

ings that led to changes in worker protection laws but is not primarily a book about changing the law. *The Radium Girls'* most compelling feature is the stories of the young women. Moore tells their stories such that they pop from the pages as real human beings with hopes and dreams, experiencing love and loss.

For me, a scientist, the book was a sobering reminder of the responsibility scientists have to do our important work carefully, thoroughly, and ethically. When I am working to make my laboratory OSHA-compliant, I will think of the dial painters and, rather than grumble about the extra work, I will be grateful for the protections we have in labs and industry thanks to the radium girls, whose fierce persistence led to the formation of OSHA and other organizations. The story of the dial painters reminded me that the world was (and unfortunately still is) a place where people who lack power—women, children, people of color, and the poor—also lack a voice. The story compels me to be a voice, whenever I can, for those who lack power; this is an especially important ethical responsibility for Christians.

Who should read this book? Anyone interested in science, law, or business regulations. Anyone who loves a good nonfiction story with sympathetic characters and real-life villains. I will recommend this book to some of the high school students in my church who love science, especially the girls. It is a compelling story of young women who found their voices and made a difference in history.

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## HISTORY OF SCIENCE

**THE RHINOCEROS AND THE MEGATHERIUM:** *An Essay in Natural History* by Juan Pimentel, translated by Peter Mason. Cambridge, MA: Harvard University Press, 2017. 364 pages, including contents, prologue, notes, acknowledgments, credits, and index. Hardcover; \$29.95. ISBN: 9780674737129.

For a person interested in natural history, the notion of a “fantastic binomial” may bring to mind a favorite plant, animal, or fossil and its uniquely crafted name following the Linnaean nomenclature for a species. But for Spanish historian Juan Pimentel, a “fantastic binomial [is] the combination and setting into motion of two objects or persons who are apparently unconnected” (p. 6). In *The Rhinoceros and the Megatherium*, Pimentel crafts an extended essay that describes the parallel journeys of two marvelous mammals to the Iberian peninsula: one a live crea-

ture from the Far East, and the other a fossil from the western hemisphere.

The first three chapters tell the tale of Ganda, a live rhinoceros transported from India to Portugal in 1515 who was named in honor of the native term for the animal. To the Portuguese people, this massive animal represented their perception of the Orient: something unfamiliar, exotic, and dangerous. What was known of rhinoceroses at the time was primarily the stuff of legend, stemming from the works of ancient Greeks such as Strabo and Pliny, and often becoming conflated with stories of the mythical unicorn. The rhino was viewed as a ferocious, brutal creature who was built to destroy its natural enemy, the elephant. Upon coming into contact with animals such as rhinos, many people simply sought to reinforce their preconceived notions about these animals, hence the staged battle between Ganda and a juvenile elephant that was not in any way ready to fight the rhinoceros. Ganda was eventually gifted to Pope Leo X, but tragically died in a shipwreck on his way to Rome. Pimentel contests that no one would remember this tale were it not for Albrecht Dürer’s classic woodcut that immortalizes the creature. This image, which would spread around the world, depicts a creature with some of the key traits of a rhinoceros, such as its robust body, stout legs, and the nose horn that gives the animal its name. But it also features what look like overlapping plates of armor, thick reptilian scales, and a small unicorn-like horn perched between its shoulders. Apparently, Dürer actually never witnessed Ganda firsthand, basing his representation on a descriptive letter, an original illustration (which has been lost), and undoubtedly a host of preconceived notions about the animal. Hans Burgkmair produced a woodcut around the same time that more accurately represented the anatomy of the rhinoceros, but it lacked the power of Dürer’s chimeric piece that carried the “fables and words of antiquity” about the animal (p. 100).

