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Terraforming for Urbanists

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When we think of “the land” and its literary representations, what usually comes to mind are the rural landscapes of Thomas Hardy or Willa Cather, the wild landscapes of James Fenimore Cooper, the social meanings of land ownership in the novels of Jane Austen or William Faulkner, Aldo Leopold’s environmentalist “land ethic,” or the dimensions of land and landscape that are associated with national self-perception, such as the savannahs of João Guimarães Rosa’s *Grande Sertão: Veredas*. A different perspective of what “land” might mean emerges from a recent science-fiction novel:

Terminator rolls around Mercury just like its sunwalkers, moving at the speed of the planet’s rotation, gliding over twenty gigantic elevated tracks, which together hold aloft and push west a town quite a bit bigger than Venice. The twenty tracks run around Mercury like a narrow wedding band, keeping near the forty-fifth latitude south, but with wide detours to south and north to avoid the worst of the planet’s long escarpments. The city moves at an average of five kilometers an hour. The sleeves on the underside of the city are fitted over the track at a tolerance so fine that the thermal expansion of the tracks’ austenite stainless steel is always pushing the city west, onto the narrower tracks still in the shade. . . .

The city sliding at its stately pace completes a revolution every 177 days. Round after round, nothing changing but the land itself; and the land only changes because the sunwalkers include landscape artists, who are out there polishing mirror cliffs, carving petroglyphs, erecting cairns and dolmens and inuksuit, and arranging blocks and lines of metal to expose to the melt of the day. Thus Terminator’s citizens continuously glide and walk over their world, remaking it day by day into something more expressive of their thoughts. All cities, and all their citizens, move in just such a way. (Robinson 29–30)

Even a reader unfamiliar with this text is likely to recognize its allusion to the narrative idiom of Italo Calvino’s *Le città invisibili* (*Invisible Cities*, 1972). The seemingly random reference to Venice and the allegorization of Terminator as a model of all cities echo Marco Polo’s descriptions of cities he has visited for Genghis Khan in Calvino’s fictionalization of the explorer’s travels. The city of Terminator appears near the beginning of Kim Stanley Robinson’s science-fiction novel *2312*, published in 2012, three hundred years before the worlds it portrays. The worlds on which humans have settled in the early twenty-fourth century include asteroids, moons, and various planets in our solar system, even Mercury, which is too close to the sun to permit any settlement directly exposed to its rays. The mobile city circumnavigating the planet on rails whose expansion keeps pushing it into the shade is a habitat attached to but not anchored in the soil, a product of technological ingenuity, aesthetic sophistication, and ecological inventiveness.

As the description highlights, the integration of technology with art and landscape does not stop at the city proper but includes large parts of the planet’s surface,

which Mercurian artists and designers continuously reshape in projects of landscape art on the model of Andy Goldsworthy, whose work is mentioned repeatedly. They alter the shapes and colors of the geological formations, inscribe them, and paint on them. The planetary landscape seems so natural a medium to the artists that one of them even wonders, during a visit to a museum on Earth, why anyone would want to create art on a canvas instead of on a landscape or a living body. Planet, landscape, city, and humans are in slow but constant motion in this vision, and the humans slowly but incessantly transform both the land and their own bodies through activities that are to varying degrees geological, ecological, and aesthetic.

Robinson's utopian vision of a planetary landscape pervasively transformed by humans is accompanied by a more dystopian portrait of far-reaching ecological changes on Earth itself, including massive biodiversity loss and a thirty-three-foot sea level rise induced by climate change. In this portrait of Earth along with other, more functional planetary habitats, Robinson reflects on the notion of the Anthropocene as it has been discussed for the last decade and a half, the idea that humans have transformed Earth so pervasively that their impact affects even remote land areas, deep ocean layers, and atmospheric strata, and that this impact will be visible to a future observer in the geological layers. Even though *2312* only refers to the Anthropocene in passing, the novel clearly acknowledges the disastrous consequences of current planetary transformations, but it also seeks to outline alternative scenarios in which humans' ecological interventions enhance and beautify natural landscapes rather than merely destroy their diversity and ecological functionality.

