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ARTICLE



“Petro-texts, plants, and people in the Anthropocene: the dark green”

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ABSTRACT

The ‘dark green’ refers to the green plant-human relationships that undergird human cultures as well as the darkly petroleum-fueled industrialization, mass species extinctions, and strange new ecosystems in the Anthropocene. I consider briefly three petro-culture novels based on various ‘road trips’ that explicitly address both the long-term and massive, albeit oft-ignored, ecological power of plants whether in living vegetal form or in their rotted, processed form of petroleum products: Frank Herbert’s *Dune*, portraying worm ‘spice’ as a stand-in for oil; Cormac McCarthy’s *The Road*, eliminating all energy and plant life leaving only hungry humans; and Paolo Bacigalupi’s cli fi novel focusing on calories and virulent plant diseases, *The Windup Girl*. These novels reveal the overlooked plant power, whether of mutant vegetal diseases, the inevitable death of all human and non-human animals without plants, or the sheer power of plant-based petroleum calories fueling our world in its drive into darkness.

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While the green blur alongside the pavement or off in the distance barely registers in many of the high-velocity, petroleum-fed narrative road-trips of the Anthropocene, that out-of-focus greenery is the actual driver of the action. These stories depend on the tarry brown-black vegetative energy that was originally green, but then is transformed repeatedly from photosynthesized sunlight into plant sugar, rotting organics into fossil fuel, and then into petroleum. That is, while petroleum is certainly ‘dark’ in terms of its environmental impact, it is also technically ‘green,’ at least when we consider its origins as a hydrocarbon substance formed in long-term processes over millions of years when phytoplankton (plants) and zooplankton (animals) fell to the bottom of the sea, mixed with ocean sediments, and slowly rotted while under high pressure, eventually taking a new form deep below the ocean. Releasing this carbon-based plant product from the depths and further transforming it into various forms of fuel and products, human use of oil therefore exposes our dependency on vegetal power in its many phases – whether bright green or ‘dark.’ Indeed, our entire human bodily existence has always been and continues to be a plant-based ecological system: besides the phyto-fossil fuels that currently feed our industrial agriculture and help us and our goods careen across the world, we eat plants or plant-eating animals, we breathe the oxygen released in

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(From footnote 1, reference to my previous work: “‘dirt theory’”: See Sullivan, 2011, 2012.; deleted in text).

photosynthesis, and we flourish best where greenery shapes the local water, temperature, and ecological systems. Plants, in short, are our most predominant, most essential, and often most easily overlooked energy source. Furthermore, the vegetal often stands in as a seemingly passive green backdrop – ‘nature’ – for our fast-moving human/animal activities, and yet plants actually are very mobile when considered on their own vegetal time scale.¹ Plants move with growth, by taking advantage of wind, water, and animal activity, and they spread as wildly colonial pioneering species at every opportunity. Now they move as oily fuels. Even though the green stuff enabling our very being may seemingly disappear in our imaginations under the spinning wheels on our streets, there should be no doubt that beyond the freeway the fossil-fuels are other forms of the mobile, vegetal that is ‘green,’ albeit not in the way we usually understand the environmentalist sense of the color. This essay therefore addresses what I call the ‘dark green’ of petro-cultures.

I formulate the ‘dark green’ in reference to the plant-human relationships that have always undergirded human cultures, but even more so as an evocation of how the petroleum-fueled Anthropocenic industrialization, rapid development, and the increasingly large human populations alter entire ecosystems. The color ‘green’ reflects numerous well-known environmental concepts including the ‘Green’ party, the color of most vegetation, and yet, rather ironically, the color of capitalist US ‘dollars’ and the so-called ‘Green Revolution’ when agriculture became industrialized. This modern green is getting ever darker, one might add: darker as in toxic, laden with pesticides and herbicides, but also in the death-colors of invasive species like the fertilizer-fed algae blooms creating dead spots in seawater, the kudzu vines covering entire trees, and the unconquerable, ‘Roundup-resistant’ pigweed overtaking many agricultural lands in the southern US. Thus, the dark green as a larger project is a study of vegetal agency that participates in the recent proliferation of work in critical plant studies and plant science that include inspiring re-assessments of vegetal power, intelligence, and chemical communication by Michael Marder, Luce Irigaray, Catriona Sandilands, John Ryan, Monica Gagliano, Peter Wohlleben, Mathew Hall, David George Haskell, Robin Wall Kimmerer, and many others (Haskell, 2017; Irigaray and Marder, 2016; Kimmerer, 2013; Ryan, 2017; Sandilands, 2016; Wohlleben, 2015). Plants, it turns out, are neither passive nor immobile; indeed, they are actively responding to current Anthropocenic conditions.

