

The Most Recent Orogeny: Verticality and Why Mountains Matter

BY MICHAEL S. REIDY*

MARTIN F. PRICE. *Mountains: A Very Short Introduction*. Oxford: Oxford University Press, 2015. xviii +134 pp., illus., index. ISBN 978-0199695881. \$11.95 (paperback).

VERONICA DELLA DORA. *Mountain: Nature and Culture*. London: Reaktion Books, 2016. 264 pp., illus., index. ISBN 978-1780236476. \$24.95 (paperback).

BERNARD DEBARBIEUX and GILLES RUDAZ. *The Mountain: A Political History from the Enlightenment to the Present*. Translated by Jane Marie Todd. Foreword by Martin F. Price. Chicago and London: University of Chicago Press, 2015. ix +354 pp., illus. index. ISBN: 978-0226031118. \$50.00 (hardcover).

In the mid-nineteenth century, two Swiss geologists, Amanz Gressly and Jules Thurmann, coined the term “orogenesis” to describe the process of mountain creation. Since then, geologists have identified numerous periods of mountain formation, including the relatively recent Alpine orogeny, which produced the Alps, the Hindu Kush-Himalaya, and the Rocky Mountains, all of which are still growing. The three books reviewed here suggest we are now entering yet another period of orogeny, though this one is social, cultural, and political. Mountains have a geological history, created through crustal dynamics and other geological forces. But they also have a human history, created through our ideas and imagination. Mountains are as socially constructed as they are geologically formed.

This latest period of mountain formation is taking place in many different fields, including history, indicated by the recent spate of scholarship over the

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past decade focused on mountains and mountaineering.¹ Yet the spatial turn in history has been primarily limited to the horizontal: to the territorial vision of nation-states, the oceans they must cross, or the landmasses they attempt to conquer. Historians of science, in particular, are better than most in analyzing the many ways in which humans create horizontal space: through lines of latitude and longitude, timetables and telegraph cables, and trigonometric surveys and railroads. The recent work in geography represented by these three books—each of which features the word “Mountain” as the title—can help historians turn this horizontal bias on its side. A vertical viewpoint can expose trends that are otherwise invisible, revealing a rich analytical framework in which to study human history.

Martin F. Price’s *Mountains: A Very Short Introduction* is one in a series of about 400 such titles published by Oxford, ranging widely from *Memory* and *Michael Faraday* to *Terrorism* and *The Tudors*. It is exactly what the series and the subtitle suggest: a very short introduction. It is also the least historical of the books considered here, focusing primarily on the quantifiable importance of mountains for humans: how and why we rely on them (for mineral and water resources), how we are affecting them (through tourism and climate change), and how they are affecting us (as tourist destinations and as direct evidence for climate change). The opening chapters are highly descriptive, covering the geology and physical geography of mountains, including an interesting discussion of mountains as “The World’s Water Towers” (Chapter 3), which outlines the significant role of mountains as sources of freshwater, the increasing challenges that stewardship of that freshwater will present, and the pivotal role of hydropower for the future.

Political and cultural geography dominate the last half of the text. Chapter Four, “Living in a Vertical World,” begins with the zonation of the flora and fauna in the mountains, the tendency—first identified by naturalists in the eighteenth century and popularized by Alexander von Humboldt in the early

1. Beginning, for instance, with the special issue of *Science in Context* 22 (2009), and followed by Ann C. Colley, *Victorians in the Mountains: Sinking the Sublime* (Farnham, UK: Ashgate, 2010); Joseph E. Taylor III, *Pilgrims of the Vertical: Yosemite Rock Climbers and Nature at Risk* (Cambridge, MA: Harvard University Press, 2010); Peter H. Hansen, *The Summits of Modern Man: Mountaineering after the Enlightenment* (Cambridge, MA: Harvard University Press, 2013); Maurice Isserman, *Continental Divide: A History of American Mountaineering* (New York: W.W. Norton, 2016); and Tait Keller, *Apostles of the Alps: Mountaineering and Nation Building in Germany and Austria, 1860–1939* (Chapel Hill: University of North Carolina Press, 2016).

nineteenth century—for organisms to thrive in specific altitudes. “This zonation,” Price argues, “is one of the main characteristics that make mountains different from other parts of our planet” (44). We learn how humans have transformed that zonation, changing the tree line, for instance, up to 800 meters in the Bolivian Andes, and through our current reforestation efforts underway throughout the globe, including an increase of sixty percent in the acreage of forests in Switzerland since the 1860s. Price also analyzes how much political attention mountains have gained in the past four decades, from failing to be even mentioned in the first global meeting on the environment in Stockholm in 1972 to having a whole year named in their honor by the United Nations General Assembly in 2002, accompanied by the slogan “We Are All Mountain People.”

