Summer Reading

Summer, a great time for reading, going in a new or old directions, finding new materials for teaching! Dick Pagni, Cheryl Frech, Brian Coppola, Jeff Kovac, and Hal Harris offer lots of tempting suggestions.

Dick Pagni recommends

The Dilemmas of an Upright Man: Max Planck as Spokesman for German Science
by J. L. Heilbron

University of California: Berkeley, CA, 1986. 250 pp. ISBN 978-0520057104. Both paper and hardbound, but out of print.

Most scientists know that the classically-trained German physicist, Max Planck, discovered quantum mechanics in his successful attempt to explain black body radiation. Very few know how he reached that moment in his life and what happened to him after his monumental achievement. All of this is beautifully revealed in this scholarly study by the eminent historian of science, J. L. Heilbron. Planck's prominence in and role as a spokesman for German science occurred during the turbulent first half of the 20th century. Although renowned for his contributions to physics and the German scientific community, Planck was ultimately a tragic figure because the elderly man remained in Germany during the frenetic Nazi years and tried to uphold the integrity of German science in the face of barbarism.

Sky in a Bottle by Peter Pesic

MIT Press: Cambridge, MA, 2005. 256 pp. ISBN 978-0262662000. $12.95 (paper); also available hardbound.

Last year I was touring the Fogg Art Museum at Harvard University when I found a flyer in the lobby announcing an organ recital by Peter Pesic in the adjacent Busch-Reisinger Museum. I was surprised to find that Peter Pesic, the author of several fine general audience books on science, is also an accomplished musician. In his latest book, *Sky in the Bottle*, Pesic asks this simple question: Why is the sky blue? In attempting to arrive at an answer, scientists over a period of centuries have used a large number of seemingly unrelated experimental and theoretical tools. Even Avogadro's number plays a prominent role in the story. I can think of no better book where the power and beauty of science in its pursuit of truth is demonstrated.

The Code Book: The Science of Secrecy from Ancient Egypt to Quantum Cryptography
by Simon Singh

Anchor Books: New York, 1999. 432 pp. ISBN 0385495323. $15.95 (paper); also available hardbound.

As long as people have encrypted messages, others have tried, usually successfully, to break the codes. Perhaps the most famous encrypting tool was the Third Reich's Enigma Machine, a device of extraordinary complexity. Nonetheless, the Machine's ever changing code was also broken. All of this and more is entertainingly told in Simon Singh's *The Code Book*. If you have ever wondered how one can order items online securely, you will find the fascinating answer in this book. Enigmatically, the application of quantum mechanics to encryption promises codes that can never be broken and codes that will always be broken. I am certain that our government agencies with three-letter acronyms are currently working on both contradictory projects.

Is Nature Enough? Meaning and Truth in the Age of Science by John F. Haught

Cambridge University: Cambridge, U.K. 2006. 232 pp. ISBN 978-0521609937. $19.99 (paper); also available hardbound.

Some of you may remember the classic Peggy Lee song: "Is That All There Is?." These few words in a nutshell describe naturalism, the premise that there is nothing beyond nature or the universe, including God. In this scenario nature is without purpose. Many well-known individuals uphold this view while others, including the author of this book, do not. Why do these very intelligent, inquisitive, and productive people have such divergent views on naturalism? Even though science examines nature, and its theories have profoundly influenced religious beliefs, it is nonetheless ill equipped to probe what is beyond nature, a metaphysical problem that must be investigated by other means. In this lively, reasoned, and quite readable book, John Haught, a professor at Georgetown University, provides cogent arguments which dispute the tenets of naturalism. People interested in the intersection of science and religion, as I am, will enjoy this book.

Theory and Reality: An Introduction to the Philosophy of Science by Peter Godfrey-Smith

University of Chicago: Chicago, 2003. 272 pp. ISBN 978-0226300634. $27 (paper); also available in hardbound.