Finally, I connect the ‘dark’ green to Timothy Morton’s concept of ‘dark ecology,’ which he defines as having the complicit perspective typical to noir film. As he describes it: ‘The noir narrator begins investigating a supposedly external situation, from a supposedly neutral point of view, only to discover that she or he is implicated in it’ (Morton 2010, 16).² Dark ecology places humanity fully within the environmental systems and within the cultural alterations of these systems, and is hence without idealizations of isolated purity where ‘nature’ is a far-away place separate from human culture. Morton states: ‘I explore the possibility of a new ecological aesthetics: *dark ecology*. Dark ecology puts hesitation, uncertainty, irony, and thoughtfulness back into ecological thinking. There is no metaposition from which we can make ecological pronouncements’ (Morton 2010, 17). The dark green, similarly, evokes the complicit view from within oil cultures, but it relates specifically to the human-plant interactions by acknowledging that our petro-paths are actually derived from long and varied forms of botanical output that grows, dies, rots underground, and then re-emerges in new and fiery forms.

The wild vegetal exuberance now transformed into the hot burn of oil culture is not just some recent human discovery: plants and their predecessors have long dominated the energy landscapes of Earth, at least in terms of living things. The pioneering cyanobacteria started to settle on the terrestrial surface about 1.2 billion years in the past, and they were followed by plants and fungi around 500 million years ago that spread and conquered with a fury until they eventually colonized most of Earth's livable surface. The vegetal take-over changed everything: plants transformed the soil, the water systems, and the atmosphere into the ecological systems from which we and our animal kin emerged. While their ancient remnants transformed into fossil fuels, plants' ongoing production of sugars and oxygen remain the obvious yet backgrounded energy basis of our lives. As the editors of *The Language of Plants: Science, Philosophy, Literature*, Monica Gagliano, John C. Ryan, and Patricia Viera note:

Plants are perhaps the most fundamental form of life, providing sustenance, and thus enabling the existence of all animals, including us humans. Their evolutionary transition from Paleozoic aquatic beginnings to a vegetative life out of water is undoubtedly one of the farthest-reaching events in the history of the earth. It was the silent yet relentless colonization of terrestrial environments by the earliest land plants that transformed the global landscape and radically altered the geochemical cycles of the planet. This resulted in lowered concentrations of atmospheric carbon dioxide and thus set the scene for the emergence of terrestrial animals about 350 million years ago (Gagliano, Ryan and Viera 2017, vii).

And Matthew Hall similarly writes: 'Most places on Earth which contain life are visibly *plantscapes* [...] In fact, the bulk of the visible biomass on this planet is comprised of plants. It is a fact that in most habitable places on Earth, being in the natural world first and foremost involves being amongst plants, not amongst animals, fungi, or bacteria' (Hall 2011, location 42–46). While Gagliano, Ryan, and Viera set the stage for the dominance of 'plantscapes,' I note also how our vegetal basis has taken on a more recent turn with a darker shade, one less direct in kind, one accelerated by the energy-dense, volatile, culture-changing, and industry-enabling plant product of petroleum. In other words, the radical transformations of the Earth's systems through vegetal photosynthesis are once more shifting dramatically as human beings burn plant-based fossil fuels. This anthropogenic shift is, however, a dirty oil-colored green. This long-term view suggests that our plant-energy-dependency has more dimensions than even the vast vegetal impact on water cycles, food, oxygen production, and carbon dioxide absorption.

Though the connection between plants and petroleum usually garners little attention, it is noted in the recent 2018 *New York Times Magazine's* article, 'Can Dirt Save the Earth?' by Moises Velasquez, albeit in parenthetical asides amidst discussions of the carbon cycle and the soils that absorb carbon: 'Lest we forget, the fossil fuels that now power civilization contain carbon removed from the air during photosynthesis millions of years ago,' and 'Coal beds are the fossilized remains of ancient marshes and peatlands' (Velasquez-Manoff 2018, 31). Velasquez describes farming efforts to cultivate soil both for better crops and to sequester carbon more efficiently. The newly emerging field of petro-cultures often notes the historical plant-petroleum connection (though without continuing to analyze the implications of petroleum as plant-power); Stephanie LeMenager notes, for example, 'The Museum of La Brea Discoveries allows us to

conceive of fossil fuels as fossil and fuel, and predominantly a fossil' (LeMenager 2014, 150). And Allan Stoekl writes in the foreword to *Oil Culture* that:

It's when we think about what 'oil history' could mean that we take a *natural* entity and recognize its *cultural* centrality. Oil is natural in the sense that no one put it there in the ground: it is the result of natural processes, the arrested decomposition of plant and organic matter over millions of years. And yet everything that is done with it – the pumping, the refining, the grading, the distribution, the use in transport, manufacture, heating, the generation of electricity – is fully cultural (Stoekl 2014, xii).

I suggest that we expand our consideration of this 'natural' origin as well as the ongoing transformation of human/culture-plant interactions more fully in this study of the dark green, or the entwined impacts of plants, petroleum, and people.

