Summer Reading

Summer! Read—and thus explore, think, ponder, happen upon new materials, dream...

To what worlds will Brian Coppola, Cheryl Frech, Hal Harris, and Dick Pagni take us this year?

Brian Coppola recommends

China Shakes the World: A Titan's Rise and Troubled Future—and the Challenge for America
by James Kynge

Houghton Mifflin: New York, 2006. 288 pp. ISBN 978-0618705641 (hardcover). $25. Mariner Books: New York, 2007. 288 pp. ISBN 978-0618919062 (paper). $14.95

I am a Sinophile, and my views about China are in part shaped by the 20-plus trips I've made there since 2001; but not completely... because I also read. And of all the books I've read, I think that Kynge's book is in the cream of the crop.

There is an interesting perspective on China from which this book's title is derived. Throughout its entire Imperial Age—about 2500 years—China was either the world cultural leader or in a small, select group of leaders. For various reasons, China turned inward just after the start of the Industrial Revolution in the West. China, as they say, went to sleep. Napoleon Bonaparte is reputed to have once said of China, "Let her sleep, for when she wakes, she will shake the world." That 180-year nap ended in the 1980s.

Kynge, who has spent decades reporting on the financial scene of China, holds a unique and authoritative insider's perspective on the last 20–30 years. In every chapter, he tracks one story, featuring interviews and a wealth of background information, about an aspect of the modern Chinese economy. In doing so, he reveals a depth of character both about the involved individuals and the system in which they exist. From the dismantling and rebuilding of German manufacturing plants, and the takeover of entire Italian tailoring villages, to the meteoric rise of former political prisoners to millionaire capitalists, Kynge places piece after piece of an intricate puzzle together. The only down side: the book is becoming quickly outdated thanks to the still-exponential rate of change in China.

What is most striking about this author is his clarity in conveying complex topics. His narrative style is rich and engaging, to the point where some of these stories are so compelling that you find yourself drawn into the mystery and turning the pages to see how it all comes out. One of the reasons for this, I think, is because Kynge offers a glimpse into a culture that is wholly unfamiliar to us, and so our Western ideologies are useless in trying to predict what comes next. In that way, this book is exactly why I like visiting and working in China: a new thing to learn around every corner... or on every page.

The Forbidden City (Wonders of the World)
by Geremie R. Barmé

Harvard University Press: Cambridge, 2008. 288 pp. ISBN 978-0674027794 (hardcover) $19.95

Speaking of China, the Forbidden City and Imperial Palace, sitting in the geometric center of Beijing, just north of Tiananmen Square, are the *de rigeur* starting point for any first visit to the city. In 2020, the site, commonly know as Gugong ("former palace") celebrates its 600th birthday. To me, this book, written by a history professor at The Australian National University, is scholarly without being stilted, informative yet avoiding the trappings of a guide's manual.

I have a few caveats. A person might read this book cover to cover, but it is also possible to pick through it in response to questions (What about those eunuchs, anyway?). It is not a tourist's primer, nor is it a high school chronology. Instead, history provides a context as Barmé takes a non-linear approach to the subject, organized by historical themes (e.g., "rises and declines"). Even if all you know of Gugong is the portrait of Mao hanging watch at the Gate of Heavenly Peace, or the 7-year controversy over the Starbucks (formerly) located on the grounds, Barmé uses the history to draw insights into the psyche of the Chinese people, and their culture, through their interaction with this architectural site.

The Substance of Style: How the Rise of Aesthetic Value Is Remaking Commerce, Culture, and Consciousness
by Virginia Postrel

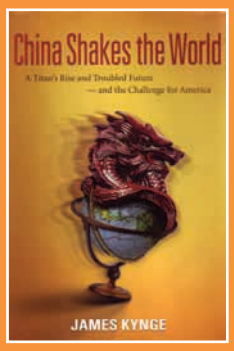
HarperCollins: New York, 2003. 251 pp. ISBN 0060186321 (hardcover). $24.95. Harper Perennial: New York, 2004, 272 pp. ISBN 978-0060933852 (paper). $13.99. Also available electronically as a Kindle Book.

