

Re-Imagining Scientific Inquiry: Affective Practices of Ecological Knowledge Production and Relations of Care in Becky Chambers's *To Be Taught, If Fortunate*

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ABSTRACT: This paper explores the intersection of science, ethics, and affective knowledge in Becky Chambers's contemporary science fiction novella *To Be Taught, If Fortunate* (2019). Through a feminist ecocritical reading of Chambers's queer narrative of interstellar exploration attentive to questions of epistemology as well as affect, we investigate how scientific inquiry can be re-imagined as an ethically aware and emotionally engaged practice that accounts for the influence on processes of knowledge-production of a complex array of interpersonal as well as human-nonhuman relations. In contrast to traditional views of science promoted in the male-dominated tradition of science fiction, we suggest, *To Be Taught* presents a queered vision of scientific exploration as an epistemological project that depends on empathy, relations of care, and a sense of responsibility toward alien—that is, strange but potentially neighborly—forms of life and the ecosystems they inhabit.

Drawing on Helen Longino's feminist epistemology, Alexa Weik von Mossner's affective ecologies as well as queer ecocriticism, we argue that the novella exemplifies how the frequently neglected social, ethical, and emotional dimensions of knowledge production are crucial for rethinking the relationships we establish with the world through science in ways that are less exploitative and less harmful. The queerly embodied and complexly embedded perspectives on ways of knowing depicted in *To Be Taught* together with the queer(ed) enactments of alternative ways of knowledge production that the text presents underscore the value of empathy, ongoing and cautious affective engagement, and care in addressing ecological crises and re-envisioning science as a collaborative, ethical, and passionate endeavor. By examining the narrative's portrayal of alien ecosystems and the scientists' attitudes and responses to their findings alongside their relationships to each other, this paper illustrates how contemporary science fiction such as Chambers's can encourage readers to rethink the ethical obligations of scientific knowledge production within a fragile and interdependent universe.

KEYWORDS: science fiction; Becky Chambers; feminist epistemology; affect; queer ecology

Introduction

Traditional science *fiction* and traditional science *making* have in common the fact that they tend to frame scientific inquiry not just as objective and rational, but often also as detached from ethical or emotional concerns. This is particularly true in the male-dominated “hard sciences” as well as in the equally male-dominated “hard science fiction” (Lovell 70). In stark contrast to traditional portrayal of scientists as conquerors of territories and masters of knowledge, Becky Chambers’s science fiction novella *To Be Taught, If Fortunate* (2019) presents a radically different vision of science and the people involved in it—one that casts scientists as participants in a complex web of relations and meanings. Helen Longino’s feminist epistemology, Alexa Weik von Mossner’s affective ecologies as well as Cate Sandiland’s and Nicole Seymour’s thinking about queer ecologies, we suggest, provide a lens through which one can understand *To Be Taught* as more than just another story about the scientific exploration of space. Through writing that emphasizes the narration of sensual perception, embodied cognition, and critical reflection, Chambers offers a vision of science that is affectively charged as well as ethically attuned, challenging the disembodied rationality of conventional scientific discourse. What is more, by emphasizing the social and environmental context of knowledge-making, Chambers’s evocative novella queers traditional models of scientific inquiry, effectively embedding knowledge production within a framework of relationality, emotional engagement, and care.

The narrator of Chambers’s *To Be Taught* is Ariadne O’Neill (Ari), a flight engineer aboard the Open Cluster Astronautics spacecraft Merian. Along with Elena Quesada-Cruz, Jack Vo, and Chikondi Daka, who specialize in different scientific disciplines, the four astronauts are part of the Lawki program, a collectively funded science project that has sent several small teams into space to undertake ecological surveys of exoplanets suspected of harboring life. What readers find on the pages of the novella is Ariadne’s project report, which takes the form of a markedly personal account of her team’s mission filled with their discoveries and failings as

they get to know four worlds in orbit around the red dwarf star Zhenyi: the icy moon Aecor, and the three terrestrial planets Mirabilis, Opera, and Votum.

Ariadne's mission report reads as a letter, a kind offering, rather than a prescriptive instruction manual. Readers are encouraged to imagine a way of doing and viewing science differently, that is, to conceive of scientific inquiry as a collaborative project of knowledge-making influenced by—and benefitted by—cultural values, social relations, and ethical concerns. By examining the narrative's portrayal of alien ecosystems and the scientists' responses to their findings alongside their relationships to each other, our goal is to illustrate how contemporary queer science fiction such as Chambers's invites readers, through modelling a critical *and* affective engagement with the phenomena of an infinitely complex world, to rethink the ethical obligations and everyday practices of scientific knowledge production.

U.S.-American writer Becky Chambers is the author of several acclaimed works of science fiction, including the award-winning *Wayfarers* and *Monk & Robot* series, as well as works of short fiction and the co-authored novel *Vela* (2019, with Yoon Ha Lee, S. L. Huang, and Rivers Solomon). Her works have sometimes been described by reviewers and readers as solarpunk, hopepunk, or "cozy" science fiction, highlighting their generally optimistic vision of the future, their inclusion of characters with diverse cultural backgrounds, abilities, and identities, and their emphasis on collaborative and mutually enriching social relations (Vandersteene 7). However, such labels risk obscuring the tensions, ethical challenges, and various kinds of conflict that Chambers's narratives mobilize, even when they are permeated by optimism. *To Be Taught, If Fortunate* in particular exemplifies this complexity. It is a work of science fiction in which the central focus is neither interstellar warfare nor imperial conquest but the practice of science as a *conflictual* undertaking. Indeed, the novel asks how scientific knowledge is produced, under what conditions it can be pursued, and what social and political responsibilities such knowledge-making entails. One of the ways the novel achieves this, we hope to show, is by highlighting the affective social and ecological dimension of scientific work. By creating a story about four scientists on an isolated,

long-duration space mission, Chambers emphasizes the interdependence of ecosocial and epistemic structures and systems, suggesting that all scientific endeavors require some level of engagement with the socio-political, ecological, as well as the ethical and affective dimensions of knowledge-making. *To Be Taught* ultimately provides an alternative culture of science-making: one in which critical reflection, collective accountability, and queer-ecological acts of care are recognized as integral to the ethical pursuit of knowledge.

