Summer Reading

Summer, a great time for leisure reading! Try to set aside some time and find a quiet spot, because Hal Harris, Dick Pagni, Jeff Kovac, and Brian Coppola have a variety of interesting suggestions for you.

Hal Harris recommends

Stuffed Animals and Pickled Heads: The Culture and Evolution of Natural History Museums by Stephen T. Asma

Oxford University Press: 2001. 303 pp. ISBN 0-19-513050-2. $30 (scheduled for publication in paper May, 2003)

When I was a kid, my brother and I used to negotiate Saturday Los Angeles traffic on our bicycles in order to get to the Museum of Natural History of Los Angeles, where the great collection of dinosaur bones from the La Brea Tar pits were exhibited. (Now, many of them are in the Page Museum and elsewhere.) The museum had lots of things besides the dinosaurs, though, and all of it fascinated me. Steven Asma has written a terrific book about how natural history museums came to be, and how natural history became scientific. He kindles (or rekindles) the sense of curiosity that so often opens the eyes of young people to science, and does a great job of explaining how mankind came to understand our place in nature and in evolution. The "pickled heads" in the title refers to those of William Mons, lover of the wife of Peter the Great, and Mary Hamilton, Peter's own lover. Peter had them both executed and their heads preserved in jars that were kept in the chambers of his wife, Catherine. Stephen Asma has stuffed "Stuffed Animals" with dozens of stories like this, mixed with solid intellectual history.

The Map That Changed the World: William Smith and the Birth of Modern Geology by Simon Winchester

HarperCollins: 2001. 327 pp. ISBN 0-06-019361-1 (hardbound). $26; Perennial: 2002. 352 pp. ISBN 0060931809 (paper). $13.95

If the name "Simon Winchester" sounds familiar, it is probably because of his recent bestseller, "The Professor and the Madman"—the history of how the Oxford English Dictionary was originally compiled. It is supposed to be very good, but I haven't read it myself yet. However, my experience with "The Map…" strongly inclines me toward reading that other one as well. Mr. Winchester does an excellent job of bringing to life not only the obsession of William Smith to publish a lifetime of work in the first geological map of England, but also the milieu in which he worked. Perhaps Winchester slightly exaggerates the singularity of his main character, and gives him a bit more credit than he deserves, for putting together ideas that had been going through the minds of others of the time. But there is no minimizing his painstaking effort to gather the data that would constitute his opus. This is a book that brings lots of life to the relatively slow-moving science of geology.

The Honors Class: Hilbert's Problems and Their Solvers by Benjamin H. Yandell

A. K. Peters Ltd.: Natick, MA, 2001. 486 pp. ISBN 1-56881-141-1. $39

In 1900, David Hilbert gave an address to the International Congress of Mathematicians that outlined the 23 most important unsolved problems of mathematics, as he saw them. In "The Honors Class", Benjamin Yandell describes the problems and the very remarkable people who worked on them. More than a century later, there are still a few that remain unsolved, and some of those that have been successfully attacked withstood assault for many decades. I was familiar with many of the names in the book because they are associated with equations that I have used and that I teach my students about. It was not until reading this attractive and well-written history that I was able to put those names and their contributions into the context of their mathematical contributions other than those I know of from quantum chemistry or statistical mechanics. This is the best popular book about mathematics that I have read since "Fermat's Enigma" by Simon Singh.

Crypto: How the Code Rebels Beat the Government—Saving Privacy in the Digital Age by Steven Levy

Penguin Putnam: 2002. 356 pp. ISBN 0-140-24432-8 (paper). $14

The usefulness of the Internet for commercial and industrial purposes depends on the ability of individuals and companies to communicate privately, using an intrinsically public medium. People have come to rely on the fact that credit card information, bank and brokerage transactions, medical records, and other sensitive data can be safely hidden from the outside world, yet be readable by the intended recipient. "Crypto" is a history of how the "public key" system that makes this possible was invented by a group of computer programmers working outside of and in competition with the U.S. National Security Agency (NSA). Government agencies, and especially NSA, tried to keep the technology secret, and to limit the degree of security available to a level that would be "crackable" by them, because truly secret codes also allow criminals and terrorists to communicate secretly. One can only wonder what the consequences for individual freedom would have been, had the technology not been largely settled before September 11, 2001. (The cloth version of the book was published in 2000.) For more on those important issues, see the Web pages of the Electronic Frontier Foundation (*http://www.eff.org*).