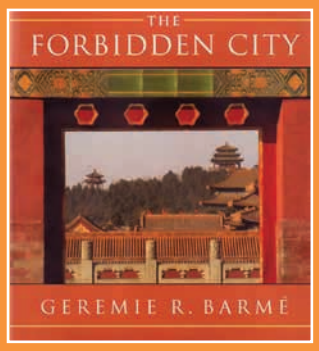
Speaking of Starbucks, have you ever stopped for a moment to look around one of those stores? From the cutout blocks on the ceiling to the placement of a service counter that is not "in your face", the sensory aesthetic of your visit has been taken into account. And, too, your choice of an iPod, your visit to the Home Depot, and your recent stay at the Hotel Rouge in DC (a Kimpton property).

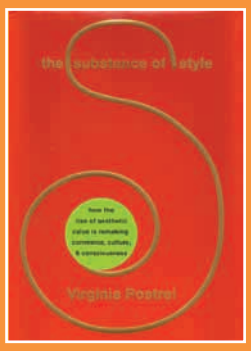
Postrel presents a convincing case that "form follows emotion" was a logical outgrowth of "form follows function", and so the age of Henry Ford (you can have any color you want for your car, as long as it's black) has given way to the oxymoronic notion of mass production customization (I'll take a decaf venti non-fat no-whip mocha). It's not really a mystery: we're willing to pay for it.

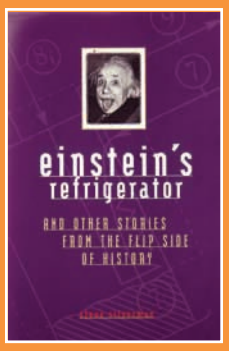
Aesthetic pleasure, Postrel argues, is an end unto itself. "Colas are neither good nor evil," she explains, "and neither is their packaging. The packaging design adds pleasure and meaning, and thus value, to morally neutral products."

Authors who bring some awareness and insight into the imponderable aspects of our lives and culture, particularly when these things are going on around us, are worth spending a little time with.









I love to lose myself in other men's minds.

Charles Lamb: *Detached Thoughts on Books and Reading*

Einstein's Refrigerator—And Other Stories from the Flip Side of History

by Steve Silverman

Andrews McMeel: Kansas City, 2001. 192 pp.
ISBN 978-0740714191 (paper) $9.95
Also available electronically as a Kindle Book.

Pure sugar is not as sweet as this book.

Speaking of imponderables, the reigning deity in the Pantheon of this sort of content is the "Imponderables" series by Dave Feldman (11 books and counting, as well as the Malarky bluffing game). Enter Steve Silverman. Silverman teaches high school earth science, physics, and computer science near Albany, NY. Over the years, he has gathered up stories to spice up his science classes. The guy who gave away the invention of the Eveready battery to work on his model train set (his middle initial, "L," stood for Lionel, if that tells you how this turned out); or the story of Joshua Norton I, Emperor of the United States and Protector of Mexico; or what the letters in S.O.S cleaning pads really stands for (and why it is wrong to write this as "S.O.S."). You get the idea. Silverman has a second book out, too, titled *Lindbergh's Artificial Heart.*

Note: Imponderable, Useless information on the Web

Steve Silverman and Dave Feldman both maintain Web sites in support of their books. Silverman has his stories collected at *http://uselessinformation.org*, while Feldman has a sorted index from all of his first 10 "Imponderables" books at *http://www.imponderables.com* (both sites accessed May 2009).

Cheryl Frech recommends

Musicophilia: Tales of Music and the Brain (Revised and Expanded)

by Oliver Sacks

Vintage Books (Random House): New York, 2008. 448 pp. Index, Bibliography. ISBN 978-1400033539 (paper). $14.95. Also available in hardcover and electronically as a Kindle Book.

Chemistry readers know Oliver Sacks as the author of *Uncle Tungsten,* his 2001 memoir about his childhood interest in chemistry and the world of science. Like many chemists, Sacks is quite musical and has an extensive knowledge of opera and classical music. *Musicophila* is an annotated collection of anecdotes about the mysterious connections between the human brain and music. Some of the tales are weird and disturbing: a research chemist becomes intensely interested in music after surgery to remove a brain tumor. Sacks describes patients whose seizures are induced by music, and conversely, a composer whose increasing inability to hear music in tune threatens his career. Other tales shed light on those pesky earworms—tunes that play repeatedly in your head, and the prevalence of perfect pitch. The book presents children who are musical savants, dementia patients who can barely speak but who can still sing, and musicians with synesthesia who experience music in colors. Take a break from your chemistry routine and explore the brain–music connection with Oliver Sacks as your guide.