Challenging Disembodied Rationality Through Feminist Knowledge-making

Becky Chambers's novella *To Be Taught, If Fortunate* constitutes a meditation on the social nature of science and the ethics of knowledge-making. Helen Longino's work (2002; 2017; et al. 2021) can serve as a useful starting point both for understanding science-making as a socially informed practice and for thinking about how speculative literature such as Chambers's facilitate readers' engagement with knowledge production in ways that are critical of traditional knowledge-making practices. Knowledge-making practices that aim for human triumph or mastery over what is studied are foundational to modern science (Plumwood 1994), which often claims to be guided solely by cognitive values (Haraway 1988). The consequences of this traditional approach to science include the fragmentation and instrumentalization of the world, leading or at least contributing, as these feminist thinkers indicate, to the current polycrisis. Feminist scientists, Longino (2017; et al. 2021) notes, produce knowledge according to different criteria, favoring models and representations that distribute power rather than attempting to depict phenomena as subject to human power or to hierarchical power relations within a given domain. Such a relational logic that shows critical awareness of how power differences shape knowledge-making processes resonates with the representation of scientific practice in Chambers's text.

These feminist values in science discussed by Longino (2017) are not just instructive for feminist epistemology; they also inform other fields, including Environmental Science and Science and Technology Studies. Their distinctiveness lies in revealing gender biases embedded in knowledge production and making the social dimension of science

unavoidable. Recognizing feminist practices enables an epistemological critique of the dichotomy between rationality and the sociability of knowledge, challenging the overvaluation of the former at the expense of the latter. By foregrounding social, ethical, and political considerations alongside traditional epistemic ones, Longino's framework opens space for considering literature, and especially speculative fiction, as a means of exploring the production, circulation, and consequences of knowledge in ways that are relational and ethically engaged. It demonstrates that introducing alternative values to scientific practice can lead science to produce different, and perhaps more meaningful or socially beneficial, results: outcomes better aligned with the kinds of worlds feminists and other socially engaged communities wish to build. This ethically informed vision of science highlights how Chambers's narrative emphasizes care, collaboration, and attentiveness to the consequences of scientific work. The novella's focus on the crew members' interactions, their reflections on the environments they study, and their awareness of the broader implications of their mission exemplifies a (queer) feminist model of science in which ethical and social considerations are inseparable from epistemic ones.

Feminist epistemology challenges masculinist traditions of science and its commitment to a cognitive individualism that "further reinforces the assumption that cognitive processes are always opposed to social processes and obscures the possibility that some cognitive processes may be social processes" (Longino, *The Fate* 68). In *The Fate of Knowledge*, Longino (2002) emphasizes a fundamental insight for the understanding of the social aspect of knowledge making: there is always a "gap between its explanatory resources (data) and its explanatory aspirations (theories)" (8). Individual observation and reason, contrary to traditional views of knowledge, must be mediated by social processes such as critical discursive interaction. Cognition, therefore, "has social, as well as sensory and calculative, elements" (Longino, *The Fate* 205). One alternative model to the cognitive individualism of modern science is explored in Becky Chambers's novella.

The Lawki missions are conducted by an international organization called Open Cluster Astronautics (OCA). Unlike other fictional and nonfictional interplanetary exploration

agencies, the OCA does not aim for the colonization of distant planets for the purpose of human resettlement or resource extraction; rather it aims for the advancement of knowledge through respectful observation of the worlds visited. The OCA emerged at a time, readers learn from the narrator, when scientific enterprise was divided between state control and market control (Chambers 19). As an international non-profit organization sustained exclusively by donations from private individuals, the OCA offers no financial returns, makes no ideological concessions, and follows no corporate interests. Each astronaut sent to space by the OCA is represented by a tree planted on every one of the organization's campuses in a circular garden that evokes a living forest. Every donor, regardless of the amount contributed, has their name inscribed at the level of the forest's roots. Here is how Ariadne recounts her visit to one of these gardens:

Roots interlocking like fingers, with gossamer fungus sprawled symbiotically between, allowing for the peaceful exchange of carbon and nutrients. [...] Don't believe the lie of individual trees, each a monument to its own self-made success. A forest is an interdependent community. Resources are shared, and life in isolation is a death sentence. (Chambers 20)

As a living monument to collective practices of knowledge production, the garden connects the astronauts to the communities that make their work possible. Science, in *To Be Taught*, is not the purely objective pursuit of isolated minds but a socially situated project, shaped by institutions, funding bodies, and interpersonal relationships. By embedding knowledge-making within webs of relation, Chambers offers a feminist alternative to the cognitive individualism of the isolated sciences: against the image of the lone, self-sufficient tree, she places the living forest.

