Viral Denial

Pandemics, Chiropractic, and the Persuasive Power of Invisibility

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Julie Homchick Crowe
Seattle University
Seattle, Washington

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Introduction

While arguments about masking and vaccines became commonplace during the COVID-19 pandemic, a less prominent argument worthy of attention is the denial of the very existence of the SARS-CoV-2 virus. Perhaps unfamiliar to many of us, versions of virus denial have persisted across multiple pandemics, live in conversations among family and friends, and even transmit through providers and caretakers. The ramifications of these beliefs not only show us the fraught ontological nature of claims about viruses, but also how deadly such claims can be. While the denial of the existence of physical viruses takes a variety of forms, this paper will focus on a historically-rooted belief known as *germ theory denialism*, and will do so by drawing a rhetorical lineage from Antoine Béchamp's terrain theory of disease up through the practice of modern-day chiropractic and into the COVID-19 pandemic.

Germ theory denialism is a close cousin of vaccine hesitancy, but they are different in important ways. Vaccine hesitancy arises for a variety of reasons, including fear of toxins, fear of the government, fear of side effects, appeals to autonomy and individual liberties, and more (Bennett, 2021; Bricker and Justice, 2019; Kolodziejski, 2014; Lawrence, 2021; Scott, 2016; Smith and Graham, 2019); but most arguments against vaccines maintain that germs are real. Germ theory denialism, on the other hand, either rejects the actual existence of viruses or minimizes their virulence or threat in some way. In many ways, germ theory denialists are anti-vaccine, but primarily because they think there is nothing to vaccinate against. The argument of germ theory denialists is an epistemic and ontological one, asking us to reconsider what is real and what is not in respect to pathogens and our health.

Such ontological arguments about viruses have more commonly functioned to establish their existence in order to shape our realities and behaviors. For example, in *The Gospel of Germs: Men, Women, and the Microbe in American Life,* Nancy Tomes (1998) reveals how a belief in germs persuaded people "to alter fundamental aspects of their daily lives to avoid them" (p. xv). To demonstrate the persuasive power of germs, Tomes seeks to answer the questions: "When and how did ordinary Americans come to believe in the existence of germs? How did they first imagine and understand their coexistence with a world of living microbes unseen to the naked eye?" (p. xiv). But given the persistence of germ theory denialism, I propose that we now need to investigate an inverse set of questions: How did ordinary Americans come to deny the existence of germs? How did they first imagine and understand a world where unseen causes of disease resided only within our own bodies rather than outside of them?

To answer these questions, I aim to trace the historical contours of arguments against germ theory by performing what Michel Foucault (1972) describes as a genealogy of the "discursive formations" of germ theory denialism, with the aim of augmenting our understanding of the "complex collage of relationships between biological entities and the social groups and cultural formations that organize around them" (Keränen, 2011, p. 236). This genealogical approach aligns with John Pickstone's method for doing history of science (2000) – rather than focusing on discrete time periods, he advocates for analyzing "ways of knowing" by looking at knowledge across centuries that link histories of sciences to other histories. Jenelle Johnson's (2014) work on the rhetorical history of lobotomies offers a useful guide for this work as well – rather than just performing a medical history of lobotomies, Johnson seeks to show how narrative and stories of lobotomies "*are* histories" of "the meaning of lobotomy in American culture" (p. 4). She maintains that both medical history and the meaning of medicine in culture are "inextricably linked, and each has shaped, and continues to shape, the meaning of the other" (p. 8). In the present study, those other histories are rhetorical histories of *biorhetoric* that help us better understand the permutations and reach of denialist arguments.

In the analysis below, I utilize both primary and secondary sources to trace the discursive lineage of germ theory denialism back to Louis Pasteur's rival, Antoine Béchamp; offer a discussion of Béchamp's influence in the development and practice of chiropractic in 20th century America; and locate the persistence of COVID-19 denialist arguments against this backdrop. Overall, I argue that the denial of the existence of the SARS-CoV-2 virus has, in some contexts, roots in alternative models of medicine – particularly chiropractic – that embrace Béchamp's terrain theory. This denial offers a peculiar form of biorhetoric in that instead of relying on the "persuasive power of pathogens" (Keränen, 2011, p. 225), it uses the *invisibility* of pathogens to render their alleged *absence* as persuasive, ultimately embedding such absence with moral imperatives to resist public health directives. While germ theory denialism may seem largely disconnected from most people's lives, its appeal greatly impacts public health as it encourages the rejection of vaccines and other public health measures. Commonly paired with capitalist assumptions of self-determination and autonomy, the rejection of the existence of viruses often lives in tandem with the rejection of care for others and the common good.

Theorizing Absence as Evidence

Germ theory denialism offers an interesting case that augments how we might see biorhetoric in public discourse. As John Lyne (1990) describes it, biorhetoric functions as a "strategy for inventing and organizing discourses about biology in such a way that they mesh with the discourses of social, political, or moral life" (p. 38) – and this definition allows us to identify the intersection of claims about our biology and health, the life and existence of viruses, and our personal and political responses to them. One particularly important aspect of biorhetoric worth unpacking for this study is its reliance on materiality. Jane Bennett (2010) notes how material things "have the power to startle and provoke a gestalt shift in perception" (p. 106) – and discussions of biorhetoric have extended this material power to biological "things." In Lisa Keränen's (2011) review of five different books on epidemics, germs and security, she notes how they all:

> ...testify to the durability and power of pathogens as objects whose material reality and changing symbolism becomes deeply embedded in broader cultural narratives and emerging forms of governance and security. Together, they disclose how our responses to real and imagined germs reshape our understandings of self and other, nation and community, and risk and safety. (p. 236)

Such material power rests on the *presence* of pathogens, a strategy that Chaim Perelman and Lucie Olbrechts-Tyteca (1969) describe where discursive strategies make present "what is actually absent" (p. 117). Their work shows how "the thing on which the eye dwells" (p. 116) – or the idea that the speaker has brought to the forefront for the audience – often carries more rhetorical power than that which is not present. As other scholars have shown, the idea of presence helps us understand "rhetorics of sight" wherein visual rhetoric functions as an important part of scientific thinking and understanding, namely in the act of observation. In a project on conceptions of agentic abilities of PET scans, S. Scott Graham shows us how biomedical imaging technologies helped establish the ontology of fibromyalgia within both medical research and for the public (2009). Jordynn Jack's work on Robert Hooke's *Micrographia* further shows us how visuals within science create a "pedagogy of sight" that instruct viewers how to see and interpret microscopic forms of visual evidence (2009). Such research underscores the inextricability of presence and sight, particularly within scientific and medical discourse.