The last chapter, “Climate Change in the Mountains,” is representative of the approach of the text. Price explains how the “clearest direct evidence” (100) of climate change has come from the study of disappearing glaciers, from the upward movement of plants, and from continuous measurements of carbon dioxide levels taken on the summit of Mauna Loa in Hawaii (though no mention is made of the ongoing protests against scientific observatories being placed on the top of this and other sacred summits in Hawaii). Mountains also tell a tale through their rising temperatures, as they are warming at double (Alps) and even triple (Rocky Mountains) the average global rate. Thus, Price concludes, the most remote environments on earth are both where the clearest evidence of climate change is being tallied and where the most devastating effects are being felt. The world is indeed an intricate and connected web, with mountains at the center of our understanding.

Whereas Price highlights the current state of mountains, Veronica della Dora focuses on the cultural and historical significance of mountains. Her *Mountain: Nature and Culture* is part of Reaktion Books’ Earth Series, a series of twenty-one titles focusing on the cultural history of natural phenomena. It is a beautiful book, exquisitely and lavishly illustrated with color photographs, paintings, and maps. Like her previous books, such as *Imagining Mount Athos: Visions of a Holy Place from Homer to WWII* (2011), this one relies heavily on religious and spiritual sources, canonical texts, scientific treatises, and artistic masterpieces. She describes how different cultures throughout history have interacted with, shaped, and ultimately created mountains, and in turn, how mountains then helped to shape each culture’s ideas about wilderness and the sacred, life and death, the knowable and the infinite. She focuses on these tensions and the paradoxes that mountains produced in the past and will continue to fashion into the future.

As a starting point, della Dora shows how most cultures viewed mountains as both holy sites and diabolic environments. In the Western tradition, mountains were liminal spaces between the heavenly and earthly worlds. Moses received the Ten Commandments on Mount Sinai; St. Francis of Assisi fasted for forty days on Mount Verna, where he received the stigmata; St. Jerome thought the Garden of Eden was on an inaccessible peak. But della Dora also shows how mountains were significant in other religious and philosophical traditions as well. Muhammad received his first revelation from Allah on Jabal an-Nour (“Mountain of Light”) in Saudi Arabia’s Hejaz region. In the Taoist tradition, yin-yang was inspired by the shaded and sunlit sides of mountain peaks.

Although transcendence has often been associated with immersion in extreme environments, especially the solitude found on lofty peaks, these same environments also produced fear, terror, and often tragedy. Mountains served as the perfect environment in which to experience the sublime, a more fearful type of transcendence. Their heights have historically been important for surveys, their landscapes have served as borders, and their summits have been sought out as imperial trophies, all suggestive of the long history of conflict in mountain regions. There is perhaps no better modern example than the Siachen Glacier in the Kashmir region between India and Pakistan, where troops are permanently stationed, fighting the highest-altitude battle in history.

The real strength of della Dora’s approach comes as she analyzes how mountains have helped produce significant revolutions in the way we experience the world—in our way of seeing, our notions of space, and our understanding of time. The eighteenth-century French naturalist Horace-Bénédict de Saussure is important as an early geologist and mountaineer, but in della Dora’s reading, he is equally significant for how his published accounts “dramatically contributed to shaping a new way of seeing” (125). His scientific ordering of the natural world, part of the Enlightenment project, helped popularize the beauties of the European Alps, culminating in the new visual technology of panoramas. Albert Smith’s extremely popular Piccadilly show in the 1850s enabled the London middle classes to climb Mont Blanc, while visitors to the actual Mont Blanc would gaze at mountaineers through telescopes. As della Dora argues, “Visual technologies turned mountains into commodities for the consumption of the European urban bourgeoisie” (133).

