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Microbial Perspectives: Mark Twain's Imaginative Experiment in Ethics

Kym Weed

It is entirely unjust to condemn all bacteria because a few chance to produce mischief. Bacteria in general are agents for good rather than ill.

—Herbert W. Conn, *The Story of Germ Life*¹

In his popular science book *The Story of Germ Life* (1897), Herbert W. Conn, a prominent American bacteriologist, dwells on the good rather than the ill that microscopic organisms do for humans. Because most bacteria are harmless or even helpful to human health, he concludes that “it is entirely unjust” to categorically condemn all bacteria.² Framing what he sees as a fundamental misunderstanding of microbes as unjust, Conn extends human concepts of justice to the microbial world. In doing so, he not only anthropomorphizes microbes as agents of good or ill, but also interpolates them into a human system of ethics. To extend moral standing to nonhuman microscopic entities raises questions about the relation of microbial ethics to human ethics. By what standards should microbes be judged?

In recent years, scholars have begun to extend questions of ethics beyond anthropocentric paradigms in favor of more ecological frameworks that acknowledge the networks that connect humans and nonhumans. The nonhuman turn in critical theory that has yielded New Materialism and Object Oriented Ontology is invested in considering the agency of nonhuman beings and nonliving objects, looking beyond the human to consider beings or objects outside of their relationship to humans and human value systems. This reorientation raises questions about what constitutes an ethical relationship between humans and nonhumans. As Elizabeth St. Pierre, Alecia Y. Jackson, and Lisa A. Mazzei put it in their introduction to the “New Empiricisms and

New Materialisms" issue of *Critical Studies* ↔ *Critical Methodologies*, "If humans have no separate existence, if we are completely entangled in the world, if we are no longer masters of the universe, then we are completely responsible to and for the world and all our relations of becoming with it."³ In highlighting human entanglements, they offer an ethical shift framed as a matter of stewardship, suggesting that it is our responsibility to see ourselves in relation to the world. Social scientist Myra J. Hird extends these ethical questions specifically to human-microbe relationships. She calls for a critical engagement in "microontologies," or "an ethics that engages seriously with the microcosms" and moves beyond the "pathogenic matrix" that tends to define our interactions with microbes as antagonistic.⁴ These provocations challenge our anthropocentric thinking and the ethical paradigms supported by it.

In his unfinished novel, "Three Thousand Years Among the Microbes" (1905), Mark Twain uses a fictional microbial landscape to imaginatively test solutions to the ethical entanglements brought about by the realization that we share our world with an untold number of microscopic organisms. Written in Dublin, New Hampshire between May 20 and June 23, 1905, "Among the Microbes" recasts humanity on a microbial scale, creating a world of anthropomorphized microorganisms inspired by Conn's *The Story of Germ Life*. In the bizarre tale, a human scientist who studied "micrology under Prof. H. W. Conn" becomes a cholera germ when a magician's experiment intended to turn him into a bird goes wrong.⁵ This accident places the narrator, Huck, in a position to live among the microbes living within the body of a Hungarian immigrant tramp, Blitzowski. As a microbe, Huck maintains his human memories while simultaneously being "instantly endowed with a cholera germ's instincts, perceptions, opinions, ideals, ambitions, vanities, prides, affections and emotions" (435). With the benefit of this hybrid perspective, Huck identifies otherwise imperceptible similarities between human and microbial egotism that raise complex questions about the value of both microbial and human life. Like the experiment that establishes the premise for the novel, Twain's "Among the Microbes" is a literary experiment in which fiction becomes an instrument to juxtapose two perspectives—human and microbe—that function on vastly different spatial and temporal scales.

In this essay, I argue that Twain critically engages in bacteriology, as articulated by Conn, to reexamine human life on nonhuman scales. The emergence of bacteriology offered new terrain in which Twain could explore questions about human significance that he was

already working through in other texts like “The Mysterious Stranger” manuscripts (1897-1908) because it facilitated drastic changes in scale that necessitate a corresponding ethical shift to account for minute forms of life.⁶ Despite using Conn’s bacteriology as a model for his imagined microbial experiment, Twain reaches a different conclusion about the relationship between humans and microbes. Whereas Conn recuperates human significance by framing the microbe and its value in human terms, Twain defamiliarizes the human by imagining alarming similarities between the human and the microbe. I explain these vastly different conclusions by analyzing the cultural and discursive work that the microbe performs for each writer. Conn uses microbes, especially those that he categorizes as “friends,” to expand the scope of bacteriology beyond pathology, thereby claiming intellectual and cultural authority for the discipline. His project contributes to the regime of power in which scientific knowledge facilitates human mastery over the nonhuman world. Twain literalizes Conn’s anthropomorphized, friendly microbe to the point of satire to unsettle these traditional hierarchies. Using jarring juxtapositions in spatial and temporal scale, Twain comes to the conclusion that humanity is nothing but “microscopic trichina concealed in the blood of some vast creature’s veins.”⁷

Reading “The Mysterious Stranger” manuscripts alongside “Among the Microbes” shows us that Twain draws bacteriology into fiction to imaginatively explore multiple perspectives. Experimenting with nonhuman worldviews reframes the human and opens imaginative space for alternatives. In the introduction to *The Medical Imagination: Literature and Health in the Early United States*, Sari Altschuler argues that “imaginative experimentation,” or “the ways in which doctors and writers used their imaginations to craft, test, and implement their theories of health,” was critical to the production of new medical knowledge.⁸ I extend this concept beyond physician-writers to take seriously Twain’s turn to the microbial world.

