The Shape of Meat:
Preserving Animal Flesh in Victorian Britain

*by Rebecca J. H. Woods**

ABSTRACT

In the mid-nineteenth century, animal flesh was subject to a range of treatments in an effort to preserve meat grown on the fringes of the British Empire (in Australia and New Zealand, South and North America) for consumption in urban centers in Britain. Focusing on the publications of the British Society for the Encouragement of Arts, Commerce and Manufacture, and allied sources such as the *Lancet*, this article demonstrates that the more a preservative technique transformed animal flesh, the more likely consumers—often presumed to hail from the poor and working classes—were to resist it. This resulted in frustration among elite "men of science and industry," who held that tinned, canned, dried, or chemically treated meats were a "great boon" to precisely these classes. By refusing to consume industrial charqui, which was salted and dried, or by purchasing imported tinned Australian beef or mutton only unwillingly, the lower classes frustrated the ambitions of would-be tastemakers in the Society of Arts, who interpreted consumer resistance in their articles and published reports as the lower orders' refusal to act in their own best interest. Importantly, it was the very changeability of meat—its figurative malleability as well as its material inconstancy—that enabled industrial transformations, consumer resistance, and its cultural symbolisms, making it a particularly rich object of study for historians of science.

In the 1860s, political economists, statisticians, journalists, industrialists, and technologists in Britain's imperial metropole looked out beyond their shores and saw vast herds of cattle and flocks of sheep languishing for want of a market. Some of these animals cropped the grass—newly seeded and fiercely maintained—of British colonies proper.[1] Many of them browsed the pampas and prairies of South and North America, part of the sphere of British financial and sometimes cultural influence, but politically if not economically independent of Rule Britannia.[2] These herds and flocks were often at

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I am grateful to Emma Spary, Anya Zilberstein, Suman Seth, W. Patrick McCray, Lisa Messeri, and Emily Wanderer for their comments on drafts of this article.

[1] Recent scholarship emphasizes the constructed nature of New World grasslands. See Tom Brooking and Eric Pawson, eds., *Seeds of Empire: The Environmental Transformation of New Zealand* (New York, N.Y.: I. B. Tauris, 2011); and Maura Capps, "Fleets of Fodder: The Ecological Orchestration of Agrarian Improvement in New South Wales and the Cape of Good Hope, 1780–1830," *J. Brit. Stud.* 56 (2017): 532–56.

[2] Richard Perren documents British investment in the North and South American livestock industries in "Capital and Markets," chap. 3 in *Taste, Trade and Technology: The Development of the International Meat Industry Since 1840* (Aldershot, UK: Ashgate, 2006).

least partly composed of descendants of the British animals sent out as ovine and bovine counterparts to human colonizers a hundred or more years before.[3] They had been deliberately encouraged to reproduce, both in order to solidify European claims to indigenous lands and in the service of imperial markets such as that for wool. Now, having reproduced at a much faster rate than human populations, there were far more flesh-bearing domesticates than local populations could possibly ingest.[4] And yet, when these observers turned their gaze homeward, they saw hordes of people—primarily the poor and working classes, they claimed—clamoring for more meat.

Merchants, distributors, and victualers in Britain, on the one hand, and Australasian stockmen and ranchers on the other, were keen to "promote equalisation of supply and demand," but meat was a notoriously difficult article to redistribute.[5] On the hoof, transport over such great distances was uneconomical, while on the hook, meat was too vulnerable to putrefaction to remain edible for the duration of a voyage from the Americas or Australasia.[6] Thus, finding a way to forestall natural processes of decay for long enough to transport meat across the ocean (or oceans) and distribute it to consumers in Britain seemed the likeliest solution to what appeared to these interested parties as a problem of misplaced supply and mismatched demand. Expressing a faith in progress typical of their time, contemporaries were certain that "science and mechanical skill will ere long master the difficulty" of so doing.[7] And indeed, the technically inclined and profit minded applied themselves to this project with great zeal. Subscriptions were taken and companies formed.[8] The Society for the Encouragement of Arts, Manufactures and Commerce (hereafter the Society of Arts)—a more practical analogue to the Royal Society—offered a prize to anyone who could devise "a process for preserving fresh meat better than by any method hitherto employed, applicable to the preservation of meat in countries where it is now almost valueless, so as to render it an article of commerce."[9] Over a twenty-year period, meat was salted, tinned, enveloped in paraffin,

[3] On breeds of livestock in the British Empire, see Rebecca J. H. Woods, *The Herds Shot Round the World: Native Breeds and the British Empire* (Chapel Hill: Univ. of North Carolina Press, 2017), especially chap. 5, "A Universal Type." On Spanish antecedents to British sheep and cattle, see Elinor Melville, *A Plague of Sheep: Environmental Consequences of the Conquest of Mexico* (New York, N.Y.: Cambridge Univ. Press, 1994).

[4] Alfred Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900–1900*, 2nd ed. (Cambridge: Cambridge Univ. Press, 2004). For a characterization of this issue with respect to New Zealand specifically, see Rebecca J. H. Woods, "Breed, Culture, and Economy: The New Zealand Frozen Meat Trade," *Agricultural History Review* 2 (2012): 288–308. For the role of domesticated livestock in colonial territorial acquisition and the establishment of markets, see Virginia De John Anderson, *Creatures of Empire: How Domestic Animals Transformed Early America* (New York, N.Y.: Oxford Univ. Press, 2004); Melville, *Plague of Sheep* (cit. n. 3); and William Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England* (New York, N.Y.: Hill and Wang, 1983).

[5] "Animal Food Supplies," *Lancet* 102 (1867): 94–7, on 94.

[6] C. Knick Harley, "Steers Afloat: The North Atlantic Meat Trade, Liner Predominance, and Freight Rates, 1870–1913," *J. Econ. Hist.* 68 (2008): 1028–58; Richard Perren, "The North American Beef and Cattle Trade with Great Britain, 1879–1914," *Econ. Hist. Rev.* 24 (1971): 430–44.

[7] "Australian Meat," *Lancet* 93 (1869): 239.

[8] One agricultural historian writes that the mid-1860s "saw a rash of canning factories" established overseas: E. J. T. Collins, "Food Supplies and Food Policy," in *The Agrarian History of England and Wales*, vol. 7, *1850–1914*, pt. 1, ed. Collins (Cambridge: Cambridge Univ. Press, 2000), 33–71, on 36.

[9] "Proceedings of the Society: Food Committee," *Journal of the Society of Arts* 15 (4 January 1867): 99–102, on 100. (**Hereafter** referred to as *J. Soc. Arts.*) See also Richard Perren, *Taste, Trade and Technology* (cit. n. 2), 8.

soaked in chemicals, vacuum packed, frozen, refrigerated, and treated in a host of other ways in a great collective effort to hold putrefaction at bay.[10]

As E. C. Spary and Anya Zilberstein argue in the introduction to this volume, food is profoundly relational and transformational—"a site of direct encounter between individuals and larger social structures or transformations over which they may have little power" and that can emerge as a flashpoint between conflicting interests, commitments, and contested forms of expertise.[11] Meat in mid-nineteenth-century Britain was no exception. Not only a "very perishable material," in the words of the *Lancet*, vulnerable to putrefaction and decay, animal flesh was, and is, a highly changeable substance, materially and metaphorically. Conceptually, meat held a wide array of significations and values, ranging from those implicated in national identity to those made in service of scientific authority. Materially, meat was subject to industrial processes capable of transforming it from a familiar article of diet into highly debated gustatory novelties.[12] In 1860s Britain, industrialists, entrepreneurs, and "men of science" assumed that innovation would solve what they perceived as Britain's problem of supply and demand, but the products they proffered met with resistance from consumers—more specifically, poor and working-class consumers, the "teeming masses" who constituted the stated beneficiaries of these efforts to "increas[e] and cheapen . . . the supply of animal food" in Britain, and who exercised their power by choosing whether or not to purchase imported preserved meats.[13] In effect, the more a process transformed that which it sought to preserve—by cooking, chemical application, desiccation, or by some other process—the less appeal it held for consumers. The more consumer resistance a tinned or dried product generated, the more the frustrations of would-be tastemakers grew.

