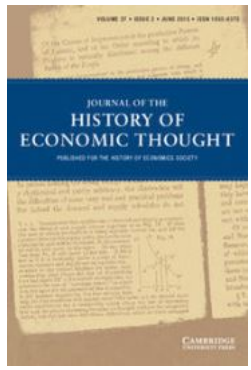

HENRY CAREY'S RURAL ROOTS, "SCIENTIFIC AGRICULTURE," AND ECONOMIC DEVELOPMENT IN THE ANTEBELLUM NORTH

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The American political economist Henry Charles Carey is generally thought of as a spokesman for industrialization due to his strident protectionism. In fact, his most original contributions came in his discussions of agriculture, the environment, and their relation to technological progress. Carey developed his ideas by drawing on the contemporary discourse of "scientific agriculture," which enjoyed great influence, thanks to a widespread agricultural reform movement. This allowed him to argue effectively against Malthusian population doctrine and Ricardian rent theory by stressing the almost limitless potential of technological innovation, not only in manufactures but also in agriculture. Analogous views were also expressed by George Perkins Marsh, known today as the "father of conservationism," indicating a broader contemporary engagement with questions of economic development and humanity's relationship to nature, an engagement in some ways strikingly parallel to present-day concerns.

American economic writing in the early 1800s can seem irredeemably rooted in history: derivative, narrowly political, largely irrelevant to what would become of the economics discipline. Yet, the period itself was so formative that even a parochial outlook could address questions of lasting significance in quite original ways. This was especially true of Henry Charles Carey. Precisely because his ideas never made it into the economics mainstream, they are best understood historically (Meardon 2015 [this volume]). But that is not to say that they merely register bygone particularities. Carey tackled big questions that continue to resonate, bringing a creative

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if distinctly American perspective that Marx aptly called "Yankee universalism" (Marx and Engels 1975).

Carey is typically understood as a herald of industrialization, but, in fact, his most original insights concern agriculture. This requires some explanation. The standard story of American economic change in the first half of the nineteenth century tends to leave out important developments. The problem is our schematic geography, which identifies the Northeast with industrialization, and the South and Midwest, respectively, with slave and free agriculture. Yet, on the eve of the Civil War, the Northeast remained two-thirds rural, largely a farming society. To be sure, northeastern agriculture was in flux, but not necessarily in eclipse. Instead, it was in the throes of a social movement for the promotion of "scientific agriculture." This movement's remarkable profusion of print—dozens of agricultural periodicals, countless farming items in mass-circulation newspapers, and a veritable outpouring of government-sponsored reports—allowed Carey to develop a unique theory of long-term social development that rested on an anti-Malthusian (and proto-Boserupian) relationship between agriculture and population growth. Once we understand this, we will see that Carey belongs beside theorists of long-term agroecological development as much as beside the industrial protectionists with whom he is usually classed. We will also have a clearer sense of the concerns that guided American economic thought in the early stages of the country's rise to global hegemony.

I. HISTORIOGRAPHICAL CONTEXT

The consequences of rural change in the antebellum Northeast have fallen into a gap produced by the tectonic movements of several historiographies. Traditional agricultural history tended to come out of Midwestern land-grant universities. Steeped in a set of questions flowing from Frederick Jackson Turner's frontier thesis, it focused on land-use issues related to western settlement (Gates 1934; Bogue 1963). Subsequently, the "new rural history" rekindled interest in the Northeast, but because it concentrated on locating the "transition to capitalism," it pulled scholars toward community studies of the late 1700s and early 1800s.[1] These moves obscured the emergence of a trans-local agricultural reform movement that responded to economic and environmental changes in the 1830s and 1840s. Meanwhile, the ongoing investigation of slavery continues to produce massive research into southern society. As a result, scholars generally work with a highly stylized conception of antebellum agriculture in which Midwestern wheat growers stand in for northern farming generally and cotton planters represent the South. Almost by default, the Northeast becomes industrializing, if not quite industrialized; and its farming, static or declining. This, however, distorts the diversity and dynamism of northern agriculture.

