

## Summer Reading

Maybe you are thinking ahead to the approaching summer and its promise of free time for reading. If so, here are some suggestions that Jeff Kovac, our new Book & Media Reviews Editor, has gathered, with the help of Dick Pagni, Hal Harris, and Brian Coppola.

Dick Pagni recommends . . . . .

### **Beauty and Revolution in Science**, by James W. McAllister

Cornell University Press: Ithaca, NY, 1996. ISBN 0-8014-8625-4 (paperback). \$16.95.

What do beauty, aesthetics, and revolution have to do with experimental and theoretical science? This very readable book, which is in some ways a response to and corrective of Thomas Kuhn's *The Structure of Scientific Revolutions*, attempts to answer this complicated question in a detailed and nuanced manner, looking at all of the relevant issues from every angle. Although the book is full of interesting ideas, let me mention two that I found provocative. One: the author disagrees with Einstein (and many others) that a scientific theory cannot be valid if it isn't beautiful. According to the author, our aesthetic appreciation of a successful theory only develops over time. Two: of the two major scientific theories developed during the twentieth century, relativity and quantum mechanics, only the latter is revolutionary, as it has little precedence in earlier physical theories. Relativity, on the other hand, no matter how

counterintuitive its predictions, is not revolutionary but the culmination of classical physics initiated by Newton. I highly recommend this thought-provoking book to those interested in ideas and the history, philosophy, and methodology of science.

### **Chemical Creativity**, by Jerome A. Berson

Wiley-VCH: Weinheim, 1999. ISBN 3-527-29754-5. \$62.50.

This is a wonderful discourse on how experimentalists and theoreticians have shaped our views of several fundamental organic reactions and concepts over the past century. Written by a distinguished physical organic chemist and, more recently, "amateur" historian of organic chemistry, it brings an insider's insight to the topics at hand. Although the book deals with organic chemistry, it is really about scientists and the way science is carried out. I particularly enjoyed the story of Erich Hückel and the chilly initial reception his molecular orbital theory and  $4n+2$  rule received from experimentalists. How things would change. As is made abundantly

clear in this book, science, like all human endeavors, is still done by fallible people. What lifts the subject above cultural and personal biases is that it is self-correcting. My only reservation is the book's steep price for a slim volume.

### **The Nothing That Is: A Natural History of Zero**, by Robert Kaplan

Oxford University Press: Oxford, 1999. ISBN 0-19-512842-7. \$22.

There have been excellent recent books on the history of the transcendental numbers  $p$  and  $e$  and the imaginary number  $i$ . Robert Kaplan's *The Nothing That Is: A Natural History of Zero* deals with another extraordinary number in all its facets. This small tome covers a lot of ground, dealing with ancient cultures, philosophy, symbolism, the history of ideas, and, need I say, mathematics in an engaging and entertaining way. What does it say about us that it has taken thousands of years to come to grips with the concept of nothing? Alas! There is still some distance to go, as nobody has yet to explain why there is something rather than nothing.

Brian Coppola recommends . . . . .

### **How Scholars Trumped Teachers. Change without Reform in University Curriculum, Teaching, and Research, 1890-1990**, by Larry Cuban

Teachers College Press: New York, 1999. ISBN 0807738654 (hardcover); 0807738646 (paperback). \$60.00 (hardcover); \$28.95 (paperback).

Larry Cuban has been one of my heroes since I came across his 1990 article in the *Educational Researcher*, "Reforming Again and Again". He is a keen commentator on the state of teaching and learning and especially on the generally unsuccessful culture of reform in higher education. Cuban, unlike the ubiquitous whiner-critics who just decry the system, seeks to understand the

system. Using two departments at Stanford, his home institution, as case studies, he takes the long view on the research and teaching question. His analytical style is represented well by this brief passage from the concluding chapter: "Favoring research over teaching is not some conspiracy of security-minded faculties aided by administrators who fear conflict. ... Concentrating on research flows from durable compromises made over the century to deeply embedded value-conflicts in the university's mission and a keen ambition to remain on the top rungs of the prestigious ladder." If I were going to subtitle this book, I would call it *Where we are and how we got there, and an insightful caution that change will not happen overnight*.

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Jeff Kovac recommends . . . . .

**Thinking Styles**, by Robert J. Sternberg

Cambridge University Press: Cambridge, 1997. ISBN 0-521-65713-X (paperback). \$16.95.

All teachers need to know more about thinking styles, also called learning styles, and this is the best book I have read on the subject. Sternberg, a professor of psychology and education at Yale, has developed a theory of mental self-government to explain why "what happens to us in life depends not on just *how well* we think, but also on *how* we think." Schools, and other institutions in society, tend to value certain ways of thinking more than others and penalize people who don't fit in. Students of high ability can fail in school merely because they have trouble adapting to the style in which the material is taught. After reading this book, you will better understand yourself and your students.