Have any of you read books or articles on modern philosophy? I have done so on a number of occasions and have often found the exercise difficult. I am happy to say that *Theory and Reality* by Peter Godfrey-Smith, a Professor of Philosophy at Harvard University, does not fall into this category. It is an easy-to-read, well-organized textbook (in the Science and Its Conceptual Foundations series) designed to be used in conjunction with an elementary course in the philosophy of science. Scientific ideas are, as you know, sometimes contentious, take for example the heated debate about the structure of the 2-norbornyl cation of a few decades ago. Philosophical views on how science operates and whether it attains truth are equally heated, and often whacky to my mind. The problem lies in part with the fact that many philosophers have not taken the trouble to learn the discipline they wish to understand. This is equivalent to asking me to choreograph a ballet without my ever being a dancer. I can think of no better place to learn what the philosophy of science attempts to do, who the formative figures in the subject are, and what all the controversy is about, than Godfrey-Smith's excellent book.

Cheryl Frech recommends

Nontraditional Careers for Chemists: New Formulas in Chemistry by Lisa M. Balbes

Oxford University: New York, 2006. 320 pp. ISBN 978-0195183672. $27.95 (paper); also available hardbound.

In talking to students, most of us have been confronted by the question, "But what can I *do* with a degree in chemistry?" After you read *Nontraditional Careers for Chemists* you will have an expanded variety of answers. Author Lisa Balbes has a Ph.D. in chemistry and operates a St. Louis-area consulting firm that specializes in scientific writing services. She has a blog devoted to career development for scientists *(http://balbes.com/wordpress/).* Her book is designed to help chemists explore their professional options in 12 areas ranging from "Chemistry and People" (which includes human resources and external relations) to "Chemistry and Business Development". Each chapter has some introductory material about career possibilities, but Balbes uses individual profiles to communicate the bulk of the information. Each profile includes the individual's education (degree and university), current position, career path, advice, and predictions for their field. There is an appropriate mix of people, ranging in age, cultural background, and geography, as well as both men and women. Anyone who advises students about chemistry careers or who has pondered their own career change will find this book to be a handy resource for a new generation of chemistry-related careers.

Leaving the Lectern: Cooperative Learning and the Critical First Days of Students Working in Groups by Dean A. McManus

Anker Publishing: Bolton, MA, 2005. 212 pp. ISBN 978-1882982851. $33 (paper).

The title of this book is somewhat misleading. Not strictly a "how-to" book, *Leaving the Lectern* is largely Dean McManus's description of the transformational changes that he made to his own teaching late in his career. Much of McManus's oceanography career was devoted to research, and he thought about teaching very little, if at all, for the better part of three decades. When a small change in pedagogy at his classes was successful, he timidly attended a conference devoted to teaching issues in the geosciences to present his results. "The Meeting", as he refers to it, changed his life. He was shocked and troubled by the new methods of active learning that were part of the structure of the conference, yet he returned and converted his course from traditional lecture to a dynamic active learning format.

The book chronicles McManus's changes over a period of years. Each chapter ends with reflections that readers can use to probe their own issues and attitudes toward teaching. If you are tired of lecturing to students who are text-messaging and falling asleep in your class, I encourage you to read *Leaving the Lectern.* That McManus made his changes well into his career should give readers hope that it is never too late to become a better instructor.

