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New Narratives about Infectious Diseases via Ecological and Systems Thinking

Barbara Simons
University of Washington

ABSTRACT

According to the scientific experts, the COVID-19 pandemic is the harbinger of future pandemics due to the intrusion of humans into the habitats of many species among whom microorganisms innocuously live. Nonetheless, the dominant paradigm for narratives about infectious diseases—the "outbreak narrative" based on "germ theory"—focuses on microorganisms as the culprit that must be rapidly identified, quarantined, and eradicated. To contribute to an alternative paradigmatic narrative for understanding infectious diseases, I rely on Bruno Latour, Isabelle Stengers, and other major philosophers of science in my analysis of two nonfictional and one fictional text. I argue that a paradigm for narratives of infectious diseases based on ecological and systems thinking is vital to tracing the complex interconnections between human activity and viral spread in order to reorganize human life in sustainable and nurturing ways for entire populations of human and non-human species.

KEYWORDS

Pandemics, narratives of infectious disease, the outbreak narrative, germ theory, ecological and systems thinking, humans and non-humans, sustainability of life

A year into the COVID-19 pandemic, amidst global failures to implement effective public health and social support measures to stop the spread of the coronavirus, health care systems that were already underfunded and inadequate are overwhelmed with sick and dying people. Now, even though laboratory scientists have already produced highly effective vaccines, worldwide, there are huge inequities in who has access to the vaccines and in the countries with the vaccines, efficient systems are not in place for their manufacture, distribution, and administration. These inequities are concomitant with the sharp increase in disparities between the rich and poor as the wealthy benefit and more and more people are impoverished during the pandemic. In this context, the debates are furious: How best to respond to the virulent spread of the coronavirus; what are the links between the pandemic and environmental destruction and global warming; are there connections between gross gender and racial inequities of wealth and infectious diseases; and what is the legitimacy of governments who are failing to offer effective solutions to the interrelated crises at hand?

Certainly, the contemporary moment is rich in opportunities to see the world in new ways and to imagine alternative trajectories into the future. In this essay, I address these many debates about the COVID-19 pandemic by narrowing the focus to examine the widely accepted "outbreak narrative" and its scientific foundation, the "germ theory" of infectious disease, according to which the infectious microbe is the deadly culprit to be contained and eradicated by humans empowered by their scientific expertise. Two questions must be asked: 1) Is the rapid acceleration in the pandemic only due to widespread failures to implement public health guidelines as advised by the expert scientists in the outbreak narrative, or are there problems with the outbreak narrative itself such that it hinders our abilities to effectively intervene in the current pandemic and to prevent future pandemics? 2) How would an alternative paradigm for narratives of infectious diseases based on "ecological and systems thinking" contribute to our survival during the COVID-19 pandemic and to preventing future pandemics by forming sustainable relations with one another and the natural world?

This essay is well-situated in the context of long-standing debates about germ theory and the outbreak narrative. To clarify what the contours of this narrative are, the science writer and cultural studies scholar Priscilla Wald examines the history of the "outbreak narrative" as the paradigmatic narrative about pandemics that has dominated scientific and popular discourse since the nineteenth century. According to this narrative, when there is an "outbreak" of infectious disease, the goals are: 1) prompt laboratory identification of the germ that is causing the disease; 2) rapid testing to identify the pathogenic carrier—Patient Zero—in order to localize (through contact tracing) and contain the infection (through quarantine) to limit its spread to the rest of the population and 3) the development of a vaccine against the infection. In spite of its widespread acceptance, Wald is highly critical of this narrative because, contrary to their promises of cure and containment, these strategies actually exacerbate the effects of pandemics by further impoverishing those most vulnerable while deluding the rest of the population with the false idea that they are somehow protected from virulent microorganisms that spread without regard to artificial—human—borders of containment and that often mutate in response to vaccines and other drug therapy. Therefore, Wald highlights the need for alternative "paradigmatic" narratives about infectious disease to counter the outbreak narrative.[1]

1 Priscilla Wald, *Contagious: Cultures, Carriers, and the Outbreak Narrative*. (Durham and London: Duke University Press, 2008).

In agreement with Wald, I argue that an alternative framework based on ecological and systems thinking is needed to change the ways we understand the COVID-19 pandemic and other infectious diseases. Indeed, I propose a loose "framework" to include a multiplicity of voices, including humans and nonhumans, to compose more accurate and empowering narratives. These narratives must replace reductionist laboratory science with the science of complexity to address the interrelated problems of science and technology, environmental destruction, and global climate change.

In the first part of this essay, I offer a theoretical introduction to ecological and systems thinking as the basis for an alternative framework for narratives of infectious disease. In the second part, I analyze two nonfictional texts that highlight the contrasts between the different paradigms for understanding infectious diseases. On the one hand, John M. Barry's *The Great Influenza: The Story of the Deadliest Pandemic in History* follows the script of the "outbreak narrative" by focusing on the laboratory scientists who worked intensely to isolate the microbe that caused the 1919 flu pandemic, and whose failure to do so left people bereft of vaccination against the flu. On the other hand, Bruno Latour's *The Pasteurization of France* exemplifies a systems thinking approach to science studies that analyzes the reliance of Louis Pasteur, a germinal laboratory scientist, on the work of the key players of his time, including hygienists, farmers, veterinarians, and military doctors, for the acceptance of the microbiology of laboratory science in the redesign of public health measures and medical practice. I have chosen these two texts to shed light on the COVID-19 pandemic because currently there is a tension between the implementation of effective public health measures and vaccination that strengthen the biopolitical power of current governments versus building fully funded public health care systems that serve everyone in an equitable and compassionate manner.