This dialectic emerges from the published record of the Society of Arts' Food Committee, established in 1867, and more specifically, from its subcommittee on meat, and the broader discussion of meat preservation carried on in the *Journal of the Society of Arts* and other specialist literature largely between the years 1860 and 1880. Reading these records against the grain, this article demonstrates how the very changeability of meat itself became an opportunity for poor and working-class consumers to resist and refuse both the claims and the products of scientific and industrial expertise. Members of the Society of Arts and their contemporaries writing in the *Lancet* and more broadly understood "science" to encompass both the technical ingenuity requisite for the preservation of meat as well as expert evaluations of its value as food, which was usually expressed in terms of "wholesomeness," "nutritive power," or "nutritive value."

[10] For the history of food preservation generally, see Sue Shephard, *Pickled, Potted and Canned: The Story of Food Preserving* (London: Headline Book Publishing, 2000); Stuart Thorne, *The History of Food Preservation* (Totawa, N.J.: Barnes & Noble Books, 1986); and C. Anne Wilson, ed., "*Waste Not, Want Not": Food Preservation from Early Times to the Present Day* (Edinburgh: Edinburgh Univ. Press, 1991).

[11] E. C. Spary and Anya Zilberstein, "On the Virtues of Historical Entomophagy," in this volume, 12, 7.

[12] Mark R. Finlay, "Quackery and Cookery: Justus von Liebig's Extract of Meat and the Theory of Nutrition in the Victorian Age," *Bull. Hist. Med.* 66 (1992): 404–18; Lesley Steinitz, "Making Muscular Machines with Nitrogenous Nutrition: Bovril, Plasmon and Cadbury's Cocoa," in *Food and Material Culture: Proceedings of the Oxford Symposium on Food and Cookery 2013*, ed. Mark McWilliams (Totnes, UK: Prospect, 2014), 289–303; Steinitz, "The Language of Advertising: Fashioning Health Food Consumers at the *Fin de Siècle*," in *Food, Drink, and the Written Word in Britain, 1820–1945*, ed. Mary Addyman, Laura Wood, and Christopher Yiannitsaros (London: Taylor & Francis, 2017), 135–63.

[13] "Animal Food Supplies" (cit. n. 5), 94.

They expected science to solve Britain's "meat deficit."[14] But these self-appointed experts in the Society of the Arts and elsewhere were forced to admit that consumer preference would also determine the success or failure of a given product. Charqui—an industrially dried and salted nineteenth-century South American precursor to beef jerky—offers a particularly stark example of the way this scientistic push met with resistance, but tinned and canned meat were subject to similar contestation. Ultimately, freezing and refrigeration—processes which seemed to transform dead meat the least—carried the day, becoming by the close of the century a common article of diet.

AN EMPIRE OF MEAT EATERS

The way in which Great Britain developed foodstuffs, and consequently British diets, underwent profound transformation over the course of the nineteenth century. This transformation was part of a much larger contemporaneous structural shift in British culture and economy that redefined both the substance of diet and the culture of consumption from the macroeconomic level down to the plates of working people across Britain.[15] Early in the century, a regional system of procurement and distribution reigned, where grains and livestock raised in various districts of the British Isles were exchanged for consumption in population centers, and local market gardens and urban dairies provided fresh vegetables and milk for cities across the industrializing north and in London.[16] Diets were seasonally varied and locally determined, with a significant portion of foodstuffs (such as bread and preserves) made in the home.[17] As Britain's population grew, and became increasingly concentrated in London, Manchester, Birmingham, and other newly industrialized conurbations, this arrangement came under strain.[18] By midcentury, urban centers, especially London, absorbed more and more livestock from Scotland, Wales, Ireland, and eastern Europe, while reliance upon imported grains grew. In addition to sugar and tea, Britons increasingly came to subsist on purchased foods fabricated from imported grain, and eventually, imported meat as well.[19] As procurement networks industrialized, so too did the diet

[14] See also Benjamin Aldes Wurgaft, "Meat Mimesis: Laboratory-Grown Meat as a Study in Copying," in this volume.

[15] John Burnett documents this transition in *Plenty and Want: A Social History of Diet in England from 1815 to the Present Day* (London: Thomas Nelson & Sons, 1966).

[16] See Jack Cecil Drummond, *The Englishman's Food: A History of Five Centuries of English Diet* (London: J. Cape, 1940), esp. pt. 3; and Craig Muldrew, *Food, Energy and the Creation of Industriousness: Work and Material Culture in Agrarian England, 1550–1780* (Cambridge: Cambridge Univ. Press, 2011).

[17] Andrea Broomfield, "Rushing Dinner to the Table: The 'Englishwoman's Domestic Magazine' and Industrialization's Effects on Middle-Class Food and Cooking, 1852–1860," *Victorian Periodicals Review* 41 (2008): 101–23, on 102.

[18] Thorne, *History of Food Preservation* (cit. n. 10), 17; Richard Perren, "Changes in Town Markets, 1840–64," chap. 3 in *The Meat Trade in Britain 1840–1914* (London: Routledge and Kegan Paul, 1978), esp. 32; Robyn S. Metcalfe, *Meat, Commerce and the City: The London Food Market, 1800–1855* (London: Pickering & Chatto, 2012). Although other cities in Europe experienced similar transformations, London's size and rapid growth meant that the strain to its existing systems of procurement was particularly acute. See Hans Jürgen Teuteberg, "Urbanization and Nutrition: Historical Research Reconsidered," in *Food and the City in Europe since 1800*, ed. Peter J. Atkins, Peter Lummel, and Derek Oddy (Burlington, Vt.: Ashgate, 2007), 13–24, on 18.

[19] Derek J. Oddy, "Food Quality in London and the Rise of the Public Analyst, 1870–1939," in Atkins, Lummel, and Oddy, *Food and the City* (cit. n. 18), 91–104, on 99. See also Sidney Mintz's classic account of the British industrial diet in *Sweetness and Power: The Place of Sugar in Modern History* (London: Penguin, 1985).

of most Britons (with the possible exception of society's highest echelons), inaugurating what Chris Otter has termed "the British nutrition transition," the first instance of a truly globalized food chain, and the origins of twentieth-century diets across the developed world.[20]

The significance of this broad shift was felt deeply with respect to meat. The association between national identity and meat eating has deep roots in English thought and culture, but it took on a new charge as a mark of Britishness in the eighteenth century with the intersection of contemporary dietetics and anti-French rhetoric, as Anita Guerrini has argued.[21] In material terms as well, meat— understood at the time to refer to beef, sheep meat, and pork (to the exclusion of fowl, fish, and game, the last of which was primarily a delicacy reserved for the gentry)—was central to the British diet, and Britons consumed quantities of meat far in excess of their continental counterparts.[22] This material enthusiasm for meat reinforced cultural preference so that even as the components and qualities of what constituted an adequate diet were debated throughout Europe at this time, few contested that meat was requisite.[23] When Wentworth Lascelles Scott, a statistician and expert on food adulteration, proclaimed it "a primary necessity of our national existence" in a paper read before the Society of Arts, he expressed a majority position.[24]

So, when a complex of factors converged to put the squeeze on Britons' access to meat in the 1860s, the issue of the nation's meat supply ranked high for policy makers, agronomists, and other interested parties. By midcentury, rising wages for industrial workers, which translated to greater purchasing power, contributed to a burgeoning demand for meat, while repeated zoonotic outbreaks in Europe undercut regular sources of imported foreign livestock, as did the transition to grain growing for export in traditional cattle districts of central Europe.[25] As the cost of butcher's meat rose accordingly, many learned commentators feared that animal protein was

[20] Chris Otter notes that the diversity of meats consumed rose with social standing, and that the characteristic high-fat, high-carbohydrate diet that emerged from the "British nutrition transition" was a phenomenon of the working class. See Otter, "The British Nutrition Transition and its Histories," *Hist. Comp.* 10 (2012): 812–25, on 813. See also Andrea Broomfield, who notes the persistence of traditional estate cooking after the early nineteenth century, but only among the landed gentry: Broomfield, "Rushing Dinner to the Table" (cit. n. 17), 102. For the impact of industrialized transportation networks on Britain's meat trade specifically, see Perren, "Changes in the Domestic Livestock Trade, 1840–64," chap. 2 in *Meat Trade in Britain* (cit. n. 18).

