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The Role of Pollution Regulation and Litigation in the Development of the U.S. Meatpacking Industry, 1865–1880

CHRISTINE MEISNER ROSEN

Business historians have treated the emergence of large, modern, vertically integrated meatpacking firms in the second half of the nineteenth century as the economically rational and inevitable product of the industry's search for ways to maximize profits through technological innovation, vertical integration, and the achievement of economies of scale and scope. This is only part of the story, however. Society's efforts to force the industry to abate its environmental pollution through government regulation and private lawsuits also stimulated and shaped these processes of modernization.

To understand the role played by pollution regulation and litigation in the modernization of the American slaughtering and packing industries, business historians need to understand the incredible

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quantity of waste the slaughtering of animals generated and the seriousness of the pollution problems associated with traditional methods of managing these wastes through most of the nineteenth century. The slaughter of cows, hogs, and other livestock for food generated huge quantities of waste. By weight, only about 50 percent of a cow, for example, was edible meat. The other 50 percent was composed of the animal's bones, hide, gut and stomach contents, blood, organs, horns and hooves, hair, and other inedible materials. Killing one 1,000 pound cow thus produced approximately 500 pounds of waste, much of it the foul smelling, quick to decompose, semi-solid entrail, organ, and scrap material known, onomatopoeically, as "offal." By the 1850s hundreds of thousands of cattle, hogs, and sheep were being slaughtered in New York City, Cincinnati, Chicago, and other centers of the slaughtering and packing industries, killings that generated millions of pounds stinking organic waste.¹

Whole industries sprang up to convert some of these wastes into usable goods, including leather, wool cloth, lard, tallow, candles,

1. For the numbers of hogs slaughtered annually in Midwestern cities between 1847 and 1848 and between 1877 and 1878, see, Margaret Walsh, *The Rise of the Midwestern Meat Packing Industry* (Lexington, Ky., 1982), 20–21. The numbers slaughtered in New York were not reported on a regular basis, but in 1850, the Mayor reported that 275,000 animals were killed annually in 206 slaughterhouses. See, "Communication from Professor Hare of Philadelphia in Relation to the Removal of Dead Animal Substances, Etc., from the Streets of the City," *Documents of the Board of Aldermen* (New York City) no. 80, XVII, Part 1 (Jan.–June 1850), p.1263. Figures for how much of a cow is edible meat vary greatly. According to Rudolf Alexander Clemen, *The American Livestock and Meat Industry* (New York, 1923), p.349, roughly 60 percent is edible meat. At the opposite end of the spectrum, in a bulletin directed at the butchers of the developing world prepared for the United Nations, K. J. Scaria, places the proportion at 35 percent and 25 percent for old animals. See, K. J. Scaria, "Economics of Animal By-Products Utilization," *FAO Agricultural Services Bulletin* 77 (1989), p.1–3. In the early to mid-nineteenth century, before the development of improved animal husbandry and advanced methods of dressing beef and turning scrap and other slaughter waste into food products, the figure was probably closer to Scaria's figure than Clemen's. (I will split the difference here and, to simplify things, assume that 50 percent was the waste.) Multiply the quantity of waste per animal killed by the growing numbers of animals slaughtered and the scale of the waste problem becomes clear. For example, if we assume that the 275,000 animals (hogs and cattle), killed in New York City in 1850 weighed, on average, 400 pounds and that half of that was waste, slaughterers would have generated over 55 million pounds of inedible material that would have had to find some use—or be dumped or buried. If we assume an average weight of 200 pounds per hog and the same ratio of edible material to waste, Cincinnati's pork packers would have generated over 33 million pounds of waste during the winter of 1850–1851, when 334,529 hogs were slaughtered. They would have generated well over 43 million pounds of waste nine years later during the winter of 1859–1860, when 434,499 hogs were packed.

soap, various kinds of oil, and glue. Most date back millennia and stand in testimony to mankind's desire to make use of all the organic material in the animals they killed, not just the meat.² They also testify to mankind's deeply rooted fear of the foul stench emitted when organic materials decayed, something that people had associated with disease and death and moral impurity since ancient times.³

Much slaughterhouse waste was not utilized, however. Some, like blood and gut and stomach contents, found little economic use until new technologies developed in the 1870s and 1880s made it easier to convert them into high value products. Materials that were not diverted into the by-product manufacturing industries were discharged into streams and other waterways, or piled up and carted off to places where they could be dumped or buried, or taken to nearby piggeries and fed to pigs, processes that often produced the stench of decay, especially in the summer. Other waste got stuck on the walls and collected in crevices and cracks in the floors of slaughterhouses and soap and glue factories, or got lost in the dirt in slaughterhouse yards, where they, too, decayed and stank.⁴

2. Clemen, *By-Products in the Packing Industry* (Chicago, 1927) touches on the ancient origins of some of these activities on pp. 12, 45, 81, 184–86, 201, 237, and 280.

3. For a background on mankind's deeply rooted fear of the stench of organic decay, see, Constance Classen, David Howes, and Anthony Synnott, *Aroma: The Cultural History of Smell* (London, 1994), p.13–94. For a much more in-depth examination of the cultural meanings of good and bad smells in seventeenth and eighteenth-century France, see, Alain Corbin, *The Foul and the Fragrant: Odor and the French Social Imagination* (Cambridge, Mass., 1986). For insight into how American settlers carried these fears with them as they moved westward in the early part of the nineteenth century, see, Conevery Bolton Valencius, *The Health of the Country: How American Settlers Understood Themselves and Their Land* (New York, 2002), p. 85–158. These fears gave rise to the miasmatic or filth theory of disease, which became dominant in the American medical profession at mid-century. For general overviews, see, Stanley K. Schultz, *Constructing Urban Culture: American Cities and City Planning, 1800–1920* (Philadelphia, 1989), p. 122–38; Martin V. Melosi, *The Sanitary City: Urban Infrastructure from Colonial Times to the Present* (Baltimore, Md., 2000), p. 43–72. Christopher Hamlin, "Providence and Putrefaction: Victorian Sanitarians and the Natural Theology of Health and Disease," *Victorian Studies* 28 (Spring 1985): p. 381–411 is an interesting exploration of the cultural and philosophical dimensions of the filth theory of disease and their relevancy to sanitary reform in England.

4. Massachusetts State Board of Health, "Report on Slaughtering for Boston Market," in *First Annual Report of the State Board of Health of Massachusetts* (Boston, 1870), 20–22; E. H. Janes, "Sanitary View of Abattoirs and the Slaughtering Business in New York," *Public Health Reports and Papers* 3 (1877): 24–31, 27–28; Bushrod W. James, "How Abattoirs Improve the Sanitary Condition of Cities," *Public Health Reports and Papers* 6 (1881): 232–38, 233–35; Gustavus Devron, "Abattoirs," *Public Health Reports and Papers* 6 (1881): 217–30, 219.

To make matters worse, even the process of converting wastes into products contributed to the industry's pollution problems. Most slaughterers did not boil the bones and fat of the animals they butchered, nor tan their hides. Instead, they piled them out in the open in the streets or the yards of their slaughterhouses where they could be picked up by carters and transported to the places where independent bone and fat boilers, soap and candle manufacturers, and tanners had their shops. This was a big problem in warm weather. As material in these piles rotted, they generated horrible stench and foul liquids that flowed into street gutters or percolated into the ground. The carts that carried the wastes to the fat and bone boilers often dripped with stinking putrefaction as they trundled through the streets.⁵

Foul stench also emanated from the businesses that processed these wastes into products. Using age old methods, renderers extracted lard and tallow from fat-bearing slaughter scraps, heads, leg bones, and other waste materials by heating them in open vats and cauldrons that emitted greasy, terrible-smelling vapor and smoke. Other tradesmen used equally smelly processes to make glue, neats-foot oil, candles, and soap. Leather tanners tanned hides, flecked with decaying flesh, by soaking them for months in a series of vats filled with lime, sulfuric and other acids or urine and dung, and ground bark, a process that also generated foul odors. All of these processes produced their own foul-smelling waste residues that had to be disposed of somehow.⁶

As the number of animals led to the slaughterhouse skyrocketed, traditional regulatory methods of dealing with these foul-smelling waste streams broke down. Clean-up ordinances requiring butchers and fat melters to clean out their shops on set schedules became increasingly difficult to enforce as the number of shops multiplied. Their businesses were so intrinsically dirty that it was virtually impossible for them to clean them up enough to prevent stench. Prior to the advent of good municipal sewerage and sewage treatment,

5. Janes, "Sanitary View of Abattoirs," 28–29; James, "How Abattoirs Improve the Sanitary Condition of Cities," 234–35; John Duffy, *The Sanitarians: A History of American Public Health* (Urbana, Ill., 1990), 30, 88; "Board of Health - About Butchers," *New York Times*, 29 Aug. 1866, p. 5.

6. Edward B. Dalton, "Annual Report of the Metropolitan Board of Health of New York, 1866," *North American Review* 106 (April 1868): 351–75, 368; Massachusetts State Board of Health, "Report on Slaughtering," 26; Henry G. Crowell, "Sanitary Regulations Relating to Abattoirs," *Public Health Reports and Papers* 3 (1877): 16–23, 16; Barbara McMartin, *Hides, Hemlocks, and Adirondack History: How the Tanning Industry Influenced the Region's Growth* (Utica, N.Y.), 12–25. See also Diana Muir, *Reflections in Bullough's Pond: Economy and Ecosystem in New England* (Hanover, N.H., 2000), 93–97.

the use of water to clean the killing floors simply washed the ever-increasing quantities of putrefying organic material into open street drains and local waterways.

The traditional practice of using zoning ordinances to isolate these industries in localities some distance away from the more densely settled central districts also became increasingly problematic. Zoning regulations did not reduce noxious industrial emissions. Instead they allowed traditional nuisance businesses to pollute without restriction in the areas in which they were permitted to operate. When urban population growth took off, residents began moving into the areas where these businesses were permitted and their foul odors could not be avoided. By then, however, the increasingly numerous butchers, packers, fat melters, and other animal waste processors in operation in the larger cities and centers of the packing trade usually had enough political clout to make it hard for municipal officials to revise the zoning laws to force them to move to more distant locations—or even to enforce the zoning and other regulatory laws on the books.⁷

Nuisance law also proved to be a weak tool for forcing the slaughtering and waste by-product processing industries to reduce their emissions—notwithstanding the justice system's deeply ingrained tradition of treating their stench as per se material nuisances from which people had an inherent right to be protected, a principle that theoretically could have enabled judges to force all such businesses out of densely settled urban areas.⁸ Very few property owners took the costly and complicated step of suing their neighborhood butcher or fat boiler for injunctions to shut them down. When they did, they sued a specific defendant in a particular locality, not all such businesses in a neighborhood or city. The same was true when municipal governments indicted a particularly offensive enterprise for violating public nuisance laws. These narrowly focused actions had little impact on the overall level of industrial pollution in towns and cities.

These problems were significantly alleviated (but not eliminated) during the last three decades of the nineteenth century by several

7. John Duffy, *A History of Public Health in New York City, 1625–1866* (New York, 1968), 420–26, 382 discusses the breakdown of these kinds of regulation in New York; See also, “Abattoirs,” *New York Times*, 1 April 1866, p.3. See Wade, *Chicago's Pride*, 36–41 for problems in Chicago.

8. For a discussion of the common law tradition of treating the pollution of the slaughtering and animal waste processing industries as per se nuisances, see, Christine Meisner Rosen, “‘Knowing’ Industrial Pollution: Nuisance Law and the Power of Tradition in a Time of Rapid Economic Change, 1840–1864,” *Environmental History* (Oct. 2003): 563–95.

major improvements in the design and management of the facilities in which slaughtering, meatpacking, and animal waste processing took place. The advances included the design and construction of large-scale meatpacking houses and municipal abattoirs that physically integrated an increasingly wide variety of rendering and other waste by-product processing activities with slaughtering and packing operations—and the changes in management organization and practice that accompanied this integration. They also included the invention of technologies for collecting blood, offal, and other slaughter wastes and converting them into an increasingly wide variety of useful products and the implementation of technical and management systems that ensured that slaughtering wastes would be picked up and conveyed to sealed storage tanks and processing facilities quickly and efficiently, before decay set in. The invention of equipment for preventing the emission of foul smelling gases from rendering tanks and other waste processing machines also helped these industries control their pollution, as did the installation of refrigeration systems to keep waste as well as meat from decomposing, running water to facilitate the cleaning of slaughtering, packing and waste processing facilities, and asphalt floors to prevent seepage of wastes into the ground.

These improvements were aspects of the rise of large-scale, increasingly mechanized, capital intensive, vertically integrated meatpacking companies, like Swift and Armour, as well as the emergence of large-scale, increasingly mechanized, capital intensive, and diversified independent glue, soap, lard oil, fertilizer, and other animal waste processing companies like Procter & Gamble. The purpose of this article is to fill a gap in the business history of these important developments—a gap left by a generation of business historians who abstracted the rise of these businesses from the environmental as well as the regulatory and legal contexts in which they arose, contributing a great deal to our understanding of organizational and technological change in the packing industry and the market drivers behind this change, while missing an important piece of a much larger picture.⁹

9. The two most important mainstream, book-length business histories of the meatpacking industry are Mary Yeager, *Competition and Regulation* (Greenwich, Conn., 1981) and Walsh, *Rise of the Midwestern Meat Packing Industry*. Alfred Chandler also used the meatpacking industry to exemplify the rise of modern, large-scale, vertically integrated business in *Strategy and Structure: Chapters in the History of the Industrial Enterprise* (Cambridge, Mass., 1962), 25–27 and *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, Mass., 1977), 299–302, 391–402. These works, which are representative of what is

The article will show that management response to pollution regulation, litigation, and public protest—not just market conditions—shaped the processes of technological innovation, spatial reorganization, and vertical integration, which led to the development of the modern packing industry. Over time these developments would significantly reduce the industry's waste discharges and stench pollution, while helping to improve the efficiency of production and lowering the prices Americans paid for fresh and preserved meat. They would not, however, come close to eliminating these problems, which would continue to challenge industry engineers and government leaders and plague the people living and working in neighborhoods located close to these facilities for decades to come.