Just as mountains helped transform the way we experienced space, they also shaped our perceptions of time. With the creation of geology as a discipline in the late eighteenth and early nineteenth centuries, the timeless and seemingly

immutable structure of mountains gave way to geological formations that had a history—an incredibly long history. From James Hutton’s wanderings through the Cairngorms to Charles Lyell’s meticulous study of Mount Etna, the mountains helped scientists uncover the earth’s “deep time,” causing us to view all landscapes, including mountains, with entirely different eyes.

Della Dora ends her text by analyzing the creation of our view, still widely held today, of mountains as works of art. Seen especially in the works of John Ruskin—“[mountains] are the great cathedrals of the earth” (197) and “the beginning and the end of every natural scenery” (194)—this view was foundational for early wilderness advocates, such as George Perkins Marsh and John Muir, who developed their ideas of conservation and restoration largely in the mountains, setting the stage for the creation of the world’s first national parks. Mountains had transitioned from objects to commodities.

This type of approach to the social construction of mountains comes out most forcibly in the account by Bernard Debarbieux and Gilles Rudaz of the creation of mountains as political objects. Like the other books discussed here, their *The Mountain: A Political History from the Enlightenment to the Present* attempts to take a global view, comparing and contrasting Western and non-Western constructions of mountains through time. French scientists and authors, in particular, take pride of place. While della Dora focused heavily on some of the main characters in Western science—from Hutton and Lyell to Marsh and Muir—Debarbieux and Rudaz introduce figures like Ramond de Carbonniere, one of the first scientists to travel to the Pyrenees, and Alexandre Surell, whose study of flooding in the Alps helped form the foundation of our understanding of the consequences of deforestation and the centralized state-sponsored reforestation projects that followed.

The text is sophisticated and wide-ranging, covering large swaths of time, different regions of the globe, and diverse and often complex political transformations. Debarbieux and Rudaz do not approach mountains as physical objects in and of themselves; rather, mountains are “a geographical category of collective action and public policies” (8) in response to specific problems formulated differently by different cultures through time. Thus, they introduce the concept of the mountain as an analytical category of analysis.

The book is divided into two sections. The first section focuses on how the idea of a mountain was used within the context of nation-states. The second moves beyond the nation-state, following the varied political uses of mountains in the colonial era, the post-colonial era, and in the modern era of globalization. The initial transformation of mountains into objects of study

during the Enlightenment set the stage for their use by modern nation-states. They remained resources for the nation-state, but were never purely economic; rather, they contributed to the overarching idea of what the “nation” was or could be. Mountains functioned, for instance, simultaneously as convenient borders between states, following the influential idea that political boundaries should map onto natural boundaries (as in the case of Argentina and Peru), or as unifying entities, as the backbone of a nation (as in Romania). This dual use of mountains also determined how populations who lived on mountains were viewed—as either embodying the spirit of a people (as in Switzerland), or as a marginalized group in need of conquering (as in Serbia). How nation-states invoked the mountain and the mountaineer has always been a political choice.

As mountains helped to define the nation, they also served as the perfect geographical space for state-sponsored development strategies and policies, most of them interventionist. Debarbieux and Rudaz focus heavily on forest policies—an extreme “politics of nature”—from their initial establishment in Germany and France in the nineteenth century to their use as a model adopted by other nations, culminating in the national forests and parks of the United States (most of which are located in mountainous regions). The specialist and the scientist became the authorities on mountain management, a place for large-scale reforestation projects, and eventually for tourism and protection.

While the first section of Debarbieux and Rudaz’s book demonstrates how mountains were conceptualized and used by nation-states, the second focuses on the processes of colonialism, post-colonialism, and globalization. The main colonial powers were the main nation-states of the eighteenth and nineteenth centuries, and their conception of mountains motivated their approaches to colonialism. The case of the Himalayas provides a good example. The British chose to use mountains as barriers, transforming mountain regions into buffer zones. They granted autonomy to Nepal, Sikkim, and Bhutan in order to check the influence of both the Chinese and the Russians. Russia, on the other hand, intent on gaining control of all Eurasia, aimed to gain control of the highlands, leading to direct intervention, for instance, in Afghanistan.