Acid Tongues and Tranquil Dreamers: Eight Scientific Rivalries that Changed the World
by Michael White

Perennial (an imprint of Harper Collins): 2002. 448 pp. ISBN 0-380-80613-4 (paper). $14.95; ISBN 0-380-97754-0 (cloth). $26

Many people have difficulty understanding the importance to scientists of discovering things before someone else does. While some of the protagonists in "Acid Tongues" may have had monetary incentives, it is more often pride and the acceptance of one's ideas that drove the rivalries of Newton vs. Leibniz, Edison vs. Tesla, Crick and Watson vs. Pauling vs. Franklin and Wilkins. Sometimes these men of great intellect (there is only one woman profiled, Rosalind Franklin) acted in the most petty and immature fashion. Chemists will enjoy the Lavoisier-Priestley history, and the battle between Gates' Windows and Ellison's Oracle may not have seen its last skirmish. Michael White not only tells some of the most interesting history in science, but also reminds us that great science is done by human beings, with most of the same faults as the rest of us. My favorite quote from the book appears on the first page, and it is from Winston Churchill: "In science you don't need to be polite, you only have to be right."

Dick Pagni recommends

Hydrogen: The Essential Element by John S. Rigden

Harvard University Press: Cambridge, 2002. 320 pp. ISBN 0-674-00738-7. $28

This short book is a biography of hydrogen, the element which, more than any other, has played a pivotal role in the development of physics in the past century or so. In 23 beautifully written chapters, Rigden, the author of a biography of I. I. Rabi and other books, describes the critical experiments and theories carried out and developed by a host of illustrious scientists who have so profoundly transformed our understanding of nature. I need only name spectroscopy, quantum mechanics, nuclear spin, electron spin, anti-particles, the Lamb shift, the maser, quantum electrodynamics, and the recently discovered Bose-Einstein condensate to give a flavor of the topics described therein. This book is a must read for anyone interested in science and its history. I can only hope that someone will write a similar book on the chemical history of hydrogen.

Cardano's Cosmos: The Worlds and Works of a Renaissance Astrologer by Anthony Grafton

Harvard University Press: Cambridge, 2000. 304 pp. ISBN 0-674-09555-3 (hardbound). $37.50; ISBN 0674006704 (paper). $16.95

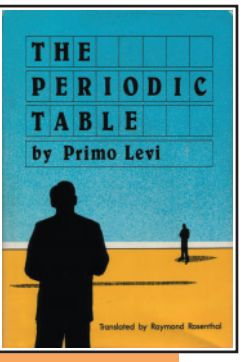
Girolamo Cardano was a sixteenth century polymath. He was a practicing physician, an accomplished mathematician who made major contributions to algebra including the general solution of cubic equations, and a practicing, highly skilled astrologer. He was a self-promoter who wrote horoscopes of famous people living and dead including Jesus Christ, which got him in trouble with the Church for a time. He wrote many books on all manner of things including his own life.

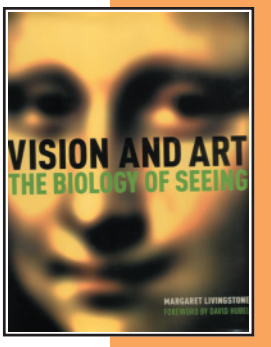
Anthony Grafton in his prize-winning, learned, and highly readable book examines Cardano the astrologer and the milieu in which he practiced his art, the Europe of the Reformation and Counter Reformation, the century of great artistic achievement in which astrology was widely practiced and well accepted. I think you will be enchanted by this contradictory person, a man of reason who practiced what in our eyes is an unreasonable art.