From the start, Twain establishes his story within the mode of scientific experimentation and observation. As Beverly A. Hume points out, the very premise of the story hinges upon experimentation—Huck is turned into a cholera germ by a misguided experiment.⁹ Moreover, Twain sets up the document as if it were a translation of a “history” written by Huck, who, as a former scientist, is “consciously trying to state bare facts, unembellished by fancy” (433). Huck is uniquely positioned to study this new world because he can access both the human and the microbe perspective simultaneously. As he explains, “I could observe the germs from their own point of view. At the same

time, I was able to observe them from a human being's point of view" (435). Huck's hybrid perspective allows him to access the microbial world in ways not afforded by even the best scientific instruments.

Rather than scientific tools, Twain's experiment utilizes a different instrument: fiction. Positioning the narrator in the microbial world means that Twain and his readers have access to infinitely tiny universes, some previously unimagined. In other words, the microbe-eye of his fiction provides a lens not afforded by human microscopy. Claiming the superiority of the microbe-eye for scientific observation, Huck explains, "In matters pertaining to microscopy we [microbes] necessarily have an advantage, here, over the scientist of the earth, because . . . we see with our naked eye minuteness which no man-made microscope can detect, and are therefore able to register as facts many things which exist for him [humans] as theories only" (448). In his distinction between theories (ideas that cannot be proven because they cannot be seen) and facts (ideas that can be proven because they are seen), Twain critiques models of empiricist inquiry that privilege unmediated sight over other imaginative models in scientific knowledge production. He very well may be satirizing "the view that scientific insight was the highest form of intellectual insight humanly attainable" as Hume suggests.¹⁰ Yet more than satire alone, Twain offers an alternative way to access new knowledge. Despite the inferiority of the human eye to see these tiny molecules in the microbial world, even when assisted by a microscope, Twain emphasizes the ability of the human mind to stand in where scientific instruments fail. Huck continues: "To the human mind they [atoms] exist only in *theory*, not in demonstrated fact. The human mind—that wonderful machine—has measured the invisible molecule, and measured it accurately, without seeing it; also it has counted the multitudinous electrons that compose it, and counted them correctly, without having seen one of them" (447; emphasis in the original). If the human mind, in Twain's formulation, is capable of accurately measuring unseen molecules and counting unseen electrons with accuracy, might another product of the human mind, fiction, offer an alternative means by which to make the unseen world visible? Twain's fictional microbial world presents a new way of looking at the world that requires new conceptual and ethical structures. His experiment in worldviews becomes an experiment in ethics that tests the effectiveness of including smaller and smaller life forms within our moral framework.

Twain's experiment animates bacteriological concepts, especially those relating to harmless or helpful microorganisms as championed

by Conn, to imaginatively explore the implications of approaching microbes as “friends.”¹¹ In a striking overlap between the texts, Twain closely borrows from a passage from Conn’s book in which microbes serve a crucial ecological purpose by clearing the earth of debris. To demonstrate the importance of microbial action to sustaining planetary and therefore human life, Conn imagines a world without bacteria:

If we think for a moment of the condition of the world were there no such decomposing agents to rid the earth’s surface of the dead bodies of animals and plants, we shall see that long since the earth would have been uninhabitable. If the dead bodies of plants and animals of past ages simply accumulated on the surface of the ground without any forces to reduce them into simple compounds for dissipation, by their very bulk they would have long since completely covered the surface of the earth so as to afford no possible room for further growth of plants and animals.¹²

In this speculative example, the role that microbes play in sustaining life is made visible through their absence. Having glimpsed a world without microbes, Conn’s readers can more readily see the positive effects that microbes have on their lives. Reversing the paradigm of microbes as harbingers of disease, he reframes them as integral to life. Rather than cause death, they do away with the remains of death to make room for life.

Twain closely borrows Conn’s example to depict the work of a fictional life form, the swink.¹³ Explaining the importance of the swink to microbe life, the Duke, a microbe bacteriologist, also frames microscopic entities as central to planetary life: “Suppose he [the swink] didn’t do this work? The fallen vegetation would not rot, it would lie, and pile up, and up, and up, and by the by the soil would be buried fathoms deep; no food could be grown, all life would perish, the planet would be a lifeless desert. There is but one instrument that can keep this vast planet’s soil free and usable—the swink” (522). In a similarly speculative move, the Duke leads Huck through a thought experiment about the state of the world without these tiny life forms. Again, the importance of an otherwise invisible world is revealed through its absence. In both examples, the reader is taken to the brink of an apocalyptic landscape only to be rescued by the work of microbial life forms. The same life forms that can be pathogenic on the scale of an individual human become life-sustaining on the scale of the planet. In this persuasive move, the undervalued labor

of the microbe is reframed as utterly crucial to survival. The Duke's conclusion that the swink is the only "instrument" that can preserve the planet frames the microbe-swink relationship as interdependent. The swink, like the microbe for Conn, is an instrument that can be employed in the preservation of life on larger scales. In this similarity, we also see the utility of the imaginary microbial world for Twain. Inhabiting this fictional microscopic world allows him to re-envision the human world and its relationship to the microbial world.