I will focus on describing the role that regulators, public health reformers, vigilantes, and the courts played in the history of these industries in the late 1860s and 1870s in New York City and in nearby Jersey City as well as in Chicago, the city that has drawn the lion's share of the attention of business historians interested in the evolution of the meatpacking industry. Like Chicago, New York City was an important regional center of the slaughtering, packing, and animal waste processing trades in this period. Jersey City was an outpost of the New York City market. The case studies will show that if we are to fully understand the modernization of these industries,

often called the Chandlerian approach to business history, focus on the economic and technological drivers behind the rise of the large, vertically and horizontally integrated, multidivisional firms that came to dominate the industry at the end of the nineteenth century. The only book-length treatment of the history of this industry that diverges from this model in a significant way is Louise Carroll Wade, *Chicago's Pride: The Stockyards, Packingtown, and Environs in the Nineteenth Century* (Urbana, Ill., 1987). Wade takes a holistic approach to analyzing the development of Chicago's meatpacking industry that integrates detailed analysis of its operational, technological, and spatial development with analysis of its environmental impacts, the regulation of its pollution, its other regulatory problems, labor issues, and its impact on community life in Packingtown. In another important departure from the mainstream norm, Roger Horowitz, Jeffrey M. Pilcher, and Syndey Watts argue in "Meat for the Multitudes: Market Culture in Paris, New York City, and Mexico City Over the Long Nineteenth Century," *American Historical Review* 109 (Oct. 2005): 1055–83 that differences in national styles of regulation led to different patterns of industrial development in the packing industry in France, Mexico, and the United States. For a study that focuses on the regulation of the industry's pollution, but not its business history, see Andrew Hurley, "Busby's Stink Boat and the Regulation of Nuisance Trades, 1865–1919," in *Common Fields: An Environmental History of St. Louis*, ed. Andrew Hurley (St. Louis, Mo., 1997), 145–62.

we must attend to the role played by environmental and regulatory forces as well as that played by market forces.¹⁰

New York City

In 1866, after a long struggle by public health reformers, the state of New York established the New York Metropolitan Board of Health and charged it with responsibility for protecting Manhattan and the town of Brooklyn from the ravages of an impending cholera epidemic and other diseases responsible for the city's high mortality rates. The state granted the Metropolitan Board unprecedented authority to enact and enforce public health regulations and to function as a quasijudicial body with the authority to issue warrants, compel witnesses, hold hearings, and resolve disputes related to its legal actions. These powers enabled the Board to reduce the death toll from the cholera epidemic way below that which the city had suffered in previous epidemics, making it a model for health reformers around the country.¹¹

One of the first things the Board did as part of its effort to protect the city from the epidemic was to embark on a campaign to clean up the slaughtering and rendering industries. Riding a wave of public revulsion against the foul odors these trades emitted, which were widely believed to spread disease, the Board began preparing

10. In 1880, New York City (Manhattan and the Bronx) ranked second only to Chicago in terms of the "value of products" of its combined slaughtering and meatpacking industries. The value for Chicago was \$85,324,371, and for New York City, \$29,297,527. The next highest was Cincinnati, at \$11,614,810. See Table 7, U.S. Bureau of the Census, *Census of Manufacturers: 1905: "Slaughtering and Meat packing, Manufactured Ice, and Salt,"* Bulletin 83 (Washington, D.C. 1907), 14–15. (Brooklyn ranked sixth at \$8,010,486.) Philadelphia, a city also discussed in this article, ranked seventh, at \$7,869,114. Jersey City was also on the list of cities whose meat industries had products valued at over \$5,000,000, but to avoid disclosure of individual establishments, it was not broken out and listed individually.

11. H. Brieger, "Sanitary Reform in New York City: Stephen Smith and the Passage of the Metropolitan Health Bill," *Bulletin of the History of Medicine* 40 (Sept.–Oct. 1966): 407–29; Duffy, *History of Public Health in New York City, 1625–1866*, 540–71; Duffy, *A History of Public Health in New York City, 1866–1966* (New York, 1974), 1–31; D. Kramer, "Early Municipal and State Boards of Health," *Bulletin of the History of Medicine* 24 (Nov.–Dec. 1950): 503–16; Charles E. Rosenberg, *The Cholera Years: The United States in 1832, 1849, and 1866* (Chicago, 1962), 192–212. See also George Rosen, *A History of Public Health*, Expanded Edition (Baltimore, Md., 1993), 223–24; and Duffy, *The Sanitarians*, 120–25.

regulations to force the industry out of the built-up lower sections of the city, a conventional move in keeping with the tradition of using the city's police power to force noxious businesses to locate in less built-up zones where their stench would affect fewer people. More innovatively, it also ordered the city's nearly 300 fat, bone, soap, and gut boiling establishments to replace their open rendering kettles with sealed steam tanks and install other stench-abating equipment. It also ordered its nearly 200 slaughterers to abate their odors by constructing sewer connections, improving the ventilation of their premises, closing doors and windows that opened on public streets, and cleaning out their offal every day. The Board also tightened up the restrictions on driving livestock through city streets. To put teeth in these directives, it ordered the butchers, fat melters, bone boilers, and other animal waste processors to obtain licenses to operate.¹²

In an even more extreme move, Board leaders also began advocating for a radical structural transformation of these industries. They called for the construction of large, modern, sanitary "abattoirs," equipped with "every facility for cleanliness and decorum, and efficient means for utilizing hides, hoofs, horns, bones, blood, and offal upon the spot," modeled after those in France. French abattoirs were large, compulsory, government-operated slaughterhouses that were designed to meet the highest sanitary standards. They were equipped to render lard and tallow on site, a form of vertical integration that eliminated the need to pile such wastes on the streets and cart them elsewhere. The space inside them was divided into stalls that were rented by individual butchers who made payment by giving the operators the feet and legs of the animals they killed or other waste.¹³

12. "Sanitary Reform," *New York Times*, 18 March 1866, p. 4. A list of the many regulations that the Board imposed on these industries in the first year can be found at Jackson S. Schultze, "'H': Code of Health Ordinances and Rules and Sanitary Ordinances," in *Annual Report of the Metropolitan Board of Health*, New York Metropolitan Board of Health (New York, 1866), 385–89, 396. They are summarized at "The Code of Health—Practical Requirements of the Sanitary Law," *New York Times*, 20 May 1866, p. 4. For key Board actions, see, New York Metropolitan Board of Health, *Annual Report of the Metropolitan Board of Health*, 18–24, 27, 376–77.

13. New York Metropolitan Board of Health, *Annual Report of the Metropolitan Board of Health*, 33–35; E. Harris, "'A': Report of the Sanitary Superintendent," in *Third Annual Report of the Metropolitan Board of Health* (New York, 1868), 113; Dalton, "Annual Report of the Metropolitan Board of Health of New York, 1866," 365–66; "Public Slaughter-Houses," *New York Times*, 18 Sept. 1867, p. 2. See also Citizens' Association of New York, Council of Hygiene and Public Health, *Sanitary Condition of the City: Report of the Council of Hygiene and Public Health of the Citizens' Association of New York* (New York, 1970), reprint of the Second Edition of Report of the Council of Hygiene and Public Health (New York, 1866), xciv;

Though they briefly raised the possibility of French-style government control, the leaders of the Metropolitan Board seem to have assumed that private businesses would construct and operate the abattoirs they hoped to see get built.¹⁴ They envisioned that a few such businesses would centralize the city's slaughtering, rendering, and livestock droving industries in several well-equipped abattoirs in locations near the docks along the Hudson and East rivers above 40th street and in New Jersey near the railroad terminals along the Hudson River. This would enable livestock shippers to move the animals directly from barges and railroad cars to the slaughter pens, finally ending the driving of herds of cattle, sheep, and hogs through city streets. By physically integrating the operations of butchers and animal waste processors, the well-designed and equipped abattoirs would do away with the filth and stench of the present system, even as they cut costs by improving the efficiency with which these materials were moved from one stage of the production process to the next, by eliminating the need to pile rotting slaughterhouse wastes in the open and cart them long distances to the processors or disposal at the offal dock. This would spur the growth of the packing industry, by enabling packers to make money from the utilization of wastes that they were currently selling to external processors or throwing away, thus simultaneously benefiting industry and the public health.¹⁵

The Board was only partially successful in achieving these goals. Its struggles reveal how deeply conservative most butchers and animal waste processors in New York City were, and how unwilling they were to adopt new ways of doing business, including ones that would prove profitable by virtue of how they increased the efficiency of their operations.

Janes, "Sanitary View of Abattoirs," 24–31; and "Abattoirs," *New York Times*, 1 April 1866, p. 3.

14. "Metropolitan Board of Health—Meeting of the Butchers' Hide and Melting Association," *New York Times*, 13 March, 1866, p. 4.

15. The assumption that the abattoirs would be privately owned and operated is evident in the widespread use—by the Board, New York city newspapers, and public health reformers elsewhere—of the term "abattoir" as a label for large, privately constructed cattle slaughter and packing plants constructed with at least some of the sanitary features they deemed desirable and characteristic of European abattoirs. See, for example, "Metropolitan Board of Health—The Butchers and Slaughter-Houses," *New York Times*, 23 March 1866, p. 8; "The Communipaw Abattoirs," *New York Times*, 20 Sept. 1866, p. 2; Janes, "Sanitary View of Abattoirs." See also, Crowell, "Sanitary Regulations Relating to Abattoirs," 16–23; James, "How Abattoirs Improve the Sanitary Condition of Cities," 232–38; Devron, "Abattoirs," 217–30.

The leaders of the Board initially hoped that they would be able to obtain the voluntary cooperation of many if not all of the city's butchers, fat melters, and other tradesmen if they approached them with a "gentle, though firm hand." They convened several meetings that they framed as conversations with the tradesmen in which they reached out to them in a spirit of collaboration, emphasizing their desire to work with them so that their move into new sanitary quarters uptown could be made "with good feeling" rather than as a result of "coercion." They knew that many of the city's butchers, fat melters, and other waste processors were set in their ways and would resist demands that they invest in stench-abating equipment or relocate. They believed, however, at least at first, that given time, encouragement, and technical help, most of the tradesmen would come around to seeing the necessity of making changes that would so greatly benefit the whole community, including themselves. As Sanitary Superintendent Edward P. Dalton put it, "A people long accustomed to order their lives, each individual in his own way, without reference to those about him, cannot all at once be brought to see the benefit of a measure which shall subordinate personal advantage to the general good. To any measure of this sort the people must be educated to discern that each individual will in the end enjoy far greater benefits when all shall so live as to contribute to the public welfare."¹⁶

This well-intentioned attempt to defuse industry opposition failed miserably. Although some tradesmen quickly complied with the Board's request and some wealthy butchers began making plans to form abattoir companies, most of the city's butchers and animal waste processors refused to make any significant improvements in

16. Dalton, "Annual Report of the Metropolitan Board of Health of New York, 1866," 363–69, "hand" and "A people long accustomed" quotes are from p. 363; other quotes are from "Metropolitan Board of Health—Meeting of the Butchers' Hide and Melting Association," *New York Times*, 13 March 1866, p. 4; see also "The Butchers and the Board of Health," *New York Times*, 15 March 1866, p. 4; "About the Butchers," *New York Times*, 16 March 1866, p. 4; "Sanitary Reform," *New York Times*, 18 March 1866, p. 4; E. B. Dalton, "'A': Report of the Sanitary Superintendent," in *Second Annual Report of the Metropolitan Board of Health* (New York, 1867), 29; Moreau Morris, "'K': Report of Inspector Moreau Morris Upon the Nuisance from Fat Melting," in *First Annual Report of the Metropolitan Board of Health* (New York, 1866), 410–14.

their operations whatever.¹⁷ The industries' response reveals how intensely disinterested most were in turning their wastes into valuable products and or doing anything beyond what they were already doing to abate their stenches. It also makes clear that they had many reasons for feeling this way. Many feared the improvements would be so costly as to put them out of business. But this was only one cause of their anger. They also refused to admit that they were causing serious pollution problems. Numerous butchers and fat melters, including many of the most important leaders of these businesses, testified at the meetings the Board convened that there was no need for relocation and other expensive changes because their businesses were not inherently dangerous to public health. They claimed that the Board was insulting their public spiritedness by implying that they were not already doing everything in their power to conduct their operations in ways that would prevent the spread of disease during the current cholera emergency. Only a few poorly kept slaughterhouses and melting places were responsible for the vast majority of their industries' filth and stench; the rest were clean and stench free. To prove this, some invited the Board members to tour their businesses, to see first hand how high their standards were.¹⁸

As the months passed, the conflict intensified. The more the Board leaders encouraged the tradesmen to comply, the more the vast majority dug in their heels and refused. The tour the tradesmen organized for the Board confirmed its leaders' suspicion that even the best slaughterhouses were filthy. By mid-summer, Board leaders were ready to take a much more aggressive approach to achieve their goals. After what the *New York Times* called "repeated 'general orders,' 'orders verified,' 'final orders,' hearings, experiments, renewed orders, entreaties, kicks, caresses, and appeals," they abandoned their attempt to elicit voluntary cooperation and began ordering the owners of the most noxious businesses to suspend their operations until they came into compliance. The most recalcitrant ones responded by suing to

17. "Metropolitan Board of Health—The Butchers and Slaughter-Houses," *New York Times*, 23 March 1866, p. 8; New York Metropolitan Board of Health, *Annual Report of the Metropolitan Board of Health*, 34–35; "Local Intelligence—Uptown Nuisances," *New York Times*, 19 May 1866, p. 8; "An Abattoir for New York," *Scientific American* 15 (18 Aug. 1866): 120.