But it is also important to note that Perelman and Olbrechts-Tyteca argue that the "suppression of presence is an equally noteworthy phenomenon" (p. 118), an idea several scholars have engaged with. Notably, Jenny Rice's work on distal evidence in *Awful Archives* (2020) shows how presence can be suppressed: "Rather than making things feel close, distal evidence is made to feel remote. Evidence is 'out there' away from ourselves. Presence thus turns into a kind of ventriloquist act, where the sound seems to be coming from somewhere else" (pp. 117-118). In terms of medical discourse, Jamie Landau describes not just distance from that which is present, but also discusses a form of "absence" in her work on HPV pharmaceutical advertising (2011). Showing us that it is not just the presence of women in HPV campaigns that articulate who gets to be a victim, she argues that the suppression and absence of men and minoritized women function to minimize and obscure other potential victims. Similarly, Nicole Gangstad (2021) shows us how the fundraising efforts of the National Tuberculosis Association in the 1900s "erased the existence of many people with tuberculosis from their philanthropic endeavors" (p. 302) in only making present pictures of Tuberculosis through white, Christian iconography. Sara DiCaglio (2021) further helps us see how invisibility functions persuasively through her analysis of the rhetorical power our atmosphere, underscoring the connection between invisibility and assumptions of absence. She writes: "…so many aspects of the atmosphere are imperceptible and therefore may mistakenly be assumed to be absent—that is, because of atmospheric erasure" (p. 380).

To extend this discussion of the rhetorical power of absence, we should consider the rhetorical dimensions of claims that germs are fiction that ultimately turn *presence* on its head. Rather than calling forth the materiality of germs, germ theory denialists use strategies to make something that is present – the germ – absent (while in turn making other potential causes of disease more present). Relying on the invisibility of germs in our everyday lives, denialists can redirect us and claim the cause of symptoms, hospitalizations, and deaths is not the virus because *the virus is not there*. While such arguments that deny the existence of something fail to meet the test of falsification (Karl Popper might want to know how one might prove that germs do not exist), they nonetheless are appealing because our sight alone can neither confirm nor deny their existence. In public health discourse, making germs more present is only possible by showing the effects of the germ – and when the cause itself is invisible, it becomes easier to argue that the cause is something else. Such arguments permeate germ theory denialism – as we first see in the following discussion of Antoine Béchamp's counterproposal to Louis Pasteur's germ theory.

Antoine Béchamp's "Little Bodies" and the Terrain Theory of Disease

When Louis Pasteur first developed germ theory in the 1860s, his work revolutionized the way we understand disease transmission. Long thought to be born in the miasma of cities, some disease, Pasteur argued, was in fact biological and could be transmitted from person to person. While today we might typically think of Pasteur's work as historically in competition with the filth (or miasmatic) theory of disease, his work emerged among a "multiplicity of germ theories" (Steere-Williams, 2015, p. 397) that developed across the world around the same time. In tandem with Pasteur's work, other scientists were developing the disciplines of biology and physiology to better understand human health. While this history is complex, one friend of Pasteur stands out as particularly relevant to understanding the beginnings of germ theory denialism – Claude Bernard. Between the 1840s-1870s, Bernard delivered a series of lectures in France that aimed to discuss what he called the *milieu intérieur* – or the internal environment of the body. He spoke about nutrition, bodily fluids, internal temperature, and other topics that he argued illustrated the importance of "equilibrium" in the body, all of which reflected earlier humoral medicine. He synthesized this work into what he called "terrain theory" (Holmes, 1986), a proposal that soon became largely associated with one of Pasteur's rivals, Antoine Béchamp, in spite of Bernard and Pasteur's friendship.

While largely an outsider among the French scientific elite in the 1800s, Béchamp worked steadfastly on a variety of projects related to fermentation and physiology. Most notably, he built upon Bernard's terrain theory to argue that diseases – or general unhealthiness – create microbes internally from a cellular structure called *microzymas,* which he referred to as "little bodies" (1912, p. 76). In his own words, Béchamp wrote, "The characteristic microbe of a disease might be a symptom instead of a cause" (1912), complementing Bernard's proposal that our *milieu intérieur* – our organs, fluids, etc. – is what determines our health. In other words, it was an already-diseased or injured body that would produce microorganisms internally, a claim that was directly oppositional to Pasteur's theory of external microbes. Pasteur and Béchamp would spend their careers in conflict with an ongoing rivalry that extended beyond germ theory and into their concurrent work on fermentation (Manchester, 2007), but it is this contestation over the cause of disease that occupies our interest for this study.[1]

Béchamp's argument may seem quaint to the modern eye, but the landscape of scientific discourse about germ theory in the 1800s was rather contentious until the 1870s when Robert Koch offered evidence to support his postulates confirming viruses as the cause of infectious disease. By the 1880s, as Steere-Williams notes, germ theory gained wide acceptance in the United States and "…directed not only how scientists practiced…but how everyday people behaved, lived, and worked" (p. 432). And yet, not everyone accepted germ theory, as the analysis below unpacks. Often lauded as a misunderstood martyr, Béchamp has figured as hero for those who reject both germ theory and the persona of Pasteur. In the 1920s, for example, Béchamp champion Ethel Douglas Hume (1923) described Béchamp as morally superior to Pasteur and purer in his scientific ambitions. In contrast to Pasteur, Hume claimed,

> …[Béchamp] made no effort to seek out influential acquaintances and advertise his successes to them. Self-oblivious, he was entirely concentrated upon nature and its mysteries, never resting till something of these should

[1] It's worth noting that the contention between germ theory and terrain theory relates to a division in approaches to microbiology known as Monomorphism vs. Pleomorphism where scientists were divided over whether or not bacteria could change into new shapes in regeneration (pleomorphism) or if they stayed mostly the same (monomorphism) (Wainright, 1997).

> be revealed. Self-glorification never occurred to him and while the doings of Pasteur were being made public property, Béchamp, shut in his quiet laboratory, was immersed in discoveries, which were simply published later in scientific records without being heralded by self-advertisement. (p. 6)

For Hume, Pasteur was a socialite who could play the game with ecclesiastical elites and noble scientists; Béchamp, instead was a devoted individual committed to both faith and science rather than fame and fortune. So, while germ theory largely displaced other theories of disease in the 1800s, the celebration of Béchamp and his work persisted in a variety of circles – notably for this analysis, we will explore next what this looked like in the world of chiropractic in the US.

