four volumes to ten and conflated with his *Epochs of Nature.* Charles Lyell's *Principles of Geology* is described as a product of his "world travels" (which, at the time it first appeared, extended from England to Italy) rather than his ability to synthesize the observations and reports of others who *were* world travelers.

Once the story proper begins, even this makeshift context disappears almost entirely. Universities, scientific societies, museums, government agencies, and the United States Army appear as institutional black boxes: lacking lives or agendas of their own, interesting only in terms of what they provided (or failed to provide) the expeditions. Paid fossil collectors did much of the dirty, heavy work for East Coast luminaries like Marsh and Cope. *The Legacy of the Mastodon* treats them as colorful individuals but pays little attention to them as a group. Nor—despite its linking of western fossils to America's emerging cultural identity—does the book say much *about* that identity: how it was constructed and how, specifically, fossils played into it.

The relentless lack of attention to context repeatedly steers the book away from interesting historical issues. Did, for example, paid fossil collectors enjoy higher status in the egalitarian, entrepreneurial culture of American geology than they did in the gentleman-amateur world of British geology? Did the culture of western fieldwork allow eastern professors temporarily to adopt the identity of "frontiersman," the way that (as Michael Shortland has suggested) gentlemanly British geologists used fieldwork to adopt the identity of "skilled laborer"? Such questions, unfortunately, remain off the table in *The Legacy of the Mastodon.* What we are left with is minutely detailed, well-told stories of expeditions, excavations, and extralegal shenanigans. Again.

A. Bowdoin Van Riper

Beatriz Vitar. *La pasión científica de un liberal romántico: Lorenzo Gómez Pardo y Ensenyat (1801–1847).* 344 pp., figs., bibl. Madrid: Iberoamericana; Frankfurt am Main: Vervuert, 2007. €24 (cloth).

In the early decades of the nineteenth century, Lorenzo Gómez Pardo y Ensenyat (1801–1847) enjoyed a distinguished scientific career. His art of assaying gold and silver came straight from a family tradition, but pharmacy studies introduced him to emerging scientific disciplines such as physics, chemistry, and mineralogy and their applications to mining and metallurgy. In 1825 Pardo traveled to Paris and attended courses on botany, zoology, mineralogy, geology, mathematics, and chemistry given by such scientific luminaries as Étienne-Geoffroy de Saint-Hilaire, Alexandre Brogniart, Joseph-Louis Gay-Lussac, Pierre-Louis Dulong, and Nicolas-Louis Vauquelin, among others. Later, he was awarded a *pensionado* (fellowship) to travel to the German regions of Saxony (in particular to the Mining Academy of Freiberg), Harz, and Silesia. He was also influenced by his personal contact with the Spanish chemist Fausto de Elhuyar (1775–1833), the codiscoverer of tungsten and the founder of the Royal School of Mines in Mexico. Back home in Spain, in 1835, Pardo played a very important role in designing the new School of Mining Engineering (Escuela de Ingenieros de Minas) in Madrid. He also became an inspector for the Dirección General de Minas and one of the most renowned Spanish experts in the field.

Like other Spanish scientists of his day, Pardo was a committed liberal, close to the ideology of the *afrancesados*—followers of the values of the French Revolution of 1789 and fighters against absolutism and the privileges of the *ancien regime.* His scientific training should be understood in the context of an international network, in which travel, exile, secrecy, and political trust were all crucial parts of an exciting intellectual "adventure." Pardo's travel journals are full of aesthetic sensitivity and humanism. He also wrote poems and supposedly practiced "Romantic" science in the field—in a style we might compare to that of Alexander von Humboldt. However, his Romantic profile requires more in-depth discussion. Beatriz Vitar covers the political context in which Pardo developed his career very well, but unfortunately she does not integrate historical research that illustrates the link between science and Romanticism (see, e.g., Andrew Cunningham and Nick Jardine, eds., *Romanticism and the Sciences* [Cambridge, 1990], or José Montesinos, Javier Ordóñez, and Sergio Toledo, eds., *Ciencia y Romanticismo* [Fundación Canaria Orotava de Historia de la Ciencia, 2002]).

