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“A Splendid Delusion:” Reassessing Vaccination in England, 1796-1853

Cover Page Footnote

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"A Splendid Delusion:" Reassessing Vaccination in England, 1796-1853

Public health interventions integrate into our present-day habits to the point of imperceptibility. Policies revolve around our speed limits, employee sanitation standards, food preparation policies, immunization mandates: all with the encompassing intent to increase our fitness in society. This was not the case in nineteenth century England. In fact, state-mandated hygiene and preventative disease measures were quite foreign ideas before then. Until its politicization and centralization by the state, public health was privately maintained within the family, through alternative medicines, or through procedures practiced by the regional medical ecumene; it referred to related practices in smaller, community-based populations and changed based on the needs of such spaces. Smallpox vaccination, one of the first large-scale public health initiatives implemented in England, sits within the dichotomy budding between these two practices—one very new and the other sincerely integrated—beginning in the late-eighteenth century.

Before the vaccine's invention in 1796, preventative measures against smallpox involved the introduction of pustule matter into a healthy, unexposed host in a process known as variolation or inoculation. This was widely popular throughout the world before its introduction into Europe during the 1720s.¹ Renowned and effective as it was, variolation increased the threat of epidemics in communities with an otherwise lower risk. Additionally, though smallpox matter was often sourced from patients expressing mild cases, there lacked a means of anticipating the severity of outcomes in a subsequently exposed patient. Thus, the virus remained in circulation, and mortality persisted, as was the case for Prince Octavius, the eighth son of King George III and Queen Charlotte, who died of complications from smallpox inoculation in 1783.² The

procedure was also costly, restricting accessibility to the more affluent classes until the 1760s, when surgeons began standardizing the procedure, making it more affordable.³ Despite these caveats, variolation's successes secured long-term immunity from a virulent and disfiguring disease. For many, this was an obvious risk to chance. Additionally, because the procedure was simple, anyone could learn and perform it, ensuring that poorer communities had trustworthy access to this preventative measure particularly in the late-eighteenth century.

The smallpox vaccine emerged alongside this risky, yet effective method of disease prevention as a new practice that is argued by its proponents as equally, if not, more effective. Its dissemination began in 1796 by Dr. Edward Jenner, a physician living in the English countryside near Gloucestershire. Noting that milkmaids who encountered cowpox never contracted smallpox, Jenner hypothesized that pustule matter from the former affliction imparted immunity towards the latter.⁴ This is the difference between the smallpox vaccine and variolation: the vaccine matter originated from viral pustules that appeared on afflicted cows, rather than from pox pustules on infected humans, as in the case of variolation. Since cowpox mildly affects humans, vaccination could impart the same long-term immunity as variolation without risking a significant outbreak of smallpox in the process, both in the individual and the community. The vaccine was easy to generate, as well as to distribute, which addressed potential inaccessibility in the English countryside.

For these reasons alone, the vaccine should have been widely accepted amongst the English. And in some respects, it was. Hiding his political reservations towards the wealthy classes, Jenner recruited England's aristocratic families to participate in disseminating the vaccine amongst their neighbors. Jenner employed the influence of the Earl of Berkeley to cull an audience in Jenner's hometown and surrounding villages. Upon meeting King George III in

1800, Jenner was granted regal permission to publish a second edition of his work on the new technology.⁵ In this early campaign, many affluent women, believing in the power of Jenner's publication, took it upon themselves to vaccinate their children, assist vaccinating physicians, and vocalize their support of the practice to other aristocrats.⁶ Additionally, the new practice spread rapidly into other European nations, many of them extending the procedure into their respective colonial holdings. Due to vaccination's initial successes across the world, the historiography related to the first decade after emergence illustrates a triumphant period, where public implementation was smooth and streamlined.

However, despite the number of well-documented successes, the historiography is unbalanced, for it does not account for two discrepancies. The first is that in writing profusely on the anti-vaccination movement in the late-nineteenth century, many historians gloss over the status of anti-vaccinationism in the time between 1796, the year Edward Jenner published his experiments using the smallpox vaccine, and the year that a controversial Vaccination Act was passed in 1853, which made smallpox vaccination mandatory for infants under three months. Rather, scholars trace the movement back to the period that its popularity was at its peak, at its most politically prominent, which is after the 1853 Act passed. That is not to say the early-nineteenth century is completely ignored; Nadja Durbach mentions key laws related to vaccination before 1853, such as the Vaccination Act of 1840.⁷ However, her period of inquiry does not allow for effective evaluation of the significance of other older laws that lead up to the compulsory controversy in 1853. Another pair of historians, Dorothy and Roy Porter, provide an extensive microhistory on the scope of the anti-vaccination movement and the various leagues that formed between 1853 and the early-twentieth century. Though this source bears value in revealing and analyzing changes in medical culture rather than simply praising humankind's

conquest over disease, it does not address the origins of the leagues that formed, nor what provided them with the rationale to form the different schools of thought surrounding anti-vaccinationism. Moreover, the Porters do not address other related debates within parliament or the scientific community to the vaccine's incorporation into English law prior to 1853, which relegates the pool of research to the latter half of the nineteenth century and impedes investigation into what happened prior to that time that made the compulsory law so controversial.

Second, vaccination history in the early-nineteenth century is often characterized by its large success in the early decades after its creation, with how quickly it dispersed, or how legislation was effectively passed in countries besides England. Donald R. Hopkins briefly acknowledges the backlash that appeared in the late-nineteenth century, citing reasons why anti-vaccinationists abhorred the practice, including the patient's safety risk upon vaccination, scientific skepticism towards the vaccine's mechanism, as well as its alleged defiance of God's will by combatting smallpox's natural occurrence with something man-made.⁸ Moreover, when Hopkins does discuss smallpox vaccination in the early-nineteenth century, he addresses its immediate successes in England. By 1801, over one hundred thousand people had been vaccinated in the country, and within the same decade, smallpox vaccination began to spread around the world, in places like Russia and the Western Hemisphere.⁹ However, despite the immediate dispersion of the vaccine, extensive epidemics persisted, including one that seriously plagued London between 1837-1840. This particular epidemic paved the way for the Vaccination Act of 1840, which in addition to making vaccinations free to the laboring classes, illegalized former methods of smallpox prevention, such as inoculation. Though this is a more realistic image of the practice's dispersal into the masses compared to preceding accounts, Hopkins'

descriptions of the anti-vaccination movements—at least in the early-nineteenth century—are minimal. Additionally, Hopkins measures the vaccine's overall success by the amount of related laws passed across several European nations, as well as how many individuals were vaccinated in the first few decades, using that evidence to overshadow the negotiations involved. Durbach exposes the pitfalls of these same pieces of legislation in England specifically, which indeed presents a more accurate image of this time. However, given her primary research period, there is still not enough attention and elaboration given to the early-nineteenth century beyond generality.

That said, the implementation of state-mandated vaccination in the early-nineteenth century was not so simple a process as depicted in the historiography. The later success of this public health intervention in the early-twentieth century should not overshadow the dialogue that formulated the movement in the early-nineteenth century. Sentiments of resistance began much earlier in modern England than currently indicated. Moreover, other factors existed that contributed to such sentiments: in reiterating the movement's later popularity, historians ignore the build-up of its political prominence. It did not simply appear after 1853, triggered by the Compulsory Vaccination Act, but instead was a product of increasing anxiety and skepticism brought about by a number of dynamic occurrences.