Chiropractic, Subluxation, and Disease

Only a few decades after Pasteur's original work on germs, the story of chiropractic begins in 1895 with Daniel David Palmer, a magnetic healer in Davenport, Iowa. Palmer's work began when he allegedly restored the hearing of a Harvey Lillard, a janitor, by adjusting his spine (D.D. Palmer, 1910a) – accounts of the incident vary from accident to experimentation to treatment, but the Lillard incident remains a prominent point in the history of chiropractic (Folk, 2017, pp. 74-76). Palmer built his chiropractic enterprise from that moment, writing prolifically on the topic and establishing the first chiropractic school, The Palmer School of Chiropractic, which still operates today (now named the Palmer College of Chiropractic). Embracing what Holly Folk describes as "vertebral vitalism" that functioned as a "tapestry of ideas…from domains across Western science, religion, and philosophy" (p. 3), Palmer's primary focus was on the "subluxations" – or joint dysfunctions – in the spine that not only cause back pain, but cause disease as well. He wrote, "A subluxated vertebra…is the cause of 95 percent of all diseases…The other five percent is caused by displaced joints other than those of the vertebral column" (D.D. Palmer, 1910b). By adjusting these subluxations, according to Palmer, disease would be cured through a drug-free approach that functioned as both prevention and treatment. As Holly Folk notes, D.D. Palmer's fixation on subluxation as the cause of disease revealed his rejection of germ theory, a sentiment that was prevalent in his self-published newsletters. One particularly revealing passage shows his interest in drawing out a "common sense" rejection of germ theory and modern science:

> If we were to receive instructions from the would be learned physicians, we would believe that every breath of air, every drop of water, every bite of food was filled with some form of microscopic life, so very small that only costly microscopes could reveal them, owned only by the profession; that everything our Creator has made and given us to support life is filled with death. (as cited in Folk, 2018, pp. 72-73)

D.D. Palmer gradually handed over his work to his son, Bartlett Joshua Palmer, who took over the Palmer School in 1906 at age 20 despite their contentious relationship. B. J. Palmer maintained his father's philosophy of disease and was likewise fixated on spinal subluxation as the cause. In 1910, he wrote:

> Chiropractors have found in every disease that is supposed to be contagious, a cause in the spine. In the spinal column we will find a subluxation that corresponds to every type of disease. If we had one hundred cases of small-pox, I can prove to you where, in one, you will find a subluxation and you will find the same conditions in the other ninety-nine. I adjust one and return his functions to normal.... There is no contagious disease....There is no infection....There is a cause internal to man that makes of his body in a certain spot, more or less a breeding ground [for microbes]. It is a place where they can multiply, propagate, and then because they become so many they are classed as a cause. (as cited in Campbell, 2000, p. 2)

The Palmers' denial of contagious disease and their insistence that disease is a "cause internal to man" amplified Béchamp's terrain theory along with vitalistic, rather than mechanistic, views of the body. As the profession grew during the mid-1900s, such beliefs even impacted public health. As Sean Carroll (2020) notes, with the advent of the polio epidemic and vaccine, many chiropractors, "...dismissed the role of contagious pathogens and adhered to the founding principle of chiropractic that all disease originated in the spine" (para. 4). [2]

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[2] The field of chiropractic was not the sole arena of germ theory denial in the 20th century, but it is the most cohesive one that persists today. A related belief system grounded in Béchamp's germ theory denialism is a philosophy known as "natural hygiene." Gaining momentum in the Progressive Era, practitioners believed that either the body or God would take care of disease, and they rejected the notion that disease could be caused through infection (Whorton, 1981). This belief system was

In spite of the field's growth in the mid-century, chiropractors were often treated as outsiders within the medical community. With the lack of formal licensure and regulation around chiropractic, practitioners were sometimes vilified and prosecuted as well – D.D. Palmer himself was jailed for his practice (and a statue pays tribute to him as a martyr for the discipline in Iowa today). The American Medical Association was particularly aggressive toward the profession, boycotting practitioners and disallowing physicians to refer patients to chiropractors for care. By 1963, they had established a Committee on Quackery that termed chiropractors as "scientific cultists," but after a series of court cases in the 1970s and 80s where the AMA was described as having an "intent to destroy a profession," the AMA changed their rules to allow physicians to work with chiropractors and toned down their aggressive language toward practitioners (Associated Press, n.p). As Colleen Derkatch (2016) notes, the "culture of expertise" that gave rise to such boundary-drawing resulted in many alterative therapeutic practitioners taking "…an explicitly antiestablishment approach" by setting "themselves in direct opposition" (p. 25) to the conventional medical community – a stance still observable in sectors of the chiropractic community today.

Modern Chiropractic and Germ Theory Denial

Today, there are two primary schools of thought in the world of chiropractic that are sometimes described as unhappily married (Leboeuf-Yde, et al., 2019). The first follows an evidence-based model with a focus on musculoskeletal issues – an approach that often functions in complementary ways to conventional medicine (such practitioners are referred to as "mixers") and is the approach

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embraced by Dr. Herbert Shelton (1922) through the midcentury as part of a modern-day natural hygiene movement that promoted fasting, plant-based diets, and other lifestyle choices as means of eliminating disease. Natural hygienists reject the idea of contagion and will not, for example, admit smallpox was eradicated because they do not believe there was ever a disease to begin with. While much of Shelton's influence has waned (the practice of natural hygiene is today highly decentralized), some alternative approaches to medicine and schools of naturopathy still embrace this perspective of disease and the body. Today, evidence of this school of thought can be found on the websites of natural hygiene organizations, in writings that promote unconventional care, and in the social media accounts of those who embrace this system in their approach to alternative medicine. While distinct from the field of chiropractic in many ways, the influence of both of these alternative approaches to healing have shaped modern day skepticism towards germ theory.

embraced by the American Chiropractic Association. The second school of thought – adhered to by the “Super Straights” (Folk, 2017; Wiese, 1996) – follows a “vitalistic” traditional approach, maintaining a commitment to Palmer’s view that subluxation is “…the sole cause and manipulation as the sole cure of all human disease” (Ernst 2008, p. 547). Given the lack of universal infection upon exposure to viruses, these chiropractors ask: Why would some people get ill and others not when encountering the same virus? The International Chiropractors Association (ICA) embraces the “straights” perspective and the vitalistic lineage of D.D. Palmer, naming him as their founder in 1926. On their site, they write:

> The ICA is dedicated to the growth and development of the chiropractic profession based on Dr. Palmer’s fundamental belief in the principle and philosophy of chiropractic as a unique, separate, distinct, and drug-less health care profession. We believe in ‘staying in the lane of chiropractic.’ (ICA, 2021, para. 2)

Such sympathetic language indicates that Palmer’s beliefs – and by extension, Antoine Béchamp’s – still influence chiropractors globally.[3]

A cursory review of chiropractor websites online reveals an embrace of Béchamp prior to the COVID-19 pandemic as well. Robert O. Young, naturopath and chiropractor based in California, offers one such example. Young has been interviewed on Oprah and has published popular books on his pH miracle program but has gotten into significant legal trouble and has even been jailed for practicing without a license (following in the footsteps of D.D. Palmer, it would seem). On his site, Young offers an extensive collection of writings but one particular post from 2019, called “Dismantling Viral Theory,” offers a clear picture into the type of

