Foreign Relations

Utopian Fictions and the Birth of Scientific Citizenship

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The circulation of terms like "citizen science" and "scientific citizenship" underscore the political logic by which both academics and the general public conceive of regimes of knowledge. These terms imply rights and responsibilities associated with access to certain forms of knowledge about the natural world.[1] "Scientific community" generally refers in a limited sense to researchers, practitioners, and other professionals involved with the institutional production and application of a narrow array of sciences; the phrase posits and defends a friendly but distinct border between those credentialed professionals and the general public. "Scientific citizenship," on the other hand, is a plastic term that sometimes extends rights and responsibilities of the scientist to the public—rhetorically, if not practically, democratizing science—and sometimes figures the scientist as a sort of supercitizen of the larger society, encouraging responsible application of their inherently powerful position. It most often refers to communications and exchanges (of knowledge, trust, and credit) at the border between the scientific community and the general public, often troubling that boundary as it attempts to invoke it—a logic that also obtains in political rhetoric.[2] Appropriating the political category of citizenship to imagine a separation between science and the rest of society serves to justify the institutional priority of defending that border from erasure even while it narrates its intention to reach across it.

The implications of this metaphor and its intimate connection with authority, truth value, and political power can be better understood by tracing the origin of modern science's culture of citizenship to its roots in the so-called "Scientific Revolution." The seventeenth century's milieu of political and social contexts gave rise

1 See Mita Banerjee's chapter in this volume, "'What the Eyes Don't See': Medical Citizenship and Environmental Justice in Mona Hanna-Attisha's Medical Memoir," for an investigation into how citizen science and narrative medicine converge during the water crisis in Flint, Michigan.

2 For more on the implications of social exchanges that happen at the disciplinary boundary imagined between "science" and "non-science," see Thomas F. Gieran.

to both our modern understanding of citizenship and the institutional reorganization of authority over natural knowledge. At that time, the emerging discipline of experimental science was writing itself into being as the exclusive arbiter of truth about the natural world—grounded, ostensibly, in its method, which relied explicitly on observation and experimentation and implicitly on self-selecting investment of credit and authority.[3] This method, modeled upon Francis Bacon's vision of scientific orthopraxy, gave rise to a modern notion of authority over nature that would end up being crucial for modernity and its increasingly secularized claims about states, sovereignty, and citizenship. Both rely on invoking an imagined separation between the public and private spheres, producing and reproducing a narrative that valorizes objectivity while investing real authority and power in specific bodies.

This essay considers two works of seventeenth-century fiction, written by authors of scientific treatises, that focus on voyagers' discoveries of hidden societies and their engagement with the scientific knowledge production happening in each. Both Bacon's *The New Atlantis* (1627) and Margaret Cavendish's *The Description of a New World, Called the Blazing World* (1666) narrate border-crossing adventures in which travelers enmesh themselves ritually, tediously, and imperfectly into new worlds. Both present models of organized, methodical inquiry into the natural world; both assign high importance to border control, connecting it intimately with conditions of knowledge production. While Bacon generates an austere and straightforward vision of masculine authority, later so pivotal for science's self-conception, Cavendish raises troubling questions about which bodies can be included in the production of authoritative knowledge and why. These two fictions reveal a tension between disciplinary gatekeeping and the very language of authority that writes this emerging discipline into being. In considering Bacon and Cavendish's tales alongside their antipodal relationships to the Royal Society of London, I focus on the implications of the figuratively reproductive body (and its strategic rhetorical erasure) on the early negotiation of what will come to be called "scientific citizenship." Our contemporary scientific community still struggles to overcome these implications as we wrestle with an array of life-or-death challenges that occupy the intersection of scientific knowledge, authority, and global politics.

Public and Private

Hannah Arendt posits a theory of citizenship that relies upon producing and maintaining the spatial and functional separation of the public sphere from the private.

3 For continuity and brevity, I am using the terms "science" and "scientific" somewhat anachronistically throughout this essay as a shorthand for activities and products that would have, in the seventeenth century, more properly been called "natural philosophy."

In the public sphere,[4] like the idealized conception of the Athenian *polis*, citizens interact and exchange ideas; the public represents a conceptual and literal space for discourse, a constructed "space of appearance" where people come together, recognize each other, and through reason make responsible joint decisions (198). The public sphere permits and encourages plurality, because it functions as a space where people can represent themselves to each other as individuals, irrespective of the social categories of identity that they inhabit by virtue of their bodies. This spatial distinction structures Arendt's concept of citizenship as being bound to a public-facing context, and political metaphors like "scientific citizenship" rhetorically extend this conception to disciplines of science. Distinct from other categories of political identification and belonging, "citizenship" generally implies reciprocity of duty that infuses rights with responsibilities—expectations as well as privileges, often viewed as mutually constitutive. In the Global Citizenship Observatory's definition, citizenship confers "rights and duties" and is both "a legal status and relation"—sometimes idealized as a way of being, an attitude, and a relation, while at the same time it is policed as a received/assigned condition ("citizenship"). Citizens are distinct from subjects in this way, and the status benefits from the term's connotation of merit, which is to say that citizenship is imagined as a set of ideal behaviors as well as an assigned or otherwise passive condition. The status requires relational duties.