Bedrock: Writers on the Wonders of Geology edited by Lauret E. Savoy, Eldridge M. Moores, and Judith E. Moores

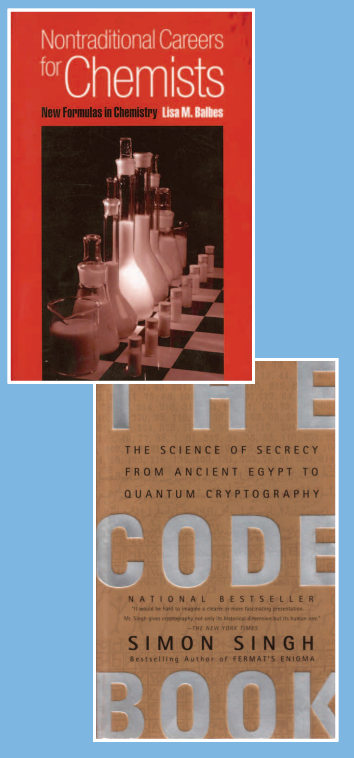
Trinity University: San Antonio, TX, 2006. 352 pp. ISBN 978-1595340238. $24.95 (paper)

I teach General Chemistry using a lot of rocks. A piece of transparent calcite passed around the classroom with a piece of blackboard chalk elegantly illustrates the crystalline and amorphous forms of calcium carbonate. A former student brought me a copy of this book upon his graduation, remembering my love of rocks.

Bedrock is an anthology of writing about geology and the earth. The collection is loosely grouped into themes including "Volcanoes and Eruptions", "Rivers to the Sea", and "The Work of Ice". The writers span time, disciplines, and cultures, and many will be familiar. Pliny the Younger writes of the catastrophic eruption of Vesuvius in 79 AD.



Summer Reading



Summer Reading

Cheryl Frech recommends

Charles Darwin describes the wonders of the Galápagos, and Mark Twain opines upon the origin of the earth, tongue firmly in cheek. Selections from John McPhee and Stephen Jay Gould are included alongside contemporary writers Annie Dillard, Michael Ondaatje, and N. Scott Momaday. There are poems, selections of fiction, essays, and journal entries. The editors have done a fine job selecting brilliant writing that flows together well. Most pieces are less than five pages in length.

Bedrock is an ideal book for your evening reading table since you can read and re-read as much as you like. The connections to chemistry are mostly indirect, with a few minerals and chemical phenomena here and there. But we chemists can dream that someday there will be enough beautiful words written about chemistry to merit a similar volume.

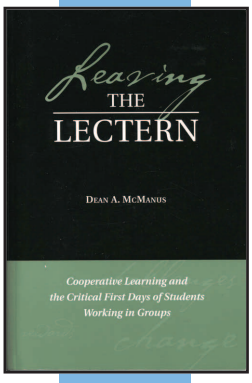
What Einstein Told His Cook 2: The Sequel: Further Adventures in Kitchen Science

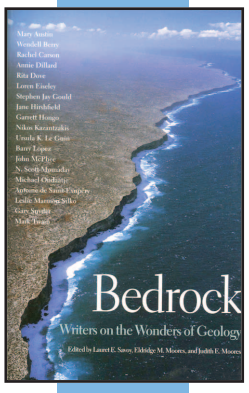
by Robert L. Wolke with recipes by Marlene Parrish

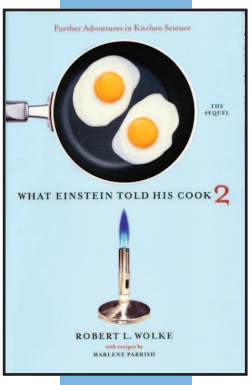
W. W. Norton: New York, 2005. 464 pp. ISBN 978-0393058697. $25.95 (hardbound).

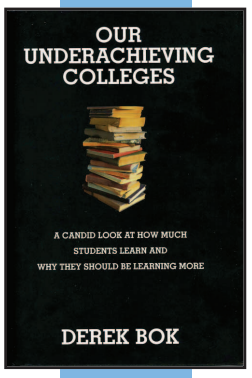
If you are a chemist and a foodie, you'll enjoy Robert Wolke's latest offering. Ten chapters are loosely grouped into themes such as drinks, grains, chocolate, fish, and spices, and Wolke expounds on questions asked by readers of his newspaper column in the *Washington Post*. He tackles food rumors (counterfeit Mexican vanilla? fake wasabi?), procedural questions (how to cut onions or make meat stock), and equipment inquiries (What is a salt pig? Is the new silicone bakeware effective and safe?).