According to the script of the outbreak narrative, the laboratory scientists and government are the key players; according to Latour, there are multiple human and nonhuman actors whose power is constantly shifting based on the networks of association that are formed or that fall apart. As can be seen in the current pandemic, the coronavirus is a key player, spreading, infecting, harming, and killing depending on the varied responses of humans to its infestation—the same virus is not the same from one locale to another. *Furthermore, Latour's methodology lends support to people and groups worldwide who are attempting to shift laboratory science and public health measures from support for the powerful and wealthy to equitable support for all communities, everywhere.*

In the third part of this essay, I rely on literary fiction to show how the humanities contribute to a critique of the reductionist scientific model of germ theory and the outbreak narrative in favor of ecological and systems thinking. Here, I appreciate the ways in which *Blindness*, a novel by José Saramago, is an allegory about pandemics that questions what it means to "see" the world—what is health and what is "infectious" dis-ease. Faced with the abject failures and brutality on the part of the government and medical authorities, the characters learn to organize themselves in decentralized forms of power to survive the pandemic of white-blindness. This narrative is exciting because it exemplifies the ways in which ecological and systems thinking affords new directions for the stories we compose about the COVID-19 pandemic and related problems.

It's important to end this introduction on a cautionary note about the prospect of establishing effective public health measures, including vaccination, that promote decentralized democratic empowerment. To the contrary, Michel Foucault details the eighteenth century European establishment of public health as a regime that

> entails a certain number of authoritarian medical interventions and controls. . . . Medicine . . . assumes an increasingly important place in the administrative system and the machinery of power. . . . And there is likewise constituted a politico-medical hold on a population hedged in by a whole series of prescriptions relating not only to disease but to general forms of existence and behavior (food and drink, sexuality and fecundity, clothing and the layout of living space).[2]

In response to the COVID-19 pandemic, nation states around the world have demanded that populations change every facet of life, oftentimes in brutal disregard for the hardships imposed. Indeed, Latour says that

> [t]he originality of the present situation, it seems to me, is that, by remaining trapped at home while outside there is only the extension of police powers and the din of ambulances, we are collectively playing a caricatured form of the figure of biopolitics that seems to have come straight out of a Michel Foucault lecture.[3]

Latour contrasts the biopolitical nation state necessary for control of infectious diseases with a state capable of meeting the challenges of climate change, a state that would maintain habitable conditions for all life on whom a citizenry depends. In the politics of this new state, "it is the administration that must learn from a multiform people, on multiple scales, what will be the territories upon which people are trying to survive in many new ways as they seek to escape from globalized production."[4]

My hope is to explore how the outbreak narrative—predicated on the biopolitics of the nation state—can be replaced by alternative narratives about decentralized forms of power that are needed both to meet the challenges of the pandemic and to counter the iniquitous effects of state power. In my view, the COVID-19 pandemic is one crisis among many interrelated crises that constitute the larger crisis of climate change. If a new state, as advocated by Latour, is to emerge, now is the perfect opportunity to organize ourselves democratically to voice our concerns and establish empowering networks of association. This essay honors the many people who have been working—often for decades—to demonstrate the integral links between effective public health and medical interventions and the expansion of democracy. For field work that substantiates my argument, I could provide countless examples. Here, I will mention the work of two people who are extremely influential in conversations about infectious diseases, climate change, and democracy. Paul Farmer has worked as an infectious disease doctor in the United States and abroad for decades. In his prolific writing and lectures, he has argued that infectious diseases can only be understood, prevented, and treated by addressing the structural violence of social inequalities and environmental destruction and by listening to the disenfranchised who have been voicing—for centuries—the crucial need for democratic change to stop this violence.[5]

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2 Michel Foucault, "The Politics of Health in the Eighteenth Century," In *The Foucault Reader*, ed. Paul Rabinow. (New York: Pantheon Books, 1984). 282-3.
3 Bruno Latour, "Is This a Dress Rehearsal?" *Critical Inquiry* (2020), http://critinq.wordpress.com/2020/03/26/is-this-a-dress-rehersal (accessed January 17, 2021).
4 Ibid.
5 See Paul Farmer, *Infections and Inequalities: The Modern Plagues* (Berkeley, Los Angeles, London: University of California Press, 2001) and Haun Saucy, ed., *Partners to the Poor: A Paul Farmer Reader* (Berkeley, Los Angeles, London: University of California Press, 2010).

Likewise, epidemiologist and policy maker Ali S. Kahn argues that the most potent factors affecting emerging infections

> are not scientific but political. Politics underlies poverty and social inequity, which allow certain people to be susceptible to infections and others to be relatively immune—at least for now. Politics is the driver for war and famine, poor public health systems, and biologic, chemical, and radiologic terrorism . . . disorder leads to displaced populations and mass migrations at risk of contagion, while societal despair and inequity lead to disenfranchised individuals and groups capable of committing bioterrorism. . . . Perhaps the greatest compounding factor for the spread of existing infectious diseases will be climate change.[6]

Throughout their accounts of their extensive field work, both Farmer and Kahn give example after example of failed public health measures imposed on people by governments in contrast to the success of measures generated by people on a local level to protect their communities from disease. In tandem, they emphasize that microbes do not recognize national borders. Therefore, new forms of international cooperation and coordination that rely on listening to and empowering local communities on a global scale are needed to meet the challenges of infectious disease. Their work purposefully attempts to mitigate rather than reinforce the biopolitics of the nation state in favor of democratizing health care and medicine.

Part I: Conflicting Scientific Paradigms and Conflicting Narratives of Infectious Disease

A central tenet of this essay is that the COVID-19 pandemic is part of a much larger transformation. According to the Marxist evolutionary biologists and ecologists Richard Lewontin and Richard Levins, we are at a pivotal historical moment of changing from a post-industrial age/mode of production into an ecological age/mode of production.

> After three centuries of reductionist science . . . modern science increasingly confronts the problems of complexity and dynamics. Whereas the great successes of science have been largely discoveries about isolatable phenomena or small objects in which a small number of determinate causes are operating, the dramatic failures have arisen where attempts are made to solve problems of complex systems and dynamics. . . . [C]omplexity is the central scientific problem of our time.[7]

Furthermore, physicist and science historian Fritjof Capra shows that the great shock of twentieth-century science has been that living systems cannot be understood by analysis of the parts.