The historiography of Civil War causation has further overshadowed the northeastern countryside. According to Charles and Mary Beard's old "economic" interpretation of the conflict, the region's industrialists engineered a Prussian-style "marriage of iron

[1]See, for instance, Henretta (1978) and Prude (1983). Two important partial departures are Barron (1984) and McMurry (1995).

and rye" with Midwestern farmers against the semi-feudal planters of the South (Beard and Beard 1962). Historians largely reject this interpretation, but they have done so in ways that emphasize western conflicts over territorial slavery and the emergence of an industrial proletariat in northern cities (Foner 1995; Beckert 2001). Northerners' responses to immigration and wage labor have become dominant themes, and although these were not exclusively urban issues, they characterized the problems of town more than of country. More recently, attention has shifted toward revised views of slaveholders as modern capitalists, not backward aristocrats (Majewski 2009; Barnes et al. 2011; see also Schoen 2015 [this volume]). This has tended to associate agricultural reform with planters rather than with northern farmers.

Yet, by any measure, the North dominated agricultural reform in both absolute and relative terms. According to data compiled by the Patent Office in 1858, the North led the South in number of agricultural organizations, 690 to 197, figures that translate into higher rates relative to total population, free rural population, and number of farms. Similarly, whereas the period's leading southern agricultural journal claimed a peak circulation of 10,000, even relatively small northern agricultural journals such as the *Boston Cultivator* reached twice that number, while larger ones such as the *New England Farmer* and the *American Agriculturist* claimed subscription lists of 50,000 to 100,000. Nationally, therefore, northern voices grounded in northern conditions, interests, and ideological assumptions dominated the discourse of agricultural reform (Ron 2012).

II. "SCIENTIFIC AGRICULTURE" AND RURAL CHANGE IN THE GREATER NORTHEAST

It is possible to be even more specific by locating the core of antebellum agricultural reform in what I call the Greater Northeast: New England and the Mid-Atlantic states, shading into the Chesapeake area around Baltimore, the Ohio River Valley, and the Great Lakes states. This region shared several key characteristics. Its Euro-American settlers had been farming long enough to experience declining soil fertility, competition from farmers further west, and disastrous new pest infestations. Most importantly, the region's agriculture was being shaped by growing cities within the emerging domestic economy. Altogether, these factors amounted to a basic structural shift from colonial-era Atlantic trade to an emerging home market.

Economic historians have recognized Von Thünen rings beginning to appear in these areas during the antebellum period, indicating the new centrality of domestic cities as agricultural markets. In the Philadelphia region, the distinctive zones were clearly discernible by 1840 (Lindstrom 1978). A similar pattern developed around Syracuse in the 1840s and 1850s as the combination of older canal and newer railroad links stimulated urban growth and transformed the surrounding hinterland (Miller 1979). By the 1860s, the same process was transforming the rural districts around Madison, Wisconsin (Conzen 1971). Thus, the immediate hinterlands of first the large coastal cities and then the progressively more western interior canal and railroad towns turned to market gardening, truck farming, wool and dairy production, and the supply of horse fodder for urban transport. Where wheat growing persisted within the Northeast, it too increasingly went to domestic urban consumers (Gates 1960; Danhof 1969).

Serious environmental challenges accompanied this market reorientation. By the late 1700s, sharply reduced yields from over-cropping characterized the entire Atlantic coast. In the vicinity of Philadelphia, for example, farms that had once produced twenty-five to thirty bushels of wheat per acre were down to ten or fewer by century's end. Over the ensuing decades, the problem crept west. Soil acidity, poor drainage, shallow tillage, and erosion from deforestation all aggravated the underlying deficiency of nutrients (Fletcher 1950; Danhof 1969). New crop pests made matters worse. In 1811, the Hessian fly wreaked such havoc in eastern New York that John Jay compared wheat growing there to "taking a ticket in a Lottery—more blanks than prizes" (Brier 2013, p. 91).

