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Chemists who in 1926 claimed — erroneously — that they had discovered element 61: left to right, J. Allen Harris, Leonard Yntema and B. Smith Hopkins.

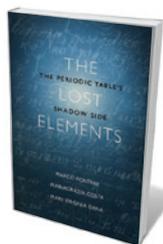
HISTORY OF SCIENCE

Chemists behaving badly

Theodore Gray revels in the ego-ridden story of the elements that never were.

Rarely has so much been written so authoritatively about things that do not exist. In their marvellous *The Lost Elements*, chemists Marco Fontani, Mariagrazia Costa and Mary Virginia Orna detail the ‘discovery’ of dozens of elements that turned out not to be.

Some (such as polymnestum, claimed as an element by the wealthy — and sloppy — Victorian landowner Alexander Pringle) were the product of nothing more than poor measurements of impure samples. Many were products of wishful thinking, vanity, jealousy, pride, greed — name your sin, and someone has probably falsely claimed the discovery of an element because of it. But all shared the same fate: to be brought down, more often than not, by scientific rivals only too glad to point out the follies of their enemies. The false discoveries were announced with great fanfare, but the retractions, if they came at



The Lost Elements: The Periodic Table's Shadow Side
MARCO FONTANI,
MARIAGRAZIA COSTA AND
MARY VIRGINIA ORNA
Oxford University Press:
2014.

all, were often obfuscating. For example, the retraction of one candidate for element 61, florentium, was published “in a minor journal of the Vatican State ... for the most part, written in Latin”.

Why such a parade of professors behaving badly? If you discover an element, you name it, and thereby insert yourself into this single greatest of all collections. Since the nineteenth century, when the Russian chemist Dmitri Mendeleev formulated the

first version of the modern periodic table, it has been known that the number of elements is strictly limited. Generations of chemists could see the slots being filled as they grew inexorably older, and the temptations were too much for some.

As *The Lost Elements* reveals, one of these was Luigi Rolla, the discoverer of the ill-fated florentium. Head of chemistry at the University of Florence, Italy, in the early twentieth century, his contributions to rare-earth chemistry are indisputable. But things started to unravel in 1926 when, fearing he might be scooped in the discovery of element 61, he announced his ‘find’. That year, a rival group at the University of Illinois, headed by B. Smith Hopkins, announced its discovery of the element, dubbing it illinium. But there were other complications. New Hampshire chemist Charles James, the expert on rare earth elements asked to review Hopkins’s

paper, had also been working on element 61; and out of deference to the Illinois team, published his own paper after theirs.

In the event, none of these players had actually pinned the element down (although this did not stop Rolla from systematically destroying the career of his former colleague Lorenzo Fernandes, who had

“Name your sin, and someone has probably falsely claimed the discovery of an element because of it.”

lobbied for retraction). As is now known, element 61 — promethium — is a short-lived radioactive element that cannot occur naturally to any appreciable degree.

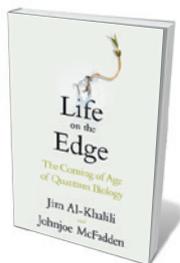
The rivers of academic blood spilled over it were inevitable, simply because its discovery was essentially impossible before the era of synthetic elements.

Several elements have legitimately been discovered by their spectral lines, most notably helium — so named because the first evidence of its existence came from its presence in the atmosphere of the Sun. Less well known is the ‘discovery’ that helium could be separated into two different elements with slightly different spectral lines and densities. This claim, made by Carl David Tolmé Runge and Heinrich Gustav Johannes Kayser in the late nineteenth century, might have represented the discovery of isotopes 20 years ahead of its time. However, although Runge and Kayser were expert spectroscopists, they were not very good pressurologists. What they had in fact discovered is that the spectrum of a gas depends on its pressure. So by measuring what was actually the same substance under slightly different pressures, they were misled about both its density and its spectral lines. Thus died the element asterium.