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[3] While the Palmers’ rejection of germ theory shaped much of 20th century chiropractic, other manifestations of germ theory denial are worth nothing as well. Peter Duesberg (1996) has long maintained that HIV is a harmless virus that does not cause AIDS, and that the disease is caused by drugs like AZT instead. South African President Thabo Mbeke made similar arguments during his 2000-2008 term, resulting in policies that denied citizens access to antiretroviral drugs. Beyond HIV, in 2019 over 300 healthcare workers were injured and six killed at Ebola clinics in Western Africa by local militia groups, repeating the type of violence seen in earlier outbreaks (Burke, 2019). These examples and others indicate a persistence of denialism within arguments about disease and public health that reveal public anxieties about government, power and autonomy that map onto many arguments within the COVID-19 pandemic as well.

germ theory denial we see elsewhere (Young, 2019). He writes, "so-called pathogenic viruses have never been observed in humans or animals or in their body fluids and have never been isolated and subsequently biochemically analyzed." He describes poliomyelitis as an "alleged virus;" HIV, EBV, CMV, Hepatitis C, West Nile Virus, Ebola, Measles, Zika, and the Coronavirus are "Phantom Viruses;" and he claims they are all an "invention." In a bold heading, he writes: "Viral Existence Has NEVER Been Scientifically Demonstrated and Never Proven!" and offers in his conclusion a reference to Béchamp's terrain theory:

> My bottom line still holds the truth that the terrain or internal environment is everything and the germ or so-called virus is NOTHING! The germ or so-called virus can only be a symptom of cellular breakdown due to an imbalance of the delicate alkaline pH balance of the body fluids and NOT the cause of that breakdown. (Young, 2019)

Young might appear to yell at his readers, but his message is clear: none of these viruses have ever existed.

Less infamous chiropractors offer a similar message. For example, at Maximized Health in Centennial, Colorado, the owner Craig Burns writes on his site, "I personally believe in the terrain theory and have eliminated many disease labels and symptoms from my life by completely following this theory and admonishing the idea of the germ theory" (Burns, n.d.). Along with Burns, other chiropractor sites regularly describe Béchamp as a kind of underdog and a hero; they mistakenly repeat the unfounded myth that Pasteur recanted his theory on his deathbed and conceded Béchamp was right; many raise suspicions about the profit-motives of Big Pharma for the proliferation of germ theory; and several of the offices appear to use word-for-word language when describing Béchamp.

In spite of tension over germ theory in the field, chiropractic is a booming industry. According to the Centers for Disease Control over ten percent of adults – or 32 million – in the US report seeing a chiropractor for treatment (Clarke, et al., 2018) and it is "the most patronized form of alternative medicine in America" (Folk, p. 17). While not all of these patients will see chiropractors that espouse germ theory denialism in the office, some will. According to Carroll, even decades after the eradication of polio "…as many as one third of chiropractors still believed that there was no scientific proof that vaccination prevents any disease, including polio." He goes on to say, "That belief and resistance continues to this day, with some chiropractors campaigning against state vaccination mandates" (Carroll, para.5), indicating how "chiropractors are likely to play an increasingly influential role in the formulation of societal perceptions of public health issues such as vaccination" (Campbell, Busse, and Injeyan, 2001, p. 1). Ernst's (2008) work illustrates how such skepticism can be traced to existing chiropractic literature that "repeatedly stresses that immunization is hazardous and ineffective" (p. 554). But importantly, the ICA school of chiropractic does not just embrace anti-vaccine views that shape public perceptions; it likewise disseminate skepticism of viruses. When a patient is seeing a chiropractor or an alternative medicine practitioner, those moments and relationships become potential vectors for disseminating skepticism about the existence of germs and the power dynamic in such settings makes those arguments all the more persuasive. The threat of such arguments to public health is real, too. As Brian Gleberzon, et al. (2013) point out,

> ...since chiropractors interact with a significant number of patients throughout their professional careers, it stands to reason that if a segment of chiropractors also advise their patients to eschew vaccinations, this could imperil the success of large-scale immunization programs championed by the World Health Organization (WHO), the Centre of Disease Control and Prevention (CDCP) and the Public Health Agency of Canada. (para. 2)

The spinal adjustment work of chiropractors might often be far from our minds when we worry about infectious disease, but in dismissing the cause of disease, messages in the offices of germ theory denialist practitioners can further threaten public health.

Public Figures and Pre-COVID Germ Theory Denial

In the post-Wakefield paradigm of vaccine hesitancy in the 2000s, we saw a resurgence of appeals to Béchamp in public discourse, particularly with the agitating television host, Bill Maher. In 2005, on his show *Real Time with Bill Maher*, he discussed his skepticism about the medical industry with his guests and went directly to the source by referencing Béchamp's theory of terrain (Grant, 2005):

> I don't believe in vaccination either. That's a... well, that's a... what? That's another theory that I think is flawed, that we go by the Louis Pasteur theory, even though Louis Pasteur renounced it on his own deathbed and said that Béchamp was right: it's not the invading

> germs, it's the terrain. It's not the mosquitoes, it's the swamp that they are breeding in. (Maher, 2005)[4]

He went on to address his guest, Dr. Bernardine Healy (former NIH director):

> You're in denial, about I think is a key fact, which is it is that... people get sick because of an aggregate toxicity, because their body has so much poison in it, from the air, the water... Yes, much of it is not our fault and we can't control it...I'm not presenting myself as a paradigm. I do cruddy things to my body too and I enjoy them. But when I do them, I'm not in denial. I'm not eating fat-free cheese and saying: 'You know what, I'm healthy for eating this. I'm saying: 'Oh yeah, this is chemical goop and this is killing me.' (Grant, 2005)

And when the H1N1 flu circulated in 2009 and researchers were working to develop a vaccine, Maher tweeted in September of that year, "If u get a swine flu shot ur an idiot" (Maher, 2009). He took a hard stance against vaccinations and Big Pharma in the following week on his show, which he was criticized for in the *New York Times* and other outlets (Parker-Pope, 2009). While he did not mention germ theory in that episode, the following week he went back on his show and attempted to rescind his claims, saying "I am not a germ theory denier. I understand that germs and viruses cause diseases" but still called vaccines a "risky medical procedure" (Grant, 2009), leaving his stance somewhat ambiguous.