18. "Metropolitan Board of Health—Meeting of the Butchers' Hide and Melting Association," *New York Times*, 13 March 1866, p. 4; The Butchers and the Board of Health," *New York Times*, 15 March 1866, p. 4; "About the Butchers," *New York Times*, 16 March 1866, p. 4; Dalton, "Annual Report of the Metropolitan Board of Health of New York, 1866," 365–69;

stop enforcement of the orders—in most cases winning injunctions that put the Board’s whole regulatory initiative in jeopardy.¹⁹

Bolstered by strong public support, the Metropolitan Board ultimately prevailed—but only after two years of contentious litigation. The fat melters surrendered relatively quickly, after a wave of protest prompted a judge to dissolve the injunctions he had granted just days earlier and a prominent practitioner of their trade was sentenced to 60 days in jail when he continued to refuse to comply with the Board’s orders. By late summer 1866, all the city’s lard and tallow manufacturers, soap makers, and other boilers and melters of animal waste had either gone out of businesses or agreed to replace their antiquated kettles and cauldrons with sealed rendering tanks and install the other stench-abatement equipment the Board required.²⁰

The butchers’ fight to block the imposition of the orders forbidding the driving of cattle and the operation of their slaughterhouses below 40th street dragged on much longer. It, too, was finally extinguished, however. In March 1868, New York state’s highest court, the Court of Appeal, ruled that the state legislature had the constitutional authority under the police power to create the Metropolitan Board and empower it to take all the regulatory actions needed to protect the public health, including imposing zoning regulations on the industry. This victory allowed the Board to adopt a much more aggressive policy of prosecuting companies for violating its orders, finally enabling it to

19. “Local Intelligence—The Butchers and Drovers,” *New York Times*, 20 June 1866, p. 8; “Local Intelligence—Another Injunction,” *New York Times*, 17 July 1866, p. 2; “Law Reports—The Fat-Melting Establishment at Abattoir-Place—Argument of the Motion for an Injunction,” *New York Times*, 20 July 1866, p. 3; “Local Intelligence—Closing the Fat-Melting Establishments,” *New York Times*, 24 July 1866, p. 2; “Injunctions’ on Nuisances,” *New York Times*, 31 July 1866, p. 4; “Law Reports—The Cattle Driving and The Slaughterhouse Nuisance,” *New York Times*, 24 Aug. 1866, p. 3; “City Slaughter-Houses,” *New York Times*, 29 Aug. 1866, p. 5; Dalton, “Annual Report of the Metropolitan Board of Health of New York, 1866,” 364–65, 368. Quote is from “Local Intelligence—Another Injunction.” The Board imposed regulations on a wide range of businesses, not just the traditional nuisance industries. A number of these other initiatives also sparked litigation. For an overview of the full range of lawsuits and injunctions the Board had to deal with and the difficulties this posed for the Board, see George Bliss, Jr., “F’: Report of the Attorney,” in *Annual Report of the Metropolitan Board of Health* (New York, 1866), 358–75.

20. “Law Reports—The Fat-Boiling Nuisances,” *New York Times*, 28 July 1866, p. 3; “Injunctions’ on Nuisances,” *New York Times*, 31 July 1866, p. 4; New York Metropolitan Board of Health, *Annual Report of the Metropolitan Board of Health*, 23, 36–37; Bliss, “F’: Report of the Attorney,” 362–63; *Westheimer v. Schultz*, 33 How. Prac. 11 (New York 1866).

force the city's butchers to agree to move their establishments above 40th street.²¹

As a result of the Board's regulations and the legal decisions that upheld its right to impose them, many of the improvements the Board sought to achieve took place. The city's butchers and meatpackers moved out of lower Manhattan into new premises—or left the city or went out of business. Most, though by no means all, of those who stayed modernized their operations quite substantially when they relocated, moving into bigger and more mechanized quarters where they performed more on-site waste processing, changes that enabled them to take unprecedented advantage of economies of scale and scope, while reducing the need to transport waste around the city. All the pork packers moved into well-equipped plants to the area near the Hudson between 30th and 41st Streets, which were equipped (or would in the next few years be equipped) with on-site tanks for rendering fat into lard. Though they spread out more and modernized less, cattle butchers and beef packers also improved their quarters—at least to the level required by the new regulations. Many moved into one of three new abattoirs, where health officials could easily monitor their operations, and their wastes were easily collected and processed into tallow in on-site rendering tanks or made ready for transporting to independent processors under the watchful eyes of the sanitary inspectors. The rest moved into their own small, detached, less well-constructed shops on the east and west sides. In addition, some of the city's slaughtering and packing activity (and possibly some of the butchers engaged in it) moved across the Hudson to New Jersey to a huge new abattoir constructed on Communipaw Cove in Jersey City, a business that the leaders of the Metropolitan Board lauded as a model of sanitary progress when it opened in October 1866.²²

21. The butchers initially mounted 17 lawsuits to stop enforcement of the Board's orders. For a detailed description of the arguments in one of the cases see: "Law Reports—Superior Court—General Term—June 22," *New York Times*, 23 June 1867, p. 3. For the text of the legal decision that turned things around for the Board see *Metropolitan Board of Health v. Heister*, 37 N.Y. 661 (1868). See also, Harris, "'A': Report of the Sanitary Superintendent"; "The Butchers and the Board of Health," *New York Times*, 3 July 1868, p. 5; New York Metropolitan Board of Health, *Third Annual Report of the Metropolitan Board of Health* (New York, 1868), 37–38; B. Eaton, "'B': Third Annual Report of the Legal Department," in *Third Annual Report of the Metropolitan Board of Health* (New York, 1868), 154–61; Bliss, "'C': Report of the Attorney of the Metropolitan Board," in *Third Annual Report of the Metropolitan Board of Health* (New York, 1868), 161–62.

22. New York Metropolitan Board of Health, *Third Annual Report of the Metropolitan Board of Health*, 37–38; Janes, "Sanitary View of Abattoirs," 25–27; Harris, "'A': Report of the Sanitary Superintendent," in *Third Annual Report of the Metropolitan Board of Health* (New York, 1868), p.117, 127 and 137; New York

Equally important, the companies engaged in animal waste processing came into compliance with the Metropolitan Board's regulations for abating stench from their rendering tanks. Most installed sealed rendering tanks and stench-abatement equipment that condensed the smelly gases generated during the rendering processes and discharged them into sewers or the Hudson River. Some installed the even more effective equipment that vaporized the organic material in the gases by running them through a boiler.²³

These advances demonstrate the powerful role regulation played in the process by which these industries modernized their production facilities and integrated into by-product manufacturing while abating their emission of stench. The Board's regulation did not, however, succeed in forcing New York City's butchers, packers, and animal waste processors to completely eliminate their waste and pollution discharges. Quite the contrary, they continued to emit a great deal of both into the city's environment. As a result, the changes also reveal the continuing limits of the private sector's interest in waste recycling and pollution control, limits that persisted despite the Board's best efforts to induce them to take the steps needed to completely close the loop on waste.

By the end of 1869, a mere four years after Metropolitan Board began its work, the scope of these limits was already clear. As the leaders of the Board ruefully admitted, the slaughtering, packing, and animal waste processing industries were still creating terrible stench, despite strict enforcement of the regulations and what they called the "good faith" efforts of the tradesmen "to render their works harmless" through the installation of "[n]ew and costly machinery," the liberal use of disinfectants, and the implementation of "every suggestion of chemists and experts . . . to accomplish the desired

Metropolitan Board of Health, *Fourth Annual Report of the Metropolitan Board of Health* (New York, 1869), 16, 50–57; "The Communipaw Abattoirs," *New York Times*, 20 Sept. 1866, p. 2; "Opening of the New Abattoirs—Great Celebration at Communipaw," *New York Times*, Oct. 18 1866, p. 2.

23. New York Metropolitan Board of Health, *Annual Report of the Metropolitan Board of Health*, 23–24, 36–37; Bliss, "'F': Report of the Attorney," 362–63. For a description of how a bone burning establishment "effectively destroyed" its odors, see Harris, "'A': Report of the Sanitary Superintendent," 123. However, the Board found it had to monitor the waste processors very rigorously to ensure that they kept this equipment in good working order. New York Metropolitan Board of Health, *Third Annual Report of the Metropolitan Board of Health*, 19, 39; See also: Harris, "'A': Report of the Sanitary Superintendent," 69–70, 112–13, 127. New York Metropolitan Board of Health, *Fourth Annual Report of the Metropolitan Board of Health*, 26–27, 49–50, 53.

object.” Some animal waste processors were using their stench-abatement equipment improperly. Many were allowing “crude fatty tissues” to pile up on their premises or emptying the rendering tanks carelessly and disposing of the residues improperly.²⁴

The biggest problem, however, was that despite the increase in on-site lard and tallow manufacturing and some other forms of waste processing, the vast majority of pork packers and cattle butchers were still draining blood into sewers and still putting large amounts of other wastes out for collection by the cartmen who took them to the many independent fat melters, bone boilers, and soap and fertilizer manufacturers still in operation in the city. Even worse, most were still putting a great deal of waste out for transportation to the city’s offal dock, the destination of last resort for materials the private sector had no interest in processing into products. All these materials still were still decomposing while waiting to be collected and still reeking of decay en route to the waste processors and the dock. At the dock, barrels of offal were still being piled up along with rotting animal carcasses and spoiled meat and other animal refuse from the city’s markets, before being taken to the stinking offal boats for rendering and disposal.²⁵

As a result of the continuing stench problems, the leaders of the Board began trying to impose tougher regulations on these industries. In 1869, they banned the establishment of new fat melting businesses below 110th Street and required all existing fat melters located below 110th Street to obtain new permits to operate that were conditional on their proving to a sanitary inspector that they were using “the most approved methods” for securing cleanliness in their operations as well as “fresh materials only.” They also proposed a prohibition on slaughterhouses from locating between First and Eleventh Avenues, a regulation enacted in 1870.²⁶ In 1870 the Board was replaced by a new Department of Health. The new Department continued to struggle with the industry’s pollution problems. In 1873, its leaders began

24. New York Metropolitan Board of Health, *Fourth Annual Report of the Metropolitan Board of Health*, 20–21, 23–27, 49–52, quotes are from pp. 26 and 51.

25. *Ibid.*, 20–21, 23, 49, 56–57; Janes, “Sanitary View of Abattoirs.” Progress was taking place but it was slow. The only abattoir equipped to dry blood and offal and convert it into fertilizer was built in 1875. See, “The New Abattoir—A Model Establishment,” *New York Times*, 1 Aug. 1875, p. 5.

26. New York Metropolitan Board of Health, *Fourth Annual Report of the Metropolitan Board of Health*, 27. New York Board of Health, *Annual Report of the Board of Health of the Health Department of the City of New York* (New York, 1870), 21–22.

considering a much more radical plan to either ban the slaughtering of hogs entirely within the city limits or force the hog yard, butchering, packing, and rendering industries to locate in a single, centrally located, sanitary abattoir large enough to “accommodate the entire business in all its details, and of such material and construction as to prevent all nuisance.” In 1874, Department leaders went a step further and proposed an ordinance to force the entire livestock, slaughtering, and animal waste processing industry (for cattle and sheep as well as hogs) to concentrate within a single giant abattoir located above 110th Street. This plan, which generated enormous controversy, failed to be enacted, and because the Department experienced increasing difficulty enforcing the regulations on the books, the industries’ waste and stench problems continued to plague the city.²⁷ In the mid-1880s, things got so bad that the city’s Ladies’ Health Protective Association took on the issue, holding protests and introducing a bill in the State Legislature to tighten regulatory restrictions on the slaughtering and packing industries. The rapid growth of the fertilizer and bone boiling (and chemical and oil refining) industries in Brooklyn in the 1870s and 1880s spread the turmoil, creating a pollution problem of multijurisdictional proportions that helped lead to the establishment of the New York State Board of Health.²⁸

27. Duffy, *History of Public Health in New York City 1866–1966*, 128–32; “The Rendering Nuisance,” *New York Times*, 23 July 1873, p. 3; G. Ceccarini, Stephen Smith, and Magnus Gross, “Fat Melting,” in *First Annual Report of the Board of Health of the Health Department of the City of New York* (New York, 1870), 509–11; “The Board of Health—Sanitary Measures,” *New York Times*, 13 Aug. 1873, p. 2; “Sanitary Suggestions,” *New York Times*, 26 Feb. 1874, p. 2; “Sanitary Reforms—Proposed Removal of the Abattoirs,” *New York Times*, 4 March 1874, p. 3; “The Abattoir System,” *New York Times*, 11 March 1874, p. 3; “The Proposed Abattoir,” *New York Times*, 18 March 1874, p. 8; “Sanitary Matters—The Various Nuisances Which Ought to Be Abated,” *New York Times*, 26 July 1874, p. 1; “Board of Health—An Important Meeting Yesterday,” *New York Times*, 3 Sept. 1874, p. 2; “Slaughter-Houses Inspected,” *New York Times*, 16 March 1876, p. 8; “The Slaughtering Nuisance in New York,” *Sanitary Engineer* 11 (16 April 1885): 411.