The Friendly Microbe: A Matter of Discipline

In October and November 1894, twenty-five Wesleyan University students fell ill with typhoid fever. The culprit, identified by a committee of Wesleyan faculty that included Conn, was a batch of raw oysters contaminated with typhoid bacilli while being fattened at the mouth of a river near a sewer outlet before being served at the initiation dinners of three fraternities. A series of extraordinary coincidences produced an exemplary case. As Conn explains in his report for the Connecticut State Board of Health, "a more typical example of an outbreak of typhoid, due to a single source of infection, has hardly been found in the history of medicine, and the example furnishes a demonstration of a new source of danger for the disease."¹⁴ Yet while Conn's investigation identifies a novel source of infection, it does not dwell on the microbe's culpability, but rather on the human practices that are to blame for the introduction of typhoid bacilli into the oysters. For the duration of his career as a bacteriologist and public health official, Conn seems committed to recuperating the reputation of microbes. His representations of the microbial world, from *The Story of Germ Life* to reports like these, consistently stress the utility of microbes over their disease-producing capabilities. The friendly microbe serves two related purposes: it supports his claims to the professional authority of bacteriology and establishes human control over the microbial world in both scientific and popular discursive spaces. For Conn, the friendly microbe is a matter of discipline.

In the 1880s and 1890s, bacteriology was a new field of study in the United States. Having identified a microbial cause of some diseases, scientists like Louis Pasteur and Robert Koch inspired what Lorenzo Servitje and Kari Nixon have called "the Bacteriological Age, in which a new generation of young scientists, trained in the ostensible verity of germ theory, sought to identify the specific microbes

associated with various diseases."¹⁵ An unintended consequence of the early Bacteriological Age is that bacteriology became associated most closely with disease germs and was therefore often considered to be a subordinate branch of other disciplines, like medicine and pathology. Barnett Cohen, the mid-twentieth-century archivist for the American Society of Bacteriology, suggests that the practical applicability of bacteriology to so many fields "led to the 'handmaiden' concept of the position of bacteriology so widely prevalent, especially in the early days."¹⁶ The anxiety that bacteriology would be subsumed by other disciplines became a perennial issue for bacteriologists well into the twentieth century. In response, they sought to reframe the scope of bacteriology beyond the study of disease germs and therefore beyond the purview of pathology. As Conn repeatedly stresses, the tendency to focus on disease germs means "that the bacteria story has only been half told, and thus far it is the smaller half that has been told."¹⁷ Conn tells that story in support of his attempt to define a new field of scientific inquiry. The friendly microbe comes to stand in for an entire field of study that is invested in the non-disease-causing bacteria just as much as the disease-causing germs. Bacteriologists like Conn were, as his son Harold J. Conn puts it, "interested in bacteriology *as such*—not merely as a phase of pathology" and had to advocate for professional autonomy and cultural authority.¹⁸

Conn's professionalization efforts extended beyond scientific discourse communities and into the public sphere. Outside of the laboratory, the friendly microbe served a critical role in demonstrating the importance of microbes—and the study of bacteriology—to everyday life. In acknowledging that the average person knows of microbes only in their relationship to disease, Conn identifies a site of intervention to change the public perception of bacteria and bacteriology. If, as Conn suggests, "it is doubtful chance if any knowledge of their [microbes'] beneficial effects has passed beyond the reach of the scientist's laboratory and lecture-room," then one way to correct the misunderstanding of bacteriology is to bring the laboratory and lecture-room to the people.¹⁹ As Frederick M. Cohan and Alexa Boesel have noted, Conn "endeavored to make the unseen world of microbes familiar, real, and consequential to the public."²⁰ He does so by comparing bacteria to more familiar organisms. For example, Conn used his audience's familiarity with plant respiration to depict an equally crucial portion of the food cycle: microbial decomposition. Just as plants are the agents that connect nutrients from the soil to animal life, bacteria complete the other half of the cycle. As Conn says, "The food cycle would

be as incomplete without the agency of bacterial life as it would be without the agency of plant life."²¹ In comparing bacteria to plants, Conn simultaneously helps his readers see the bacteria and understand their importance outside of disease by establishing them as crucial to a balanced ecosystem.

In both professional and popular contexts, Conn harnesses microbial power by dwelling more on their ability to do good rather than ill, framing the friendly microbe as an ally in human survival. As a bacteriologist, he demonstrates scientific mastery over microbes, thereby claiming authority for the discipline. Valuing microbes primarily based on their relationship to humans also reclaims human agency in a world teeming with microbes. Conn consistently relies on the friendly microbe to perform some of the discursive labor necessary to convince multiple audiences of bacteriology's autonomy and authority. So long as microbes were viewed with fear, bacteriology could be seen as little more than a branch of pathology. To recuperate the image of the microbe was also to establish the importance of bacteriology beyond pathology and demonstrate human mastery of the microbial world.

Moral Sense and Human Exceptionalism in "The Mysterious Stranger" Manuscripts

Whereas Conn maintains human control over microbes, Twain calls into question the primacy of humans, especially in his later works of fiction. Critics like Henry J. Lindborg or Patricia M. Mandia, who argue these later writings reflect Twain's existential pessimism toward the end of his life, have overlooked Twain's crucial interest in contemporary scientific questions.²² While this scholarly preoccupation with Twain's bitter end threatens to miss his serious engagement with new sciences like bacteriology, scholars like Hume and Kathleen Walsh have acknowledged the relationship between Twain's fiction and contemporary science.²³ I too read Twain as invested in questions of contemporary science, and take seriously the role that bacteriology plays in his thinking about human life. Rather than read "The Mysterious Stranger" manuscripts and "Among the Microbes" as exercises in nihilism and solipsism, I read them as the testing ground for the questions raised by Conn and bacteriology writ large about human and microbe interactions.