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6 Ali S. Kahn with William Patrick, The Next Pandemic: On the Front Lines against *Humankind's Gravest Danger*s (New York: Public Affairs, 2020), 250-251.

7 Richard Lewontin and Richard Levins, *Biology Under the Influence*, (New York: Monthly Review Press, 2007), 34.

> Systems science shows that living systems cannot be understood by analysis. The properties of the parts are not intrinsic properties but can be understood only within the context of the larger whole. Thus systems thinking is 'contextual' thinking; and since explaining things in terms of their context means explaining them in terms of their environment, we can also say that all systems thinking is environmental thinking. . . . In the systems view we realize that the objects themselves are networks of relationships, embedded in larger networks.[8]

This transformation in scientific thinking is the basis for an alternative paradigmatic narrative about the COVID-19 pandemic that shifts from narratives based on reductionist science to narratives based on systems and environmental/ecological thinking.

To support this argument, I rely on the guidelines that Paul Farmer has drawn from his decades-long work on the implications of complexity theory and systems thinking for narratives about infectious diseases. Farmer outlines four areas of research to guide narratives about infectious diseases: 1) Trace the "reticulated links between social inequalities and emerging disease. . . . The persons most at risk for emerging infectious diseases generally do not, in fact, have much of the benefit of scientific knowledge. We live in a world where infections pass easily across borders—social and geographic—while resources, including cumulative scientific knowledge are blocked at customs." 2) Keep infectious diseases in transnational perspective by following the virus as it spreads without imposing artificial human biases such as "nation-states" on our analyses. 3) Historically deep and geographically broad, we must "incorporate complexity as the central scientific question of our times, for example, the effects of World Bank projects and policies on diseases ranging from onchocerciasis to plague." 4) To counter assigning blame and stigmatizing those with infectious diseases that don't affect the wealthy, instead of a differential valuation of human life, we need to critically interrogate the effects of such biases on the allocation of resources to treat infectious diseases.[9] In full agreement with Farmer, I would like to add a fifth recommendation: Connect the networks of infectious diseases to the networks of concurrent crises, such as police homicides, suppression of democratic participation, massive oil spills, rampant deforestation, and the incarceration of immigrants and refugees, in order to distinguish intersecting networks that could promote new alliances to empower the powerless to make widespread structural changes to provide compassionate and equitable care, protection, and healing for everyone, non-humans included.

The red thread running through these guidelines is the reconceptualization of human agency from reliance on the "superior" agency of laboratory and medical science to reliance on what Latour calls the "non-autonomous" and "non-originary" agency that is connected to a network or collective.[10] Faced with the accelerating spread and devastating losses of the COVID-19 pandemic, nonetheless, recovery and regeneration are possible precisely because of the

8 Fritjof Capra, *The Web of Life: A New Scientific Understanding of Living Systems*. (New York: Anchor Books, 1997), 37.

9 Farmer, *Infections and Inequalities*, 53-57.

10 Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory*. (Oxford/New York: Oxford University Press, 2007), 44. Latour calls such networks "actor-networks" in his Actor Network Theory. ANT flattens the asymmetry between humans and non-humans (both things and animals). Like humans, non-humans (such as viruses) can be actants, that is to say, beings endowed with the capacity to transform reality. Actants are defined as "mediators" that "transform, translate, distort and modify the meaning or the elements they are supposed to carry" (39); they are mediators that make others do things while being made to do things by others. Latour's

"distributive agency" of humans to change the trajectory of the pandemic through the formation of entirely new "actor-networks" that generate their own form and order. This concept of distributive agency is central to a new framework for narratives of infectious disease because, as physicist and philosopher of science Fritjof Capra explains, the pattern of organization of all living systems is a network pattern capable of self-organization based on non-linear circular feedback paths of interconnectivity. "Self-organization is the spontaneous emergence of new structures and new forms of behavior in open systems far from equilibrium."[11]

Situating human agency in networks of interconnectivity offers the promise of expanding the agency of the individual to that of collective support—exactly what is needed when faced with a pandemic. With the inventive power of collectives, new patterns of social reorganization can be established from chaotic, unpredictable events. Such inventiveness offers substantive hope instead of the illusory hope that "life can return to normal" once a vaccine is found. Fundamentally, this illusion is based on the modern scientific notion of "time as reversible" according to which the processes of life are akin to the workings of machines that endlessly reproduce processes (of destruction) and that "ruptures" in time—such as the end of a pandemic with a return to "normality"—are possible through scientific and technological inventions. In sharp contrast, the concept of "irreversible time" is a cornerstone of complexity and systems theory. In the language of complexity and systems thinking, pandemics are unstable and decentered, and emergent properties arise from the connectivity of all the parts—Latour's actants/mediators—that daily constitute the "whole" of the pandemic, at particular moments, in each locale. As Lewontin and Levins explain, "A consequence of the codetermination of the organism and its environment is that they coevolve . . . through their life activities, organisms are the active makers and remakers of their milieu."[12] To summarize, based on ecological and systems thinking science, an alternative narrative framework for the COVID-19 pandemic involves imagining new forms of collective organization and individual participation that could support human survival and the sustainability of life on earth.

Part 2: The "Outbreak Narrative" versus Ecological and Systems Thinking Narratives of Infectious Disease

My choice of nonfictional texts highlights the contrasts between an alternative narrative framework for infectious diseases and the dominant, widely-accepted framework of the "outbreak narrative." John M. Barry's *The Great Influenza: The Story of the Deadliest Pandemic in History* is a telling example of the hidden biases and limitations of the "outbreak narrative." Following this script, Barry devotes one hundred and sixty-four pages to the influenza pandemic of 1918-1919 to narrate how millions of soldiers and civilians sickened and died, and he devotes two hundred and fifty pages to the heroic scientists and their decades-long quest to make laboratory science the basis for medical training and care. Certainly, the book details the history of the dependency on laboratory science for industrial capital expansion and imperialist warfare. For example, Dr. George Sternberg

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notion of agency is profoundly dialectical and action should be viewed as a "node" or "knot" in an actor network formation.