There are three points of discussion to be addressed in this project regarding this observation. The first resides in the scientific discourse of the early-nineteenth century, and the extent that it contributed to the strong base of anti-vaccinationism in the late-nineteenth century. Most communities simply did not understand the mechanism behind the vaccination; in failing to understand its means of imparting immunity without risking another outbreak of smallpox, these groups refused to vaccinate. Many English doctors, both in country and abroad, chose not to

vaccinate because they did not understand how an animal product could impart immunity towards something that affected humans. That is not to say that those who understood the technology accepted it either. Others were influenced by emergent sociological writings related to overpopulation risks.¹⁰ Moreover, some professionals still preferred previous prevention methods, such as variolation, because they had proven their efficacy for several years before the vaccine. Though Jenner and his cohort of proponents fostered an atmosphere of support in-country by scouting regal and aristocratic influences, it is important to address why many in the sciences rejected the vaccine.

The next point intends to investigate Parliament's development as a political bastion supporting vaccination. Initially, members of the House of Commons and House of Lords opined different perspectives on smallpox vaccination, and the extent that it should become a large-scale public health initiative. Anxieties about legalizing the procedure present themselves as far back as 1815, nearly two decades after the vaccine's initial publication.¹¹ This immediately goes against narratives that romanticize the spread of the vaccine in the first few decades of its invention, while simultaneously avoiding discussion of dissenting voices. Per the increase in vaccination data during the 1820s and 1830s, Commons and Lords members alike began to unify under the idea of mandatory vaccination. Members began to accept that vaccine efficacy outweighed the benefits of inoculation, barring all associated risks and reactions associated with both methods. This article intends to monitor and track the development of the vaccination regime so characteristically intolerant of dissent in the late-nineteenth century, as well as estimate the point where this shift in legislative intent occurred in the early-nineteenth century.

The final contribution to anti-vaccinationism in early-nineteenth century England in this discussion is the contemporary shift from medical pluralism to standardized medical

professionalism. This theme grew more pervasive as certain laws passed in the early-nineteenth century that concerned myriad things that negatively targeted the laboring class. Laws such as the 1832 Anatomy Act, which guaranteed that unclaimed bodies of deceased workers become cadavers on medical school dissection tables, exemplify an emergent idea in the nineteenth century that Michel Foucault coined as "biopolitics," which describes the assumption of one's life as subject to the state.¹² Irrelevant to its intention, to ameliorate the issue of graverobbing for cadavers, the 1832 Act certainly harmed the relationship between the state and the working class, since the law turned to them to serve as tools for medical education. Additionally, the act seemed to not serve its purpose well, bringing in approximately three hundred bodies to dissection in 1846, as opposed to six hundred in 1833, just after the law went into effect.¹³ Anti-vaccinationism brewed more easily within these groups because of such coexistent laws that addressed their workplaces, inhabited public spaces, or their lives. Between these three discussions, this paper aims to complicate the existent narrative on vaccination, contributing to a medical history that is less teleological and progressive, alike past accounts of this period. To be an effectively periodized historical assessment, the initiatives that led to this technology's successful integration into global health should be excluded from the scope of research. It is imperative to understand its origins and formulation in order to understand it as "one of the largest medical resistance campaigns in Europe."¹⁴

Most importantly, this paper aims to flirt with the idea of a social movement, which implies organization, cohesion, and unity under a set of standards. After the 1853 Act, many anti-vaccination leagues appeared, each advocating for a different reason why the practice should not be nationalized. The first of these to form are the Anti-Compulsory Vaccination League in 1866, which specifically opposed the compulsory law passed thirteen years prior. By 1870, this

alliance chartered over one hundred league chapters across the country, rapidly increasing its memberships up to over one hundred thousand. It nationalized by the end of the nineteenth century, becoming the National Anti-Vaccination League.¹⁵ While there is no such evidence of these physical, organized leagues in the early-nineteenth century, the question remains: to what extent was there conceptual cohesion within brewing resistances to the new technology? What did anti-vaccination groups unify under prior to 1853, if not a name or a formalized mission? This article will illustrate that the roots of the anti-vaccination movement took fertile soil well before the Vaccination Act of 1853. Rather than unifying under various organizations and doctrines, vaccine resistance movements in the early-nineteenth century manifested in the quiet, undemonstrated, but persistent questions and anxieties expressed by civilians—both affluent and laboring—dispersed amidst the voices that supported Jenner’s weighty contribution.

Anti-Vaccinationism in the Scientific Ecumene

Dr. Edward Jenner published his experiments with cowpox matter at a rather peculiar time given the contemporary scientific discourse. The vaccine emerged where, though it was not molecularly clear, variolation was a surefire way to prevent smallpox. Whether infection was natural or controlled, it guaranteed immunity to its survivors, outweighing the risks of epidemic and death. However, it is important to note that though variolation success rate was high by the late-eighteenth century, this practice was accepted because it suited an axiom concerning those infected with smallpox: those who survive it have long-term immunity and rarely contract it again. Of course, the mechanism remained unknown, but this tangible observation ensured the integration of variolation into common medical practice. Considering this, much of the apprehension towards Jenner’s vaccine relates to a disconnect and discomfort surrounding its nature and intended function. It was not as easily understood as variolation. It arrived at a time

when the term "virus" did not exist. Scientific consensus on speciation and relationships between organisms had yet to be reached. Whatever consensus existed was anthropocentric, placing humanity superior to other organisms and defining the world hierarchically according to mankind's gaze.¹⁶ Additionally, in cases where the vaccine's function and intention was understood, some groups still failed to accept it due to its potential risks.

One key rift in the scientific discourse that contributed to vaccine hesitancy was the dispute over disease transmission patterns. In the early-nineteenth century, contagionism competed with the dominant miasma theory for the prevailing paradigm of disease transmission, with different illnesses illustrating the verity of each pattern of transmission.¹⁷ Contagionists believed that smallpox spread from contacting infectious material present in obvious cutaneous blisters or from contacting objects that had previously contacted these blisters.¹⁸ Scholarly discussion of Jenner's position on this spectrum is scant, however, evidence suggests that he ascribed to the contagionist perspective. In his first writings on the nature of the vaccine, he drew a distinct symptomatic connection between mud fever, a pox disease afflicting horses, and cowpox. He argued that the first zoonosis undergoes modifications when it comes into contact with a cow's udder, and the resulting disease, cowpox, continues on mildly infecting humans who come into contact, while functionally indisposing cows for the time of infection. He called the virulent material "infectious matter," indicating that from his perspective, these illnesses are not passed through the air, or through unbalanced environmental conditions, but rather through contact with physical matter that afflicts these organisms.¹⁹ Jenner used this for the basis of discussion on the connection between cowpox and smallpox in the later portions of his *Inquiry*.