[21] Anita Guerrini, "Health, National Character and the English Diet in 1700," *Stud. Hist. Phil. Biol. Biom. Sci.* 43 (212): 349–56.

[22] Peter J. Atkins, "'A Tale of Two Cities': A Comparison of Food Supply in London and Paris in the 1850s," in Atkins, Lummel, and Oddy, *Food and the City* (cit. n. 18), 25–38, esp. 35; Perren, *Meat Trade in Britain* (cit. n. 18), 3.

[23] Ulrike Thoms, "The Technopolitics of Food: The Case of German Prison Food from the Late Eighteenth to the Early Twentieth Centuries," and Corinna Treitel, "Nutritional Modernity: The German Case," both in this volume.

[24] Wentworth Lascelles Scott, "On the Supply of Animal Food to Britain, and the Means Proposed for Increasing It," *J. Soc. Arts* 14 (21 February1868): 255–68, on 256. In a paper read before the Society of Arts in 1875, Scott was described as "Public Analyst to the Counties of Durham and North Stanford"; Scott, "Food Adulteration and the Legislative Enactments Relating Thereto," *J. Soc. Arts* 23 (2 April 1875): 427–37, on 427. See also Scott, "On Food; Its Adulterations, and the Methods of Detecting Them," *J. Soc. Arts* 9 (1 February 1861): 153–62.

[25] The "Great Cattle Plague" of 1865 was particularly notable, and had a palpable effect on the availability of meat in Britain. See Arvel B. Erickson, "The Cattle Plague in England, 1865–67," *Agricultural History Review* 2 (1961): 94–103; Collins, "Food Supplies" (cit. n. 8), 36.

beyond the reach of "our teeming and poorer population."[26] As the 1860s drew to a close, Scott claimed, "the entire country is in a state of mitigated starvation."[27] Although such dramatic terms distorted the actual availability of meat in Britain, the rhetoric of scarcity persisted into the 1870s, especially in relation to the nation's meat supply.[28] Periodic hungers gripped Britain—notably during the Napoleonic wars, and again in the hungry 1830s and 1840s, the memory of which probably contributed to anxiety surrounding what an eminent agricultural historian called the "mid-Victorian meat famine"—yet economic historians largely agree that all but the very poorest in Britain were relatively well supplied with animal protein during the latter half of the nineteenth century, even if they paid dearly for it.[29] Per capita consumption was in fact considerably higher than in other European countries at 90 pounds per head in the 1860s.[30] Yet the cultural and rhetorical emphasis placed on meat eating as a marker of Britishness meant that the midcentury "meat-deficiency" was felt acutely, apparently by those who commented on it, and presumably also by those who experienced it directly.[31]

Anxiety about the presumed inadequacy of the nation's meat supply, moreover, was an expression of worry over Britain's standing as an industrial leader and was deeply tied to Britain's imperial identity. "It is more than likely," according to George Carrick Steet, a fellow of the Royal College of Surgeons who presented before the Society of Arts in 1865, "that our position among the nations is not a little due to [our] national taste for good, strong food and plenty of it."[32] Without sufficient meat to fuel labor, Steet worried, the working class might not be able to bear the mantle of Britain's industrial primacy. "If . . . our energies of body and mind are to be kept going it is absolutely necessary that proper supplies of aliment should be forthcoming," Steet continued, "and if that is not to be had at home we must go to other countries to seek for it."[33] If only, an anonymous contributor to the *Lancet* editorialized in 1867, "meat could be as easily transported from one country to another as tea, sugar, and

[26] "Australian Meat" (cit. n. 7), 239. Between 1850 and 1870, domestic production of meat rose by less than 3 percent; see Perren, "Foreign Imports and the Domestic Supply, 1840–64," chap. 5 in *Meat Trade in Britain* (cit. n. 18), 69.

[27] Scott, "Supply of Animal Food" (cit. n. 24), 256.

[28] Collins, "Food Supplies" (cit. n. 8), 33.

[29] E. J. T. Collins, "Rural and Agricultural Change," in Collins, *Agrarian History* (cit. n. 8), 7:107–16; quoted in Perren, *Taste, Trade and Technology* (cit. n. 2), 8. Michael Nelson notes that nineteenth-century diets in Britain were "radically different" across the classes, with the very poor eating very little meat, while "well-off families" were well supplied. See Nelson, "Social-Class Trends in British Diet, 1860–1980," in *Food, Diet and Economic Change Past and Present*, ed. Catherine Geissler and Derek J. Oddy (Leicester: Leicester Univ. Press, 1993), 101–20, on 102 and 103. Nonetheless, per capita meat consumption rose by approximately 50 percent between 1840 and 1914, according to Richard Perren; see Perren, *Taste, Trade and Technology* (cit. n. 2), 3. See also Perren, *Meat Trade in Britain* (cit. n. 18), 3; and Forrest Capie and Perren, "The British Market for Meat, 1850–1914," *Agr. Hist.* 50 (1980): 502–15. For hunger and the British state more generally, see James Vernon, *Hunger: A Modern History* (Cambridge, Mass.: Belknap Press of Harvard Univ. Press, 2007).

[30] Perren, *Meat Trade in Britain* (cit. n. 18), 3.

[31] For meat eating as a mark of Britishness, see Steven Shapin, "'You are What You Eat': Historical Changes in Ideas about Food and Identity," *Hist. Res.* 87 (2014): 377–92. For the dietary perspectives of the poor in late nineteenth-century Britain, see Anna Davin, "Loaves and Fishes: Food in Poor Households in Late Nineteenth-Century London," *Hist. Workshop J.* 41 (1996): 167–92. Quotation from Scott, "Supply of Animal Food" (cit. n. 24), 255.

[32] G. C. Steet, "On the Preservation of Food, especially Fresh Meat and Fish, and the Best Form for Import and Provisioning Armies, Ships, and Expeditions," *J. Soc. Arts* 13 (1865): 309–15, on 315.

[33] Ibid.

grain can, much benefit would result both to the owners of land and stock on one side of the Atlantic, and to the imperfectly fed populations on the other side."[34] Meat, though, is very little like sugar, tea, or grain, all of which are bulky yet relatively light commodities, making them cheap to transport, and easy to store for long periods without degradation. Instead, both the weight of live animals and the tendency toward decay of dead meat kept the profit margins of the live trade industry slim, and hampered the feasibility of a long-distance trade in dead meat.

THE FOOD OF THE PEOPLE

In 1866, in the midst of this perceived crisis of supply and demand, the Society of Arts established a committee on "the food of the people," commonly called the Food Committee.[35] Motivated in part by recent governmental inquiry into the "defective amount of nutritious food available for the population at large," the Food Committee's principal charge was to "inquire and report respecting the food of the people," and to bring scientific thought and method to bear on what was, according to the members of parliament, aristocrats, and the occasional medical man who staffed the committee, no mere "question of humanity and charity," but "a grave national question, vitally affecting 'arts, manufactures, and commerce,' and the very sources of national strength."[36]

Inquiries into the national diet, food supply, and "production, importation, preservation, and preparation of articles suitable for food" were precisely the kind of reasons for which the Society of Arts had been founded in 1754.[37] An organization devoted to the "encouragement of Arts, Manufactures and Commerce in Great Britain," it drew members from throughout Britain's educated strata.[38] Improvement-minded worthies like Lord Romney, elected the society's second president in 1761, and other "men of great property" came together with men of lesser property but great reputation for applied practical or technical knowledge, to offer premiums "for such Productions, Inventions, or Improvements as shall tend to the employing of the Poor, to the Increase of Trade, and to the Riches and Honour of this Kingdom, by Promoting Industry and Emulation."[39] At regular Wednesday meetings, where members were invited to read papers on their relevant expertise, in the pages of its journal, and among the specialist committees, members of the society sought scientific and technical solutions to problems of national and imperial significance.[40]

As a central article of diet, rhetorically and materially, meat and the questions of where to get it and how to preserve it, distilled precisely the issue of imperial order

[34] "Animal Food Supplies" (cit. n. 5), 94.