28. “A Tour by the Ladies of the Health Protective Association,” *New York Times*, 27 Jan. 1885, p. 8; “Legislation at Albany,” *New York Times*, 17 March 1885, p. 1; “To Prepare for Cholera,” *New York Times*, 29 March 1885, p. 7; “Regulating the Slaughtering Nuisance,” *Sanitary Engineer* 11 (2 April 1885): 378. For more on the industry’s stench problems in Brooklyn, see, Andrew Hurley, “Creating Ecological Wastelands: Oil Pollution in New York City, 1870–1900,” *Journal of Urban History* 20 (May 1994): 340–64.

Jersey City

As in New York, government authorities in New Jersey helped set in motion the process of technological and business innovation that paved the way for the emergence of large modern, integrated, and sanitary enterprises in the meatpacking and animal waste processing industries. Here, however, the state's chancery court played the role of change driver, filling a void left by the failure of state and local governments to create strong public health authorities and give them powers commensurate with those wielded by the Metropolitan Board. When growth took off in the packing and animal waste processing industries in New Jersey in the late 1860s, the lack of a regulatory structure forced people outraged by their stenches to turn to public protest, vigilante action, and, if they could afford it, injunction suits for protection. This generated a case law record that provides further insight into the limited extent to which companies in these industries were willing to invest in innovative forms of waste utilization and stench abatement in the absence of strong regulation, while simultaneously illuminating the role that the courts sometimes played in motivating firms to develop these capabilities in the absence of such regulation. Because the New Jersey livestock, packing, and animal waste processing industries were so closely tied into the New York market, the case law also provides additional insight into why government regulation played such an important role in the modernization of these industries in New York City.

Two of the most interesting cases were *Babcock v. New Jersey Stock Yard Company*, decided in 1869, and *Manhattan Manufacturing and Fertilizing Co. v. Van Keuren*, decided in 1872.²⁹ Both were issued in response to lawsuits over pollution problems at a huge cattle, sheep, and hog stockyard and meatpacking business located adjacent to the New Jersey Central Railroad's terminal at the harbor at Communipaw Cove in Jersey City. This facility was initially hailed by the leaders of the Metropolitan Board as a model abattoir that exemplified the centralization, sanitary design, and integration of slaughtering and animal waste processing that they hoped to see structurally transform these businesses in New York City. The lawsuits shed light on how even the most innovative, well-capitalized, large-scale firms that might today be called "socially responsible" (because they designed their factories to exceed local regulatory requirements), dragged their

29. *Babcock v. New Jersey Stockyard Co.*, 20 N. J. Eq. 296 (1869); *Manhattan Mfg & Fertilizing Co v. Van Keuren*, 23 N. J. Eq. 251 (1872).

feet when it came to waste utilization and stench abatement. They also document the technical challenges such businesses faced trying to abate their pollution.

When opened by the New Jersey Stockyard and Market Company in October 1866, six months after the establishment of the Metropolitan Board, the Communipaw facility was a large-scale, highly (but, as we will see, not completely) integrated enterprise comprised of stockyards that held as many as 20,000 hogs, 10,000 sheep, and 20,000 cattle, as well as a large, mechanized slaughterhouse, a rendering house, and an ice house. It also contained a variety of facilities deemed essential by public health reformers, such as “ample” provisions for good ventilation and for keeping the place clean and state of the art, sealed rendering tanks.³⁰ Its scale and sanitary features were so impressive that the Secretary of the Metropolitan Board enthusiastically thanked its “enterprising” owners in a speech delivered at a formal dinner held to celebrate the inauguration of the plant, “for engaging in such a humane and philanthropic work for the citizens of New York and Brooklyn.”³¹

The *Babcock* plaintiffs were owners of expensive residences in Jersey City located near the company’s premises. In their lawsuit, they charged that the company was emitting foul smelling “poisonous gasses” that were impairing their families’ health and destroying their property values. The sources of this pollution included the firm’s on-site rendering tanks and the large quantities of blood and offal it was discharging into New York Bay, “which at low tide was left exposed to the sun in putrid masses,” as well as the droves of hogs held in its stockyard. They had previously obtained a partial injunction that imposed weak limits on how long the firm could hold live hogs in pens prior to slaughter. Now they were asking the chancellor to shut the whole business down.³²

The chancellor agreed that the stenches were unacceptable. Rather than impose a full injunction, however, he modified the existing

30. “Abattoirs at Communipaw,” *New York Times*, 5 May 1866, p. 2; “Local Intelligence—The Communipaw Abattoirs,” *New York Times*, 29 June 1866, p. 2; “The Communipaw Abattoirs,” *New York Times*, 20 Sept. 1866, p. 2; “The Communipaw Abattoir,” *New York Times*, 12 Nov. 1868, p. 8; “The Great Abattoirs at Communipaw, New Jersey,” *Scientific American* 19 (16 Dec. 1868): 392.

31. Quotes are from “Opening of the New Abattoirs—Great Celebration at Communipaw,” *New York Times*, 18 Oct. 1866, p. 2. For the Board leaders’ delight that this large abattoir was located in New Jersey (not NYC); see, “The Communipaw Abattoirs.”

32. Quote is from “The Communipaw Abattoir—Application for an Injunction,” *New York Times*, 14 Aug. 1869, p. 2; *Babcock v. New Jersey Stockyard Co.*, 20 N. J. Eq. 296.

injunction, allowing the defendant to continue to operate the stockyard and abattoir, but reducing the time it was allowed to keep live hogs on its premises and, more importantly, requiring it to stop discharging wastes into the bay and abate the stenches from its rendering tanks. Declaring that he believed “from the evidence of the scientific and practical experts and others examined, that it is practicable to remedy these matters,” he gave the defendant time to “perfect the arrangement necessary” to dispose of the wastes currently going into the bay in a more sanitary way. He also appointed a commissioner to consult with experts and issue a report to help the managers of the company determine what actions it should take to solve the problems.³³

As a result of this decision, the New Jersey Stockyard Company made some important changes in how it managed its waste. It began collecting the blood and offal previously discharged into the bay. It rendered the offal to extract the fat and oil it contained on site. In addition, a new company, the Manhattan Manufacturing and Fertilizer Company, was set up. The new firm constructed a factory just 100 yards away from the abattoir to convert the blood into fertilizer, which opened for business in October 1870. These changes took the New Jersey Stockyard Company several steps closer toward full integration into animal waste by-product manufacturing.³⁴

Rather than solve the company’s stench problems, however, the innovations made them worse. Owing to the large quantities of smelly offal that had to be rendered, the company’s on-site rendering operations grew more, not less odiferous. The deterioration was obvious to the Secretary of the Massachusetts State Board Health. After visiting the abattoir in May 1871, he reported that the abattoir was “now poorly managed, and has retrograded in a sanitary point of view,” compared to his visit two years earlier. The New Jersey Stockyard Company was rendering so much foul smelling offal and other slaughterhouse waste that the foul smelling waste materials left in the rendering tanks after the oil was drained off (called “tankings”) completely overwhelmed the capacity of the Manhattan Company’s fertilizer factory. The company dealt with the excess tankings by piling them in barges floating in Communipaw Cove, where, the Massachusetts public health leader charged, they “swarm

33. *Babcock v. New Jersey Stockyard Co.*, 20 N. J. Eq. 296.

34. *Manhattan Fertilizing Co v. Van Keuren*, 23 N. J. Eq. 251. It is not known whether the Manhattan Manufacturing Co. was a subsidiary of the New Jersey Stockyard Co. or an independently owned firm. They were certainly interdependent.

with maggots,” emitting foul stenches as they awaited transfer to the Manhattan Manufacturing and Fertilizer Company’s fertilizer factory, or perhaps to some more distant fertilizer plant.³⁵

Even worse, the Manhattan Manufacturing Company was making phosphate fertilizer, a valuable product produced by an exceptionally vile manufacturing process that involved mixing the tankings and the abattoir’s waste blood with dry phosphate of lime, sulphuric acid, and other chemicals. As the Secretary of the Massachusetts Board graphically explained, the process “[liberated] phosphoric acid to form a new combination with the ammonia of the decomposing meat,” emitting a “dreadful” stench.”³⁶

In a sign of just how far things had deteriorated, the second decision involving the abattoir, *Manhattan Manufacturing and Fertilizing Company v. Van Keuren*, resulted from a vigilante attack on the phosphate fertilizer factory. Because Jersey City did not have a board of health, Street Commissioner Benjamin Van Keuren became the point person for residents infuriated by the factory’s stenches. On July 1, 1871, he warned the manager that it was violating the city’s nuisance ordinance. He gave the company 24 hours to abate the nuisance. Eighteen days later, when no improvements were made, he led an enraged mob, including 24 police, to the facility and proceeded to forcibly abate the nuisance by “taking off the eccentric rods of the machinery for grinding the baked blood, removing the belting or gearing, damaging and carrying off parts of machinery and property, and committing other acts to put a stop to the fertilizer company’s works.”³⁷

Furious, the proprietors of the Manhattan Manufacturing Company won an injunction to stop the townspeople from taking further action and resumed operations. This led to more legal conflict. On August 18, 1871, the city council passed an ordinance that essentially authorized Van Keuren to continue to physically dismantle the Manhattan Manufacturing Company’s machinery and sell it if the company continued to defy his order to abate its stenches. In response, the company sued again. Arguing that this was an illegal violation of due process, it demanded a new injunction to prevent the city from taking any further action to “hinder or impede the operation” of their factory, until a nuisance was proven in a jury trial.

35. Massachusetts State Board of Health, “Slaughtering, Bone-Boiling, and Fat Melting,” in *Third Annual Report of the State Board of Health* (Boston, 1872), 234–35, 243, quote is from p. 234.

36. *Ibid.*, 235, 243, quote is from p. 235; *Manhattan Fertilizing Co v. Van Keuren*, 23 N. J. Eq. 251.

37. *Manhattan Fertilizing Co v. Van Keuren*, 23 N. J. Eq. 251, 252.

This time the chancellor came firmly down on Van Keuren's side and issued a ruling that put a permanent stop to the production of phosphate fertilizer at the Communipaw abattoir. Declaring that "such destruction" of private property was not a violation of constitutional due process, he held that it was a legitimate exercise of its police power that "depends upon the principles that every man must so use his property as not to injure his neighbor and that the safety of the public is the paramount law."³⁸

This was not the end of the story, however. In late 1873, in response to this conflict and the chancellor's strong sanctioning of the city's right to use its police power to protect the public health, the Central Stock Yard and Transit Company, a subsidiary of the Pennsylvania Railroad Company, opened a new sanitary abattoir in Jersey City that was widely praised by public health reformers for its superior design. Known as the Harsimus abattoir, this new facility was fully integrated in an organizational sense, incorporating all stages of the production process, from the flow of livestock into its stockyards through the production of fertilizer from slaughterhouse wastes. Hoping to defuse community opposition by carefully designing the enterprise to prevent the problems at the Communipaw abattoir that had led to so much legal strife, the Central Stock Yard and Transit Company physically isolated its dirtiest operations. It built an enormous cattle yard and an abattoir for slaughtering cattle and sheep adjacent to the Pennsylvania Railroad yards on the Hudson River at Harsimus Cove, a densely settled area at the northern edge of Jersey City. To situate its smelliest operations as far from the center of population as possible, it erected a large hog slaughterhouse and a rendering and fertilizer manufacturing facility nearly four miles away in an undeveloped area on the Hackensack River. It shipped the wastes generated at the Harsimus Cove abattoir to the Hackensack operation for recycling.³⁹

The Central Stock Yard and Transit Company also took several additional steps to ensure that the slaughtering waste generated at the Harsimus abattoir not be given the chance to decompose and stink. It

38. *Ibid.*, 252–257, quotes are from pp. 252, 255.