Jenner was actually in the minority in his perspective compared to his physician colleagues. Many doctors of his time ascribed to miasma theory, also known as anti-

contagionism, believing that disease originated in the “bad airs” emanating from rotting organic materials.²⁰ This concept supported the environment’s conductivity for infection rather than the existence of contagious particles. Prevalent, severe diseases such as yellow fever, plague, and cholera better fit this paradigm because until the late-nineteenth century, their causes appeared seemingly from the environment, and thus were the often-spouted examples by vehement anti-contagionists. Charles Maclean (1766-1824), an English physician for the East India Company, defended the verity of his views until his death, claiming that contagionism lacked empirical medical evidence. His views primarily developed from practicing in warm, moist regions in India that in reality provided sustainable seasons for these microbes and vectors to grow. Nonetheless, he denied such existences of contagion infecting these communities, and further argued that the entire perspective was a political ploy initiated by the Christian church, beginning in the mid-sixteenth century.²¹ Furthermore, he denounced the usefulness of quarantines, known as “lazarettos,” named for the biblical myth about Lazarus, because they fostered a highly infectious pool in these communities that largely affected those nursing the dying ill, sustaining the disease rather than facilitating its elimination.²²

However, for much of his professional life, Maclean grappled with constructing a solid paradigm for anti-contagionism. His primary postulate was that the environment, unspecified, was the primary driver of epidemics. He tested this theory by measuring tangible environmental factors, such as moisture, temperature, and day length.²³ These factors explain why plague, yellow fever, and cholera fit so well into his theory; their specific reservoirs had yet to be articulated, and they often arrived in bursts of warm, moist weather. Since contagionism assumes the existence and movement of infectious agents independent of environmental conditions, it could not possibly fit into his thinking.

Much of the apprehension towards the emergent vaccination stemmed from this dichotomy in the schools of thought concerning disease transmission. The vaccine's popular emergence asked a contradictory question: can this technology combat the throes of the environment and the pestilences produced from it? In his writings, Maclean argued no, even though many budding organizations such as the National Vaccine Institution brushed off his objections. Considering his developing anti-contagionist postulates, Maclean called the technology "worse than useless," and ultimately "a splendid delusion."²⁴ Its mandatory administration into the ranks of the British Army during the Napoleonic Wars was not only obsolete but also exemplified an impending despotic system against those who rejected the mandate. Most importantly, he believed vaccination damaged the health of society, putting it at risk of contracting other diseases. This did not aid the technology's case as it was initially difficult to afford.

Then there were those in the profession who did not understand how a disease afflicting one organism could confer immunity towards a different disease in humans through the fashion of variolation. Inherent in this line of thinking is an assumption of interconnectedness between humans and animals. In the early-nineteenth century, this concept was new and polemical amongst several naturalists in Europe constructing models of the world that accounted for the dynamic scope of its natural order. The commonality in all these theories is that they assumed that God's hand in creating the world was true and perfect. Most naturalists at the time, from Georges Cuvier to Jean-Baptiste Lamarck operated under a very long-integrated, habituated model called the Great Chain of Being, a hierarchical construction that oriented the world from simple to complex, the least divine to the most. Despite this common axiom, their interpretations of the world clashed with one another. Cuvier, in line with many of his anti-evolution

contemporaries proposed that biodiversity in animals stems from the functions they perform and denied any morphological change over time within a species.²⁵ Lamarck, who perhaps proposed the most polemical theory, argued that animals change over time to become increasingly complex, passing down characteristics that they acquired throughout their lives to their offspring.²⁶ This was very controversial, as it questioned the perfection of God's creation, by assuming its subjection to change.

However, none of these theories proposed interconnectedness between species; though it came close, Lamarck's approach cordoned off each species to its own teleological pedestal. As a result, learned physicians who understood the discourse could only speculate why the cowpox vaccine conferred immunity towards a disease that affected humans. Some doctors feared the effects of "introducing a bestial humor into the human frame," and conjured up vaccinal effects based on anecdotal evidence.²⁷ Benjamin Moseley (1742-1819), an English physician who spent several years practicing in the New World, habituated to performing inoculation, and much preferred it to vaccination. He was outraged by the ease with which families chose to vaccinate their children with a foreign zoonosis; how could the public's health rest on the back of an inferior animal? He ponders the vaccine's effects in his *Treatise on the Cow Pox* and criticizes the swift reception of those supporting Jenner's publication, citing the "Holles Street Case" as a consequence of the vaccine, and a subsequent reason why it should be rejected. This case described an obtuse outcome of a nine-month-old boy's vaccination, citing topical side effects "on his back and loins patches of hair, not resembling his own hair, for that was of a light color, but brown, and of the same length and quality as that of a cow."²⁸

Whether or not this case was true, Moseley's clout in the medical establishment ensured that his audience heeded this warning. Moreover, he hardly hesitated to express his initial

distaste with Jenner's *Inquiry*, mocking the pastoral nature of the technology, downplaying the contribution of the countryside to English public health.²⁹ Using his practice as a platform, alongside a cohort of other prominent physicians, Moseley preyed on the apprehensions of those families who were ill-informed on the new technology, instilling a culture of fear, and subsequently, anti-vaccinationism.³⁰ Unlike Maclean's speculations, which centered on vaccine's uselessness given the popular mode of disease transmission, Moseley's suspicions stem from the incredulous request that vaccinators employ the pustule lymph of cattle on innocent, ill-informed lives.

Moseley's vaccination hysteria made its way to the political realm. Prolific cartoonist, James Gillray (1756-1815), satirized many things about late-Georgian affairs, including vaccination.³¹ His most famous cartoon on the subject depicts a wild exaggeration visualizing Moseley's hyperbolic anti-vaccination statements. In the image, a physician, assumed to be Edward Jenner, administers cowpox matter into a woman's arm with a lancet, while she is surrounded by previously-vaccinated people all showing a rather visceral side effect: cows erupting from their arms, legs, and noses. Some individuals display horns growing on their heads, while a crowd lined up outside the door awaits aid from their ailments from a bucket of "opening mixture."³²



Cartoon by James Gillray: “The Cowpox—or—the Wonderful Effects of the New Inoculation,” 1802. British Cartoon Prints Collection (Library of Congress), Washington D.C.

While this cartoon intended to satirize the egregious pamphleteering of Moseley and his cohort, it also depicted the massive anxiety brewing amongst those who must blindly inform themselves of this new technology that preaches immunity towards a disfiguring scourge. On the other side of the coin, Gillray took a stab at vaccination proponents; because they were the assumed bearers of new medical knowledge, Gillray argued that they were blind to objection from obvious questions proposed by skeptics, and instead becoming increasingly zealous.³³ The image in the upper center of the cartoon shows a crowd of people worshipping a golden calf, likening supporters of vaccination to the biblical group who lost sight of their divine guidance by enforcing an unclear technology amongst the masses.