Other talking heads promoted germ theory denialism prior to the pandemic as well. Fox News host Pete Hegseth embodies the tension found in some germ theory denialist arguments where they simultaneously deny the existence of germs but also claim that their rejection of measures like handwashing increase their immunity to germs (and as such, admit that germs do in fact exist). In one episode of Fox & Friends on February 10, 2019, he shared that he hasn't washed his hands for 10 years. "I inoculate myself...Germs are not a real thing. I can't see them, therefore they're not real. I

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[4] Note that the author first learned of this interaction from the work of oncologist David Gorski, who writes online about science misinformation. The author could not locate the original episode through HBO, on any streaming service or television archive, or at the university and public library, so is relying on multiple second-hand reports that these are Maher's words, including two blog post by Gorski (in 2007 and 2009) and two online discussions from March 4, 2005, the date of the episode (one from the International Skeptics Forum called "Bill Maher says vaccines don't prevent disease" and one from Skeptico called "Idiot Week").

can’t get sick” (as cited in Gainty, 2021, para. 2). Andrew Wakefield, notorious author of the rescinded *Lancet* article on MMR vaccines and autism, has directly referenced Claud Bernard in his campaign against universal vaccinations as well. In an article from 2019, he wrote: “Before rushing into universal vaccinations for every child, should we not be asking what is unique, what is different about that one child in the million, about what Claude Bernard described as the ‘terrain,’ which makes a child susceptible to this infection?” (p. 79).

While Maher’s, Hegseth’s, and Wakefield’s comments have little to do with the world of chiropractic, they illustrate the appeal – and virality – of germ theory denialism. In some ways, their claims have an intuitive, common-sense quality to them. Many viewers or readers would agree that the pharmaceutical industry is not that trustworthy and that the American public is generally unhealthy – these shared assumptions then get tied to the conclusion that since we are being lied to, Béchamp was right, and therefore germs do not cause disease.

Germ Theory Denialism and COVID-19

Not surprisingly, such denialist arguments gained momentum during the COVID-19 pandemic. Maher did not take up the full germ theory denial mantra in this case, but he still flirted with it in comments like, “…over the past year the pandemic has prompted the medical establishment, the media, and the government to take a scared straight approach, to getting the public to comply with their recommendations,” implying there’s a larger conspiracy at foot rather than a real pandemic going on (Grant, 2021). So not surprisingly, conspiracy theories and the denial of viruses emerged in other spaces at the start of the pandemic as well. In spring of 2020, hospitals in the United States were overcrowded and public health officials asked the public to stay home to “flatten the curve” and minimize the need for hospital beds. In response, the #filmyourhospital Twitter trend asked members of the public to get footage that showed how empty their local hospitals were. The aim was to reveal that the claims of hospitals being short on beds for COVID-19 patients was a ruse in order to create more fear and panic among the public. The conspiracy theory went viral quickly with “22,785 tweets sent over a seven day period by 11,333 users” (Ahmed, 2022, para. 5). While many users may have been motivated more by the idea that they were being lied to by the media and government, others likely embraced the idea that COVID was not real. The same can be said for those who believed that 5G towers, rather than a virus, were to blame for the disease. What this amounts to is a clear picture that hesitation about public health measures during the pandemic was not typical. Rather, as David Graham (2021) in *The Atlantic* points out: "…the pattern of resistance to the coronavirus vaccines looks less like COVID-19 vaccine hesitancy and more like COVID-19 denialism" (para. 5). This underscores Scott et al.'s (2021) observation that the COVID-19 pandemic "enabled a confusing and sometimes dangerous proliferation of evidence" (p. 277) that allowed for misinformation and conspiracy theories to flourish.

Regarding chiropractors during the COVID-19 pandemic, many expressed skepticism by focusing specifically on treatments (as in, natural remedies or spinal adjustments will improve recovery outcomes) or on personal liberties (as in, don't let the government tell you what to do). One viral example from April 2020 was chiropractor Eric Nepute who started a Facebook group called Common Sense Nation. In one widely viewed video – one post had over 21 million views within a week (Broderick para. 2) – he told viewers to drink quinine and take zinc to treat the virus, all remedies not recommended by doctors and researchers (Kasprak, 2020). He asked that viewers be leery of the "untested" vaccine when it arrives (Nepute, 2020) and appealed to his authority in such mandates, saying "I'm a physician, I'm a doctor." But embedded within the Nepute tirade on infringement of personal liberties, he tells viewers to go to their hospitals to "find out what's going on," embracing the #filmyourhospital conspiracy theory and revealing not just a critique of government overreach and fear-mongering, but a suggestion that the whole thing is a hoax. Nepute is not alone either. A *Buzz Feed News* piece catalogued several similar statements from chiropractors:

> The Twitter account for a clinic in Virginia on Monday told its followers to "stop worrying about the germs and start taking care of the host!" A chiropractor from Colorado shared a tweet on Sunday that accused the NWO ('New World Order') of forcing people to wear face masks. A chiropractor in New Jersey shared a video from a QAnon-affiliated Twitter account claiming the coronavirus death toll was fake. And on TikTok, California-based chiropractor Alicia Tsounis promoted colloidal silver spray, which is ineffective at killing the coronavirus. (Broderick, 2020, para. 15)

Such messages might first appear to function as different forms of paranoia, but there's more going on here than an anti-establishment appeal to our personal liberties. By offering a different reality – one where the virus does not exist – the paranoia turns into a call for liberation, to set our minds free, and to no longer be duped by those in power.

Among the din of concerns and speculations at the start of the COVID-19 pandemic, the professional bodies overseeing chiropractors grappled with internal tensions over germ theory and how some practitioners were spreading disinformation about the disease. Within March 2020 alone, the College of Chiropractors of Ontario (CCO) in Canada sent 54 cease and desist letters to providers who were making claims about spinal manipulation and improved immune responses to COVID (Bellemare, Ho and Nicholson, 2020, para. 6). The American Chiropractic Association's Board of Governors noted cause for alarm as well. In a statement posted on their site, they wrote:

> The American Chiropractic Association (ACA) is working to coordinate information and guidance from multiple credible sources and partners for use by doctors of chiropractic and their clinics throughout the country, while also monitoring communications channels and providing the public with reliable information about chiropractic care. We are committed to responding to misinformation that may cause confusion. For example, some claims are being made that spinal adjustments can boost immunity and decrease the risk of contracting COVID-19. While spinal adjustments are effective for a number of conditions, there is no quality evidence to support that they can improve immunity to COVID-19. (ACA, n.d.)

Such actions and statements are telling because they reveal that it is not just Nepute and a handful of other chiropractors who promoted germ theory denialism that are cause for alarm; the ACA's statement and the CCO's punitive actions seem to suggest that germ theory denialism is a known and pervasive problem in their field and for public health.