Outliers: The Story of Success

by Malcolm Gladwell

Little, Brown and Company (Hachette Books): New York, 2008. 320 pp. Index, Notes. ISBN 978-0316017923 (hardcover). $27.99. Also available electronically as a Kindle Book, as an unabridged audio CD, and for download from *Audible.com*.

As chemical educators, we are often asked to define success in a course, as the outcome of a degree program, or of a research project. In *Outliers,* Malcolm Gladwell turns some popular notions of success sideways for re-examination. Consider sports. Parents urge their children to train hard and not miss any practices, when in fact, the child's birth date and the concomitant slight advantage conferred by the additional height, weight, and experience of older participants can markedly skew the membership on a team roster. Gladwell discusses some "overnight" successes like Bill Gates and Steve Jobs. What is not immediately

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Cheryl Frech recommends

obvious about their stories is the incredibly rare opportunities each had to learn and practice computer programming as a youngster and to then come of age at exactly the moment in history when you could found a computer company with this accumulated knowledge.

"How smart is smart enough?" "What are the cultural legacies that factor into success?" Gladwell's latest book is a quick and enjoyable read that will give you some things to consider the next time you are faced with assigning grades or recommending students for advanced study.

The Sixth Extinction: Journeys Among the Lost and Left Behind
by Terry Glavin

Thomas Donne Books (St. Martin's Press): New York, 2006. 336 pp. Index, Notes, and Sources. ISBN 978-0312362317 (hardcover). $24.95

Our planet has experienced five great prehistoric extinctions that eliminated many living species each time. Glavin's book explores the idea that we are on the brink of a sixth great extinction, not only of animal and plant species, but of humanity's diversity as well. Large fractions of plant, mammal, amphibian, bird, and fish species are currently threatened and many will not survive without extensive intervention programs. Unique languages and cultures are disappearing by assimilation into a global modernized blur.

Rather than simply research the facts, Glavin journeyed around the world to see and experience some of the endangered animals, plants, and isolated human villages. From roosting macaws in Costa Rica to a rare song language shared around a campfire in a remote corner of India, Glavin lovingly describes the beauty and rarity of things that may be lost to future generations. This book does not present a gloom-and-doom environmentalist agenda, but provides a rich description of why we all should care about the world's diversity. Along the way he quotes William Blake, Dorris Lessing, E. O. Wilson, and the United Nations World Charter for Nature: "Every form of life is unique, warranting respect regardless of its worth to man, and, to accord other organisms such recognition, man must be guided by a moral code of action."

The Sixth Extinction: Patterns of Life and the Future of Humankind
by Richard Leakey and Roger Lewin

Anchor (Random House): New York, 1996. 288 pp. Drawings, Index, Notes. ISBN 978-0385468091 (paper). $15.90