For all of these reasons, citizenship is implicitly bound up with policing borders and with categorizing bodies. The category of citizenship relies on imagining the body as a repository of the essential quality of belonging, as is evident in policies surrounding citizenship through descent, or *jus sanguinis* ("right of blood"), and birthright citizenship, *jus soli* ("right of soil"). The notion of "naturalized citizens" reveals the extent to which both forms of citizenship are imagined as organic states of being rather than artificial, rhetorically authorized conditions; implying that the body holds a "natural" citizenship obscures the agency involved in establishing this condition. And yet citizenship clearly also denotes a *relation* between the private body and some external public which can determine its membership. Some boundary, in other words, must precede the authority required to adjudicate a person's relationship to it. Since authority to define inside/outside must come from inside, this rationale often requires an origin story—a history that establishes the founding condition or event from which the governing body derives authority to delimit citizenship. However arbitrary geographic political boundaries may be, an origin myth provides

4 Jürgen Habermas introduced this term into scholarly discourse with *The Structural Transformation of the Public Sphere*. His work generated substantial debates, especially among critics informed by feminist theory, such as Nancy Fraser; see, for example, Craig Calhoun, *Habermas and the Public Sphere*; Seyla Benhabib, "The Embattled Public Sphere."

a guiding rationale, [5] a narrative of how and why the current conditions are right and natural. Heritage, heroism, or divine prerogative: there is always an Excalibur. Scholars agree that narrative fiction was often invested in naturalizing the illusion of a clear and stable boundary between the public and private spheres. Elizabeth Maddock Dillon, for example, has shown how eighteenth-century fiction served as public reasoning documents, which circulated within an ostensibly disembodied "public" space while depicting the "private" realm on the page, discursively reproducing and naturalizing the split between public and private. This same naturalization of public and private, I argue, structured even earlier fictional explorations of scientific praxis, shaping the form of knowledge production that we will come to call "science."

Disciplines of knowledge production must also be constituted by imagined boundaries, which require policing much as state borders do. Geopolitical metaphors are commonplace in intellectual histories, especially science studies; Michel Foucault and Bruno Latour, for example, organize their critiques around figuring disciplines as "regimes" and "fiefdoms" and other political power centers, stressing the extent to which scientific discourse relies on narrative to justify (often-concealed) practices of inclusion and exclusion (Foucault 133; Latour 8). But while the body has long served as a physical space and as an imagined entity that posits a boundary between private and public in political and scientific discourses, feminist critics have revealed this boundary to be constructed and unstable,[6] a division historically and conceptually reinforcing a gendered hierarchy of power that served to reconcile Enlightenment ideals of individual liberty with the reality of social difference and patriarchy. The "scientific community" depends on practices rooted in the "Scientific Revolution," a sea change in practices of knowledge production that culminated in the calving of science from philosophy in the seventeenth century. Yet modern science's origin myth takes an overtly gendered view of the mind and its products, one that is predicated on the public/private divide, and it relies on the naturalized hierarchy of gender to elevate some perspectives above

5 I am applying the idea of origin myths as Mircea Eliade conceives of them in *Myth and Reality*, in terms of their social function as primarily a way to account for, naturalize, and make sense of present conditions.

6 There is a wealth of scholarship that participates in this conversation: see, for example, Nancy Fraser, "Rethinking the Public Sphere"; Joan Wallach Scott's landmark *Gender and the Politics of History*, which argues that the relegation of women to a feminized domestic sphere, separate from the political, is a tool of subordination; Catharine McKinnon, *Feminism Unmodified*, which explores gender, the body, civil rights, and the law; *Feminism, the Public and the Private*, edited by Joan Landes, which offers feminist critiques from multiple disciplines; *Languages and Publics*, edited by Susan Gal and Kathryn Ann Woolard, which examines "the public" as a "language-based form of political legitimation" that is connected to the construction of authority (4).

others. Although exclusion is usually naturalized with an official rationale, the history of the academy includes countless examples of how the body often forecloses belonging. Juxtaposing fictional narratives by Bacon and Cavendish foregrounds this naturalization and its fault lines: Bacon, the imputed "father" of empiricism, imagines the abstraction of pure unmediated reasoning, while the marginalized Cavendish, as we will see later, engages with the myriad ways in which some bodies must be excluded in order to sustain that fantasy.