In "The Mysterious Stranger" manuscripts, Twain depicts scalar differences between human and nonhuman worlds to enable a radi-

cal re-thinking about the position of the human in the cosmic order. Between 1897 and 1908, Twain made at least three incomplete attempts to write a story about a supernatural stranger whose inability to sympathize with humans creates chaos in the lives of the villagers he meets.²⁴ The three surviving manuscripts each depict a version of the same character, young Satan or No. 44, whose supernatural abilities inspire wonder and fear in the townspeople he meets. Satan/No. 44 befriends a group of boys whose well-intended attempts to convince him to use his power to help others cause more harm than good. While the setting, characters, and events vary across the manuscripts, Satan/No. 44's indifference to human life remains constant, suggesting that this idea was at the heart of Twain's multiple attempts at writing the story. As a nonhuman outsider—it is never entirely clear if he is angel, devil, or dream—Satan/No. 44 observes the strangeness of human beliefs, relationships, and actions with indifference.

Throughout the manuscripts, Satan/No. 44 relegates humans to a marginal position in the universal order by positioning himself as fundamentally superior to humanity, often through analogies of scalar differences. In a passage from "The Chronicle of Young Satan," he marginalizes human life by replicating it on a micro-scale, separating himself even farther from humanity. In a demonstration of his powers, Satan reproduces the Creation story in miniature, molding hundreds of tiny men and women from clay and setting them to work on the construction of a castle while the boys watch in wonder. The similarities between the miniature and full-scale humans serve two complementary purposes. First, it prompts the boys to sympathize with their miniature counterparts. Second, it equates the full-scale human with its miniature in Satan's regard. If Satan considers the miniature as being "of no consequence," then how does he regard the boys, or humanity as a whole?²⁵

This dual purpose establishes two seemingly irreconcilable perspectives: the human, which values human life above all else, and the angel, which disregards human life as inconsequential. This clash in perspectives is most apparent when Satan casually does away with the miniature humans. While explaining a key difference between his kind and humans, Satan hardly interrupts himself to kill two miniature humans who have annoyed him:

"We others are still ignorant of sin; we are not able to commit to it; we are without blemish, and shall abide in that estate always. We—" Two of the little workmen were quarreling, and in buzzing

little bumble-bee voices they were cursing and swearing at each other . . . Satan reached out his hand and crushed the life out of them with his fingers, threw them away, wiped the red from his fingers on his handkerchief and went on talking where he had left off: "We cannot do wrong; neither have we any disposition to do it, for we do not know what it is."²⁶

The sudden interruption to Satan's train of thought sets up an equally sudden juxtaposition between his speech and actions. On the one hand, Satan establishes himself as incapable of sin; on the other, he thoughtlessly kills two miniature humans. From Satan's perspective, extinguishing the life of one of his creations is no more deplorable than a human killing a fly. Yet, the boys are "shocked and grieved at the wanton murder he had committed."²⁷ Satan continues on unaffected, pausing only when the grieving miniatures "began to annoy him" enough that "he reached out and took the heavy board seat out of [the boys'] swing and brought it down and mashed all those people into the earth just as if they had been flies, and went on talking just the same."²⁸ The boys' shock is met with total disregard.

This passage sets up a recurring problem throughout "The Mysterious Stranger" manuscripts that Twain continues to explore in "Among the Microbes": how to reconcile perspectives—and their corresponding value systems—across scales. Ryan Simmons suggests that the boys have only one way to respond to the dilemma: as humans. "For us humans," he writes, "what happens to other humans on our little anthill is more deeply resonate" and that the boys' "dismay at the snuffing of the little creations' lives is morally superior to Satan's logically rigorous indifference, at least in the only framework by which the three boys (and we readers) are capable of exercising moral judgment, the only such framework available to us."²⁹ Simmons's conclusion eliminates Satan's perspective from consideration and misses the importance of the simultaneity of the perspectives in the passage. In maintaining both at once, Twain pushes his reader to search for ways to reconcile them. Fiction like Twain's "Chronicle" allows us to expand our frameworks, moral or otherwise.

Satan attributes his indifference to the miniature human lives to his inability to sin or his lack of a "Moral Sense," which holds a different significance from different points of view. From the human perspective, the Moral Sense elevates humans above all other creatures. As Father Peter explains to Theodor in "Chronicle," it "is the only thing that lifts man above the beasts."³⁰ As the defining characteristic

of humanity, the Moral Sense guarantees its privileged position in the cosmic order. From Satan's perspective, the Moral Sense separates humans from other creatures, but it degrades rather than elevates humans. When Theodor calls torture a "brutal thing," Satan corrects him: "No, it was a *human* thing. You should not insult the brutes by such a misuse of that word—they have not deserved it."³¹ According to Satan, there is a crucial difference in perception between humans and animals: while animals are incapable of perceiving sin, humans are "not able to perceive that the Moral Sense degrades him to the bottom layer of animated beings and is a shameful possession."³²

The irreconcilability of these positions comes down to fundamental differences in moral structures, which Twain tethers to differences in spatial and temporal scale to make them more easily comprehensible. Differences in scale make other, more abstract, differences legible. For example, Satan explains, "The elephant lives a century, the red spider a day; in power, intellect, and dignity, the one creature is separated from the other by a distance which is simply astronomical. Yet in these and in all qualities man is immeasurably further below me than is the wee spider below the elephant."³³ Based on the extreme difference in size, the experience of both time and space is utterly irreconcilable between the elephant and the red spider. Moreover, Satan scales up that incompatibility to communicate the difference between human and angel; the time and space between the elephant and the red spider becomes a unit of measure to aid Theodor in understanding the time and space between himself and Satan. These seemingly objective measures—we can *see* and *measure* the difference in size and lifespan between an elephant and a red spider—in turn communicate immeasurable differences in importance. These scalar analogies serve to demonstrate that Satan is incapable of empathizing with humans because of what he perceives as their relative insignificance. His comparison between the elephant and the red spider emphasizes the core problem when attempting to reconcile differing perspectives: concerns of the red spider "can never be important to the elephant, they are nothing to him, he cannot shrink his sympathies to the microscopic size of them."³⁴ Not only are the two creatures vastly different in size, but that difference also prevents one from understanding and empathizing with the other.