11 Capra, *The Web of Life*, 85.

12 Lewonin and Levins, *Biology Under the Influence*, 183-93.

> was an army medical officer in combat with the Nez Perce Indians . . . [who] was building a laboratory largely at his own expense at a frontier army post. In 1881 he became the first to isolate the pneumococcus, a few weeks before Pasteur and Koch . . . [and] also first observed that white blood cells engulfed bacteria, a key to understanding the immune system.[13]

Later, Sternberg's research was helpful to scientists searching for a vaccine against pneumonia in order to support economic expansion and military conquests. For example,

> [n]owhere was pneumonia more severe than among workers in South Africa's gold and diamond mines. Epidemic conditions were virtually constant and outbreaks routinely killed 40 percent of the men who got sick. In 1914 South African mine owners asked [Dr. Almroth] Wright to devise a vaccine against pneumonia.[14]

A major strength of *The Great Influenza* is showing this intimate relationship between laboratory science and the expansion of global capitalism through warfare.

Barry's emphasis on laboratory science is evident by the narrative structure of the book according to which two parallel stories are told: 1) the rapid spread of influenza in 1918 via the troop deployments of U.S. and European armies throughout the world to civilians and other troops both at home and abroad; and 2) the intense laboratory research to identify the microorganism that caused the influenza and to develop a vaccine against it. This research failed for years, and meanwhile, the pandemic killed an estimated 100 million people worldwide. While Barry concentrates on the scientific race for a vaccine as the only possible solution, his narrative about the actual course of the disease includes many examples of how public health measures and an end to the war could have stopped the spread of the virus. For example, in September 1918 in Philadelphia, influenza began to spread from army troops to civilians, so doctors and public health experts urged the government to cancel the Philadelphia Liberty Loan parade to be held on September 28, to no avail. In the ten days after the parade, "the epidemic had exploded from a few hundred civilian cases and one or two deaths a day to hundreds of thousands ill and hundreds of deaths each day."[15]

While mentioning these failures to adhere to public health measures, *The Great Influenza* emphasizes laboratory science as the centerpiece to effective responses to pandemics. Furthermore, the book highlights another pivotal assumption underlying the script of the outbreak narrative: uncritical acceptance of the institutions responsible for the spread of virulent infections among human populations around the globe. While Barry mentions the widespread opposition to the U.S. involvement in the war and the mutiny against the war among European troops in the trenches of France, these are not the heroes of Barry's historical account. Instead, the heroes are the doctor-scientists who devote their lives to the laboratory search for the pathogenic sources of this and other infections, which have long been recognized as a greater danger to military troops than mortal combat.

Today, in response to the COVID-19 pandemic, one central challenge is to critically interrogate the institutions responsible for the worldwide spread of infectious diseases. I argue

13 John M. Barry, *The Great Influenza: The Story of the Deadliest Pandemic in History* (New York: Penguin Books, 2005), 59.
14 Ibid., 153.
15 Ibid., 221.

that the silver lining in the grey clouds of this pandemic are the opportunities, even the necessity, to not only critically interrogate but to effectively intervene as major fault lines and weaknesses are exposed by corrupt, incompetent, and oftentimes brutal governmental, military, and corporate responses to the spread of SARS-Cov-2. To support this argument, it is helpful to stand back from current controversies to take a bird's eye view of the origins of laboratory science and its social impact.

In *The Pasteurization of France*, Latour counters Master Narratives—such as the outbreak narrative—by tracing the complex chains of association among multiple actors in the spectacular ascendency of laboratory science and germ theory achieved by the Pasteurians. No doubt Louis Pasteur became the "great man" of science through his exploits in the laboratory; however, Latour's task is to give credit to the multitude that supported the ubiquitous insertion of laboratories into the institutional fabric of modern society. A Latourian approach is likewise helpful to understand the course of the COVID-19 pandemic, which has repeatedly demonstrated that science is dependent for its development and application on numerous actants whose responses to the recommendations and tools of the scientific and public health experts vary widely. In my analysis of *The Pasteurization of France,* I look for insights to better understand the current situation in which the tools and recommendations of brilliant scientists and highly competent public health officials are oftentimes rejected or only partially accepted and poorly implemented, at best. Furthermore, I rely on Latour to hone a critical view of laboratory science itself—its promises and shortcomings; its benefits and dangers. Indeed, I argue that Latour's study is germinal both to understanding the biopolitical power of the modern state and to the composition of new narratives about infectious disease.

According to Latour, Pasteur's genius as a scientist was complemented by his political shrewdness. He inserted himself into pre-existing debates in the hygienist movement about the causes of infectious diseases and public health measures to prevent their spread. Latour points out that it is not Pasteur but

> the hygienist movement that defined what was at stake, prescribed the aims, posed the problems, demanded that others should solve them, distributed praise or blame, and laid down priorities. It is also the hygienist movement that galvanized people's energies, found the money, and offered those who served it troops, goals, problems, and energy . . . The Pasteurians translated these stakes and rules into their own terms, but without the hygienists, it is clear that very little would have been heard about them [the Pasteurians].[16]

Furthermore, and this is the tricky part to being a genius, Pasteur worked on "getting himself attributed with the origin of the movement [of his allies] . . . as he recruited his allies . . . he maintained a discourse by which all the strength of what he did came from fundamental research and the work of his laboratory."[17]

With the advent of laboratory science, the terrain of Pasteur's allies shrank significantly. Now that the hygiene movement could concentrate its energy on microbial control and eradication,

> all the great problems of hygiene—overcrowding, quarantine, smells, refuse, dirt—were gradually retranslated or dissipated. Either the microbe gets through and *all precautions*

16 Bruno Latour, *The Pasteurization of France* (United States of America: Harvard University Press, 1988), 25.
17 Ibid., 71.