The Royal Society: Citizens of a Public Science

In seventeenth-century England, The Royal Society of London, modeled on Bacon's prescriptions, sought to claim for a self-selecting group of wealthy, well-connected men authority over natural knowledge.[7] In what Eve Keller calls their institutional "myth of origins," Thomas Sprat, a Fellow of the Society, writes a fawning history, apology, and virtual hagiography in language that vigorously and sometimes defensively argues for both the indispensability of the Society's founding and the natural fitness of its members to serve as arbiters of such authority ("Producing Petty Gods" 447). The urgent need to mark this line by establishing an organization, and to promote it in this way, suggests that the boundary and the authority it conferred were not otherwise extant. In fact, there was considerable skepticism, even among their learned peers, about the Society's program. Proponents of experimental science strove to present it as a new discipline that was distinguished from others specifically by virtue of its methodological difference. Bacon's experimental model promised to correct the perverting influences of bodies and minds on the study of nature. They promoted these methods as a way to produce knowledge uncorrupted by subjectivity: in this vision, the person was not the source of knowledge but rather a witness to the experiment's trial of nature. The knowledge was disembodied, separate from the subject—public reason operating operating independently of the private body that offers, as Steven Shapin puts it, a "disengaged and nonproprietary presentation of authorial self" (179).

Claiming authority as a purportedly objective witness, however, requires creditability, some pre-existing belonging. The Royal Society grew out of an "invisible college" of natural philosophers who were already gathering before the official establishment of the Society ("History of the Royal Society"). The term suggests an implied, "invisible" culture of citizenship that eventually became formalized—not only visible but sanctioned by the King and populated entirely through election, creating

7 For a thorough analysis of the connection between the institutional aims of the Royal Society and the historically specific priorities of the English upper class in connection with the Restoration, see P. B. Wood.

a closed pipeline controlled by current members. Envisioning the early Royal Society as a culture of citizenship reveals that its explicit and implicit conditions of inclusion center the body in determining belonging. In his *History of the Royal Society*, Sprat makes an argument for the qualifications of Society members based on what he lauds as a kind of diversity—that they admit "Men of all religions" and "Of all countries" and "Of all professions (64–65).[8] However, other parts of the *History* offer qualifications to these categories: he had earlier called for "all civil nations" to join arms against the "common enemy of Christendom"; other context confirms that by "all religions" he means only sects of Christianity and by "all countries" he means only those nations that he deems "civil" (57).[9] He follows this section with one entitled, "It consists chiefly of gentlemen," which argues, essentially, that wealth inoculates against corruption. According to Sprat, the Society ought to include only "such men, who, by … the plenty of their estates, and the usual generosity of noble blood, may be well supposed to be most averse from such sordid considerations" (67). Sprat argues here that containing authority within a group made up primarily of men with inherited wealth solves the otherwise insurmountable problem of corruption in knowledge production.[10] He explains that wealthy men are "free, and unconfined," which he says protects against "corruptions" such as profit motive and institutional hierarchies (67). Exemplifying the logic of Engin Isin's theorization of *acts of citizenship*, the Society's founders were determined to "call established forms of responsibilization into question" and replace scholastic authority with their own form of gatekeeping (37). It was important to tether the logic of this gatekeeping to characteristics of the individual rather than to method, because, as Deborah Harkness and Pamela Smith have shown, the work of science largely developed out of practices of observation and craft already commonplace in the domestic lives of everyday folk. Inclusion and authority did not follow naturally from that labor and expertise: the Society's exclusion of women as Fellows was a given, and Sprat takes no pains to offer an explanation or apology for it.[11] By the time Margaret Cavendish—a prolific natural philosopher in her own right—became the first woman to attend a meeting in 1667, she was crossing a well-defended border as an acknowledged outsider. Her

8 Note on spelling: I have silently modernized spelling and punctuation in the seventeenth-century texts for ease of reading.

9 For further discussion on how citizenship has been deployed as an arbiter of the false boundary between the civilized and the uncivilized with regard to Indigenous Peoples, see Vanessa Evans's chapter in this volume: "'You've Heard it Now': Storytelling and Acts of Citizenship in Cherie Dimaline's *The Marrow Thieves*."

10 For a treatment of how the Royal Society evaluated reports from outsiders, including travel narratives and cases where only a secondhand report was available, see Barbara J. Shapiro, *A Culture of Fact: England 1550-1720*, especially Ch. 3, "Discourses of Fact," and Ch. 5–6, "The Facts of Nature [I and II]."

11 The Royal Society did not admit any women Fellows until 1945.

body rendered her alien even to an emerging field being defined by its attempt to separate authority over knowledge production from the body of the practitioner.

The rationale for exclusion centers qualities connected to one's imagined fitness for participating in the public sphere, underscoring the importance of that division to the Society's gatekeeping. Sprat pits private against public explicitly in describing the impact of the Reformation on textual archives:

> The first thing that was undertaken, was to rescue the excellent works of former writers from obscurity. To the better performing of this, many things contributed about that time. Amongst which … the dissolution of abbeys: whereby their libraries came forth into the light, and fell into industrious men's hands, who understood how to make more use of them, then their slothful possessors had done. (23)

This characterizes the takeover of knowledge from scholastics not in terms of a democratization of that knowledge but rather as a process by which self-described "industrious" men claimed control over resources in order to "make more use" of them than their animal-like former stewards. Sprat's language obscures agency: he begins with passive voice, then has an unnamed entity "rescue" texts, before shifting agency to the knowledge itself and finally to nature—the libraries "came forth" and then "fell" into the right hands. Both the texts and nature itself seem to be choosing sides rather than being acted upon. This romantic fable positions scholastics as private hoarders of knowledge and the Society as a well-lit public square—but, given that the Society's membership was also closed and maintained a secrecy code, this "rescue" of archives seems more a colonizing move than a democratizing one.