39. This description of the Harsimus abattoir is based on statements by opponents of the Pennsylvania RR Co's plan to build an abattoir in Philadelphia that was modeled on the Harsimus abattoir, as well as testimony the company marshaled in favor of its plan: *Letter from a Committee of Citizens to the Pennsylvania Railroad Company on the Proposed Schuylkill Drove-Yard and Abattoir* (Philadelphia, 1874), 2–3, 6; *The Philadelphia Stock Yards and Abattoir: The Testimony in Favor of Their Location on the Schuylkill River Above Market Street* (Philadelphia, 1875), 79–81, 83–88, 98, 110–11, 118–20. See also: *Sellers v. Pennsylvania RR. Co.*, 10 Phila. 319 (Penn. 1875), 320.

installed nonabsorbing asphalt floors in the buildings and pens, gave the buildings ventilation and plenty of water for cleaning, and put in good drainage. It also instituted strict rules for cleaning the facilities and removing waste each day in addition to making use of a wide range of technologies to maximize the efficiency with which waste was converted to products and prevent the emission of stench. Workers collected the blood, offal, and other wastes from the slaughtered animals and immediately deposited them into sealed iron tanks for transport to the rendering tanks and fertilizer machines. To prevent the nearly four-mile trip from Harsimus Cove to the Hackensack rendering house from causing problems, the company shipped the waste in these sealed metal tanks in frequently washed and disinfected Pennsylvania Railroad cars, rather than trundling them through city streets in leaky wooden barrels carried in wooden carts pulled by horses.⁴⁰

Most innovatively, the company used a technology newly invented by John J. Craven, a Jersey City physician and “practical chemist,” which integrated the rendering tanks with a machine that dried tankings and blood and converted them into a powdered fertilizer in a process that was sweet smelling compared to the phosphate fertilizer manufacturing process in use at Communipaw Cove. As admiringly described by Bushrod W. James, a Philadelphia public health reformer, the Craven drier consisted of a large cylindrical tank used to render fat from intestines, offal, rough fat and the like that contained a “shaft with radial arms, connected with the engine by pinions and belts.” After this material was twice rendered and the fat drained off, the waste blood was added to the tankage and a motor was turned on to heat, beat, dry, and pulverize them into a powdery fertilizer with “the appearance, consistency, and dryness of ground coffee.”⁴¹

The construction of the Harsimus Cove abattoir illustrates the way public protest and litigation stimulated private sector innovation in the area of pollution control. The Pennsylvania Railroad Company, the parent of the Central Stock Yard and Transit Company, saw an opportunity in the community protest, vigilante attack, lawsuits, and injunctions against the Communipaw abattoir to capture market share from the New Jersey Central Railroad, the railroad line serving Communipaw Cove, through better facility design and pollution abatement. It did more than simply capture market share, however. The Harsimus abattoir was so successful that the New Jersey Stockyard

40. *Sellers v. Pennsylvania RR. Co.*, 10 Phila. 319, 324, 327; *Letter from a Committee of Citizens to the Pennsylvania Railroad Company*, 2–3, 6. *The Philadelphia Stock Yards and Abattoir*, 79–81, 83–88, 98, 110–11, 118–20.

41. James, “How Abattoirs Improve the Sanitary Condition of Cities,” 236.

and Market Company was forced to close the whole Communipaw abattoir.⁴²

But this was not all. The Pennsylvania Railroad also derived strategic benefit from the Harsimus project's innovative design in nearby Philadelphia. Many medical and public health professionals were very impressed by the sanitary features of the Harsimus complex. The railroad deployed some of them as expert witnesses in its successful fight to defeat an injunction suit that threatened to prevent it from constructing a similar facility on its line in Philadelphia.⁴³ It thereby gained a double strategic advantage in the market for transporting livestock from the West and Midwest to these East Coast centers of the slaughtering and packing trades. What is important is that the company earned this advantage by establishing stockyard, packing house, and animal waste processing facilities whose innovative sanitary design features were responsive to public health concerns about the pollution emitted by these industries. By winning the lawsuit, it won, both figuratively and literally, its license to operate them.

These and other similar examples of litigation against the pollution of the packing and animal waste processing industries show that the New Jersey equity court played an important role in the process of technological and organizational modernization as well as pollution abatement in these industries. The decisions not only forced defendants to innovate, but they also created opportunities for shrewdly managed, economically well-endowed firms like the Pennsylvania Railroad to identify unmet needs and take advantage of the economies of waste reuse while overcoming community opposition to the construction of large industrial facilities.

This will come as no surprise to legal historians. Since the publication of William J. Novak's award-winning reinterpretation of American law, *The People's Welfare: Law and Regulation in Nineteenth-Century America*, it has been clear that nineteenth-century courts were deeply involved in regulating the economy to

42. In sworn testimony, the President of the Central Stock Yard and Transit Co. stated that one of the main reasons why the Communipaw facility was "abandoned" was that the Harsimus and Hackensack facilities "adopted the best devised modern sanitary improvements and plans," which were far superior to the "antiquated" and unsanitary design and construction of the Communipaw abattoir. See, *The Philadelphia Stock Yards and Abattoir*, 81.

43. *Sellers v. Pennsylvania RR. Co.*, 10 Phila. 319. One of the expert witnesses was New York sanitary inspector Moreau Morris: *The Philadelphia Stock Yards and Abattoir*, 136–39. See also the testimony of 27 residents of Jersey City in *Ibid.*, 79–125, 139–143.

protect the public health and welfare.⁴⁴ What we see here is that the decisions issued by the New Jersey equity courts in these cases had important impacts on technological and institutional development of the packing industry. In other words, their significance to historians extends beyond the realm of legal history to that of business history.

It should be noted, however, that despite these positive impacts on industrial development and their significance for the history of American law, the practical environmental benefits of the *Babcock*, *Manhattan Manufacturing*, and *Meigs* and other similar decisions were actually quite limited. Because the decisions' injunctive restraints applied only to the defendants—and because lawsuits against the industry's pollution were rare and public health regulation so weak in New Jersey's industrial cities—the state's meatpackers, animal waste processors, and other manufacturers were, in general, under little pressure to abate their pollution. Indeed, by 1880 there were so many air and water polluting fertilizer factories, oil refineries, and other stench producing businesses in Bayonne, New Jersey, that when winds blew east across the Kill Van Kull, the residents of Staten Island complained that they had to keep their windows closed to escape the smells even on the hottest days of summer, and even then they found that the smokes and fumes seeped into their homes and “sensibly” coated their walls and furniture with offensive matter, “to the destruction of the property and the disgust of owners.” These problems caused so much complaint that the New York State Board of Health passed a resolution in April 1881 calling on the Governor of New York to ask the Governor of New Jersey for his help in securing the abatement of the nuisances.⁴⁵

Chicago

Mainstream business histories of the Midwestern meatpacking industry have given short shrift to the problem of the packers' air and water pollution in their analyses of its evolution. They explain its modernization in economic terms, as the product of growing demand in urban areas for meat, growing supplies of

44. William J. Novak, *People's Welfare: Law and Regulation in Nineteenth-Century America* (Chapel Hill, N. C., 1996).

45. “How to Stop the Odors,” *New York Times*, 17 April 1881, p. 16. For more information about the growing problem of urban industrial pollution in this period in Northern New Jersey and the Newtown Creek industrial district in Brooklyn, see, Hurley, “Creating Ecological Wastelands.”

hogs and cattle raised on Midwestern and Southwestern farm and rangeland, the rise of market-expanding canal and railroad systems, the development of technologies for refrigerating fresh meat, and the canny, profit-maximizing decisions of brilliant entrepreneurs like Philip D. Armour and Gustavus Swift, who understood the significance of these developments better than their rivals and were unusually creative in finding ways to profit from this and from technological innovation, vertical intergration, and improvements in economies of scale and scope.⁴⁶ In fact, however, public outrage at pollution, sanitary regulation, and court decisions also helped shape the modernization of the meatpacking and animal waste processing industries in this part of the country, just as they did in the New York and New Jersey areas. This can be seen in the evolution of the meatpacking industry in the city that has drawn the lion's share of the historians' attention, Chicago.

By the early 1860s Chicago was the biggest pork packing center in the United States. Over 500,000 hogs were packed during the 1865–1866 season, the winter when the cholera hit and a relatively slow year for the industry.⁴⁷ Though a high proportion of the tens of millions of pounds of waste generated from this slaughter was being sent to the city's rapidly expanding leather, lard, soap, glue, and fertilizer factories, the city's butchers and packers (as well as the waste processors) were also discharging vast quantities into the Chicago River as well as dumping it in open areas beyond the city limits. As Philip D. Armour recalled years later, "the blood was allowed to run into the river, and men were paid five dollars a load to cart the heads, feet, tankage, and other waste materials out upon the prairie and there bury it in pits and trenches."⁴⁸

46. Yeager, *Competition and Regulation*; Walsh, *Rise of the Midwestern Meat Packing Industry*; Chandler, *Strategy and Structure*, 25–27 and *The Visible Hand*, 299–302, 391–402. See also, Howard Copeland Hill, "The Development of Chicago as a Center of the Meat Packing Industry," *Mississippi Valley Historical Review* 10 (Dec. 1923): 253–73. Louise Carroll Wade's *Chicago's Pride* was an exception, but also not seen as a mainstream business history when published.

47. By 1871–72 the number had grown to well over a million, by 1874–75, to well over two million. Walsh, *Rise of the Midwestern Meat Packing Industry*, 20–21.

48. Philip D. Armour, "The Packing Industry," in *One Hundred Years of American Commerce*, ed. Chauncey M. Depew (New York, 1895), 388. Armour was white washing things a bit when he claimed the waste was being buried. A reporter for the *Chicago Times* informed his readers in the summer of 1863 that he found "vacant fields covered with entrails, tankings, and embryotic animals, rotting in the sun, emitting dreadful odors, and covered with 'innumerable rats' and 'countless millions of flies.'" Quoted in Wade, *Chicago's Pride*, 37.

City leaders began a long struggle to force the slaughtering, packing, and animal waste processing trades to stop discharging their wastes into the Chicago River and other local waterways soon after the city was founded. Their efforts closely resembled those of the New York reformers who created and led the Metropolitan Board. The big difference was that the Chicago reformers faced industry opposition that was much stronger than that which dogged the leaders of the Metropolitan Board. Up until 1878, they also faced a hostile legal system.

The Chicago city council passed regulations to force butchers and fat melters to stop discharging their wastes into the Chicago River in 1837, 1843, 1849, 1851, and 1862, but these laws were too weak to stop the growing tide of pollution. A turning point of sorts was reached in late 1864. The pollution had gotten so bad by then that some business leaders, including a few of Chicago's leading packers—men who had presumably already taken steps to reduce their waste discharges—joined forces with public health reformers to campaign for stronger regulations.⁴⁹ In response to their efforts and news that a new cholera epidemic was on the way, the city council passed regulations in the fall of 1865 that forbade renderers from “tainting” the air within two miles of the city limits with their stenches and ordered butchers, packers, and animal waste processors to stop discarding their “offal, manure, rubbish, filth,” and “nauseous liquor” in the river, lake, river banks, lake shores, streets, alleys, and vacant lots. (In a sign of how far butchers and packers were from utilizing all their wastes, the ordinance ordered them to bury these materials on the prairie at least 40 rods from the rivers.) A few months later, the council took an ultimately unsuccessful stab at forcing the small butchers and slaughterers to move into a compulsory abattoir. It also authorized several large glue manufacturers to construct a railroad depot and lay railroad tracks to the factories they were constructing south of the city on the Calumet River so that offal could be shipped to the waste processors by rail instead of the traditional cart.⁵⁰

49. Wade, *Chicago's Pride*, 10, 29, 36–41. Wade's book provides the best historical account of these regulatory efforts and I rely on it a great deal in this analysis. For a very detailed contemporary overview, see, Chicago Board of Health, *Report of the Board of Health of the City of Chicago, for 1867, 1868, and 1869; and a Sanitary History of Chicago, from 1833 to 1870* (Chicago, 1871), especially pp. 73–74, 80–81, 84–88, 97–98. The most innovative Chicago packers began installing on-site rendering tanks in the 1850s and early 1860s. See Wade, *Chicago's Pride*, 30, 34.

50. Wade, *Chicago's Pride*, 39–41.

In 1867, impressed by the achievements of New York's Metropolitan Board of Health and the physicians who led it, the city council appointed John Rauch, a physician and dedicated public health reformer, to head a newly constituted Board of Health modeled on the Metropolitan Board. Rauch quickly moved to impose technology-based stench-abatement regulations on the packers and waste processors modeled on those enacted by the Metropolitan Board. These included requirements that all rendering tanks be equipped with a stench-abating "apparatus for condensation of steam and vapors" and that all blood, tank water, or plant washings be directed into drains equipped with sieves and catch basins containing disinfectants to keep solid wastes from going into the sewers. When most packers and waste processors refused to obey the new rules, Rauch persuaded the city council to pass an ordinance requiring all slaughterers, packers, and animal waste processors operating within a four-mile radius of the city limits to obtain a license to operate that required their compliance or be declared nuisances. He later banned the establishment of new slaughterhouses, waste processing factories, and other noxious businesses within a mile radius of the city limits and imposed additional regulations on waste processors that required them to take further steps to abate their odors through the installation of stench-abating equipment.⁵¹

Alas, Rauch and his successors lacked the enforcement power they needed to force the city's butchers, packers, and animal waste processors to come into compliance with the new regulations. They did what they could, including trying to embarrass the tradesmen into taking action by taking reporters and city leaders on tours of the packing districts to see and smell first hand the industry's most disgusting water pollution and stench problems. Some of the biggest packers and waste processors followed at least some of the stench-abatement regulations, but the vast majority simply ignored them. The most recalcitrant ones fought the rules in court, sometimes all the way to the state Supreme Court, mostly very successfully. Juries in the local police courts generally found for the defendants in these cases. The Illinois Supreme Court blocked the effort to force the

51. Duffy, *The Sanitarians*, 122; Chicago Board of Health, "Sanitary History of Chicago," 119–28, 140, 146–47, 170–71, 229–30, 256, (quote is from p. 146); Chicago Board of Health, *Report of the Board of Health of the City of Chicago for the Years 1870, 1871, 1872, and 1873* (Chicago, 1874), 12–14, 160–61; Wade, *Chicago's Pride*, 68–69, 133–34. See also Harold L. Platt, *Shock Cities: The Environmental Transformation and Reform of Manchester and Chicago* (Chicago, 2005), 158–61.

butchers into a compulsory abattoir in 1867. In 1875 it ruled the Board of Health did not have the authority to ban the construction and operation of new slaughterhouses and rendering and fertilizer plants outside the city limits, so those located around the Union Stockyards (in the Town of Lake), the Calumet area, and other areas outside the limits were able to continue to multiply and expand their operations without restriction.⁵²

As in New York City and Jersey City, the disposal of blood and offal posed especially difficult challenges. Most of Chicago's butchers and packers stopped dumping or burying their surplus offal in vacant fields outside of town in the 1870s after several large, new fertilizer and glue factories were built in the Packingtown area and the Calumet district south of the city and a system for shipping it to the Calumet factories by rail was set up.⁵³ They continued discharging a great deal of waste into the various branches of Chicago River and the Healy Slough, however, and stench problems continued to plague the districts downwind of their smelly factories. The disgusting smell of putrefying offal also continued to disturb the neighborhoods along the route taken by the offal trains. By the early 1870s this last problem was causing so much distress in the town of Hyde Park that the town declared the waste processing company there a public nuisance, forcing it to move. It also enacted an ordinance banning the transport of offal and dead animals within its boundaries by wagon or rail. The Northwestern Fertilizer Company, which was shipping 200 tons of Chicago's offal through Hyde Park every day to its factory in Ainsworth, sued to prevent the town from enforcing the ban. It won in 1873, when the U.S. Circuit Court ruled that Hyde Park had no right to "throw back upon the city (of Chicago) this vast mass of animal matter."⁵⁴

These conflicts—and the stench and water pollution problems that caused them—formed the broader context in which the packing and animal waste processing industries vertically integrated and modernized their manufacturing facilities in the early and mid-1870s. The pressure from regulators, plaintiffs, and concerned citizens to abate

52. Wade, *Chicago's Pride*, 68–69, 133–34; Chicago Board of Health, *Report of the Board of Health of the City of Chicago for the Years 1870, 1871, 1872, and 1873*, 12–14, 160–61; *City of Chicago v. Rumpff*, 45 Ill. 90 (1867); *Tugman v. City of Chicago*, 78 Ill. 405 (1875).