Much of the chemistry is set aside in "Sidebar Science" sections. For the lay audience, the author suggests that these sections can be skipped, but chemists will find much to chew on in these vignettes. Wolke's wife, Marlene Parrish, contributes 16 interesting recipes to demonstrate some of the book's concepts. Wolke's writing style is conversational and fun, and he interjects plenty of wry science humor. Reading this book is like watching a science-oriented cooking show, without the commercials.









Our Underachieving Colleges: A Candid Look at How Much Students Learn and Why They Should Be Learning More by Derek Bok

Princeton University: Princeton, NJ, 2006. 414 pp. ISBN 978-0691125961. $29.95 (hardbound).

Bok, (twice) former president of Harvard, asks why students are not learning more in today's technology-rich and often highly regarded colleges and universities. He relies heavily on data from student surveys and educational scholarship to discuss topics such as the composition of traditional majors, the differences between student and faculty in their attitudes toward knowledge, and the fate of general education courses. He neither defends the academy nor decries its shortcomings, but probes the reasons that faculty, departments, and colleges do not more closely analyze their pedagogy and its outcome.

This book was mentioned several times in my university's startup sequence last fall, so I decided to read it. The series of chapter titles would make excellent cross-campus reading group discussions: "Faculty Attitudes Toward Undergraduate Education", "Learning to Think", "Acquiring Broader Interests", "Preparing for a Global Society". I urge you to gather a group of colleagues and spend some time with this book and its compelling questions.

Summer Reading Reviewers

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Brian Coppola recommends

Pygmalion in the Classroom: Teacher Expectation and Pupils' Intellectual Development

by Robert Rosenthal and Lenore Jacobson

Irvington: New York, 2003. 266 pp. ISBN 978-1904424062. $21.95 (paper).

We live in a time where the cognitive theorists have beaten back the behaviorists when it comes to thinking about teaching and learning. Everyone stands around waiting for the next great set of instructional materials that embed a constructivist epistemological orientation, as though any tool can do its work without a skilled operator at its helm. Self-Fulfilling Prophecy, as an idea, dates to the late 1920s, and this classic book by Rosenthal and Jacobsen, first published in the late 1960s, delivers the message so clearly and simply that you already believe it: teacher expectations are inextricably linked to students' ultimate achievement. Students can live up to the level of the high expectations set by a superb teacher—it is what the superb teacher does; and these same students can equally well live down to the low expectations that another teacher might have. All subsequent work in the areas of bias draws from it. If you have never read this work, or worse, never even encountered the general idea, I guarantee you will come away with your view of yourself and your role as an instructor changed significantly.

The Nature of Paleolithic Art by R. Dale Guthrie

University of Chicago: Chicago, 2006. 520 pp. ISBN 978-0226311265. $45 (hardbound).

Dale Guthrie is exactly the sort of rebel we love to see in science. He has looked at something that people have been looking at for years, seen a piece of it that has been ignored, and puts out a great big challenge to the established academic view. I'm no expert on Paleolithic art, and I had to do a little background research to read this book (because Guthrie does not spend much time with the *status quo*). The quick of it is that the intricate drawings and paintings that we see on cave walls is only a small part of the story. Academicians have done what academicians do: they have created an elaborate psychosocial picture of shamans and magic and symbolism and deep meaning in the motivations of our forebears to illustrate these cave walls. The beautiful paintings we are accustomed to seeing, as it turns out, are simply outnumbered by smaller, cruder, sketchier, and perhaps, more earthy drawings. By mapping hand size and shape, Guthrie has contributed a generally widely acknowledged insight: the work of the elders (in the detailed paintings) is accompanied by the sketchy scribbles of adolescent boys, drawing what you might expect adolescent boys to draw—graffiti dreams of being powerful, and of girls. Guthrie's work is controversial, in part because he has not followed all the scholarly rules and only provides his own drawings of the drawings rather than photographs. On the other hand, he has looked at something that the researchers have been looking at for years and seen, by every account, something that no one else has seen. That these other drawings have been systematically ignored seems to be true, and you get the sense that this will no longer be the case. This is an accessible book, written in a pleasant, narrative style.

