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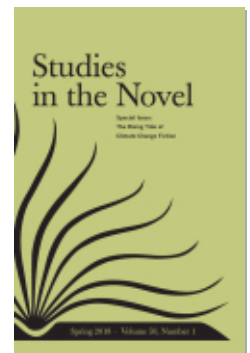
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TEARING DOWN THE GREENHOUSE: VISUAL ECOLOGY, SAVVY CRITICS, AND CLIMATE CHANGE IN T. C. BOYLE'S *THE TERRANAUTS*

RIVER RAMUGLIA

T. C. Boyle's novel *The Terranauts* (2016) satirizes the events surrounding the construction and operation of Biosphere 2, a multimillion-dollar ecology experiment beginning in the 1980s that had the goal of creating a contained, self-sustaining environment that, beyond its potential applications in space exploration and colonization, could support human life in the event of the ecological collapse of Biosphere 1 (i.e., Earth).¹ Boyle attributes much of his inspiration for *The Terranauts* to a detailed study of Biosphere 2 by Rebecca Reider, in which she explains how the founders of this "glass eco-castle" in Arizona envisioned its operation:

[they] packed their greenhouse world with more than 3,800 carefully listed plant, animal, and insect species, and tracked biological and chemical changes through countless scientific studies, trying to make sense of the interactions of organisms, soil, water, and air...[it was] designed to condense the interactions of [Earth]...in a compact space. (4)

On one level, the project attempted to contain within a physical structure an artificial ecology that might produce and maintain a stable climate for human survival regardless of external environmental factors. On another level, Biosphere 2 worked to escape the sociocultural forces of capitalism by redefining human actions as serving the needs of the environment rather than those of consumer markets. Eight "Biospherians" voluntarily confined themselves inside the ecosystem for two years, acting as "midwives to the birth of a new world" while they subsisted off its food products and performed the requisite measurements of its climate (70), later producing a variety of written accounts about their time living in the structure that Boyle also used as source material. In the novel, Boyle renames the structure "Ecosphere 2" (E2) and refers to its inhabitants as "Terranauts" rather than

“Biospherians,” but he retains many of the ironies that undercut the original project’s fantasy of ecological and ideological containment, such as its reliance on external fossil-fuel energy (Reider 240) and its financial support from billionaire investors (Reider 125). What Reider’s study argues, and what Boyle exploits for comic effect in *The Terranauts*, is that Biosphere 2’s unsuccessful pursuit of a self-contained ecosystem also exposed the difficulty, if not impossibility, of escaping the forces that would permit the production of such an absurdly expensive (and ultimately insolvent) ecological spectacle in the first place.

The Terranauts narrates this dual failure of containment through the retrospective written accounts of Dawn, Ramsay, and Linda, three prospective Terranauts who compete for coveted positions in a two-year closure of E2. Ramsay and Dawn make the cut alongside six other candidates, but Linda fails and jealously schemes to sabotage her colleagues on the inside as they struggle to maintain the balance of their ecosystem. The novel derives much of its humor from juxtaposing the absurdity of life within the back-to-basics ecological madhouse of E2 with what Ramsay describes as “the corruption of the outside world” (158). As the Terranauts resist these corrupting temptations offered to them by jealous outsiders at the visitors’ window, tourists and the media ogle their every move through E2’s glass walls, ravenous for any sign that the Terranauts might “break closure” and reveal the project for the ecological charade that it is. Predictably, numerous problems ensue, notably the unexpected overflows of species packed into the dome: overgrown morning glories block out sunlight to crucial biomes (216); colonies of ants and cockroaches war for space in the back of Dawn’s closet (249); and an infestation of broad mites decimates the Terranauts’ crops, reducing food and oxygen supplies simultaneously (260). Boyle weaves these imbalances into an equally complex visual ecology of surveillance, performance, and spectatorship generated by the protagonists as they vie for the celebrity status offered by the panoptic regime of E2. As the imaginative gaze of readers inevitably gets wrapped up in these visual dynamics, *The Terranauts* comes to question the possibility of containment across a broad swath of other categories: textual, fictional, and intellectual, including the novel itself, which, as fiction, becomes a fantasy of containment of the very delusions it critiques. As such, the novel operates under the deeply ironic and reflexive logic at work in many reality television programs, which actively position self-conscious artificiality as integral to “real” experience. In *The Terranauts*, this quality is key in Boyle’s effort to indict passive, “televisual” readers and spectating literary critics as participants in E2’s consumerist fantasy. By installing the transparent glass surface of E2 somewhere in the ironic distance between reader and text, Boyle alerts readers to the problems (and potential dangers) of contained reading practices in which we consume narratives that offer built-in environmental critique rather than critically engage with them as part of broader constellations of environmental discourse.

To explore these ideas, this article will proceed by explaining how contemporary literary theory, particularly ecocriticism, has dealt with the problem of intellectual containment of environmental problems, and then examine how *The Terranauts* uses the dramatic irony associated with E2's decidedly uncontained visuality to broaden the conception of ecology to include non-material symbolic flows as well as physical/chemical ones. Then, by placing theoretical discussions of irony by Claire Colebrook and Bronislaw Szerszynski alongside Mark Andrejevic's analysis of reality television, I will explore how *The Terranauts* nests this first-level irony within a second, more complex irony associated with the practice of literary criticism. Finally, I will explain how Boyle uses irony to open his audience up to a more earnest kind of ecological "seeing" that, somewhat paradoxically, emerges from the simulative context of E2 and the self-conscious language used to narrate it.