Lastly, there are those affiliated with the scientific community who understood the vaccine in its natural scope, and yet still rejected it on a number of anecdotes that described harsh

side effects. In some cases, the vaccine did not work; the cowpox in the pustule material could have inactivated before meeting its recipient, or the pustule itself could not have been infectious at all. As a result, whatever immunity the matter imparted was short-term. There are several instances reported in newspapers where this occurred and subsequently produced tragic consequences, later used as fuel for vaccination skeptics. In the news section of *The Times of London*, an anonymous writer reported an incident concerning a pair of sisters vaccinated with cowpox at St. Pancras Smallpox Hospital at ages five and three. Each girl received the inoculation one year apart from one another, and yet they both erupted with smallpox simultaneously, long after their procedures took place.³⁴

The writer speculated that the vaccine was not properly absorbed into the girls' arms, or that the vaccine itself was not very effective to begin with. However, because several hundred others had been vaccinated at the same hospital, and did not report the same outcome, the writer claims that the vaccine is not all that it is promoted to be, considering that these two girls were left "thickly covered with decaying pustules."³⁵ Moreover, the group of physicians who inoculated these girls took the matter from their blisters so as to administer it to other patients, ignoring the outrageous side effects of the preceding reactions. The author notes in the beginning that their report intended to discredit faith in the vaccine, calling it "an infallible security," endangering communities in the same way as variolation. The report serves as an early rebuttal of Jenner's discovery, highlighting its potential inefficacy. Moreover, this article illustrates a developing rift in the upper-class community, who by scholarly consensus is the most supportive of the vaccine, given Jenner's extensive discussions with Parliament and associated affluent families to garner support for his publication.³⁶ Here is an example where a literate, well-connected individual (both to *The Times* and St. Pancras) publicly expresses their opinions on

this technology to numerous readers, extending their vaccination skepticism and apprehension to at least the literate masses.

That is not to say that this piece went without reaction. A rebuttal to this story appeared in *The Times* one week later as a letter to the editor, imploring both the paper and the public to disregard the previous week's testimony. The anonymous writer attacked the initial report, and stated that it colluded with "a set of beings...whose minds are so fashioned; that they constantly oppose whatever is brought forward for the public good."³⁷ The writer did not deny the incident concerning the two girls, but instead claimed that the situation is rather common, unlike what the first story implies. Rather than being a fluke, what occurred in the girls resulted from a lack of standardization and management of cowpox vaccination, abetted by its rapid proliferation around the country. Furthermore, the rebuttal advocated for the continued support of those who believed in the potential of the vaccine; just because such outcomes occurred did not mean the public should forsake it. Rather, it is incumbent upon Parliament in conjunction with the appropriate medical ecumene to regulate the vaccine for the sake of the public's health, to prevent such counterproductive instances.

In opposition to this rebuttal, other vehement anti-vaccinationists warned against the practice on the basis of what this previous author advocates patience for: the lack of regulation and management of the practice. Though he was most prolific in the late-nineteenth century, well-renowned physician Charles Creighton (1847-1927) wrote about the significant drawbacks to the vaccine's ascent in popularity during the early-nineteenth century with the purpose of abetting the massive anti-vaccination movement that he identified with in the late-nineteenth century. Due to an absence of vaccine standards and practice management, Creighton illustrated the risk posed for vaccine recipients in contracting its potential pathological side effects. In *The*

Natural History of Cow-Pox and Vaccinal Syphilis, Creighton described an incident where a colleague of Jenner's out of Eastington vaccinated an infant in December 1798 that resulted in a horrendous outbreak all over the child's body, marring it with phagedenic ulcers.³⁸ A similar incident occurred in the previous year with a seven-year-old child, Susan Phipps, who had the same nasty reaction to the lymph.³⁹ Had Jenner not received a less infectious cow-lymph at the same time from William Woodville, a physician at the St. Pancras Smallpox Hospital, Creighton mused that he would have discontinued his trials on young children, fearing its counterintuitive tendencies.

Most importantly, Creighton took issue with the method by which physicians sustained the vaccine in the population. A successful vaccination produced a well-defined cowpox lesion from which a physician could extract lymph to administer to a waiting recipient. This method, known as "arm-to-arm," was more cost-effective and propagated the chain of vaccination more effectively than sourcing from cattle each time. Jenner and his associates employed this approach early-on across the country, sprouting vaccination chains across the rural country as well as bustling cities like London. By the turn of the nineteenth century, arm-to-arm vaccination was essentially the default approach to sustaining the public's immunity. However, because the technology was not methodologically regulated in dose or sanitation, the arm-to-arm approach posed dangerous limitations. Creighton highlights an increase in syphilis incidence in vaccinated infants, as a result of contaminated lymph sourced from humans vaccinated earlier in the chain. Though cowpox lesions and vaccinal syphilis were alike in that they both were slow to heal, vaccinal syphilis also presented with severe ulcerations in the skin, as well as swollen lymph nodes, indicating a somatic infection.

In Jenner's time, these incidents were dismissed as bad reactions because if the infant survived, the severe symptoms eventually passed. However, vaccinal syphilitic death still pervaded; Creighton recalls an instance where an early-nineteenth century physician, Robert Squirrell, vaccinated a twenty-two-day old infant with cowpox and it died due to complications from cutaneous ulcers and blotches that could only be tamed with mercurial substances or anti-syphilitic drugs. Given this, the father reported to Squirrell that the symptoms appeared venereal, and yet Squirrell discounted it in his report as a "scrofulous" side effect, which often described similar severe vaccinal reactions in the early-nineteenth century.⁴⁰ This problem remained scanty addressed until the mid-nineteenth century. Between 1847 and 1853, infantile death due to syphilis increased from 255 to 380, respectively. By 1863, that number spiked to 983. For comparison, Creighton pairs these statistics with the syphilis mortality rate beyond infancy, which illustrate a slower increase, from 310 to 403 between 1847 and 1863.⁴¹ For the purpose of illustrating issues in vaccinator methodology, Creighton argued against the practice entirely, citing that it posed more of a risk to infants than it does a solution to smallpox. Given that the two most controversial Vaccination Acts passed in 1853 and 1860, Creighton's plea could not have been direr.

"Persons talk very glibly about sores being syphilitic, and eruptions being syphilitic, as though the characters of syphilitic sores and syphilitic eruptions were so made out that there could never be any mistake about them," Creighton quotes Edward C. Seaton, a physician and epidemiologist who criticized the arm-to-arm method frequently, "Yet such mistakes are daily being made by practitioners in general, and are occasionally made by the very highest authority."⁴² Given the discussion presented, it is clear that vaccination was not widely accepted throughout the community of English physicians and naturalists. Between dynamic scientific

ideas, hyperbolic dramatizations of vaccine symptoms, and direness of realistic prospective side effects, the resultant consensus over smallpox vaccination was sincerely muddled. Differences in ideas on disease transmission and the natural order contributed to increasingly-solidified perspectives that the scientific ecumene could individually ascribe to, resulting in logically structured conclusions concerning the acceptance of vaccination. The extent of knowledge of vaccination amongst physicians made no difference in their subsequent acceptance. Circulating news of visceral side effects, be it dramatic, cattle-like features, or vaccinal syphilis, reached not just those familiar with the technology, but also those who were uneducated. Visual or dramatically vocal communication convey just as, if not more, effective a message on vaccination opinions than written work, especially in a country with an approximate fifty percent literacy rate.⁴³ As the vaccine dispersed nationally and globally, anti-vaccinationism within the community who assumedly knew it best grew just as effective a voice.