Through its descriptions of these varied habitats, Robinson's novel highlights the connections between the science-fiction motif of terraforming and current discussions about the Anthropocene, connections that I discuss briefly in the next section. In the process, it also outlines a vision of the city not as an antithesis to nature or a biological wasteland but as itself a form of nature. This vision of the city as a natural system, which I explore below, contrasts with more typical dystopian visions of future cities as scenarios of exploitation, crisis, and disaster, such as the portrait of Bangkok in Paolo Bacigalupi's *The Windup Girl* (2009), which I will compare with *2312*. Moving beyond just using the city as a central theme, Robinson's novel deploys literary strategies of high-modernist urban novels and poems so as to create a narrative of cities and planets as humanly transformed but nonetheless natural environments. The last section will bring these futuristic visions back to the present with a recent text on nature in Los Angeles, Harryette Mullen's *Urban Tumbleweed* (2013), which in a minimalist mode of poetry echoes Robinson's urban vision and some aspects of his narrative procedure, as they share a focus on the figure of the flaneur exploring the newly natural streets of large metropolises.

Terraforming and the Anthropocene

When the ecologist Eugene Stoermer and the atmospheric chemist Paul Crutzen proposed replacing the name "Holocene" with "Anthropocene" for the geological epoch humankind is currently inhabiting, they had mainly the negative impacts of

human activity on the planet in mind. In their short initial article in 2000, they mentioned population growth, exhaustion of fossil fuels, emissions of nitrogen monoxide that cause smog, emissions of carbon dioxide and methane that cause climate change, increased transformation of land surfaces and use of freshwater, increased nitrogen fixation, increased rates of species extinction, and loss of coastal mangrove forests, among others, as examples of humans' pervasive impact. "Considering these and many other major and still growing impacts of human activities on earth and atmosphere, and at all, including global, scales, it seems to us more than appropriate to emphasize the central role of mankind in geology and ecology by proposing to use the term 'anthropocene' for the current geological epoch. The impacts of current human activities will continue over long periods," they summarized (17).

While geologists will take until the year 2016 to determine whether the available evidence warrants the introduction of a new epoch into geological history, the concept of the Anthropocene has developed an intellectual and cultural life of its own. It has been interpreted and used in multiple and sometimes contradictory ways. Since it conjures up a world from which any nature that could be conceived as wild and untouched by humans has disappeared, it functions as a shorthand for environmental decline narratives in some contexts—in Crutzen's own publications, but also those of activist Bill McKibben. But it takes on quite a different meaning in the writings of other researchers such as the geographers Erle C. Ellis and Navin Ramankutty, the biologists Peter Kareiva and Joseph Mascaro, the science writers Emma Marris and Christian Schwägerl, and the environmental journalist Andy Revkin, some of whom have long been skeptical of wild areas as the dominant focus and yardstick of conservation.¹ In their view, the notion of the Anthropocene opens up the possibility of a new kind of environmentalism that does not see nature as invariably deteriorating under human influence, that emphasizes creative as well as destructive human impacts, and that seeks to understand and preserve mixed landscapes alongside wild ones. This positive reconceptualization of the Anthropocene is even more accentuated in radically techno-optimist visions of the future such as Diane Ackerman's *The Human Age* (2014).

The Anthropocene has triggered equally lively debates in the humanities and social sciences. The historian Dipesh Chakrabarty has claimed in a by now widely known 2009 essay, "The Climate of History: Four Theses," that the global scope of climate change and of Anthropocenic transformations of nature call for a new conception of history and a new kind of universalism, though he concedes that given the failures of past attempts to envision humankind as a coherent whole, he can only envision that universalism as a negative, undefined one. Marxist and postcolonial scholars have indicted any such universalism and indeed the notion of the Anthropocene itself as ideological smoke screens that hide from view vast socioeconomic inequalities, environmental destruction, and the central role of global capitalism in generating both: in this view, any approach that postulates "the

¹ See Ellis and Ramankutty; Marris et al.; Marris, *Rambunctious Garden*; Schwägerl; and Revkin. Jens Kersten delivers a detailed analysis of the history and uses of the concept in *Das Anthropozän-Konzept*.

human species” as the agent of history denies continuing structures of inequality and the systems that undergird them (Žižek 333–34; Nixon). In a somewhat broader framework, the emphasis on human agency that comes with explorations of the Anthropocene clashes not only with the attention to nonhuman factors in a good deal of environmental history and cultural studies, but also with the more sustained interest in nonhuman forms of agency in recent theories ranging from new materialism and new vitalism to object-oriented ontology. While these theories diverge from each other in some of their central assumptions, they share the endeavor to replace the exceptionality of human subjects with a more capacious understanding that includes varied forms of nonhuman agency and impact—an endeavor that runs counter to the centrality of human intentions and actions in debates about the Anthropocene.