The next three chapters tell the story of a different beast, whose bones were dug up from the earth near the Luján River in present-day Argentina. The fossil was initially taken to Buenos Aires before eventually being transported across the Atlantic Ocean to the Royal Cabinet of Natural History in Madrid during the summer of 1788. This skeleton was like nothing anyone had ever seen before—it was massive and had an anatomy unlike any modern creature known to science. Initially reconstructed as a pachyderm or large cat, the first people to study it did not really know what to make of it. Juan Bautista Bru and Manuel Navarro collaborated to produce illustrations and engravings of this beast to publicize it, but

## Book Reviews

it was not until Georges Cuvier got his hands on these images that the mysteries of this ancient creature began to unravel. In 1796, Cuvier produced a paper documenting the anatomy of this creature, placing it in the family tree of mammals, and finally giving it a name: *Megatherium americanum* (which translates to “great American beast”). Through careful comparative work, Cuvier recognized that this animal was new to science, but clearly related to the edentates, a grouping of mammals that includes armadillos and sloths. This work marked the beginning of Cuvier’s prodigious career and helped to provide evidence that the ancient world was full of creatures that are not represented in the modern fauna. Additional fossils of related creatures would be found in later years, and after some further debate, the great anatomist Richard Owen would eventually demonstrate that *Megatherium* was an extinct species of giant ground sloth.

Pimentel uses these two stories to explore many topics along the way. While some digressions are more interesting and germane than others, they generally raise intriguing ideas inspired by the tales of the rhinoceros and *Megatherium*. Pimentel recurrently explores topics such as “the role of imagination in the manufacture of scientific and historical facts” (p. 6), the power of images to convey reality mixed with “preconceptions and mental resonances” (p. 103), and the “alliance between art and science” (p. 164) that gave rise to the discipline of scientific illustration. In telling these tales, he also conveys the importance of understanding how our collective knowledge has changed across centuries. He discusses how the discovery of fossils presented a challenge for many eighteenth-century naturalists, who believed in the doctrine of plenitude and the fixity of species. In so doing, he briefly covers the infancy of paleontology, the debate between uniformitarianism and catastrophism, and the tensions that existed between science and faith during this time, pointing out that religion actually played an important role in the development of earth history and science in general.

If readers are in search of a more systematic and thorough history of paleontology or zoology, then they should look elsewhere. However, Pimentel’s extended essay about the “circular biographies” (p. 287) of the rhinoceros and *Megatherium* offers plenty of historical illustrations (56 in total) and rich stories that will inspire further thought about the natural world, how we engage with that which is unfamiliar, and the role of imagination and images in helping us see the reality around us.

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**A MATHEMATICIAN’S LAMENT: How School Cheats Us Out of Our Most Fascinating and Imaginative Art Form** by Paul Lockhart. New York: Bellevue Literary Press, 2009. 144 pages. Paperback; \$14.95. ISBN: 9781934137178.

**MEASUREMENT** by Paul Lockhart. Cambridge, MA: Harvard University Press, 2012. 407 pages, with index. Paperback; \$20.50. ISBN: 9780674057555.

**ARITHMETIC** by Paul Lockhart. Cambridge, MA: Harvard University Press, 2017. 223 pages, with index. Hardcover; \$22.95. ISBN: 9780674972230.

You will forgive me if I find it normal for mathematics education to be under attack. That has been my experience since the mid-1960s. I wasn’t subjected to “new math” in the classroom (we weren’t that up-to-date), but I was privileged to attend a National Science Foundation Saturday course aimed at introducing talented high school students in the Chicagoland area to the modern abstract view of mathematics. The short text we used developed the real number system as equivalence classes of Cauchy sequences, claiming this would help us understand what creative mathematics was really all about. I stumbled out of those lectures in a fog of confusion, none the wiser for the honor, yet still interested in mathematics as I understood it.

I underwent the same anxious muddle about three years later during my first semester of abstract algebra, but this time the haze gradually cleared, and I began to appreciate an abstract formal viewpoint. I was not convinced, however, that imposing a set-theoretic foundation on school mathematics was pedagogically or philosophically sound, nor that it would help catapult the USA ahead of the Soviet Union in the space race. Aspects of the New Math reform appealed to me, but I also resonated with parts of Morris Kline’s hyperbolic rant *Why Johnny Can’t Add: The Failure of the New Math* (1973). The more concrete heuristic approach taken by British mathematics educators under the leadership of Edith Biggs seemed far more promising than what new math proponents had on tap.

Since the 1960s a host of professional documents by committees and individuals have detailed what’s wrong with mathematics education in the USA on all levels and have told us what we should do to fix it. Progress has been made on a number of fronts, but not everyone has clambered aboard one of the reform trains. Paul Lockhart, for instance, begs to differ with how things still typically go—actually, he