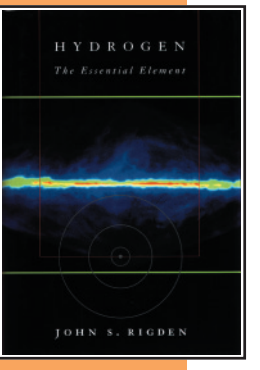
Vision and Art: The Biology of Seeing by Margaret Livingstone

Harry N. Abrams, Inc.: New York, 2002. 208 pp. ISBN 0-8109-0406-3. $45

Most of us give little thought to our senses, which help us make our way in the world and our lives enjoyable. This is no more so than for vision, perhaps the most sophisticated sense of all. What happens when photons impinge on our eyes? How is it that we perceive color, and in so many variations? The answer to these questions, and so many more, can be found in this well-written and beautifully illustrated book.







Summer Reading

Dick Pagni recommends

The author, a professor of neurobiology at the Harvard Medical School, describes in clear, accessible English the sophisticated, ever-fascinating chain of chemical, photochemical, and electrochemical reactions, all of which occur in or between cells, and other phenomena that make vision and color possible. The book is more than a primer on vision; it is also an art book. The author, who has an interest in painting and the history of art as do I, also shows how artists use visual and color effects to make their paintings stand out. I highly recommend this book which is the best science (and art) book I read in 2002.

Who Rules in Science: An Opinionated Guide to the Wars by James Robert Brown

Harvard University Press: Cambridge, MA, 2001. 256 pp. ISBN 0-674-00652-6. $26

Most of us are aware of the philosophy of science whose goal is to understand the workings of science. You may be surprised to learn that in the last few decades the sociology of science has come on the scene as well. Sociology could play an important role in explaining important aspects of science. The practice of science is, after all, partly a social activity. Scientists do collaborative research, publish papers, referee papers and proposals, attend meetings, give lectures, and correspond with one another. Unfortunately, what many sociologists say about science is tempered by the postmodern world of social constructionism which says that there is no objective reality and everything is relative. One group's view of the world is no better or worse than another group's. Often this perspective is presented in the most abstract, obtuse, and unintelligible language. Other sociologists contend that the major driving force of science is not the search for truth but social betterment. In this view, for example, the new quantum mechanics of the 1920s' Weimar Republic was formulated not because it explained nature better than the old quantum mechanics, but because it gave more prestige to Germany—and its scientists—which had been discredited by World War I.

In the face of this perceived onslaught into the integrity of the scientific enterprise, the physicist Alan Sokal has responded with a stunning joke on the sociology community. He submitted a serious sounding, but utterly untrue, article entitled "Transgressing the Boundaries: Toward a Transformative Hermeneutics of Quantum Gravity" to a leading sociology journal. This gibberish was accepted and published. Not surprisingly, this hoax has generated a lot of verbiage once it was revealed.

You may find the above amusing, if a little unbelievable, but of little concern to science. This is not true, it is deadly serious. How the public views science will ultimately dictate the pace, direction, and health of what we do. One can find no better place to learn about the science wars than in James R. Brown's engaging, thoughtful defense of science: *Who Rules in Science.*

The Periodic Table by Primo Levi (Raymond Rosenthal, trans.)

Knopf: New York, 1986. 240 pp. ISBN 0-8052-1041-5 (paper). $12; Random House: 1996 (reissue). 241 pp. ISBN 0679444637 (hardbound). $17

Primo Levi, the Italian writer and chemist, first came to attention in the United States with *If This is a Man*, a translation of *Se Questo è un Uomo*, the story of his experiences as a prisoner at the hellish Auschwitz death camp. Levi was allowed to live because he was a chemist, one who could work at a synthetic rubber plant on the site.

I first read *If This is a Man* in college, partly because of the riveting descriptions of the Holocaust and partly because Levi was a fellow chemist. I have continued to read Levi's work through the years and have come to appreciate his extraordinary writing skills, which are apparent even in translation.

I can think of no better place for a chemist to begin exploring Levi's oeuvre than with *The Periodic Table*. This is not a book about chemistry but about a chemist; it is part memoir and part fable. The book consists of 21 stories, each named for an element that evokes a memory from the author's past. Argon, the title of the first chapter, for example, because it is inert, rare, and noble, evokes memories of Levi's ancestors. In the author's restrained, lean style, one learns of his growing up in fascist Italy and the difficulty of a Jew, no matter how brilliant, of attending the university, of his relatives and friendships, his partisan activities, and yes, his days as a student and then professional chemist. The stories, I should add, are as much about the people in Levi's life as about himself. All the stories are memorable but the one entitled "Vanadium" is particularly trenchant because it describes Levi's interactions in the business world after the war with a German chemist who was one of his overseers at Auschwitz. The stories are serious and funny, sad and cheerful; they are a wonderful celebration of life.