From the perspective of literary analysis, the concept of the Anthropocene has surprising resonances with the older idea of “terraforming,” which emerged in the science-fiction genre in the 1940s to refer to human efforts at reshaping entire planetary habitats. The idea of geoengineering the Earth’s atmosphere so as to avert some of the worst consequences of climate change has the most obvious similarities to such science-fiction scenarios. Some of the large-scale changes associated with the Anthropocene—climate change, biodiversity loss, and ocean acidification, to name just three of the most important ones—differ from classical terraforming in that they are unintended consequences rather than strategic goals of collective action. But the idea that humans, intentionally or not, have altered global ecosystems to the point where they have in fact created a different planetary environment has also infiltrated recent environmental nonfiction. McKibben’s *Eaarth: Making a Life on a Tough New Planet* (2010) quite explicitly adopts the trope of humans on an alien planet:

The world hasn’t ended, but the world as we know it has—even if we don’t quite know it yet. We imagine we still live back on that old planet, that the disturbances we see around us are the old random and freakish kind. But they’re not. It’s a different place. A different planet. It needs a new name. Eaarth. . . . It still looks familiar enough—we’re still the third rock out from the sun, still three-quarters water. Gravity still pertains; we’re still earthlike. But it’s odd enough to constantly remind us how profoundly we’ve altered the only place we’ve ever known. (2–3)

Seen from this perspective, the Anthropocene is a sci-fi trope that calls on us to see the Earth as an alien planet—terraformed by beginners who did not quite know what they were doing but who might be trained to do better in the future.

Terraforming also plays a crucial role in Robinson’s work, especially in his epic trilogy *Red Mars*, *Green Mars*, and *Blue Mars* (1993, 1994, 1996), which paints an extraordinarily scientifically informed and sociopolitically detailed portrait of the engineering challenges as well as the cultural and political conflicts around human settlements on Mars. These efforts to create new habitats and social structures, which result in an ambiguously utopian society, map obliquely onto continuing conflicts on Earth, which is still riven by economic inequality, ecological degradation, natural disasters, corporate exploitation, population growth, and military

conflicts. Terraforming, in the context of these two very different planets, becomes a complex metaphor for thinking about questions of biology, ecology, conservation, engineering, politics, and aesthetics. Should Mars be terraformed or be at least partially preserved in its original state?—a question that echoes environmentalist debates over conservation on Earth. Should the Red Planet be terraformed or areoformed? That is, to what extent should Earth's ecosystems and societies provide the model for the new Martian environment? Once Mars is terraformed, does it offer paradigms that could be applied back on Earth to help alleviate that planet's escalating crises?

In *2312*, Robinson revisits some of these questions but takes them up in a lighter tone and with more experimental narrative strategies. Among other things, he intersperses his narrative with quotations from a variety of imaginary books that convey a sense of the future world's different voices and provide interpretive frameworks for the unfolding plot. One of the quotations is an excerpt from what appears to be a manual on how to create a so-called terrarium, an artificial mini-biosphere that imitates one of Earth's ecosystems:

Take an asteroid at least thirty kilometers on its long axis. . . . [H]ollow out your asteroid. . . . Begin with a light dusting of heavy metals and rare earths. . . . With a soil base cooked up, your biome is well on its way. . . . [A] lot of terraria designers start out with a marsh of some kind, because it's the fastest way to bulk up your soil and your overall biomass. . . . [O]ver time you can transform the interior of your terrarium to any of the 832 identified Terran biomes, or design an Ascension of your own making. (Be warned that many Ascensions fall as flat as bad soufflés.) (38–42)

Humorously styled as a galactic cookbook, the manual gives very detailed instructions on how to build up the biomes. A later entry from a different manual portrays in a similarly joking tone the terraforming of the planet Venus that has already taken place: "Take raw Venus. . . . There's real potential here for a great new creation" (129).

These terraforming experiments foreshadow the return to Earth of several characters who were born on other planets. On Earth, they lend a kind of development aid to a planet with eleven billion inhabitants that has undergone a thirty-three-foot sea-level rise since the twenty-first century. The protagonist, Swan Er Hong, an ecological designer and landscape artist from Mercury, is not by temperament a patient person. She and the other "spacers" find Earth utterly bewildering and frustrating: political procedures that are easy to follow in their small settler societies are infinitely more complicated in Earth's populous democracies, and terraforming decisions that are easy in environments not naturally hospitable to human life turn out to be very difficult on Earth, where every acre of land is contested territory in terms of ownership rights, historical memories, cultural traditions, and current uses.

Through the spacers' visits and their plans for support, Robinson reapplies the idea of terraforming back to Earth. Florida, for example, which has gone completely underwater, is rebuilt at a higher level through the importation of vast quantities of rock from Canada. And in one of the most spectacular scenes in

the novel, hundreds of thousands of extinct animals that have been bred in off-world terraria are rereleased into the habitats where they used to live on Earth decades or centuries earlier, in a process that comes to be known as the “Reanimation.” Earth, in scenes such as these, is constantly being made and remade—just as Mercury was in the scene I quoted at the beginning. Both planets turn into examples of nature remade by humans, in a deliberate play on the idea of the Anthropocene.