A final point of interest is worth noting as well – Béchamp and Bernard's concept of the "terrain" was not entirely wrong and maintains appeal both separate from and connected to germ theory denialism. The terrain of a body is something we still acknowledge as part of one's health – our genetics, immune systems, age, environmental factors, and a host of other variables change how each individual responds to a virus. So in some ways, the persistence of Béchamp's terrain theory among chiropractors and in public discourse is not too different from the ways that the logics of miasmatic theory were never fully displaced by germ theory, as Emily Winderman, Robert Mejia and Brandon Rogers note in their analysis of sensory rhetoric (2019). Its logic persists easily, then, when individuals find themselves disenchanted with conventional medicine. From one public Facebook group called "Terrain Theory vs. Germ Theory" we see an image [fig. 1] that offers a comparison between terrain theory and germ theory, along with quotations from Pasteur and Béchamp. In the discussion, users regularly share direct quotations from Béchamp and seek out medical advice that relies on terrain theory. The most recent comment (as of July 30, 2022), simply starts, "I am very much of the thought that viruses do not exist and fully on board with the terrain theory…" (Heanan, 2022). Terrain theory maintains an intuitive quality because we understand that our internal health greatly shapes our health outcomes – the extension to germ theory denialism, though, not only undercuts foundational understandings of modern medicine, but also comes at great costs to public health.

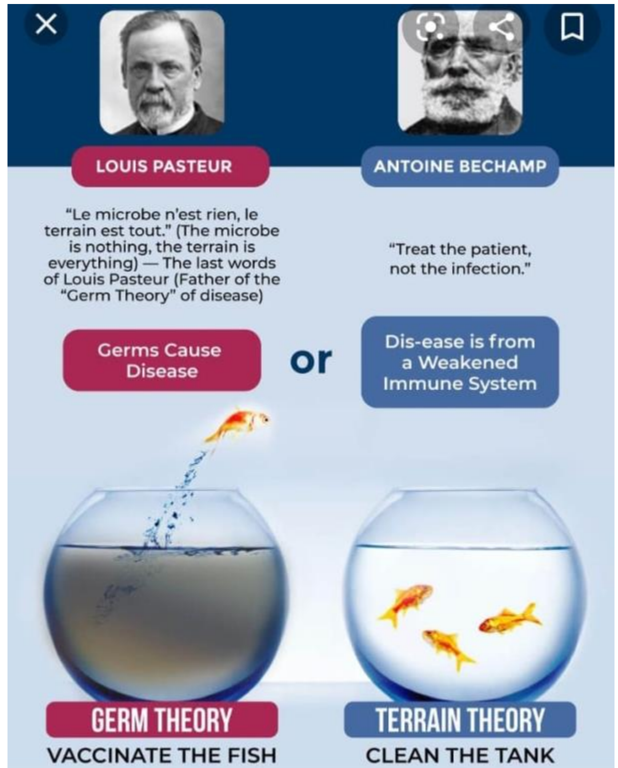

Figure 1 Terrain theory vs. germ theory meme

Biorhetorics, Invisibility and Denialism

While Priscilla Wald (2008) illuminates for us the different dimensions of outbreak narratives, this study shows how we might also learn from resistive narratives that attempt to counter the very existence of an outbreak by relying on absence/invisibility of viruses. Invisibility has, in fact, regularly functioned as a common resource for skeptics of science. The very act of observation – an act central to the scientific enterprise – is something so quotidian at the same time. The non-scientist can observe the effects of gravity just as well as they can observe their neighbors walk down the street, for example – and such abilities to observe are empowering and make the act ripe for exploitation in the world of science denialism. Galileo's heliocentric model of the universe and Darwin's theory of natural selection are both textbook examples of scientific ideas where critics relied on their own observations as resources for rejecting these proposals. For Galileo, critics both observed the sun appearing to move across the sky and *did not* (or could not) directly see the earth moving around the sun; critics of Darwin could not observe speciation but *could* observe the differences between humans and animals. Those things that were more invisible, then (speciation and heliocentrism), were also more suspect.

While invisibility functions as a powerful concept for denying the truth or existence of something, it is not invisibility alone that makes a scientific idea controversial. We cannot see x-rays or atoms or black holes, but we rarely wring our hands about such matters. Invisibility functions as a caricatured feature, then, of the scientific ideas that press the public to reevaluate their place in the universe or their political philosophy – if your identity, teleology or philosophy are threatened by such facts, then invisibility becomes a resource by which one can simultaneously deny scientific ideas, assert the absence of something material, and uphold the reality and sense of self one desires. This strategy ties directly to the connection John Lyne (1990) sees between science and moralistic arguments when he analyzes how Richard Dawkins' writing on "the selfish gene" infused the gene with agency and attitude, qualities that genes cannot have. John Lynch (2009) extends this idea to stem cell research debates, showing how the *is* of the fetus becomes replaced with an *ought* for both opponents and proponents. In both projects, not surprisingly, the existence of either the gene or the fetus is a given presumption upon which moralizing takes place. But in the case of virus deniers, such presumption is turned upside down. We are asked to consider that something might be invisible not because of our inability to directly observe it but, instead, because it does not exist. And because it does not exist, its absence becomes evidence to not only support Béchamp's theory but also to support conspiracy theories about the virus and to resist public health directives. As Baker et al. point out, "The virus has not created…structural inequalities; it has only made them apparent" (Baker et al, 2010) – so to deny the virus becomes a strategy of denying such structural inequalities as well. And as Jenelle Johnson (2016) points out in her discussion of visceral publics, "the open relationship between the body and the world that gives rise to feelings of vulnerability and fear is often perceived as a relationship of threatening object / threatened subject that 'demands' a response" (p. 5). In this sense, the denial of something out there in the world allows us to construct a reality where we are less vulnerable and more in control of our lives and fate.

By analyzing germ theory denialism through a biorhetoric framework, we can better understand how claims of "is" in regard to the existence of the virus move to claims of "ought" about what we should do and think if the virus is in fact not real. If we can identify that the materiality of the virus's existence creates a moral imperative to mask, social distance and get the vaccine, then claims of the virus's *nonexistence* compel us to uphold our liberties, live our lives, and reject public health measures. Arguments from invisibility are simultaneously material and immaterial; they make claim to an ontological reality about the material world – that viruses do not exist – but in doing so, they attempt to affirm a negative, a void, an absence of something material – the virus.

Reference List

Ahmed, W. (2022, October 15). *'Film your hospital' – The anatomy of a COVID-19 conspiracy theory*. The Conversation. https://theconversation.com/film-your-hospital-the-anatomy-of-a-covid-19-conspiracy-theory-147948

American Chiropractic Association Board of Governors (ACA). (n.d.). *Not business as usual: A safe, responsible response to Covid-19*. American Chiropractic Association. https://www.acatoday.org/News-Publications/Coronavirus-COVID-19/Safe-Responsible-Response.