[35] "Food Committee," *J. Soc. Arts* 14 (16 November 1866): 781.

[36] Ibid.; "Food Committee" (cit. n. 9), 99. On the broader nutritional and public health fallout from the Privy Council's 1863 report on the diet of the poor, see Edwin Chadwick, "'Mutton Medicine,' and the Fever Question," *Bull. Hist. Med.* 70 (1996): 233–65. For a list of inaugural members, see "Proceedings of the Society: Food Committee," *J. Soc. Arts* 15 (21 December 1866): 69.

[37] "Food Committee" (cit. n. 9), 99.

[38] The statement was made by William Shipley in 1754, and was quoted in James Harrison, *Encouraging Innovation in the Eighteenth and Nineteenth Centuries: The Society of Arts and Patents, 1754–1904* (Gunnislake, UK: High View, 2006), vii.

[39] Ibid.; D. G. C. Allan and John L. Abbott, "General Introduction," in *The Virtuosi Tribe of Arts and Sciences: Studies in the Eighteenth-Century Work and Membership of the London Society of Arts*, ed. Allan and Abbott (Athens: Univ. of Georgia Press, 1992), xv–xxii, on xvii–iii.

[40] Harrison, *Encouraging Innovation* (cit. n. 38), xxii, 37–8.

and political economy at the heart of the Society of Arts' mandate. Food, as E. C. Spary has shown in the context of eighteenth-century France, played a constitutive role in building, maintaining, and transforming bodies in the service of European imperial expansion.[41] Because food is and has been such an important marker of cultural identity, the ability of cosmopolitan French imperialists to bring the gustatory trappings of their nation with them on board oceanic expeditions and to Caribbean plantation communities was of utmost importance. Fulfilling this desire required devising new techniques for making characteristic French cuisine portable, such as the creation of the stock cube.[42] Preserved foods, including meat, were thus a crucial way in which European bodies could remain European in the colonies, but they were also an opportunity for colonial matter to reformulate metropolitan bodies. Harry Chester, who gave the opening address at the Food Committee's inaugural meeting on 21 December 1866, declared that "science was required to devise means" for dealing with the "millions of tons of beef and mutton [that] were wasting in distant quarters of the earth . . . [so] that commercial enterprise might be enabled to bring it to this country in a condition suitable for food."[43] Like the stock cubes of eighteenth-century French imperialists, but in reverse, preserved meat in the nineteenth century was to be the lynchpin with which to orchestrate bodies, nation, and empire. The herds and flocks of colonial places were now seen as the raw material through which to reconstitute the industrial human bodies of the imperial metropole in stronger, more efficient laborers.[44] Within this logic, the "resources" of global-imperial places—not only dead meat, but grain, sugar, and other foodstuffs as well—would be redirected toward the maintenance and constitution of the very same colonizing bodies that were intended to supplant indigenous populations throughout the empire.

THE QUESTION OF MEAT

So significant was this matter to the well-being of Britain that by the third meeting of the Food Committee, a subcommittee devoted to "the question of meat" was appointed; it was hoped the subcommittee would oversee the distribution of the Trevelyan Prize, on offer since 1864 to reward a recipient for any superior method of preserving fresh meat.[45] But the "question of meat" and its nutritive value was a complex one in

[41] E. C. Spary, "Self Preservation: French Travels Between *Cuisine* and *Industrie*," in *The Brokered World: Go-Betweens and Global Intelligence, 1770–1820*, ed. Simon Schaffer, Lissa Roberts, Kapil Raj, and James Delbourgo (Sagamore Beach, Mass.: Science History Publications, 2009), 355–86.

[42] Ibid., 364–9.

[43] "Food Committee" (cit. n. 9), 100.

[44] M. Norton Wise and Crosbie Smith chart the wide-ranging shift toward thermodynamical models of work and efficiency in nineteenth-century Britain in a three-part series published in the journal *History of Science*: Wise and Smith, "Work and Waste: Political Economy and Natural Philosophy in Nineteenth Century Britain (I)," *Hist. Sci.* 27 (1989): 263–301; "Work and Waste: Political Economy and Natural Philosophy in Nineteenth Century Britain (II)," *Hist. Sci.* 27 (1989): 391–449; and "Work and Waste: Political Economy and Natural Philosophy in Nineteenth Century Britain (III)," *Hist. Sci.* 28 (1990): 221–61.

[45] "Proceedings of the Society: Food Committee," *J. Soc. Arts* 15 (15 February 1867): 189–91, on 191. Two further subcommittees on milk and fish were appointed at the same meeting. W. C. Trevelyan had first "placed in the hands" of the Society £70 to be offered "for any subject the Council [of the Society] thinks fit" in June 1863. It was designated for "Preserved Fresh Meat" in November of the same year. See "Annual Report," *J. Soc. Arts* 11 (26 June 1863): 546–50, on 548; and "Subjects for Premiums for the Sessions 1863–4 and 1864–5," *J. Soc. Arts* 11 (13 November 1863): 1–8, on 5.

the 1860s. Contemporaries understood meat to be a changeable substance, and they recognized the challenges this posed for its preservation. Meat consisted of "organic bodies of highly complex constitution" subject to "constant mutation," whether the animal "yielding it" was alive or dead, explained the *Lancet*.[46] If the former, the set of changes to which meat was subject—growth, regulation, "constant renewal and repair"—were "controlled by the vital force" of the creature in question, but upon death, "other changes immediately commence, resulting in putrefactive decomposition."[47] Although microorganisms were identified in the late eighteenth century, their precise role in putrefaction remained obscure until almost the close of the nineteenth. That bacteria were associated with decayed flesh was well known thanks to the prevalence of microscopy as a method of analysis, but their presence in decaying organic matter was assumed to be effect, rather than cause.[48] Steet explained that "as soon . . . as life ceases," the "constituents of flesh and other structures" composing the animal body "have a tendency to resolve themselves into new compounds by the union of their elements with atmospheric air and with one another."[49] Existing methods of preservation that excluded oxygen or precluded oxidation, such as canning or pickling, offered good support for this theory, and so interpretations of putrefaction remained rooted in oxidation.[50]

Novel methods developed for preserving meat around midcentury likewise focused on excluding oxygen from contact with meat. Many tried to accomplish this by providing a "protecting shield or bulwark" such as a tin or a can between the meat and the "oxidizing influences of the atmosphere," as Scott explained.[51] But preservation could also be accomplished by "deoxidating . . . chemical substance[s]" that "rapidly absorb[ed]" oxygen, or by "the addition of some substance which . . . prevents or arrests oxidation or putrefaction by its mere presence."[52] Preservative additives ranged from the familiar (salt, smoke) to the novel "chemical antiseptics," of which bisulphite of lime constituted Scott's preferred method.[53] Over the course of the Subcommittee on Meat's existence—alongside its parent committee, it met regularly until 1879—it regularly sampled specimens of meat preserved by various methods and interviewed expert "witnesses" from the medical and practical professions whose work was related to meat.[54]

[46] "Animal Food Supplies" (cit. n. 5), 94.

[47] Steet, "Preservation of Food" (cit. n. 32), 312; Analytical Sanitary Commission, "Records of the Results of Microscopical and Chemical Analyses of the Solids and Fluids Consumed by All Classes of the Public," *Lancet* 59 (1852): 294–7, on 294; "Animal Food Supplies" (cit. n. 5), 94.

[48] Thorne, *Food Preservation* (cit. n. 10), 13.

[49] Steet, "Preservation of Food" (cit. n. 32), 312.

[50] Thorne, *Food Preservation* (cit. n. 10), 13, 14. For the reception of germ theory in Britain, see Michael Worboys, *Spreading Germs: Disease Theories and Medical Practice in Britain, 1865–1900* (Cambridge: Cambridge Univ. Press, 2000); Peter J. Atkins, "The Pasteurisation of England: The Science, Culture and Health Implications of Milk Processing, 1900–1950," in *Food, Science, Policy, and Regulation in the Twentieth Century: International and Comparative Perspectives*, ed. David F. Smith and Jim Phillips (New York, N.Y.: Routledge, 2000): 37–52.