In many cases, scientific models of production, especially in the field of forestry, helped solidify control while undermining the authority of local populations. France, for instance, fostered the differentiation of populations of North Africa during its period of colonial rule, linking the Berber population to the mountains in an attempt to undermine cohesion. A similar colonial strategy was followed by Russia in the Caucasus, especially with the Chechens. During the period of post-colonial rule, the new governments often continued

the politicization of the mountains begun by the colonial powers; at other times, they adopted a different strategy. Morocco and Algeria, for instance, have both denied the integrity of their Berber population, suggesting their unique status was an attempt by colonial powers to divide their society.

In all of these cases, mountains acquired the status of “global political objects,” and in the last several chapters Debarbieux and Rudaz outline the process and consequences of this globalization. From the early 1990s onward, stakeholders from a wide coalition of interests—including governments, non-governmental organizations, and conservation groups—fashioned the mountains as perfect sites to solve global issues, from establishing sustainable environmental policies to reducing poverty. As we move into the twenty-first century, a focus on ecosystems, biospheres, and ecoregions has in many instances supplanted the idea of nation-states in mountainous zones. Debarbieux and Rudaz end with how the rhetoric of a “unifying mountain” has led to an entirely different type of political conception of the mountain.

At each stage of the politicization of the mountain, from its utility in terms of resources in the eighteenth century, to the scientific and colonial transformations in the nineteenth century, to its post-colonial and global qualities in the twentieth century, Debarbieux and Rudaz demonstrate how the idea of mountains was “naturalized,” masking the social and political motivations that ultimately created these conceptions in the first place. And we are living with the results. Most national parks throughout the world are located in mountainous regions, places of conservation and sustainable development that have successfully erased local populations and their histories. Political skirmishes in Chechnya and Ethiopia, along with environmental devastation in Nepal and Peru all attest to the ongoing legacy of these earlier social and political conceptions of the mountains.

There is something special about the actual physical setting where science takes place. One of the most significant advances in the history of science in the last two decades has been the idea that where science is produced matters. It was hard work in the seventeenth century to transform laboratories from social spaces to epistemic places; the field sciences in the eighteenth and nineteenth centuries gained credibility by carefully bounding their practitioners, both physically and socially. In short, what type of knowledge is produced is fundamentally dependent on the actual physical setting in which its production takes place, and this is always a calculated and contested process. The botanical garden, the museum, anatomy theaters, public lecture rooms, world’s fairs: all these spaces

helped define authority, relied on distinctions of social class, and were infused with political and economic significance. The question these three books reviewed here pose for historians of science is whether mountains are qualitatively similar to other “spaces” of science—like oceans or laboratories—or whether there is something intrinsically different about their “verticality.” Debarbieux and Rudaz state the problem clearly: “What questions can the category of mountain contribute to answering?” (7). That is, what does a focus on the mountain offer?

The answer, I think, like the question, relates to physical geography. If we could shrink the earth down to the size of a fist, it would be smoother than a manufactured billiard ball. And the place on that billiard ball where we can actually live would not exceed the thin veneer painted on its surface. We live in an extremely thin layer of the globe, trapped vertically in a very limited zone. We can have nearly unlimited access to its circumference, but only a few miles into its depth and atmosphere. This has profound implications for human life, but it also could have equally significant consequences for our histories, especially our histories of science. It should affect the way we think about our narratives.

Taken together, all three texts deal specifically with why mountains matter in today’s world. But they also offer an analytical approach that can be transferred beyond the mountain. Their focus on mountains is part of a broader attempt to give value to the vertical. They are examples of recent work by scholars, made up primarily of cultural and political geographers, focused on what Stephen Graham has called “vertical geopolitics.”² These scholars are interested in state power and control, in how territories are bordered, divided, and demarcated, and in the significant role played by architects and urban planners. Rarely have these things been studied through height and depth. A vertical analysis, however, focuses specifically on subterranean spaces below and surveillance and warfare spaces above. It acknowledges space as three-dimensional, with oceans and rivers, tunnels and caves, sanitation systems and mines, hills and mountains, skylines and airways.

