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Bob Johnson. *Carbon Nation: Fossil Fuels in the Making of American Culture.* Lawrence: University Press of Kansas, 2014. 264 pp. $39.95, cloth, ISBN 978-0-7006-2004-3.

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In *Carbon Nation*, the historian Bob Johnson provides a novel history of energy use in America that takes media and the human body as its twin sites of analysis. In doing so, Johnson productively employs both social and media theory to uncover a rich cultural history of America's energy use. Recent histories of energy in the late nineteenth and early twentieth centuries have tended to take a resource-centered approach: Timothy Mitchell's *Carbon Democracy* (2011) traces the political transformations made possible by shifting from a predominantly coal-based social system to one of oil; Peter Shulman's more recent *Coal and Empire* (2015) offers an account of the role of coal as both a source of power and commodity to be fought over, in American foreign policy; and Shellen Xiao Wu's *Empires of Coal* (2015) tells the history of the Qing dynasty's appropriation of the Western art of coal-powered industrialization. Most recently, and perhaps most congruently with Johnson's text, Andreas Malm, in *Fossil Capital* (2016), describes how the shift to fossil fuels created a new ecology of labor, more conducive to the growth of capitalism than that of organic and water-powered economies. Like Malm, Johnson focuses on the physiological and social significance of fossil fuel use, but with an emphasis more on how this reception inspired myriad forms of art, film, theater, and literature.

Johnson begins his history in 1876, when a giant Corliss steam engine took center stage at the Centennial International Exhibition in Philadelphia. America's president, Ulysses Grant, and Brazil's second emperor, Dom Pedro, started the engine, an act which, in Johnson's account, heralded a dramatic transformation in American society. So began "the most fundamental material change in human history in the past eight thousand years" (p. xxii). Only a few decades later, fossil fuels would account for as much as 88 percent of the nation's energy use. This shift, Johnson rightly suggests, hurled Americans into "a seemingly infinite new material world where the pleasures, risks, and dependencies of modern bodies could be tracked back to the lifelessness of mineral energies from beneath the world's soils and ocean floors" (p. xvi). Modern Americans paradoxically "became a people of prehistoric carbon" (p. xix), a polity who would go on to channel this abundant power into unprecedented wealth and population growth. What began, in historian Stephen Kern's words, as a "crisis of abundance" came to a head only a century later, in the 1970s, when manifold crises in energy supply occurred, bringing the whole societal energy edifice into question. It is this period, from the early nineteenth century to the 1970s, which Johnson populates with a rich array of evidence of the encultur-

ating effects of the exploitation of different forms of power.

Johnson's book is divided into two main thematic parts, "Divergence" and "Submergence." "Divergence" leads us into the dynamics of America's initial break from the world of somatic power. In this section Johnson describes how the coal mine and stokehole became the dirty and dangerous sites from which a seemingly pristine modernity emerged. These fossil fuel foci created modernity in two ways. First "ecologically," as a "tidal wave of prehistoric carbon calories" flooded into everyday practices. Second, "ontologically," as this flood created a mentality consisting of "a strong cultural aversion to the talk of cultural limits" (p. xix). In this section Johnson richly demonstrates how this flood of carbon affected both bodies and minds in numerous ways. The book's second part, "Submergence," describes America's cultural reception of this new mineralogical input. Here Johnson draws on Michel Foucault's notions of "counter memory" and "genealogy" to depict relations between the material infrastructure of energy use, culture, and psychology. In some ways, in carrying out Foucauldian analysis of the roots of our energy system, Johnson's work is congruent with anthropologist Dominic Boyer's proposal to study "energopolitics," the extrapolation of Foucault's "biopolitics" to the human use of energy, defined as the study of the "power over (and through) energy" rather than, as in Foucault's scheme, over life and population. [1]