[51] Scott, "Supply of Animal Food" (cit. n. 24), 266.

[52] Ibid.

[53] Ibid., 267.

[54] Quotation from "Food Committee" (cit. n. 9), 99. One of the first experts to appear before the subcommittee was Johann Thudichum, the noted German biochemist and former student of Justus von Liebig: "Proceedings of the Society: Food Committee," *J. Soc. Arts* 15 (8 March 1867): 237–41.

But other, simpler ways of preserving meat, from sun drying to smoking or salting, existed and were also widely employed. Despite their taste for smoked herring and bacon, the British had a tendency to associate nonindustrial methods of preservation—especially those drawing on the evaporative power of the sun—with "less civilized peoples" due to their antiquity and presumed simplicity.[55] "The process of drying or desiccating is . . . hardly a scientific process at all," a miscellaneous note on food preservation stated in the *Journal of the Society of Arts* in 1875.[56] However, despite the high imperial chauvinism at work in relegating atmospheric preservation to the primitive, Victorians displayed a great interest in other cultures' preservative techniques, particularly if they seemed useful for the "very important object of increasing and cheapening the supply of animal food" in Britain by facilitating importation from distant lands.[57] Some of the earliest efforts to exploit the "enormous meat stores of Australia and South America" were based on indigenous methods of preservation that harnessed the power of the sun and the atmosphere (the "desiccating class," in Scott's typology, "which include all methods for robbing food products of their natural moisture").[58] In this way, the British Empire provided not only a source of meat for preserving, but the method by which to do so.

THE RAW AND THE DRIED

Just as imperialists mined the globe for resources, including the "enormous meat stores" of distant lands, so too they mined indigenous cultures for methods of preservation that might provide the raw material, so to speak, for novel industrial methods of preserving meat. In scouring indigenous cultures at the fringes of Britain's imperial expansion for methods of preservation, British industrialists and innovators hoped to subject desiccation to industrialization. Pemmican, a kind of dried animal flesh mixed with berries and fat and used extensively by indigenous peoples of the North American Plains and the Pacific Northwest, came under consideration. Though it came to provide the basis of a regional Great Plains energy regime, at least until the destruction of the bison in the late nineteenth century, for metropolitan entrepreneurs, pemmican was little more than a curiosity.[59]

However, British industrialists went much further in adapting, extending, and industrializing the production of charqui.[60] Charqui originated as sun-dried llama meat among the Quechua people of present-day Peru, but by the nineteenth century it applied to horseflesh and beef as well as to that of native ungulates, and was used more broadly to sustain the laboring bodies of gauchos and enslaved laborers throughout South America. By applying copious amounts of salt, exposing it to the open air,

[55] Samuel Rideal, "The Use and Abuse of Food Preservatives," *J. Soc. Arts* 48 (1908): 384–93.
[56] "Miscellaneous: Food Preservation," *J. Soc. Arts* 23 (1 October 1875): 917–20, on 917.
[57] "Animal Food Supplies" (cit. n. 5), 97.
[58] Scott, "Supply of Animal Food" (cit. n. 24), 267, 262.
[59] George Colpitts, *Pemmican Empire: Food, Trade, and the Last Bison Hunts in the North American Plains, 1780–1882* (New York, N.Y.: Cambridge Univ. Press, 2015).
[60] "Food Preservation" (cit. n. 56), 917. Biltong, the dried meat of southeast Africa, which would have been familiar to British colonists in South Africa, did not seem to have been considered as a possible method for cheapening meat for the masses and only became a subject of medical/dietary notice during the Second Boer War (1899–1902). See, for example, "Emergency Rations," *British Medical Journal* 1 (1900): 1243–4; W. D. Haliberton, "The Composition and Nutritive Value of Biltong," *Brit. Med. J.* 1 (1902): 880–2; and "The Preservation of Foods," *Brit. Med. J.* 1 (1908): 936–8.

and then packing it in barrels, firms funded by British investment transformed cattle flesh into industrial charqui and introduced it to British palates as a solution to the mid-nineteenth-century "meat-deficiency."[61] Very quickly, though, "an almost universal opinion against it" took root, first among the lower classes who were its target consumers and subsequently among experts and promoters who conceded that charqui was neither toothsome nor nutritious.[62]

Charqui's ill-fated introduction to Britain illuminates the extent to which the relative success or failure of any preservation technique depended on the degree to which any given type of preserved meat represented the "genuine article"—that is, raw, uncooked flesh.[63] To varying degrees, all methods of preservation induced change in the tissues and fibers that compose meat, but the more limited the extent of that change, the better. Conversely, the more profoundly a given method changed the texture or appearance of meat, or sensory response to it, the more likely it was to fail. According to Steet, the British public's dislike of charqui was rooted in "its appearance and unsavoury smell in the raw state." Its smell, he explained, "resemble[ed] the odour of a small country chandler's store," where the rendering of animal carcasses and the byproducts of butchery for candle making would have taken place on site.[64] And its form and texture were most unlike those of fresh-killed animal flesh. In an exposé of the lives of the working poor aimed at middle-class readers, one contemporary journalist claimed to have overheard a pair of shoppers mistake a roll of rubber roofing felt for imported charqui, suggesting both the extent of transformation meat underwent in this particular preservative process and consumers' disdain for it.[65]

It is therefore hardly surprising that charqui failed to find a ready reception among its intended consumers. The further preserved meat was from resembling the fresh variety, the less likely it was to be considered tasty. And taste was so closely associated with evaluations of "nutritive value" that the less tasty a product was, the more chance there was of its "wholesomeness" or "nutritive power" coming into question. Steet undertook a chemical analysis of charqui, the results of which suggested that it "undoubtedly lost a large proportion of its best constituents" compared to fresh "lean English" beef. This led him to declare that charqui "would never commend itself to the stomachs and appetites of our people."[66] Indeed, in their published disquisitions on the question of preserving meat for importation to Great Britain, experts toggled directly back and forth between matters of taste and matters of nutrition, revealing just how closely the two were aligned. Mr. Warriner, a "practical cook," "did not decry charqui because of its untempting appearance." He claimed this during the discussion that followed Steet's paper at the Society of Arts, adding, "the great question was whether it contained the necessary nutritive qualities which all food should possess."[67]

[61] Scott, "Supply of Animal Food" (cit. n. 24), 256.
[62] Steet, "Preservation of Food" (cit. n. 32), 313.
[63] Wurgaft (cit. n. 14).
[64] Steet, "Preservation of Food" (cit. n. 32), 313, 314. On chandlery, see Joan Tighe, "An Early Dublin Candle Maker," *Dublin Historical Record* 41 (1988): 115–22. On industrial candle making more generally, see Jeremy Zallen, *American Lucifers: The Dark History of Artificial Light, 1750–1865* (Chapel Hill: Univ. of North Carolina Press, 2019), esp. chaps. 2 and 4 on the smell associated with this work.
[65] [James Greenwood], "The Depths of Poverty: A London Exploration. III—Poverty's Larder," *Englishwoman's Domestic Magazine* 15 (1866): 86.
[66] Steet, "Preservation of Food" (cit. n. 32), 313, 314. Nor was Steet alone in his opinion. The Society of Arts revisited charqui in its 1875 miscellany on food preservation, declaring that, "though largely used in South America, it will not 'go down' among ourselves"; see "Food Preservation" (cit. n. 56), 917.
[67] Steet, "Preservation of Food" (cit. n. 32), 316.

Edward Smith, a fellow of the Royal Society and also among Steet's audience, connected "the hardness and saltness" of charqui—"both bad qualities, the former showing the absence of the nutritious elements of meat . . . and the latter exercising a prejudicial effect upon the human frame"—with "the questionable flavour of this South American beef as at presently cured."[68] Steet offered a scientific rationale for this conclusion: salting "abstracted . . . the greater part of the nutritive element of meat," rendering the fiber "drier, harder, and less digestible."[69] Unpalatability thus called into question the "nutritive value" of preserved meats, and experts found themselves conceding to popular opinion.