> *are useless*, or hygienists can stop it getting through and *all other precautions are superfluous*. The hygiene that took over the doctrine of microbes became stronger and simpler, more structured. . . . In a sense hygiene lost ground, since it was no longer directed at the totality, but in another sense it gained ground at last by striking more surely at an enemy that had become visible.[18]

Indeed, Latour shows how the biopolitical power of the state was greatly extended when the "complete hybridization of hygienists and Pasteurians multiplied the power of both. The least precept in hygiene could now be dictated by a prestigious, indisputable science, while the most obscure researchers in laboratories were at grips with the fate of France itself."[19] These actors in the movement to "pasteurize" France are "renegotiating what the world is made up of, who is acting in it, who matters, and who wants what. They are all creating—this is the important point—new sources of power and new sources of legitimacy."[20]

Latour's argument offers a helpful approach to understanding the COVID-19 pandemic. Since the first human infection with SARS-Cov-2, the coronavirus has significantly altered the human landscape, with great variation depending on the responses of the human actors and the movement and variation in the microbe itself. Consequently, the politics of who matters and for what ends are hotly contested. In Latourian fashion, by tracing the networks of association among multiple actants, we can broaden the discussion about legitimate power. What really matters among people around the world who are struggling with the threats of the microbe *and* the inadequate and even deadly interventions by governments against the virus?

Following his presentation of the "pasteurization of France," Latour looks at the pasteurization of the French empire and the ascendency of "tropical medicine." "With each parasite conquered, the columns of soldiers, missionaries, and colonists became visible on the map of Africa and Asia, sailing up the rivers and invading the plains."[21] For this essay, taking a close look at Latour's account of the advent of tropical medicine, will explicate how laboratory scientists both produce new objects that become facts outside the lab and reduce the world to elements that can be scientifically and medically controlled to extend the reach of certain groups at the expense of others.

Latour chooses the work of Alexander Emil Jean Yersin, a Swiss bacteriologist, as a "heroic" medical figure who typifies "the subtlety and elegance of Pasteur's style of action."[22] The Ministry of Colonies assigns Yersin the task of preventing the spread of a deadly epidemic of bubonic plague in May 1893 from Hong Kong across southern China and into Indochina. Yersin sets up a field laboratory in Yunnan province, where he grows the culture medium necessary to propagate the plague bacillus. In his influential article, "The Bubonic Plague at Hong Kong," published in 1894 in the *Annales de l'Institute Pastueur*, he discusses his methodology as a guide to other Pasteurian scientists. First, he provides a detailed study of the work of many others, including epidemiologists, clinical medicine, hospital administrators, urban hygienists, and social activists, to trace the exact pattern of the plague. As Latour explains, "[a]ll these details matter when we are considering a city as a culture medium likely to encourage or

18 Ibid., 48.
19 Ibid., 56-7.
20 Ibid., 40.
21 Ibid., 141.
22 Ibid., 94.

attenuate the action of a microbe."[23] Second, Yersin explains his laboratory work to identify the infectious microbe. Now, Latour points out that the center of plague infection moves from Lan-Chow and Pei-hai and the fever and the tumor to the precise laboratory work with "aniline, Gram's method, and the microscope. New trials produce a new agent."[24] Third, after isolating the bacillus, Yersin alters the medium to mimic a patient's body to prove the microbe acts the same in the laboratory as in the outside world. Finally, he inoculates animals to study their symptomatology and corpses to learn how the disease affects their organs. Yersin ends the article by pointing to his on-going work to develop an attenuated bacillus vaccine. Latour concludes that on the one hand, Yersin was interested in all the agents, macroscopic and microscopic, human and non-human, but, on the other hand, in each agent he was only interested in what would lead him to a vaccine.

Latour steps back from Yersin's example to generalize about the Pasteurians during the following decades. While their interdisciplinary work involves hygiene, society, medicine, biology, industry, chemistry, zoology, and microbiology, "instead of speaking about everything in a vast synthesis, they speak only about the agent that they can retranslate into the language of their attenuated microbe."[25] Their narrow focus on a few points of hygiene, biology, administration, and pathology enabled them to renew medicine, politics, and hygiene without studying the poor and social outcasts as such. Thus, Latour critiques the reductionist science of germ theory that is the basis for the paradigm of the outbreak narrative of infectious disease.

An alternative paradigmatic narrative based on ecological and systems thinking is exemplified in the story Paul Farmer tells about the bubonic plague in West Africa. Farmer *includes* everything that reductionist science according to the Pasteurian model *excludes* in his narration of the ways in which the recommendations of the Pasteurians abetted racial discrimination and brutal imperial domination over native populations. Furthermore, Farmer rejects the Pasteurian emphasis on containment/quarantine without attention paid to caring for those who fall ill.

> Consider the frightening example of plague due to *Yersinia pestis*. . . . If attention to *care* for the poor—the chief victims of plague—had displaced *prevention* as a priority, then the case-fatality rate would have dropped as new infections did. That did not occur, as we've seen in Senegal, where the antibiotic era began for white settlers well before it began for the natives. Nor was it only in Senegal and elsewhere in West Africa that colonial Pasteurians rejected offers of curative therapy for the natives while availing themselves of it. If plague is still famous as the Black Death, it's less often remembered for its twentieth-century devastation, killing untold millions in Africa, Asia, and the Americas.[26]

Under the guidance of the Pasteurians, the sick were quarantined when possible, where they were left to suffer and die without any treatment—no problem as long as they didn't infect the rest of the population. With COVID-19 and the countless other epidemics throughout the world, Farmer insists that as much effort must be put into the "staff, stuff, space, and systems" to

23 Ibid., 96.
24 Ibid., 98.
25 Ibid., 104.
26 Paul Farmer, *Fevers, Feuds, and Diamonds: Ebola and the Ravages of History* (New York: Farrar, Straus and Giroux, 2020), 498-499.

provide compassionate care as into containment, and all forms of containment must involve full social support for those affected.

Both Farmer and Latour point out that very few infectious diseases have been eliminated since the advent of laboratory science. At the end of *The Pasteurization of France*, Latour challenges the scientists whose work he has so exhaustively defended. Now, he explains that his fight is not against microbes but against

> the misfortunes of reason. . . . We are no longer, alas, at the end of the nineteenth century, the most beautiful of centuries, but at the end of the twentieth, and a major source of pathology and mortality is reason itself—its works, its pomps, and its armaments. The situation was unforeseeable, as was, in 1870, the pullulation of microbes.[27]

To counter reason, Latour insists that we acknowledge the non-humans, as he has done.