Urban Nature and the Urban Novel

One manifestation of the Anthropocene, Crutzen and Stoermer argue in their 2000 article, is that urbanization “has even increased tenfold in the past century” (17). Demographic reports over the second half of the twentieth century have often predicted that urban populations will become a majority. Various United Nations organizations such as the UN Population Fund, UN-Habitat, and the Population Division of the UN Department of Economic and Social Affairs declared that in 2007 or 2008, the global urban population had crossed the 50 percent threshold for the first time in the history of the human species (UNFPA; UN-Habitat; UNDESA, Population Division). Some debate and skepticism have followed over what counts as an urban area in these UN publications and what statistical methods were used to compute the threshold (Brenner and Schmid; Buettner). Yet the fact that urban populations are growing and that future population growth for the most part will either start out or end up in urban areas is not in dispute; even critics of the UN highlight that “[u]rbanization has become a planetary phenomenon. . . . There is . . . no longer any *outside* to the urban world; the non-urban has been largely internalized within an uneven yet planetary process of urbanization” (Brenner and Schmid 751). For an environmentalist perspective as well as for any consideration of the future meanings of “the land,” this implies that future human habitats will be primarily urban ones.

Conservationists have, of course, paid attention to gardens, parks, and wild areas in cities for some time, the “green spaces” usually perceived to be “natural” in an urban framework. Conservation efforts have also focused on the “blue spaces” of riverbeds, lakes, and creeks and more recently on “gray spaces,” large numbers of empty lots that often spontaneously turn into habitat for plants and animals. Beyond that, urban ecosystems are also known to have ecological properties of their own: they generate their own temperature environments and sustain particular mixes of native and nonnative biodiversity. The notion of “novel ecosystems” proposed by Australian ecologist Richard J. Hobbs, which refers to ecosystems that were altered by humans but now sustain themselves, might be adjusted also to include the urban ecosystems that are sustained through continuous human intervention (Hobbs, Higgs, and Hall). For environmentalists, this means that Leopold’s “land ethic” becomes an urban space ethic.

In architecture, design, urban planning, and urban history, nature has played an important role over the last fifteen years in terms of such issues as decarbonized transportation, energy-efficient architecture, and urban farming. Landscape urbanism, urban metabolism, urban political ecology, biophilic design, “climate

urbanism” (attempts to rethink urban planning and design in view of climate change), and other movements and paradigms have transformed these fields in their assumptions if not always in their practices.² Contemporary urban literature has begun to engage questions of urban ecology as well, especially in nonfiction, as the works of, for example, James Barilla, Mike Davis, Matthew Kahn, and Andrew Ross show. Novels and poems that address urban ecology in detail, however, remain rare. Patrick Chamoiseau’s Martinican novel *Texaco* (1992) and Karen Tei Yamashita’s *Tropic of Orange* (1997) do present urban nature in its full complexity, entangled with political histories and current class divisions. But other important urban novels—for example, William Gibson’s *Pattern Recognition* (2002), China Miéville’s *The City and the City* (2009), Jonathan Lethem’s *Chronic City* (2009), or Teju Cole’s *Open City* (2012)—either do not engage with environmental issues or integrate them as part of sociocultural background noise, items in the average citizen’s portfolio of neurotic obsessions. On the other hand, Lydia Millet’s novels *How the Dead Dream* (2007) and *Magnificence* (2012), which focus on biodiversity and extinction, are set in cities but tend to cast them as antitheses to nature rather than as instantiations of it.

Speculative fiction and film, by contrast, have energetically taken up issues of urban ecology—though mostly as frameworks for staging familiar scenarios of urban misery, disaster, and destruction, as Roland Emmerich’s *Day after Tomorrow* (2004) and Neill Blomkamp’s *Elysium* (2013), among others, demonstrate. Ecology as disaster also plays a central role in Bacigalupi’s award-winning science-fiction novel *The Windup Girl*, which portrays combined crises of climate, agriculture, and biodiversity. In Bacigalupi’s future, perhaps 100 or 150 years from the early twenty-first century, the world has been devastated by sea level rise and even more by constantly mutating plagues and pests that agribusiness corporations are barely able to stay one step ahead of through constant genetic reengineering. Thailand is the only country that has been able to offer resistance to the “calorie companies,” the chemical and agricultural corporations from the North, because it has meticulously maintained an archive of uncontaminated seeds whose genes can be called upon to create new, temporarily plague-resistant crops. Bangkok, the “City of Divine Beings” or “City of Angels,” has been saved from flooding by an act of royally mandated civic engineering: a system of dykes, locks, and pumps. But even at the beginning of the novel, it is flooded by what one of the environment ministry’s top officials considers a metaphoric ocean:

Protecting the Kingdom from all the infections of the natural world is like trying to catch the ocean with a net. One can snare a certain number of fish, sure, but the ocean is always there, surging through. . . . Pollen wafts down the peninsula in steady surges, bearing AgriGen and PurCal’s latest genetic rewrites, while cheshires molt through the garbage of the sois and jingjok2 lizards vandalize the eggs of nightjars and peafowl. Ivory beetles bore through the forests of Khao Yai even as cibiscosis

² The term “climate urbanism” was to my knowledge first used by the geographer Javier Arbona. I am grateful to Jon Christensen for pointing me to his work.

sugars, blister rust, and fa'gan fringe bore through the vegetables and huddled humanity of Krung Thep. It is the ocean they all swim in. The very medium of life. (47–48)

Genetically reengineered nature also includes humans, among them one of the protagonists, the Japanese “windup” Emiko—so called because the Japanese gene engineers who created her included into her programming unnecessary stutter-stop movements reminiscent of older mechanical imitations of the human. Appreciated for her grace and beauty in her homeland, Emiko experiences Bangkok as a nightmare of discrimination, violence, and sexual exploitation. City and nation are riven by struggles between the powerful Environment Minister and the Minister of Trade over questions of commerce and protectionism, nativism and international engagement, and varying alliances with the Queen, the commoners, and the foreign representatives of the calorie companies. The world beyond Thailand presents an even more apocalyptic scenario of corporate exploitation, power politics, rampant ecological crisis, and mass death.

Bangkok is destroyed in the end, as cities usually are in dystopian fiction and film, even and especially when they were conceived on the model of a fortress:

The destroyed locks and sabotaged pumps take six days to kill the City of Divine Beings. Emiko watches from the balcony of the finest apartment tower in Bangkok as water rushes in. . . . On the sixth day, her Royal Majesty the Child Queen announces the abandonment of the divine city. . . . Slowly, the city empties. The lap of seawater and the yowl of cheshires replace the call of durian sellers and the ring of bicycle bells. At times, Emiko suspects that she is the only person living. (355–56)

She is not, but she is certainly the individual with the best chances for survival into the long-term future, since she is immune to the new diseases, highly intelligent, and can occasionally move at superhuman speed. Along with the cheshires, genetically engineered cat successors, and Thailand’s multifarious biotech flora and fauna, she stands for the future in Bacigalupi’s world, for the new nature humans have created.

At the end, the fact that she does have a future and might join a community of similar “New People” turns into the only utopian silver lining on the novel’s otherwise relentlessly bleak futuristic horizon. But it does not feel like much of a utopia to the reader, because Emiko’s future is outlined by one of the more sinister characters in the novel, the unscrupulous biotech genius Gibbons. Gibbons had earlier in the novel argued against conservation in an encounter with an employee of the Ministry of the Environment:

The ecosystem unravelled when man first went a-seafaring. When we first lit fires on the broad savannas of Africa. We have only accelerated the phenomenon. The food web you talk about is nostalgia, nothing more. Nature. . . . We are nature. Our every tinkering is nature, our every biological striving. We are what we are, and the world is ours. We are its gods. . . . [Y]ou die now because you cling to the past. We should all be

windups by now. It's easier to build a person impervious to blister rust than to protect an earlier version of the human creature. . . . You cling to some idea of a humanity that evolved in concert with your environment over millennia, and which you now, perversely, refuse to remain in lockstep with. Blister rust is our environment. Cibiscosis. Genehack weevil. Cheshires. They have adapted. . . . Our environment has changed. If we wish to remain at the top of our food chain, we will evolve. Or we will refuse, and go the way of the dinosaurs and Felis domesticus. (243)

The nightmarish world of the novel is here portrayed by Gibbons as nothing more than an altered ecological environment that requires new strategies of adaptation. The biologically reengineered and ultimately drowned city of Bangkok becomes the symbol and the material incarnation of this remade Anthropocenic world. That it will offer a suitable habitat to a future, genetically altered species of humans holds little consolation for the older humans who are doomed to perish in this urban ecology.