Nor were other preserved meats immune to these challenges. A promotional notice for Australian preserved meat—mutton and beef, that is, cooked and sealed in tins—linked taste and nutritive value closely together, and claimed that "it is wholesome . . . it contains all the nourishment of meat of good quality, and . . . it is tender, sweet, and sound."[70] But an earlier evaluation of a similar product by the *Lancet*'s Sanitary Commission on Australian Boiled Beef concluded, "as might be supposed," that the tinned meat "was deficient in true meat flavour, and contained but little of the constituents of extract of meat."[71] Generally, the *Lancet* explained in 1867, a successful preservative method "must be neither costly nor complicated, nor injurious to the flavour, nor destructive to the nutritive qualities of the substance with reference to its use as food."[72] Taste and "nutritive value" went hand in glove in the mid-nineteenth century, the former often trumping claims to the latter.

A GREAT BOON REBUFFED

The relationship between class and consumption in the case of meat is a complex one. The palatability and suitability of a particular cut of meat, or of a particular animal breed, had long been a factor in British dietary habits, which is to say that different kinds of meat were believed to be suitable for different classes of people. In the early nineteenth century, for example, the meaty, marbled Leicester sheep—whose status in Britain approached that of an ovine national hero—was held to be the most appropriate breed for working-class consumption, while the more refined merino breed was touted as better suited for the plates and palates of the wealthy, on account of its more "gamey" flavor and texture.[73] Predictably, the starkest expression of the connection between animal protein and social status was made with respect to charqui. According to the *Lancet*, charqui was "a bad sort of animal food, which has been amply dried and definitively condemned and rejected as unsuited for European palates." In fact, it was fitting only for the lowest of the low, such as "the slave populations of the West Indies," among whom it was extensively employed "as an article of food."[74] Other social castoffs closer to home might also profit from charqui, such as Britain's prison population; Warriner, the practical cook in Steet's audience, suggested, "they should feed convicts on charqui, and leave English beef and mutton for the honest labouring population."[75]

[68] Ibid., 317.
[69] Ibid., 312. See also Scott, "Supply of Animal Food" (cit. n. 24), 267.
[70] "Australian Meat," *Lancet* 97 (1871): 681.
[71] "Report of the Lancet Sanitary Commission on Australian Boiled Beef," *Lancet* 89 (1867): 550.
[72] "Animal Food Supplies" (cit. n. 5), 95.
[73] Woods, *Herds Shot Round the World* (cit. n. 3), 63–4.
[74] "Animal Food Supplies" (cit. n. 5), 95.
[75] Steet, "Preservation of Food" (cit. n. 32), 316.

Although experts yielded to popular opinion in the case of charqui, they clung to what they claimed were the benefits of other preserved meats more persistently, and none more so than tinned boiled beef. Those involved in procuring, preserving, and marketing imported meat in Britain insisted that industrialized meat products represented a "great boon" to the lower orders. Time and again, contemporaries described their work in these terms. The *Lancet* pronounced in 1869: "Cheap meat, of good quality, would be an immense boon to the poorer classes, many of whom must experience extreme difficulty in procuring animal food at all."[76] The medical superintendent of the Sussex Lunatic Asylum noted in 1872 that preserved meat from Australia was in extensive use "in many of our public institutions," and yet, he lamented, "there is still a great prejudice against it . . . in the minds of many." If only "it could be proved to them that preserved meat as nutritious as fresh meat can be put within their reach" at a reasonable price, "it would . . . be a great boon to the lower classes."[77]

The poor, however, were unwilling to accept preserved meat, whether in tins or barrels, or gassed or dipped in wax, on the terms dictated by doctors, importers, or other would-be adjudicators of the issue. And this refusal generated resentment. Ever attuned to the national interest, Steet commended his fellow citizens "for the wonderful appetites we possess, and the appreciation we have for the best quality of food."[78] But the poor stood in the way of truly efficient use of scarce nutritional resources. Their "ignorance" with regard "to the proper use of food . . . was very great," according to the Right Honourable Henry Austin Bruce, member of British Parliament. He held that "probably in this matter they were among the most backward in Europe, certainly they were the most wasteful."[79] With hardly more sensitivity to the demands upon the time of working-class women, many of whom were employed outside the home and therefore had little time to devote to the kitchen, Scott concurred that "much might be done . . . towards husbanding the supplies we already have if a better and more common-sense plan of cookery were adopted by all classes, but especially the poor."[80]

Experts admitted that preparation for the table was of the utmost significance when it came to handling tinned meat, because unlike many other preserved varieties, this article was in fact cooked during the preservative process. Canning methods varied somewhat, but nearly all involved the application of extreme heat to effectively sterilize the contents of a given tin. Containers of meat were "immersed . . . in a bath of boiling brine," and held there until their contents reached a given temperature.[81] Steam produced during this process was allowed to escape through a small hole left in the lid, which was soldered closed once "air has been expelled and was entirely excluded," thereby "preserving the contents in vacuo."[82] The high temperature necessary for preservation, and the length of time tins tended to remain in their "bath" thoroughly cooked the meat.[83] Not

[76] "The Australian Meat Question," *Lancet* 93 (1869): 71.

[77] S. W. D. Williams, "The Nutritive Value of Australian Preserved Meat," *Lancet* 98 (1872): 287–8, on 287.

[78] Steet, "Preservation of Food" (cit. n. 32), 315.

[79] "Food Committee" (cit. n. 45), 190.

[80] Steet, "Preservation of Food" (cit. n. 32), 315. Broomfield notes that for middle-class as well as working-class women, industrialization meant that they "lost their ability—and arguably the liberty—to raise and preserve food themselves, let alone cook it expertly." Broomfield, "Rushing Dinner to the Table" (cit. n. 17), 108.

[81] "Proceedings of the Society: Food Committee," *J. Soc. Arts* 15 (3 May 1867): 375–80, on 375.

[82] Ibid.; "Animal Food Supplies" (cit. n. 5), quotation on 96.

[83] Analytical Sanitary Commission, "Records of the Results" (cit. n. 47), 296. See also Thorne, *Food Preservation* (cit. n. 10); and Shephard, *Pickled, Potted, and Canned* (cit. n. 10).

only did this detract from its desirability as a substitute for fresh meat, it meant that anyone heating canned meat for a meal risked "reduc[ing it] to shreds."[84] Even when the contents of a tin of meat were "of first-rate quality," as the Society of Arts' Food Committee found upon examining two tins of Australian beef, "[it] is so much cooked in its preparation that any further application of heat deteriorates it and diminishes its usefulness as an article of food." Although tinned meat would be "quite fit to eat as it is found in the tins, cold," they concluded that "few persons would like it in that condition."[85] Experts like Scott suspected that the process of canning "overheat[ed its contents] to the detriment of its nutritive power."[86] Consequently, it was "very desirable that further attention should be given to the method of preservation, in order to provide an article which could be converted into stews, curries, &c., without disintegration, which is now inevitable if it is further cooked."[87]

Despite widespread recognition that the process of putting meat into cans profoundly transformed it, experts insisted on holding consumers to blame for its poor reputation, along with its producers. What consumers did with canned meat in the privacy of their kitchens detracted from its alimentary value, members of the Society of Arts believed. It was well known, claimed Harry Chester to the Food Committee, "how deplorable was the cooking among the lower, indeed among all but the highest classes in this community."[88] Yet diagnosis alone was no cure for the disease. "Great as the evil" of wasteful cookery among the poor was, Chairman Bruce of the Food Committee believed that "greater still was the difficulty of dealing with it, because we had to do with the settled habits, and often fixed prejudices of the people."[89] The well-known German physiologist Johann Thudichum spoke to the Subcommittee on Meat in February of 1867 and proclaimed that "as the common people do not know how properly to cook the simplest thing, they would not succeed in imparting appetizing qualities to preserved food materials."[90] In a milder tone, the editors of the *Lancet* in 1872 commended recent "public attention" to "the subject of supplementing our native supply of fresh meat by importations from Australia," but noted that until "improved methods of curing . . . come into vogue," great care was needed "to do little more than heat without cooking them afresh."[91] Recognizing how critical preparation for the table was to the success of canned meat, one importer went so far as to hand out "receipts for preparing and cooking the food" to buyers of preserved Australian meat "on behalf of the shippers of the meat . . . and, in order to clear away difficulties," by which he no doubt meant danger to the product's reputation that might result from improper preparation.[92]