53. Armour, "The Packing Industry," 388; Clemen, *American Livestock and Meat Industry*, 354. Chicago Board of Health, "Sanitary History of Chicago," 97–98.

54. Wade calls Hyde Park's efforts to keep the fertilizer companies and the offal trains outside its boundaries "the Suburban Perfumery War." Good descriptions of the struggle can be found in Wade, *Chicago's Pride*, 138–40; and Platt, *Shock Cities*, 168–69. Quote is from Wade, p. 139.

pollution stimulated technological innovation and entrepreneurship, much like regulation and litigation in New York City and Jersey City. For example, Morris Hirsch, a local chemist invented a process for turning blood into albumen in 1867, after the cholera scare led the city to tighten its regulatory restrictions on the discharge of packing and slaughterhouse wastes. His business grew so quickly that he was able to move it into a large new factory in 1871. James Turner, a meatpacker, responded to John Rauch's efforts to reduce the stench emitted by waste processors by inventing a closed loop system for converting the organic materials in rendering tank emissions into fuel that could be used to power the rendering tanks—or used as illuminating gas. Rauch liked the system so much that he ordered the rest of the city's packers and waste processors to install it on their rendering tanks and hyped the technology, which Turner patented, at sanitary conventions. John Reid, a Board of Health official, captured the way in which regulation stimulated innovation when he reported that the Board's recent regulatory efforts, "having reference principally to the nuisance arising from offal, have stimulated inquiry and invention to find a remedy, and at present, important experiments are in progress, which bid fair to prove successful."⁵⁵

Despite these advances, however, the city's stench nuisance intensified. Without effective regulation, the vast majority of the city's packers and waste processors continued to discharge effluents into Chicago's rivers and swamps and to emit stench into the air, and the offal trains continued to blight the neighborhoods along the route they followed on their way to the glue and fertilizer factories south of the city. As the slaughter of cattle and hogs mounted into the millions per year, the butchers and packers turned the South Fork of the Chicago River into "a stagnant pool of abominations," even though they were shipping more waste than ever to independent tallow, soap, oil, and fertilizer manufacturers and other waste processors. Although a few very large packing firms were by the 1870s converting growing quantities of wastes into lard and other, mostly food, products in their own plants, the vast quantities of wastes that were still being sent to the independent processors continued to be set out for collection and transferal to the processors, just as they were in New York City. This added to the "insufferable stinks" that filled the air above the city, as did the smelly smokes and fumes emitted by the fat renderers and

55. Wade, *Chicago's Pride*, 63, 102; Reid quote is from Chicago Board of Health, *Report of the Board of Health of the City of Chicago for the Years 1870, 1871, 1872, and 1873*, p. 161.

other waste processors and discharge of tankings into the branches of the Chicago River and the Healy Slough. Horrified observers called Chicago a “Stygian pit” of air and water pollution.⁵⁶

By 1875, the regulatory effort was in shambles, tied up in legal knots as well as suffering from severe budget cuts. As anger over the problem boiled over, a fire of suspicious origins, probably set by vigilantes, destroyed the Wahl Glue Works in Bridgeport, and newspaper reporters and the Chicago Citizens’ Association, a business led reform organization, began conducting investigations that documented the packing and waste processing industries’ gross violations of the sanitary laws.⁵⁷

The city finally succeeded in forcing the packers and waste processors to obey its stench regulations in 1878, more than 12 years after it began trying to tighten its strictures on them in order to protect against the cholera epidemic of 1866. This regulatory sea change took place as a result of the political reform movements that shook Chicago and the state as a whole in the early and mid-1870s. Municipal reformers secured a new city charter in 1875 that enabled the city council to replace the Board of Health with a much larger and more powerful Department of Health, while also giving it unprecedented power to license and regulate business.⁵⁸

With the help of the Citizens’ Association, the newly constituted Department of Health conducted new investigations to document the abysmal level of compliance with regulations which required that companies that rendered slaughter waste to equip their rendering tanks with stench-abating mechanisms that operated effectively. This led to the prosecution of one of the most flagrant violators. When the jury refused to convict him, an outraged city council took advantage of its new regulatory powers and passed an ordinance that put real teeth into the Health Department’s ability to enforce its sanitary laws. The new law required the owners of all businesses in the slaughtering, packing, rendering, glue, or fertilizer trades within a mile radius

56. Wade, *Chicago’s Pride*, 130–33. Quotations are from contemporary sources cited by Wade on pp. 131 and 133. See also Chicago Board of Health, “Sanitary History of Chicago,” 170–71, 229–30, 276–81, 293–98, 305–96.

57. Wade, *Chicago’s Pride*, 134, 138–40.

58. Wade, *Chicago’s Pride*, 134–35. For more on the reform movement and the conflict over the city charter see, Bessie Louise Pierce, *A History of Chicago, 1871–1893* (New York, 1957), 300–2; and Chicago Citizens Association, “Report for 1876” in *Address and Reports of the Citizen’s Association of Chicago, 1874–1876* (Chicago, 1876), 28–30. See also Richard Schneirov, *Labor and Urban Politics: Class Conflict and the Origins of Modern Liberalism in Chicago, 1864–97* (Urbana, Ill., 1998), 46–98.

of the city limits to obtain a license to operate, which could be revoked if the firm violated any city ordinance or state law. The regulation, which historian Louise Carroll Wade memorably labeled the “stink ordinance,” empowered sanitary officials to freely inspect their factories at all hours of the day and night. Persons convicted of committing a violation could be fined \$100 a day or imprisoned for 90 days, severe penalties for that era.⁵⁹

With the aid of yet another special committee of the Citizens’ Association whose members again helped it conduct its investigations, the Department of Health compiled another detailed body of evidence of regulatory violations and identified the companies responsible for the most egregious pollution problems. It then indicted 27 companies, including Armour, the Wahl Glue Works, and other big packing firms and glue and fertilizer manufacturers.⁶⁰

This time, the courts sided with the city. The first trial was held in the summer of 1878. After listening to damning testimony by health officials, prominent physicians, members of the Citizens’ Association who had inspected the defendant’s fertilizer factory, and residents living downwind of it, the jury convicted the defendant. At about the same time, the Illinois Supreme Court handed down a decision on a case brought by a packing company to test the constitutionality of the licensing provision of the stink ordinance. The court upheld the city’s authority to use this power to force the owners of noxious businesses to comply with sanitary regulations, even those outside the city limits, in order to protect the health of its citizens.⁶¹

This one-two legal punch forced the other companies under indictment to plead guilty and beg the judge for leniency to give them time to come into compliance. As Louise Wade put it in her history of Packingtown, the managers of the city’s packing, slaughtering, and animal waste processing industries now “scurried” to install the stench-abating equipment they had for so long refused to accept. The city’s Health Commissioner was soon praising them

59. Wade, *Chicago’s Pride*, 135–36; Chicago Citizens Association, “Annual Report for 1876,” 31–32; and “Annual Report for 1877,” (Chicago, 1877), 12

60. Wade, *Chicago’s Pride*, 136–37; Chicago Citizens Association, “Annual Report for 1878,” (Chicago, 1878), 6–7. Chicago Department of Health, *Annual Report for 1878* (Chicago, 1878), 15–16.

61. Wade, *Chicago’s Pride*, 137–38; Chicago Citizens Association, “Report for 1878,” 6–7; *Chicago Packing & Provision Co. v. City of Chicago*, 8 Ill. 221 (1878). These events took place in the aftermath of the conflict over the regulation of big business that led to the U.S. Supreme Court’s landmark decision in *Munn v. Illinois*, which sanctioned the regulation of businesses imbued with a public interest (94 U.S. 113 (1876)).

for so “cheerfully” obeying the regulations and abating the stench nuisance.⁶² A year later the Citizens’ Association declared that “a very sensible abatement of this nuisance will not be denied, and we can only regret that ample means at hand have not always been employed so as to stop them altogether.”⁶³

What followed was a sustained period of growth, innovation, and vertical integration in Chicago’s meatpacking trade, characterized by, among other things, vigorous integration by the big packing companies into by-product development and manufacturing. In the 1880s, Armour, Swift and the others not only began acquiring independent waste processing companies, but also set up their own by-product operations and began investing in research and product development in this area, hiring chemists, and setting up laboratories for this purpose. This activity testifies to the way in which pollution regulation and litigation helped break down barriers to modernization, which in retrospect seems so economically rational as to be inevitable, while also stimulating investment in stench control technologies that, in the absence of regulation, only the most “socially responsible” companies would have ever installed because there was no way to profit from it.⁶⁴

The expansion of by-product manufacturing greatly increased the packing industry’s capacity to recycle wastes that it formerly discharged into the environment. This substantially reduced the rate at which the packers emitted wastes into local waterways. It did not, however, eliminate either their water pollution or their stench. These emissions continued to blight the working class neighborhoods of Packingtown for decades to come. In the 1890s, the city took the extreme step of constructing the Chicago Ship and Sanitary Canal, an enormous, multimillion dollar public works project that reversed the flow of the Chicago River. Their goal was to solve the problem once and for all by sending the packing industry’s

62. Wade, *Chicago’s Pride*, 137–38, quotes are from p. 137; Chicago Citizens Association, “Report for 1878,” 6–7.

63. Chicago Citizens Association, “Report for 1879,” in *Address and Reports of the Citizens Association of Chicago* (Chicago, 1879), 13.

64. For overviews of this development see, “Developing Packinghouse By-Products,” *National Provisioner* (23 Jan. 1915): 17, 41; Clemen, *American Livestock and Meat Industry*, 347–78; “The Significant Sixty: A Historical Report on the Progress and Development of the Meat Packing Industry, 1891–1951,” *National Provisioner* (26 June 1952): 258–59; Pierce, *History of Chicago, 1871–1893*, 123–27; Wade, *Chicago’s Pride*, 200–03; Yeager, *Competition and Regulation*, 68–71; Cronon, *Nature’s Metropolis*, 247–53. For a very detailed analysis of all the branches of by-product manufacturing in the 1920s, see, Clemen, *By-Products in the Packing Industry*.

effluents and all the other sewage discharged into the river flowing away from the city and Lake Michigan westward to the Mississippi River. But even this huge project—and further innovation in by-product manufacturing—failed to eliminate the packers' pollution. Improvements in pollution regulation, waste abatement and waste treatment, as well as frequent dredging of the South Fork of the Chicago River by the city, state, and federal governments, as well as by the Chicago Sanitary District and the packers themselves further alleviated but also failed solve the problem. So much waste continued to flow into the South Fork that the riverbed “rose at the rate of almost half a foot a year between 1900 and 1921.” In 1929, Swift & Company, one of the most vertically integrated of the big five packing companies, alone discharged 52,170 pounds of waste into the river—a tiny fraction of what would have gone into it had there been no advances in waste processing over the previous 50 years, but still a substantial environmental burden.⁶⁵

Conclusion

This article provides insight into a piece of the more multidimensional narrative of the history of business that is starting to emerge as a result of our discipline's post-Chandlerian cultural turn and our belated recognition that industrial pollution has a history.⁶⁶ It shows that in

65. For more on the impact of the packing industry's pollution on life in the surrounding neighborhoods see, Sylvia Hood Washington, *Packing Them In: An Archaeology of Environmental Racism in Chicago, 1865–1954* (Lanham, Md., 2005), 75–125 and Robert A. Slayton, *Back of the Yards: The Making of a Local Democracy* (Chicago, 1986), 26–28. Quotation is from Slayton, p. 28. For more on regulatory and engineering solutions, see Chicago Department of Health, “Report of Bureau of Sanitary Inspection,” *Annual Report for 1906* (Chicago 1906), 217–21; Sanitary District of Chicago, *Report on Industrial Wastes from the Stock Yards and Packingtown of Chicago* (Chicago, 1914); and Sanitary District of Chicago, *The Activated Sludge Process for Handling Packingtown Trade Wastes* (Chicago, 1917). For the link between packing house pollution on the South Fork and the building of the Chicago Ship and Sanitary Canal, see, Citizens' Association of Chicago, *Report of the Committee of the Citizens' Association on the Main Drainage and Water Supply of Chicago* (Chicago, 1885), 9. For more on the canal itself see, Louis P. Cain, *Sanitation Strategy for a Lakefront Metropolis: The Case of Chicago* (DeKalb, Ill., 1978), 64–76.