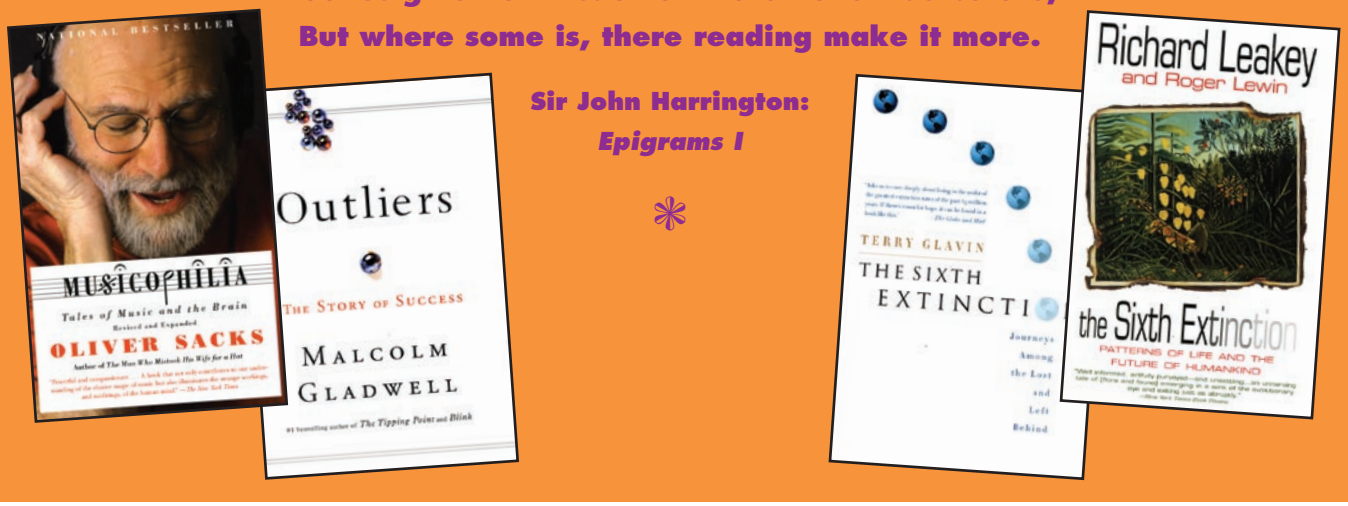
Last year I organized a reading group on Glavin's *The Sixth Extinction*, described above. Some of the readers showed up with Richard Leakey's book, which they heartily recommended, so I read it as well, and the two books make a nice pair. Each book reflects the training of its author(s). Glavin, a journalist, presents a compelling and moving narrative. Leakey and his collaborator, Lewin, are anthropologists, and their *Sixth Extinction* has a more scientific tone than Glavin's.

Leakey and Lewin spend more time discussing the complex causes of the previous five extinctions and the intricate and chaotic patterns of ecology. They introduce the elephant as a "keystone herbivore", akin to the proverbial coal miner's canary, as a signal of impending ecological collapse within its range. The value of diversity in nature is considered from a variety of angles, including as potential sources of new materials, food, and medicines. "What is the special role of humans?" ask the authors. Humans have impacted diversity by direct exploitation of species, with the havoc wrought by what accompanies us – cats, goats, fleas, and by destruction of habitat.

Successful species have an average life span of one- to ten-million years. *Homo sapiens* has only been around about 150,000 years, so we should have another few million years to go. That's plenty of time to catch up on your summer reading and ponder the potential of a sixth extinction.

Bookes give not wisdome where none was before,
But where some is, there reading make it more.

Sir John Harrington:
Epigrams I



Hal Harris recommends

The Invention of Air: A Story of Science, Faith, Revolution, and the Birth of America
by Steven Johnson

Riverhead Books (Penguin Group): New York, 2008. 272 pp. ISBN 978-1594488528. $25.95. Also available electronically as a Kindle Book, as an unabridged audio CD, and for download from *Audible.com*.

The 1994 BCCE was held at Bucknell University, not far from the home of Joseph Priestley in Northumberland, PA. I was one of a group that visited his house. At that time I knew some of Priestley's scientific contributions, but I did not appreciate the importance of his role in the intellectual life of the nascent republic. While they were not close when either was in office, Thomas Jefferson and John Adams exchanged 165 letters during the last years of their lives. They wrote about Alexander Hamilton (a mutual antagonist) twice, Benjamin Franklin five times, and George Washington three times. But they mentioned Joseph Priestley, the expatriate Unitarian and discoverer of oxygen, 52 times. Such was the influence on his adopted country of this "amateur" scientist. Priestley was no theorist—he left to others (especially Lavoisier) the careful quantitative experiments that were essential to prove that mass is conserved, even in chemical reactions that involve gases. Priestley's science was of sufficient quality for him to gain entrance into the Royal Society, but his theological tracts against the worship of saints and the divinity of Jesus forced him to flee England. Priestley made all of the details of his work available freely to colleagues, hiding nothing and spreading his love for experimentation to anyone showing an interest. In *The Invention of Air* Steven Johnson has captured both Priestley the revolutionary chemist and Priestley the advisor to the American Revolution.