Chambers's epistemology of science accommodates the entanglements of science with the socio-political and material conditions of science-making, and also of the entanglements of scientists with the objects they make science *about*. This entanglement is one that both scientists and organisms must suffer in the name of science. As Ariadne observes: "To properly survey a place, you need boots on the ground. You need human intuition. You need eyes that can tell when something that looks like a rock might be more than a rock"

(Chambers 14). Given that each planet explored by the Lawki 6 team possesses unique atmospheric and geological characteristics, getting said boots on the ground involves challenges for the well-being of the crew, if not threats to their survival. The solution found by the OCA, as Ariadne notes, is a temporary and reversible biological modification of the astronauts' bodies called "somaforming":

It ended up being far easier, once the science matured, to engineer our bodies instead [of engaging in terraforming]. [...] I'm as biased as can be, but I believe somaforming is the most ethical option when it comes to setting foot off Earth. I'm an observer, not a conqueror. I have no interest in changing other worlds to suit me. I choose the lighter touch: changing myself to suit them. (Chambers 14)

Somaforming comes as an alternative to terraforming, which is historically anchored in colonial and anthropocentric paradigms: it asserts the primacy of human life over nonhuman life forms and non-terrestrial environments (Pak 12). From the awareness that presence means interference, somaforming invites readers to reimagine a form of knowledge production in which knowledge-makers come to embody a scientific ethics that seeks to do the least harm possible to the environments studied. Instead of merging with, modifying, and destroying the ecosystems they explore, the members of the Lawki crew try their best to stay at a cautious distance from the worlds they encounter.

The crew's resistance to a colonialist approach to exploration is also shown by the fact that the researchers carefully manage their desire for knowledge in order to avoid exploration that will turn into a form of colonization. Indeed, this is a matter of ethics and policy for Ariadne's organization, which makes the return to Earth mandatory for all members of their exploratory missions and has moreover declared that "[the OCA's] mission is to catalogue, not to colonise" (Chambers 24). Early on in the novel, Ariadne explains the rules of the nomadic lab into which the four-person ship transforms once it lands on a planet:

Like any good guests, we carefully checked our surroundings before setting up our temporary home. A probe can scout a good spot for you to plant your spacecraft, but it's only when you're on the ground that you can tell if you're about to park a habitat module into a puddle, or worse yet, onto something's home. [...] We try to be mindful tenants and ethical observers, to have as minimal an impact as possible. As possible. At some point, you have to accept the fact that *any movement creates*

waves, and the only other option is to lie still and learn nothing. (Chambers 28; emphasis added)

By stressing that exploring can mean visiting, looking at, and learning from, and does not need to involve carelessly disturbing, willfully destroying, or violently replacing another's home by one's own, Chambers's novella tries to envision a kind of space exploration in which scientists do not become colonizers. And yet, the above passage shows, even if scientists do not enact a colonizing science, they cannot avoid interference. Mindful that to touch is to alter, the mission recognizes that it is not enough to avoid terraforming through somaforming. Even though the crew could presumably be physically altered to make them capable of coming into direct contact with the environments they explore without endangering themselves, they still wear protective suits. This choice underscores that their mission is built on valuing the survival and integrity of alien life, instead of merely their own.

The OCA astronauts' refusal to assume positions of mastery is also portrayed in how they describe the life they find on Votum, a process of knowledge-making that unfolds less as an act of classification than as an exercise in collective negotiation and epistemic humility. The scene in question reveals the scientists' awareness of the limits of their own epistemological frameworks, as they deliberately resist imposing Earth-based taxonomies upon alien life. Instead of naming and thus symbolically claiming these beings as object of knowledge, they adopt a provisional language—"Annelid (e.g. earthworm) Approximate: AnA. You can find this acronym on the same list as Avian Reptile Approximate (AvA), Amphibian Approximate (AA), Mammal Approximate (MA), and so on—plus the ever-exciting 'NP' for 'New Phyla'" (Chambers 47)—that keeps meaning open to collective revision and leaves space for the strange and the surprising, the (yet) unknown and the hard to describe. Their method, reminiscent of Longino's insistence on critical interaction as a condition for objectivity (Longino, *The Fate* 5), transforms observation into interdisciplinary dialogue. In the scene, no single observer claims authority over what is seen or recorded; rather, meaning emerges through collaboration and collective deliberation. When the crew gathers around the images from the camera traps, each member contributes a different disciplinary and perceptual angle—Elena's focus on environmental systems, Jack's geological instincts, Chikondi's

technical precision, and Ariadne's ability to summarize the findings for "the layman" (Chambers 49). Their exchanges—questioning, contesting, and revising each other's interpretations—and cautious summary of findings illustrate a community of knowers and communicators engaged in what Longino calls "transformative criticism" (Longino, *The Fate* 134).

What ultimately emerges from Chambers's reimagining of science is a feminist epistemology put into practice: one that recognizes and values knowledge-production as a socially mediated and critically interactive process that can be guided by values of interdependency and collaboration. The scientific method portrayed rejects the individualism and detachment of traditional empiricism in favor of a mode of inquiry grounded in responsiveness and ethical attentiveness. Knowledge produced by the OCA is reliable not because it is objective or value-free, but because it is produced within a community of scientists and non-scientists that chooses to remain accountable to the consequences of its knowledge practices. The OCA's collective approach to research, its participatory ethos, and its commitment to minimal interference reflect this epistemic ideal, even when the group fails, as we will explore in the following sections.