Vitar makes little reference to important authors who have written widely on the history of science in Europe during the early decades of the nineteenth century. The same problem applies to work on the application of chemistry to pharmacy and mineralogy. Similarly, in terms of science in early nineteenth-century Spain, *La pasión científica de un liberal romántico* is not historiographically up to date. This makes the whole account less interesting for an audience of historians of science than it could be. The book

is often overly factual, while lacking a more historiographical focus. Given that Vitar had the privilege of using such a rich collection of primary sources (student notes, private and institutional correspondence, travel journals, printed sources, etc.), which are preserved in the Gómez Pardo Foundation, we might have expected a more focused reconstruction of Pardo's scientific travels (unfortunately, many details of his trip to Germany are still unknown), networks, and mechanisms for appropriating scientific knowledge.

Nonetheless, Vitar has written an interesting book on the life and works of one of the founding fathers of the School of Mining Engineering of Madrid, a good representative of the early nineteenth-century generation of Spanish scientists. Because the "big picture" of the history of science in Spain is still poorly developed for that period, Vitar's work is a useful case study that tells us a lot about the circulation of knowledge and cosmopolitanism. It encourages us to reconsider the standard account that too often describes Spain in the early decades of the nineteenth century as terribly hostile to the practice of modern science.

AGUSTÍ NIETO-GALAN

Daniela Wuensch. *Der Erfinder der 5. Dimension: Theodor Kaluza, Leben und Werk.* 715 pp., bibl., index. Göttingen: Termessos, 2007. €59.50 (cloth).

Theodor Kaluza (1885–1954) studied in Königsberg, taught mathematics in Kiel and Göttingen, published fifteen papers, and is remembered for just one. Entitled "Zum Unitätsproblem der Physik," it was submitted in 1921 to the Prussian Academy of Sciences by Albert Einstein, who had already taken note of Kaluza's work on this topic two years earlier. Einstein was attracted to Kaluza's five-dimensional formalism for unifying gravity and electromagnetism, the only two fundamental forces then known. In 1926 the Swedish physicist Oskar Klein succeeded in generalizing Kaluza's results, which thereafter became known as Kaluza-Klein theory. All this is well known, as is Einstein's on-again, off-again fascination with this five-dimensional approach to unified field theory (see Abraham Pais, *"Subtle Is the Lord . . ."* [Oxford, 1982], pp. 329–334).

Like many mathematicians, Kaluza dabbled in relativity theory during the period 1910–1925. His other main interests, analysis and set theory, receive only scant attention in the present book, which focuses on his contributions to theoretical physics. Indeed, Daniela Wuensch would have us believe—though without a scintilla of hard evidence—that Kaluza was at heart a theoretical physicist. Perhaps he should have tried physics, for his career as a research mathematician could hardly be called stellar. Nevertheless, despite his meager output, totaling less than two hundred printed pages, Kaluza did enjoy one notable success: quite astoundingly, he was chosen in 1935 to succeed Richard Courant, the dynamic former director of the Göttingen mathematics institute during the Weimar era. Those familiar with the dismantling of Courant's institute and Göttingen's precipitous fall thereafter will no doubt be startled to read what Wuensch has to say about the noble deeds that took place there during the Nazi period. Regarding Kaluza, suffice it to say that she goes out of her way to portray him as a "good German," while ignoring completely the question of whether the same could be said of Courant (who was, of course, Jewish).

Wuensch describes *Der Erfinder der 5. Dimension* as an attempt to strike a balance between scientific and popular biography. One cannot get very far into it before realizing that, in her eyes, Kaluza was a man who combined "universal genius" with sterling character; he simply could never do wrong. Still, a conventional biography would hardly have done him justice, given his rather colorless and passive personality. Something different was needed, and so Wuensch came up with a novel approach, mixing lowbrow Koyréan history of ideas with a cozy, sentimental story about the life of a distinguished German professor. Biographers often identify with their subjects, but here one senses a deeper empathy that tells us far more about the author than about her subject. In fact, Kaluza remains throughout merely a canvas for the author's own thoughts and feelings. Only rarely does she bring him to life by citing his own words, preferring instead to give us her own intimate portrait, supplemented by rambling excursions through vast (and largely familiar) tracts of historical thought on space, time, and dimensionality from Plato through Kant and on to Edward Witten.

Presumably this erudition is meant to bolster the book's central claim, announced on its back cover: that in the United States Kaluza's name stands alongside those of Einstein, Bohr, and Heisenberg! It seems that some smart Americans at the University of Miami figured out that the grand quest to unify all physics by means of high-dimensional geometric models began with Kaluza's paper from 1921. So why should Germans remain in the dark? This, according to her