Whereas the Satan of the "Chronicle" manuscript sets up an uncomfortable and ultimately irreconcilable juxtaposition in perspectives and scales, Forty-four of "No. 44, The Mysterious Stranger" brings them together to suggest other possibilities. In the surprise ending of "No.

44," Forty-four reveals to the narrator, August Felder, that "*Life itself is only a vision a dream Nothing exists save empty space—and you!*"³⁵ He continues, "your universe and its contents were only dreams, visions, fictions!"³⁶ It is within these fictions that August created a world so strange that it had to be a dream. It is also within these fictions that irreconcilable perspectives merge into one singular perspective. "But I your poor servant," Forty-four insists, "have revealed you to yourself and set you free. *Dream other dreams, and better!*"³⁷ The strange fiction that August dreams is open to revision. There are infinite possibilities for alternative dreams and Forty-four implores him to dream them.

Hilton Obenzinger argues that the dream ending of "No. 44" "can be seen as an extended meditation on the powers of imagination in fiction."³⁸ Just as August can "dream other dreams," so too can the novelist: "there are other possibilities, even the prospects of revolutionary transformation."³⁹ In contrast to the "Chronicle," this conclusion reestablishes the human as the center of, and in fact the entirety of, the universe. As the only thing in existence, August possesses the agency to create and recreate the world in any form. Together, these manuscripts demonstrate Twain's imaginative experimentation with theories of human exceptionalism that he revisits with the help of bacteriology in "Among the Microbes."

Testing Scalar Empathy in "Three Thousand Years Among the Microbes"

While he uses the Moral Sense to set humans apart from other beings, whether animals or angels, in "The Mysterious Stranger" manuscripts, Twain approaches the same problem differently in "Among the Microbes."⁴⁰ Rather than ask how humans differ from other creatures, he instead asks how they are similar. Twain imagines a microbial perspective that is just as egocentric as the human perspective. In parallel conversations with a human clergyman and a microbe reverend, Huck explores the implications of extending moral agency to all living creatures. In his human conversation, presented as a memory from that life, Huck and the clergyman debate the salvation of all creatures, concluding that "no creature designed, created, and appointed to a duty in the earth will be barred out of that happy home [Heaven]; they have done the duty they were commissioned to do, they have earned their reward, they will be there, even to the littlest and the humblest" (497). Yet, when Huck extends that to the "disease-germs,

the microbes," the clergyman hesitates then changes the subject (498). In this anthropocentric worldview, humans cannot imagine including microbes in the same category as themselves. Microbes are so small as to escape moral consideration altogether, so the only way the human clergyman can measure the importance of microorganisms is in their relationship to human life. Their perceived threat to human health coupled with their minute size makes it nearly impossible for the human clergyman to think of them as "created, and appointed to a duty in the earth." Whereas Conn might refute that position with evidence of all the good that microbes do for the earth, Twain does not limit the moral standing of microbes to only the "friendly microbes." Instead, he extends Conn's logic to the point of absurdity.

It takes a wholesale change in point of view to answer the question that the human clergyman could not. From Huck's microbial perspective, "Heaven was not made for man alone, and oblivion and neglect reserved for the rest of His creatures But for the despised microbe and the persecuted bacillus, who needed a home and nourishment, he would have not been created. He has a mission, therefore—a reason for existing; let him do the service he was made for and keep quiet" (447–48). In a cosmic shift, humanity's importance is immediately called into question. Not only will they be outnumbered in Heaven, but humans have also erroneously assumed that they will occupy a privileged position there. The world was not created for man, but rather man was created for the microbe. Here, Twain not only extends the definition of life and salvation (all things are alive, have souls, and are capable of attaining salvation), but also replaces man with microbe at the center of the universe. Reframing the "despised microbe" and the "persecuted bacillus" as humanity's "reason for existing" necessitates an alternative ethical structure in which humans lose their privileged status.

As in "The Mysterious Stranger" manuscripts, "Among the Microbes" uses scalar differences to challenge ethical structures. Yet, Twain uses a different set of techniques to explore these ideas in "Among the Microbes." Rather than limit each character to a singular perspective, he provides Huck with a hybrid perspective that is both human and microbe. With the memory of his human life, Huck can facilitate juxtapositions between human and microbial spatial scales. As Huck explains, there are incredible differences in human and microbial perception because of the differences in vision: "What would my rugged mountains be, to the human eye? Ah, they would hardly even rank as warts. And my limpid and sparkling streams? Cobweb