Americans combated these threats in a number of ways. They adapted European methods to rebuild and maintain soils, they scoured the world for pest-resistant cultivars, and they developed new marketable crops. By the 1820s, careful fertilization and crop-rotation techniques—collectively known as "convertible agriculture"—were firmly established in the farming districts surrounding Boston, New York, Philadelphia, and probably Baltimore (Wines 1985; Stoll 2002). Indicating just how dynamic American agriculture was in the period, continuous experimentation led to an impressive amount of "biological innovation" long before the advent of genetic hybrids (Olmstead and Rhode 2008).

At the same time, middling northeastern farmers began to pursue literacy and numeracy as never before (Kaestle 1983; Cohen 1999). According to one study, before 1850, "the rural North led the world in the building of schools, the hiring of teachers, and overall enrollments" (Go and Lindert 2010, p. 2). According to another, farmers within the rural North "seem to have invested much more in the education of their children" than did non-farmers, and northeastern rates of school attendance appear to have been higher than Midwestern rates (Atack and Bateman 1987, p. 41; Parkerson and Parkerson 1998, p. 2). Rising interest in secondary schooling further attests to these trends.

This demand, it appears, "was rooted in rural life and the commercial farming economy" (Beadie 2008, pp. 59–60). Isaac Roberts, the first dean of the Cornell College of Agriculture, recalled that in the 1850s, "ambitious families . . . laid almost as much stress upon 'schooling' as upon manual dexterity and willingness to work" (Roberts 1916, pp. 66–67). Education was thus seen as a complement rather than an alternative to manual labor. Indeed, agricultural reformers relentlessly insisted that successfully negotiating the processes of economic development required scientific and technological literacy in addition to traditional work ethic. "The farmer is no longer a mere laborer," explained the editor of the *Working Farmer*. "To succeed in competition with the improvements of the day, he must be educated to a fair extent."[2]

Economic priorities, in turn, led to a new emphasis on the natural sciences. Many small-town academies even began to offer courses in the burgeoning field of agricultural chemistry (Ron 2012). Horace Mann placed these developments squarely in an economic context:

> Agriculture requires knowledge for its successful operation. In this department of industry, we are in perpetual contact with the forces of nature. We are constantly

[2]*Working Farmer* 1 (Feb 1849): 4.

> dependent on them for the pecuniary returns and profits of our investments, and hence the necessity of knowing what those forces are. (Vinovskis 1970, p. 563)

This was not merely an elite opinion. Ordinary farmers such as the Weeks brothers of upstate New York, who worked land on shares and made their children's shoes themselves, subscribed to farm journals, adopted various agricultural improvements, and attended lectures on everything from chemistry to electro-magnetism (Pawley 2009). "In this age science is greatly popularized," the New York Regents reported, for "it is a conceded principle of political economy, that science and knowledge constitute the most productive capital."[3] This "conceded principle" was a cornerstone of the American School of Political Economy that Henry Carey would come to lead (Persky 2015 [this volume]).

The need to maintain productive soils, perhaps more than anything else, drove interest in agricultural education. When Jesse Buel set down the principles of the "New Husbandry" in the late 1830s, his very first point was "that our lands will not wear out, or become exhausted of their fertility, if they are judiciously managed."[4] As Sally McMurry points out, "numerous diaries show that farmers . . . were spending long hours procuring and hauling fertilizers," so it is hardly surprising that they were eager to learn what worked best (McMurry 1995, p. 29). The chemistry of plant nutrition and soil formation thus became basic to reform discourse, and European pioneers in the field, such as Justus von Liebig, became practical celebrities (Rossiter 1975).

How and where were fertilizers "procured"? The development of the American fertilizer trade in the first half of the nineteenth century was, among other things, a story of growing integration between rural and urban economies. Farmers steadily upped their use of soil amendments, commercial networks gradually developed to supply their needs, and the products themselves came to be factory-manufactured. Although barnyard manure remained a mainstay of northeastern agriculture, the shift to new commercial fertilizers was well under way by the 1850s. Many of these fertilizers were manufactured from urban waste and industrial by-products. Even imported guano was frequently "augmented" in this way (Wines 1985; Nelson 1990).