The Scientist as Rebel by Freeman Dyson

New York Review of Books: New York, 2006. 400 pp. ISBN 978-1590172162. $27.95 (hardbound).

Dyson's book is an eclectic set of essays. He has a series of reflections on contemporary issues in science (global warming, nanotechnology, nuclear proliferation…) and another grouping that sets historical stories of scientific discovery (Einstein, Rutherford, Newton…) against his personal and philosophical views on many aspects of the human condition. His view of science is conservative and almost stereotypical. Science proceeds with a strong deterministic zeal to apply logic and reason in the face of the squishy, romantic culture derived from tradition and history. Like art, science, in Dyson's view, is intrinsically subversive in its endless quest to improve understanding by destroying prior understanding. Dyson is a talented and compelling writer, and the book's structure allows you to cherry-pick your way through topics of interest. His overall view of science, however, I find as ironically romanticized as some of the social culture that he targets as the impediments of science. On the other hand, his message from his title is stunningly clear: instead of merely taking on the objects of science as their targets, scientist should also rebel "against poverty and ugliness and militarism and economic injustice." Rebel, he says, by force of reason rather than by force of arms.

Self-Fulfilling Prophecy: A Practical Guide to Its Use in Education by Robert T. Tauber

Praeger: Westport, CT, 1997. 200 pp. ISBN 978-0275955038. $28.95 (paper); also available hardbound and as an e-book.

One of the early criticisms of Rosenthal and Jacobson was their apparent focus on elementary and middle school settings, and whether they had anything to say about teaching and learning in higher education. As it turns out, they do; and the criticism itself is unfounded—Rosenthal's original work was on undergraduate and graduate students! So, as an instructor, do you think you are really good at sizing up students? When the class is over, and—sure enough—the kids you pegged as the trouble-maker, the star, and the slacker have all turned out to be spot-on versions of what you were expecting, then Tauber is here to remind you that your own beliefs about those individuals, and how you subsequently act, can contribute significantly to the outcome itself. Tauber's book, while clearly oriented toward pre-college settings, is no less relevant to college and university settings. Instructors are not neutral conduits of information, and the core notions of why we gather together in face-to-face—and how qualitatively

Summer Reading

Brian Coppola recommends

different this is than any other setting—speaks to the interdependence of teacher and student when excellent teaching and learning takes place.

Internet Sites (accessed Feb 2007)

I have no pretense toward representing science in this year's look at things on the Internet. I've decided to mine my browser's bookmarks and point you to three things that, if you do not know about them, I think you would not mind spending a few moments, then a few more, while taking a break from your summer reading.

http://postsecret.blogspot.com

If true genius is seeing something for the first time and then acting on it, then Frank Warren is a genius. The Post Secret site is perhaps the most phenomenal non-pornographic social science experiment ever done. Have you got a secret that you have told to no one and want to unload it? Illustrate it on a post card and mail it to Frank. He might post it on his web site; he might publish it in one of his books; he might include it in a gallery display. I have a number of regular Sunday morning correspondents with whom I exchange views after that week's new secrets have been posted.