The Earth in Robinson's *2312*, as I mentioned earlier, suffers from ecological crises, military conflicts, and corporate exploitation in ways that might make it just as dystopian as Bacigalupi's world, though it is juxtaposed with a multitude of other habitats, cities, and social systems that humans have created across the solar system. But when some of the citizens of these new societies return to Earth, they do not invariably perceive it as dystopia. If they are often bewildered, frustrated, or put off by the difficulties of life on Earth, they are just as often intrigued, fascinated, and delighted by what they find, and this is nowhere more true than in their encounter with terrestrial cities.

Swan, the landscape artist from Mercury, for example, visits twenty-fourth-century Manhattan, a city partly under water after a massive sea level rise induced by climate change. In Emmerich or Bacigalupi, this kind of plot premise provokes urban apocalypse. Not so in Robinson:

A few parts of Manhattan's ground still stood above the water, but most of it was drowned, the old streets now canals, the city an elongated Venice, a skyscraper Venice, a super Venice—which was a very beautiful thing to be. Indeed it was an oft-expressed cliché that the city had been improved by the flood. The long stretch of skyscrapers looked like the spine of a dragon. The foreshortening effect as they got closer made the buildings look shorter than they really were, but their verticality was unmistakable and striking. A forest of dolmens!

Swan got off the ferry at the Thirtieth Street Pier and walked on the broad catwalk between buildings to the High Line extension, where people filled the long plazas stretching north and south. . . . The rooftops were garnished with greenery, but the city was mostly a thing of steel and concrete and glass—and water. Boats burbled about on the water below the catwalks, in the streets that were now crowded canals. (100–101)

Instead of urban disaster, Robinson's utopian imagination conjures up another Calvino-type, Venetian-inflected scenario in which climate change combined with human ingenuity and engineering know-how creates a new aerial-aquatic

cityscape. For the reader, this new cityscape's artificiality, even surreality, makes it most striking. For Swan, on the contrary, who is used to domed habitats and open spaces that humans can visit only in space suits, it is one of the purest forms of nature she can imagine:

Below her the slop of water threw up a big ambient sound. Human voices, and water splashing, and the cries of gulls back on the docks, and the rush of wind through the canyons of buildings; these were the sounds of the city. The water below was completely chopped up with intersecting wakes. Behind her, down the avenue to the west, mirrorflakes of broken sunlight bounced on the big river. This was the thing she loved—she was outdoors, truly in the open. Standing on the side of a planet. In the greatest city of all. (101–2)

This scene not only turns the familiar science-fiction scenario of the drowned metropolis from dystopia to utopia but also presents an altered perception of the city as a profoundly natural place: even the most built-up and densely inhabited cityscape is part and parcel of planetary ecosystems. Visiting the city is tantamount to “standing on the side of a planet.”

As a complex ecological system, then, the city in Robinson's novel provides a template for thinking about terraformed planets and the transformation of nature through human agency, as it does in a very different way in Bacigalupi. Robinson makes this point formally as well as thematically by strategically redeploying narrative techniques that first emerged in high-modernist urban novels of the early twentieth century. In between the chapters of *2312*, as I mentioned earlier, he inserts quotations from fictional books, lists of new inventions or old customs, and passages that describe human settlements on a particular asteroid, moon, or planet. The science-fiction text closest in time to *2312* that uses a similar technique is David Brin's *Earth* (1990), which also features excerpts from books, online archives, TV news updates, and Internet chat groups.³ In addition, italicized passages at the beginning of sections in *Earth* recount the geological history of the planet as a kind of bildungsroman.

This narrative architecture closely follows John Brunner's technique in his science-fiction novel *Stand on Zanzibar* (1968), a work about the global growth of cities and of urban violence that similarly includes segments from news items, television, and book extracts to develop its portrait of the planet. At the time, this seemingly new technique attracted a good deal of attention and critique, to which Brunner responded rather acerbically by pointing out that it was “not an invention but an adaptation. Since . . . s[cience] f[iction] is a notoriously conservative field in the stylistic sense, it didn't surprise me that a lot of people felt something that was actually a couple of generations old was too much of the *avant garde* to be tolerated” (“Genesis” 36). Specifically, he mentioned John Dos Passos's *U.S.A.* trilogy (1938) and *Midcentury* with their “technique of documentary association” as a model for his own procedure (“Genesis” 36).

³ Brin imagined chat groups several years before Tim Berners-Lee introduced the Mosaic browser and started the Internet as we know it today.