Measuring Up: What Educational Testing Really Tells Us
by Daniel Koretz

Harvard University Press: Cambridge, MA, 2008. 368 pp. ISBN 978-0674028050. $29.95

Whether you are trying to choose a school for your child, evaluate a student or a teacher, comply with the requirements of No Child Left Behind, admit students or apply for admittance, or compare the educational systems of different countries, there is likely to be some kind of a test involved. The design and interpretation of tests is fraught with pitfalls, and Daniel Koretz points out many of the ways in which they are misused and misinterpreted. There are many ways to foul up a test, and we see them every day. Incredible as it might seem, Koretz has managed to write an engaging and wry book about testing and measurement, often considered a dry subject. I strongly recommend this book, but only to teachers, parents, school board members, principals, college faculty, legislators, voters, and others concerned about teaching and learning. It is the best book on education that I have read in a long time.

Sex in an Age of Technological Reproduction: ICSI and Taboos
by Carl Djerassi

University of Wisconsin Press: Madison, 2008. 136 pp. ISBN 978-0299227944 (paper), $24.95. ISBN 978-0299227906 (hardcover) $50

You won't find titillation in this book about sex and reproduction. These two one-act plays are intended by their author, one of the "fathers of the Pill", to prompt discussion of the many ethical questions posed by the divorce between the act of sex and human reproduction. The current debate about same-sex marriage is only the prelude to questions that arise in an age when even dead persons can provide the DNA for a baby. Do we think differently about incest if a brother-in-law provides semen or a sister-in-law is a surrogate mother? The "ICSI" in the title of the first play stands for "intracytoplastic sperm injection", a technique that allows a single sperm to fertilize an egg (rather than the millions that potent males produce). The second play, "Taboos", examines issues associated with the use of reproductive technologies within a family. Both are intended for use in school or college classrooms and an accompanying DVD provides microscope videos of the ICSI process which are needed for the production.

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Supporting *JCE Online* Material
http://www.jce.divched.org/Journal/Issues/2009/Jul/abs792.html

Abstract and Keywords

Full text (PDF)

Summer Reading

Hal Harris recommends

Molecules of Murder: Criminal Molecules and Classic Cases
by John Emsley

Royal Society of Chemistry: Cambridge, U.K., 2008. 242 pp. ISBN 978-0854049653. $24.95. Also available electronically as a Kindle Book.

Poisons are among the favorite weapons of mystery writers, if not murderers. Guns may be quicker, but poisons have a cachet that you really can't beat. On the other hand, murder by poison has become increasingly dangerous—to the perpetrator! Despite the fact that incredibly small amounts of certain chemicals constitute a lethal dose, resourceful forensic scientists have pushed the limits of quantification to even smaller values. It is amazing that a person can be killed with only micrograms of a few substances (think about what a microgram would look like), but even more so that they are always detectable in a corpse. *Molecules of Murder* recounts some of the most infamous murders by poison in a style that will appeal to chemists and students of chemistry. While he does not provide chemical structures for the toxins (so as not to put off the non-chemical reader), skilled science writer John Emsley deftly describes the murders and the murderers in a case-by-case style that never speaks down to his audience.

The Symmetries of Things
by John H. Conway, Heidi Burgiel, and Chaim Goodman-Strauss

A. K. Peters Ltd.: Wellesley, MA, 2008. 447 pp. ISBN 978-1568812205. $75

This beautiful book could certainly enhance your coffee table, but don't buy it just for its looks. Be prepared to spend some time with it, and join the wonder that mathematicians are expressing at the brilliance of this new way of describing and inventing symmetries. *The Symmetries of Things* begins with a classification of the elements of symmetry—the orbifold signature notation, whose features are "wonders, gyrations, kaleidoscopes, and miracles". Combined, they give the *signature* of a pattern. There is a Magic Theorem that tells you how features can be combined. John Conway may be known to you from his cellular automaton, "Game of Life", and the puzzles and amusements that have been described by Martin Gardner. His coauthors are a former graduate student (Burgiel) and a mathematician whose exceptionally beautiful illustrations are widely known (Goodman-Strauss). More than 20 years in the making, the book is divided into three parts. The first part should be accessible to lay readers who may be lured into mathematical ideas before realizing it. Part two introduces color to symmetry and requires some understanding of group theory (and was more than sufficiently challenging to this physical chemist). Part three is intended only for professional mathematicians and goes into symmetries in higher dimensions. I don't see exactly how this is relevant to chemistry, but I would not be surprised if it is finds application in supramolecular chemistry and self-organization.