The growth of the fertilizer industry thus helped reorder the relationship between town and country. Farmers now looked to cities not only as markets, but as suppliers of new implements and the "raw materials" of crops. Conceptually, they expanded convertible agriculture's "recycling mentality" to a wider regional framework that linked the agricultural and manufacturing sectors in a loop of inputs and outputs (Wines 1985). If this seemed to undermine the ideal of yeoman independence, so much the worse for the ideal. As New York *Tribune* editor Horace Greeley put it bluntly, "Let us deal decisively at the outset with the mistaken consciousness of self-sufficiency, which is the chief obstacle of Agricultural Progress."[5]

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[3]*Annual Report of the Regents of the University of the State of New York* 70 (1857): 20, 23.
[4]*Farmer's Monthly Visitor* 1 (20 Dec 1839): 182.
[5]*Cincinnatus* 3 (Oct 1858): 465. For similar sentiments, see *Working Farmer* 1 (1849): 126; *The Plough, the Loom, and the Anvil* 6 (1853): 90.

III. HENRY CAREY'S "MANURE THEORY"

Like Greeley, most agricultural reformers came out of a nationalist economic tradition that stressed the benefits of an interdependent "diversity of pursuits." Indeed, early northern agricultural societies were closely associated with broad national development schemes predicated on "an identity of interests between agriculture and manufactures." According to this view, domestic manufacturing would provide farmers with a reliable "home market" (Carey 1824, p. 16; see also Peskin 2003, pp. 123–129; McCoy 1982, pp. 81–82). Moreover, economic nationalists argued for positive technology spillovers that would accrue to agriculture from industrial development. A healthy manufacturing sector, they claimed, offered not only a ready consumer base, but also a source of technological novelty—everything from labor-saving machinery to soil-regenerating fertilizers.

Henry Carey elaborated these propositions into what Paul Conkin has called the "manure theory" (Conkin 1980, pp. 283–284). Carey argued that the only way to sustain rising agricultural productivity was to recycle industrial by-products and urban waste back to the land by erecting domestic manufacturing nearby to agriculture. He further argued that tightly bound communities of educated citizens would foster information exchange and generate new technical knowledge—including how best to utilize by-products and other previously unsuspected resources. The manure theory thus synthesized the existing tradition of American protectionist thought with the contemporary discourse of scientific agriculture to arrive at an original model of intensive economic development. Ingenious and fundamentally optimistic, Carey's writings won a substantial following at home and abroad. Contextualizing them reveals how agricultural reform came to play a central part in American economic thinking during the 1850s.

Early economic nationalists focused on what they called a nation's "productive powers": its present level of economic development and its capacities for further innovation. So long as Britain dominated global manufacturing, they argued, the only way to increase national productive powers was to block British imports. Their main theoretical beef, therefore, was with the principles of comparative advantage and the international division of labor. This doctrine—indeed, the whole edifice of classical political economy—they regarded as little more than an ideological cloak for naked British industrial interests. "English Authors write Free Trade doctrines for other Nations," they cried (American Institute 1844, p. 11).

Economic nationalists also rejected the classical postulate of an inescapable agricultural bottleneck. Thomas Malthus had argued that people multiplied at a much faster rate than food production, leading to horrific "checks" on population growth. David Ricardo added an alarming distributional analysis. Agricultural productivity, he assumed, was largely determined by "the original and indestructible powers of the soil" (Ricardo 1817, par. 2.2). Although improvements might raise output, they were subject to diminishing returns. As population grew, therefore, the resort to evermore marginal lands would depress wages and profits while padding landlords' unearned rents.