The Formation of the Vaccination Regime

The role of government in the historical narrative on vaccination is often painted by scholars as a cohesive, affirmative organization that staunchly supported the implementation of vaccination law. In both Porters' and Durbach's works, this is a common assumption made despite their different disciplines and approaches, and it is easy to argue so, given the amount of health policy passed in the early-nineteenth century that reflects this, including a pair of controversial Vaccination Acts. However, just because the conclusion reached by the political ecumene advocated for compulsory vaccination by 1853 does not mean that Parliament had always been a cohesive bulwark for vaccination. Instead, it is more valuable to inquire about the formation of the vaccination regime that imposed compulsory vaccination; when, if at all, did Parliament question the vaccine? When were members skeptical of its efficacy? Since the two

practices overlapped in use until 1840, governing bodies must contend with the merits of and limitations of both throughout the early-nineteenth century. Around when did the government prefer vaccines over inoculation, and when did that mentality habituate in their discourse? The purpose of this section is to tinker with the oft-assigned description of Parliament in the early-nineteenth century as a cohesive body regarding vaccination, to illustrate skepticism expressed over Jenner's publication even within Britain's governing body, as well as depict approximately when a consensus on vaccination assumed within Parliament.

Soon after Jenner published his vaccine experiments, he marketed it to renowned, aristocratic families as well as to King George III and his associates.⁴⁴ In accordance with establishing both of these connections, the House of Commons and House of Lords began their debates on what to make of the new technology. Vaccine negotiations, in terms of acceptance and methods of procedure, go as far back in the Hansard archive as 1806. In the vaccine's infancy, the primary dilemma that concerned Parliament was the extent of vaccination implementation into the public given the limited knowledge Parliament had on it. In one July report in 1806, an unnamed member of the House of Commons acknowledged the increasingly pervasive nature of early resistances throughout the kingdom, despite its positive reception in other countries. The member presented statistics of steadily declining smallpox fatalities in European cities such as St. Petersburg and Vienna after the vaccine entered these populations, and proposed that the Commons pass a document releasing these statistics to the British public in order to quell any rising anxieties about vaccination.⁴⁵ However, another Commons representative, William Wilberforce, expressed his anxieties about releasing those numbers to the public, suggesting that more knowledge of the vaccine should be acquired before any public action is taken. The aforementioned cities in Europe likely face a similar dilemma of limited

knowledge even though their smallpox fatalities decreased. Additionally, he cited instances of vaccine failure and repeated administrations of the technology, as well as early accounts of bad reactions in infants as additional reasons why Parliament should not be rash in passing legislation. Ironically, Wilberforce suggested that should the House of Commons pass legislation on the mandatory nature of vaccination, they should make it non-compulsory, for fear of significantly negative public reaction. In order for the vaccine to smoothly integrate into the constituency, vaccination must be voluntary.⁴⁶

Most members disagreed with him on the former warning; Wilberforce was one of two members in this discussion who did not wholeheartedly agree with the proposal of releasing these early statistics to the public. Regardless of the majority of support against the views of Wilberforce and his colleague, it is worth pointing out that dissenting voices exist in Parliament, warning of the repercussions of hasty legislation. However, it is worth noting that Wilberforce was likely not an anti-vaccinationist; there is no evidence illustrating that he took issue with the technology itself, rather than the extent to which Parliament should be involved in enforcing it. His wariness and apprehension towards invasive, compulsory legislation displays an awareness of potential popular reactions should Parliament encroach too far.

Another report in June 1808 proposed the establishment of a vaccine institution in Central London, to supply cow-pox lymph to "all parts of the empire."⁴⁷ The discussion of expanding vaccination to Britain's colonial holdings saw some apprehension. Lord Henry Petty warned that though there are many examples that show the efficacy of vaccination, evidence of its infallibility does not exist. Therefore, should Britain expand this institution globally, lawmakers should be wary of skeptics abroad who may not accept the technology. Another member, Sir Francis Burdett corroborated Petty's view, stating that the public viewed the

vaccine in 1808 far differently from twelve years prior, due to increasingly abundant stories of poor reactions in babies and a lack of clarity in what the vaccine confers as a result. When Jenner published the vaccine, Burdett claimed, its principle appeared so simply, “a woman could perform it.”⁴⁸ However, because of the increasing number of negative anecdotes, the principles behind vaccination complexified. He surmised that he cannot vote for the bill due to a lack of cohesive knowledge behind it: “it would be better to appoint a Committee, further to inquire into the efficacy of the discovery,” he says, before disseminating it throughout the world. After some objections to these warnings, the resolution passed: out of sixty votes, fifty-five were for the establishment of an institution, and five were against.⁴⁹

Perhaps the best example of a decision made based on a lack of consensus on the vaccine’s success lies in a pair of House of Lords reports in July 1815. Charles Stanhope presented a bill he intended to reject that would incentivize every impoverished individual who had their children vaccinated with half-a-crown. Additionally, the bill did not indicate what kind of vaccine matter was to be used; it could be of true quality, or “good for nothing.”⁵⁰ In the following report in the next day, Stanhope initiated a vote to reject the bill following a second reading, hoping that a better proposition for a government-subsidized healthcare initiative would take its place. Like the previous unnamed member, Stanhope presented statistics that corroborated the success of both practices. At St. Pancras Smallpox Hospital, of 1,730 inoculated individuals, only one died, and of those vaccinated with cowpox at the hospital one in six died.⁵¹ Though these statistics require more balance between them—more patients should have been vaccinated before Stanhope spouted this statistic—it was enough for the majority of the Lords Chamber to scrap the bill on the basis that ample uncertainty still circulated around the success of the vaccine, given the evidence presented by the St. Pancras hospital. A cohesive, subsidized

vaccination program hung in the balance for the next twenty-five years. Though the men in these three examples argued opinions that countered the majority of individuals in the Commons and Lords Chambers, they vehemently warned of the consequences of imposing vaccination upon the public too quickly. Contemporarily, vaccination circulated through the trials of the scientific base, producing knowledge of its efficacy and side effects; however, these few officials judged the existent knowledge base as insufficient evidence of its successful functionality, and urged the rest of Parliament to reconsider. In Stanhope's case, it worked.

The hesitance to construct vaccination institutions near the turn of the nineteenth century changed almost imperceptibly in the late-1820s. An assumption of vaccinal benefit developed in the parliamentary discourse coinciding with the presentation of consistent data showing the inverse parallels between vaccinations and case fatalities due to vaccination and smallpox. Apprehensive questions by the likes of Burdett were instead replaced with questions of particularity: how should vaccination be administered to the environment? How can Parliament ensure that low-income communities have access to vaccination alike affluent communities? How can government incentivize the procedure in hard-to-vaccinate populations? All of these questions assumed that vaccination was destined to be distributed amongst the masses; in the eyes of parliament, it toppled the integral practice of inoculation, and the only questions that remain concerned the particularities of dissemination.

According to the Hansard archive, there is little mention of vaccination until 1828. In a House of Commons report on the Life Annuities Repeal Bill, one member, Joseph Hume, shared his observation on changes in disease patterns and a shift in life expectancy, ascribing it to Jenner's invention, among other significant medical developments. Forty years prior to the vaccine's emergence, "there had always been some epidemic or other," Hume said. "In the year

1782, an epidemic had occurred, which spread itself throughout Europe, and had been felt most severely.”⁵² Hume implied that because of the vaccine, disease patterns changed perceptibly in England. Rather than questioning the efficacy of the vaccine or requiring more evidence before passing legislation delineating access to vaccination, Hume suggested that future legislation should propagate these positive changes in disease patterns.