> Books should to one of these four ends conduce,
> For wisdom, piety, delight, or use.
>
> John Denham: *Of Prudence*

The Ten Most Beautiful Experiments
by George Johnson

Knopf (Random House): New York, 2008. 208 pp. ISBN 978-1400041015 (hardcover). $22.95; Vintage: New York, 2009. 208 pp. ISBN 978-1400034239 (paper). $13.95. Also available electronically as a Kindle Book and for download from *Audible.com*.

Lists of "the best" movies, books, sports stars, American Idols are often intriguing and controversial. Science has its own lists, be they Nobelists or most-cited publications. Just a few years ago, Philip Ball published a similar book of "elegant chemistry experiments" (*Elegant Solutions: Ten Beautiful Experiments in Chemistry*, Royal Society of Chemistry, 2005. A review appeared in this *Journal;* see *J. Chem. Educ.* **2006,** *83,* 41.). Johnson chooses from a wider range of disciplines, but his "top ten" has no overlap with those in Ball's list. This rather short book does an outstanding job of describing the experimental science, with an adequate minimum about the personalities and the times during which the scientists lived. I think it is an excellent list: Galileo's laws of motion, Harvey's study of blood circulation, Newton's color experiments, Lavoisier's quantitative gas experiments, Galvani's connection of nerves to electricity, Faraday and electromagnetic radiation, Joule and the mechanical equivalent of heat, the Michelson–Morley experiment, Pavlov and his dogs, and Millikan's measurement of electron charge. The last is an experiment that Johnson actually recreated himself (a man after my heart). This is an excellent, concise book—one in which the science speaks. You can read it in a well-spent hour or two.

Dick Pagni recommends

Leonardo
by Martin Kemp

Oxford University Press: Oxford, UK, 2005. 304 pp.
ISBN 0192806440 (paper). $15.95

I venture to suggest that Leonardo da Vinci is as well known in the West, at least on a superficial level, as such luminaries as Michelangelo, Shakespeare, Newton, Bach, and Einstein. Why is that? I can give several reasons. He was a supreme artist, one of the greats of the High Renaissance, but one who rarely finished his rather few paintings. He produced the most famous European painting of all, the Mona Lisa, which he carried around with him during his many travels in the Italian peninsula and lower France. Then there is the sublime Last Supper, painted in a new, revolutionary, unproven, and ultimately unsuccessful manner, which has slowly decayed over time. The painting, which miraculously survived the bombing of Milan during World War II, has recently been completely restored.

Leonardo was interested in everything and excelled at whatever he tried. He earned his living at times as an engineer, a financially lucrative career in the turbulent times in which he lived. He was involved in a fruitless project to divert the waters of the Arno River from Pisa, Florence's perpetual enemy. He also dissected cadavers of hanged criminals or bodies stolen from cemeteries, usually in secret, because the authorities frowned on such activities. Much of the internal structure of the human body that da Vinci discovered has been displayed in his extraordinarily beautiful drawings that have been discovered over the centuries in dusty monasteries and museums. He had great foresight, predicting manned flight, the helicopter, and the parachute. Unfortunately, the man was extremely secretive and even wrote in a form of code that could only be read by its reflection in a mirror. Thus, his insightful speculations had no impact on the development of science and technology. In spite of his secretive nature, he was always in demand for one job or another, most of which were never finished. In his middle age, he lived in Milan where he worked on the construction of an enormous bronze equestrian statue for the ruler of Milan. Alas, the statue was never completed because the metal was melted down to make cannons to fight the invading French. The French king, now the ruler of Milan, knew of Leonardo's skills and provided haven to him during the last three or four years of his life.

There is so much more to Leonardo's life, work, and enigmatic character than what I have described above. All of this can be found in Martin Kemp's superlative *Leonardo*. Kemp, Professor of the History of Art at the University of Oxford, is the world's leading authority on da Vinci, has written extensively on the man, and is a regular contributor to *Nature* where he writes a regular column on the confluence of art and science.