The promise of "scientific agriculture" offered a way out of this conundrum. Arguing in 1841 that recent improvements had already "increased tenfold . . . the means of subsistence," the German economic nationalist Friedrich List demanded,

"Who will venture to set further limits to the discoveries, inventions, and improvements of the human race?" List therefore simply dismissed Malthus and Ricardo. The logical corollary of stressing human artifice, after all, was that natural conditions mattered little. "The original natural productive capability of land is evidently so unimportant . . . that the rent derivable from it alone is not worth mentioning" (List 1916, pp. 104, 206).

Henry Carey began along similar lines. "What are indestructible powers?" he asked. "The most fertile soil, if not renewed, will have its powers destroyed" (Carey 1837, vol. 1, p. 189). But Ricardians never denied that agricultural improvements could slow the rise of rents, only that they would eventually run into diminishing returns, making the shift to marginal soils ultimately certain. Carey crafted an ingenious historical refutation of this argument in *The Past, the Present, and the Future* (1848). His purpose was to show that increasing returns from technological progress constituted a general phenomenon, as true in agriculture as in manufacturing—to show, in other words, that there was no bottleneck. "Scientific agriculture" occupied the core of his thesis.

Carey argued that Ricardo had gotten things backward. People did not begin on the best soils, proceeding to worse when population pressures forced them to. Instead, they first settled "the high and thin lands requiring little clearing and no drainage." Only when society advanced did they manage the difficult task of clearing and draining "lower and richer lands." Further progress allowed them to tap fecund subsoils and to otherwise command nature for their benefit. Citing endless historical examples spanning the globe, Carey concluded that "everywhere" population growth resulted in an "increased power over land" (Carey 1848, pp. 24, 48; see also Meardon 2011, especially pp. 22–27).

The key to this forward movement was what Carey termed "association" or "combination of action." The phrase recalls List's claim that the division of labor requires reintegration, or "union of labor" (List 1916). But whereas List, coming from a cameralist tradition, aimed at justifying state management, Carey was getting at something different.

> The first cultivator can neither roll nor raise a log, with which to build himself a house. . . . He is in hourly danger of starvation. At length, however, his sons grow up. They combine their exertions with his, and now obtain something like an axe and a spade. They can sink deeper into the soil; and can cut logs, and build something like a house. . . . With the growth of the family new soils are cultivated, each in succession yielding a larger return to labour . . . and thus with every increase in the return to their labour the power of combining their exertions is increased. (Carey 1851, p. 86)

What Carey depicted here went beyond Smithian growth by pointing to technological spillover effects. It is not the case that part of the family goes to farming while the rest go to somehow knocking down trees. Instead, they make the implements by which all can do more of everything, compounding Smithian productivity gains as the effect of new tools cascades through the entire economy. Rising agricultural productivity, then, means that a higher proportion of the population can specialize in non-agricultural activities, creating a virtuous upward cycle.

As history, the settlement narrative was questionable. As allegory, it was inspired. Carey suggested that any static conception of resource endowments, including soil fertility, missed the nature of technological advancement. "All soils have qualities

tending to render them useful." It just took figuring out what they were. "With our present limited knowledge," he argued, it was "absurd" to predict the limits of agricultural improvement (Carey 1848, pp. 62, 92). Carey's model and mantra was, thus, "better machinery applied to better soils" (Carey 1851, p. 86). Peppering his writing with references to marl, lime, acidulated bones, under-drainage, and deep plowing, Carey showed off his agricultural literacy and gave his pronouncements the appearance of a firm grounding in modern science. Many contemporaries found this compelling. "The earth," declared Ralph Waldo Emerson in a talk before his local agricultural society, "is a machine which yields new service to every application of intellect." Citing Carey by name, he explained that "it needs science to cultivate the best lands in the best manner" (Emerson 1859, pp. 11, 15).

Among the guiding principles of contemporary scientific agriculture was the belief that nutrients taken up by plants and consumed by humans must be returned to their source (Wines 1985; Cushman 2013). Urbanization threatened this circuit through what Karl Marx later called a "metabolic rift" (Foster 1999). Reformers therefore called for municipal sewage systems that would create inexpensive fertilizers while simultaneously improving sanitation. In 1850, for instance, a French sanitary engineer arrived in Philadelphia with a plan to erect "an establishment for the transmutation of feculent matter into inoderous and chemical manure" (Pyesson 1851, p. 4). Such ventures promised to solve two of the most vexing problems of nineteenth-century economic growth: the maintenance of rural soils and of urban health (Barles 2007; Dana 2006; Tarr 1975; Schultz and McShane 1977).