Re-Imagining Scientific Inquiry Through Affective Ecologies

Chambers's four-part novella contains several scenes in which the scientists of the Lawki crew first encounter alien environments they aim to study. Like the one discussed in the previous section, many of these scenes are remarkable not only for their attention to the cognitive dimensions of observation but also for their emphasis on the emotional and affective responses elicited by these encounters. It is precisely this affective dimension of Chambers's reimagining of scientific practice that we turn to in this section. As we seek to demonstrate, *To Be Taught* reconceives scientific inquiry by engaging what Alexa Weik von Mossner calls "affective ecologies," highlighting how ethical, emotional, and relational sensibilities are inseparable from the production of knowledge on Earth and beyond.

Alexa Weik von Mossner's cognitive-affective approach to environmental narratives offers a productive way to think about how "feelings" shape human thinking more broadly and humans' understanding of ecosocial relationships more specifically, including those represented in literature. In her book *Affective Ecologies* (2017), Weik von Mossner emphasizes that cognition is both an embodied and an embedded process that involves affects on most, if not all levels of perception and information processing (4). Building on insights from Cognitive Psychology and Neuroscience, she explains that cognition and affect are crucial to everyday interactions between humans and their environments, as are the narratives humans tell about these interactions and the ecologies that emerge from them (6). "Narrative," she emphasizes, "is a means for making sense of the world; not only of the imaginary world on the pages of a book or on the silver screen of a movie theater, but also of the actual world in which we live out our lives" (7). Precisely because cognition, affect, and narrative are closely linked, Weik von Mossner ultimately contends, watching films or reading literary texts and immersing oneself in the "mental simulations of story-worlds and of characters' perceptions, emotions, and actions within those virtual worlds" (3) can activate similar cognitive-affective responses as does experiencing what is represented.

Engaging fiction films and fictional narratives usually do not just build elaborate story-worlds, though, they articulate affective ecologies in which characters' affective relations with their environment resonate with readers immersed in the narrated world. As she explains, "narratives appeal to our sensual perception and embodied cognition [...] to immerse us into their storyworlds" (Weik von Mossner 2-3) which is why "embodied cognition is of particular relevance for our theoretical and practical investigations of environmental narratives and the emotional responses they cue in readers and viewers" (3). Becky Chambers is a master of evoking affective ecologies: she not only creates highly immersive story-worlds, she also communicates the experiences of her characters in ways that are cognitively and affectively engaging. One such thickly descriptive scene that exemplifies how Chambers articulates the processes of embodied cognition arising from humans' encounters with alien worlds occurs in the novel when the narrator Ariadne is chosen to be the first member of the crew—and the first human in history—to step onto the ice planet Aecor:

I descended the ramp. My thoughts were dizzy, dreamlike. I was so overwhelmed that I was afraid I wouldn't remember the moment later. But I did. I do. I'll never forget it. Impossible quiet waited beyond the airlock, as if this moon were holding its breath with me. My boots clunked lightly on the ramp, each foot headed a little further down. The sound changed – not the clap of machine-made metal, but the soft crunch of ice. I could feel it give ever so lightly beneath my weight, the hold fast. Endless ice surrounded me, untouched and undisturbed. A flawless canvas. A smooth block of clay. And it *looked* more like clay or mud than the water I knew it to be comprised of. [...] I stood there, without thought or words. Despite the inviting bounce of low gravity, I remained stock-still. (Chambers 27, emphasis original)

In the above excerpt, which may be said to describe an emerging affective ecology that involves the Lawki crew and an alien world, sense perceptions abound, despite the fact that Ariadne is wearing a suit that is meant to separate her from the ecosystem she is entering. She hears the quiet of the planet, sees the strange coloring of the ice under her feet, and feels the impact of her steps together with the lightness of her body. What she perceives and feels does not match what she knows, yet she relies on her faculties of embodied cognition to learn more about the planet. Her knowledge-making, which—given her job and mission—is also science-making, is subjective. Her attempt at understanding more about the alien environment she finds on Aecor is enriched with the affects of wonder and reverence for the unique experience granted to her, feelings that inform the initial impressions she distills from this first encounter for her report. This report is not only explicit about the fact that it was recorded in the aftermath of the experience as such, it is also explicit about a certain degree of uncertainty this time lag introduces. It is an uncertainty of memory in light of an overwhelming cognitive-affective experience that does not, however, invalidate the knowledge about the planet the protagonist has gained from that experience. What Chambers presents here is a method of scientific investigation in which the process of growing in understanding of one's environment is emphatically embodied and affectively rich. By foregrounding her character's *sensual perception* and *embodied cognition*, to return to Weik von Mossner's terminology, this passage offers what Weik von Mossner calls a "liberated embodied simulation" (14): it stimulates a cognitive-affective process that can produce in readers a "sense of transportation and immersion into literary storyworlds" (14) which in turn allows them, we posit, to learn about learning. Or put differently, the text

encourages readers to come to understand science as a form of knowledge production and as an embodied experience that *includes* feeling.