threads, delicate blood-vessels which it could not detect without the aid of the microscope. And the soaring arch of my dream-haunted sky? For that course eye it would have no existence" (447). Huck speculates about the differences in what humans and microbes are capable of perceiving. Framing the inquiry in a series of questions, not unlike a research question in the scientific method, Huck's hybrid perspective, as both human and microbe, gives him the experiential knowledge to answer each one in turn. Moving between human and microbe perspectives, "warts" turn into "rugged mountains" and "cobweb threads" to "sparkling streams." This rapid switch between the microbe and human point of view emphasizes the irreconcilable differences between the two. Humans not only see things differently, but also miss the beauty in the minute detail only afforded by the microbe-eye. The microbe's "exquisite organ of vision" registers things that are invisible to human observation, even when mediated by a microscope (447). This new perspective not only reveals new things, like the "dream-haunted sky," but also a new understanding of their component parts, as the landscape buzzes with the life of atoms. In juxtaposing human and microbe perspectives, Twain makes it clear that how one sees the world, meaning what one is able to perceive, dramatically impacts how one understands the world. The landscape of Blitzowski is beautiful because the microbes can perceive the details that contribute to that beauty. If a human were capable of perceiving it in the same way, we would expect that human to see the beauty as well. To look at the world differently, then, is to understand the world differently. Twain switches between two perspectives, human and microbe, to facilitate this kind of re-worlding. The striking difference between what a human can see and what a microbe can see calls into question the primacy of the human perspective and the ethics it engenders. If human sight can miss so much, why would we want to rely on it to understand the world?

To see the world on a nonhuman scale is to see the world differently. The same is true of humanity. The shift in perspective from human to microbe allows Huck to perceive an otherwise unappealing human body as beautiful. From the human perspective, the microbial habitat of Blitzowski "is unspeakably profane" (436). The "mouldering old bald-headed tramp" within which Huck's microbial world resides "was shipped to America by Hungary because Hungary was tired of him" (436). To his fellow human, Blitzowski is appalling: "his body is a sewer, a reek of decay, a charnel house, and contains swarming nations of all the different kinds of germ-vermin that have been in-

vented for the contentment of man" (436). Thomas Peyser reads this passage as a moment of "straightforward revulsion" that inspires an utter lack of sympathy for Blitzowski.⁴¹ However, he ignores the microbial perspective that soon follows: within the very same paragraph, this reeking human body becomes marvelous. Huck continues, "When the soul of the cholera-germ possesses me I am proud of him: I shout for him, I would die for him; but when the man-nature invades me I hold up my nose" (437). Immediately after Twain offers an exhaustive list of reasons to think Blitzowski repugnant, he shifts perspectives. The dirty sewer of decay and vice becomes beautiful through the eyes of the microbe—a masterpiece akin to the beauty that humans see in the Earth. This juxtaposition of not just physical descriptions but also emotional responses to Blitzowski suggests an alternative to the human perspective and human ethics. To see the dirty and dismissed Blitzowski through the eyes of the microbe is to see beauty and value. And yet, that ethic measures human value in microbial terms. Despite the possibilities that the microbe perspective opens up, we also begin to see its limitations.

Just as the microbial spatial scale facilitates an alternative ethic vis-à-vis otherwise "undesirable" humans, the microbial temporal scale facilitates an alternative ethic vis-à-vis microbes. Microbial time, in Twain's novel, occurs at a faster pace than human time because of the rapid rate of bacterial reproduction. Rather than simply watch microbial progeny pile up from a human point of view, he creates a narrator who can inhabit microbial time. Huck explains, "My human measurements of time and my human span of life remained to me, right alongside of my full appreciation of the germ-measurements of time and the germ span of life. That is to say, when I was thinking as a human, 10 minutes meant 10 minutes, but when I was thinking as a microbe, it meant a year" (435). Phrases like "when I was thinking as a human" signal shifts in perspective. He goes on to repeat this phrase multiple times as he scales up the measures of time until he reaches a year, which amounts to 52,416 years for a microbe. Again, signaling a shift, Huck writes "When I was using microbe-time, I could start at the cradle with a tender young thing and grow old with her" (436). In describing the details of a single microbe's entire life, Huck does not just adjust the spatial scale from the human world to the microbial world, he also shifts the temporal scale, narrating things that were otherwise unseeable in both space and time, down to the wrinkles that this individual microbe develops in her old age.

Whereas the spatial scale of the microbial perspective may facilitate a new ethical approach to human bodies, its temporal scale makes room for a similar shift in the ethical approach to microbes. The similarities between an individual human life and an individual microbe life, made apparent by Huck inhabiting microbial temporality with his human-microbe hybrid perspective, leads him to a startling conclusion: "there is no moral difference between a germicide and a homicide" (504). In equating germicide with homicide, Huck equates the value of microbe life with human life. In this radical shift, the work of the bacteriologist amounts to "torture" and "murder" rather than scientific investigation (504). Transforming seemingly innocuous bacteriological methods into morally reprehensible acts establishes a microcentric ethical structure that has the potential to fundamentally alter human-microbe interactions.

Twain tests out the ethics that the microbe perspective engenders on an even smaller scale only to find that the microbes are unable to "shrink [their] sympathies to the microscopic size" of the swink.⁴² The Duke, a champion of the swink, shows Huck one of his prepared slides, introducing him to "one of those old familiar rascals which [Huck] had had under the microscope a thousand times in America, and here was his unspeakably littler twin exactly reproduced, to the last detail" (514). These micro-organisms, or swinks, bear a striking resemblance to the microbes that human scientists study, down to their crucial role in supporting microbe life, offering a minute testing ground for the new moral structure that equates microbial life with human life. The Duke celebrates the crucial role that swinks play in the ecology of Blizowski. Without them, microbe life would quickly become unsustainable. Because of their importance, he suggests that the swink "is in truth the *only* very important personage that exists" (520; emphasis in original). Assigning personhood to the swink would suggest that swinkicide is not different from germicide. Does the Duke's reverence for swinks bear out this suggestion?

