressing the book to life scientists rather than physical scientists. To cater to this intended readership, he explains clearly and in exquisite detail the elementary concepts underlying the discipline of dynamical systems (irritatingly referred to by the author as "dynamic systems" or sometimes—as in the above quotation—"dynamics systems").

Among these elementary concepts (and by "elementary" I mean "fundamental," as in elementary particles, rather than "simple") are linearity vis-à-vis nonlinearity; fixed points, limit cycles and attractors (including strange attractors); the geometrical foundations of chaos, neatly illustrated by the baker's transformation; fractals and fractal dimension; maps of the interval, bifurcations, period doubling and universality (or self-similarity); and Lyapunov exponents. The level is sufficiently simple that those with only a limited knowledge of physics or mathematics should