"Nothing In, Nothing Out"

The failure of containment narrated by *The Terranauts* echoes what many ecocritics and other theorists have already articulated as both a feature of Anthropocene ecologies and a way of describing the limitations of the human intellect in apprehending the climate crisis. Timothy Morton's concept of the "hyperobject," for example, is now critical shorthand for the uncontainable vastness of climate change and its causes (*Hyperobjects* 1). As Morton explains, hyperobjects are concepts, entities, forces, temporalities, and their interrelationships that are so complex that, at the scales of human experience, they can only be glimpsed in their constituent parts in reduced or mediated forms—in other words, contained. Ursula Heise describes how one such mediation, "Blue Planet," the first image of Earth taken from space, shows the globe "appear[ing] as single entity, united, limited, and delicately beautiful" (22). The image, Heise explains, was an attractive figure for global imaginaries, but its "erasure of political and cultural differences," among its other simplifications, allowed the image to be co-opted for a variety of political and cultural agendas (24). Containment is also clearly at issue in Donna Haraway's all-encompassing equation for the ecological utopia of "Terrapolis," which she defines using a multivariable/linguistic calculus of deliberately hyperbolic proportions. This "*n*-dimensional niche space for multispecies becoming-with" is "open, worldly, indeterminate, and polytemporal" (11), a space, perhaps, in which hyperobjects can have presence, though Haraway and Morton would argue that "space" and "presence" are hardly adequate terms for the magnitudes they reference.

Haraway's and Morton's terms are paradoxical in the sense that they operate as linguistic containers to name concepts that negate them as meaningful symbols in the first place: they have a frustrating kind of transparency with neither ground nor figure. Timothy Clark defines the psychic stress caused by this disparity built into linguistic access to hyper-scale

phenomena as “Anthropocene Disorder,” which is marked by a “vertiginous” tension between comfortably operating within disciplinary boundaries and the apparent drive to study the “ecology” of everything and anything” (145). Heise finds similar friction between “local” and “global” perspectives of imagining the planet, which she resolves by advocating “ecocosmopolitan” culture unanchored to local senses of place while at the same time recognizing their importance for environmental movements (10). Each theorist questions the degree to which fictional narrative helpfully “contains” and helps address large-scale environmental problems, with differing conclusions. Borrowing from Ursula K. LeGuin, Haraway suggests that stories are essential containers for a kind of interspecies worldmaking (40), while Clark finds that fiction often produces incompatible meanings when framed at different scales of environmental thought (23), a view largely shared by Heise, who only cautiously suggests that narrative can “accommodate a view of global systems along with local stories” (208). Morton reasons that in order for environmentally themed art to be effective, it must “question the gap between contents and frame,” somehow offering an experience of aesthetic containment at the same time that it questions the container (*Ecology without Nature* 144), a challenge well met by *The Terranauts*.

From a philosophical perspective, Peter Sloterdijk suggests that the act of containment, whether physical or mental, is a recursive feature of the human condition that helps abate anxiety in the face of a planet we now know to be indifferent to human existence, particularly when it comes to our environmental preferences. He embeds this argument in the well-known greenhouse metaphor for global warming, suggesting that containment has a feedback effect that accelerates the growth of the original problem:

To oppose the cosmic frost infiltrating the human sphere through the open windows of the Enlightenment, modern humanity makes use of a deliberate greenhouse effect: it attempts to balance out its shelllessness in space, following the shattering of the celestial domes, through an artificial civilizatory world....[A] comprehensive house-building operation for the species and a policy of global warming must be successful faced with the open, cold and silent sky. (24)

Sloterdijk’s description is marked by a cognitive dissonance similar to the self-negating terms “hyperobject” and “Terrapolis” in that it uses descriptive language to “contain” an external, distant relationship to the problems of “modern humanity.” In this sense, it seems impossible to locate where, exactly, we are in Sloterdijk’s process: either outside building a structure to resist the “cosmic frost” of existential uncertainty or inside one but somehow still feeling the chill as critical interlocutors. The problem of containment as confronted by Morton, Heise, Clark, and Sloterdijk suggests that language—whether deployed for narrative or theoretical purposes—does not itself exist outside of the logic of containment.

Clare Colebrook calls this feature of theoretical inquiry Socratic irony, in which we can “discuss ideals towards which life can strive, but which can never be fulfilled” (132), which in this case is the power of language to bound the ecological problems of modern humanity. This irony is emblemized in *The Terranauts* by the mantra recited by Ramsay and his colleagues to voice their commitment to E2: “Nothing in, nothing out” (30). The phrase marks the disjuncture between the protagonists’ “intent” of harmonious ecological containment and the “contrary outcome” of furthering a consumerist spectacle (Colebrook 15). The phrase is also representative of the Terranauts’ inability to reconcile this vision of containment with their awareness of E2’s unbridled visual ecology facilitated by the structure’s transparency. For example, as Dawn competes for one of the eight Terranaut positions in the opening chapter of the novel, she explains how “Mission Control was watching and Mission Control definitely did not want to present fat Terranauts to the public” (10). Of her colleague Stevie, who Dawn is certain will make the cut to be a Terranaut, she remarks: “For one thing, she had an advanced degree in the field, and for another, she looked great in a two-piece” (6). And later, when Ramsay assesses his own role as the communications director for E2, he reveals the project to be only a stone’s throw away from the entertainment industry:

E2, the new world, the first and only world apart from the original one...it was largely up to me...to present all this to the press, TV cameras whirring, flashbulbs flashing, my fellow Terranauts at my side with their gleaming faces, far-seeing eyes and the rigid posture of Marine Corps recruits, all of us squeezed into designer jumpsuits the color of tomato juice that had been created for us by the Hollywood costumer who’d come up with Marilyn Monroe’s celebrated levitating dress, among other miracles. We stood behind our chairs at a long table set up twenty feet from E2’s entrance chamber and the airlock it framed—a visible symbol of what we were committed to. (42)

Even as Ramsay describes in detail the importance of visual presentation to the public eye, he remains oblivious to how this visual extravaganza problematizes his attachment to material ecological containment independent from external sociocultural dynamics: “This was the moon, this was Mars, this was material closure, not some greenhouse you could just stroll in and out of whenever you had the urge,” he explains (33). Mission Control selects the Terranauts not for their scientific expertise, but for their compatibility with and subservience to a simulation presented as a consumable environmental ideal to the public (complete with a gift shop) (415). In one scene, Linda, the rejected Terranaut, renders the ogling gaze of E2’s tourists in a way that perfectly captures the recursive, self-sustaining quality of this ecological delusion: “They were everywhere, flitting around the outer skin of the spaceframe like outsized moths, their faces pressed to the glass, cameras flashing—paying customers” (70). Linda’s narration emphasizes how those caught up in E2’s ecological fantasy (whether on the inside or on the outside) overwrite the visual exchanges

between tourist and spectacle that maintain its commercial health with a metaphoric mirage of a tidy organic relationship between the surface of flesh and transitory insects.

Managerial and internal surveillance is also an important part of the novel's visual ecology. Boyle highlights this aspect of the novel by renaming Space Biosphere Ventures (the governing organization of Biosphere 2) to Space Ecosphere Enterprises (SEE) (321). This transposition not-so-subtly identifies SEEing as the primary characteristic of E2's power structure. In one chapter, Linda details the visual apparatus that permits her to enact jealous revenge on her more famous colleagues by surveilling them on behalf of the managers at Mission Control, whose goal is to ensure the Terranauts behave properly for the public eye. Even as she describes a nightmarish form of biopower, Linda's tone is casual:

I'm right there in Mission Control, monitoring the cameras and the phone line and the computer too, reporting back to Judy and Dennis on even the pettiest things like who's wearing the same clothes three days in a row or staring into space during team meetings, looking for what Judy calls anomalies. We're building psychological profiles on each of the crewmembers as a component of the sociological and behavioral experiment going forward here, just as Richard, with his blood-pressure cuff, urine samples and monthly strip-down physicals, is documenting the physiological side of things. (132)

Later, Linda surveils Gyro, another Terranaut, as he wanders away from the "Human Habitat" inside E2 toward a more private forested section: "We have the ability to reposition the cameras and that's what I do now, trying to keep him in sight not so much out of duty or even nosiness, but boredom, simple boredom, just that" (148). As is subsequently revealed, Gyro uses what he believes to be the seclusion of the forest biome to not-so-privately satisfy his sexual urges. Later, at the visitors' window, Linda divulges the secret of Gyro's actions to Dawn, who is shocked at Mission Control's intrusiveness: "E2's cameras were in place to record ecological changes over time...but not to spy on us. It was shameful...what the mission was doing in trying to control every aspect of our lives" (165). Nevertheless, Dawn and the other Terranauts continue with the project, the success of which they believe to be more important than their privacy, and Linda, even as she exploits the methods of surveillance to which she would be subjected as a Terranaut, still aspires to become one. It is a fairly straightforward parable for how the mirage of green consumerism easily shrouds authoritarian forms of surveillance and control that prey on the mutually constitutive desires to see and be seen.

The text is replete with moments of surveillance and spectatorship like these. Boyle repeatedly contrasts how these visual dynamics solidify power relations between characters with moments that emphasize the fictive visions of harmonious ecology underpinning the project. For example, Terranauts ogle other Terranauts sharing intimate moments at the visitors' window, but

meanwhile the Terranauts' prized galago Luna gets electrocuted by E2's technological underbelly (183); tourists continue to observe them through the glass, often represented only as the disembodied synecdoche of camera flashes (230), even as the Terranauts celebrate the "low rate of extinctions to date" as evidence of a healthy ecosystem (231); and the Terranauts stage a variety of televised plays, but fail to see the species packing of E2 as its own kind of ecological theater (144). It is worth noting at this point that one unintended consequence of Biosphere 2's ecosystem that *The Terranauts* does not parody was the production of toxic levels of nitrous oxide, or laughing gas (Reider 220). As if to compensate for the relegation of that detail in his narrative, Boyle oversaturates the text with the basic irony of the Terranauts' ecological pageantry: so much, in fact, that he seems to leave little room for the articulation of any authentic or more hopeful environmental paradigm that might escape engulfment by the forces of consumer capitalism.