Experiments in Ethics
by Kwame Anthony Appiah

Harvard University Press: Cambridge, MA, 2008. 288 pp.
ISBN 978-0674026094 (hardcover). $22.95. Also available electronically as a Kindle Book.

Whenever I think about philosophers at work, three pictures come to my mind: (1) a group of men wearing robes or togas debating issues with one another under the scorching Mediterranean sun (Socrates, Plato, and Aristotle for example); (2) a German man taking a regular and punctual walk in the Baltic city of Königsberg, with his mind deep in thought (Immanuel Kant); (3) a man or woman slouched in a chair with legs stretched out and hands clasped behind head and eyes staring out into space (all of the above folks and so many more). I jest, of course, but these pictures suggest that philosophers are interested solely in detailed and careful abstract thought and introspection on issues such as ethics and morality, and not in information derived by scientific experimentation. This view, I gather, is true of a goodly number of philosophers. I discovered

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to my surprise that there is a genuine scientific side to philosophy involving psychology, neuroscience, and evolutionary biology. These scientific empiricists carry out experiments and theory to explain how brain function results in moral and ethical behavior. These folks want to understand how the brain/mind works. The abstract thinkers, on the other hand, don't care about how the mind works. Not unexpectedly, there is considerable tension between people in the two camps.

This is the domain that Kwame Anthony Appiah, a professor of philosophy at Princeton University, brilliantly describes in his book *Experiments in Ethics,* which is based on lectures he gave at Bryn Mawr College. Appiah wants to connect—actually reconnect—the abstract thinkers with the scientists. One of his arguments is that philosophers have always been interested in empirical information, including that derived from science, which somehow over time has been forgotten. Appiah is an excellent writer, but being a philosopher and a humanist, he writes in a style that some scientists may find unfamiliar. Don't be put off by this unfamiliarity because, if you persist, you will learn a great deal about the reasons for and causes of moral and ethical behavior.

Deep Down Things: The Breathtaking Beauty of Particle Physics
by Bruce A. Schumm

Johns Hopkins University Press: Baltimore, 2004. 392 pp. ISBN 0801879715 (hardback). $30.95

I imagine that most readers are familiar with the picture of an atom presented in general chemistry. The teacher tells the student that the atom consists of a very dense nucleus made up of an ensemble of protons and neutrons at its center surrounded by a swarm of electrons whose behavior follows the mathematics of quantum mechanics. The teacher will then describe atomic number and mass, isotopes, and various kinds of radioactive decay and leave the picture at that. Rarely is it mentioned that it is odd that nuclei containing a number of positively charged protons in a very tiny space don't fly apart due to Coulomb repulsion. Physicists now understand this oddity and quite a bit more about the structure and behavior of atomic nuclei.

The beautiful and still-emerging picture of elementary particles and the forces by which they interact has been told in a large number of recent books written by physicists. The one I like the best is *Deep Down Things* whose title is derived from a lovely poem by Gerard Manley Hopkins. The exposition is clear and detailed, with numerous tables and well-drawn figures, but virtually no mathematics. There is also copious background material to get the reader up to speed.

Just to whet the appetite of a potential reader, let me note that the weak force is, surprisingly, asymmetric. How do physicists know this? Let me mention two ways: atoms with large atomic numbers have very small, but measurable, optical rotations and beta decay liberates mostly left-handed electrons.

Descartes' Bones: A Skeletal History of the Conflict between Faith and Reason
by Russell Shorto

Doubleday: New York, 2008. 320 pp. ISBN 978 0385517539 (cloth). $26. Vintage: New York, 2009. 336 pp. ISBN 978-0307275660 (paper). $15. Also available electronically as a Kindle Book, as an unabridged audio CD, and for download from *Audible.com*.

René Descartes was born to a well-to-do couple in rural France in 1596 where he received a solid Jesuit education. In his early twenties he enlisted in the army of Prince Maurice of Nassau where he worked behind the lines as an applied mathematician and engineer. René was an intellect of the first rank, having made major contributions to mathematics (the invention of analytical geometry), which led to the development of calculus, natural philosophy, i.e. physics and astronomy, which is not highly regarded today, and philosophy, where he perhaps has

made his greatest contributions. He believed that reason was the basis for all clear thought. You may recall his "*Cogito ergo sum*" (I think, therefore I am), which sums up a type of dualism that separates the body and mind. He also developed the mechanistic model of the universe, which still pervades all branches of the sciences to this day. My research career, for example, has been devoted mostly to *mechanistic* organic chemistry.