**Ethics and the University**, by Michael Davis

Routledge: London and New York, 1999. ISBN 0-415-18098-8 (paperback). \$25.99.

The university, like the rest of life, is filled with ethical problems, both small and large, but very little has been written about what is often termed academic ethics. In this thoughtful book, Michael Davis discusses many of the crucial ethical questions that arise in academic life, including the relationship between academic freedom and ethics, research ethics, and the teaching of practical ethics. This book offers a lot to all of us who make our lives in the academy.

**The Gift: Imagination and the Erotic Life of Property**, by Lewis Hyde

Vintage: New York, 1983. ISBN 0-394-71519-5 (paperback). \$15.

This is not a new book, only one I was recently introduced to by philosopher of science Davis Baird, which has changed my thinking about science profoundly. Hyde discusses the problem of being a creative artist in a market-driven economy, a problem he analyzes in terms of the differences between the gift and commodity economies. In an interdisciplinary tour de force, Hyde draws on anthropology, history, psychology, economics, and literature. I found that much of what he says also applies to science and the ethical tensions in the contemporary research environment.

**The Missing Moment: How the Unconscious Shapes Modern Science**, by Robert Pollack

Houghton Mifflin: Boston, 1999. ISBN 0-395-70985-7. \$25.

Robert Pollack claims that "This book is about the difference between scientific knowledge and scientific wisdom." He argues that the research agenda of modern biomedical science is driven, in large part, by the unconscious private demons in the minds of scientists, such as the fear of death, rather than public needs. This is a controversial thesis, but Pollack, a distinguished molecular biologist at Columbia University, draws on a detailed knowledge of both the workings of the brain and the nature of contemporary research in biology and medicine to argue that scientists must better understand their real motivations for choosing research problems.

Brian Coppola recommends, continued . . . . .

**Absolute Zero and the Conquest of Cold**, by Tom Shachtman

Houghton Mifflin: Boston, 1999. ISBN 0395938880. \$25 (hardcover).

If you like reading science history stories anchored in enough science to keep the chemical educator side of your brain at attention, Shachtman's new book will do the trick. Do you know why we call them "degrees"? Did you know that Celsius assigned zero to the boiling point of water? Snippets and tales run through this book, telling stories that begin with 17th century fear of cold (a mystery, the absence of heat, death) and run through recent work where light itself was slowed by near-absolute cold. Shachtman does not have James Burke's (*Connections*) elegance, so the narrative is uneven and does not always seem to follow an overall plan, but I've continued to reach for this book since it has been on my shelf.

**Thought Signs. The Semiotics of Symbols—Western Non-pictorial Ideograms**, by Carl Liungman

IOS Press: Amsterdam, 1995. ISBN 9051991975. \$50 (hardcover).

Liungman, a Swedish scholar in semiotics, has it right in the title: thought signs. As the semiotician credo goes, the map is not the territory. And Magritte probably said it more loudly than any other: "Ceci n'est pas une pipe." Symbols are not the objects they symbolize, yet we imbue and attach great meaning and emotion to them. Chemists should take the opportunity to think about the larger context of signs and symbols, I think, because representationalism is at the core of our science. Liungman's texts are dictionaries (see also *Dictionary of Symbols*, Norton, 1991; \$20.95), but they are a delightful resource to think about the fundamental human (and scientific) need to represent concepts in the concrete

Hal Harris recommends . . . . .

**Fermat's Enigma: The Epic Quest to Solve the World's Greatest Mathematical Problem,**

by Simon Singh

Anchor Books: New York, 1997. ISBN 0-385-49342-2 (paper); 0-8027-1331-9 (cloth). \$12 (paper); \$23 (cloth).

In about 1637, a French mathematical genius named Pierre de Fermat wrote in the margin of his copy of *Arithmetica*, by Pythagorus, that he could prove that there were no solutions to the simple variation on Pythagorus' theorem  $a^n + b^n = c^n$  when  $a$ ,  $b$ , and  $c$  are integers and  $n$  is larger than two. In the more than 350 years since then, the greatest mathematicians have attempted to prove or disprove this little conjecture (or even to prove that no proof is possible). Students of science will recognize many of the famous names involved in the quest to solve "Fermat's Last Theorem", including Euler, Gauss, Lagrange, Cauchy, and Hilbert. Fewer will be aware that one of the most fruitful attacks on the problem was made by a woman named Sophie Germain, who concealed her gender in order to achieve credibility for her work. The recent solution of the puzzle by Andrew Wiles