Savvy Readers and Savvy Critics

I argue that the identification of such entertaining disjunctions between the novel's visual ecology and the ecological failure of E2 is part of the expected form of engagement with the text, making the novel much more interesting from a critical perspective. As Boyle prompts readers to imagine the spaces, origins, and targets where consumptive visual flows occur, they inevitably get caught up in those dynamics, even if they believe they have outsmarted them through advanced critical eyesight. As a way of explaining how Boyle engineers this relationship to *The Terranauts*, I draw on Mark Andrejevic's scholarship on the visual ecologies of reality television programming. Like E2, reality TV uses the contrivance of human containment to create a spectacle. One common category of such programs, according to Andrejevic, features "a return to a natural and implicitly more traditional environment...the regression of the cast members to a premodern ('precivilized') level of tribal culture" (197). In Andrejevic's case study of *Survivor*, he explains how producers stage contestants in encapsulated, remote regions of the Earth where their competitive activities are reinforced by the supposedly unproduced and natural characteristics of the wilderness environment. Of course, the environment is actually heavily produced and scripted in order to provide maximum drama for viewers (197). Voyeurism and surveillance, he explains, are also typically built into the architecture of such shows. In his examination of *Temptation Island*, Andrejevic explains how the show's participants surveil each other in order to expose any infidelity in their romantic partners—or, to put it in the terms the Terranauts use to describe their commitment to E2, to discover the truth of whether they are committed to the "mission" of their relationships. While the participants of *Temptation Island* are granted only a "partial" gaze of their companions, the show gives audiences the comfortable seat of omnipresence: a perspective

from which one can unmask all deceptions, surveillances, and artifices of production as they happen in real-time (181).

For Andrejevic, occupying this position constitutes a perverse form of voyeurism that converts audiences into “savvy viewers” (135): an inert, politically resigned subject position closely aligned with Morton’s explanation of the Hegelian “beautiful soul,” an attitude that believes itself to be separate from the objects of its critique (*Ecology without Nature* 118).² Andrejevic defines “savvy viewership” as

a complacent “knowing” that takes pleasure in not having any illusions about society....[I]t sacrifices the possibility of social struggle in order to claim the status of the ‘nonduped’—so as to recognize behind every social ideal the way in which it is deployed as a ruse of power....Savvy subjects derive pleasure precisely from not being fooled by either the elite or the social critics: they know just how bad things are and just how futile it is to imagine they could be otherwise. (178)

Andrejevic concludes that being a savvy viewer is in fact part of an ideology in which “submission serves as a form of empowerment” (192). In other words, should viewers casually accept the “exemption” from the visual dynamics at work in the object of their entertainment offered to them by its creator, they become subject to the “gaze that monitors and surveys the audience” (190). What is given as a form of empowerment, Andrejevic argues, has as its true aim the control and obedience of its recipients.

In *The Terranauts*, this logic works on several levels. In the world of the story, the Terranauts display a certain awareness of their role as performers in an artificial spectacle, but minimize this aspect of the project in service of the false but more noble pursuit of ecological containment. A “savvy reader” of *The Terranauts* notices and delights in this dissonance, lazily exempting him- or herself from the activity of ogling tourists who watch through E2’s windows, similarly avoiding questions as to what—if anything—qualifies as “good” environmental behavior. On a more removed level, *The Terranauts* considers a reader’s awareness of this dangerous subject position, and also assumes the reader has some degree of knowledge about the actual Biospherians’ accounts on which the novel is based. Boyle integrates the presence of these outside texts through the tripartite narrative structure of the novel (first-person retrospective accounts of E2 written by Dawn, Ramsay, and Linda, grouped into their experiences before, during, and after closure of E2), which parallel the retrospective styles of the source texts written by Abigail Alling, Jane Poynter, and John Allen.³ This style has the effect of enticing readers to cross-reference each narrative when they overlap on a common event in the novel—much like a literary critic does with an array of texts. One silly but illustrative example is when Linda wears an oversize sombrero while visiting with Dawn at the visitor’s window in order to get her attention. In Linda’s account, Dawn assures Linda she likes the sombrero and that it looks good on her, but in the

subsequent chapter from Dawn's perspective we learn that she actually thinks it is "ridiculous really, like a breadbasket or something" (372). The "savvy critic" not only notes the disparity between external social performance and internal reality, but also delights in the scopic apparatus that permits it—the partition of E2's glass as well as the chapter divisions that divide the narration between the "inside" experiences of E2 (Dawn and Ramsay) and the "outside" ones (Linda).⁴ When this narrative structure is considered alongside the phantom presences of the source texts, we can see how the text broadcasts its status as a fictional construct, not unlike the way reality television calls attention to its artifice with glimpses of cameras or other production equipment during the supposedly "real" moments of action.

The conceit of narrative retrospection also has the effect of creating a space outside the world of E2 that savvy readers can share with the narrators, in a manner not dissimilar from the confessional mode employed in many reality TV programs in which participants offer personal commentary in a visual space separate from the "actual" events of the show. For example, consider the moment in which Ramsay describes the iconic galagos living in E2: "If you don't have experience of galagos, picture a furball with a fluffed up tail, oversized ears and big night-seeing eyes, the sort of thing Disney would put front and center if one day the Magic Kingdom should devise its own ecosphere" (120). Ramsay's direct address to readers in this narrative side-room emphasizes not just the gap between a real "experience of galagos" and their fictional representation, and not just the gap between Ramsay's retrospection and the actual event, but also the eerie chasm between Boyle's E2 and the supposedly more real accounts of Biosphere 2, in which we learn that the project was, in fact, funded by Disney money (Reider 204), and that a galago really did die by electrocution (Alling 169). Ramsay's description is an authorial "inside" joke for savvy critics who have already explored the ecology of "outside" source texts on which Boyle based the novel. This structure plays out on a broader scale across the novel, where savvy critics are tasked with (or perhaps rewarded by) cross-referencing the irony of the narrators' ecological fantasies with those of the original Biospherians, particularly as those narratives have been pre-processed in Reider's study. As such, we straddle the boundary of E2 and the text that contains it like "a cat stuck between the inside and outside" of a house, in Morton's words from *Dark Ecology* (87), our savvy criticism exposed and the fallacy of fictional containment laid bare.