In another report in 1830, Commons member William Dickinson offered a petition to the chamber from a set of physicians headed under Dr. William Towsey urging Parliament to pass a law preventing the practice of inoculation, citing that unlike vaccination, inoculation increased the prevalence of smallpox and maintained its presence in the population when that was no longer necessary. Adding support to Towsey’s petition, Hume attributed a recent spike in smallpox deaths to an increase in anti-vaccinationist propaganda from a number of physicians, “who wished to persuade the public that no benefit was derived from vaccination.”⁵³ Claiming that the public had endured enough governmental inaction, he encouraged a motion to the Commons Chambers that separated children infected with smallpox from children who had not encountered smallpox. Hume believed this procedure buys time for parents seeking vaccination or inoculation for their children.

Throughout the 1830s, vaccination became an increasingly habituated component of political discourse between the Houses. Moreover, at the advent of the first Vaccination Act, many legislators called for the termination of existing inoculation institutions, which became a provision of the 1840 Act, because they accepted that inoculation endangered more people than vaccination.⁵⁴ With inoculation, smallpox would exist at varying incidence levels, risking epidemic spikes as it pervaded the environment, while vaccination potentially lowered those levels. In a report in 1840, mere months before the first Act passed, petitions from the Medical

Society of London arrived in the House of Lords providing a count of recent cases of smallpox given the "imperfect state of vaccination in many parts of the country."⁵⁵ The Medical Society argued that even if smallpox occurred after vaccination, something they deem unsuccessful, it always presented in a manageable form; patients had a higher change of surviving the illness. Thus, it was incumbent upon Parliament to pass legislation mitigating the imperfect techniques performed in vaccination. In response, Edward Law, the First Baron Ellenborough, suggested a swift bill enabling the Poor Law Guardians to supply vaccination to the poor, per enough procurement of government funds. Many other lords agreed with Ellenborough's suggestion, believing it intended to improve the issue of procedure affordability amongst the working class and increase vaccination in communities with low rates.⁵⁶

At the close of the conversation, Constantine Phipps, the First Marquess of Normanby, stated he would inquire about the extent to which vaccination mandated under the recently-reformed Poor Law Guardians were possible.⁵⁷ By September of that year, the first of the Vaccination Acts was passed, providing voluntary vaccination to the poor through the Poor Law Guardians that administered relief to working class individuals. No question of the functionality of vaccination existed, nor was any further consideration given to the instances of vaccine failure appearing throughout Britain. Throughout the 1840s, the vaccination inquiries primarily concerned the means that it was implemented amongst the public. When the Compulsory Vaccination Act passed in 1853, there was no doubt that Parliament, in association with organized physicians, assumed the role of vaccination administrator amongst all classes.

Sanitary Measurers, Public Health, and the Working Class

Clearly, vaccines led to intense negotiations amongst scientists and parliamentary members. Jenner revealed the vaccine at the crux of a politically dynamic time. The nineteenth century saw the medicalization of human conditions or societal characteristics by governmental

authorities, transforming them into exacerbated afflictions that must be prevented for the sake of public health. With respect to smallpox prevention, poverty and the lives of the laboring classes were such medicalized characteristics; much of the significant public health policy targeted epidemic risk in impoverished spaces as well as the laboring force.

Similarly, the nineteenth century also saw an increasingly authoritative medical relationship between Parliament and the working individual. In association with pro-vaccination physicians, Parliament became a political harbinger of professionalized medicine. Doctors in the nineteenth century, according to Foucault, served the role of “linking medicine with the destinies of states.”⁵⁸ Rather than prescribing aid to patients privately based on a known set of symptoms, the association of physicians with the state produced a medical knowledge system that developed into an elusive, unequal, and exclusive system divided between those who had it and could provide accordingly and those who did not. Public health policies of the early-nineteenth century often incorporated the input or employment of physicians in the policy, ensuring that communities without privilege of entry into this knowledge system had to interact with the professional union—that is, Parliament and physician—for preventative care. Often charged with ignoring the healthcare of their families, the working class found itself subject to various public health laws that medicalized their living conditions.⁵⁹ Policies emphasized sanitation in workhouses, healthcare responsibility upon the working class, and restricted access to existent healthcare. Workers, both in life and in death, became subjects of the state, molded by statutes enforced by governmental associates, despite being characterized by Edward C. Seaton as “indolent and indifferent” towards their own healthcare.⁶⁰ For the working classes, this policy administration culled a mindset within that did not trust its government and remained highly suspect of its hubris. They used opinions such as these as fuel to counter proponents of the

technology: that they were more concerned with vaccinating the workers so that they are healthy enough to remain in industry rather than address harsh working conditions or power dynamics between workers and supervisors. Subsequently, when the first vaccination mandate passed in the 1840s, workers were not so quick to receive the offered lancets of a seemingly supportive regime.

In tandem with the majority of scientists of the time, parliamentary policies of the early-nineteenth century reflected the anti-contagionist theory of disease transmission. The advent of a massive cholera pandemic reaching England in the 1830s prompted an extensive investigation into sources of diseases in the public realm. In accordance with miasma theory, where did illness arise? In response to this epidemic, a number of officials looked to the poor classes and their workplaces for answers. A Royal Commission formed to investigate the Poor Law, a two-century old set of poverty relief statutes that intended to offer economic welfare to poorer classes, to ameliorate their plight. However, because of its age, it no longer accounted for new developments, not just in medical thought, but also in growing urban populations brought about by industrialization.⁶¹

Edwin Chadwick (1800-1890), the secretary of this Commission, specifically reported on the relationship between unsanitary urban environments and working classes in London, and how that facilitated the spread of disease. In 1833, he presented a report on this investigation, which laid the foundation for the New Poor Law that passed in 1834. This legislation defined much of Victorian identity politics between the socioeconomic classes thereafter. To solve the problem of excessive spending on the needs of the workers, the New Poor Law veered towards a more stringent welfare system, on the recently popular basis of utilitarianism, that only offered accommodation to poor, unemployed families if they served in workhouses, rather through an

expanded, per-basis need, as was the prior designation. Workhouses consolidated the unsanitary conditions that Chadwick desired to limit, by dividing each house's laborers based on sex, age, and ability. Each house could then cater to its demographic's needs. However, because the workhouse assumed the role of relief distribution, the New Poor Law also abolished the supply of outdoor relief granted to these workers, like monetary pay and better access to food and clothing.⁶²

Rather than ensuring those who often went without had a reliable source of aid, the Poor Law Amendment essentialized the role of the laboring class as a group to propagate growing industrial demands. Unlike the previous Poor Law's intention, the revised statutes did nothing to relieve working families of heavier burdens; rather, it did more to dissuade and discourage workers from subsisting on the state in order to create lives for themselves.⁶³ Once able-bodied employees entered a house, conditions made living there unmanageable, given what little care and opportunity for upward mobility existed. It is worth noting that this pattern of inferiority did not begin with the New Poor Law, though it certainly exacerbated it, solidifying the role of the worker as a compulsory servant to the state. Naturally, the relationship between the workers and the state grew increasingly strained.