One of the feelings that accompanies processes of learning/knowledge-making and scientific inquiry/science-making in Chambers's *To Be Taught*, as can be seen in scenes like the one just quoted, is joy and wonder. Another prominent one that shapes affective ecologies in the novella is grief. After an alien creature has snuck into the ship on Mirabilis, the second planet the scientists visit, the crew find themselves obligated to follow protocol, which demands that they kill the animal in order to avoid the risk of it contaminating its home planet or any planets they will visit in the future. Chikondi, the character who accidentally brought the creature back onto the ship, takes it upon himself to pull the trigger. Here is how Ariadne describes the moments leading up to the killing:

Chikondi closed his eyes and gathered himself. He pulled his palm back and leaned against the wall, folding his legs beneath him, trying to stay calm for the sake of them both. They remained that way for several minutes, the grieving man and the frightened alien. [...] He took a shaking breath as he began to record. "Specimen is hexapodal, and both fur and body shape are Mammal Approximate. [...] Further study would be needed, but I find it likely this is a new phyla." He leaned his head back against the wall. "It's a very beautiful animal. [...] I'm sorry." The words ripped themselves from Chikondi's throat. "I'm so sorry." (Chambers 72-73)

Although his fellow crew members reassure him that the incident was not his fault, Chikondi is devastated at the prospect of having to kill the alien creature. While he uses the opportunity to study it at least briefly, his scientific observations are soon joined by a grievous awareness of the creature's beauty, a beauty that depends on its aliveness. Forced to shoot the alien "animal," a term that points to the relational and ethical dimensions of scientific classification, Chikondi is grief-stricken about having to destroy a life that he values despite its nonhumanness. Because he failed to uphold the ideal of non-interference his work demands, he is confronted in the scene above with a most painful form of intimacy. Importantly, though, he feels grief, rather than treating the creature's death as an acceptable consequence of scientific exploration. The affective ecologies of grief established here point to the ethics of non-interference and non-violence that characterizes science-making in

Chambers's novel. It is an ethics of care that is validated through the different kinds of affect that pervade human-nonhuman encounters even when an encounter as in the case above, constitutes a failure of the crew to live up to its organization's most important principles.

It is not only Chikondi's pain and grief that is foregrounded in the storyline involving the alien creature the crew has to kill. The creature's fear and pain is emphasized as well. Because of its alien physiology, the first shot does not kill it, neither does the second or third:

The animal screamed. A moment of this was expected – an involuntary cry at the end. But it *continued* screaming, and flailing, too, an obscene dance of fear and agony. It hadn't died. So Chikondi shot it again. The fur began to smoke, and it screamed. He shot it again. Its legs spasmed, and it screamed. He shot it again. And still it screamed. (Chambers 73; original emphasis)

What may have otherwise been framed as a mercy-killing, turns into a desperate and gruesome struggle for life and against death. This death struggle is not just recorded by a camera mentioned earlier in the scene (Chambers 72), it is also recorded by Ariadne. In her report she emphasizes the creature's ongoing "screaming," a verb not usually used to describe sounds produced by animals. Ariadne's description of the scene highlights its pain and fear of death, two common affects that suddenly make the creature seem much less distinct from humans than its outward appearance and alien origin would suggest. Ultimately, then, the creature is not just transformed from an object of study into a subject worthy of care through Chikondi's pain and grief but more importantly perhaps—in a narrative shift that recalls Jeremy Bentham's "sentientist view of moral considerability" (Gruen and Monsó)—through the scientists' acknowledgement of the creature's capacity for fear, pain, and suffering.

Becky Chambers continues to explore the complexities of a science that tries to avoid suffering in the creatures it studies. In a conversation that takes place some time after the scenes just discussed, when the crew gets stuck on the next planet they visit because numerous seal-like creatures attach themselves to their ship, Chikondi asks Ariadne, whether she thinks that "it's right for [them] to be here" (Chambers 96) and to "flip[/] over rocks

because we're curious" (96). When Ariadne remarks that "[s]pecies migrate" (96) and that he is "a guy who likes flipping over rocks" (96), the following conversation ensues:

"Yes, I like it. The animals underneath do not. Say there are worms under the rock. Worms hate sunlight. It hurts them. [...] Is that a fair trade, their pain for our knowledge?" "If that knowledge means we can do right by the general population of these figurative worms? That we can alter our behaviors and practices so that everything in an ecosystem, worms included, won't be harmed in the future? Yes, I think that's a very fair trade. A sacrifice on behalf of one, or a few, to benefit the many." "You can only call it sacrifice if it's consensual. Nobody asked the worms under the rock what they thought about the whole thing." "If we don't hurt a few worms, we won't know that worms can be hurt. That path's got far more potential for destruction." "You think so?" "You don't?" He thought silently. "I probably do," he said at last. "But I don't know right now." (Chambers 96-97)

This passage shows that there is discomfort and even pain in considering objects of study, through ethical and affective scientific practice, as deserving of ethical and emotional considerations. The resulting ethical quandaries and practical problems are not solved within the novella. The characters never truly stop feeling uncomfortable with the friction between the desire to know and they continue to struggle to avoid doing harm. Traditional science avoids such discomfort by excluding emotions from "good" scientific practice along with those ethical considerations that follow from them. Chambers's narrative foregrounds both.

Aside from joy, grief, and the kind of discomfort and doubt expressed by Chikondi in the above conversation, feelings that foster an ethics of care as Chambers's novella indicates, *To Be Taught* also explores fear, disgust, and anger as affects that have a very different effect when they become part of science-making. When the crew visits the third planet, Opera, they become stranded due to severe storms and because hundreds of seal-like creatures have attached themselves to the hull of their ship. After nearly four months, the crewmembers are pushed to the brink of mental breakdown from malnutrition and the constant screaming of the creatures they come to refer to as "rats" (Chambers 88) because Jack, who names them, "hate[s] rats" (88). Under immense psychological pressure, the crew eventually takes the decision to use a rare moment of calm to escape the planet, even though take-off will kill the creatures on the hull:

The rats were terrified. Some had fallen with the initial blast, but others were still clinging to the goddamn windows, too stupid to understand that the longer they held fast, the more certain their doom. I watched their shuddering bodies as the rushing air sent them flailing, as the ones that did not fall were swallowed in flame and rendered ash. I felt nothing but quiet loathing toward them, and the purity of that feeling was the ugliest I've ever felt. *It's not their fault*, the good scientist in me feebly argued. *They mean no harm. This is a terrible death. They don't deserve this. I don't care*, the raw spite in me replied. And I didn't. (Chambers 106; original emphasis)

Ariadne's extreme psychological and emotional state clearly manifests in her account of the escape from the planet. Her use of swear-words, including in reference to the alien creatures is completely out of character; so are her admissions of feelings of "quiet loathing" and "raw spite" where her usual feelings toward the alien life she encounters is curiosity and appreciation, if not wonder and admiration. The use of phrases such as "shuddering bodies" and verbs such as "flailing" recall her description of Chikondi's killing of the single alien creature on Mirabilis, but the effect of the scene is entirely different. Indeed, the above scene constitutes both a more extreme version of and a counterpoint to the one previously discussed. Where the affect of pain and grief associated with the killing of the "beautiful" animal on Mirabilis emphasized the creature's right to life and freedom from suffering and thus upholds the ethical principles the crew embraces, even as they are forced to break its rule of non-interference and non-violence, the affect in the above scene has no such effect: instead of bolstering the ethical principles on which their quest for knowledge rests, Ariadne's feelings of disgust and hatred toward the "rats"—feelings shared by the other crewmembers—renders the crew's decision to prioritize their survival over that of the rats ethically questionable. Thus, the storyline involving the rats, more forcefully perhaps than other parts of the book, lays bare the tensions and frictions that can arise from the affective ecologies that emerge as part of the intense encounters between the space-traveling scientists and the alien worlds they study.

Re-Imaging Scientific Inquiry Through Queer Ecologies

The encounters that entangle human and nonhuman life physically, epistemically as well as affectively in Chambers's narrative of scientific exploration can be understood to produce

queer systems of relations, or “queer ecologies.” Drawing on Catriona Mortimer-Sandilands’s and Bruce Erickson’s understanding of queer ecologies as “alternative cultures of nature” (35) that raise “important questions at interrelated conjunctures of sex and nature, oriented to probing and challenging the biopolitical knots through which both historical and current relations of sexualities and environments meet and inform one another” (5), we use the term in a deliberately dual sense: first, the ecologies depicted in Chambers’s novella are queer, we suggest, insofar as they involve queer individuals—that is, individuals who are (gender)queer and/or engage in non-heteronormative relations with each other—; second, they are queer in a figurative sense, insofar as the interactions among these queer individuals and the worlds they inhabit are shaped by “sensual desires in and for (nonhuman) nature” (Sandilands 172) that defy normative, hierarchical, or strictly rational frameworks. We thus adopt this language not as a claim about formal Ecological Science, but as a theoretical lens following the critical-cultural orientation of queer ecology as a form of inquiry (Seymour 108-109) to highlight how it is the queerness of the ecologies depicted in *To Be Taught, If Fortunate* that allows Chambers’s novella to re-imagine scientific inquiry as a troubling cognitive-affective endeavor that can neither escape the eco-social relations that shape it nor the ethical demands on the individual that result from them.

The four scientists of the Lawki mission are all queer in one way or another. As readers learn early on in the narrative, one member of the crew, Jack, is a trans man (Chambers 38). Ariadne, the narrator, used to be in an intimate romantic relationship with Jack and still sometimes shares his cabin (33-34), but she also has an ongoing sexual relationship with Elena (34) that does not involve cohabitation. The fourth crewmember, Chikondi, is asexual, which does not, however, exclude him from the web of intimate relations that Ariadne has woven among the crew, as her telling name implies. As Ariadne remarks: “Chikondi’s not interested in sex – with me or anyone else – but when he comes to my cabin to talk, we engage in another kind of sharing, one that’s every bit as good and every bit as intimate” (37). In some sense, then, the entire Lawki crew engages in a polyamorous relationship, forming a polycule in which each member is connected through intimate affective relations to the other members, although the precise nature of the relationships differs in each

individual case—including whether it is only romantic, only sexual, or physically and emotionally intimate in others ways.

Aside from being queer on account of their sexual and gender identities, all the members of the Lawki crew share the experience of queer embodiment inasmuch as they exist in a constant state of bodily transformation due to their use of “enzyme patches” for the purpose of somaforming (Chambers 14). Ariadne, who emphasizes that “metamorphosis” in nature, or more generally “the fluidity of form” of all living things in the universe is “a thing of beauty” to her (9), compares her own bodily transformations to medical adjustments she and two of the other crew members rely on for their well-being. One of them is Jack’s use of patches “providing him with the testosterone he’s received since his—as he calls it—second puberty” (38). Very much aware that the bodily changes induced in the process of somaforming will reverse without ongoing medical assistance (14), Ariadne revels in the fact that “bodies are [such] wondrously malleable things” (14). She immensely enjoys the feeling of waking up with a stronger, more muscular body for her mission on Mirabilis (57), a planet with unusually strong gravitation, and she is more than excited to realize that one of the supplementations for their research stay on Aecor is reflective skin: “My skin *glittered*, and for a moment, I felt childlike glee, like I’d emptied a bunch of craft supplies on myself, like I’d had my face painted at carnival, like I’d flown here in a cloud of pixie dust. [...] I *glittered*” (15, original emphasis). Although Ariadne asserts that she and the rest of the crew “don’t change much [through somaforming]—nothing that would make [them] unrecognizable, nothing that would push [them] beyond the realm of [their] humanity, nothing that changes how [they] think or act or perceive” (13), their bodily experiences of the planets they visit and, as a result, the embodied cognition that is activated while they study the planets’ environments is influenced by their changing bodies. They are queerly embodied as they transition into and out of different bodily constitutions in between their travels from one unique planetary environment to the next. They are queerly embodied scientists who move within and between shifting ecologies.