This comfortable seat of savvy criticism offered by Boyle is named by a concept pioneered long before the advent of contemporary ecocriticism: Jeremy Bentham's "Panopticon," a prison designed to permit constant surveillance of its captives. Clearly this is the situation Boyle intended to replicate in the surveillance dynamics between Mission Control and the confined Terranauts, who observe a certain similarity between their ecological utopia and a prison. Dawn, describing her first few days in E2, observes

the visitors' window, where we could meet with anyone we liked and speak to them via in-house phone, just as if we were in prison—and don't think we didn't joke about it, good-naturedly at first, and then, increasingly and inevitably, with a kind of bitterness none of us could have imagined at the outset. (86)

In his theoretical work describing the Panopticon, Foucault also identifies in its operation a self-policing reflexivity, and it is a useful coincidence that he describes its final, most potent architectural form as a transparent structure similar to E2:

[A]nyone may come and exercise in the central tower the functions of surveillance, and...this being the case, he can gain a clear idea of the way in which the surveillance is practised....This Panopticon, subtly arranged so that an observer may observe, at a glance, so many different individuals, also enables everyone to come and observe any of the observers. The seeing machine was once a sort of dark room into which individuals spied; it has become a transparent building in which the exercise of power may be supervised by society as a whole. (207)

In the same way that reality television programs broadcast their artificiality in order to lull viewers into scopic complacency, the Panopticon allows its supervisory channels to be seen so that its power seems innocuous but is actually dangerous and all-encompassing. As I have explained, these dynamics are present in the world of the text (visiting tourists looking through the glass, Linda's casual but obligatory participation in the surveillance of her colleagues) but also in the way Boyle always positions readers as omnipresent spectators of events as they unfold in the novel, and on a more removed level as spectating literary critics clued in to the novel's source texts. The mediating substance between these levels of "seeing" the text is a pervasive irony, symbolized and manifested by the greenhouse shell of E2. Earnest moments that would seem to carry enough power to jolt the Terranauts out of their absurd fantasy only fold in on themselves under the anterior pressures of ironic spectatorship. For example, after Ramsay accidentally impregnates Dawn (threatening the delicate balance of their ecosystem with an additional mouth to feed), he holds a wedding ceremony and remarks that "it was a small, private ceremony, attended only by me, Dawn and Gretchen, though a few flashbulbs flared in the distance and half a dozen tourists and at least one journalist pressed their faces to the glass behind us" (184). At first, Ramsay flatters readers by allowing them privileged access to the private ceremony, then reveals that the moment is broadcast to the public, dampening the importance of our participation in the scene and causing readers to question the actual motives driving the characters to wed.

I do not mean to suggest by connecting the Panopticon to E2 that the novel is an accurate account of contemporary surveillance practices. Rather, I argue that when environmental discourse manifests in the rhetorical situation

of entertainment culture—as a Disney-funded spectacle or a novel satirizing it, for example—some kind of supervisory force (not unlike the media watching Ramsay’s wedding ceremony) seems to prevent any earnest engagement with that discourse because it can always be dismissed as “only” entertainment with the separate and possibly incompatible aim of monetization. We are caught in the situation that Claire Colebrook, in response to Linda Hutcheon and Richard Rorty, calls the “immanence” of postmodern irony, in which we are forced to occupy two seemingly incompatible scenarios: that either irony short-circuits itself by nullifying any objective sense of reality (suggesting any and all conceptions of reality are valid, including E2’s consumer spectacle), or that irony and the doubt it spawns are necessary if we are to have any point of view at all (161). In her reading of Hutcheon, Colebrook suggests that, even if the use of irony has the intent of critiquing a particular paradigm (such as that of green consumerism), and even if such a critique is well designed, it necessarily relies on the voice of the old, undesirable paradigm to make its point, rather than simply presenting the new paradigm on its own (156). *The Terranauts*, for example, offers the vision of E2 only as a simulative extension of consumer society. The question becomes how and to what degree *The Terranauts*’ engagement with environmental problems and ideas navigates this seemingly unresolvable immanence.

Bronislaw Szerszynski offers a useful framework for how environmental discourse works with and moves through four crucial types of irony toward authentic engagement with environmental ideas: situational (dramatic) irony, the irony of comportment, irony as tactic, and irony as world relation, the final term roughly corresponding to Colebrook’s sense of ironic immanence (Szerszynski 341). One of the main environmental “crisis” moments of *The Terranauts* serves as a useful example to show how these nested forms of irony work. The scene begins as an intoxicated truck driver far away from E2 crashes into a utility pole, causing a wildfire that cuts off E2 from its power supply, in turn shutting down the temperature-regulating mechanisms of E2. The Terranauts, faced with the possibility of roasting in the desert heat magnified by the greenhouse effect of E2, consider breaking closure in order to survive. As E2 morphs from eco-topia into a greenhouse hell, Ramsay imagines the catastrophic media fallout that would ensue if he and the other Terranauts chose to escape:

Our critics had accused us of hubris and of elitism too, as in let’s preserve a handful of privileged white people in a hundred-and-fifty-million-dollar bomb shelter and leave the rest of the world to face the blitz of global warming and the storms, droughts and mass starvation that come along with it, and now they’d fill the airwaves with their derisive laughter and poison every aspect of the mission regardless of what we might have accomplished. (189)

It is one of the more amusing moments in the novel, especially when Ramsay goes on to “scuttle around like a crab in a pot set over a gas burner” (189),

but of course the moment is deeply ironic, considering that the Terranauts can leave the structure at any moment. Ramsay clings to the vision of E2's ecological self-sufficiency even as the crisis itself is caused by a cascade effect with distant origins. Ramsay is also willing to sacrifice the lives of his fellow crewmembers—and therefore the ecological management of E2—in service of his dedication to closure and what it represents to the public eye.

