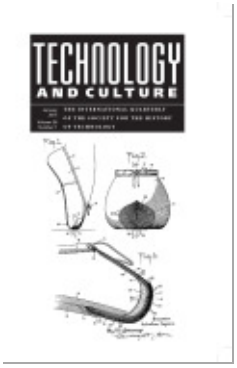
Reviving Animals as Technology: Ann Norton Greene, *Horses at Work* (review)



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Reviving Animals as Technology

Ann Norton Greene, *Horses at Work*

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First appearing in 2008, Ann Norton Greene's *Horses at Work: Harnessing Power in Industrial America* (Cambridge, MA: Harvard University Press, 2008. Pp. xiv+322. $36) has made a major contribution to an ongoing discussion in the SHOT community about animals as technology. The discussion began with Edmund Russell's 2001 email to the Envirotech listserv asking, "Are animals technology?" This intriguing question was taken up in prominent studies, including Philip Scranton and Susan Schrepfer's *Industrializing Organisms* (2004), Clay McShane and Joel Tarr's *The Horse in the City* (2007), and then in Greene's book.[1] These studies have explored animals (especially horses) as both workers and biochemical engines that serve humans, an insight that expands the discussion of biotechnology and biopower at the intersection of environmental and technological histories. Despite what Scranton rightly called the "provocative" implications of this topic and the pathbreaking efforts of these scholars, the topic does not yet enjoy the prominence it deserves in the history of technology.[2]

Greene's *Horses at Work* is a remarkable energy history of draft horses as "prime movers" of the industrializing nineteenth-century United States. She argues that horses were a (if not the) crucial power source behind American industrialization. Growing adoption of mechanical power in the 1800s did not, as is often assumed, entail less animal use. The growing pop-

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1. Read the entire email exchange at www.envirotechweb.org/2001/08/01/are-animals-technology. See also Philip Scranton's preface to Susan Schrepfer and Philip Scranton, eds., *Industrializing Organisms*.

2. Schrepfer and Scranton, eds., *Industrializing Organisms*; Clay McShane and Joel Tarr, *The Horse in the City*; Ann Norton Greene, *Horses at Work*. See also: Nicole Shukin, *Animal Capital*; Sam White, "From Globalized Pig Breeds to Capitalist Pigs"; Ron Broglio, "The Romantic Cow."

ulation of American horses—from 5 million in 1850 to 27 million in 1920 (p. 282)—illustrates their increasing importance across this era. This argument parallels a broader, more familiar claim from environmental history: industrialization has never separated "nature" from human-built "second nature," but rather has coupled them tightly, as shown in William Cronon's 1991 classic *Nature's Metropolis* and in more recent work in the field of envirotech, such as Sara Pritchard's 2011 *Confluence*. As Michael Rawson noted in his review of Greene's book, this argument harnesses horses for critiquing the metanarrative of Western modernity as a triumph over nature's limits.[3]

Our technologies both shape and express who we are. The United States is a fundamentally energy-hungry, perhaps energy-profligate, society. Greene's book teaches that we first built the high-intensity American "energy landscape" on the backs of horses in the 1800s. Today's concerns with climate change, energy prices, and resource geopolitics make histories of forgotten or alternative energies like Greene's resonate widely in public debate (p. 279). Returning to Greene's work can help us link the study of animal technology with broader scholarly dialogues in "animal studies," thus helping historians of technology ask the "big questions" that Rosalind Williams called for in her 2014 da Vinci address.[4] Fortunately, Greene's clear and elegant writing style, combined with careful definitions of most scholarly terms, makes the book accessible to a broad audience well beyond SHOT.[5]

To date, discussion of animals as technology has made limited, but significant, inroads into SHOT. A Project Muse text search of *T&C* since 1998 reveals 134 hits for the word "animals" and 145 for "animal." Of these 279 hits, only *three* were full-length research articles with animals as a major focus: William Boyd's study of industrial poultry, Gijs Mom's and David Kirsch's study of American motorization, and Richard Kirk's study of sterile laboratory animals.[6] Another five hits come from recent SHOT conference papers, each the only paper about animals at its respective meeting: Jennifer Alexander on mechanical and animal efficiency, Edward Tenner

3. Michael Rawson, "A Horse Is a Horse, of Course, but Also Much More." Similar arguments implicating nature and technology can be found in Etienne Benson, *Wired Wilderness*; Sara B. Pritchard and Thomas Zeller, "The Nature of Industrialization"; Harriet Ritvo, "Going Forth and Multiplying"; Edmund Russell et al., "The Nature of Power"; and Edmund Russell, "Introduction: The Garden in the Machine: Toward an Evolutionary History of Technology."