In other words, we need to think about petroleum's vegetal origins lest we either continue overlooking the actual scope of vegetal power or else sublimate notions of plant energy solely into some kind of mythic and lost past. This tendency to discount plants' roles in our daily lives and in their manifold forms results in an odd array of overly simplified plant references in petro-cultures, including the dichotomy between the machine-like agricultural products and distant greenscapes for vacations; or between utopian visions of harmonious pastoral gardens and dystopian horror tales of overwhelming and nightmarish vegetal agency re-emerging and re-conquering the Earth. In Dawn Keetley and Angela Tenga's volume, *Plant Horror: Approaches to the Monstrous Vegetal in Fiction and Film*, we learn that Anthropocene plants often function as the return of the repressed (power of plants) in such narrative forms as Triffids, body-snatching, plant-based aliens, ferocious tomatoes, plant-people hybrids, carnivorous corn and predatory vines (Keetly and Tenga 2016). My dark green project acknowledges vegetal power in narratives on all these levels: the mundane, the utopian dream, and the horror-scape of realizing our unceasing dependency on green vibrancy regardless of technology.

In terms of petro-texts, however, the dark green perspective concentrates on the *transformative* processes underlying both plant life and the resulting petro-cultures. I therefore seek to offer a possible alternative to the three forms of petro-narratives described by Imre Szeman: 'strategic realism' (maintaining the status quo), 'techno-utopianism' (imagining new and utopian futures of clean energies in pastoral-urbanscapes), and 'eco-apocalypses' (describing the need for full system-change in the face of vast environmental collapse brought about by fossil fuel capitalism) (Szeman, 2007). 'Dark green narratives,' in contrast, tell of transforming energy, bodies, and human-plant relations in (strangely) hybrid and possibly sustainable forms, thus offering options beyond the utopian, apocalyptic, or economically-driven stories maintaining the status-quo of petro-cultures. Indeed, the dark green is dedicated to unearthing petro-culture's actual dependencies, its 'enabling conditions,' as Val Plumwood would have it in *Environmental Culture*, and imagining how these conditions shape our daily lives and energy uses as we move through the plantscapes all around us (Plumwood 2002, 17).

However, such an understanding of long-term transformative human-plant interactions needs to avoid the easy science-fiction path towards utopian dreams of inevitable *technological* transformation that will save us all. As Gerry Canavan so clearly explains:

In the ideology of ecstatic technological progress that oil ontology generates, it is only natural to assume that in due time oil itself will eventually be superseded by a new form of energy – something even more excessive and miraculous, allowing for even greater marvels and wonders. This assumption has the paradoxical result of relegating fossil fuels – so central to the workings of modern capitalism, so utterly transformative of every aspect of life in the twentieth century, and so generative of the fantastic new technologies science fiction lauds – to a short historical footnote in the *longue durée* of human progress: oil as mere transitional energy source (Canavan 2014, 334–35).

The dark green instead suggests that it's *always been* plant power for us; hence the real energy question is which form or process of vegetative energy will we next utilize or, perhaps, emulate.

Even as plant-energy is such a dominant force in human history, plants are still all too often perceived merely as the stage for, and not the drivers of, change. Such inattention to the vegetal basis of our biospheric existence relegates the green foundation of our living bodies to the background, that is, as Michael Marder describes it in *Plant-Thinking: A Philosophy of Vegetal Life*, 'If animals have suffered marginalization throughout the history of Western thought, then non-human, non-animal beings, such as plants, have populated the margin of the margin, the zone of absolute obscurity undetectable on the radars of conceptualities' (Marder 2013, 2). Plant scientists have similarly claimed that human beings suffer from a kind of shared 'plant blindness,' as formulated by botanists James Wandersee and Elisabeth Schussler and noted in *The Language of Plants* and a recent discussion of 'plant intelligence' (Wandersee and Schlusser 2001; Gagliano, Ryan and Viera 2017, viii; Ruggles 2017). Plant blindness means that human beings perceive the surrounding greenery, however sparse or lush, as 'mere' background since the potential predators lurking among the trees like snakes grab our attention much more than the wending branches and vines that quietly fuel our existence. Wandersee and Schussler claim that plant science is itself an understudied and underfunded field in biology; hence, they argue that plant blindness pervades many disciplines and practices. On a positive note, such neglect is being countered by the upswing in critical plant studies, as well as increased scientific knowledge of plant activities; this essay on the dark green is part of this effort to bring more attention to cultural, biological, and literary plants.³ Such interdisciplinary efforts struggle for recognition in contrast to the dominant economic discourse regarding plants, one made evident by Martin Heidegger's critical term, the 'standing reserve' or 'board-feet' (*Bestand*), meaning that trees and forest are replaced by the profit-oriented discourse of wood as capital. More recently, rotted-plant oil functions as the driving force for petro-capitalism, though it is rarely described in terms of its botanical origins. Furthermore, even when Anthropocene discussions relate to both animal and plant extinctions, plants receive less attention. As Ursula Heise writes in *Imagining Extinction*, 'The species or groups of species that are portrayed are almost always animals, while plants, which are equally affected by extinction, receive almost no attention' (Heise 2016, 23). Of course, Heise both draws attention to the plant blindness and herself pays far more attention to animals in the book. Explicating the role of plants in our lives generally remains a challenge, as does connecting them to our fossil-fueled reality.