Szerszynski's third type of irony, "irony as tactic," is the fictional shell provided by Boyle that helps readers recognize the moment's dramatic irony but also their relationship to the novel that contains it. Szerszynski explains that, in tactical irony, "there is the ironic tension between the ideas and values being presented by the characters within the theatrical frame, and those that suddenly come to the fore when the audience recognises the existence of that frame, and that the intended meaning is quite different" (347). As Boyle weaves tactical irony into the novel by carefully overlapping many of its details with those of his source texts (in which the Biospherians experience a similar warming crisis), we not only see the hyperbolic quality Ramsay ascribes to the media's opinions about E2 as accurate, but also that Biosphere 2 really was a multimillion-dollar blueprint for an environmental bomb shelter with the same blind devotion to its falsity—and that the fictional experience of *The Terranauts* is ultimately subsidiary to its source material. From this point we enter what Szerszynski calls "irony as world relation," a distinctly *positive* form of irony in which "there is no distanced observer, aloof from the folly and blindness they perceive being played out in front of them. Here, irony embraces even the observer, the identifier of the irony, within its grasp" (348). It is, Szerszynski explains, a "metaphysical" subjectivity in which we cannot strike a negative ironic pose when confronted with environmental problems and their simulative solutions. We come to realize that we are, as Ramsay is to the intoxicated truck driver, inextricably linked with the fate of humans and systems far away from us; with, perhaps, the millions of incoming climate refugees from the global South certain to be displaced by rising temperatures (of the life-threatening kind on display in E2) in coming decades (Lelieveld).

Even this emergence into Colebrook's postmodern "immanence" (or Szerszynski's "irony as world relation") is staged in *The Terranauts* by none other than Ramsay himself. When Dawn decides she wants to raise their daughter Eve inside E2, Ramsay reluctantly agrees to participate and cooperates with Mission Control to use the Terranauts' re-entry ceremony (at which point the previous crew of eight Terranauts emerge from E2 and the next group goes inside) to break the news to the public. The ceremony does not go as planned. Instead of going back inside with six new Terranauts to be with Dawn and their child for an unprecedented second two-year closure, Ramsay flees the compound, delirious in a world uncontained by the protective irony of E2:

I wasn't in the rain forest anymore, wasn't in a controlled atmosphere: I was out in the Sonoran Desert, and I was drunk and sick to my stomach and caught

up in the greatest crisis of my adult life....And I was thirsty, me, the water-meister of E2, where even in our own artificial desert it was insufferably humid and a drink was never more than fifty feet away. Irony? Sure, irony enough for another chapter altogether. Turn the page. Here it is, staring you in the face....I pushed myself up then and scanned the horizon, looking for the lights of E2 or even the highway beyond, but saw nothing but the darkness of the world. (483)

Boyle again emphasizes the multi-dimensionality of the novel's irony, this time with a direct address to the reader and a reference to the materiality of the text. The page becomes the surface onto which the irony that Ramsay finds in his situation (that as a water expert he is thirsty without the artificial comforts of E2) comes in direct contact with the savvy reader's gaze on Ramsay's written account, and finally the savvy critic's gaze on the page of *The Terranauts*. It is a truly metaphysical moment: in an effort to outsmart the simulative strategies of *The Terranauts* by following its outward movements of comic irony, we find ourselves at last in a greenhouse erected by the aesthetic experience of the novel itself. Suddenly unaccompanied by other gazing tourists, Ramsay's "expert" readers become swathed in his darkness at the same time that they can enter Szerszynski's "irony as world relation," a perspective that upholds the power of narrative fiction to reveal the boundaries of a very real (if not tangible) greenhouse. In this space, *The Terranauts* exists not as a container separate from or external to lived experience, but rather as a kind of tessellation of a fiction that we already inhabited, and that Boyle's novel simply reveals to his readers.

Breaking the Greenhouse, or, World Relation

The manner in which *The Terranauts* uses the irony of E2's containment fantasy to complicate the tidy relationship between the "inside" and "outside" coordinates of texts and their reading experiences also has bearing on other moments in the novel. I will not rehearse Szerszynski's striations of irony again, but it is helpful to examine a scene in which the novel's visual dynamics intersect with its irony in order to convey an earnest environmental message: that the scientific version of natural ecology as strictly a measure of energy inputs and outputs through a system potentially neglects the equally important non-material and non-human components of terms in that system. The Terranauts, desperate for additional calories, decide to eat Petunia, one of the pigs brought in before E2's closure. Dawn, responsible for tending to E2's livestock, narrates the moment in which she brings Petunia to her fellow Terranauts Troy and Ramsay to be slaughtered, while the other Terranauts carry on with their scientific experiments:

Stevie was in her ocean, fighting algae. Richard was in his lab. Gretchen was recording the growth of select trees in the rain forest, measuring tape and

clipboard in hand....But Petunia wouldn't budge. She was unsettled by seeing the men there because when I'd brought her to the [Intensive Agriculture Biome] all those other times—for a reward—no men were present. Troy... was in a temper, his eyes boring into me as if all this was my idea....[The men] didn't want stress hormones released into Petunia's bloodstream any more than I did....I felt a sorrow so vast it was like a cavern opening up inside me and it was all I could do to keep from breaking down in front of my teammates....The only relevant equation here was that a dead pig equaled meat and meat equaled calories and protein and essential amino acids. (230)

In its attention to non-material aspects of the act of slaughtering a pig, the scene extends the ecological exchange between humans and pigs to include the emotions evoked by seeing and being seen. Petunia the pig *sees* the signal of human bodies and becomes fearful; Dawn *sees* the signal of impatience in Troy's glare and becomes sorrowful. They are the kinds of processes that would escape the purview of, say, Gretchen's measurement of rainforest growth, the kind of quantitative apples-to-apples version of ecology to which Dawn emotionally reaffirms her commitment. Just as Ramsay's hysteria ironically opens up readers to the reality of the global crises he can only minimize, here the novel shows how the contrivance of E2 enforces an artificially individualized scale in which these non-material aspects of the act of animal consumption can be explored. In a strange move away from its own artifice, the scene helps readers regenerate an ecological framework in which pig-seeing operates in the same symbolic plane as human-seeing, identifying what is lost when the general concern moving this scene along—how to most expediently and effortlessly slaughter Petunia—is carried out to its logical large-scale conclusion in, say, the aggregative environment of a factory farm. Boyle elsewhere creates ironic distance with absurdity, then writes scenes like this one in which maintaining that distance seems affectively untenable, demanding that readers “see through” the novel and its ironic manipulations, and excavate from the wreckage of cynicism potentially helpful tools with which to see the world.

Later in the book, as the protagonists themselves begin to doubt the legitimacy of the project, Dawn is presented with the choice either to consume a sugary treat offered to her by her colleague Gyro as romantic enticement, or to participate in a more creative form of ecological vision:

The room was lit by the early sun fingering its way across the IAB and spilling through the window, strands of the wool carpet lit like trees in a miniature forest, a whole ecosystem there, moth larvae, dust mites, flakes of shed skin. I was holding a hot iron in my hand. And despite my resolve... my mouth was watering. I wanted that candy, wanted it more than ever, but I fought myself. “I can't believe it,” [Gyro] said. “I'm offering you sugar, chocolate, M&M's—like last time. Remember last time?” He rattled the bag suggestively. “And you're saying you don't want them, that you're what,

refusing even to accept a present from me?" I set down the iron, shook my head. "I'm sorry," I said. (276)

The simple option for Dawn would be to accept the M&Ms: a pre-packaged "Easy Think Substance" (*Dark Ecology* 62) of savvy reading that can only see this passage as a cheap and well-trodden environmental parable about the importance of resisting consumerist impulses in favor of something potentially more sustainable. More difficult, but crucial for any ecocritical praxis, is to see how this moment—as text on a page—is the package of M&Ms itself if read as its own kind of ecological carpet woven from the fibers of numerous outside texts. Behind the simple lesson of saying "no" to consumerism and "yes" to organisms in the carpet is a more profound one about what happens to environmental themes when presented in consumable, reality TV-style packages. For Andrejevic, such packages leave us intellectually primed for real forms of surveillance and social control that predate on Easy Think environmental discourse.

Biosphere 2 itself came under such an attack with lasting effects that shape our political climate to this day. As Biosphere 2 descended into potential bankruptcy in the early 1990s, its Disney-linked financial backer Edward Bass called in the military-style managerial services of the investment banker duo of Steve Bannon and Martin Bowen to take over the complex. As Reider explains in her study, their ascendancy to control of Biosphere 2 was marked by secrecy, authoritarian control, and exclusion of the original founders:

When Martin Bowen's and Steve Bannon's faces first appeared on the biospherians' videoconferencing screen inside Biosphere 2 to tell them the news [of the takeover], it sounded so strange that the biospherians first thought it was a practical joke or a bizarre training exercise to test their resolve. (209)

Following his tenure at Biosphere 2, which oversaw the sale of the apparatus to Columbia University in 1995 (Reider 226), Bannon went on to work as a producer in the entertainment industry and eventually became a chief strategist on Donald Trump's presidential campaign, and even occupied a position on the National Security Council when Trump formed his administration. Considering that Boyle began work on *The Terranauts* long before Trump was taken seriously as a political candidate, and published the novel prior to the 2016 general election, the events that ensued suggest we should take E2's seemingly hyperbolic surveillance practices, racist exclusionary principles (i.e., the exclusion of Linda from E2 on account of her Korean heritage), and the spectacular erosion of environmental thought behind a mirage of green consumerism very seriously. Indeed, as Amitav Ghosh argues in *The Great Derangement*, wealthy nations like the United States engage in "the politics of the armed lifeboat" when faced with the realities of global environmental problems, whereby the state becomes increasingly militarized and exclusionary

to less fortunate nations faced with refugee crises caused by climate change (144). It should come as no surprise that, in describing the aforementioned warming crisis of E2, Ramsay uses the figurative language of naval warfare: “It’s like we’re a battleship and the enemy lobbed a couple shells over the decks, but now the seas are calm again and all we have to do is keep on swabbing” (198).