4. Rosalind Williams, "Our Technological Age, from the Inside Out."

5. Terms she clearly defines include "technology" (p. 4), ecological "niche" (p. 5), "draft" (p. 6), "agency" (p. 8), "telegony" (pp. 100–103), "professionalism" (pp. 212–13), "technological momentum" (pp. 239–40), and "progressivism" (pp. 245–48). An exception is the term "energy landscapes," which appears nine times in the book (pp. 8, 58, 82, 84, 95, 240, 274, 279, and 318) and is even indexed, though never carefully defined. Not that the term is hard to understand; it reads like the more familiar "energy regimes."

6. William Boyd, "Making Meat"; Robert G. W. Kirk, "'Standardization through Mechanization'"; Gijs Mom and David A. Kirsch, "Technologies in Tension."

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on draft horses in agriculture, Etienne Benson on radio-tracking of wildlife, Edmund Russell on dog evolution, and Jesse Smith on dead animals in zoos.[7] About 130 remaining unique instances of "animal/s" are mentioned only in passing. To the extent that they have considered animals, then, historians of technology have studied them in three technical domains: agriculture and food; power and transport; and animal-based scientific studies in fields including biotechnology/biomedicine, ecology, evolutionary biology, and zoology. Greene relates horses to all three categories, and she goes on to connect them with cultural, economic, energy, and military histories. Few have explored animal technology in as much depth as Greene has.

Outside of SHOT, the scholarly stampede toward animal studies—also "human-animal" studies—has now produced a mature field with its own listserv (H-Animal), research journals (*Animal Studies Journal*, *Journal for Critical Animal Studies*, *Society and Animals*, among others), and book series (Brill's "Human-Animal Studies"; Minnesota's "Posthumanities"; and Michigan State's "The Animal Turn"). Linda Kalof, Sandra Swart, and Kari Weil speak of an "animal turn." Animal studies bring together several disciplinary threads that interweave with the history of technology: studies of agriculture and food, histories of science and medicine, environmental history, and bioethics.[8] Animal agency, rights, and subjectivity are vital issues in studies of posthumanism in continental philosophy, cultural studies, and the social sciences.[9] Kari Weil explains that "nonhuman animals have become a limit case for theories of difference, otherness, and power," or a new way to further intersectionality: gender *and* race *and* species.[10] Studies of pest animals by Edmund Russell, Clapperton Mavhunga, and others argue that human-*animal* relations are co-constituted with human-*human* relations. Pest control reveals a biopolitics connecting social control with control of nature. The war on pests is always a war of people, too.

7. Jennifer Alexander, "Mechanical and Animal Efficiency: Alfred Marshall, American Manufactures, and British Decline" (see "Organizational Notes," 554); Edward Tenner, "Horse Power: Draft Animal Agriculture Today" (see "The Amsterdam Meeting," 161); Etienne Benson, "Wild Animals and Radio Landscapes: Wildlife Telemetry at the Cedar Creek Natural History Area, 1960–1980" (see "The Minneapolis Meeting," 150); Edmund Russell, "The Incredible Evolving Dog: Making an Animal Modern" (see "The Las Vegas Meeting," 146); Jesse Smith, "Dead Animals in the Zoo: The Philadelphia Zoo's Penrose Research Laboratory" (see "The Portland Meeting," 208).