Descartes moved around a lot, mostly because his writings offended the French political and religious authorities. Much of his work was published after his death. Even though he remained a Roman Catholic throughout his life, his eccentric views on Catholic doctrine, such as that on transubstantiation, afforded him perpetual problems with the authorities. Eventually he settled in the very liberal Netherlands where he spent most of his life. Late in life he moved to Sweden where he became tutor and savant to Queen Christina, a very formidable woman and intellect. Having to get up daily at a very early hour under frigid weather conditions to meet with the queen took its toll on René. The middle-aged philosopher died in Sweden in 1650.

In time France wanted the remains of one its own returned to the motherland. *Descartes' Bones* describes this odyssey of many centuries and cleverly interweaves this story with the ongoing debate over faith and reason, a debate, I might add, that Descartes had a large part in initiating. Russell Shorto tells this important story superbly. There are several thousand books in the Library of Congress that deal with René Descartes, and I believe that Shorto's book is one of the more richly rewarding—and unusual—of the bunch.

The First Three Minutes: A Modern View of the Origin of the Universe

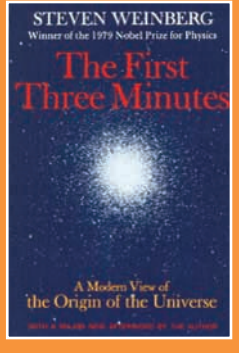
by Steven Weinberg

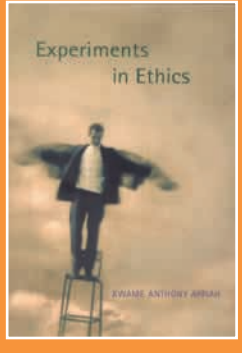
Basic Books: New York, 1993 (2nd edition). 224 pp. ISBN 978-0465024377 (paper). $16.95. Also available electronically as a Kindle Book and for download from *Audible.com*.

Most people have heard of the Big Bang Theory of the origin of the universe. There was nothing and then there was an infinitely dense and infinitely hot point which expanded and cooled. Why do astronomers and physicists believe this seemingly unbelievable scenario? Astronomers have demonstrated that galaxies are moving away from each other at great speed, with the speed and distance being correlated with one another, clearly suggestive of an explosion. There is also the pervasive microwave background radiation that behaves as a black body radiator with a temperature a few degrees above absolute zero. A very hot and massive, but cooling, universe, when given enough time (approximately fifteen billion years) will yield radiation of this type. There are many problems with the theory that scientists continue to work on including the fact that the universe had at some point in its early life to grow at rates that seemingly exceeded the speed of light (inflation).

Steven Weinberg, a professor in the Department of Physics at the University of Texas, who shared the 1979 Nobel Prize in Physics for the theoretical unification of electromagnetism and the weak nuclear force (electroweak theory), fills in the details in his remarkable *The First Three Minutes* which is one of the best science books I've read in a while. Here's why. Weinberg is an excellent writer for a general audience and has great wit; he takes the time to explain complicated themes slowly and clearly. Weinberg doesn't "dumb down" his topics; he assumes his audience is intelligent and wants to learn something new, isn't afraid to dig into some difficult, new material, and is willing to spend the time to do it. Weinberg also spends the necessary time and space presenting historical and background physics so that the reader is prepared to tackle the physics of the Big Bang. The book is also laced with pictures, graphs, tables, a glossary of terms, and a mathematical supplement for those who are more mathematically inclined and want to understand the physics at a deeper level.

Even if scientists understood the Big Bang Theory in detail, something is still amiss. Astronomers now know that approximately 95% of all the mass in the universe is of unknown types (dark matter and dark energy), whose existence is only known because of the gravitational effects on stars and galaxies.





A man ought to read just as inclination leads him; for what he reads as a task will do him little good.

Samuel Johnson: in Boswell's *Life*