Using the Duke's advanced microscopic techniques, Huck and Duke observe the even smaller universe of the swink as two armies prepare for battle. In an attempt to wipe out the families for which these armies are fighting, they accidentally boil the whole lot of swinks. The Duke tells Huck that "these people were nothing to us, and deserved extinction anyway for being so poor-spirited as to serve such a Family" (526). This justification echoes Satan's disregard for humans; even though the Duke apparently venerates the tiny swinks, he does extend sympathy to them. Huck notes the irony that the Duke "was

loyally doing the like himself, and so was I, but I don't think we thought of that. And it wasn't just the same, anyway, because we were sooflaskies [microbes], and they were only swinks" (526). Despite the extended conversation about the value of the swinks and the Duke's near worship of them as "Our benefactor, Our prosperity-maker" and "Protector of the Lord of Creation," Huck and the Duke are ultimately unable to empathize with them (517).

Where in the beginning of "Among the Microbes," the similarities between humans and microbes might prompt us to reconsider our relationship with our microbes, Twain later demonstrates that humans and microbes share a tendency to think individualistically even at the peril of entire, albeit smaller, universes. To shift perspectives to one that is equally self-important does little to alter the ethical structures. Microbes, like humans, are unable to "shrink their sympathies" to the swink because they see their own lives as more important. Both microbes and humans see themselves as the "chief creature in the scheme of Creation" (439). That imagined privileged position also means that each perspective—human, microbe, or swink—can only look down on the worlds smaller than their own. Reflecting on the swink, Huck concludes, "It doesn't make a difference who we are or what we are, there's always somebody to look down on! somebody to hold in light esteem or no esteem, somebody to be indifferent about" (526–27). In other words, there is always something lower, something smaller that escapes the limits of our empathy. Twain's ethical experiment is a failure, and yet he hints at an alternative ethic that extends empathy beyond our own scale.

Huck's hybrid perspective highlights the failure because he can see the irony in the microbes' treatment of the swink as they are the "despised microbes" from another perspective. Huck's microbe friend, who he calls Benjamin Franklin, points out that there are "wee creatures" that live inside the microbes and "feed upon [them], and rot [them] with disease" (454). He laments, "Ah, what could they have been created for? they give us pain, they make our lives miserable, they murder us—and where is the use of it all, where the wisdom?" (454). Huck, with both microbe and human perspectives, points out the irony and in so doing extends the irony even further. He asks the reader, "You notice that? He did not suspect that he, also, was engaged in gnawing, torturing, defiling, rotting, and murdering a fellow-creature—he and all the swarming billions of his race. None of them suspects it. That is significant. It is suggestive—irresistibly suggestive—insistently suggestive. *It hints at the possibility* that the

procession of known and listed devourers and persecutors is not complete" (454; emphasis added). The irony that the microbe does not know himself to be a microbe extends to the human because there is the possibility "that man is himself a microbe" and just as easily ignored by some larger being in the universe (454). This suggestion "hints at the possibility" that a singular perspective is insufficient for ethical considerations across scalar differences. In presenting not only the microbial perspective, but also by imagining this list of "devourers and persecutors," Twain hints at innumerable other perspectives that may see humanity differently. As Patricia Mandia argues, "Twain reveals that even though people's view is restricted because they have been limited to one perspective, the possibility exists that there are other perspectives and other realities."⁴³ While Conn's friendly microbe opened a space to think differently about the microbial world and the study of it, Twain tests that line of thinking and identifies the limitations of considering microbes our friends. So long as we maintain the singular perspective that evaluates microbes on human terms, we can only imagine beings smaller than ourselves as living solely for the purpose of serving our needs. While Twain's irony demonstrates how these singular worldviews may fail, the same irony suggests an alternative and perhaps a more inclusive worldview that values all forms of life. If both humans and microbes get it wrong, perhaps there is an alternative that can reconcile these perspectives into a yet to be imagined ethical structure. Twain, humorist and satirist that he is, does not represent that ethic for us, but his juxtaposition between human and microbe worlds opens a space to imagine otherwise.

Conclusion

Both Conn and Twain explored the possibility of expanding ethics to include minute forms of life near the turn of the twentieth century. In my analysis of these attempts, I have identified significant limitations to the line of thinking that unproblematically extends ethical status to all matter. The figure of the "friendly microbe" may have the potential to inspire differently oriented ethical structures, but it has primarily been leveraged to human ends. For Conn, ascribing value to microbes in turn ascribes value to the study of microbes and therefore to his profession as a bacteriologist. While he frames his dedication to recuperating the reputation of microbes as an ethical project to correct their unjust condemnation, his seemingly radical rethinking of the

microbial world ultimately reinscribes human dominion over microbes. Which microbes are condemned or exonerated still relies on human values and human-scaled ethical paradigms. For Twain, extending ethical considerations to microbial life becomes possible only when inhabiting that world. Huck's hybrid perspective allows for humans to see microbes as moral agents, but it becomes practically impossible to extend moral standing to microbes when we imagine an infinite number of progressively smaller universes. In narrating the failures of microbial ethics, Twain highlights the failures of human ethics, even when it attempts to account for minute forms of life.

My analysis of these texts sheds light on the project of recent literary, science, and cultural critics who, in extending human ethics to nonhuman entities, hope to engender a more ecological ethic. The ethical failures in the texts examined here demonstrate the practical challenges of radically inclusive ethical structures that place all forms of life on a horizontal rather than hierarchical line. Twain and Conn show us that even when we try to imagine alternatives to human ethics, we cannot escape our own anthropocentric thinking. It takes incredible effort to inhabit these perspectives and continued imaginative experiments can facilitate an otherwise unimaginable microontology.