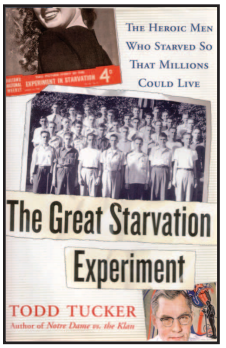
http://babynamewizard.com/namevoyager/lnv0105.html

Although this is limited to primarily Anglo names, the site is just mesmerizing. How has the occurrence of a given name changed in frequency over the last hundred years? You will spend time here testing hypotheses. If you can think of the sort of data that might make this sort of search useful for chemistry students, it's certainly an intriguing framework.

http://www.mercitrain.org/

When I was in high school, our French teacher took us to the site of New Hampshire's train car that was a part of the "Merci Train." After WWII, France sent a multi-ton thank you note to the United States for its help during the war. Thousands and thousands of objects, from the common to the sublime, were collected from the French people and loaded onto remodeled train cars … *Le Train de la Reconnaissance* (*The Train of Gratitude*, or, as it has became known, the *Merci Train*). This is another one of those cool stories that hardly anyone knows about, and one that would probably make a great background for a Tom Hanks movie. Thinking about that high school field trip, I often wanted to learn more about the Merci Train. Once there was an Internet, I figured it was only a matter of time before someone else did the hard work for me.

Jeff Kovac recommends



The Great Starvation Experiment: The Heroic Men Who Starved So That Millions Could Live by Todd Tucker

Free Press: New York, 2006. 270 pp. ISBN 978-0743270304. $26 (hardbound)

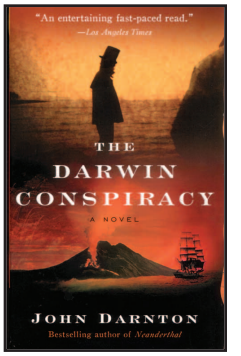
Most of what we know about the effects of starvation on humans was learned in an experiment conducted by Ancel Keys at the University of Minnesota during World War II. The test subjects were volunteers, 36 conscientious objectors. After a 12-week control period to determine the number of calories needed to maintain a constant body weight, the men were systematically starved for 24 weeks during which they received half the calories they had been previously fed. After the starvation phase, several recovery protocols were tested. Throughout the experiment, the physical and psychological responses of the men were carefully monitored.

In *The Great Starvation Experiment*, Todd Tucker tells this dramatic story. He interviewed many of the test subjects and their memories supplement the documentary record left by Keys and his co-workers. It is a story of the remarkable courage of men who volunteered to suffer to provide the knowledge that would help in the recovery effort after a devastating war. Several men were unable to complete the experiment. A few cheated; others could not take the stress and broke down psychologically, but a large majority survived 24 weeks of agony in a noble cause. In retrospect, it is an experiment that never should have been conducted because of the risks to the men involved, but when information about the effects of starvation on the body and mind is needed, the report of the starvation experiment is the only place to turn.

Nonviolence: Twenty-five Lessons from the History of a Dangerous Idea by Mark Kurlansky

Modern Library: New York, 2006. 203 pp. ISBN 978-0679643357. $21.95 (hardbound); also available as audio CD.

Mark Kurlansky's book, *Salt: A World History*, was a Summer Reading Recommendation in 2002. In that book, he chronicles the importance of salt in the history of the world. In this brief and controversial new book, he draws lessons from the history of violence and non-violence. Although you may not agree with Kurlansky, you will find his book provocative in this time of war and terrorism.



The first, and most interesting, lesson is that there is no word for non-violence. Although every major religion praises the concept, it is only referred to as a negative, as the absence of an action. But those who have been advocates of non-violence have pursued a positive program of seeking peace. Kurlansky tries to show how the pursuit of non-violence has been subverted throughout history as wars have followed wars. It is an alternative look at history that may change the way you look at things. It might even help us find a way to peace.

The Darwin Conspiracy: A Novel by John Darnton

Anchor Books: New York, 2005. 309 pp. ISBN 978-1400034833. $14 (paper); also available hardbound, as audiobook CD (abridged), unabridged MP3 CD, and unabridged audiocassette.