Summer Reading

Jeff Kovac recommends

Dark Matter: The Private Life of Sir Isaac Newton by Philip Kerr

Crown Publishers: New York, 2002. 346 pp. ISBN 0-09060981-5. $24

Summer is a good time for light reading. If you like mysteries, you will probably enjoy this new novel with Isaac Newton as the detective. After leaving Cambridge, Newton became Warden, and later Master, of the Royal Mint, which was housed in the famous Tower of London. The story is set in 1696 when young Christopher Ellis become Newton's assistant. Newton has been asked by the King and Parliament to investigate and prosecute counterfeiters and Ellis becomes Dr. Watson to Newton's Sherlock Holmes. As in all good mysteries, the plot becomes increasingly complex as dead bodies are discovered in the Tower along with messages in code. Newton's intellect and Ellis's leg work and skills with a pistol prove equal to the task. As a bonus, the reader will also learn a bit about Newton and about English history. This is a great book to take along on vacation.

Brotherhood of the Bomb: The Tangled Lives and Loyalties of Robert Oppenheimer, Ernest Lawrence and Edward Teller by Gregg Herken

Henry Holt and Co.: New York, 2002. 464 pp. ISBN 0-8050-6588-1. $30

Robert Oppenheimer, brilliant and moody, is one of the most fascinating figures in 20th century science. The story of the Manhattan Project and Oppenheimer's security hearing has been told many times, perhaps most notably by Richard Rhodes in *The Making of the Atomic Bomb* (Simon & Schuster, 1986). In this triple biography of the three major scientific figures in the Oppenheimer story, Gregg Herken, a senior historian and curator at the Smithsonian's National Air and Space Museum, takes advantage of "dead files" from the FBI, including records released after the collapse of the Soviet Union in 1991, to retell the story more fully. It is the story of three of the most influential scientists of the past century, a story of arrogance, power, intrigue, and unforeseen consequences.

Tuxedo Park: A Wall Street Tycoon and the Secret Palace of Science that Changed the Course of World War II by Jennet Conant

Simon & Schuster: New York, 2002. 330 pp. ISBN 0-684-87287-0 (hardbound). $26; 2003. ISBN 0684872889 (paper). $14

In reading about the Manhattan Project and related topics, I had come across the name of Alfred Lee Loomis, but knew little about him. Loomis was a Wall Street broker who made an enormous fortune in the 1920s and had the foresight to sell his stock before the market crashed in 1929. Loomis and his partner and brother-in-law, Landon Thorne, entered the depression with "pockets full of cash," and later went on to increase their fortune by becoming successful investment bankers. Loomis was a rich and powerful figure, but his influence was magnified by his relationship with his uncle Henry Stimson.

Brian Coppola recommends

The Mating Mind: How Sexual Choice Shaped the Evolution of Human Nature by Geoffrey F. Miller

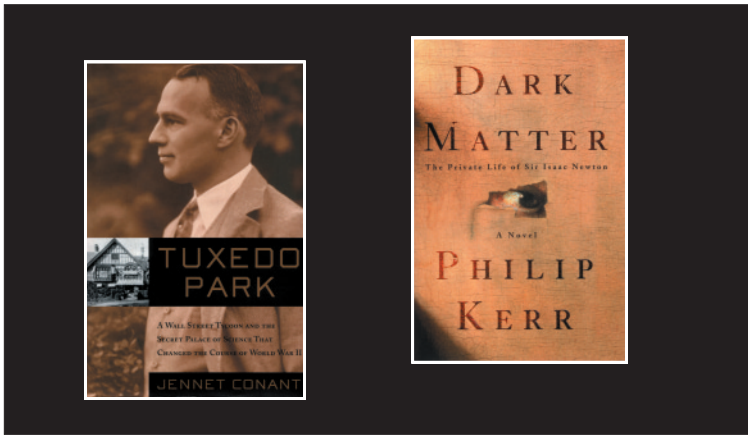
Doubleday: New York, 2000. 520 pp. ISBN 0-385-49516-1. $27.50; Anchor Books: New York, 2001. 512 pp. ISBN 0-385-49517-X (paper). $15