By retracing this genealogy of various science-fiction novels back to the high-modernist urban novel, the connection between the narrative architecture of *2312* and the collage of different idioms, discourses, and genres in James Joyce's *Ulysses* (1922), Virginia Woolf's *Mrs. Dalloway* (1925), and Alfred Döblin's *Berlin Alexanderplatz* (1929) emerges clearly. If twentieth-century urban novelists translated the diversity and simultaneity of the modern metropolis into narrative through their fragmentation and recombination of discourses, Robinson uses a similar technique to convey a sense of the diversity of human-made habitats across the solar system at the beginning of the twenty-fourth century, habitats that combine dimensions of natural and built environments.

New Streets and New Strollers

The high-modernist genealogy of Robinson's techniques also emerges in several short passages titled "Quantum Walk" that are interpolated between chapters in the second half of the novel. "Quantum Walk 1" begins as follows:

a street out in a street move naturally be alert don't make eye contact that will be hard

hope is the thing with feathers buildings massed to the sides of the street surface foamed silicate lightly brushed for better footing by a circular broom tines two hundred millimeters apart each sweep erased part of a previous pair of sweeps surcharge and overlapping concentricities . . .

a stranger on the edge of town green moss green grass marigold calendula yellow a male scrub jay drops bluey onto flagstone puddle in gap between street and flower strip wall of tram station jay hops in puddle . . .

humans talking to other humans perpetually they pass the Turing test it isn't very hard to do ask a question seem distracted. (336–37)

The lack of capitalization and punctuation, the sentence fragments, and the extended spacing turn these passages into a kind of modernist poetry, blending Emily Dickinson's "thing with feathers" and imagist style. The "Quantum Walk" poems are also a stream of consciousness expressing the perceptions of an urban flaneur with a sharp eye for technological and natural detail as well as a superior mathematical ability. As the reference to the Turing test betrays, however, this flaneur is not human but transhuman, a new kind of person who in the novel emerges from a conjunction of quantum computers, so-called qubes, with other types of digital intelligence. The "Quantum Walks," in this way, map a new kind of urban subject and subjectivity with some of the time-honored devices of high-modernist urban novels and poems. The urban framework, understood as a thematic emphasis but also as a certain kind of narrative and stylistic matrix, informs *2312* when it portrays cities as well as when it engages with the transformation of entire continents, moons, or planets.

Walter Benjamin, in his reflections on nineteenth-century Paris and the poetry of Charles Baudelaire, famously characterized the flaneur as standing outside the operations of market capitalism by virtue of his leisure but also as fascinated with

the pleasures of the commodity (55). The gaze of Robinson's flaneur, by comparison, foregrounds elements of urban nature along with details of technology. Like Swan's experience of Manhattan as a thoroughly natural space, the que human's acute awareness of plants and animals in the urban space helps to naturalize it. This alien perception does not share any human biases against the city as the antithesis to nature and therefore approaches its natural and technological dimensions as part of an uninterrupted continuum. The city walks of "spacers" and que humans, at the same time, connect the European high-modernist figure of the flaneur to the figure of the hiker, who has played a crucial role in the American environmentalist imagination all the way from Henry David Thoreau's famous essay, "Walking" (1862), to Cheryl Strayed's *Wild: From Lost to Found on the Pacific Crest Trail* (2012).⁴ At stake in this combination are questions of what constitutes an ecological or social community, whom it includes and who remains outside, and what social and political agency community members might have or might be denied.

The same questions and a similar conjunction of flaneur and hiker also structure a recent text on urban nature that looks, on the surface, quite different from Robinson's far-future utopia. Harryette Mullen's volume of poetry, *Urban Tumbleweed*, is subtitled *Notes from a Tanka Diary* and consists of 366 thirty-one-syllable poems about urban nature, mostly but not only in Los Angeles. The poetic form is adapted from a classical Japanese verse form that tended to express stylized perceptions of a highly aestheticized nature. Mullen keeps the syllable count but distributes the syllables over three lines in a way that diverges from the Japanese model, and she turns her perception to a space that for a long time was not assumed to include any nature at all. (In her well-known essay, "Thirteen Ways of Seeing Nature in L.A." [2005], the environmental historian Jenny Price points out that the denial of any nature in Los Angeles is in fact one of many stories told about it.) Mullen's first-person stroller encounters many kinds of nature in the city: wild, domestic, planned, accidental, literal, metaphoric. Some of the short poems appear fairly conventional at first sight in their attention to birds and flowers:

*Hummingbird alters its course, zooming
closer to check out the giant hibiscus flower—
only me in my red summer dress. (26)*

*A profusion of oleanders—to beautify
the freeway and filter the air, though
leaf, stem, and blossom all are poison. (24)*

*Would have said this purple clustered flower
looks like a burst of fireworks, but of course it's
the fireworks that imitate the flower. (30)*