Associated Press. (1987, August 29). U.S. judge finds medical group conspired against chiropractors. *The New York Times*. https://www.nytimes.com/1987/08/29/us/us-judge-finds-medical-group-conspired-against-chiropractors.html

Baker, J. A., et al. (2020). Rhetorics & viruses. *Philosophy & Rhetoric*, *53*(3), 207-216. https://doi.org/10.5325/philrhet.53.3.0207

Béchamp, A. (1912). *The blood and its third anatomical element*. (Montague R Leverson, trans.). John Ouseley Limited.

Broderick, R. (2020, April 13). Chiropractors are feeding their patients fake information about the coronavirus. *Buzz Feed News*. https://www.buzzfeednews.com/article/ryanhatesthis/chiropractors-misinformation-coronavirus

Bellemare, A., Ho, J., & Nicholson, K. (2020, March 30). *Chiropractors told to remove posts claiming their methods boost immune system and prevent COVID-19*. Canadian Broadcasting Corporation. https://www.cbc.ca/news/health/chiropractors-immune-system-covid-19-1.5511008

Bennett, J. (2010). *Vibrant matter: A political ecology of things*. Duke University Press. https://doi.org/10.1215/9780822391623

Bennett, J. A. (2021). Everyday life and the management of risky bodies in the COVID-19 era. *Cultural Studies*, *35*(5), 1-11. https://doi.org/10.1080/09502386.2021.1898015

Bill Maher says vaccines don't prevent disease. (2005, March 4). International Skeptics Forum. Retrieved July 28, 2022 from http://www.internationalskeptics.com/forums/showthread.php?t=35791

Bricker, B., and J. Justice. (2018). The postmodern medical paradigm: A case study of anti-MMR vaccine arguments. *Western Journal of Communication*, *83*(2), 172–189. https://doi.org/10.1080/10570314.2018.1510136

Burke, J. (2019, November 28). Ebola health workers killed and injured by rebel attack in Congo. *The Guardian*. https://www.theguardian.com/global-development/2019/nov/28/ebola-health-workers-killed-and-injured-by-rebel-attack-in-congo

Burns, C. (n.d.) *Terrain theory or germ theory?* Maximized Health Chiropractic. Retrieved July 29, 2022 from https://maximizedhealth.net/germ-theory-versus-terrain-theory/

Campbell, J., James, J., Busse, S. & Injeyan, S. (2000). Chiropractors and vaccination: A historical perspective.

Pediatrics, *105*(4), 1-8. https://doi.org/10.1542/peds.105.4.e43

Carroll, Sean. (2020, November 8). The denialist playbook. *Scientific American*. https://www.scientificamerican.com/article/the-denialist-playbook/

Clarke T., Barnes, P., Black, L., Stussman, B., & Nahin, R. (2018). Use of yoga, meditation, and chiropractors among U.S. adults aged 18 and over. *National Center for Health Statistics Data Brief*, (325), 1-8. https://pubmed.ncbi.nlm.nih.gov/30475686/

Derkatch, C. (2016). *Bounding biomedicine: Evidence and rhetoric in the new science of alternative medicine*. The University of Chicago Press. https://doi.org/10.7208/chicago/9780226345987.001.0001

DiCaglio, S. (2021). Breathing in a pandemic: Covid-19's atmospheric erasures. *Configurations*, *29*(4), 375-387. https://doi.org/10.1353/con.2021.0027

Duesberg, P. (1996). *Inventing the AIDS virus*. Regnery Publishing.

Ernst, E. (2008). Chiropractic: A critical evaluation. *Journal of Pain and Symptom Management*, *35*(4), 544–62. https://doi.org/10.1016/j.jpainsymman.2007.07.004

Folk, H. (2017). *The religion of chiropractic: Populist healing from the American heartland*. University of North Carolina Press. https://doi.org/10.5149/northcarolina/9781469632797.001.0001

Foucault, M. (2008). *The archaeology of knowledge.* Pantheon.

Gainty, C. (2021, July 5). Germ theory denialism is alive and well – and taking the nuance out of scientific debate. *The Conversation*. https://theconversation.com/germ-theory-denialism-is-alive-and-well-and-taking-the-nuance-out-of-scientific-debate-163408.

Gangstad, E. (2021). Making present, making absent: Exploring medical fundraising imagery through the National Tuberculosis Association Christmas seals. *Rhetoric of Health & Medicine*, *4*(3), 288-318. https://doi.org/10.5744/rhm.3004

Gleberzon, B., Lameris, M., Schmidt, C., & Ogrady, J. (2013). On vaccination and chiropractic: When ideology, history, perception, politics and jurisprudence collide. *The Journal of* *the Canadian Chiropractic Association*, *57*(3), 205-13. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3743646/.

Gorski, D. (2007, October 16). *Is Bill Maher really that ignorant?* Science Blogs. Retrieved July 28, 2022 from https://scienceblogs.com/insolence/2007/10/16/is-bill-maher-really-that-ignorant-part

Gorski, D. (2009, September 7). *'Oh, come on, Superman!': Bill Maher versus 'Western Medicine.'* Science-Based Medicine. Retrieved July 28, 2022 from https://sciencebasedmedicine.org/oh-come-on-superman-bill-maher-and-western-medicine/

Graham, D. (2021, April 27). It's not vaccine hesitancy. It's COVID-19 denialism. *The Atlantic*. https://www.theatlantic.com/ideas/archive/2021/04/its-not-vaccine-hesitancy-its-covid-denialism/618724/.

Graham, S. S. (2009). Agency and the rhetoric of medicine: Biomedical brain scans and the ontology of fibromyalgia." *Technical Communication Quarterly*, *18*(4), 376–404. https://doi.org/10.1080/10572250903149555

Grant, H. (Director). (2005, March 4). Real Time with Bill Maher 46 (Season 3, Episode 3) [TV series episode]. *Real Time with Bill Maher*, HBO.

———. (Director). (2009, October 16). Real Time with Bill Maher 172 (Season 7, Episode 31) [TV series episode]. *Real Time with Bill Maher*, HBO.

———. (Director). (2021, April 16). Real Time with Bill Maher 562 (Season 19, Episode 12) [TV series episode]. *Real Time with Bill Maher*, HBO. Youtube. https://www.youtube.com/watch?v=Qp3gy_CLXho&t=1s

Heanan, D. (2022, July 26). *I am very much of the thought that viruses do not exist and fully on board with the terrain theory*. Terrain theory vs. germ theory. [Facebook page]. Retrieved July 30, 2022 from https://www.facebook.com/groups/3559536407481238

Holmes, F. (1986). Claude Bernard, the 'milieu intérieur', and regulatory physiology. *History and Philosophy of the Life Sciences*, *8*(1), 3–25.

Hume, D. E. (1923). *Béchamp or Pasteur? A lost chapter in the history of biology*. Covici-McGee.