In order to make the connection between petroleum, plants, and people in the Anthropocene more overt, I consider briefly three petro-culture novels in this essay

that explicitly address both the long-term yet seemingly subtle ecological power of plants and the explosively short-term power of petroleum, and which all document various versions of failed road-trip journeys. In each, the human figures seek meaningful mobility but fail in various ways while plants, ever active, are still on the move (or are totally gone, which means that soon all other living animation will also cease). First, Frank Herbert's 1965 ecological novel *Dune* portrays worm 'spice' as a stand-in for oil. Spice fuels all intergalactic travel but may be lost entirely due to the actions of the local Fremen, who are led by the messianic Paul Atreides on his journey towards becoming emperor, and who wish to terraform the planet with greenery which would likely decimate the spice-producing sand worms. Paul's travels with the Fremen do lead to his successful ascension as emperor, but he fails both to stop the jihad and to control the plants. Secondly, Cormac McCarthy's 2006 *The Road* mysteriously explodes all oil and energy forms into extinction, thereby annihilating all vegetal and animal life except, oddly, for human beings, leaving a world devoid of fuel except for some canned goods and human bodies. In other words, in this dark tale, neither living plants nor their ancient products in coal, oil, or gas remain available to feed human desires – but humans keep on walking down the dark road paved by tears and petroleum-based tar. Without plant life, it will be a short trip. Thirdly, Paolo Bacigalupi's 2009 *The Windup Girl* presents a climate-changed world suffering from both the depletion of petroleum products and the spread of fearsome plant diseases that cross species lines and devastate human populations; everyone remaining seeks alternative forms of energy from (potentially dangerous) food calories, wind, kinetic springs, and good old-fashioned animal power (albeit with some helpful genetic manipulation). In typical Bacigalupi-style, hybrid humans and animals who are genetically modified remain oddly stable in contrast to the continually mutating and out-of-control plants and their algal cousins. The battle to recreate older plant forms succeeds in part, but the fight against mutating algae and plant diseases appears unwinnable for human beings in *The Windup Girl*, although the new post-humans are resistant. Indeed, and with a spoiler alert: everything finally implodes due to randomly mutating algae. Plants and their plant relatives seem more fundamental and more dangerous in the long run than all the genetically-modified soldiers, explosive weaponry, and war-elephants combined. Emiko, the titular windup girl and posthuman, spends the novel fruitlessly hoping to journey north where there might be a windup community living free in the forests (where else) as an impossible green dream. In sum, all three of these novels portray oil-culture as a kind of failed road trip cursed by petroleum dreams and subtly driven by the power of living plants; each of them also reveal a different kind of plant power and mobility that contrasts with human travel. By highlighting the connection between people, petroleum, and plants from a dark-green perspective, I also hope to create a better understanding of what our energy sources actually are, and what the implications of (ignoring) plant power might be. These three petro-texts portray various plant-infused destinies with the unceasing flow of plants (or the dearth of them which will bring the eventual end of human trips) contrasting to the flawed and failing human journeys driven by green urges of the Fremen, a fatal lack of greenery in *The Road*, or the challenges of surviving a world in which there is no (human) escape from the plants run amok in *The Windup Girl*. Overall, the novels reveal in different ways how the dark green power of plants reigns supreme and continues to transform the world, even when their altered forms of carbon become

inaccessible or inspire galactic wars. All three novels reveal an underlying sense that the dark-green plant scale of energy and vegetal mobility dominate – and if the vegetal fails, we fail.

Herbert's classic ecological novel, *Dune*, directly connects the problem of balancing the human need for greenery and a plant-based ecosystem with the need for intense and powerful fuel. The story of the spice – the stand-in for oil – tracks Paul Atreides, soon to be known throughout the galaxy as 'Muad'Dib,' or the fanatic leader of the Fremen, on his journey towards knowing the ecology of Arrakis and dominating the economy with this knowledge. One of the most powerful facts of Herbert's *Dune* is that understanding ecology, including water cycles, plant lives, and the sources of your fuel, is the most crucial, cosmic power of all. Indeed, Paul quickly learns this lesson as he masters Fremen culture and eventually even the sandworms amidst the harsh desert landscapes. Early on in the novel, he begins to grasp the water/spice tension (humans need water for life but they also need spice, which he later learns is produced by the sand worms for whom water is toxic), and by the end, Paul briefly achieves control over both by threatening the destruction of spice by contaminating it with water in order to manipulate the empire. Already at their first dinner party on Arrakis, Paul's mother, Jessica, mentions their dreams to turn the planet green and increase access to water with an inadvertent comment that puts them in the middle of an ongoing power struggle: 'It is our dream that someday the climate of Arrakis may be changed sufficiently to grow such plants anywhere in the open' (Herbert 1980, 130). The power of water becomes clear to both Paul and Jessica during the ensuing conversations: 'It occurred to Jessica that the banker had said: "I, too, control that ultimate source of power on Arrakis – water"' (Herbert, 136).