Despite the wealth of literature already mentioned, Johnson notes a reluctance among the human sciences to address the subject of energy directly. He suggests that "while the topic of energy organizes entire disciplines and subfields in the natural sciences, those humanistic disciplines that take culture, meaning, and narrative as their main concerns (with the notable exceptions of ecological anthropology and environmental history) have not managed to integrate energy very effectively into the narratives of self and society that they use to frame their understanding of the world" (p. xxii). It is an argument which creates a space for the narrative that follows, but it is based on a slight strawman premise. *Contra* Johnson (p. xxiii), the history of science and technology has, almost since its inception, placed the science of energy at the center of its concerns. Alongside which, historians of economic thought, prompted by Philip Mirowski's landmark text ***More Heat than Light*** (1989), have long debated the role energy physics has played in the development of economic theory. Alongside which, the younger field of ecocriticism, defined as the study of relations between literature and the environment, has also produced a number of important papers on the relation between energy and literary culture, and at least two notable monographs: Barri Gold's ***Thermopoetics*** (2010) and Allen McDuffie's ***Victorian Literature, Energy, and the Ecological Imagination*** (2014). I would argue that energy was never entirely, and is certainly no longer, forgotten by the human sciences. Johnson's book, though not explicitly grounded in the ecocritical school, makes a welcome addition to this growing canon. However, what it does not do, explicitly, is to discuss energy as it is understood in physics or engineering. His focus, like that of most other historians, is on the distribution, use, and consequences of fossil fuels from which energy is derived.

Another criticism is that Johnson describes the effect of the flood of fossil fuel power using the physiological and psychological term "trauma." Whilst this discussion takes place with care, and with due consideration of trauma's various connotations, at the risk of being accused of being Panglossian, this reviewer could imagine a different history book which described the traumas of harsh winters, famine, and manual labor in an organic economy, and the physiological and psychological salve to these trauma that fossil-fuel powered industrialization provided, at least in some

of its later forms, and for its more affluent beneficiaries. British geographer and historian Anthony Wrigley's careful cliometric work on the demographic composition, increased agricultural output, and per capita income of pre- and postindustrial England provides empirical evidence to support this more optimistic counternarrative. That being said, Johnson is right to acknowledge that the flood of hydrocarbons that marked the industrial age clearly had traumatic effects for some members of society, particularly those directly working to extract and use fossil energy, long before contemporary concerns about the variegated impacts of irreversible climate change. As it is, the more pessimistic timbre of Johnson's narrative suits the numerous cultural artifacts he uncovers.

Chapter 1 describes modernity's "ecological preconditions" (p. 4), the rapid and disjunctive use of fossil fuels that occurred between 1850 and 1970; the 120 years over which America's energy use increased 150 times. Within this time frame, Johnson's geographical emphasis is rightly defended because "the United States stands out as the extreme case" (p. 5) in a global history of industrialization and growing energy use. With well-chosen statistics, the author describes how energy contributed to the emergence of "free white Americans" as some of the world's richest people (p. 10). Though some economists or economic historians might balk at the implied causation between energy use and economic growth, the fact that the economy grew at 1.9 percent per annum in real gross national product for a century after 1870 suggests a significant correlation.

Johnson also suggests modernity's shifting ecology had marked effects beyond economic propulsion, from which he draws four major material-sociological conclusions. First, this new ecology constituted a vast input of mechanical labor, of an equivalence of around 1.5 billion horsepower per annum, as estimated in the 1920s (p. 18). Second, potential constraints in an agrarian economy were averted, as the exploitation of fossil fuel meant that, borrowing historian Rolf Sieferle's term, it was as if a vast "subterranean forest" had been discovered (p. 26). Third, this forest could be used to develop plastics and other novel "synthetic" materials, an often overlooked aspect of fossil fuel use. Fourth, carbon energy could be used to underwrite a growing population's demand for fuel, mainly via the development of fertilizers that allowed the environment to exceed its organic nitrogen balance. These four factors, amongst others, marked a "radical new ecology of production" (p. 40). Though this chapter covers fairly familiar ground within environmental history, Johnson's prose, and sometimes intriguing exemplification, including "synthetic bacon" and rare examples of humans eating oil, adds freshness to this material.