The priorities for this new method of inquiry, and its implied restriction to an aristocratic, masculine authority, were given their iconic articulation by Bacon. In *Novum Organum*, Bacon sets forth his plan for a reworking of the methods of natural philosophy, which he characterizes as aiming to extract truth from matter in order to reclaim mankind's domination over nature. Sprat's *History* celebrates the experimental method as a corrective for specific defects of thought, the "idols" that Bacon enumerates in *Novum Organum*. But Bacon's program of experimental philosophy was an explicitly masculinist one, and one project of the Royal Society was to make that gendered separation key to what its members saw as a productive and socially beneficial hegemony over the production of natural knowledge. Sprat's introductory material makes explicit the Society's investments in masculinizing philosophy; its dedicatory poem even muses that the personified Philosophy, gendered "she" in the classical tradition, ought to be "he," and it defines its intellectual products as "masculine" in opposition to the "feminine" mode of poetry: "[A]s the feminine arts of pleasure, and gallantry have spread some of our neighbouring languages … so the English tongue may also in time be more enlarged, by being the instrument

of conveying to the world, the masculine arts of knowledge" (129). Unlike feminine language that invents or creates, their masculine language simply "conveys." The implicit claim of experimental science, then, is that Nature is telling its own story and that these "masculine" methods convey that narrative unmodified; in this way, their role in its construction is rendered invisible.

In his utopian fable *The New Atlantis*, Bacon makes this rhetorical erasure of subjectivity into one of the defining characteristics of Bensalem, where he will imagine a society built around his principles and practices of knowledge production. Bensalem, explains the narrator, is "known to few, and yet knew most of the nations of the world," situated in a "secret conclave of a vast sea," where it is hidden from the sight and knowledge of other nations (272). The islanders strictly enforce their entry policies with the narrator's company of travelers, first keeping them cloistered indoors and thereafter giving them freedom to roam only within a tightly controlled distance from the Strangers' House where they are lodged. The islanders explain that they prioritize "preserving the good which cometh by communicating with strangers, and avoiding the hurt" (280). They maintain strict secrecy when interacting with foreigners abroad or on their own shores, even obscuring their national identity when traveling, and they employ an armed patrol to guard their borders and control entry. They also tell of their own regular explorations overseas, through which they maintain the power advantage gained by the island's hiddenness: "we have twelve that sail into foreign countries, under the names of other nations, (for our own we conceal); who bring us the books, and abstracts, and patterns of experiments of all other parts" (297). They send out explorers to report back "knowledge of the affairs and state of those countries … and especially of the sciences, arts, manufactures, and inventions of all the world" (288). The narrator wonders at this asymmetrical invisibility, which does not seem humanly possible: "[I]t seemed to us a conditioner and propriety of divine powers and beings, to be hidden and unseen to others, and yet to have others open and as in a light to them" (275). This aspect of Bensalem's project—no less than "finding out of the true Nature of all things"—is essential to understanding Bacon's vision of an intellectually responsible praxis for producing natural knowledge; it also underscores the extent to which the story tacitly acknowledges the intimate connection between knowledge and political power.

In the apparent climax of the tale, the group elects the narrator to receive a private audience with one of the "Fathers" of Salomon's House, the pride of Bensalem, a learned (patriarchal) Society that would directly inspire the founders of the Royal Society. One Father regales the narrator with a "relation of the true state of Salomon's House": structured like a scientific paper, it includes "the end of our foundation," the "preparations and instruments we have for our works," the "several employments and functions whereto our fellows are assigned," and finally the "ordinances and rites which we observe" (290). The Father enumerates these elements—introduc-

tion, materials, methods, references—at length; over 100 sentences begin "we have" or "we make," detailing the resources, instruments, and labor that Salomon's House employs. Interestingly, the narrator witnesses none of this himself; all of the knowledge of Salomon's House derives from the relation he hears in private after his group elects him to serve as witness.