It is not just their constantly changing bodies that allow the members of the Lawki crew to survive their encounters with alien environments. Importantly, it is also their queer relations with each other that help them to continue their work of exploration and scientific inquiry. When the team members are stranded on Opera, one of the main reasons they do not go mad is because they have each other. Specifically, it is the queer intimate relations the crew maintains that enable them to bear the strange and strained proximity with the rats and an unwelcoming environment that—while being partly shut out by the ship—increasingly torments them with an unavoidable and intrusive cacophony of sounds:

The rats shrieked. Thunder growled. Choppy waves smacked the hull. I gave up on the questions [of how to leave and where to go]. I couldn't cosy up in the future. The present was far too loud. Please let me sleep, I thought. It was a wretched plea, transmitted in no direction in particular but asked from the bottom of my heart all the same. Please, please let me sleep. I did not. (Chambers 99)

Under these harrowing conditions, it is Ariadne's carework and her ability and willingness to engage lovingly and patiently with each member of the crew that sustains her chosen family amidst the growing psychological and physiological stress resulting from months of confinement and exposure to the queer ecologies of Opera. Within the polycule her crew has formed, Ariadne offers comfort through conversations, company, sex, and nonerotic touch. She thus stands at the center of the queer affective ecology of the ship and the larger queer affective ecology of the planet the ship and its crew has become part of.

As *To Be Taught* indicates, the Lawki crew's scientific mission as such is only possible because of a system of queer affective and physical relations. This shows most dramatically after the crew escapes from Opera, when Ariadne, who took care of everyone else during their grueling stay on the planet breaks down and, just as importantly perhaps, is at risk of breaking away from her chosen family. Back in orbit, Ariadne leaves the ship in a space suit to survey possible damage that the rats and salt water may have caused to the ship's hull:

The airlock opened before me, edgeless vacuity beyond. There were no winds here, no crashing waves. Only the cold constancy of stars, to which I was just a crude bit of wet carbon, a flake of skin you brush aside. My pain and pettiness and mistakes and

inadequacies did not matter. I did not matter. Nothing we did out here mattered. Nothing we could or would ever do would matter, in the face of this. (Chambers 107)

Exhausted from the crew's time on Opera and her own month-long exposure to its torturous sonic environmental conditions, Ariadne suffers a mental crisis. Struggling with the memory of entrapment as well as with her crew's decision to abandon some of their most important ethical principles for a chance to escape the planet, she longs for solitude and quiet; she longs for non-relation.

After being thrown into various states of close contact with three different alien worlds, after being allowed but also forced into different kinds of wanted and unwanted intimacies with three different alien environments, Ariadne tries to distance herself from everything. Taking to the emptiness of spaces without a tether, which in the last consequence means committing suicide, is the only way she can imagine an escape from the shifting affective ecologies that traveling between distant planets has entangled her in:

I took a breath. That's all I could hear – my own breath. No screaming wind, no endless waves, no slimy mouths sucking. I heard nothing but the air travelling in and out of me. This was good. This was good. [...] I could live behind my own eyelids. This was good. (Chambers 108)

Overwhelmed and desperate for relief from her pain and guilt, Ariadne wishes to be cut off from all sense impressions and relations; in a world that makes on self-aware and caring individuals such as Ariadne constant demands for relatability and responsibility, she wishes to become a closed-off entity. In the end, though, it is her relations to the other crew members that pull her back from the nothingness of space. Ariadne hears Jack's and Elena's voices via the space suit's communication system and sees Chikondi "floating on the other side of the window, his palm pressed toward [her]" (Chambers 108) together with his insistence that "We need you in here. [...] In *here*" (109, original emphasis). It is these sensual tethers together with one of her beloveds' appeal to their mutual connection and dependence on each other that bring Ariadne back. She remembers that such intimate connection, such relationality, comes with duties and responsibilities.

The crew's scene of reunion is highly symbolic of the mutual connection the crewmembers share, a connection that is intensely emotional as well as intimately physical and thus counters the isolationist fantasy Ariadne indulged in during her brief walk in space:

Jack pulled me inside. Elena removed my helmet, my gloves. Chikondi pulled me out of the cocoon of my suit. I could still hear my own breath, but it was quieter, and I could hear theirs, too, every breath and heartbeat as they held me close – as we all held each other, floating in the centre of the room, no beginning or end to us. (Chambers 109)

As the crewmembers rejoin and begin to heal individually, so does the team rejoin whose mission it is to explore the strange ecologies of alien planets. Only because the personal relations are reestablished can the team of scientists continue to do its job. Chambers suggests as much as the above scene repeats when the crew is about to explore the last planet of their mission, Votum, a rocky desert planet:

Elena surveyed. She put her hand on Jack's shoulder congenially; he put his hand over hers. "It's beautiful," she said. Chikondi and I walked panting up beside them. I leaned my helmet against his arm. He offered his hand to Elena. She took it gladly. We became a molecule, distinct components attached by natural bonds. (Chambers 118)

Challenging notions of abstract individualism alongside many of the foundational ideas of heteropatriarchal science, the characters of Chambers's novella practice a queer science driven by a queer desire to gain knowledge about alien worlds that is mindful of and carefully tending to intimate social relationships as much as to larger ecological relations.