This staggeringly comprehensive, well-researched book weighs in at more than 500 pages, yet does not get bogged down in minutiae. Perhaps the greatest value in *The Lost Elements* is its examination of scientists as all too human, with lives as convoluted as those of any poet or monarch. One Josiah Wedgwood, for example, proposed in 1790 to have discovered evidence of a new element in an interesting clay found near the recently settled penal colonies of Australia. That claim turned out to be mistaken, but playing with clay was not a complete waste of time for Mr Wedgwood, who found success making pottery instead. Yes, that Wedgwood. ■

Theodore Gray is the co-founder of Wolfram Research, founder of Touchpress, and proprietor of periodictable.com. His latest book is *Molecules: The Elements and the Architecture of Everything*, also available in an interactive iPad edition. e-mail: theodore@theodoregray.com

Books in brief



Life on the Edge: The Coming of Age of Quantum Biology

Jim Al-Khalili and Johnjoe McFadden BANTAM (2014)

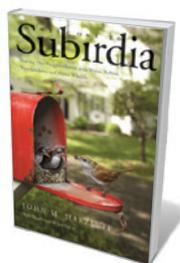
Quantum biology — where “hot, wet and messy living bodies” meet quantum weirdness — has hit the popular-science shelves. Physicist Jim Al-Khalili and molecular biologist Johnjoe McFadden explore this extraordinary realm with cogency and wit. Starting with the slippery nature of life itself, they canter through recent findings in areas of research such as quantum tunnelling inside enzymes, Einstein’s “spooky action at a distance” vis-à-vis organisms’ navigational compasses and the wilder shores of synthetic biology. A fine survey of emergent science.



Lives in Ruins: Archaeologists and the Seductive Lure of Human Rubble

Marilyn Johnson HARPER (2014)

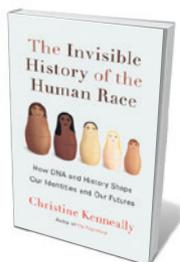
Archaeology is news, as the cave paintings in Indonesia just dated to 40,000 years ago remind us (see *Nature* <http://doi.org/wjh>; 2014). In this gem of hands-on reportage, Marilyn Johnson delves into the lives of the pros behind the finds — impossibly dedicated, beset by job insecurity and in love with the hidden and half-decayed. Packed with ace accounts of hard graft featuring the likes of flint-knapping palaeoanthropologist John Shea and forensics specialist Kimberlee Moran, who studies the effects of explosions using pig carcasses.



Welcome to Subirdia: Sharing Our Neighborhoods with Wrens, Robins, Woodpeckers, and Other Wildlife

John M. Marzluff YALE UNIVERSITY PRESS (2014)

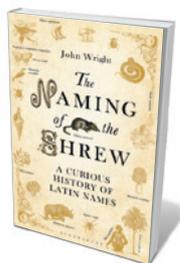
Great horned owls and bald eagles live and hunt in ornithologist John Marzluff’s suburban garden in Washington state. As Marzluff shows in this rich account of fieldwork in ‘metropolitan wilds’ from New Zealand to Costa Rica, such annexed environments — which boast some 75 billion trees in the United States alone — can host an astounding diversity of birds. But, he argues passionately, intelligently and with scientific authority, any land-use change reweaves the ecological web, and may leave it threadbare.



The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures

Christine Kenneally VIKING (2014)

A family mystery — a gap where her father’s father should be — goaded science writer Christine Kenneally into exploring the phenomenon of identity. Kenneally goes at it full tilt, taking a machete to a jungle of genomics; reassessing the contentious practice of genealogy; unravelling the knotted realities of adoption; and pondering DNA testing. This sparkling, sometimes harrowing read is packed with intriguing interludes, such as still-speculative findings on the dark-skinned Melungeons of Appalachia.



The Naming of the Shrew: A Curious History of Latin Names

John Wright BLOOMSBURY (2014)

Anyone enamoured of binomial nomenclature — the system of Latin names formalized by taxonomist Carl Linnaeus in the eighteenth century — will relish this telling of its long, bumpy evolution. As natural historian John Wright notes, the names are not merely appellative, but have gradually become “things in themselves”. And indeed, his cabinet brims with verbal curiosities, from *Senecio squalidus* (Oxford ragwort), meaning ‘dirty old man’, to *Upupa epops* (the hoopoe), based on a character in Aristophanes’s play *The Birds*. **Barbara Kiser**