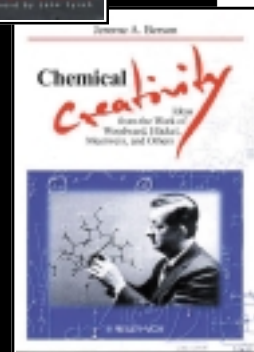
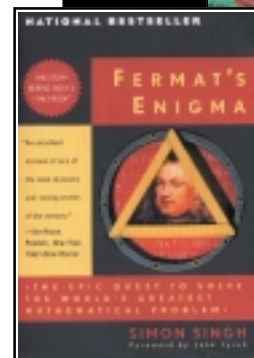
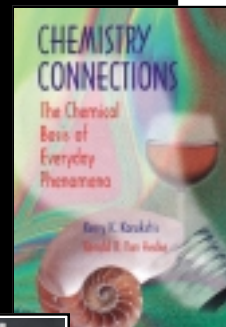
was the impetus for the PBS *Nova* program, "The Proof", which is based on Singh's work. If a book about an equation sounds pretty dry to you, this one is not! Singh has written a wonderful, engaging chronicle that brings together a huge fraction of the history of mathematics and beautifully illustrates the utility of pure research. This is one of the best science books I've read this year.

**Chemistry Connections: The Chemical Basis of Everyday Phenomena,** by Kerry K. Karukstis and Gerald R. Van Hecke

Academic: New York, 1999. ISBN 0-124-00860-7 (paper). \$34.95.

Kerry Karukstis and Gerry Van Hecke teach undergraduate chemistry at Harvey Mudd College (my alma mater), and Gerry was a student there at the same time I was (way back in the previous millennium). They have collaborated on a very useful and engaging supplementary book for introductory and organic chemistry. One of my colleagues is using it in conjunction with his "Chemistry in Context" course. If their intention was to enrich the chemistry curriculum, they have overshot the

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world of symbolism. You won't bring anything to your teaching straight from the text, except perhaps a broadened appreciation for how common it is for humans to attach meaning to these physical artifacts. After all, "NaCl" is only a placeholder for the idea of salt; ceci ("NaCl") n'est pas salt . . . even if you try to lick this page. (Liungman's Symbols.Com is a great site, and it points you to the CD-ROM version of the text if the paper-and-ink version is not your favorite symbolic medium: <http://www.symbols.com>).

**Space, Time, Place,** by South to the Future

South to the Future: San Francisco, 1997, 1999 (2nd printing). ISBN 4152826001000. \$10 at Tower Records or order from <http://www.sttf.org> (spiral).

Learning who we are from who we are. To go South: to turn back. The Future: to look ahead. South to the Future (sttf) is an organization that runs a self-proclaimed information boutique in the Mission District of San Francisco. But they are more: performances, proposals, Web sites, and text in conventional medium: print. *Space, Time, Place* is a delightful little read that it is an up, down and sideways look at the non sequitur called American culture. You can find it at Tower Records or buy it through [www.sttf.org](http://www.sttf.org). Summer reading can be hypertext, right? Be sure to check out the cell phone proposal! The kids at sttf are pals with the creative folk who do [www.superbad.com](http://www.superbad.com) (don't go here unless you have the whole summer to give up). I recommend all these because they evoke simultaneously intellectual and emotional response, and I think you are poorer without the experience.

## Summer Reading

Hal Harris recommends, continued

goal and have accidentally written a book that most chemists will enjoy browsing. Of course you find things here that you already knew, but you will also surely discover a few new fascinating factoids. One of the best things about this book is that the authors provide references for every discussion and also give a list of relevant Web resources (with URLs) for each of them.

**World Records in Chemistry**, by Hans-Jurgen Quadbeck-Seeger, Rüdiger Faust, Günter Knaus, and Ulrich Siemeling

Wiley-VCH: New York, 1999. ISBN 3-527-29574-7 (paper). \$54.95.

These authors address a few of the same questions as do Karukstis and Van Hecke, but they take aim at a somewhat more technically sophisticated audience; instead of trying to enhance chemical education near the introductory level, they are speaking to practicing chemists, some of whom may also be teachers. I really enjoyed reading about the most powerful poisons, the smelliest compounds (and the smallest pheromones), all topics that could have been included in *Chemistry Connections* (but weren't). But *World Records* also covers topics that would interest a chemistry professional but not a beginning student: the longest footnote, the most stable carbocations, the nations that produce the largest amounts of petroleum, and the largest consumers. The highest and lowest melting points, the reaction with the most components, the most strained molecules, the cheapest explosive. There are hundreds of these things, and they are addictive. Learn a few at a time, and enrich your conversational repertoire!