Carey made the nutrient circuit into a pillar of his protectionism. He argued that agriculture must remain in geographic proximity to manufacturing so that by-products could return cheaply to the land. This implied that agricultural exports alienated vital soil nutrients by placing them beyond the practical possibility of return. British industrial dominance thus calamitously distorted the world's environment and economy. But with a tariff wall fostering domestic diversification and exchange, "the consumer and the producer will then be near neighbours to each other, and all the manure produced by the land will go back again to the great giver of these supplies" (Carey 1848, p. 306; see also Hudson 2010).

IV. CAREY AND GEORGE PERKINS MARSH ON HUMANITY AND THE ENVIRONMENT

At almost the same time, George Perkins Marsh made strikingly parallel arguments. Marsh is remembered today as the author of *Man and Nature* (1864), a monumental work considered to be the first systematic exploration of how human societies alter the environment. Like Carey, he combined a wide breadth of scientific and historical reading with first-hand experience of American economic development to achieve insight into the ways that humans remake nature. He was therefore a foundational figure in the history of modern environmentalism, but, unlike Henry David Thoreau, he aimed at rational resource management instead of an ethics and esthetics of wilderness (Lowenthal 2000).

Steeped in the Scottish Enlightenment's stadial theory of social development and his own commitments to rural Vermont, Marsh believed that modern civilization could promote sustainable material progress. In an address at the 1847 Rutland County

agricultural fair, he argued that the "savage . . . desolates the region he inhabits," but that "social man repays to the earth all that he reaps from her bosom, and her fruitfulness increases with the numbers of civilized beings" (Marsh 1847, p. 6). In other words, careful recycling of organic wastes would allow agricultural productivity to keep pace with growing population. Indeed, civilization progressed furthest, Marsh maintained, "where the earth, with the latent capacity of giving the most, does yet spontaneously yield the least" (Marsh 1860, p. 75). Marsh proved more cautious in *Man and Nature*, but he continued to hold that "ingenuity" and "wise economy" would make nature a "plenteous and perennial" source of material well-being (Marsh 1864, p. 29).

Like Carey, Marsh was a protectionist and, like Carey, he argued that the manufacturing sector deserved farmers' support because it offered both consumer markets and technological marvels. The "mechanic arts," he explained, "are at once the most profitable customers of the agriculturalist, and the most munificent patrons of the investigator of nature's laws" (Marsh 1847, p. 24). Indeed, although Carey's and Marsh's insights appear distinct, they both boiled down to the observation that people could modify the natural order to a greater extent than typically understood. In *Man and Nature*, Marsh showed that not only did the natural environment shape human society as Enlightenment social theorists had stressed, but humans themselves shaped the environment. Carey's development theory, with its notion of continuing technological transformation, stood in just the same relationship to Ricardian naturalism, which posited a given distribution of factor endowments rigidly determining economic life.

That Carey and Marsh seem not to have known each other's work makes their parallels all the more significant. It suggests a broader contemporary discussion on the relationship between nature and the course of social development. Both thinkers certainly drew on Liebig's *Familiar Letters on Chemistry and Its Relation to Commerce, Physiology and Agriculture* (1843), which questioned the long-term wisdom of agricultural exports. After 1850, the Patent Office's agricultural division chief, Daniel Lee, gave wide circulation to such concerns through his annual reports, which Congress distributed in editions running to the hundreds of thousands (Hudson 2010; Ron 2012). Lee repeatedly contended that if agricultural exports appeared profitable, that was only because future nutrient deficiencies were being left out of the account. "No fact in the science of political economy is more important than this," he insisted.[6] A young sanitary engineer named George Waring, Jr. then tried to quantify this loss. Extrapolating from the 1850 Federal Agricultural Census, Waring estimated the annual national nutrient deficit at the equivalent of 1.5 billion bushels of corn. "To suppose that this state of things can continue, and we as a nation remain prosperous, is simply ridiculous," he concluded (Waring 1999, p. 306).