What really happened on the *Beagle?* How did Charles Darwin actually develop his views on natural selection? Why was Darwin ill for most of his life? More than 150 years later, two young scholars find the letters and diaries of Darwin's daughter, Elizabeth, that reveal a tangle of rivalries and secrets. They unravel an extraordinary story of the expedition on which two men, Darwin and Robert McCormick, the ship's surgeon, embarked but from which only one returned.

It is rare to find a fast-paced mystery with a scientific theme, and this is one of the best I have read. Darnton uses the known historical facts as a background on which to construct an alternative narrative of the life of Charles Darwin and his scientific work. Once you pick up *The Darwin Conspiracy*, you will find it hard to put down.

Summer Reading

Hal Harris recommends

The Immortal Game: A History of Chess; or How 32 Carved Pieces on a Board Illuminated Our Understanding of War, Art, Science and the Human Brain by David Shenk

Doubleday: New York, 2006. 325 pp. ISBN 978-1400034086 $15.95 (paper); also available hardbound, as an e-book, or as an abridged audiobook on CD.

One might expect that an especially memorable chess match would have been a world championship game, or at least a tournament competition. However, one of the most famous matches ever played was an exhibition played in London in the middle of the 19th century. This remarkable game is used as a scaffold on which David Shenk hangs the whole history of this addictive pastime. As he describes this relatively short game, disclosing the moves a few at a time in most chapters (and none in others), he interweaves anecdotes and history that provide perspective on this particular game and its relationship to an evolving sport.

The Rock from Mars: A Detective Story on Two Planets by Kathy Sawyer

Random House: New York, 2006. 393 pp. ISBN 978-1400060108. $25.95

It has been more than ten years since the publication of a controversial report in *Science* that claimed that a meteorite found in Antarctica provided evidence for life on Mars. How do we know this rock really came from Mars? How do we know that the critical isotopic ratios of its carbonates are the result of life, rather than inorganic processes? How do we know that it has not been altered during its time on earth? Many of these questions were raised ten years ago, and even more have beleaguered the authors of the paper since then. The story is much longer, richer, and even more interesting than it first appeared. Kathy Sawyer does a good job of describing the adventure, the personalities, the political considerations, and the controversy surrounding this chunk of rock.

Exploding Disk Cannons, Slimemobiles, and 32 Other Projects for Saturday Science
by Neil A. Downie

Johns Hopkins University: Baltimore, 2006. 295 pp. ISBN 978-0801885075 $19.95 (paper); also available hardbound.

Neil Downie runs a Saturday science program for kids in Guildford, U.K. This book is the third in a series describing building and investigative projects that he has invented for teenagers (often with the help of an adult). Most of the projects would ordinarily be classified as engineering, but several involve chemistry; the science and mathematics are thoroughly described, along with helpful suggestions and pitfalls to be avoided. The "slimemobile" is a vehicle that oozes along a flat surface on a plenum of gelatin that is constantly injected under the bottom of car; the "exploding disk cannons" of the title use compressed air to send a projectile when a disk between high and low pressure is fractured on command. All of Downie's books are consistent with Douglas Adams' quote in the Preface: "I can't tell you anything…you never believe anything unless you've worked it out for yourself."

The God Delusion
by Richard Dawkins

Houghton Mifflin: New York, 2006. ISBN 978-061868009. $27 (hardbound); also available as an audio CD, unabridged audio download, and as an MP3 CD.

Renowned evolutionist Richard Dawkins' best-selling atheist thesis, *The God Delusion*, attacks religion of all kinds head-on, and challenges the faith of every reasoning person. While he points out that few distinguished scientists hold traditional religious values, that is not true of most teachers of science and is definitely not true of our students. I recommend that teachers read this book, but be cautious about how the material in it is used in the classroom. Even if you fully agree with his very skeptical view of religion, it may not serve our educational mission to unnecessarily confront students with ideas that they will likely reject immediately because they do not comport with religious training. On the other hand, I agree with Dawkins that "religious" ideas are given more deference than they deserve, just because they are "religious".