**The Endurance: Shackleton's Legendary Antarctic Expedition**, by Caroline Alexander

Alfred A. Knopf: New York, 1999. ISBN 0-375-40403-1. \$29.95.

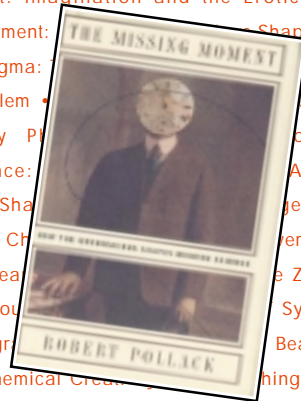
and

**Endurance: Shackleton's Incredible Voyage**, 2nd edition, by Alfred Lansing

Carroll and Graf Publishers: New York, 1999. ISBN 0-786-70621-X. \$12.95 (paper).

The 1999 exhibit at the American Museum of Natural History of artifacts from the 1915 scientific expedition to Antarctica led by Sir Ernest Shackleton is accompanied by the publication of Caroline Alexander's book, which includes Frank Hurley's documenting photographs (some of which can be seen on the Museum's Web site). This well-written and beautifully produced volume tells a story of hardship, courage, and ultimate triumph that is hard to top. Their ship, *The Endurance*, was trapped and eventually crushed by ice, marooning the men. When the ice eventually broke up during the following spring, three small lifeboats were sailed 200 miles to Elephant Island. The ultimate rescue was accomplished only after Shackleton had navigated the largest of the lifeboats, by stars and sextant, 800 miles through frigid and

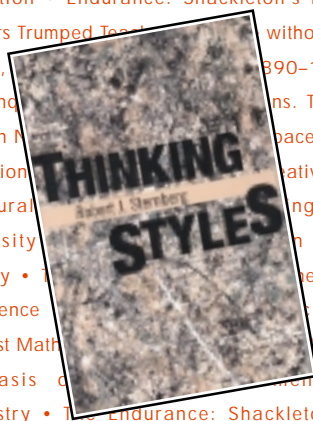
Beauty and Revolution in Science • Chemical Creativity • The Nothing That Is: A Natural History of Zero • Thinking Styles • Ethics and the University • The Gift: Imagination and the Erotic Life of Property • The Missing Moment: How the Unconscious Shapes Modern Science • Fermat's Enigma: The Epic Quest to Solve the World's Greatest Mathematical Problem • Chemistry Connections: The Chemical Basis of Everyday Phenomena • World Records in Chemistry • The Endurance: Shackleton's Legendary Antarctic Expedition • Endurance: Shackleton's Incredible Voyage • How Scholars Trumped Teachers. Change without Reform in University Curriculum, Teaching, and Research, 1890–1990 • Absolute Zero and the Conquest of Cold • Thought Signs. The Semiotics of Symbols—Western Non-pictorial Ideograms • Space, Time, Place



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## Summer Reading!

Greatest Mathematical Problem • Chemistry Connections: The Chemical Basis of Everyday Phenomena • World Records in Chemistry • The Endurance: Shackleton's Legendary Antarctic Expedition • Endurance: Shackleton's Incredible Voyage • How Scholars Trumped Teachers. Change without Reform in University Curriculum, Teaching, and Research, 1890–1990 • Absolute Zero and the Conquest of Cold • Thought Signs. The Semiotics of Symbols—Western Non-pictorial Ideograms • Space, Time, Place • Beauty and Revolution in Science • Chemical Creativity • The Nothing That Is: A Natural History of Zero • Thinking Styles • Ethics and the University • The Gift: Imagination and the Erotic Life of Property • The Missing Moment: How the Unconscious Shapes Modern Science • Fermat's Enigma: The Epic Quest to Solve the World's Greatest Mathematical Problem • Chemistry Connections: The Chemical Basis of Everyday Phenomena • World Records in Chemistry • The Endurance: Shackleton's Legendary Antarctic Expedition • Endurance: Shackleton's Incredible Voyage • How Scholars Trumped Teachers. Change without Reform in University Curriculum, Teaching, and Research, 1890–1990 • Absolute Zero and the Conquest of Cold • Thought Signs. The Semiotics of Symbols—Western Non-pictorial Ideograms • Space, Time, Place



stormy waters to South Georgia Island. I read Alfred Lansing's book in its first edition several years ago, and found his storytelling to be somehow even more gripping than the illustrated new accounting, but that may have been because I didn't know the whole story in advance. A modern reader cannot help but be struck by the technological differences between that time and this. A great story!