[84] "Australian Boiled Beef" (cit. n. 71), 550.
[85] "Proceedings of the Society: Food Committee," *J. Soc. Arts* 16 (3 January 1868): 103–5, on 104.
[86] Scott, "Supply of Animal Food" (cit. n. 24), 266.
[87] "Food Committee" (cit. n. 85), 104.
[88] "Food Committee" (cit. n. 9), 101.
[89] "Food Committee" (cit. n. 45), 190. In fact, as Joanna Bourke has documented, the poor and working classes were eager to improve their culinary skills: Bourke, "Housewifery in Working-Class England 1860–1914," *Past & Present* 143 (1994): 167–97.
[90] Thudichum proceeded to note the lack of suitable cooking apparatus among the poor, suggesting (in an echo of the wider rhetoric surrounding meat preservation) that "the introduction of a really practical and economical cooking apparatus for the poor would be a great boon." See "Proceedings of the Society: Food Committee," *J. Soc. Arts* 15 (8 March 1867): 240.
[91] "Australian Meat," *Lancet* 99 (6 Jan 1872): 32.
[92] "Australian Meat Question" (cit. n. 76), 71.

Others accused the lower orders of stymying the supposed public mindedness of preserved meat purveyors, of putting the great "boon" of imported preserved meat in jeopardy by refusing to consume it. In 1872, the *Lancet*'s editors were "glad to find the subject of supplementing our native supply of fresh meat by importations from Australia is attracting an amount of public attention which promises well for the introduction of a valuable article of diet, and a reduction in the present outrageous price of meat." That attention, though, was due to its "very general use . . . in well-to-do families; for, of course, the poor are the last to take up with anything that is wholesome and cheap but a little out of the common way."[93]

Although tinned meat, along with other commercially preserved foods, began as specialty items for the wealthy classes in the early nineteenth century, by the 1850s and 1860s it had become more affordable and widely accessible, and consumption had become more broadly popular and stratified according to class. With meat, as with other tinned foods like salmon and imported fruit, the finest-quality importations were marketed to better-off consumers, while cheaper, lower-quality products were "bought as small luxuries by the working class."[94] And though the market for canned meat expanded in this period, precise measures of consumption are difficult to obtain. Tinned meat was a relatively small proportion—never more than an estimated 5 percent—of Britain's live animal, and later frozen and refrigerated meat, imports.[95] Together with widespread and repeated claims of consumer resistance within the published record, this suggests that the lower orders never adopted tinned meat with the enthusiasm (or gratitude) that its promoters expected.

When lower-class consumption of canned meat appeared to lag, the self-proclaimed experts operating out of the Society of Arts took umbrage at what they considered their overly discriminating palates. "Of all classes of the community," averred Smith, and despite their "deplorable" skills in the kitchen, "the poor were, perhaps, the most dainty." This had sounded the death knell for charqui—"the higher classes did not want it, and the lower classes would not eat it"—and threatened other potential sources of foreign meat like pork and bacon.[96] Henry Grainger, an expert in the bacon trade whom the Society of Arts' Food Committee interviewed in 1867, did not think American bacon "would answer" on the British market, "owing to the extreme fastidiousness of the people in respect of food."[97] (It was "over-greas[y]" and "want[ed] firmness in the meat.")[98] The "very finest quality of salt beef" was similarly defeated. Though "offered in establishments in various parts of the country" on favorable terms, "it was a total failure." Simply put, Grainger explained, "the miners and colliers would not eat it."[99] To the great frustration of these "men of science," the poor refused to act in their own supposed self-interest by taking advantage of the novel sources of meat protein, suggesting not only that the assumed centrality of meat to the British diet was up for debate, but that what counted as meat was itself subject to negotiation. How it was preserved, and the extent of transformation caused by a given preservative process, mattered.

[93] "Australian Meat" (cit. n. 91), 32.
[94] Richard Perren, "Food Processing Industries C: Food Manufacturing," in Collins, *Agrarian History* (cit. n. 8), 7:1085–1100, on 1096.
[95] Perren, *Meat Trade* (cit. n. 18), 124.
[96] Steet, "Preservation of Food" (cit. n. 32), 317.
[97] "Proceedings of the Society: Food Committee," *J. Soc. Arts* 15 (17 May 1867): 414–17, on 414.
[98] Ibid., 415.
[99] Ibid., 414.

The upper orders, moreover, liked to think that they could adjudicate these matters. Experts writing in the medical press and presenting before the Society of Arts were quick to emphasize that preserved meat was never meant for the middle classes, much less the aristocracy. "This description of meat was never intended to come into competition with the sirloin of beef and the leg of mutton, which were the food of the rich," but rather "with the inferior parts, which for the most part fell to the lot of the poorer classes as being within their means."[100] It was an offering to the poor and working classes that was intended to provide them with the protein inputs necessary to fuel their labor during a time when the cost of butchers' meat put the fresh article out of reach. Recognizing the significance of meat as a marker of social distinction, the *Lancet* "strongly suspect[ed] that those who can afford to give 6d. per lb. for meat, would prefer rather to strain a point and give something more in order to secure a more satisfactory article in the shape of raw and uncooked meat."[101]

CONCLUSION

Indeed, the "shape of raw and uncooked meat" proved to be the sticking point in mid-nineteenth-century preservation efforts. Meat's changeability afforded both opportunities for transformation, and the grounds upon which to reject those efforts. Meat could be made more like sugar, tea, or grain by salting, drying, smoking, or tinning—processes that rendered it relatively stable and far more portable than in its untreated state. But opinion was universal among experts and consumers, as evidenced by the latter's hesitancy to purchase preserved meats, and the former's stated views that dried or precooked meat would never take the place of the fresh variety. Tinned meat was little more than the best of bad options, promoted in one breath, while in the next, experts acknowledged that "up to the present time, science has failed to show how meat can be popularly, as well as permanently, cheapened to the masses, inasmuch as all methods hitherto adopted have rendered fish, flesh, and fowl alike unpalatable."[102] Very few methods the Food Committee reviewed during the course of its existence were candidates for the Society's Trevelyan Prize, which by the 1870s had risen from £70 to £100. Tinned meats were "excluded by the terms of the offer," precisely because they came to the consumer cooked.[103]

The "great desideratum" was "beef and mutton preserved in a fresh state . . . and in such a manner as to be thoroughly palatable to the consumer."[104] Chemical treatments, which were part of a general enthusiasm for antisepsis in the 1880s, promised to do so, but the public was dubious.[105] Scott maintained that the "neutral sulphite of lime . . . when oxydised, is merely converted into sulphate of lime—a substance perfectly harmless and inert," but others were not so sanguine.[106] The editors of the *Lancet* dismissed

[100] Steet, "Preservation of Food" (cit. n. 32), 316.
[101] "Australian Meat" (cit. n. 7), 239.
[102] "Preserved Meat," *Lancet* 97 (1871): 133.
[103] "Proceedings of the Society: Address," *J. Soc. Arts* 25 (17 November 1876): 5–13, on 8. The address was given by Chairman Alfred S. Churchill. A claimant to the prize was mentioned in 1877, but neither the method of preservation nor the name of the claimant was mentioned; "Proceedings of the Society: Food Committee," *J. Soc. Arts* 25 (29 June 1877): 782–90, on 788.
[104] "Food Preservation" (cit. n. 56), 917.
[105] Atkins, "Pasteurisation of England" (cit. n. 50); Oddy, "Food Quality in London" (cit. n. 19).
[106] Scott, "Supply of Animal Food" (cit. n. 24), 267.

chemical antisepsis as "obviously worthless," for in "effecting the preservation of the meat, they would render it unfit for use as food."[107] Here again, the method of preservation itself "became . . . a ground of offense, and one which no subsequent treatment could wholly or satisfactorily remove."[108] When Professor Frederick Settle Barff presented his own chemical preservative—boroglycerine, a combination of boric acid and glycerine—to the Society of Arts in 1882, a hospital physician in the audience noted "how suspicious the public were of any changes with regard to their food," and emphasized Barff's need to make "absolutely clear, that the ingredients he used" to prepare "this practically fresh meat . . . were not in the slightest degree deleterious."[109] Evidently, the aptly named Barff was unable to do so, as he was pilloried for his signature method in *Punch* magazine shortly thereafter (fig. 1).

