

the Adda River views that Leonardo drew sometime around 1511–13, when he was planning a system of dams and sluices to make the river navigable. In these views of Adda's shorelines, Leonardo understood "the river as an agent gradually shaping the countryside," expressing "an engineer's critical assessment of environmental impact" (165).

The final chapter focuses on another set of drawings, little appreciated because they are hard to make out, rendered in red chalk against a red prepared ground. Perhaps surprisingly, these depictions of mountains, rivers, quarries, and marshlands are accompanied by notes that deal with evanescent phenomena, such as the transparency and murkiness of water and special lighting conditions. These notes supplement what is drawn, encompassing observations that cannot be readily shown in the chosen medium, a theme thereafter discussed in relation to Leonardo's approach to other obscure or invisible things, like smoke and sound.

This is a subtle book that demands the reader's close attention. Like the currents of a rippling tide, it carries along fine sediments, laying them down slowly, building up a fuller image of Leonardo's engagement with nature and environmental change. The author is deft in what she observes and elegant in her presentation. A rich reframing of the artist's work rather than a revisionist interpretation, the result is a compelling portrait of Leonardo's complex mind, perhaps one of the finest. As such, it brings us closer to Leonardo and his world, telling of the ways in which both practical and lofty considerations touched him, and how the environment registered in much of his thinking. Having closed the book, the reader is left to ponder the ramifications. This reader wonders about the outsize role that water plays implicitly or explicitly in the artist's sacred works, for example, his images of the solitary Saint John the Baptist. With Leonardo, there is always more to find.

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## Note

1. See David Rosand, "The Portrait, Courtier, and Death," in *Castiglione: The Ideal and the Real in Renaissance Culture*, ed. Robert W. Hanning and David Rosand (New Haven, Conn.: Yale University Press, 1983), 91–129.

## Peter H. Christensen **Precious Metal: German Steel, Modernity, and Ecology**

University Park: Pennsylvania State University Press, 2022, 236 pp., 83 b/w illus. \$99.95 (cloth), ISBN 9780271092317

The cover image features a tall, dark, and sturdy form. Its many bolts secure seams together, leaving no doubt that the material in focus is metal. The expansive structure is a bridge in the Ruhr Valley, captured by photographer Albert Renger-Patzsch in 1928. It encapsulates the unwavering zeal that geologists, industrialists, and architects had for the potential of iron and steel, and the modern worlds they promised.

Peter H. Christensen documents the iron and steel industries at different scales in *Precious Metal: German Steel, Modernity, and Ecology*. In doing so, he contributes to a growing body of scholarship focused on the histories of specific materials and commodities, produced by a group that includes Sidney W. Mintz (sugar), Sven Beckert (cotton), and Adrian Forty (concrete), among many others. Christensen's work connects the field of architectural history to a broader context encompassing ecology, politics, business, and labor history. The result is a narrative that is richly layered and complex. Instead of presenting a comprehensive history of a single national industry or business, the author challenges readers to consider the multifaceted dimensions of construction materials. What makes metal precious? Where does it come from and who manufactures it? How can a better understanding of metal's origins help us to rethink architectural production? By focusing on architecture and metal, Christensen answers these questions while skillfully exploring contemporary themes within the humanities, including the Anthropocene, new materialism, ecology, capitalism, colonialism, and empire.

The book is organized around the life cycle of iron, starting with its origins deep within the earth, followed by the processes of ore extraction and smelting, the popularization of the material through exhibitions and publications, the use of steel in architecture and infrastructure construction, and finally its eventual return to the earth through the scrapyards. At each stage of iron and steel's development, Christensen guides readers through

the intricate web of political actors, workers, and cultural objects that shaped or reflected the historical trajectory of the industry.

Whereas Germany, the iron powerhouse, occupies a prominent place in the narrative, the author artfully interweaves other national contexts, including those of the United States, the United Kingdom, France, and the Ottoman Empire. This approach helps us see how the extraction and dissemination of natural resources do not conform to political borders. Christensen's malleable approach to metal is also evident in his use of visual materials. He does not limit his analysis to architecture but instead embraces diverse aspects of the visual culture of iron and steel. He expertly discusses how the development of documentation techniques, ranging from geological maps and cross-sectional representations of mines to decorative plates, reflects the shifts that have taken place in political, artistic, and scientific thinking.

The book's most obvious contribution lies in its examination of steel within the context of the architectural profession, spanning from educational training to practical application. Reviewing the instructional materials of the École des Beaux-Arts, Christensen finds that by the 1920s, a significant 10 percent of architectural education focused on metal fabrication. Graduates of this system returned to their respective homelands as advocates for steel's transformative potential. Publications, material culture, and expositions like the world's fairs of 1851 in London and 1893 in Chicago were likewise important platforms for showcasing the capabilities of this medium of modernity. From I beams to railroad infrastructure, metal was instrumental in shaping not merely visual or aesthetic notions of modernity but also spatial ones. Christensen extends this argument to the manufacturing process itself, highlighting how the assembly-line approach to producing and popularizing metal fostered the integration of systems design within architectural practice.

In addition to the architectural narrative, *Precious Metal* unveils a much broader story about national politics in which steel assumes a central role. The discovery and extraction of iron, wood, and coal not only yielded economic gains but also symbolized cultural progress, national sovereignty, and even supremacy. Christensen

shows that Germany's transition from harvesting wood to mining coal and then to smelting iron was closely tied to the nation's perception of forests as emblematic of its cultural and racial superiority.