I suggest that the rapidly accelerating spread and mutations in SARS-Cov-2 corroborate Latour's emphasis on the vital mediation of non-humans in human affairs. Furthermore, the vaccines developed by laboratory science are new objects that shift the debate to new questions about how to mass produce and administer these new vaccines—these new objects. These are methodological questions, and, as Latour argues, "[a]ll methodological questions are based on metaphysics, and that every metaphysics is at heart a moral and political issue."[28] With millions of people infected and millions dying, will those who are vaccinated turn a blind eye to the suffering of the billions of people who, at least initially, will not be vaccinated?[29] To query such blindness, I now turn to the fictive world of literature to imagine what would happen if everyone, the medical experts included, becomes blind due to infection by a strange new disease and people have to find new ways to "see" the world if they are to survive the pandemic.

Part 3: New Narratives of Infectious Disease via the Imaginary World of Hypotheticals

Saramago's *Blindness* is a compelling narrative about infectious disease that poses two interrelated challenges: 1) What becomes visible during the COVID-19 pandemic that was previously invisible—what weaknesses does the pandemic expose and what challenges does it present if we are to survive the end of the Anthropocene? 2) How are we to organize ourselves in response to SARS-Cov-2 to mitigate its effects *and* change our relationships with all life forms?

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27 Bruno Latour, *The Pasteurization of France*, 149.

28 Bruno Latour, "For David Bloor . . . and Beyond: A Reply to David Bloor's Anti-Latour." in *Studies in the History and Philosophy of Science*, 30: 1 (1999), 113-129.

29 Achal Prabhala, interview by Amy Goodman, *Democracy Now*, May 7, 2020. Dr. Prabhala is a fellow at the Shuttleworth Foundation who campaigns for access to medicines in India, Brazil, and South Africa. According to Dr. Prabhala, 100,000 children die every year of pneumococcal pneumonia in India even though there is an effective vaccine that could prevent these deaths—the exorbitantly priced PCP-13 vaccine. Another abject failure: It took eight years for HIV antiretroviral medications to make the sixteen hour plane flight to South Africa. He argues that the solution to the pharmaceutical industry's strangulation on widespread and equitable distribution of the medications produced in the lab is to strip all new monopolies for the detection or treatment for infectious diseases. His model: Every year, the World Health Organization and the United Nations collaborate to identify the current influenza viruses and effective vaccination tools *for free distribution* to every manufacturer.

Furthermore, *Blindness* is a narrative model for what Isabelle Stengers considers to be the imaginative power of literary fiction to portray the formation of new facts and theories about the world. Such fiction mimics the thought experiments of the scientists from which scientific "facts" originate, experiments that occur in fictive environments from which all interference has been eliminated to highlight the repercussions of the proposed hypotheses. Literary fiction allows us to explore

> the virtual halo of the questions and speculations this particular epoch makes us capable of—the writer and her amateur audience, all experimenting with the metamorphic effect of an operation of dishabituation, that is, of the destabilization of the settled, authoritative distribution between the possible and the impossible, the acceptable and the unacceptable. . . . Our world does not need to be what it is . . . another composition of the world is possible.[30]

In *Blindness*, a hypothetical scenario is presented: 1) "What if" a strange new infection quickly blinds the entire population, except for one woman, a doctor's wife, who retains "normal" vision? "What if" white-blindness is not an infectious disease so much as it is an epistemological dis-ease—an incapacity—a disability—that occludes understanding the ontological conditions that threaten collective survival? 2) "But then" according to the advice of the medical authorities, the government "makes war" on the first white-blind people instead of the microbe? The broad question I ask is: How does the hypothetical world of *Blindness* change the ways in which pandemics can be understood?

As the plot plays out, instead of a hospital where they will be cared for—as expected by the doctor—the white-blind, including the infected doctor, are placed in an abandoned asylum where they are brutalized by soldiers—as directed by the military leaders—who themselves quickly succumb to white-blindness. Amidst the chaos, a gang of white-blind thieves and rapists take control in the asylum. With the leadership of the doctor's wife, the women organize themselves to successfully defeat this gang, and the asylum burns to the ground. Thus, three weeks after the pandemic begins, the escaping inmates flee into the city. There, the survival of the small group of white-blind depends on its efforts to organize themselves as a collective amidst the chaotic attempts by blind multitudes to find food and shelter. About a week later, when the entire population is on the verge of starvation, the novel ends as abruptly and mysteriously as it begins when, spontaneously, everyone recovers normal sightedness. The characters wonder, what now? There is no closure to the riddles posed by the novel, and it is up to readers to figure out the significance of the pandemic of white-blindness.

In this hypothetical scenario, in Latourian fashion, I argue that the fictional malady of white-blindness achieves its efficacy as an actant/mediator because it destroys the bridge that medicine has built between nature and society: *the sightedness of medical knowledge about disease and the dying process incorporated into medical practice.* Thus, one central concern raised by the narrative is what happens when medical practitioners have no privileged access to knowledge about an infectious disease. Nor do the government and other powerful figures have solutions. To the contrary, as the second primary actant/mediator, they make matters much worse: White-blindness—the disease—only becomes a crisis due to the incompetency and brutality of those who wield power. This raises the question, how could Saramago have got it so

30. Isabelle Stengers, "Science Fiction to Science Studies," in *The Cambridge Companion to Literature and Science*, ed. Steven Meyer (Cambridge UK: Cambridge University Press, 2018), 32.

right such that he foretells the crises precipitated by those in power with the infection of SARS-Cov-2 in humans?