Barff's chemically preserved offerings, though, were late to the table regardless of their questionable salubrity. A year earlier, the *Lancet* had declared, "there can be no longer any doubt as to the possibility of bringing supplies of meat . . . to this country in a frozen state and landing them in a condition fit for food."[110] The first shipments of Australian frozen meat reached London in early 1880, and by the 1890s, frozen meat had fast eclipsed its tinned and desiccated brethren in popularity.[111] Pinpointing the quantity of tinned, salted, or dried meat imported relative to frozen and refrigerated meat is difficult due to the imperfect statistical records for the middle to late nineteenth century, but existing quantifications suggest that they were never more than a small fraction of the dead meat that Britain imported from abroad.[112] By 1894, they constituted only 15 percent of the total yearly importation of frozen beef and mutton.[113] Meat from the freezer was so "[in]distinguishable from ordinary fresh-killed butchers' meat," according the Society of Arts' miscellany on food preservation, that it could not even "strictly be called preserved meat."[114] It preserved the "meat-juice,"[115] which Steet and others "looked upon as the active principle of meat."[116] It interfered relatively little with the flavor of the flesh, and based on the rapid expansion of the trade—from 1,095 cwts of chilled beef imported in 1874 to 839,748 cwts beef and mutton in 1883, and 4,117,337 in 1894—British consumers bought it far more readily than tinned or salted meat.[117] The Trevelyan Prize went unclaimed (none "engaged in the importation of meat preserved by means of cold" could demonstrate "any such precise claim to the credit of the invention as would warrant the committee

[107] "Animal Food Supplies" (cit. n. 5), 96.
[108] "The Frozen Meat Supply," *Lancet* 130 (1887): 433.
[109] F. Barff, "A New Antiseptic Compound, and its Application to the Preservation of Food," *J. Soc. Arts* 30 (1882): 516–21, on 524. Derek J. Oddy notes the "numerous complaints" made against the use of such chemical preservatives in the 1890s; Oddy, "Food Quality in London" (cit. n. 19), 99.
[110] "Frozen Meat and Fish," *Lancet* 118 (1881): 816.
[111] Perren, *Meat Trade in Britain* (cit. n. 18); Rebecca J. H. Woods, "From Colonial Animal to Imperial Edible: Building an Empire of Sheep in New Zealand, c. 1880–1900," *Comparative Studies of South Asia, Africa, and the Middle East* 35 (2015): 117–36.
[112] Perren notes that "unenumerated meats" were only 5 percent of the total of dead meat imported from 1882 to 1890; Perren, *Meat Trade in Britain* (cit. n. 18), 124.
[113] Perren, "Food Processing" (cit. n. 94), 1097.
[114] "Food Preservation" (cit. n. 56), 918.
[115] "Australian Boiled Beef" (cit. n. 71), 550.
[116] Steet, "Preservation of Food" (cit. n. 32), 312.
[117] James Trowbridge Critchell and Joseph Raymond, *A History of the Frozen Meat Trade: An Account of the Development and Present Day Methods of Preparation, Transport, and Marketing of Frozen and Chilled Meats* (London: Constable, 1912), 423.

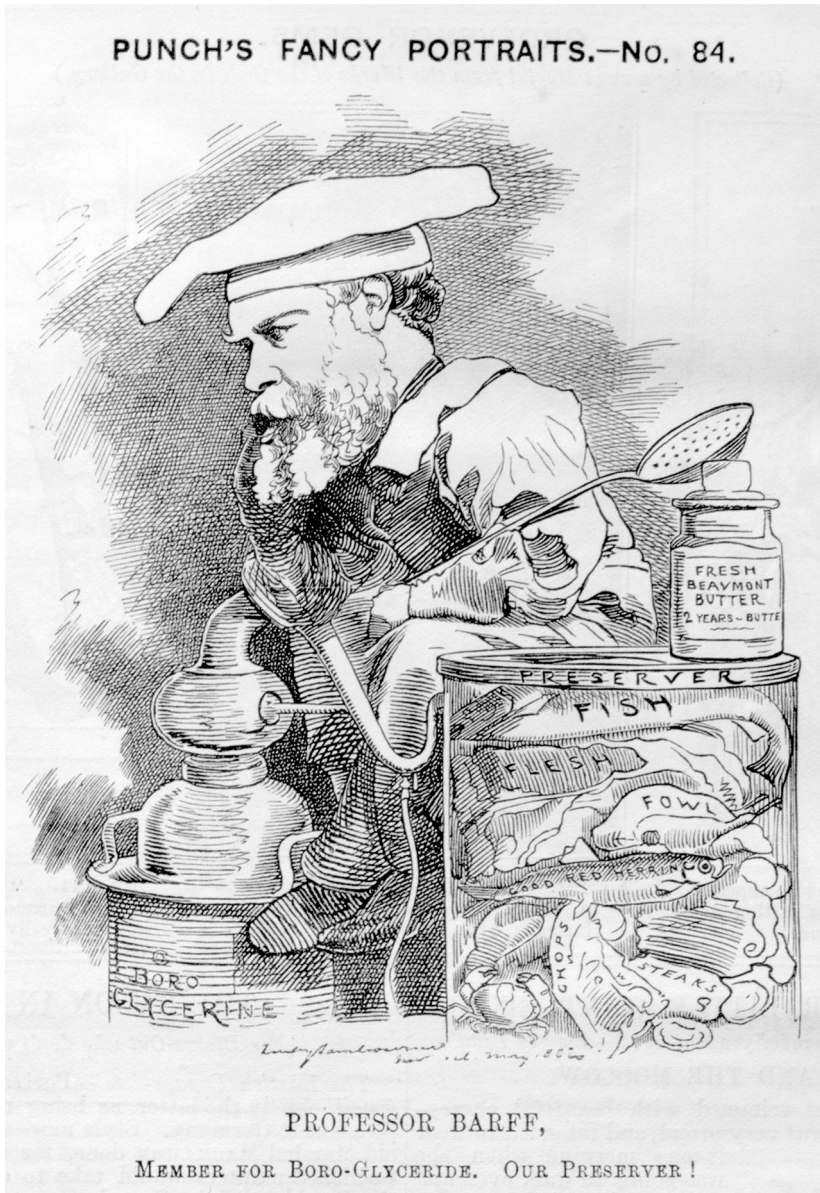

Figure 1. *Frederick Settle Barff presenting his chemical preservative, boroglycerine (*Punch *239, 20 May 1882).*

in thus awarding the prize"), and some familiar complaints were heard—of unfounded prejudice "among the working class," and of "freemasonry between butchers and cooks" who "united against anything that was cheap."[118] But frozen meat found its

[118] "Proceedings of the Society: Annual General Meeting: Report of the Council, Article 27: Food Committee," *J. Soc. Arts* 29 (1 July 1881): 645–57, on 654; "Food Preservation" (cit. n. 56), 917.

place within the diets of Britons such that by the early twentieth century, "Canterbury lamb" from New Zealand was presumed to be that of the Canterbury district of Kent in England.[119] By rendering a changeable substance inert, artificial refrigeration had achieved that "great desideratum": the preservation of raw meat in such a way as to satisfy the tastes of the poor, "popularly, as well as permanently, cheapen[ing meat] to the masses."[120]

[119] This comment was made by H. Moncriff Paul in the discussion following E. Montague Nelson's paper, "The Meat Supply of the United Kingdom," *J. Soc. Arts* 43 (15 March 1895): 420–9, on 427–8. R. Ramsay, "The World's Frozen and Chilled Meat Trade," in *The Frozen and Chilled Meat Trade: A Practical Treatise by Specialists in the Trade*, 2 vols. (London: Gresham, 1929), 1:3–30, on 5.

[120] "Preserved Meat" (cit. n. 102), 133.