By focusing on the somatic and physiological implications of the fossil-fueled human ecology, chapter 3 broaches more novel material. Johnson's aim is to illustrate how "fossil fuels had destabilized on a basic somatic level both American's access to work and the modern body's relationship to its material world" (p. 41). By taking this corporeal perspective, this account of modernity's ontology suggests two general outcomes of unparalleled energy use. First, labor became disembodied as heat engines replaced bodily exertion. Second, fossil fuels became embodied, as they conditioned new forms of labor, leisure, diet, and psychology, and even permeated the body as particulate matter. Energy was a "prosthesis" that both enabled and constrained new forms of life. These physiological implications of energy use, Johnson argues, were socially stratified. The subaltern working class's bodies were subjected to dangerous, damaging, repetitive labor at the coalface of modernity or on its production lines, whereas the predominantly middle- and upper-class beneficiaries of modernism enjoyed liberating, and even erotic energy prostheses such as flight, fast cars, and even the percussive repetition of jazz music. Johnson makes good use of a

diverse range of media to make his point, from the memorable prose of Lewis Mumford, documentary film, literature, law, and social realist murals. Johnson's account really shines where he points out society's often perverse reactions to energy use, such as the "new sentimentality for the muscular economy" that the disembodiment of labor provoked amongst those most detached from physical work (p. 49).

Chapter 3 describes a growing awareness among artists, writers, and playwrights of the gritty underside of American modernity. Coal production tripled in the first two decades of the twentieth century, at the same time miners had become increasingly prone to industrial action. The nation's reliance on the subterranean labor was increasingly breaching into political life above ground. To demonstrate this sense of unease Johnson selects a diverse range of texts and artworks. In 1922, the progressive journalist Robert Bruère, to take one example, described how mining had fueled "old hatreds" with "new intensities," creating a divided world in which those below ground suffered for the dependencies of the wealthy (p. 77). Above ground, the miner's toil was repressed, only finding expression in dark, bleakly modernist artworks, like Harry Sternberg's painting ***Coal Miner and Family*** (1938), depicting a sinewy miner working in a claustrophobic shaft, while his emaciated family waited anxiously above ground. These works suggested a broader "moral indictment of coal" (p. 83). Johnson suggests the "psychic and material traumas" of the industrial age were coming to the surface, both literally and figuratively (p. 88). He considers a work by Eugene O'Neill, his 1921 play ***The Hairy Ape***, the story of a coal stoker onboard a modern transatlantic steamship, in which Yank, the protagonist, acts as the intermediary between the dirty, subaltern industrial worker, and the clean, bourgeois cruise passenger Mildred. Written at the peak of coal power, before the shift to petroleum in the 1950s, the play reflected a deep unease about the suppression of human exploitation at the core of modernity.

Chapter 4 considers the shift wrought by electrification in a highly novel way. Johnson takes two now forgotten plays, Eugene O'Neill's ***The Dynamo*** (1927) and Arthur Arent's ***Power*** (1937), as the basis for a roaming chapter that explores how a shift toward electrical power encouraged some to engage in utopian fantasies of a "clean and tidy modernist sublime" powered by electrical power, in contrast to the dirty, smelly, and centralizing tendencies of coal. Renegade electrical engineer Charles Steinmetz, for example, prophesised a "white revolution" in which the transmission of electrical power would remake the material infrastructure of modernity, allowing a new Arcadian republicanism of dispersed settlements (p. 108). He was not alone; a number of prominent public intellectuals, not least Lewis Mumford, argued that fossil powered industrialization had, in its centralizing tendency, undermined "republican dreams for a middle class nation of independent producers" (p. 109). However, a counternarrative also emerged in the 1920s, in which electricity transmission was cast as a pernicious and monopolistic system of dispersed "Superpower," allowing industrial magnates like Samuel Insull to seize unprecedented financial control over the American economy (p. 116). In response, some, including the conservationist Gifford Pinchot, called for an egalitarian, federally controlled electrical system ("Giant power") which would guarantee low-cost power to all. The latter model found favor in the 1930s, as electrification was touted as a solution to the Great Depression, but industry had persistently lobbied against public ownership. This lobbying, Johnson argued, imposed a legacy in which public debate over the administration of energy in America was left with "a simple and inane choice between the presumably good belief in loosely regulated energy markets and the treasonous beliefs in public power and strong regulations" (p. 123). Though briefly covered in David

Nye's *Electrifying America* (1992) and his *American Technological Sublime* (1994), Johnson's account of this period provides a resonant prehistory to later debates around energy market liberalization in the late 1970s, and more recent debates about the democratizing or even libertarian potential of the Internet.