As Bruce Braun has argued, nineteenth-century explorers had to learn to see the world through its layered spaces below its surface.³ It took a concerted

2. Stephen Graham, “Vertical Geopolitics: Baghdad and After,” *Antipode* 36 (2004): 12–23. See also Stuart Elden, “Secure the Volume: Vertical Geopolitics and the Depth of Power,” *Political Geography* 34 (2013): 35–51; and Eyal Weizman, *The Politics of Verticality* (2002), http://www.opendemocracy.net/ecology-politics/verticality/article_801.jsp.

3. Bruce Braun, “Producing Vertical Territory: Geology and Governmentality in Late Victorian Canada,” *Ecumene* 7 (2000): 7–46.

effort to view the world through its depths. There is a certain way of “seeing” and “ordering” nature that is constructed by the observer, making up a significant part of the process of creating nature. One does not just see. One has to learn to see in a certain way. Braun called this the process of “geologizing” space, as he was particularly interested in mining. As we are interested in what mountains can offer, I will combine the geologizing gaze with the mountain and simply use the term “verticality.”

If, in the past, viewing the world through a vertical framework required a cultural shift, today, for us historians, it requires an analytical shift. These three books on the significance of mountains teach us to take seriously the vertical as an analytical framework to organize our histories. For the world is layered with scientific, political, and authoritative significance. In many cases, it is literally layered; in other cases, the process remains symbolic and hidden, though no less strategic or powerful. Such a view can be radically de-centering. It confuses our usual break-up of regions, because it decentralizes not just nation-states, but also the actual regions of the land itself. The Alps or the High Atlas, for instance, turn out to be highly constructed concepts. A view from the vertical is also a way to get beyond the questions of centers and peripheries; it creates a liminal zone where different cultures, ideas, and technologies meet. It can change our understanding of what to look for. Once we start thinking about the creation of science in this way, it exposes all the difficulties—access, control, exclusion—that come with science practiced within a three-dimensional space. These regions are viewed differently by different cultures at different times. There is not one space at work, but several, all carefully constructed and policed, and it is by looking at the tensions associated with these different and often competing spaces that we can gain a more nuanced view of how the environment in general functions in shaping world history.

A vertical framework can thus force us to reconceptualize what we mean by field science. Science, after all, was not practiced in the “field,” a stubbornly generic term. Rather, science was done on the land, under its crust, beneath the ocean, and on the sides of mountains. As Göran Therborn has noted, “spatiality has the two-dimensional character of flatness, of surface. It carries none of the burdens of substance, depth, conflict or contradiction, in other words, of dialectics. That is why ‘globalization’ lent itself so cheaply to both critique and adulation. Spatiality is devoid of substantial content.”⁴ Verticality can give the

4. Göran Therborn, *The World: A Beginner's Guide* (Cambridge: Polity Press, 2011), 51–52; Stuart Elden, “Bodies, Books, Beneath: A Reply to Adey and Bridge,” *Political Geography* 34 (2013): 59.

spatial turn some vitality, some graininess, some needed texture. The absence of such texture has been a major critique of the spatial turn.

This is what it means to think *with* verticality, with mountains and mines and ocean depths. Thinking not just about these spaces, but *through* them. Rather than places to visit or look at, they become places to reason with. Rather than simply stimulating one's feelings, they actually guide the imagination—both the historical actors' in which we study and our own as we write our histories. We should take this verticality into account when we describe how scientists viewed the world, how they organized spaces: mountain spaces and atmospheric spaces, mining spaces and submarine spaces, and of course, spaces of struggle, exclusion, and authority.

Many such mountains are isolated and not part of any discernible chain, as, for instance, Mount Katahdin in Maine in the northeastern United States. Some entire chains (e.g., the Appalachians in North America or the Urals in Russia), which were formed hundreds of millions of years ago, remain in spite of a long history of erosion. Most residual chains and individual mountains are characterized by low elevations; however, both gentle and precipitous relief can exist, depending on the degree of recent erosion. Mountain. Quick Facts.