Chadwick's war on unsanitary conditions did not stop after this legislation passed. He continued his research in urban areas to identify sources of contamination in impoverished regions. In 1842, he published his *Report on the Sanitary Condition of the Labouring Population* that accounted for a reciprocal relationship between disease and unclean environments in urban spaces, heavily in line with anti-contagionism. In his assessment of 112,000 "destitute orphanage" cases, he found that parental deaths were proportionately higher if they lived in environments with "defective supplies of water."⁶⁴ Additionally, individuals born into these

“noxious environments” had higher risk of falling to epidemics.⁶⁵ To ameliorate this issue, Chadwick suggested the removal of debris from houses and public streets, in the hopes that in conjunction with general personal cleanliness, the public health improves, and severe epidemics decrease.⁶⁶ This report informed subsequent policies such as the 1848 Public Health Act, which established a General Health Board that assigned municipal councils on public sanitation.

As informative as it was at its time, Chadwick’s *Report* is disputed in scholarly accounts. Some historians praise him for pioneering public health policy that argued for sewage systems, clean city streets, and personal hygiene. John M. Eyler praised Chadwick’s efforts in separating infectious disease from destitution and pauperism. In Eyler’s analysis of the *Report*, paupers fell ill because of their environments and living conditions, not because they themselves were destitute. Chadwick’s publication propagated a state-mandated sanitary movement and sparked the erasure of avoidable hazards from impoverished neighborhoods through the General Health Board and other provisions of the Public Health Act.⁶⁷

However, Chadwick exploited the poor for his research; given his advocacy for the New Poor Law prior to, whatever legislation came out of his *Report* would not ameliorate the existent harsh conditions these communities already faced. Eyler separated the intent of Chadwick’s publication from the effect it had on the poor, whereas scholars like Durbach argued that the sanitation movement Chadwick advocated for resultantly targeted the poor, by illustrating that their bodies and homes must be policed by authoritative powers to be deigned clean and safe. Furthermore, the General Board of Health established local, municipal chapters across the country per the voluntary application from a town who requested such an establishment. In reality, these applications were scant, so many of these potential boards remained vacant.⁶⁸ Rather than fulfilling its primary intention, to reduce the burden of disease on the population,

Chadwick's *Report* and corresponding legislation successfully focused the Parliamentary eye on the living conditions of the poor, rather than treating epidemics and improving their economic hardships. Because of this added scrutiny, upper-class views of the poor rarely improved.

Administrators still perceived the poverty-stricken neighborhoods affected by cholera epidemics in the 1840s and 1850s as "fever dens," complete with indecent air circulation and an abundance of filth.⁶⁹ It is clear that Chadwick's advocacy for sewage systems and proper water access, though necessary, served as mere band-aids over the entrenched class disparities that clearly privileged one community and placed the other under the thumb of the state.

All this is said to illustrate that these dehumanizing laws, futile as intended, made vaccine resistance amongst the working classes quite pervasive. The first of the Vaccination Acts passed in 1840, which made vaccination free and voluntary to those who desired the procedure. The act also illegalized variolation, to prevent the prospect of another unnatural outbreak of smallpox. The Poor Law Commission was closely associated with the Vaccination Act because the group took special interest in employing the vaccine in workhouses, specifically. Some members of the upper class took issue with this special interest. Concerned about accessibility to the vaccine to all people, one writer in *The Times* questioned the grounds on which the Poor Law Commission has the wherewithal to enforce this law when they only administer to the poor in workhouses. The writer believed that the law should apply amongst all individuals who paid taxes to support the Act, not just where the Poor Law Commission delineated.⁷⁰ Since the Commission only catered to the poor in one specific situation, the privilege of free vaccination amongst the taxpayers supplying the group was seemingly not guaranteed. Additionally, William Smith O'Brian, a member of the House of Commons, filed a petition in 1841 against the act on the basis that it placed too much power in the hands of the Poor Law Commission.⁷¹

However, the reality of the Act's application in the workhouses was not very positive, either. Many impoverished communities remained unvaccinated, because the group supplying the vaccine supervised their employment in a horrific labor system. Typically, if employees sought smallpox prevention, they sourced it from local individuals who were well-versed in variolation, such as a well-trusted minister, a wise woman, or a miller: individuals who were communally trusted with consistently variolating their families.⁷² When the procedure was criminalized, it restricted the variety of prevention measures these people could take, by providing only one route to smallpox immunity. The Act also generated a new, unbalanced knowledge system of disease prevention that rested in the hands of an oppressive commission. Workers could not access this knowledge in the same way they could with variolation because rather than approaching a neighbor, they had to approach the Poor Law Guardians, those enforcers of an oppressive set of statutes. Thus, the Vaccination Act of 1840 depicts a culmination of brewing distrust amongst the poor towards their authoritative counterparts. As a law mandating compulsory vaccination did not yet exist, stringent enforcement of this law was minimal, and many working-class peoples opted against vaccination.

The public health policy of the early-nineteenth century exemplified a number of significant changes in mentality towards the human body, conferring an increasingly intense medical gaze. Foucault argued that this focused investment on the public's health relates to a shift in political assumption from "take life to let live," as seen in policies of the seventeenth and eighteenth centuries, to "make live or let die."⁷³ The question of vaccination fits into this paradigm distinctly. The almost-obsessive investigation into sanitary conditions of urban spaces inhabited by working-class individuals resulted in authoritative permission to police them into certain methods of preventative care. Given that they received little external benefits for their

employment and accommodation in workhouses, the relationship between the working class and the state grew increasingly strained. The Compulsory Vaccination Act passed in 1853 worsened this relationship because families had no other choice but to approach the state, subject themselves to a lesser-known procedure compared to variolation, or otherwise face legal consequences, often involving monetary payment.

Conclusion

Since Edward Jenner published the vaccine, smallpox incidence steadily declined. Between 1795 and 1823, the highest smallpox mortality rates reported in London were 18.39 percent in 1796, and 12.87 percent in 1798. The mortality rate falls well below ten percent after 1800, the only exception being a dramatic spike again in 1871, where smallpox had a 9.84 percent death rate.⁷⁴ Judging by these statistics alone, it is as though smallpox vaccination in England saw no pushback. The obvious steady decline in mortality shows that even though there were other severe illnesses threatening the English population throughout the nineteenth century, smallpox steadily disappeared from that pool, at least to some basal level. It is as though the conflict between scientists, parliamentary apprehension to act, and implicit or explicit pushback from working-class families on voluntary vaccination did not occur at all.

As is with other role-fulfilling technologies, it is very simple, yet ultimately tragic, to ignore the complementary stories of resistance and contempt towards these life-altering methods, or at least not provide them their due presence in a historical narrative. Smallpox is the only disease completely eradicated from the globe; it is quite tempting to romanticize this story as the only example of man's slow but sure triumph over one of the world's most visceral pestilences. Smallpox eradication is something worth celebrating given the insurmountable effort to reach remote corners of the globe to target it. However, in parallel with vaccination disputes occurring

today, resistance stories cannot be ignored, for no matter how disruptive they may be, they contribute to a historiographical narrative that is complex and multi-faceted. Yes, vaccination was successful in intent. Its reputation for success is still highly depended upon today in ensuring sufficient global coverage. However, in its early days, it is important to understand the limitations of vaccination to illustrate why such stringent opposition occurred. This was the impetus for writing this article: To show that the consensus on vaccination in the early-nineteenth century was quite murky, unlike how many historians have crafted this story before.