Chapter 5 documents the still ongoing war of representation that is taking place between those who see the rise of oil as an intensification of the corrosive effects of coal use, and those, normally industry funded, who seek to salve the psychic, physical, and--increasingly--environmental costs of the sudden profusion of oil used from the early 1950s onward. Critics of oil included the author Upton Sinclair, whose novel ***Oil!*** And even George Steven's 1956 ***Giant***, the dramatic film story of a Texan oilman's tribulations once a prodigious oil well was struck. As oil use became more widespread, Johnson suggests, its permeation of every aspect of American life "became a volatile flashpoint for broader public debates over the meaning of power and freedom under the terms of the nation's new petro-culture" (p. 136). Oil seemed to simultaneously promise unparalleled personal freedoms at the same time as it imposed impersonal large-scale, and often international infrastructures and aggressive, often monopolistic business practices. Aside from film, Johnson discusses a "a broader muckraking literature" (p. 141) including journalist Robert Lynd, who penned essays on Montana and Wyoming oil fields that described the bleak and dehumanizing working and living conditions in oil towns. Industry began a counternarrative campaign, supported by organizations like the American Petroleum Institute (API), who funded a "steady stream of industry films, cartoons, educational videos, and myriad other media" (p. 146) that told "a simple parable of progress" (p. 147) stressing oil's liberating potential and cohesion with modern society. Johnson has unearthed forgotten films such as Robert Flaherty's ***Louisiana Story*** (1949), industry funded, presenting a harmonious image of oil's deployment in a lowland bayou, in which oil, carefully managed, could work in harmony with the local economy, environment, and even Cajun culture. Or even the odd cartoon ***Destination Earth*** (1956), again funded by the API, in which a Martian comes to earth only to find a dynamic free market system, powered by untrammelled use of oil. The association between oil and free-market politics was rarely made as crudely! Johnson ends this chapter with the warning that the "cultural clout of private power that sits ever vigilant behind the scenes" producing such counternarratives, persists to the present day (p. 162).

Johnson's concluding chapter begins with the seemingly niche subject of sex and coal. In an act of almost unbelievably misguided pop cultural appropriation, in 2008, General Electric aired an advertisement in which scantily clad models mined coal, sound tracked by "Sixteen Tons"--a song from 1947 by Ernie Ford about the arduous exploitation of Kentucky's coal miners. The effect, as Johnson suggests, was dissonant: "half-naked young men and women grinding their bodies down in a coal mine to a song about working-class suffering" (p. 163). The advertisement was soon pulled, but Johnson uses it to illustrate the contradictory, and often plainly odd, ways in which energy has entered the public imagination. Moving on from this, Johnson offers a number of "meditations" on America's continued fuel use. First, he observes that "energy crises are coming in quick succession now" (p. 164). Fears of scarcity, price rises, and environmental damage have been joined by fears of climate change; at the same time, the pursuit of unconventional hydrocarbons has led industry to take more risks and extract ever more problematic fuels, such as Canadian Athabasca oil sands. Yet, this increasingly desperate dependency is still hidden, both by industry and the short-termism of the political system. Johnson briefly notes that the human costs of energy use persist but in a different way, most obvi-

ously in the Middle East, but also in America, in depressed Virginian strip-mining communities for example. Perhaps most interestingly, Johnson broaches the subject of "utopian alternatives," by which he means biofuels, and other "alternative" energy technologies, toward which he offers some cynicism: "we continue to ooze carbon on the way to the local farmers' market" (p. 173). In place of "little personal objections" Johnson suggests we must soberly examine our current predicament. In this way, Johnson's book represents not only a rich and original cultural history of fossil fuel use, but also a powerful corrective to the idea that a shift to a less incrementally catastrophic energy system can be easily achieved through minor societal modifications. In truth, systemic change will require or result in deep physiological and cultural shifts.

Note

[1]. Dominic Boyer, "Energopolitics and the Anthropology of Energy," *Anthropology News* 52, no. 5 (2011): 5-7; 7.

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