66. For a thoughtful assessment of the Chandlerian legacy and the post-Chandlerian cultural turn see Richard B. John, “Elaborations, Revisions, Dissents: Alfred D. Chandler, Jr.'s, The Visible Hand After Twenty Years,” *Business History Review* 71 (Summer 1997): 151–206. For the environmental turn, see, Christine Meisner Rosen, “Industrial Ecology and the Greening of Business History,”

two of the most important regional centers of the post-Civil War American meatpacking industry, Chicago and the New York City–Jersey City area, sanitary regulation, public protest, and litigation helped drive and shape the processes of modernization, reinforcing the industry’s market driven movement toward vertical integration, technological innovation, and increasing economies of scale—while mitigating, but by no means eliminating, its harmful environmental impacts.

These three cities were not the only places in which public health and civic reformers, citizens outraged by industrial pollution, government regulators, and judges played key roles in the modernization of the packing and animal waste processing industries. Even more dramatic examples can be seen in the two cities where public health reformers succeeded in forcing butchers and slaughterers into compulsory public abattoirs. Compulsory abattoirs were holy grails for sanitary reformers intent on centralizing smelly, dirty, geographically dispersed and independently owned slaughtering and animal waste processing businesses into large, sanitarily designed, geographically centralized, vertically integrated, and well-regulated corporate enterprises that could be easily monitored by sanitary inspectors. The New Orleans abattoir modernized, improved the sanitation, centralized and integrated that city’s cattle, hog, and sheep stockyard, slaughtering, packing, and animal waste processing industries. The Boston abattoir (which was called the Brighton abattoir because it located in the town of Brighton) modernized, centralized, integrated, and improved the sanitary conditions of Boston’s cattle and sheep stockyards, slaughtering, packing, and animal waste processing industries. Though the reformers called them abattoirs and stressed that they were modeled on European abattoirs, both businesses were large, sanitarily designed, vertically integrated, highly regulated packing houses and stockyards that were owned and operated by private corporations. The Crescent City Stock Landing and Slaughter-House Company was incorporated in 1869; the Butchers’ Slaughtering and Melting Association in 1870. Policies requiring butchers to close their privately owned shops and lease space in the abattoirs constructed by these firms transformed the livestock, slaughtering and packing industries in New Orleans and Boston from collections of small-scale, unintegrated, poorly regulated businesses to a highly centralized, large-scale, highly vertically and

Business and Economic History 26 (Fall 1997): 123–37; and Christine Meisner Rosen and Christopher C. Sellers, “The Nature of the Firm: Towards an Ecocultural History of Business,” *Business History Review* 73 (Winter 1999): 577–600. See also Jeffrey Stine and Joel A. Tarr, “At the Intersection of Histories: Technology and the Environment,” *Technology and Culture* 39 (Oct. 1998): 601–40.

horizontally, highly regulated structure in roughly four years in both cities.

It is beyond the scope of this article to provide a detailed history of how public health reformers succeeded in bringing these abattoirs into existence. Suffice to say here that, as in New York and Chicago, they faced enormous industry resistance. In fact, the creation of the New Orleans abattoir so outraged the city's butchers that they mounted nearly 300 injunction suits in a bitter struggle to block enforcement of the state law that established the Crescent City Company and gave it its monopoly on the slaughtering and livestock businesses. The truly epic litigation, the product of bitter Reconstruction politics, as well as the butchers' fury at what they saw as an attempt to deprive them of the right to operate their own businesses, worked its way through the state courts and into the Federal courts before being resolved by the U.S. Supreme Court in its landmark 1872 Slaughterhouse Cases decision. This decision, which also divided that court, upheld the right of state governments to exercise their police powers to protect the public health and welfare.⁶⁷

The leaders of the Massachusetts State Board of Health, the initiators of the Boston scheme, went out of their way to avoid provoking a similar legal firestorm. Although they resorted to such traditional ploys as inviting angry citizens to testify at public hearings about the industry's pollution problems and threatening to shut the butcher shops down, they relied heavily on an innovative campaign to educate the city's cattle and sheep butchers to the economic advantages of modernization to achieve their goal. This included giving them detailed information about new technologies for turning blood and offal into high value products and taking some of the city's leading butchers on a guided tour of the abattoirs and packing houses of New York City and Jersey City, a brilliant strategy that opened the eyes of the extremely conservative, set-in-their-ways butchers to the practical feasibility as well the economic rewards of the new technologies

67. The most complete analysis of the history of the creation of the New Orleans abattoir, the litigation it engendered, and the Supreme Court decision that resolved the conflict is Ronald M. Labbe and Jonathan Lurie, *The Slaughterhouse Cases: Regulation, Reconstruction, and the Fourteenth Amendment* (Lawrence, Kansas, 2003). See also, Michael A. Ross, "Justice Miller's Reconstruction: The Slaughterhouse Cases, Health Codes, and Civil Rights in New Orleans, 1861–1873," *Journal of Southern History* 64 (Nov. 1998): 469–676. For the Supreme Court decision see, *Slaughterhouse-House Cases*, 83 U.S. 36 (1873). For a description of the abattoir's many features for reducing stench pollution see, Devron, "Abattoirs," 220–21.

of waste utilization and more modern, larger scale, more vertically integrated modes of organizing their operations.⁶⁸

As it turned out, the Massachusetts' State Board of Health's strategy of educating the butchers paid off in a big way from the perspective of industrial pollution control. It enabled its leaders to develop an exceptionally productive working partnership with some of Boston's most forward-looking and influential butchers. As Directors of the abattoir company, these men made it clear that their abattoir company was "not simply a business corporation" but "a public servant" committed to serving Brighton's butchers while caring for their "refuse and offensive products so that there shall be no nuisance resulting from the business."⁶⁹ They worked closely and creatively with Board leaders to develop innovative systems for controlling their pollution problems. Turning away from the design and technological conventions of traditional European abattoirs that provided the basis for the New Orleans abattoir, they studied and applied the refrigeration, disassembly line, and gravity systems coming into use in the most advanced Midwestern packing houses, figuring out ways to apply them to the task of protecting blood, offal, and other slaughter waste from decay and speeding their transfer to the rendering tanks and other waste processing machines.⁷⁰ In a process that paralleled

68. The annual reports of the Massachusetts State Board of Health are the best source of information on the history of the creation of the Brighton Abattoir. See, *First Annual Report of the State Board of Health* (Boston, 1870), 2–3; "Report on Slaughtering for Boston Market," in *First Annual Report of the State Board of Health of Massachusetts* (Boston, 1870), 20–37; *Second Annual Report of the State Board of Health* (Boston, 1871), 2; *Third Annual Report of the State Board of Health* (Boston, 1872), 2–6; "Slaughtering, Bone-Boiling, and Fat Melting," in *Third Annual Report of the State Board of Health* (Boston, 1872), 223–45; *Fourth Annual Report of the State Board of Health* (Boston, 1873), 9–10; "Report of the Butchers' Slaughtering and Melting Association," in *Fourth Annual Report* (Boston, 1873), 443–47; *Fifth Annual Report of the State Board of Health* (Boston, 1874), 6–9; "The Brighton Abattoir," in *Fifth Annual Report of the State Board of Health in Massachusetts* (Boston, 1874), 153–80; *Sixth Annual Report of the State Board of Health* (Boston, 1875), 15–17; "The Brighton Abattoir, Etc.," in *Sixth Annual Report* (Boston, 1875), 186–203; *Seventh Annual Report of the State Board of Health* (Boston, 1876), 4–8; *Eighth Annual Report of the State Board of Health* (Boston, 1877), 3–4. For general overviews see, George Chandler Whipple, *State Sanitation: A Review of the Work of the Massachusetts State Board of Health* (Cambridge, Mass., 1917), 42–44; and Clemen, *American Livestock and Meat Industry*, 228–31.

69. Massachusetts State Board of Health, *Fourth Annual Report*, 9–10; "Report of the Butchers' Slaughtering and Melting Association," and "The Brighton Abattoir." Quotations are from "The Brighton Abattoir," p. 157.

70. Massachusetts State Board of Health, "The Brighton Abattoir," 156–69. The floors of slaughterhouse were designed so that wastes flowed through holes in the floor dropping down into sealed iron carts that were wheeled to the multistoried

the development of the Craven fertilizer machine and its installation at the Pennsylvania Railroad's abattoir at Harsimus Cove in Jersey City at much the same time, they also identified a new technology (developed in New Haven) for drying large quantities of blood and offal and converting them into fertilizer and adapted it for use at the Brighton abattoir. They also developed an "ingenious system" for conducting the foul smelling gaseous emissions given off by the rendering tanks to the furnaces of the steam boilers that drove the machinery in the abattoir and the rendering house, where the fires abated stench by burning the smelly organic material in the emissions away.⁷¹

Given the dramatic nature of these stories, what is striking to me, as a historical researcher trying to recover a forgotten part of business and environmental history, is how quickly the reform campaigns, public protests, and litigation disappeared from historical accounts of the modernization of the packing industry. Most of these struggles were little remarked nor long remembered—even by many of those who participated in them or were their targets!

The most startling example of this disappearance can be seen in the stories told about the history of by-product manufacturing in the Chicago packing industry. In what appears to be more an act of conscious or unconscious repression than simple forgetfulness, Philip D. Armour published a history of the development of the packing industry in which he explained the packers' vertical integration into by-product manufacturing operations entirely in economic terms, as a product of the packers' search for efficiency and their war on waste. As noted earlier, Armour pointed out in this article that until the early 1870s, even the largest packers in Chicago allowed blood to

rendering house where they taken up to the fourth floor and dropped through openings in the floor into rendering tanks located on the third floor, from which the waste residues could, in turn, be dropped through mechanisms in the floor into fertilizer driers located on the second floor. The fertilizer poured from these machines in a similar way into bagging machines located on the first floor. It was then whisked out of the door and shipped to market. Wade provides an interesting description of the first packing plant in Chicago to "fully exploit the gravity principle," built in 1863, that shows how novel the setup at the Brighton abattoir was. Gravity was used to move the carcass through stages of disassembly and to convey the blood to exterior tanks. However, no attention was given to applying it to utilizing the blood or the wastes of the on-site lard rendering tanks because those wastes were being thrown away. Wade writes: "After the lard was drawn off, the tanks were emptied by shoveling out the solid waste and draining off the liquids. The latter substance, said an admiring reporter, just 'disappears into the sewer, and is soon mingled with the Chicago River.'" Wade, *Chicago's Pride*, 34.

71. "The Brighton Abattoir," 167–68. The prototype fertilizer machine, developed in New Haven, is described in detail in "Slaughtering, Bone-Boiling, and Fat Melting," 243–45.

“run into the river” and paid workers “five dollars a load to cart the heads, feet, tankage, and other waste material out upon the prairie and there bury it in pits and trenches.” He argued that this changed only when “progressive” packers were “forced” by the “necessities of the business, and the growing competition,” to incorporate the production of glue, fertilizer, tallow, lard oil, butterine, sausages, pepsin, and other by-products into their own establishments, noting that the large packing plant came to depend “largely for its profit on the intelligent utilization of those so-called waste materials.”⁷²

What is striking is that Armour said nothing about the regulatory and legal battles that helped stimulate these innovations, even though as the President of Armour and Co. he began investing in the truly remarkable array of by-product manufacturing activities that became one of the distinguishing characteristics of his firm only after pleading guilty to violating Chicago’s sanitary regulations in 1878, an event that followed years of public agitation against his industry’s pollution nuisances in Chicago and other cities. Although sanitary methods for converting blood and offal in fertilizer were developed in the early 1870s in New Jersey and New England (also in response to government regulation and litigation resulting from concerns about pollution problems), Armour and Co. did not begin carrying this out on site at any of their facilities until 1878, the same year that it was charged with violating Chicago’s sanitary laws. This happened at a packing house in Milwaukee that Armour had co-owned with John Plankington since 1865—in the context of a campaign by Dr. Orlando W. Wight, Milwaukee’s first health commissioner, to force that city’s slaughterhouses to improve their methods of disposing of offal. Armour began utilizing blood at his Chicago packing house in 1882.⁷³

Armour was not the only big Midwestern packer who explained the growth of the by-product manufacturing in the packing industry without referring to the public protests and regulation that helped stimulate it. Gustavus Swift also seems to have explained it this way. At least this is how Louis Swift, Gustavus’s son, explained his father’s integration into by-product manufacturing in his biography of his father. Louis and his coauthor, Arthur Van Vlissingen, Jr., argued that “keen competition” forced all the packers to “keep abreast of the others in by-product utilization.” Louis also described his father as a penny-pincher who was unusually fixated with “using everything

72. Armour, “The Packing Industry,” 388.

73. *Ibid.*; Walsh, *Rise of the Midwestern Meat Packing Industry*, 83; Judith Walzer Leavitt, *The Healthiest City: Milwaukee and the Politics of Health Reform* (Princeton, N.J., 1982), 49, 55; Yeager, *Competition and Regulation*, 68.

from the animal to produce a profit,” and “without question the aggressor in this war for extra sources of revenue.”⁷⁴ He said nothing, however, to put his father’s behavior in the broader historical context of the community protests over the stench of his industries’ pollution or the city’s regulation of it. If anything, he went in the opposite direction, attributing a great deal to his father’s unique personality. His description of his father scrutinizing the packing house sewer outlet to Bubbly Creek for any sign of fat coming out and making sure that heads rolled when he saw any sign of waste, is so vivid that Louis (perhaps inadvertently) leaves readers with the impression that his father’s intense fixation on waste minimization was more a matter of psychological obsession than simple profit maximization.⁷⁵

The next generation of packing industry leaders also failed to acknowledge the antipollution protest and regulatory activity that helped stimulate their industry’s integration into waste processing. For example, an article on the history of by-product manufacturing at Armour and Company, published in *Armco*, the Armour salesmen’s magazine, and reprinted in *The National Provisioner* in 1915, said nothing about the impact of protest and regulation in the history of food and nonfood by-product manufacturing at Armour. The article was based on an interview with C. H. MacDowell, the President of the Armour Fertilizer Works. Its description of Armour’s 1885 purchase of the Wahl glue works exemplifies MacDowell’s inability or unwillingness to acknowledge the pollution problems that helped stimulate the growth and modernization of by-product manufacturing, while providing colorful and technically interesting details about the business. Here is how the article describes the Wahl factory, which was located at the intersection of 31st and Benson streets in the Bridgeport section of Chicago, prior to its acquisition by Armour: “This inconspicuous enterprise had been going on quietly from year to year, applying the searchlight of science to one difficult problem after another, in an uninviting field, until they had developed a business of considerable importance. . . .” In fact, the extremely foul

74. Louis F. Swift and Arthur Van Vlissingen Jr., *The Yankee of the Yards: The Biography of Gustavus Swift* (Chicago, 1927), 12.