In theory. When a moth detects the sonar emitted from a bat, it launches into a chaotic flight path. When a jackrabbit is eluding one of its predators, it does the same. Makes sense: prey whose flight path can be predicted end up as dinner. Called protean behavior by our evolutionary biology colleagues, it suggests a compelling idea: sometimes selection pressure is for diversity, variation and unpredict-ability. According to Geoffrey Miller, sexually selected social proteanism contributed to the development of our clever brains. Evolutionary psychology has its popular champions (Pinker, Dennett, and Dawkins, to name three favorites), and there is readability to Miller that brings you into it comfortably. There is much in Miller's ideas (and, if you check the Web, an appropriate level of controversy), but I especially recommend the book to those of us outside of this field for the clarity of Miller's style and the accessibility of his discussion.

Miller's central thesis has two points. First, that sexual selection has been neglected in favor of natural selection, in general, as a mechanism in evolutionary psychological theory. Second, that sexual selection can be used as a basis for the hard-to-explain yet significantly unique aspects of human nature (music, art, humor, and general intelligence) that have been systematically dismissed by those who rely only on natural selection as the evolutionary mechanism. In social proteanism, the brain ends up as a socio-sexual ornament (our peacock's tail). The evolutionary advantage here is in using the capacity of an evolving brain as an indicator of mental fitness (as opposed to theories using only physical fitness) in order to attract a mate (clever speaking, good listening, process thinking, remembering, story-telling, and joke-making). A brain needs to send as well as to receive: it is a central processing unit for gathering, filtering, balancing, and assessing sensory input (especially sound and sight) that a non-pheromonal

Loomis's passion was science. He graduated from the Sheffield Scientific School at Yale and was a remarkably accomplished amateur scientist who was eventually elected to the National Academy. Loomis and his family lived in a planned community called Tuxedo Park outside of New York City. (Yes, it is the origin of the name of the formal suit.) In 1926 Loomis purchased an old stone mansion in Tuxedo Park called Tower House and converted it into a private laboratory with both a permanent and visiting staff. Robert W. Wood and George Kistiakowsky were among the scientists who worked with Loomis.

During World War II, Loomis was an important figure in the development of radar and in the Manhattan Project. His scientific credentials and relationships in the scientific community, his personal fortune and relationships on Wall Street, and his connections to government through Henry Stimson put him in a unique position. Ever reclusive, he stayed in the background. This book by Jennet Conant, the granddaughter of James Bryant Conant, tells the story of this unusual and complex man.



The One Culture?: A Conversation about Science

by Jay A. Labinger and Harry M. Collins (eds.)

University of Chicago: Chicago, 2001. 296 pp. ISBN 0-226-46723-6 (paper). $18; ISBN 0226467228 (hardbound). $65

"The Science Wars" became something of a household word with the publication of Alan Sokal's famous hoax paper in *Social Text* in 1996. The skirmishes between scientists and those engaged in what has become known as the sociology of scientific knowledge (SSK) had been going on throughout the 1990s, but the Sokal hoax brought the controversy onto the pages of the *New York Times*. This volume is the result of attempts to bring the two sides together to talk rationally, rather than in volleys of polemics. It begins with a series of "position papers" from both sides, about half written by scientists (primarily physicists) and half by social scientists. Included are essays by such well-known figures as Steven Weinberg, Kenneth G. Wilson, N. David Mermin, Steven Shapin, and Peter Dear. Alan Sokal and Jean Bricmont are here as well. After reading the initial essays the contributors were invited to provide commentaries and finally rebuttals. While there is inevitably some repetition, this volume provides a thoughtful introduction to the controversy along with hope for constructive dialogue in the future.

species uses for mating.