Reproducing Knowledge

Bensalem's careful attention to controlling narratives and dissemination of knowledge echoes the commitments to the masculinized system that Bacon sets forth in *Novum Organum*. He admonishes scientists to avoid false "idols" of thought which arise in part from the "mode of impression" (40). His aphorisms on the idols betray a deep mistrust of the role of language in knowledge production: "it is by discourse that men associate, [but] ill and unfit choice of words wonderfully obstructs the understanding" (41). In Bacon's view, language is a means by which a subject imposes form upon the matter of thought, and the violence that he perceives in this imposition is reflected both in his choice of metaphors and in his expressions of concern over the use of metaphors. He bemoans that words are unstable vessels of meaning, and especially the way they leave potentially contagious marks of subjectivity upon ideas. These concerns about "impression" are deeply connected with early modern ideas about gender and the body: in seventeenth-century England, there was widespread belief in "maternal impression," the idea that a pregnant woman's mind could physically mark the body of her fetus as a result of something she imagined, saw, or desired. This idea circulated among physicians and in print materials that purported to educate readers about the mysterious mechanisms of human reproduction. The pseudonymous *Aristotle's Compleat Master Piece*, for example, advises: "[T]he imagination of the mother works forcibly upon the conception of the child. Women therefore ought to take great care that their imaginations be pure and clear, that their children may be well formed" (46). Such warnings reveal anxieties not only about the power of a mother to physiologically shape another body but also about the possibility that what happens in the hidden, secret interior space of one body can have a lasting and material influence on future generations. Maternal impression is figured as an act of inscription, a form of authorship, and because authorship is a generative act that neatly aligns with the process and function of biological reproduction—giving form to what is "inside" the body and then putting it "outside" into the public sphere—they are effortlessly analogous, and reproductive metaphors of authorship are ubiquitous.

In discourses about the "new science" in seventeenth-century England, experimental philosophers were invested in making their subjectivity invisible to the receiving public; they claimed authority in part by purporting to transmit Nature's own

narrative unmodified, uncorrupted by the private, embodied individual. Anxieties about authoritative knowledge often surface in metaphors of reproduction not only because both deal with bringing what is "inside" the body "out," but also because both threaten to pass on undesirable traits—errors or defects—by impressing them into new bodies or minds, thus carrying patterns of deformity forward through time. It is not surprising, then, that prescriptions for preventing monstrosity by controlling "impression" pervade the discourses surrounding both the production of knowledge and the production of bodies. Such metaphors alternately structure and challenge both Bacon's practical advice to natural philosophers and his work of fiction: echoing the above advice to pregnant women, he insists on the need to "fortify" one's mind against corruption to keep the mind "clear" (40). He also signals general concerns about potentially monstrous generativity, which Sprat later repeats. Salomon's House demands "pure" descriptions of nature, absolutely disallowing, "under pain of ignominy and fines," any portrayal that is "adorned or swelling" or bears any "affectation of strangeness" (297). According to Sprat, the Royal Society maintains "primitive purity" in its descriptions, with a "mathematical plainness" and a "close, naked, natural way of speaking" (113). They share a horror of the "swelling" and figurative generativity that they associate with impurity—and with the language of the "feminine" arts.

A similarly gestational logic structures the way the travelers in *The New Atlantis* receive knowledge about Bensalem—gradually, and on a strictly regimented time scale. When the sailors wash up on the shores of Bensalem, the islanders prescribe several distinct stages of concealment and confinement that the travelers must follow before entering the public space and gaining access to the rituals and knowledge therein. This economy of time echoes Pseudo-Aristotle's timeline of fetal development: "The forming of the child in the womb of its mother, is thus described: Three days in the milk, twice three in blood, twelve days form the flesh, and eighteen the members, and forty days afterwards the child is inspired with life" (49–50). The narrator characterizes the travelers' situation during this waiting period as a space "between death and life, for we are beyond both the old world and the new," a figuratively gestational liminality overlaid with a geopolitical framework (270). That implicitly gestational logic structures the strictly controlled conditions under which they (and we) eventually gain access to Bensalem's public square and gain access to the relation of Salomon's House, Bacon's vision of an ideal regime of knowledge production.

A reproductive framework for understanding knowledge production thus shapes the logic of Bacon's vision. It is significant that the gendered nature of this division resonates with the gendering of public and private spheres, especially when considering the question of how the "citizenship" in "scientific citizenship" should be understood. In *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*, historians of science Steven Shapin and Simon Schaffer argue that the Royal Society

constructed a new understanding of scientific knowledge by creating a new *social technology* for evaluating knowledge claims, one which appeared to operate as a sort of public square along the lines of Arendt's model, and a new *literary technology* by which the attendant witnesses disseminate their narrative. They point out that the experimental method, now naturalized and widely regarded as *the* scientific method, had to be striven for, argued for, and defended from criticism.

Feminist science studies scholars have shown that the "objectivity" at its center also had to be constructed and naturalized, and that myths of gender provided a foundation. In *Modest_Witness@Second_Millennium.FemaleMan_Meets_OncoMouse*, Donna Haraway deconstructs the "modest witness" figure at the center of the Baconian ideals of the Royal Society, calling attention to the subject position that makes it possible. She points out that the mode of pass-through witnessing that rendered knowledge "objective" was only possible for a small subset of people—white, upper-class gentlemen—and suggests that Shapin and Schaffer's account of the Society's method is limited by their failure to fully unpack the implications of subject position (including gender, race, class, and national origin) on the construction of authority in seventeenth-century experimental science. Certainly, these categories come in and out of view in Sprat's *History*: for example, he emphasizes the importance of elevating "experiences" over "imagination," right after laying out an argument for excluding most people from access to those experiences based on elements of social identity (117). And as Haraway points out, it was precisely these embodied categories of identity that allowed some men's subjectivity to be obscured, thereby producing the authority that we call objectivity.