The spice-water tension is not easily resolved since living on Arrakis infuses everyone with enough spice to make them addicted for life and withdrawal is fatal. Additionally, the addictive capacity of spice connects it to, on the one hand, our own earthly plant-based drugs, and, on the other, to oil. Many scholars have commented on the spice/oil connection in *Dune*; Canavan, for example, notes that, 'The crucial turning point for a more complete cognitive mapping of oil and oil capitalism in science fiction might well be Frank Herbert's *Dune*, published in 1965. *Dune* famously transmogrifies oil imperialism into a battle for the control of the "spice" that makes interstellar navigation possible [...] (Canavan 2014, 340). Furthermore, ingesting or inhaling the addictive spice increases pre-cognition. Oil, Herbert suggests, enhances our cultural processes (cognition and technology) in the short term but it is fatally addictive in the long term. We are bodily and culturally immersed in oil energies.

Yet even more presciently, *Dune* reveals the *ecological* secrets that drive the entire cosmos even as the novel's intricate economic and political power structures completely fail to see or understand these systems. That is, the fact that spice comes from worms and worms are poisoned by water remains oddly hidden from most of the imperial figures in the novel (Herbert clarifies this fact in the appendix to the novel). Much like our petro-cultures remain fecklessly – purposefully? – blind to the (vegetal) sources of oil and the implications of that botanical origin (as well as the environmental implications of the drilling, spilling, fracking, water-poisoning, and air-polluting fossil fuels), the quest for power in *Dune* remains ignorant of ecological systems and leads inevitably to destructive battles blind to their basis. The Fremen and planetary ecologists openly

talk about these facts, making the imperial obliviousness to them all the more blatant as a representation of petro-culture's ignorance of its own fundamental basis. The planetary ecologist, Kynes, hides this knowledge from the rest of the empire; he also refuses to reveal it to Paul and his father when they first arrive on Arrakis. However, the reader learns the truth in his long monologue when Kynes is sent to death in the unforgiving desert by the cruel Harkonnen, who seek to gain power but fail to realize that ecological knowledge is the path to their goal. He explains the obvious signs that all have managed to overlook in their blind quest for spice without wisdom: 'How strange that so few people ever looked up from the spice long enough to wonder at the near-ideal nitrogen-oxygen-CO2 balance being maintained here in the absence of large areas of plant cover' (Herbert, 274). The ecological ignorance of the Harkonnen and the emperor's forces, as well as all those farming the spice in the desert, brings their downfall. They fail to perceive and understand the connection between the giant sandworms and the spice and the connection to water, which is a provocative expression of most of petro-culture's ignorance regarding its ecological basis.

Because the Fremen, in contrast, do know about their own ecological systems, they are able to gain galactic power. They are, however, driven more by their quest to change an entire planet through the use of water and plants. The planetary ecologists of Arrakis claim, in fact, that one needs only a small amount of vegetation in order to initiate global climactic alterations: 'If we can get three per cent of the green plant element on Arrakis involved in forming carbon compounds as foodstuffs, we've started the cyclic system,' Kynes said' (Herbert, 139); and: 'Keep in mind, though, that we need control only three per cent of the energy surface – only three per cent – to tip the entire structure over into our self-sustaining system' (Herbert, 276). And plants are crucial for this global transformation: 'A certain amount of plant cover had to be set aside to hold dunes in place; a certain amount for foodstuffs (both human and animal); a certain amount to lock moisture in root systems and to feed water out into surrounding parched areas' (Herbert, 499). Plants, it turns out, are always transformative and can destabilize or stabilize global ecosystems. The ecological secrets of the novel remain hidden with the Fremen until they are exploited by Paul as messianic leader seeking power. The Fremen must navigate between their secret plan to terraform Arrakis and recreate a green paradise with the vast amounts of water they have gathered underground, and the threat of this life-saving and green-producing fluid to the worms and thus to the spice to which they are addicted. In the end, being environmentally savvy brings conquest but no true form of control. Herbert's strategy of making the ecological secrets about plant life, water, and the source of energy the most relevant data of all renders *Dune* – still – one of the most profound ecological novels.

Herbert thus brings ecological ignorance to the forefront of the novel, and he demonstrates how a lack of understanding *about the source of your energy* leads to doom, war, and easy manipulation by a messianic hero. Knowing the ecology is to know the world and control the substance that everyone seeks: once Paul knows about the worms and their sensitivity to water, he realizes that he can threaten the galaxy's access to spice. But his knowledge goes even deeper as he is physically and mentally 'infused' by spice, overwhelming him with ever stronger hallucinatory insights into the future. In these visions, he sees a nexus of power leading to a terrible 'jihad,' one that he valiantly seeks to avoid but actually inevitably leads himself and his driven, desert-hardened,

fanatic, and spice-powered Fremen straight into battle. Indeed, the jihad arrives, despite all his efforts, and so his version of a spice (oil)-fueled road-trip ultimately fails. As the Fremen gain power in the next several *Dune* novels, they become so caught up in the jihad for power that they eventually lose sight of its ecological significance and their embeddedness in all the systems.⁴ Ecological knowledge of spice/oil and the clever use of plants bring power in *Dune*, but no one maintains full control of such intense energy sources and climate-changing, transformative greenery for long. Hence, the journey goes awry.