Idiot Week. (2005, March 4). Skeptico: Critical Thinking for an Irrational World. Retrieved July 28, 2022 from https://skeptico.blogs.com/skeptico/2005/03/idiot_week.html

International Chiropractors Association. (2021, January 6). *About us: History*. Retrieved May 5, 2021 from https://www.chiropractic.org/about-us/our-history/

Jack, J. (2009). A pedagogy of sight: Microscopic vision in Robert Hooke's *Micrographia*. *The Quarterly Journal of Speech*, *95*(2), 192-209. https://doi.org/10.1080/00335630902842079

Johnson, J. (2014). *American lobotomy: A rhetorical history*. University of Michigan. https://doi.org/10.3998/mpub.4664873

Jenell J. (2016). 'A man's mouth is his castle': The midcentury fluoridation controversy and the visceral public. *Quarterly Journal of Speech*, *102*(1), 1–20. https://doi.org/10.1080/00335630.2015.1135506.

Kasprak, A. (2020, April 15). 'Real doctor' promoting tonic water for COVID-19 spreads dangerous misinfo. *Snopes*. Retrieved July 28, 2022 from https://www.snopes.com/news/2020/04/15/real-doctor-tonic-water/

Keränen, L. (2011). Addressing the epidemic of epidemics: Germs, security, and a call for biocriticism. *Quarterly Journal of Speech*, *97*(2), 224–244. https://doi.org/10.1080/00335630.2011.565785

Kolodziejski, L. (2014). Harms of hedging in scientific discourse: Andrew Wakefield and the origins of the autism vaccine controversy. *Technical Communication Quarterly, 23*(3), 165–183. https://doi.org/10.1080/10572252.2013.816487

Landau, J. (2011). Women will get cancer: Visual and verbal presence (and absence) in a pharmaceutical advertising campaign about HPV. *Argumentation & Advocacy*, *48*(1), 39-54. https://doi.org/10.1080/00028533.2011.11821753

Lawrence, H. (2021). *Vaccine rhetorics*. Ohio State University Press. https://doi.org/10.26818/9780814214336

Leboeuf-Yde, C., Innes, S., Young, K, Kawchuk, G., & Hartvigsen, J. (2019). Chiropractic, one big unhappy family: Better together or apart? *Chiropractic & Manual Therapies*, *27*(4), 2-8. https://doi.org/10.1186/s12998-018-0221-z

Lynch, J. (2009). Stem cells and the embryo: Biorhetoric and scientism in Congressional debate. *Public Understanding of Science*, *18*(2), 309–32. https://doi.org/10.1177/0963662507085164

Lyne, J. (1990). Bio-rhetorics: Moralizing the life sciences. In H.W. Simons (Ed.), *The Rhetorical Turn: Invention and Persuasion in the Conduct of Inquiry* (pp. 35–57). University of Chicago Press.

Maher, B. (2009, September 26). *If u get a swine flu shot ur an idiot*[Tweet]. Twitter. https://twitter.com/billmaher/status/4403617471.

Nepute, E. [DrEricNepute]. (2020, April 8). *Dr. Eric Nepute talks about #Coronavirus #FakeNews* [Video]. Youtube. https://www.youtube.com/watch?v=yh-YbIHrXJQ

Palmer, B.J. (1909). *The philosophy of chiropractic.* Palmer School of Chiropractic.

Palmer, D.D. (1910a). *The chiropractor's adjustor*. Portland Printing House Company.

———. (1910b). *Textbook of the science, art and philosophy of chiropractic for students and practitioners*. Portland Printing House Co.

Parker-Pope, T. (2009, October 13). Bill Maher vs. the flu vaccine. *The New York Times*. Retrieved July 29, 2022 from https://well.blogs.nytimes.com/2009/10/13/bill-maher-vs-the-flu-vaccine/.

Perelman, C., & Olbrechts-Tyetca, L. (1969). *The new rhetoric: A treatise on argumentation* (J. Wilkinson & P. Weaver, Trans.). University of Notre Dame Press.

Pickstone, J. (2000). *Ways of knowing: A new history of science, technology and medicine*. University of Chicago Press.

Rice, J. (2020). *Awful archives: Conspiracy theory, rhetoric, and acts of evidence*. Columbus: Ohio State Press. https://doi.org/10.26818/9780814214350

Scott, J. (2016). Boundary work and the construction of scientific authority in the vaccines-autism controversy. *Journal of Technical Writing and Communication, 46*(1), 59–82. https://doi.org/10.1177/0047281615600638

Scott, J.B., Molloy, C., & Melonçon, L. (2021). Examining Evidence in RHM. *Rhetoric of Health & Medicine*, *4*(3), 275-287. https://doi.org/10.5744/rhm.2020.4001

Shelton, H. (1922). *An introduction to natural hygiene.* Self-published.

Smith, N., & Graham, T. (2019). Mapping the anti-vaccination movement on Facebook. *Information, Communication & Society*, *22*(9), 1310–27. https://doi.org/10.1080/1369118X.2017.1418406

Steere-Williams, J. (2015). The germ theory. In G. M. Montgomery & M. A. Largent, (Eds.), *A companion to the history of American science* (pp. 397-408). John Wiley & Sons, Incorporated. https://doi.org/10.1002/9781119072218.ch31

Tomes, N. (1998). *The gospel of germs: men, women, and the microbe in American life*. Harvard University Press.

Wainwright, M. (1997). Extreme pleomorphism and the bacterial life cycle: A forgotten controversy. *Perspectives in Biology and Medicine*, *40*(3), 407–414. https://doi.org/10.1353/pbm.1997.0038

Wakefield, A. (2019). The sixth extinction: Vaccine immunity and Measles mutants in a virgin soil. *Journal of American Physicians and Surgeons, 24*(3), 77-84.

Wald, P. *Contagious: Cultures, Carriers, and the Outbreak Narrative*. Durham, NC: Duke University Press, 2008. https://doi.org/10.2307/j.ctv11sms36

Winderman, E., Mejia, R., & Rogers, B. (2019). 'All smell is disease': Miasma, sensory rhetoric, and the sanitary-bacterologic of visceral public health." *Rhetoric of Health & Medicine*, *2*(2), 115-146. https://doi.org/10.5744/rhm.2019.1006

Wiese, G. (1996). Chiropractic's tension with the germ theory of disease. *Chiropractic History: The Archives and Journal of the Association for the History of Chiropractic, 16*(1), 72-87.

Whorton, J. (1981). 'Physiologic optimism': Horace Flectcher and hygienic ideology in Progressive America." *Bulletin of the History of Medicine, 55*(1), 59-87.

Young, R. (2019, November 11). *Dismantling the viral theory.* Dr. Robert Young. Updated June 19, 2020. Retrieved July 29, 2022 from https://www.drrobertyoung.com/post/dismantling-the-viral-theory