A View From Somewhere

Enter Margaret Cavendish. The Duchess of Newcastle was an enthusiastic autodidact keenly interested in natural philosophy. As a royalist, her situation during and following the English Civil War and Interregnum heavily influenced the attitudes toward political power and authority that both her fictional and philosophical writings reveal. After returning to England upon the restoration of the monarchy in 1660, Cavendish published (among other texts) *Philosophical and Physical Opinions* (1663), *Philosophical Letters* (1664), and an expansive critical commentary on scientific theory and practice titled *Observations upon Experimental Philosophy* (1666), which was printed together with a short novel entitled *The Description of a New World, Called the Blazing World*, a work of fancy/fiction that served as a companion piece to the serious treatise. Bound together, these two texts represent a gendered dyad, stereotypically masculine and feminine modes of delivering similar central arguments. Like Bacon's *New Atlantis*, Cavendish's *Blazing World* is preoccupied with discourses of natural knowledge and exploring how authority obtains both through relations

among people across borders and through relations of knowledge, history, and intelligence.[12] Both feature travel narratives with utopian elements, both follow the adventures of strangers in a previously unknown land, and each explores a society centered upon the production of knowledge about the natural world. But Cavendish's *Blazing World* responds from a self-consciously outsider perspective not only to Bacon's work but to many of the prominent figures and practices of the new experimental methods of natural philosophy.

From the outset, *The Blazing World* evinces a complex relationship with storytelling, gender, and political boundaries. The story opens with a border-crossing that illustrates the implications of being an outsider: "A merchant, traveling into a foreign country, fell extremely in love with a young lady; but being a stranger in that nation, and beneath her in both birth and wealth, he could have but little hopes of obtaining his desire" (154). Rather than a first-person relation, with the narrator purporting to tell his own story, as in *The New Atlantis*, Cavendish gives us a third-person omniscient narrator, adding a degree of removal between the events and the reader. The first person that the narrator mentions is the merchant: we hear about his identity, his desires, his companions, his intentions, his enumerated resources, his plans, and the obstacles in his path. It appears to be his story—until a few pages later when, after abducting the young lady and sailing off with her, he dies of exposure and abruptly exits the tale. It turns out that this is not his story at all; it is hers. While the polar cold kills everyone else on board, the lady survives "by the light of her Beauty, the heat of her Youth"—the same qualities that had incited her kidnapping, suggesting value and virtue entangled in an embodied form of subjectivity that is sometimes erased from agential control (162). After drifting through a small portal that connects the poles of her world and the Blazing World, she encounters a group of Bear-Men, who lift her from the boat and convey her a great distance to the palace, where the Emperor, also taken with her beauty, marries her and grants her absolute power over the Blazing World. To this point she has exhibited no agency at all; her passivity is exaggerated, and her body's status as an object of men's desire—rather than her own subjectivity or intention—moves the story along until she transforms instantaneously from cargo to absolute dictator without ever being simply a participant.

After achieving political power through the only means available to her, marriage, the newly-appointed Empress sets her sights on knowledge, expressing her

12 For this multilayered understanding of the term "relation," I am indebted to Frances E. Dolan, whose 2013 book *True Relations: Reading, Literature, and Evidence in Seventeenth-Century England* takes up various connotations of the word—narration, reporting, association, connecting and being connected—to explore how both writers and readers invest texts with meaning, as well as the role that social relations play in constructing truth.

desire "to be informed" (163). Her first act is to establish schools and societies, encouraging her subjects—various races of man-animal hybrids—to engage in academic occupations according to their "nature" (163). She solicits briefings on their religion and politics—like Bensalem, the people of the Blazing World are enthusiastic monotheists, monarchists, and patriarchists—and she commands "true relation[s]" of natural phenomena, synthesizing and adjudicating the diverse perspectives that the various "vertuosos" provide (165). Unlike Bacon's, this model depicts knowledge-making as discursive, situated, and relational, while also highlighting the role of political power in producing authority over truth claims. The story portrays the dissemination of knowledge as similarly fraught. When the Empress feels she's discovered (read: decided) enough about the natural world, she resolves to publish a book of knowledge and asks the spirits that live in her world to find her a learned scribe. When she suggests a series of celebrated philosophers—Newton, Helmont, Descartes, etc.—the spirits remind the Empress that these men would never agree to record a woman's knowledge, and they instead nominate the Duchess of Newcastle (Cavendish's semi-autobiographical avatar; for clarity, I will continue to refer to the author as Cavendish and will reference the character as the Duchess). Far from erasing the authorial function of narrative-making, Cavendish writes herself into the story as a border-crossing, fourth-wall-breaking character who travels between her own world and the Blazing World to serve as the protagonist's scribe, best friend, and sidekick. The two begin a sprawling series of negotiations and adventures that lead them in and out of various social and political situations, culminating in an invasion of the Duchess's world (using submarines for stealth), where the Empress burns cities to the ground in order to establish her native "ESFI"—a nod to Charles II's kingdom of English, Scotland, France, and Ireland—as "absolute monarchy of all that world" (241). While Cavendish's story nakedly advocates for the indispensability of a singular final authority—monarchism, monotheism, monism—it is full of scenes of consultation and collaboration, in which the Empress relies on intelligence reports from her subjects as well as counsel and reasoned discourse. It also calls repeated attention to its narrator being both a disembodied voice and an immutable human body. *The Blazing World* explores limits that exist both physically and conceptually over knowledge production, especially the ineluctable body.