Such worries underlay key measures within the broad developmental program initiated by the Republican Party during the Civil War (Hudson 2010; Ron 2012). In 1862, Congress created the Department of Agriculture (USDA) and passed the *Morrill Land Grant Act*, commonly known at the time as the "agricultural college bill." That Senator Justin Morrill, a central architect of Republican economic policy for decades to come, also lent his name to the initial Republican tariff is particularly apt. It conveys

[6]*Annual Report of the Commissioner of Patents, Agriculture* (1850): 8–9.

the link that Carey, Marsh, and other economic nationalists perceived between industrial development and agricultural modernization. As another leading Republican, William H. Seward, put it, "a constant and uniform relation must always be maintained between the state of agriculture (and, indeed, of society itself) and the contemporaneous state of invention in the arts" (Seward 1884, vol. 3, p. 178).

In one sense, then, Carey's and Marsh's economic vision became embodied in a set of enduring government institutions. Starting with the USDA and the land-grant universities, a matrix of state and federal agencies representing a substantial departure in American governance would help to remake agriculture in the United States and beyond. In another sense, however, their legacy resides in their creative handling of issues that remain salient a century and a half later. In 2000, the Weyerhaeuser Environmental Classics series brought out a revised biography of Marsh and, soon after, a new edition of *Man and Nature*. Meanwhile, Carey has generated recent interest from historians of economic thought pursuing questions as diverse as international trade, financial crisis, and humanity's impact on the environment (Foster 1999; Perelman 1999; Meardon 2011 and 2015 [this volume]; Magness 2015 [this volume]).

There are also intriguing parallels between Carey's settlement theory and Ester Boserup's still-influential formulation of a causal relationship leading from population growth to technological innovation, particularly in agriculture.[7] Writing during a revival of Malthusian fears that would soon be crystalized in Paul Ehrlich's *The Population Bomb*, Boserup argued that "neo-Malthusian theories . . . are misleading, because they tend to neglect evidence we have of growing populations which managed to change their methods of production in such a way as to preserve and improve the fertility of their land" (Boserup 1966, p. 22; see also Boserup 1981). Boserup's language was more measured than Carey's and her analysis infinitely more nuanced and technically informed—hardly a surprise, given the intervening century of empirical research—yet, the basic insight was essentially the same and remains at the heart of our present-day debates on the environment and the economy (Sabin 2013).

V. IMPLICATIONS

The irony of Careyite technologism is that precisely as it announced the principle of tariff-protected regional sustainability, new developments rendered the point moot. Early soil amendments had indeed been too bulky to transport very far, but imported Peruvian guano, a potent natural fertilizer that became a major item of transatlantic trade in the 1840s, demonstrated that a concentrated product could travel great distances. At the same time, pioneering British superphosphates firms began exploiting nonrenewable mineral deposits to expand production of this critical artificial fertilizer. The subsequent global search for raw materials led to sprawling imperial ventures that sustained agricultural productivity from Britain to New Zealand, yet at the cost of ecological devastation and inhuman labor practices (Cushman 2013; Melillo 2012).

In fact, contemporary Americans never seemed to grasp the world-historical significance of explosive growth in the extractive industries. Living in a profoundly

[7]I gratefully acknowledge Simon Vezina of McGill University for pointing out this connection to me.

agricultural society, they could hardly conceive of a United States that was not predominantly a nation of farmers. In their minds, raw materials were paradigmatically products of agriculture. Carey once referred even to coal as a kind of "crop" (Carey 1837, vol. 1, p. 189)—this from an anthracite entrepreneur! Antebellum American economic thought, then, remained rooted in history, after all. In an important sense, however, that history is now everyone's history.

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