If the relationship between Biosphere 2, its fictionalization in *The Terranauts*, and our current political climate did not send chills up your spine, consider further the Hawai‘i Space Exploration Analog and Simulation (HI-SEAS), a NASA-funded containment project out of the University of Hawai‘i that simulates life on a Mars colony. Among its promotional materials is a video featuring the emergence of one of the crews after a long stay in the dome. After gorging themselves on delicacies unavailable to them during their enclosure, the research crew skydives out of military-style vehicles apparently provided by the US Army, which is also credited in the film’s production (“2015 HI-SEAS Mission 3”). In *The Terranauts*, Ramsay victoriously emerges alongside his crewmates from E2, enjoys a smorgasbord of delights only capitalism could provide, and then flees re-entry, imagining that Mission Control might send out “the bloodhounds and helicopters with their heat-seeking cameras and all the rest” (484). His paranoia seems far less absurd when real-world analogues of ecological reintegration feature quick and easy deployment of such military vehicles. While literary critics may not be able to account for the “‘ecology’ of everything and anything” in their work (Clark 145), climate science included, we are very much equipped to notice when easy technological fixes to our problems get wrapped up in utopian thinking—allowing them to be used in ecologies of power with potentially more nefarious aims. Armed with “irony as world relation,” we must interrupt greenhouse-building operations when we see them, or face the consequences.

At first glance, *The Terranauts* seems to use E2 as a staging ground for irreverent, often bathetic drama of its human characters. Excavation of earnest environmental messages from its layers of irony, however, suggests that the novel levies a critique of reading practices that accept such rhetorical frames at face value, or do not regard them as an important part of a text’s meaning. Greg Garrard’s critique of Ian McEwan’s comic novel *Solar*, for example, finds fault with the intertextual, self-referential aspects of the novel similar to those at work in *The Terranauts*: “The problem with these diversions is that they ruin the allegorical drive of the main plot with their authorial self-reference and distracting intertextuality,” he states (133). To take this approach with *The Terranauts*, which arguably consists of more referential material than original plot, would miss the way the text’s porous frame destabilizes overly simple containments of ecological thought in the eerily real world of E2. In the way it anticipates the desires of savvy readers and critics, *The Terranauts* augurs an ecocritical praxis marked by permeability and openness. This praxis should

not be taken, however, as a false promise of complete intellectual access to the discursive magnitudes of Morton's hyperobjects or the higher dimensions of Haraway's Terrapolis. These terms acknowledge that discursive boundaries exist, just not necessarily in arrangements to which we are accustomed. In this open critical disposition, our task is not to try to recontain the world in the manner of E2 but to use these theoretical frameworks in order to read, respond, and take action in ways that counteract simulative media climates that deploy the promise of containment as a form of political control (e.g., the Trump administration's well-publicized plan to "protect" the United States from human migration from Central and South America with a border wall). In the context of literary studies, this might mean accepting that such works do not exist in a vacuum independent from global political realities, and that critics have a responsibility to respond to them with intellectual rigor, particularly with respect to environmental issues.

To conclude, I regard the aim of *The Terranauts* not just as comic entertainment but also as a corrective guide, or perhaps a reminder, for those caught in a certain malaise with respect to contemporary literary responses to global environmental problems. This seems to be Boyle's general attitude about his own work: as he has stated in interviews, sardonic comedy like reflexive irony helps him catch complacent readers off-guard: "[T]he tragic and poignant can be made even more powerful, more affecting, if the writer takes the reader by surprise, that is, puts him or her into a comic universe and then introduces the grimmest sort of reality" ("Frequently Asked Questions"). *The Terranauts* catches, like flies in comic honey, would-be beautiful souls and savvy readers, prodding them into a reflexive examination of themselves and the "real" simulative world they live in (as real as that world can be). The final moment of the novel is illustrative of this aim in the way it seems to sever its relationship with spectating readers and critics. Linda, in an attempt to sabotage Dawn's relationship with Ramsay and their child Eve who is to be raised inside E2, brings photographs of Ramsay's sexual affair with Judy (one of the project managers) to the visitors' window, where she intends to display them to Dawn to gain control over her. But Dawn never emerges to meet Linda: "I don't know how long I sit there, just dreaming—a long time, a very long time. I hear the echo of voices, watch the play of lights. The night deepens, deepens again, and Dawn never comes" (508). The repetitive, poetic language of Linda's realization that "Dawn" will not come (the character's name doubling to refer to the beginning of day) somehow resonates with the reflexive qualities of the novel. With Dawn's withdrawal back *into* the simulative world of E2, the absence of any conclusion to her retrospective written account, and the lack of a recipient for the transgressive voyeurism of Linda's photographs, the novel leaves only its readers to mire in their role as spectators. It is as if in the novel's visual ecology the reader provides the external visual input that makes the

whole apparatus run, but when this energy has nowhere to go but a dead end, it turns onto itself.

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NOTES

¹ *The Terranauts* follows Boyle's previous engagements with environmental themes, most notably his novels *A Friend of the Earth* (2000) and *Drop City* (2003).

² Fittingly, Morton describes the space that the beautiful soul inhabits as a "Looking Glass House" (*Ecology without Nature* 175).

³ Boyle acknowledges these sources in the author's notes at the novel's conclusion, along with Reider's study.

⁴ The sombrero, too, operates as a figure of permeability on a national register: Linda collects the souvenir on a brief visit across the southern border to Mexico.

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