In contrast, McCarthy's declensionist, post-oil, post-apocalyptic novel, *The Road*, effectively eradicates all energy sources and leaves the remaining humans wandering hopelessly on endless roads. McCarthy presents our inability to imagine a non-petro-culture by totally eliminating all fuels, fossil, dark/green, or otherwise, except for human bodies and some canned goods. In this end-of-life scenario, all plants and animals are dead after some strange explosion shut down all economic structures and cultural systems even as human beings survive and march onwards in truly futile road trips. McCarthy repeatedly describes the dead trees and plants that the nameless father and son encounter as they journey: 'The shore was lined with birchtrees that stood bone pale against the dark of the evergreens beyond' (McCarthy 2016, 8). And: 'The weather lifted and the cold and they came at last into the broad lowland river valley, the pieced farmland still visible, everything dead to the root along the barren bottomlands.[...] The roadside hedges were gone to rows of black and twisted brambles. No sign of life' (McCarthy, 21). At the end of the novel, they arrive in the South at the sea but still find more dead trees; 'A dead swamp. Dead trees standing out of the gray water trailing gray and relic hagmoss' (McCarthy, 290). As gruesome as the corpses of human beings and animals are in the novel, the dead vegetation indicates much more seriously the total ecosystem collapse. Lacking both vegetal sustenance and the animals which live on plants, the father and his boy survive by finding a few remaining canned goods while eluding the cannibals who have inevitably turned to human fuel. The exhausted pair traverses a post-apocalyptic world of darkness and hungry humans on foot while tracing the tarred road itself as the concrete embodiment of one remaining form of petroleum surrounded by dead vegetation. While less riveting in terms of narrative development, the dead plants actually much more profoundly dictate the impossibility of human survival than does the lack of the plant-product, oil.

Petro-cultures in *The Road* have imploded, and the only hope appears to be continued travel as if we have become petroleum incarnate, or, rather, the final vestiges of mobilized vegetative fuel. While the failed quest of the nameless father and son fruitlessly takes them ever southwards to the ocean where they hope it might be warmer, the road itself never ceases. 'We have to keep heading south' (McCarthy, 42). 'We follow the road here along the eastern slope of the mountains. These are our roads, the black lines on the map. The state roads' (McCarthy, 42). The father clarifies that there are no more states left in *The Road*, but 'the roads are still there' (McCarthy, 43). Roads demarcate petro-cultural paths of movement, just as traces of old Roman roads remained after the fall of that empire. The etchings into the Earth's surface are the more profound and durable products of human culture, much more so apparently than are the political, ideological, and economic structures of statehood. And so, this tragic road trip traces the one thing remaining from our petro-cultures, the titular road: 'They

ate breakfast and by first light they were on the road, wearing fresh masks cut from sheeting, the boy going ahead with a broom and clearing the way of sticks and branches and the man bent over the handle of the cart watching the road fall away before them' (McCarthy, 156). And again: 'He got up and walked out to the road. The black shape of it running from dark to dark' (McCarthy, 261). One might say that the Road itself is actually the novel's main character. This non-human protagonist could explain why the novel repeatedly delineates the status of roads while human beings are doomed to painful deaths. Even after his father dies, the boy joins a seemingly nice family who, thankfully, promise not to eat him; the text yet again turns to the Road after a death. The boy goes to say goodbye to the corpse of his father and 'Then he rose and turned and walked back out to the road' (McCarthy, 286). Likely, the family itself, like the father and son, are less important as particular individuals than is the Road itself, which continues. The final paragraph of the novel suggests this idea by somewhat mystically connecting the question of maps and the road to the patterns on the fishes' bodies that used to live in the mountain streams: 'On their backs were vermiculate patterns that were maps of the world in its becoming. Maps and mazes. Of a thing which could not be put back. Not be made right again. In the deep glens where they lived all things were older than man and they hummed of mystery' (McCarthy, 287). Maps, mazes, the Road: all are traces of the 'world in its becoming,' left over from previous phases. The Road, however, seems to be the final map in McCarthy's post-oil novel of destroyed green.