Beyond national borders, metal was significant for imperial expansion. Most notably, iron facilitated the construction of railroads, thus increasing access to other natural resources—a history Christensen explores in his first book on German-engineered infrastructure in the Ottoman Empire.<sup>1</sup> But in the context of architecture, steel allowed imperial powers to advance on foreign territories and occupy them more quickly and efficiently. Christensen highlights how the British expanded their colonial reach by developing portable steel cottages that employed metal panels to expedite assembly.

In the context of the Ottoman Empire, steel provided an opportunity to both experiment with and, in some cases, resist Western design influences. Christensen draws attention to Constantin P. Pappa's Arif Paşa Apartments (1902) in Istanbul as a notable example. The project incorporated the I beam, a hallmark of German and American engineering, while also integrating traditional Ottoman architectural elements, such as the wood-clad bay window. Furthermore, the central government supported architects' adoption of steel because of its potential to address long-standing urban challenges, including issues related to overcrowding and the threat of fires, especially those resulting from arson. However, Christensen emphasizes that iron's most significant contribution in this context was symbolic in nature. It allowed the Ottoman Empire to present itself as strong, scalable, and durable.

One of the most innovative aspects of the book is Christensen's engagement with ecological thought and history. By prompting architectural historians to contemplate humankind's relationship with the land and the labor required to transform natural resources into construction materials, Christensen broadens the scope of what is considered architecture and who participates in its production. Drawing from Marxist critiques of capitalism's exploitation of land and people, the author situates architecture within a broader political ecology. He argues compellingly that both climate change and colonialism are characterized by acts of dispossession: climate change

involves the dispossession of territory, while colonialism entails the dispossession of sovereignty.

Also notable is Christensen's attentiveness to the social and environmental consequences of mining. He sees the underground mine, for example, as an architectural space in its own right, the creation of which threatened built environments aboveground: "Mine subsidence ruined buildings by slowly tearing at them or, on rare occasions, swallowing them entirely into the ground" (19). Central to this narrative are the workers, encompassing not just men but also women and children, who toiled under deplorable conditions and often lost their lives to make this modern material. By extending his gaze beyond cities and buildings, Christensen uncovers a fascinating set of landscapes involved in the production of architecture: mountainscapes, rural mining towns, scrapyards, and distant colonies.

Christensen concludes his book by interpreting the cover photograph as follows: "Steel in all its exactitude is depicted as an abstraction of modern society" (181). This image, devoid of workers, natural landscapes, or built environments, places steel at the forefront as the central protagonist. While Christensen does not explicitly align himself with new materialist thinkers like Bruno Latour, it is worth considering what a reading informed by these perspectives might unveil about the relationship between steel and architecture. For example, as industries and businesses close their doors as a result of economic and cultural shifts, how does the material itself persist and continue to shape future generations, industries, and landscapes? More broadly, how do historical industries like iron and steel determine what types of environmental futures are possible for a given culture, nation, and landscape? The long life cycles of materials, from their origins to their ghostly afterlives, further emphasize why delving into material histories can complicate our thinking about built environments and the high stakes of their production.

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## Note

1. Peter H. Christensen, *Germany and the Ottoman Railways: Art, Empire, and Infrastructure* (New Haven, Conn.: Yale University Press, 2017).

Stuart Cohen

## **Frank L. Wright and the Architects of Steinway Hall: A Study in Collaboration**

Novato, Calif.: ORO Editions, 2021, 316 pp., 250 illus. \$35 (paper), ISBN 9781951541507

Lisa D. Schrenk

## **The Oak Park Studio of Frank Lloyd Wright**

Chicago: University of Chicago Press, 2021, 326 pp., 1 table, 179 b/w illus. \$35 (cloth), ISBN 9780226318943

Only lately has the narrative of Frank Lloyd Wright as a fully formed, naturally inspired, singular genius been dislodged, slightly, from its pedestal in the history of American architecture. That such a heroic view of the man has persisted is due in part to Wright's effectiveness at creating his own narrative so definitively that it has become difficult to imagine alternatives. Two new books, *Frank L. Wright and the Architects of Steinway Hall*, by Stuart Cohen, and *The Oak Park Studio of Frank Lloyd Wright*, by Lisa D. Schrenk, challenge the outsize myths surrounding Wright by situating the architect within the specificity of his environment, demonstrating that he was, not surprisingly, a product of his interactions with people, space, and procedures.

Cohen's history begins and ends first, chronologically: a study of Wright's brief and sporadic time in the loft of Steinway Hall in the decade between 1897 and 1907. The top floor of the building, one of Dwight Perkins's first projects after he left Daniel Burnham's office, was occupied by young architects, many of whom were part of the group later remembered as "the Eighteen." Cohen, a practicing architect, recognizes the opportunities that a loft filled with young architects attempting to establish their own practices might have presented; his study, which is loosely informed by sociologist Michael P. Farrell's work on collaborative groups, focuses on "the theft, collaboration, or intellectual cross-fertilization" (10) that happened on that upper floor of Steinway Hall. With an architect's eye for formal analysis, Cohen traces the shared architectural ideas that appeared in the work of Perkins, Wright, Myron H. Hunt, and Robert C. Spencer.

The book is divided into nine chapters of varying lengths, and it begins with