To Miller, the brain is a sexual ornament with a high metabolic price, like the peacock's tail. Sexual ornaments can end up with runaway evolutionary development because they are differentially selected for in mating. Sexual advantage is enhanced by exaggerating individual differences, so extreme variability rules the day (like the path of the moth or the rabbit) instead of conserved uniformity in the species. The cleverer an exchange, whether telling jokes or telling lies, the more likely a mental persuasion is to be attractive to a potential mate.

Historically, physical features that impact our sexual selections have not fossilized (body and facial sculpting, conversations, intimacies of courtship). In his theory, Miller suggests that, like the peacock's tail, we carry the heritable brain structures that characterize what advantages sexual selection. And because cognitive scientists seem to be on the verge of interrogating the brain in order to reveal basic bio-physico-chemical function, his theory is testable, or will be soon.

In Miller's last two chapters, he reviews the limitations and future directions of his theory. He is the first to admit its incompleteness (as are all theories), and in doing so he charms the reader. He does not stake claim to answers as much as raises good questions. Although I mentioned it above, he misses the question about how both sexes needed to develop cleverness because it is not so useful to tell a joke if no one can understand it! He dismisses homosexual attraction in a single paragraph because it does not lead to direct mating advantages, and I agree with the critics who say this needs to be addressed.

When I first encountered this book (on a friend's bookshelf, while having breakfast in his apartment outside Amsterdam), I was particularly impressed by its composition. If, as a casual reader, you want to get the gist of the argument and turn the details over to the psychologists, then you can read the first two chapters, the last two chapters, and cherry-pick the things about which you might be curious from the center. While the details are as accessible as the framework, I do admit to having read it this way the first time around. After all, I had to get back to my coffee.

Summer Reading

Brian Coppola recommends

Peer Learning in Higher Education: Learning from & With Each Other by David Boud, Ruth Cohen, Jane Sampson (eds.)

Kogan Page Ltd., London, 2001. 224 pp. ISBN 0-749-43612-3 (paper). $32.50

All together now. In all of its guises and acronyms, facilitating peer learning is certainly one of the consistently rediscovered ideas in higher education. And while there are plenty of articles and books and journals devoted to the topic, I like this book for a few reasons. First, the perspective is from adult education rather than elementary education, so the methodologies and discussion can be more easily understood in an advanced context. Second, the editors are knowledgeable and contribute about 50% of the text, and their experience as faculty members at the University of Technology, Sydney, is apparent. Third, there is a strong, selective, and not-overwhelming research base to each chapter.

The first half of the book sets a broad historical context, and synthesizes from the literature a nice review of designing peer learning environments, describing multiple approaches, discussing management issues, and covering learning and assessment topics. The second half of the book looks at a series of elaborated case studies: in MBA and Law School, and then a number of different Instructional Technology examples where distance and other computer-mediated learning is integrated with face-to-face activities. Even for experienced practitioners, "Peer Learning," especially the first half, can help frame your work and raise new, useful questions and directions.

The Laramie Project by Moisés Kaufman and the members of Tectonic Theatre Project

Vintage Books: New York, 2001. 112 pp. ISBN 0-375-72719-1 (paper). $11

In Fall 1998, Matthew Shepard was a first-year student at the University of Wyoming. That same semester, he was brutally beaten, tied to a fence, and left to die. With multiple versions in multiple media that one can find reporting the details of this tragedy, there are three particular reasons that have led me to put the text of this play, assembled from interviews conducted in Laramie by Kaufman and his troupe, on the summer reading list.

First, I want to remind instructors that our students are all Matthew Shepard in one way or another. They are individual human people with their own unique stories, and while we intersect with their lives to varying degrees, we are only one among many, many intersections that comprise a life. Second, the historical tension between town and gown, which gurgles under the surface of Matthew's story, is a subtext that affects many in higher education but about which there is little written. Finally, I think we should keep books on our shelves that invite conversations about things in addition to quantum mechanics, evolutionary psychology, and synthetic methodology. Although institutions might place a text like The Laramie Project on the campus-wide reading list for entering students (as the University of Maryland did), and to good ends, I think it even better to have books that reflect your personal choices.

I am suggesting The Laramie Project because it happens to be my most recent example; the principle is broader. Keeping a small (or large) collection of books in clear view that raise issues about which you are willing to chat is a nice, explicit signal to send to people who come into your office. How can you not be pleased when someone scans your books and says, "I notice you have a copy of…?"