In her critique of the "modest witness" figure, Haraway unpacks the gendered history of "modesty," showing that this word connoted different qualities in men and women. Masculine modesty implied gentility and sophistication, an inclination in public to subordinate one's private self. This kind of modesty served to establish credibility for the gentlemen of the Royal Society: Sprat boasts of their "fair, and equal, and submissive way of registering nothing but histories and relations"—claiming authority through this purported passivity (116). Feminine modesty played out differently: it was about staying out of masculine realms, being

relegated to the private domestic sphere—a physical erasure rather than a rhetorical one. In Bacon's *New Atlantis*, the narrator recounts in exhaustive detail the ritual Feast of the Family, which honors any man in Bensalem who can boast "thirty persons descended of his body": during the Feast, this patriarch is paraded before the crowd "with all his generation or lineage" for an excessive display of pomp, the florid description of which encompasses a significant portion of Bacon's text. Toward the end of a breathless description of this extravagant ritual, the narrator mentions, briefly and in passing, that "if there be a mother, from whose body the whole lineage is descended, there is a traverse placed in a loft above … where she sitteth, but is not seen" (283). In publicly addressing "his" descendants during the celebration of his social impact on Bensalem's community, the father refers to himself as "the man by whom thou hast breath and life," while the mother, her influence confined to her private body, is relegated to silence and invisibility in the rafters (283). This scene effects a clear distinction between the function of public and private spheres, and unlike Cavendish, Bacon does not call further attention to that erasure in his narrative.

Their fictions, the texts subordinated to secondary "feminine" status, help to complete the picture of their respective views on philosophy, providing missing vantage points that reveal how "objectivity" requires erasure. Their inclination to imagine a shift in methodology through a rupture of political and geographic borders, with the travel narrative genre, underscores the inherently political logic of knowledge making. And it is intriguing that both Bacon and Cavendish use the utopian form, in particular, to sketch out their visions: *Utopia* means "no place," and the genre is freighted with implications of impossibility, naïve idealism, and self-conscious attention to artifice. It is striking that these serious natural philosophers, who also wrote technical and scholarly works, chose to explore these ideas through this specific mode. Like Salomon's House's elaborate artificial trials of nature, speculative fiction allows for experimentation in a controlled environment: an imaginative "what if?" exercise. Whereas Bacon carefully glosses over the authorial role in that thought experiment—having his unnamed protagonist stumble upon it and report back—Cavendish openly paints herself as the inventor of both the Blazing World and her philosophy, creating and forming them into being "[out] of the most pure … rational matter" of her mind, not hesitating to reveal the manifold marks of her own authorship (*Blazing World* 250). She is transparent about the formative power of the storyteller as maker and about narrative's implicit dual function of relation and invention[13]. Utopia's denotation of "no place" also serves as a fictional illustration for the topological fiction that Haraway critiques as the impossible "god

13 For a close look at the connection between these two fictional texts and changing understandings of "invention" at this time, see Frédérique Aït-Touati, "Making Worlds: Invention and Fiction in Bacon and Cavendish."

trick of seeing everything from nowhere" in science's construction of objectivity ("Situated Knowledges" 581). Bensalem's almost-magical geographical situation and its strict maintenance of a one-way flow of intelligence that figures them always at the center are rehearsed in the Royal Society's claim to special authority: Sprat invokes Bacon's *New Atlantis* by name in claiming for London the natural right to serve as the "constant place of residence for that knowledge, which is to be made up of the Reports, and Intelligence of all countries" (87). He argues that Nature has uniquely positioned English gentlemen to produce a "universal intelligence," as evidenced by the "situation of England … in the passage between the northern parts of the world, and the southern" (85). This pronouncement encapsulates the un-self-conscious absurdity of "objectivity": England only lies between the north and south from the perspective of England itself. Cavendish pushes against this kind of claim in her *Observations*. In discussing Robert Hooke's experiments with microscopy, in which he notes that different lighting conditions and angles produce wildly different images, Cavendish asks, "which is the truest light, position, or medium, that doth present the object naturally as it is?" (17). This inquiry gets at the crux of the problem of so-called objectivity: the authority to decide which perspective offers the most accurate view constitutes the power to decide what is true. It is now commonly accepted that knowledge is always partial and situated, thanks to scholars like Harding, Keller, and Haraway, but Margaret Cavendish was spilling it out into view and fretting over it in multiple genres and forms as early as 1666, using fiction to show truths that "nonfiction" obscures. Long before terms like "sociology of scientific knowledge" or "situated knowledges" began circulating, she was reflecting on positionality and interrogating the social and political conditions of natural knowledge production.