Recurring motifs of misdirection, misperception, and disorientation subtly structure these apparently casual observations of a hummingbird's error, a landscaping

⁴ The connection between the flaneur and the hiker has been explored in detail by Catriona Sandilands and Catrin Gersdorf.

paradox, and a poet's mental double take. The relationship between original and imitation and between literal and metaphoric meanings that emerges in the poem about fireworks and flowers also informs the one that the volume's title is derived from:

*Urban tumbleweed, some people call it,
discarded plastic bag we see in every city
blown down the street with vagrant wind.* (32)

In a first reading, one might object that this attachment of a natural metaphor to a thoroughly artificial product of the consumer world glosses over the environmental damage and the risks to other species that come with the careless disposal of plastic bags. What is missing, in other words, is any sense of environmentalist resistance or dismay at the ubiquity of such throwaway items. The real point of the comparison only becomes clear in a much later poem that returns to the motif of the tumbleweed:

*Even itinerant tumbleweed had roots
attaching it to the land, before its stem snapped
and strong winds pushed it down the road.* (121)

Nature itself, this poem highlights, can be uprooted, displaced, and on the move, and the entire volume links the ecological and urban spheres through this motif of mobility, displacement, and frequent misdirection. Its goal is less to praise or criticize particular uses of nature or urban practices in any conventional environmentalist sense than to foreground their parallels with each other.

Mullen here stretches the concept of *flânerie* into a new dimension. In the introduction to *Urban Tumbleweed*, she describes how walking and taking public transit instead of driving opened up a different perception of urban space for her and made her aware of a nature for which she had no vocabulary, not being a gardener, birdwatcher, or environmentalist (viii). Not unlike Robinson's posthuman and transhuman flâneurs, she approaches the city with a perspective that does not make firm distinctions between what is natural and what is cultural or deliver judgments on what belongs and what does not. But beyond this altered human perception, urban nature itself emerges as a flâneur in *Urban Tumbleweed*, always on the move and going where it is not supposed to go. Nonnative plants such as the oleanders on the freeway medians, for example, find themselves in Los Angeles in much the way Mullen, herself not born in the city, does.

*Non-native ice plant on postage stamps
represents the golden state like a governor
whose tongue gets tangled in California.* (32)

This poem on another nonnative plant species explicitly connects introduced plants and immigrants, including Arnold Schwarzenegger, California's recent governor, originally from Austria. Other poems describe immigrants who die from

eating toxic mushrooms that resemble edible ones in their native countries and homeless people locked out from urban parks. Neither people, animals, nor plants are ever where they should be in Los Angeles, and where they should be is always open to question: that is exactly the nature of the urban in Mullen's perspective. Nature in the city presents itself, like its culture, as a heterogeneous assemblage caught up in constant mobility and displacement.

Mullen's Los Angeles may seem like a far cry from Robinson's Terminator, which is after all a very managed environment for all that it, too, is in perpetual motion. But as Robinson's descriptions highlight, the citizens of Mercury constantly remake their living environments inside and outside their capital city, as do the designers of terraria. As I mentioned earlier, they sometimes imitate Earth's biomes and sometimes make up new kinds of ecosystems that they call Ascensions; Mullen's Los Angeles is clearly another version of such a human-made biome. Robinson, it is true, tends to emphasize human design, whereas Mullen emphasizes coincidence and the complementary agencies of plants, animals, soil, and weather in the way anthropogenic biomes function. But the two authors converge in their goal to understand city and nature as elements of the same transformation processes. Both of them centrally aim to portray the constantly renewed processes of terraforming that create nature in and out of cities and cities as part of nature, and to portray the processes that create and undo cultural and political communities at the same time.

In an additional parallel, both Robinson and Mullen remodel existing literary forms to express their new sense of urban nature. Robinson's use of techniques of the high-modernist urban novel (parallax, stream of consciousness, fragments of multiple discourses, imagist juxtapositions) in combination with techniques of epic (large-scale narration and enumerations) contrasts at first sight with Mullen's minimalist redeployment of a very short verse form imported from a non-Western tradition. But both writers juxtapose fragments and use the trope of the urban stroll to tie them together, connecting the urban flaneur to the exurban hiker and thereby combining well-known literary templates for portraying the experience of nature and the experience of the city. And both, as this essay has shown, go one step beyond by turning nature and the city themselves into strollers—a setting in which not only humans move but other actants also. This technique correlates with their vision of urban communities in which wide varieties of humans as well as nonhumans make their presence felt, their voices heard, and themselves seen—a first step toward a more-than-human democracy that turns the idea of the Anthropocene away from its uniquely human focus.

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