According to my argument, Saramago got it right because his invention of a hypothetical situation *troubles the agency of the free human subject*. The disease of white-blindness completely disrupts the power of doctors and the government even as the afflicted—the third primary actant—are prompted to form new patterns of social organization based on the "distributed agency" to establish new networks of empowerment to survive. The novel offers important lessons during the COVID-19 pandemic about how to change the trajectory of the pandemic from accelerating rates of disease and death to the elimination of SARS-Cov-2 from human populations via new forms of organization and cooperation—about how higher order can emerge from chaos through cooperative organization among the afflicted.

How far do the mysteries about blindness in the novel run parallel to "blindness" about the COVID-19 pandemic? One stark difference is that in the novel, the entire population goes blind so quickly that the laboratories close before a microbial source can be identified or ruled out, so no definitive medical diagnosis is ever made. The dire situation is such that "not a single person had been left with the eyesight to look through the lens of a microscope, that the laboratories had been abandoned."[31] In life outside the novel, in the culture medium of the laboratory, SARS-Cov-2 quickly became visible to the human eye, and the genetic sequence was immediately shared with all the scientists in the world. A year later, there has been a successful world wide effort to fast-forward the production of highly-effective vaccines. Meanwhile, however, millions have become infected and millions are dying, and the lives of billions have been irreparably damaged. As Dr. Kahn, the former Director of the Office of Public Health Preparedness and Response at the United States Center for Disease Control, cautions, "the [long] road to a vaccine is paved in death."[32]

I argue that *Blindness* narrates this very situation, when our responses to SARS-Cov-2 have been forms of blindness. Like the characters at the end of the novel who can see again, we are wondering, with a vaccine, a new national administration, and new international cooperation, what can we see now, a year into this pandemic? What can we do? This depends on what lessons we have learned from the past year, and for these lessons, I look to Saramago to provide direction for the future.

Initially, the novel presents the contagion according to the script of the outbreak narrative with the rapid spread of blindness from the first blind man to others infected by their contact with him. However, this script is immediately countered by the covert narrator. When the doctor examines the eyes of the first blind man, the narrator describes the doctor's medical equipment as "a scanner which anyone with imagination might see as a new version of the confessional, eyes replacing words, and the confessor looking directly into the sinner's soul."[33] Three weeks into the pandemic, the doctor himself confirms this perspective when he says, "If I ever regain my sight, I shall look carefully at the eyes of others, as if I were looking into their souls."[34] Thus, the disease is presented as a question of morality: In a confessional, one is judged for one's sins. In the novel, the "sins" are those of government brutality, murder, rape, and exploitation. "Seeing" involves learning how to organize into cooperative collectives to care for one another; this is moral "salvation."

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31 José Saramago, *Blindness* (Great Britain: The Harvill Press, 1997), 242.
32 Ali S. Kahn, interview by Amy Goodman, *Democracy Now*, July 15, 2020.
33 Ibid., 14.
34 Ibid., 276.

Actually, when people initially turn white-blind, they don't suffer in any way other than to be baffled about how best to return home and alert the authorities to protect others. Indeed, white-blindness turns into a nightmare scenario *only when the government and military make war on the people, not the microbe, and when a group of white-blind organize themselves into a gang of thieves and rapists to exploit the others.* There is an ironic layering of meaning that complicates the experience of "blindness." On the one hand, the government and military are already "blind" to the nature of the disease even before they themselves fall victim to white-blindness and, on the other hand, the raped women "see" ways to destroy the gang that only "sees" opportunities for exploitation and victimization. When the white-blind flee the asylum, in their blindness, they "see" new ways to organize themselves for collective survival. *Blindness* is an alternative narrative of infectious disease because the story narrates how human agency alters the "dis-ease"—a potent mediator that is *always dependent in its agency to spread, sicken, and kill on the responses of the populations affected by the disease.* Furthermore, the doctor's wife demonstrates the leadership of one who can see how to collectively organize for mutual benefit and sustenance via the distributed agency of decentralized power to minimize the harm done by the disease.

She does so in response to the quarantine of the first white-blind as a form of "encampment." Their quarantine is aptly characterized by Giorgio Agamben in his study of the origins of the concentration camp in modern society, where the interned are reduced to the "bare life" of inclusion in the political order solely in "an unconditional capacity to be killed."[35] Agamben locates the origination of encampment in the political status in the state of exception of modernity's sacred man, *homo sacer*. Furthermore, the quarantine of the white-blind as a form of encampment is particularly interesting when viewed in the context of the contrasting realities of life under "quarantine" during the COVID-19 pandemic—ranging from being housed in a comfortable hotel or home to being confined to hovels in multigenerational families to die of starvation, dehydration, or exposure to being imprisoned in close quarters with other inmates. The COVID-19 pandemic raises the question, *what constitutes compassionate quarantine to prevent the spread of disease?*

In *Blindness*, in opposition to quarantine as a form of encampment, amidst the destructive chaos, the Ward One cell of blind internees becomes a collective protagonist that demonstrates the emergence of higher order through cooperative collaboration. The women rebel against the rapists, kill them, and burn the asylum to the ground; they transform themselves from blind pariahs into women free to escape their captivity. Led by the doctor's wife, they reject the logic of exclusion and contagion and their status as blind pariahs—Agamben's *homo sacer*. They reclaim their full humanity by demonstrating the greater agency achieved when they join hands to sustain each other and the group as a whole. Furthermore, once the small group led by the doctor's wife flees the asylum, this small collective is the birthplace of a new "society of the blind" with their formation of a higher order of cooperation from the ruins of the traditional society of the seeing-healthy. Doing so depends on their transformation by the mediation of white-blindness in their lives, and even as the doctor's wife retains normal sightedness, perhaps she is the one most changed by white-blindness.