8. Kari Weil, *Thinking Animals*; Linda Kalof and Georgina Montgomery, eds., *Making Animal Meaning*; Dorothee Brantz, ed., *Beastly Natures*; Lorraine Daston and Gregg Mitman, eds., *Thinking with Animals*; Mary Henninger-Voss, ed., *Animals in Human Histories*.

9. Carey Wolfe's "Posthumanities" series at Minnesota is prominent here: Michel Serres, *The Parasite*; Donna Haraway, *When Species Meet*; Carey Wolfe, *What Is Posthumanism?* See also Chandra Mukerji, *Impossible Engineering*; Jacques Derrida, *The Animal That Therefore I Am*; Giorgio Agamben, *The Open*; N. Katherine Hayles, *How We Became Posthuman*; Gilles Deleuze and Félix Guattari, *A Thousand Plateaus*.

10. Kari Weil, "A Report on the Animal Turn." For an implication of animals in the construction of sexuality, see Michael Pettit, "The Queer Life of a Lab Rat."

Pest studies thus link animalization and dehumanization, subalterns and subhumans, in the social construction of human difference.[11] Greene's book complements these pest studies by showing how socially desirable animals also serve to reshape society. These various research threads mesh with SHOT's intellectual agenda in important ways. Greene's book suggests how historians of technology can connect our work to these broader issues in big-tent animal studies.

Greene's book shows two similarities to animal studies literature. First, She goes farther than perhaps anyone else in our field to query the topic of animal agency. Previous horse studies, including McShane and Tarr's *Horse in the City* and my own modest study of Paris horses, largely describe what people do to horses, not what horses do.[12] Though Greene rarely tells stories of individual horses, she often describes their collective social-ecological impact on humans. She also pursues "animal history" self-consciously through a brief methodological discussion (pp. 7–8).

Greene's first chapter outlines the horse's natural history, explaining how its physical and behavioral qualities make it an ideal domesticated work animal: "nonterritorial herd animals, easy reproduction, sociable disposition, and manageable size" (p. 14). Furthermore, their physiology and metabolism make horses uniquely efficient among large mammals as biochemical converters of food into force (pp. 16–21). While Greene does not explicitly say it, her portrayal shares much with other recent historical horse studies that stress human-horse co-evolution and symbiosis.[13]

Chapter 2 examines the infrastructures necessary to exploit horses efficiently, including roads (pp. 46–63), canals (pp. 63–69), ferries or "teamboats" (pp. 69–71), railroads (pp. 71–78), and steam engines (pp. 78–82). This chapter richly and lucidly depicts horse use as a technological system, which created its own unique "energy landscape." In chapter 5, Greene considers the role of horses as drivers of the ballooning industrial economy, through detailed accounts of the growth of industrial cities and the mechanization of agriculture. New, heavier mechanized equipment—artillery, plows, construction equipment, urban vehicles like fire engines and streetcars, treadmills for stationary power—all were driven by horses. Horses also helped remove waste and snow from cities. Greene concludes convincingly that horses "defined the economy" (p. 199).

The second important quality of Greene's book that connects with ani-

11. Edmund Russell, *War and Nature*; James E. McWilliams, *American Pests*; Robert Argenbright, "Lethal Mobilities"; Colin Jerolmack, "How Pigeons Became Rats"; Clapperton Mavhunga, "On Vermin Beings"; Mavhunga, "Mobility and the Making of Animal Meaning"; Dawn Day Biehler, *Pests in the City*; Brian Lindseth, "Nuclear War, Radioactive Rats, and the Ecology of Exterminism."

12. Peter Soppelsa, "The Instrumentalisation of Horses in Nineteenth-Century Paris"; McShane and Tarr, *The Horse in the City*.

13. J. Edward Chamberlain, *Horse*; Pita Kelenka, *The Horse in Human History*; Alfred Crosby, *Children of the Sun*, 35–36.

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mal studies, and distinguishes it from existing studies of animal technology, is her use of cultural history. Through popular, literary, and scientific sources, she tracks the changing meaning of horses as valued objects of economic, moral, and scientific concern. Chapter 3, for example, is a high point of the book, in which Greene looks at horse production through breeding. Here she shows how horse bodies were transformed by industrialization: across the nineteenth century they were bred to be larger and stronger but also more diverse and specialized, customized for various working tasks. The expansion and diversification of breeding generated considerable uncertainty about domestic, imported, and hybrid breeds, which sometimes put breeders at odds with scientists concerning notions like heredity and evolution.