Conclusion

The central aim of this essay was to highlight some of the affordances of contemporary queer speculative fiction for re-imagining human-nature relations, affordances that become particularly visible when we consider cognition as fundamentally relational, socially embedded, ethically accountable, and informed by affects. Reading *To Be Taught, If Fortunate* through the combined lenses of Helen Longino's feminist epistemology, Alexa Weik von Mossner's affective ecologies, and Catriona Sandiland's and Nicole Seymour's queer

ecology reveals how Chambers's novella stages an alternative culture of nature along with an alternative ethics and practice of science.

According to Longino, knowledge production is inseparable from the social contexts, values, and interactions that sustain it. Science, in traditional heteropatriarchal frameworks, often presents itself as objective, detached, and extractive, privileging individual achievement and hierarchically structured authority. Chambers's narrative challenges this paradigm by foregrounding relationality: the crew's identities, affective bonds, and interdependence are inseparable from the work of observation, experimentation, and reflection they perform. This work, in turn, is made possible by the democratic structure of the OCA, which does not aim to be value-free, but, instead, chooses its values carefully and collectively. This alternative culture of science, as *To Be Taught* presents it, resonates with Longino's argument that the social dimensions of science are epistemically generative rather than incidental or undesirable.

Weik von Mossner's theorizations further deepen this reading by attending to the affective stakes of cognition as a response to humans' encounters with physical and imagined environments. In *To Be Taught, If Fortunate*, the affective dimensions of more-than-human ecologies become evident in the narrator's highly personal report on the crew's encounters with alien environments, where practices of scientific observation and data collection are suffused with feelings of wonder, awe, fear, disgust, and anger. Through what Weik von Mossner calls "liberated embodied simulation," Chambers's narrative invites readers to immerse themselves in the crew members' experiences in a way that presents knowledge production as an interplay between embodied perception, socio-culturally-informed emotions, and ethical attentiveness. By highlighting these intersections, Chambers reconceives of scientific inquiry as a collective practice that integrates cognition and affect and thrives on the confluence of different perspectives from a diverse group of people with different personal, social, and professional backgrounds.

Conceptualizations of queer ecology, finally, help to illuminate the ways in which the queer relational and ethical practices in Chambers's novella disrupt heteropatriarchal social systems

and more-than-human ecologies as well as dominant norms of scientific practice. The “queer ecologies” evoked in *To Be Taught, If Fortunate* destabilize traditional binaries such as human/nonhuman, subject/object, and rational/emotional. Science is not a heteropatriarchal project of mastery carried out by individual, infallible, and perfectly rational subjects but a collaborative, flexible, and responsive practice shaped by the needs, desires, and interdependencies of those who engage in it. In other words, queer relationality as it is depicted in Chambers’s speculative novella is epistemically productive: it enables a science that is attentive, adaptive, considerate, and self-critical and thus capable of responding with uncommon humility and care to the radically other-than-human worlds it encounters.

Works Cited

- Chambers, Becky. *To Be Taught, If Fortunate*. 2019. Hodder & Stoughton, 2024.
- Gruen, Lori, and Susana Monsó. “The Moral Status of Animals.” *The Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta and Uri Nodelman, Fall 2024 Edition, <https://plato.stanford.edu/archives/fall2024/entries/moral-animal/>.
- Haraway, Donna. “Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective.” *Feminist Studies*, vol. 14, no. 3, 1988, pp. 575-99.
- Longino, Helen E. *The Fate of Knowledge*. Princeton UP, 2002.
- . “Values, heuristics and the politics of knowledge.” *Scientiae Studia*, vol. 15, no. 1, 2017, pp. 68-86.
- Longino, Helen, et al. “Filosofia da ciência e epistemologias feministas: entrevista com Helen Longino.” *Em Construção*, no. 10, 2021, pp. 331-40, doi: 10.12957/emconstrucao.2021.62842.
- Lovell, Bronwyn. “Science Fiction’s Women Problem.” *Creative Writing Scholars on the Publishing Trade: Practice, Praxis, Print*, 1st ed. edited by Sam Meekings and Marshall Moore, Routledge, 2021, pp. 68-83.

- Mortimer-Sandilands, Catriona, and Bruce Erickson. "Introduction: A Genealogy of Queer Ecologies." *Queer Ecologies: Sex, Nature, Politics, Desire*, edited by Catriona Mortimer-Sandilands and Bruce Erickson, Indiana UP, 2010, pp. 1-47.
- Pak, Chris. *Terraforming: Ecopolitical Transformations and Environmentalism in Science Fiction*. Liverpool UP, 2016.
- Sandilands, Catriona. "Desiring Nature, Queering Ethics: Adventures in Erotogenic Environments." *Environmental Ethics*, vol. 23, no. 2, 2001, pp. 169-88.
- Seymour, Nicole. "Queer Ecologies and Queer Environmentalisms." *The Cambridge Companion to Queer Studies*, edited by Siobhan B. Somerville, Cambridge UP, 2020, pp. 108-21.
- Vandersteene, Julie. *Empathy Beyond Humanity: A Comparative Analysis of Posthumanist Perspectives in Kazuo Ishiguro's Klara and the Sun and Becky Chambers' A Psalm for the Wild-Built and A Prayer for the Crown-Shy*. 2023. Ghent U, Master dissertation.
- Weik von Mossner, Alexa. *Affective Ecologies: Empathy, Emotion, and Environmental Narrative*. Ohio State UP, 2017.