At this point, I suggest that the doctor's wife presents us with unique personal opportunities: 1) How are we to understand our life-transformations during the COVID-19 pandemic? 2) Is it possible to become leaders, as modelled by the doctor's wife and the small

35 Giorgio Agamben, *Homo Sacer: Sovereign Power and Bare Life* (Stanford, CA: Stanford University Press, 1998), 85.

group of white-blind who follow her, who invent new patterns of cooperative organization? To do so, we have much to learn from the novel. Midway through the novel, fleeing the burning asylum, this small society enters a world of chaos and disequilibrium due to the universal spread of white-blindness. Staying close together, when night comes, they organize themselves into an autonomous cell amidst the general confusion by forming themselves into a pattern of concentric circles to safely sleep until morning. With the boy with the squint in the middle, the three women encircling the boy, and the three men encircling the women, "they give the impression of being but one body, one breath and one hunger."[36]

During their six days in the city of the white blind, their difficulties exemplify a central tenet of an ecological and systems thinking paradigm for infectious disease: new order can emerge from chaos. There are pivotal bifurcation points when the survival of the group is at stake and yet where a new trajectory to a higher order is reached. For example, when the group manages to arrive at the apartment building of the home of the girl with dark glasses, her parents are gone, but they find an old woman on the ground floor of the apartment building who has refused to leave after the authorities took her husband, son, and daughter-in-law to the quarantine. She has been living off the raw meat of rabbits and chickens and raw vegetables from the garden in the backyard. Her story narrates the effects on the civilian population of quarantine as an act of nontraditional warfare. A pivotal moment for the small society of white-blind occurs when the old woman gives the girl with dark glasses the keys to her old apartment. Suddenly, they are granted a reprieve, a place where they find sustenance and can discuss what to do next. They have reached a critical juncture: Either they can splinter apart by staying in their separate abodes, or they can stay together as a self-organized group.

This is an important moment for the group and for the novel as a whole. Together, the characters reflect on the broader significance of white-blindness for human civilization and survival. The old man with the black eyepatch comments that they're like primitive hordes,

> with the difference that we are not a few thousand men and women in an immense, unspoiled nature, but thousands of millions in an uprooted, exhausted world . . . When it starts to become difficult to find water and food, these groups will almost certainly disband, each person will think they have a better chance of surviving on their own.[37]

When the doctor's wife offers to be their eyes, everyone agrees to stay together for the mutual benefits afforded by organizing themselves as a small cell.

This emphasis on organization as a form of "sightedness" and the means to recover from infectious disease is narrated the next day, when the doctor, his wife, and the girl with dark glasses "survey" the mounting rubbish and animal corpses on the city streets. The doctor says,

> the worst thing is that we are not organized, there should be an organization in each building, in each street, in each district, A government, said the wife, An organization, the human body is also an organized system, it lives as long as it keeps organized, and death is only the effect of a disorganization, And how can a society of blind people organize itself in order to survive, By organizing itself, to organize oneself is, in a way, to begin to have eyes.[38]

36 José Saramago, *Blindness*, 219.
37 Ibid., 256.
38 Ibid., 295-6.

He adds that while people have always died from all sorts of things, now they will die of blindness—of their disorganization—the worst form of death since, according to the doctor, they have the capacity to generate higher forms of order that would make such deaths unnecessary.

> [W]e shall die of blindness and cancer, of blindness and tuberculosis, of blindness and AIDS, of blindness and heart attacks, illnesses may differ from one person to another but what is really killing us now is blindness.[39]

He honors his wife, who defines a certain model of decentralized leadership to organize ourselves, as advocated by Saramago in *Blindness*.

I argue that their small group defines a vision for new order that might emerge from the chaos of the COVID-19 pandemic: local cells of cooperation supported by international collaboration to organize worldwide networks of mutual support for our collective survival. As Dr. John Nkengasong, director of the African Center for Disease Control and Prevention, advocates from a shared perspective by public health policy makers *who have coordinated efforts across the entire continent of Africa*, what is needed on a worldwide level are the 4 C's: cooperation; collaboration; coordination; and communication.[40]

To summarize, I suggest that the Covid-19 pandemic runs parallel to the novel because of the transformative aspects of living through a pandemic. Everything taken for granted about the world suddenly appears strange: what we could see before has disappeared, and new things are emerging. Especially exciting is that the Covid-19 pandemic challenges us to ask hard questions: what have humans done to cause the infection, to slow or accelerate its spread, to care for those afflicted, and to prevent further infections from one living species to another? The doctor's wife is the heroine in the novel and serves as a model for those of us who are trying to survive and care for one another during the pandemic. Her ability to see is the sightedness of being mutually responsible for the well-being of others. She understands that such caring cooperation dispels the fear of contagion and loss that precipitates violence and suffering from infectious disease. In sum, *Blindness* allows readers to imaginatively experience a woman's intuition to know what cannot be seen by scientific positivism. Such insight is the foundation for alternative narratives about the COVID-19 pandemic.

Conclusion

New questions are being asked now that governments and medical experts are "armed" with m-RNA vaccines: Will humans develop the capacity to safely invade non-human populations, perhaps even more aggressively than ever before? Can future pandemics be predicted and vaccines developed ahead of time to prevent infectious diseases, making new forms of human intrusion into nonhuman populations safe for (some) humans even as nonhumans die? The answers depend on issues of morality and politics. My hope is that based on ecological and systems-thinking, a morality of caring and equitable support and a politics of decentralized and participatory democracy can be articulated in new narratives about infectious diseases. These narratives will contribute to efforts to shift the power of laboratory science and

39 Ibid., 296.

40 John Nkengasong, interview by Amy Goodman, *Democracy Now*, July 23, 2020. See "AU and Africa CC launch Partnership to Accelerate COVID-19 Testing: Trace, Test and Track." http://africacdc.org (accessed July 25, 2020).

medicine from the elite to those who suffer the harmful consequences of science and medicine. As Latour emphasizes, the nonhumans have to be included in the process of envisioning and implementing a new politics and a new morality.

In this essay, I have advocated for an ecological and systems thinking paradigmatic narrative of infectious diseases: a paradigm that is itself in the process of invention by stories about dismantling systems that destroy ecological balance in order to create new decentralized systems to protect and promote ecological balance and equitable and compassionate care and support for everyone, everywhere. Telling these stories is how we express our grief and create hope from despair in honor of those who have died and in support of those who are suffering, ourselves and all living species, included. Supported by ecological and systems thinking, we can make new connections with one another to create higher order from the chaos of our times.