The chapter's most fascinating aspect is Greene's discussion of horse breeding as a laboratory for thinking about the social divisions of race and gender, against the backdrop of the public reception of Darwin's evolutionary theory. For example, mules as a hybrid species were both "fascinating" and "unsettling" for Americans struggling to understand human "miscegenation," a fact reflected in common use of the term *mulatto* (young mule) for humans with mixed-race ancestry (pp. 95–96). Greene also analyzes debates over "telegony"—a now discredited phenomenon in which a female mammal, having mated with a male of a different "racial" group, will continue to deliver offspring with the mixed-race characteristics, even after mating with another male of her same "race." Telegony, Greene argues, illustrates how views about gender and sexual morality shaped, and were shaped by, views about horse breeding (p. 103). Overall, American attitudes toward breeding were "complex and contradictory" (p. 117), struggling to balance human ambition to reshape nature (which dovetailed with industrial progress-talk) with more reassuring, conservative views of the rigidity and stability of biology and ecology (which dovetailed with post-emancipation anxieties about Darwinism).

Like other animal studies, Greene's book shows how human-animal interaction reshaped society. "Humans project their concerns onto horses" (p. xi), Greene writes, and also their "identities of race, class, gender, wealth, region, nationality, civilization, morality, and character" (p. 12), such that "the animal world [is] perennially employed as a metaphor for the social world" (p. 250), as in famous fables from Aesop to La Fontaine and Orwell. This metaphorical connection shaped how humans and horses actually lived and work together and also had symbolic consequences for how humans understood shared values like honor, humaneness, and humanity. Hence George Angell, founder of the American Humane Education Society, predicted that *Black Beauty* would help end horse enslavement as *Uncle Tom's Cabin* had for human slavery (p. 202).[14] Future

14. For other studies of animals reflecting society, see: Etienne Benson, "The Urbanization of the Eastern Gray Squirrel in the United States"; Kathryn Miele, "Horse-Sense"; Kari Weil, "Purebreds and Amazons"; Sandra Swart, "'But Where's the Bloody Horse?'"

studies of the cultural context of animal breeding could shed fascinating new light on histories of the body, eugenics, and race.

Chapter 6 examines expert discourses on horses from "engineers, agricultural experts, veterinarians, urban reformers, and social elites" (p. 203), showing how horse knowledge served to bolster an important nineteenth-century movement: professionalism (pp. 212–35). Continuing this cultural history, chapter 7 closes the story by narrating how progressive ideas inspired the horse's decline after 1900. Progressives furthered electrification and motorization, singled out horses as a source of urban filth, and mobilized animal welfare groups like the ASPCA. Here again, human-horse relationships had a multifarious bearing on human-human relationships as "Americans defined horses out of the modern world" (p. 243). Greene's cultural history helps us see society as including both humans and animals, living and working together according to shared, but distinct and unequal, social norms.

Greene's book reminds historians of technology that, like machines, animals can be powerful, material, and human-made. But they are also animate, sentient, and even conscious. They therefore split the category of nonhuman agency down the middle, blurring the otherwise clear line between people and things. Animals act unpredictably, like the "nature" of environmental history, but also perhaps intentionally, like designers and users in the history of technology. They trouble our sense of subject and object as in Actor Network Theory, thing theory, and posthumanism. Including them in society leads us to see the social differently. Thus, the "big questions" of animals as technology today have to do with: (a) the limits of design, of how much we can transform nature (and thereby the limits of humanism); (b) the posthumanist consequences of seeing humans as just one animal among many, in a world where many species seek to influence and instrumentalize other species; (c) the implication of animal technology in the social construction of race, gender, and species; and (d) the broad conceptual overlap between "biotech" and "envirotech." Greene's book remains an important landmark on the road to giving these research questions a more durable place in the history of technology.

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