75. *Ibid.*, 4–5. Interestingly, Armour’s biographers went beyond merely implying the idea that Armour was excessively interested in utilizing waste. They actually raised the question whether Armour and the other big packers “did not over-expand themselves in their development of byproducts.” Declaring that it “is easy to exaggerate the importance of by products,” they suggest that his fixation on waste minimization stemmed as much from his love of “the sporting zest of selling something new” as his love of profit. See, Harper Leech and John Charles Carroll, *Armour and His Times* (New York, 1938), 49–50.

smelling Wahl glue works was hardly inconspicuous or quiet! The target of community protest over many years, as well as fires in 1864 and 1875 probably caused by arson, Wahl was one of the companies that pled guilty to the charge of violating Chicago's sanitary regulations in 1878. The article provides no inkling of this. Instead it frames Armour's innovation in the byproduct field as an impressive example of corporate scientific progress and technological innovation by "methods that seem little short of miraculous."⁷⁶

By early 1910s, even Chicago's sanitary reformers appear to have forgotten the regulatory struggles that helped drive the packers' move into by-product manufacturing. The *Report on Industrial Wastes from the Stock Yards and Packingtown*, a report published by the Chicago Sanitary District in 1914, begins with a brief historical overview of the pollution problems at the stockyards and the early days of by-product manufacturing. Remarkably, it, too, says nothing, even briefly, about early regulatory initiatives, the Stink Ordinance, or the legal confrontation of 1878—even though its purpose was to help the Sanitary District, a government agency with regulatory powers, develop plans to solve the industry's water pollution and stench nuisances problems.⁷⁷

Selective memory shaped the story of the history of the packing industry in New Orleans in a similarly distorting way. Blinded by concerns about the problems raised by Reconstruction and racial politics in the post-Civil War South and monopoly power in late nineteenth-century business, several generations of legal scholars and historians lost sight of the public health concerns that led to the creation of the city's compulsory abattoir. Adopting the perspective of the losers, the butchers who opposed the abattoir, and obsessed by what they saw as the veniality of the Louisiana state legislature during Reconstruction, they regarded the law that created the abattoir as special interest legislation "of the worst sort," in which bribery and corruption led to the creation of an oppressive monopoly that deprived as many as a thousand New Orleans butchers of their property rights. They viewed the Supreme Court decision that upheld the state's right to establish the abattoir in the same jaundiced terms, as a miscarriage of justice in which a conservative majority of the Justices of the U.S. Supreme Court sanctioned this oppressive monopoly in a decision that that undermined the rights of small businessmen in their struggles

76. "Developing Packinghouse By-Products," 17. For the problems at the Wahl glue works see Wade, *Chicago's Pride*, 39, 134.

77. Sanitary District of Chicago, *Report on Industrial Wastes from the Stock Yards and Packingtown of Chicago*, 1.

against big business, while gutting the protections afforded Southern blacks by the Fourteenth Amendment.⁷⁸

It is only relatively recently that legal historians succeeded in peeling the veil of selective memory away. They rediscovered the role that public health reformers played in the creation of the abattoir and recognized that the majority Supreme Court decision was really about upholding the state's right to use its police powers to regulate business to protect the public health and welfare. They also woke up to the fact that the abattoir company itself was not a conventional nineteenth-century "monopoly" at all! It was the operator of a French-style abattoir, an enterprise that was carefully designed to meet the best sanitary standards of the day, in which all of New Orleans' butchers were entitled (as well as required) to carry on their businesses and pay a rent that was set by law—not the abattoir company—and where most of their slaughtering waste was converted into products on site, under the watchful eyes of state sanitary inspectors.⁷⁹

Public health reformers did not forget their victories quite so quickly, especially in New York City, where good state and municipal record-keeping and the historical writings of the long-lived Dr. Stephen Smith, one of the city's foremost public health reformers, helped keep the memory of the struggles of that city's mid-century reformers alive.⁸⁰ In general, however, sanitarians were much more interested in describing and praising the improved conditions at the slaughterhouses and abattoirs in their communities, and in explaining how much better they were than what had existed previously, than in describing the political and legal processes by which they forced butchers and animal waste processors to make the improvements. They also tended to downplay the remaining pollution

78. For overviews of the early historiography of this case see, Herbert Hovenkamp, "Technology, Politics, and Regulated Monopoly: An American Historical Perspective," *Texas Law Review* 62 (April 1984): 1295–96; and Ross, "Justice Miller's Reconstruction," 649–52. The "worst sort" quotation is from Hovenkamp, p. 1296.

79. The revisionism began with Hovenkamp, "Technology, Politics, and Regulated Monopoly," 1295–1308. It was further developed by Novak in *People's Welfare*, 230–33; Ross, "Justice Miller's Reconstruction"; and Labbe and Lurie, *The Slaughterhouse Cases*. Hovenkamp called the case "probably the most misunderstood example of circumstances in which new technology and changing market conditions justified the creation of a price-regulated monopoly," and charged that it had been "outrageously misrepresented in a large body of literature." (p. 1295)

80. Stephen Smith, "The History of Public Health, 1871–1921," in *A Half Century of Public Health*, ed. Mazyck P. Ravenel (New York, 1921), 1–12; Stephen Smith, *The City That Was and The Report of the General Committee of Health, New York City, 1806* (Metuchen, N.J., 1973), reprint of 1911 edition.

problems, especially in forums directed to audiences beyond their own communities.⁸¹ By suppressing an important part of the story, this, too, had a distorting effect. In New York, for example, public health officials simply did not talk about the problems at the Communipaw abattoir. Soon after it was built, they heralded its establishment as a victory for slaughterhouse reform in New York City. Then, when the new abattoir at Harsimus Cove replaced it, they treated that abattoir as an icon of their success and as a model for reformers around the country, as if it was the only sanitary abattoir that had ever been built in Jersey City and the public protest and litigation against the pollution at Communipaw had never happened.⁸²

All this forgetting and leaving out of the record had a profound impact on the early historical work on the packing industry. The stories Armour, Swift, and others who told about the history of their industry served as important sources of information for several generations of historians who did not think to question what they might be leaving out. What they said—and did not say—got repeated over and over again, contributing to the creation of an interpretive frame that put brilliant, profit-maximizing entrepreneurs and scientists responding to the imperatives of the marketplace front and center, while cutting off the regulators' role. In a particularly striking example of replication, Rudolf Alexander Clemen, author of the 1923 treatise, *The American Livestock and Meat Industry*, an important source of information on the packing industry for generations of researchers, inserted verbatim passages from the *Armco* article, including its “inconspicuous enterprise” description of the notoriously smelly, hated, and ultimately successfully regulated Wahl glue factory, directly into his description of the glue industry in his chapter on the development of packinghouse by-product manufacturing.⁸³

81. For example, of the four articles on abattoirs published in *Public Health Reports and Papers* in 1877 and 1881, only one, Devron, “Abattoirs” discussed the political and legal struggles that led to the creation of the abattoir, and that article concerned the uniquely controversial New Orleans abattoir. The other three (Crowell, “Sanitary Regulations Relating to Abattoirs”; James, “How Abattoirs Improve the Sanitary Condition of Cities”; and Janes, “Sanitary View of Abattoirs and the Slaughtering Business in New York”) did not discuss the political and legal battles that led, respectively, to the creation of the Brighton and Philadelphia abattoirs and the restructuring of the slaughtering industry in New York City.

82. “Opening of the New Abattoirs—Great Celebration at Communipaw,” *New York Times*, 18 Oct. 1866, p. 2; The Communipaw Abattoirs,” *New York Times*, 20 Sept. 1866, p. 2; Janes, “Sanitary View of Abattoirs,” 26.

83. Clemen, *American Livestock and Meat Industry*, 357–58. In what seems a rather glaring example of what would today be considered plagiarism, the passages are quoted without quotation marks or attribution. Though the book has very few footnotes, Clemen provides lists of references for each chapter at the back of the

Armour's treatment of the packing industry's integration into animal waste processing was especially influential. His assertion that growing competition and the necessities of business drove the more intelligent and "progressive" packers to find profit in the wastes that their contemporaries were throwing away was and still is analytically compelling—not to mention part of the true story. Reinforced by the famous, albeit inaccurate, aphorism about nineteenth-century pork packers using everything from the pigs "but the squeal" and the truly impressive array of by-products developed by the big packing firms in the 1880s and 1890s and after, it became a core narrative not only for biographers of Armour and Swift and others who studied the history of the packing industry but also for environmental and urban historians interested in the history of Chicago.⁸⁴

book, including this chapter (pp. 825–27). However, he failed to include this article (in either of its forms). *The National Provisioner* reprint of the original article does not name its author, so it is possible that Clemen himself wrote the piece, but this seems unlikely. In his preface, Clemen emphasized that his book was a scholarly work based on years of personal research into unpublished manuscripts and "the files of many business and agricultural periodicals," but he made no mention of personal interviews (pp. v–vi.). The title page listed him as "Associate Editor of *The National Provisioner*," but the article originally appeared in *Armco*.

84. Leech and Carroll, *Armour and His Times*, 44–53. Their chapter on Armour's by-product manufacturing businesses is titled "All But the Squeal." It not only describes the company's by-product manufacturing activities in considerable detail, but also excerpts the entire section of Armour's packing industry article that concerns the rise of by-product manufacturing (p. 45–46). In Swift and Van Vliissingen Jr., *The Yankee of the Yards*, 3–13, Louis Swift not only started his biography of father with this topic (in a chapter titled "A Dollar Wasted..."), he also attributed the "hackneyed remark that Chicago packers used every part of the hog but the squeal" to a "remark my father once made, when the by-products utilization was complete, that 'now we use all of the hog except his grunt,'" (pp. 11–12). Interestingly, Clemen, who said nothing about the impact of sanitary regulation on the evolution of the packing industry in Chicago, New York, New Orleans, or the other Midwestern centers of the trade, argued that the Brighton Abattoir played a significant role the concentration and modernization of the slaughtering industry not only in the Boston market but also in the Midwestern packing industry. He believed that Swift, who was doing business "in a small way" as a cattle dealer and slaughterer in Boston must have noticed how successful it was and tried to emulate it in his businesses in Chicago and other Midwestern cities. It "brought to the notice of Swift and others some of the ideas later worked out by the new (Midwestern) group of packers on a larger scale for the whole country, since they were able to study there the problems of concentration of cattle and slaughtering and the marketing of meats." (Clemen, *American Livestock and Meat Industry*, 231.) Neither Yeager nor Walsh picked up on this notion, however. Besides being speculative in nature, it did not fit the origin story propounded by Armour or the Swifts. For the impact of this origin story on the work of urban and environmental historians of Chicago, see, Cronon, *Nature's Metropolis*, 247–59; and Donald Miller, *City of the Century: The Epic of Chicago and the Making of America* (New York, 1996), 214–16.

The case studies discussed in this article draw attention to the other side of the history of this industry, the long forgotten side. They show how sanitary regulation, pollution litigation, and public protest directed against its environmental pollution helped shape the processes of modernization that transformed the slaughtering and animal waste processing industries, helping spur the rise of the large-scale, spatially centralized, vertically and horizontally integrated meatpacking enterprises whose size and market power so transfixed the nation in the last two decades of the nineteenth century and the first two decades of the twentieth.

Were similar regulatory and other nonmarket processes at work in other industries undergoing similar transformations at this time? If so, did this affect their organizational and technological development in the way it did the packers'? How much industrial waste did manufacturers in other industries utilize? How much did they continue to discharge into the environment in the form of solid waste and air and water pollution? What impact did these discharges have on human and ecosystem health? If these cases are any indication, the search for answers to these questions will enrich our historical understanding of the complex inter-relationships between business, the market, government, society, and the natural environment, while giving us fresh insight into the development of big business in the late nineteenth and early twentieth centuries.

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