The novel's Road as protagonist that endures, as the 'place' where the futile road trip occurs, and as the driver of action, stands in stark contrast to the totality of destroyed vegetation. McCarthy here wipes out the typical synecdoche for 'nature': the greenery that sustains us and most other living terrestrial and aquatic systems. Yet with their death, we also realize the power of plants to enable life. It is the very negation of their endless creep and towering limbs that marks the *Road's* annihilation. As we see in Herbert and McCarthy, such vegetal power is taking new forms in the Anthropocene as plants, like all living things, are noticeably reacting to the release of their own transformed remains in the form of hydrocarbon fuel. Like most of life on planet Earth, plants are impacted by the ongoing quest for more access to ever-deeper sites of fossil fuels and by their release into the atmosphere. The vegetal reactions we observe appear slow and barely visible in contrast to our standard animal mobility now typically amped up by oil-induced high-velocity delirium. Notably, one hears relatively little in the media about the mass *green* extinction of plant types though there are occasional references to the avid spread of the dark green invasive species that thrive with increased heat and carbon dioxide.⁵ Rob Nixon's account of 'slow violence' specifically references such deaths typically overlooked by our cultural media forms: 'By slow violence, I mean a violence that occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space, an attritional violence that is an event or action that is typically not viewed as violence at all' (Nixon 2011, 2). He compares the slowly devastating powers of pollution, radiation, floods, and disappearing species to the more spectacular and short term violence that gets all the attention. Science fiction, however, offers many examples of slow violence transformed into absurdly fast violence (such as the single day of radical climate change in the film, *The Day After Tomorrow*), and McCarthy's novel is typical of this tactic presenting quick and total vegetal death across the planet. The mass extinction of plants as well as the onslaught of teeming spores and

spreading vines that we are now experiencing, however, do not often register in the media any more than the role of plants in fueling our existence generally. Fueled by plants and plant-based petroleum before the apocalyptic event, human beings now remain inescapably bound to the paths of petro-cultures, tracing the dead remnants of the vegetal on the seemingly endless Road.

The third failed petro-road trip narrative, Bacigalupi's 2009 *The Windup Girl*, stands in direct contrast to McCarthy's total death of greenery: Bacigalupi brings the aggressive and unconquerable plant life to the forefront of the novel's challenges. That does not mean the trees or vines get revenge as in the many botanical horror novels and films, but rather that plants survive and mutate – or are genetically modified – with such ebullience that their diseases begin crossing species lines and harming, even killing, human beings. This post-oil novel focuses on finding (new and old sources of) energy rather than on the emptiness of lost energy like McCarthy. Bacigalupi's road trip is one that never begins since several figures wish for an exodus but never actually make it out of the city, remaining instead in interwoven paths with other characters in the climate-changed, flooded, futuristic urban realm of Bangkok, caught in a battle against both anthropogenic and naturally occurring plant diseases. With sea-walls and carbon-burning pumps, the Thais desperately try to keep the city above water; in this climate-changed situation, Bacigalupi points towards recent debates about extreme flooding in Thailand. Indeed, *The Windup Girl* reflects numerous historical aspects of Thailand's 2005–2008 political crises with a coup in 2006 and increasing conflicts between the People's Alliance for Democracy and the People's Power Party thereafter, leading to a coalition government that failed. During these years, there were huge street protests leading to further devastation and violence. The people's protests critiqued the problematic elections as well as human rights violations and the mistreatment of migratory workers, especially women, who moved to Bangkok for economic opportunity out of poorer neighboring areas. Additionally, both Thailand and Myanmar/Burma struggled with illicit drug trafficking (of plant-based opioids), the flow of which the government had been unable to control. We see these efforts paralleled in the novel where the government desperately seeks to stop the flow of plants and their diseases. Thailand's travails are projected into a futuristic 23rd-century Bangkok riddled with familiar political intrigue, drunken Westerners, Monsanto-like seed companies, and elephant labor ('megadonts' in the novel) where the mobility of humans is limited, the water is coming, and the road trips fail, but the movement of plants remains uncontrollable.

Windup Girl has four main characters, each of whom have their own perspectives in individual chapters in their name, and whose fates are interwoven. The novel opens with the hero/anti-hero, Anderson Lake, the white mid-west American 'calorie man.' Such capitalists caused the mass death of the vast majority of the global human population with their plant-genetic warfare battling for supremacy over seeds and 'calorie' power, and they are prohibited in the Thai Kingdom. Lake, however, has snuck in as the 'owner' of a local factory to look for seeds and hidden genetic material. The second main character, Hock Seng, works as an assistant for Lake while plotting his own financial resurrection. As a formerly rich Chinese capitalist now living in exile in Bangkok after Muslim groups took over Malaysia and executed his family, Hock Seng seeks a return to his former glory while suffering extreme prejudice as a 'yellow card' refugee. Emiko, the titular wind-up girl hybrid who will survive, experiences unspeakable torture in the sex

trade since her kind is forbidden in Thailand even while they are exploited every night. Her unfulfilled wish to flee to the North and join a legendary group of ‘free’ wind-ups makes this another novel of failed road trips – yet there is future hope for the hybrid people since they are immune to the plant diseases. As the plants are transformed and transform, so, too, do the transformed ‘New People’ offer future hope of a kind. Finally, Jaidee and Kanya are the ‘white shirt’ environmental officers fighting to save the country from the environmental exploits of capitalists. Jaidee is known as the ‘Tiger of Bangkok,’ or the former famous fighter turned into a heroic ‘white-shirt,’ who saved the nation from manufactured and naturally evolving plant diseases but who now holds back economic re-expansion. His antics against trade result in his murder as the tide turns back to dreams of international commerce; he is then replaced as the fourth main character by his subordinate, Kanya, who helps both trade and the environmental ministry as a double agent until the very end of the novel when she follows her voice of conscience – Jaidee’s ghost – and fights to save Thailand from the new foreign ‘calorie men’ by denying them access to the nation’s seed bank.