NOTES

1. Conn, *Story of Germ Life*, 129.
2. Conn, *Story of Germ Life*, 129.
3. St. Pierre, Jackson, and Mazzei, "New Empiricisms," 101.
4. Hird, *Origins of Sociable Life*, 1, 26.
5. Twain, "Three Thousand Years Among the Microbes," 523. Subsequent references to this text are cited parenthetically in the body of the article.
6. Here, I reference the three manuscripts recovered by John S. Tuckey and discussed in *Mark Twain and Little Satan* (1963), not *The Mysterious Stranger: A Romance* (1916), that was first published serially in *Harper's Magazine* beginning in May 1916 and in book form later that year. *The Mysterious Stranger: A Romance*, was long considered to be a nearly-finished text that required only small editorial changes to be posthumously published. However, when John S. Tuckey published *Mark Twain and Little Satan* in 1963, he demonstrated that Twain had not written a singular manuscript of the book, but rather made at least three separate and incomplete attempts. According to Tuckey, Albert Bigelow Paine, Twain's literary executor and biographer, and Joseph Duneka, Harper & Brothers general manager, combined "The Chronicle of Young Satan" fragment with an unrelated chapter that Paine found in Twain's papers to present what they claimed to be the complete novel and therefore departed significantly from Twain's manuscripts (10).
7. Twain, *Mark Twain's Notebook*, 170.
8. Altschuler, *Medical Imagination*, 8.
9. Hume, "Twain's Satire," 72-73.

10. Hume, "Twain's Satire," 75.
11. Alan Gribben's annotated list of Mark Twain's library collection includes Conn's book, making it clear that Twain was familiar with the text. Gribben, however, lists the text as "*Life of the Germ* by R. D. Conn," which is likely a result of Henry J. Lindborg's misspelling of Conn's name in the body of "A Cosmic Tramp." Lindborg does, however, accurately attribute the book to H. W. Conn in his footnote.
12. Conn, *Story of Germ Life*, 96.
13. In Twain's fictional microbial world, the microbes call themselves Sooflaskies and their own microbes "swinks." For ease of reading, I will use the term "microbe" rather than "Sooflasky" when referring to the microscopic characters in "Three Thousand Years Among the Microbes."
14. Conn, "Report on the Outbreak," 152.
15. Servitje and Nixon, "Making of a Modern Endemic," 11.
16. Cohen, *Chronicles*, 16.
17. Conn, "Some Uses of Bacteria," 258.
18. Conn, "Professor Herbert William Conn," 275; emphasis in the original.
19. Conn, "Bacteria in Our Dairy Products," 763.
20. Cohan and Boesel, "Herbert W. Conn," 406.
21. Conn, *Story of Germ Life*, 104.
22. Lindborg, "A Cosmic Tramp"; Mandia, "'Mysterious Stranger' and '3,000 Years.'"
 23. Walsh, "Rude Awakenings"; Hume, "Twain's Satire."
 24. The manuscripts include "The Chronicle of Young Satan," written between November 1897 and September 1900; "Schoolhouse Hill," written between November and December 1898; and "No. 44, The Mysterious Stranger," written between November 1902 and October 1903, January through June 1904, June and July 1905, and finally 1908. While Tuckey uses different fragment titles in *Mark Twain and Little Satan*, in this essay I use the fragment titles and page numbers from William M. Gibson's edition of *Mark Twain's Mysterious Stranger Manuscripts*. Gibson dates each fragment based on references to the work in Twain's notebooks and letters. See his introduction for an accounting of when Twain likely drafted each fragment.
 25. Twain, *Mysterious Stranger*, 51.
 26. Twain, *Mysterious Stranger*, 49.
 27. Twain, *Mysterious Stranger*, 49.
 28. Twain, *Mysterious Stranger*, 50.
 29. Simmons, "Who Cares," 137.
 30. Twain, *Mysterious Stranger*, 60.
 31. Twain, *Mysterious Stranger*, 72; emphasis in the original.
 32. Twain, *Mysterious Stranger*, 73.
 33. Twain, *Mysterious Stranger*, 114.
 34. Twain, *Mysterious Stranger*, 113.
 35. Twain, *Mysterious Stranger*, 404; emphasis in the original.
 36. Twain, *Mysterious Stranger*, 404; emphasis added.
 37. Twain, *Mysterious Stranger*, 404; emphasis added.
 38. Obenzinger, "Better Dreams," 181.
 39. Obenzinger, "Better Dreams," 181. For Obenzinger, this takes the shape of post-colonial and post-imperialist "modes of narrative and identity" (181).
 40. Twain's only direct reference to the Moral Sense in "Among the Microbes" appears in an extensive footnote that recounts the ramifications of Huck translating the word "microbe" to mean "*The Creature With The Moral Sense*" (440; emphasis in the original). The microbes are shocked by his emphasis on "the" because it sounds like an honorific. For microbes, the Moral Sense, *creates* wrong so they are ambivalent about its value. Relegating the entire passage to a footnote suggests that Twain was rethinking his modes of inquiry from "The Mysterious Stranger"

manuscripts to "Among the Microbes." The question of moral sense as humanity's unique quality becomes secondary to the kinds of ethics that a new perspective might engender.

41. Peyser, "Mark Twain," 1016.
42. Twain, *Mysterious Stranger*, 113.
43. Mandia, "Mysterious Stranger," 202.

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