From the very beginning of *Observations*, Cavendish calls attention to the way that knowledge production depends upon access and authority. The preface bluntly acknowledges gendered differences in access to the resources of knowledge production, apologizing for the shortcomings of her prose, which she attributes to gender inequity in education: "many of our sex may have as much wit, and be capable of learning as well as men; but since they want instructions, it is not possible they should attain to it: for learning is artificial, but wit is natural" (11). Cavendish's ideas were not particularly marginal,[14] but her body still functioned to alienate her from the "learned body" and revealed the limitations of their purported commitment to diversity of perspective. This is not to suggest that Cavendish's fiction manages, or even attempts, to make visible all of the implications of individual subjectivity in

14 For an analysis that corrects earlier characterizations of Cavendish as an anti-experimentalist whose views on natural philosophy were fundamentally at odds with the Society's, see Emma Wilkins, "Margaret Cavendish and the Royal Society."

knowledge production, nor to suggest that it advocates for democratization or equity: it is fundamentally a conservative vision centered on patriarchal and absolutist ideals. However, both Cavendish's *Observations* and her playfully satirical fiction offer a stranger's perspective that helps to complete the picture precisely because her analysis, as Eve Keller points out, is "spoken from outside the discursive and institutional forums it explores" ("Producing Petty Gods" 450). Cavendish enacts in *The Blazing World* the same unpacking and disrupting of the Utopian mythology that Haraway's "god trick" and "view from nowhere" critiques will perform; the intransigence of bodies serves to reveal much of what Bacon's tale obscures about how knowledge production really operates: it is messy, partial, politically fraught, and unable to maintain stable boundaries. Where Bacon's fiction attempts to erase subjectivity and obscure the centrality of the body, Cavendish answers this with a focus on the impossibility of disembodied knowledge: she shows how reporting and inventing are inextricable, and that a story can never really be told from the outside by someone who is themselves inside that story, as humans are inside of nature. Precisely because of her familiarity with exclusion, Cavendish offers a portrait of knowledge production that is more honest about the forms of erasure that keep outsiders out, and about the messiness—connections, shortcuts, partiality—of what goes on inside. Her layering of worlds and narrators performs a metafictional exploration of the permeable boundary between imagination and reason that also rehearses her critique of the selectively permeable boundary that purports to uncouple "science" from philosophy. As the outsider, she provides a missing vantage point that makes visible the relationship between outsiders and insiders and highlights the ways in which the Baconian vision relies on erasure and exclusion.

This essay has sought to show how anxieties about the provenance of knowledge, and especially the embodied nature of its synthesis and reproduction, pervade the Royal Society's overtly political autobiography. These same anxieties surface in Bacon's and Cavendish's fictions, both of which narrate models of ideal knowledge production in strikingly political terms, with an otherwise unsupportable obsession with political border crossing and defense. Both stories enact and reflect these connections and offer insight into the construction of what institutions have since naturalized as a disciplinary border constituted by method rather than identity and the body. The extent to which border crossings and political negotiations drive each story underscores how questions of who belongs on which side of a boundary, who controls that boundary, and by virtue of which embodied qualities, have always been central to establishing scientific authority. This kind of self-erasing witnessing, and the implied transparency of certain bodies, were crucial to the way that the burgeoning scientific community at its inception established the boundaries that continue to define scientific inquiry and regulate what counts as objective truth to this day. The limiting conditions of "objectivity" (and by extension, one's fitness to practice scientific citizenship) remain tied to the body and its relationship to inherently political

boundaries. In elevating what they called a "masculine" method, the Royal Society attempted to naturalize a rationale by which wealthy English men make uniquely competent scientific citizens, their unmarked identities permitting the "universal modesty" that makes some private bodies transparent.

Sprat was correct when he posited "an agreement, between the growth of learning, and of civil government": making knowledge, whether citizen science or scientific citizenship, runs into the same body-centered boundary policing as voting, jury service, and other citizenry functions (29). Enlightenment political ideals and the experimental program of the new sciences both relied on discursive erasure of how regimes produce citizens primarily by excluding based on the body. Calls to democratize knowledge, diversify access, or attend to issues of identity and subject position and the political conditions under which knowledge is produced sometimes draw accusations of "politicizing science"—as if a self-selecting community claiming to report objectively from No-Place were not already inherently political. Knowledge production and political power have always been intertwined, and both derive their authority through narrative-making. The scientific community will need to recognize and confront those connections as we struggle with a multitude of challenges that require their participation and leadership, as many of the threats currently facing the global community constitute a test not only of our sciences but also of our willingness to reimagine our relationship to boundaries.[15]

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15 See Amina Touzos's chapter, "'You're My People Now': *The Last of Us* Series on the Question of Human Belonging and Citizenship during the Age of Pandemics," for a look at how video game studies is engaging with one such threat to humanity and the complications it presents for citizenship and belonging.

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