In the latter half of the nineteenth century, the scientific community grew increasingly divided on the issue, between those who lobbied the government on policy through medical societies, and those who continued to refuse to administer on the basis of what they believed about disease and the natural world. Charles Creighton remained one of the more vehement proponents of the movement. When he was not denouncing Jenner's work, he was using his anti-contagionist platform to portray the vaccine's uselessness, employing examples of adverse vaccine events, such as rashes or syphilis, to support his claims.⁷⁵ For those who studied the natural world, vaccination remained a wedge issue. Though they were colleagues and friends, Charles Darwin and Alfred Russell Wallace disagreed upon vaccination because of the very concept they both began their careers upon: The Variational Theory of Evolution by Natural Selection. Darwin believed that vaccines increased the fitness of humans to survive in the population. To him, it was the "highest evolved form of sympathy," because it signified the end of extensive global suffering.⁷⁶ Therefore, Darwin believed, its benefit should be made compulsory by the government, so as to expedite this future.

However, Wallace called the vaccine "useless and dangerous," and urged legislative bodies to stop infringing on the rights of individuals by implementing compulsory policies.⁷⁷ He

claimed that though Jenner's *Inquiry* may have provided solid evidence for his hypothesis, time has proven the inconclusive impact of this technology. Even the most adamant proponents of vaccination in Wallace's time admitted that the vaccine lost its effect after a few years, according to his book. He cited examples of such technology failures, among which is Benjamin Moseley's 1804 work that described negative outcomes in several patients due to vaccines, some contracting smallpox, or other illnesses, developing injuries, or dying. Another physician, William Rowley, reported 504 cases of smallpox after vaccination and seventy-five deaths in his 1806 report. The list goes on, of countless physicians who reported deaths, injuries, or smallpox in cases who had been vaccinated.⁷⁸ He concluded that had Jenner not received more funding for his vaccine research from Parliament during this time, these physician reports would have garnered wider attention. Moreover, he charged those who mandated vaccination specifically upon the workers with social exploitation, only concerned with serving themselves and propagating growing industry.⁷⁹ Despite the amount of vaccination counts appearing in Parliament by supportive physicians, the technology was not only debated, but also rejected by those equally, if not more, well-versed in natural world processes.

The relationship between workers and the state grew increasingly sour after the 1853 Act passed. Though it was available to everyone, and mandatory for all infants, vaccination remained closely tied to the poor because it was a part of poor relief through the 1840 Act. Parliament was aware of this; the author of the 1853 Act, George Lyttleton, claimed the Poor Law Board had stated that free vaccination should "in no degree stamp the recipient with the character of a pauper; but, nevertheless, it was a very natural feeling..."⁸⁰ This distinction of equal access to vaccination never quite set with everyone, and furthermore implied negative characteristics about the pauper's integrity as both a member of a harsh working community and as a parent.

Additionally, lymph quality was not consistent at the public vaccination stations frequented by impoverished families, meaning that low-income parents teetered between risking their young infants' lives with potentially syphilitic vaccine lymph, or be fined and imprisoned should they be caught without evidence of an authorized procedure. This was not so much the case for affluent parents, who could afford to choose where the source of their vaccine matter.

In 1898, another Vaccination Act passed, this time including a clause that allowed parents to legally reject vaccination through authorization by a magistrate. This was significant to many families because it resolved the question of choice. It resolved the potential risk of bad reactions in infants, because parents could simply opt out of that risk. Above all, it put the growing herd immunity towards smallpox to the test. Given the choice, many families either opted out of vaccination, or were more inclined to vaccinate because they could choose to do so.

The freedom to reject is a powerful, ingrained tenant in many societies, however, in public health, refusal to vaccinate threatens many, not just the one unvaccinated. Tampering with herd immunity means that the targeted illness remains in circulation, and thus will remain a threat to everyone unprotected. One significant difference between this paper's period of inquiry and today's state of vaccine hesitancy, and why it is tempting, but difficult, to compare the two periods, is the growing body of knowledge surrounding the technology. Today's array of vaccines must pass a repetitive series of trials that measure their safety, efficacy, and chance of adverse effects before they even enter the market. The amount of research conducted on this very subject is vast. The amount of regulation of this technology, to ensure that no adverse events occur, is immense. However, it is not the fault of early-modern England that they did not know about germ theory, evolution, or had a large, accessible body of knowledge related to disease prevention beyond what they already knew.

This makes it all the more peculiar that vaccine hesitancy pervades. There are so many people who still buy into obtuse claims about vaccines, despite these protective tenants set in place that did not exist in the early-modern era. Not only do we know how vaccines function, we also have a good idea of their effects on population health. Having reduced measles cases globally by over eighty percent since 2000, epidemiologists can now observe how the growing absence of this disease has impacted global health in ways unmeasurable before when it was highly endemic. We now know that measles has a paradoxical ability to wipe out a patient's entire immune system, in a widespread cascade that erases all immunological memory one developed towards every bacterium, viral strain, or parasite they encountered throughout their entire life up until contracting measles. This is paradoxical as the only remaining memory immune response after a measles infection is towards measles.⁸¹ This explains why mortality rate rises significantly for the first few years after an infection; survivors have to rebuild their immune system from scratch, putting themselves at risk for many opportunistic infections in the process, such as pneumonia.⁸² Vulnerable populations could get vaccinated for the major preventable diseases, such as diphtheria, mumps, or *Haemophilus influenzae* B, however, there are so many other pathogens in this world that they remain subject to beyond the list of vaccineable diseases.

The problem is that this discourse is easily accessible to the scientific and greater academic body. However, not all of the information in the example provided is located through a simple internet search. A concerned parent may fear or not understand the statistics spouted across governmental health sites or a research article buried within. Additionally, many people choose not to vaccinate because these diseases do not appear as commonly as they used to in the early-twentieth century. It is arguably misunderstood that physicians vaccinate for illnesses such

as measles because the diseases themselves risk catastrophic complications should a case survive. The scientific body has the privilege of knowledge, but with that comes an important task: communication and advocacy. All vaccine proponents should be challenged to bear the burden of vocalizing its benefits in a streamlined, effective way that is as ridiculously boisterous as the claims of those who oppose it. Proponents must illustrate vaccination as a social responsibility; parents are not only protecting their children from serious, still-existent infectious diseases, but they are also protecting their neighbors, classmates, and non-vaccinable groups.

There is one more thing, that perhaps presents a point of departure for this task. Smallpox was a good candidate for eradication, because we were the only species it affected. The poxvirus family is quite large, yet each virus within it is specific to a certain animal family or species. This means that there were no other animal reservoirs for our virus to hide, and therefore no chance for zoonotic transmission, which would sustain the virus in the human population forever no matter how much we control for it in humans. This feature of smallpox made control and eradication easy, because the vaccine campaign simply targeted no other animal but humans. This case is the same for measles. Though global health has made significant strides in the past several decades to save millions of lives from this disease, there is no reason why the field cannot mobilize again in the way they did in the 1970s. Let us begin, again, there.

ENDNOTES

¹ Stanley Williamson, *The Vaccination Controversy: The Rise, Reign, and Fall of Compulsory Vaccination for Smallpox* (Liverpool: Liverpool University Press, 2007), 7.

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³ Bennett, 500.

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- ⁴ Edward Jenner, *An Inquiry into the Causes and Effects of the Variolae Vaccinae, a Disease Discovered in Some of the Western Counties of England, Particularly Gloucestershire, and Known by the Name of the Cow Pox* (London: Murray and Highley, 1798), 6.
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