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Jeremy Vetter. *Field Life: Science in the American West during the Railroad Era.* INTERSECTIONS: Histories of Environment, Science, and Technology in the Anthropocene Series. Pittsburgh: University of Pittsburgh Press, 2016. 512 pp. $49.95, cloth, ISBN 978-0-8229-4453-9.

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In 1979, the anthropologist Bruno Latour and the sociologist Steven Woolgar published an explosive but highly influential book called *Laboratory Life*. Its ambition was to lay bare how ordinary and run-of-the-mill human behaviors can produce durable scientific facts in an extremely circumscribed architectural space: the lab. In his fascinating new book, Jeremy Vetter seeks to do something similar for another, much less circumscribed space: the field. Vetter wants to know what kinds of material practices, technological systems, and social processes were used to produce knowledge about a particular region—the American West—during the late nineteenth and early twentieth centuries, a period that he calls "the Railroad era." To answer this question, Vetter brings the history of science into dialogue with the history of technology, labor history, and environmental history, producing a densely researched and richly textured account of "science in action" (to borrow a Latourian phrase) on the Great Plains and in the Rocky Mountains.

What makes Vetter's account particularly valuable is his insistence that whereas the laboratory derived considerable epistemic authority from its claim to placeless universality, the field always remained rooted in a specific geographical context. Field science was less about the discovery of timeless and universal laws of nature than it was about coming to know a particular place in depth and in detail. For that reason, life in the field was deeply and intimately tied to place and space. It mattered a great deal, both practically and epistemically, whether one was surveying a portion of the Great Plains in hopes of revealing its agricultural potential or quarrying for dinosaur bones in the Uinta Mountains of northeastern Utah. Both regions had distinct weather patterns, soil types, and geological features, and both kinds of fieldwork involved their own social networks, daily routines, and transportation infrastructures. These differences, among others, left an indelible mark on what was known about both regions.

But as Vetter rightly points out, the relationship between field science and regional geography went in the other direction as well. Not only was knowledge about nature a product of the particular place it was made, but that knowledge also went on to shape that region's geography in quite straightforwardly material ways. The dispossession of Native American tribes by white settlers, the spread of such extractive economies as mining and ranching, and the construction of a transcontinental railroad: these are just three of the more obvious transformations in which the

field sciences played an indispensable role. Vetter thus insists on treating the field as an "envirotechnical system," a geographic space shaped by the full variety of its many inhabitants. This analytical approach has a great deal to recommend it, insofar as it refuses to impose an absolute distinction between nature and culture, between the built environment and other forms of ecological niche construction. Thus, just as urban centers were home to countless nonhuman inhabitants, so too was the proverbial "Wild West" shaped by technologies ranging from the horse and the ox to the plow and the railroad.

To make this argument stick, Vetter examines four different modes of knowledge production in the American West. After a chapter that examines networks of lay observes, he provides in-depth accounts of surveys, quarries, and field stations. Whereas lay networks centered on amateurs and nonspecialists who willingly submitted material specimens and personal observations for expert examination, surveys, quarries, and field stations were more explicitly hierarchical and bureaucratic spaces of knowledge production that were more thoroughly controlled by people with more formal training in the natural sciences. Topographical surveys, for example, quickly transitioned from fairly superficial incursions into a little-known region to highly structured and organized expeditions that produced countless maps, photographs, and inventories, all in an effort to gain comprehensive oversight (and therefore dominion) over an entire region of (often highly contested) territory. Similarly, quarries were tightly controlled spaces for conducting intensive research into a single event, place, or phenomena (rather than extensive research on a broad region, as in the case of surveys). Quarry research involved digging down into a particularly rich locality (either figuratively or literally) and retrieving large numbers of material specimens, which were subsequently removed to an eastern museum or some other distant but powerful institution. Finally, field stations resembled quarries in that they too involved a long-term research investment in a specific, distinct, and often highly managed space. However, whereas quarries were modeled on mines, field stations combined elements of the farm and the laboratory to produce reliable and valuable knowledge about a particular part of the American West.

Besides the ingenious way it deploys the envirotechnical systems approach to integrate the history of science and environmental history with labor history and the history of technology, what makes Vetter's analysis so compelling is the way that it cuts through the usual divisions that characterize so much late nineteenth-century American history. We already know a great deal about many of the individuals who come up in this story —from Vernon Bailey and John Wesley Powell to Othniel Charles Marsh—and something similar could be said about its institutions, ideas, and regions. By focusing his narrative around distinct forms of practice, however, Vetter succeeds in drawing fresh connections and providing fascinating new insights. But as with any approach, this one has its drawbacks as well. Perhaps chief among them is that his geographical focus makes it difficult to trace change over time. How did the field sciences develop over the five or so decades covered in this book? Vetter's account provides some tantalizing hints at a larger chronology, but these could have been much more fully fleshed out. This is all the more so given that recent work on the tensions that often existed between commercial specimen dealers and learned naturalists suggests that the rise of more intensively managed forms of knowledge production—of which the government survey, the museum-run quarry, and the agricultural field station were all paradigmatic examples—could be seen as an attempt to overcome the problem of trust by replacing a shared culture of civility governed by personal sentiments with a more formal regime of bureaucratic oversight and organizational control.

A second issue worth raising concerns Vetter's welcome adoption of the envirotechnical systems approach itself. While the study he has produced succeeds admirably in avoiding the pitfalls of environmental determinism as well as the artificial imposition of a hard-and-fast line between the natural world and human society, one nonetheless wonders whether ***Field Life*** could have profited from pushing the concept of an envirotechnical system much further still. If the field was assembled out of diverse elements ranging from such human technologies as the railroad to such geological processes as erosion that created the imposing "badlands" of South Dakota, can we not say the same of a physiology laboratory at the University of Chicago, or an exhibition hall in the Field Museum of Natural History, to say nothing of Jens Jensen's Garfield Park Conservancy? That is, if a principle virtue of the envirotechnical systems approach is its insistence on treating humans and nonhumans symmetrically, why restrict ourselves to studying only those interventions that especially shaped rural rather than urban parts of the American West? Of course, the answer is obvious. Latour and Woolgar already published their classic account of ***Laboratory Life*** more than four decades ago. As a result, we know far more about knowledge production in these kinds of spaces than life in the field. Vetter's insistence on following scientists out of doors thus takes an important step toward further correcting that historiographic imbalance. If he has graciously left a few places for the rest of us to explore, that hardly detracts from the significance of his achievement.