The Creation of the Future: The Role of the American University by Frank H. T. Rhodes

Cornell University: Ithaca, 2001. 265 pp. ISBN 0-801-43937-X. $29.95

Required reading. Frank Rhodes is part of the distinguished and eminently qualified upper crust of higher education: former university presidents whose experience in educational policy and analysis combine with smooth prose.

While the history of higher education in the United States has been written many times, the first 12 of 13 chapters of this book are logically categorized and ordered, and benefit greatly from the integration of Rhodes' first-hand knowledge. Topics such as undergraduate instruction, the research university, funding, and governance are all given their separate treatments. I consider the exclusion of this history one of the greatest oversights in the general education of faculty members: we do not grow up knowing our past. Taking the title of the book as an objective, Rhodes believes that a thorough understanding of the past is crucial to setting our course. Taking Rhodes' own words: "Like it or not, the campus of today is the larger society of tomorrow." Although he was talking about students and the obligations of the academy to be committed to both public and social needs, the link for all of us between the past, present, and future of what we do is nonetheless real.

When you get to the ultimate chapter (13: The University of Tomorrow), you expect a culmination built on the case presented in Chapters 1–12. My recommendation is to stop at Chapter 12 and imagine on your own where we might be headed. Rhodes, unfortunately, takes some fairly popular ideas and repeats them without much new commentary. He compares knowledge to a commodity, and the restructuring of higher education to the changes in health care, manufacturing and management. Knowledge is the "fundamental resource" of the 21st century, with science and technology as its "prime movers." The new technologies make us information brokers. The contemporary university is described as ponderous, medieval, inflexible, and too expensive, with a prescription to become "nimble and adaptive." And so on. Surprisingly, Rhodes does not build this case. He simply jumps into a set of predictions. And I tend to side with Niels Bohr on prediction, which he advised to be extremely difficult—especially about the future.

Good Stories Are Great To Find

http://www.exploratorium.edu/cooking/

Even if this is only a reminder about a good resource, I wanted to spend my annual Web site recommendation on the Exploratorium's science of cooking area. Candy, bread, eggs, pickles, meat, and seasoning are all featured. Activities, explanations, and an archive of discussions, feedback, and new experiments abound.

From "The Molecular Art of Grilling" (the introduction under 'beef'):

> The Maillard reaction occurs when the denatured proteins on the surface of the meat recombine with the sugars present. The combination creates the "meaty" flavor and changes the color. For this reason, it is also called the *browning reaction.* The Maillard reaction occurs most readily at around 300 °F to 500 °F. When meat is cooked, the outside reaches a higher temperature than the inside, triggering the Maillard reaction and creating the strongest flavors on the surface. In the early twentieth century, Louis-Camille Maillard happened upon what came to be known as the Maillard reaction when he was trying to figure out how amino acids linked up to form proteins. He discovered that when he heated sugars and amino acids together, the mixture slowly turned brown.
>
> But it was not until the 1940s that people noticed a connection between the browning reaction and flavor. World War II soldiers were complaining about their powdered eggs turning brown and developing unappealing flavors. After many studies done in laboratories, scientists figured out that the unappetizing tastes were coming from the browning reaction. Even though the eggs were stored at room temperature, the concentration of amino acids and sugars in the dehydrated mix was high enough to produce a reaction. Most of the research done in the 1940s and 1950s centered around preventing this reaction. Eventually, however, scientists discovered the role the Maillard reaction plays in creating flavors and aromas. For example, as many as six hundred components have been identified in the aroma of beef.

Hal Harris is in the Department of Chemistry, University of Missouri-St. Louis, St. Louis, MO 63121; hharris@umsl.edu. *Dick Pagni is in the Department of Chemistry, University of Tennessee, Knoxville, TN 37996;* rpagni@utk.edu. *Jeff Kovac, Book & Media Reviews Editor, is in the Department of Chemistry, University of Tennessee, Knoxville, TN 37996-1600;* jkovac@utk.edu. *Brian Coppola is in the Department of Chemistry, University of Michigan, Ann Arbor, MI 48109-1055;* bcoppola@umich.edu.