Bacigalupi’s four (or five) main characters reveal the challenges of life in a world destroyed by industrial energy and genetic games created by human beings who conquered oil (and depleted it) but still cannot conquer the undying plant mutations. These genetic games brought, and still bring, death, but are nevertheless the driving force of the ongoing capitalist ventures. Oil and fossil fuels are heavily regulated and are seen as unbelievable luxuries available only to the military and the royalty as the Thai desperately try to keep the sea water out with coal-burning water pumps. Use of oil is no longer standard practice but rather perceived as exotically craven, allowable only in extreme cases such as the government tracking of killer plant-human diseases. When Kanya goes to talk to the trackers about a recent outbreak, she is horrified at their computers’ energy use: ‘Behind glass walls, LEDs on servers wink red and green, burning energy, drowning Krung Thep even as they save it. [...] Kanya imagines that she can feel the air combusting with all the energy being burned, all the coal being consumed to keep this single building running’ (Bacigalupi 2010, 213). Canavan comments on oil in the novel: In *‘The Wind-Up Girl*, set in the post-carbon, post-climate change twenty-third century, [...] [t]he end of oil is recognized in retrospect as the end to both globalization and U.S./Western hegemony, sparking a century-long period of breakdown and disaster known as “The Contraction”’ (Canavan 2014, 344). Oil becomes an impossible dream of the past.

While these ‘post-oil’ moments of insight evoke cognitive estrangement regarding our era’s wild use of energy, I want to emphasize instead how the novel’s outcomes reveal plant power in its original green form rather than in the altered form of fossil fuels, especially in the random, rapid spread of mutating algae and food diseases. In fact, the total destruction of the city occurs when some algae randomly mutate and become deadly to human beings. The algae were being grown by Anderson Lake’s factory in huge vats in order to provide a substance that enables more kinetic energy to be stored in kink springs. The disease begins to spread and it inflames the already chaotic battles between the trade and environmental ministries. With cosmic justice, Anderson Lake is infected and dies from the algae-spawned disease at the end of the novel despite being immunized against all artificial plant diseases. The plants and their algal cousins take the day, while humans respond with hysteria and violence. In the battles, the walls

holding back the sea are exploded so that the entire city of Bangkok is flooded. Kink springs contribute to their demise.

The entire novel is, indeed, about ‘calories’ in any form: food, fossil fuels, wind, kinetic energy, excrement, and beasts of burden. The main tension is between the trade ministry – which wants greater economic expansion including trade with ‘foreigners’ – and the environmental ministry – which maintains efforts to protect the people of Thailand and their seeds from the horrific diseases created by past trade wars. As Jaidee thinks to himself about the past and his present battles to limit disease and flooding, and to find viable food sources, he notes how much their ministry had to expand to cope with all of the disasters:

The plagues were but the latest insult to the kingdom’s survival. First came the rising sea levels, the need to construct the dikes and levees. And then came the oversight of power contracts and trading in pollution credits and climate infractions. The white shirts took over the licensing of methane capture and production. Then there was the monitoring of fishery health and toxin accumulations in the Kingdom’s final bastion of calorie support [...] And there was the tracking of human health and viruses and bacteria [...] (Bacigalupi, 121).

As Andrew Hageman notes, ‘Through its representations of this antagonistic struggle between the Trade and Environment Ministries, *The Windup Girl* resists the easy move of imagining a new and alternative economic-ecological system or structure that resolves the conflict neatly’ (Hageman 2012, 285). Indeed, there is no real resolution to the problems, only more conflicts and the hope for some kind of surviving hybrids. The characters therefore scramble without much success to find new and old forms of energy and old seeds that can be revived or altered in this world torn between trade expansion and environmental protection.

New forms of energy promise hope but like the algae can also be dangerous. Similarly, Emiko’s hybridity represents an instance of ‘posthuman’ resistance to the diseases which offers future humans new survival potential and yet her hidden strengths and super-human speed (that even she didn’t know she had) also allow her to resist and lash out with a violence that surprises everyone. Her rebellion against those who use her as a sex slave – she kills them all in just a few seconds with her bare hands – brings mass political uproar. The group against which she finally fought includes the visiting Somdet Chaopraya, the all-powerful leader guiding the young queen of Thailand. The repercussions of his death bring political chaos with everyone suspecting finely-tuned plots to gain power, not just a girl who finally said no. In the political aftermath of her totally spontaneous action, the entire city erupts in war, flooding, and death. Emiko, however, survives it all and flourishes even though her dream of a road trip up ‘north’ to a community of freed ‘windups’ in the forest fails. In the end, she encounters Gibbons, former Midwest scientist who went to Thailand for a challenge and who happens to be one of the most famous ‘gene-rippers’ of all, having worked with plants and plant diseases his entire career. With seemingly god-like knowledge and power, he now promises to give her the ability to reproduce. She is the new Eve and he is a deity who needs no Adam: ‘Limitations can be stripped away [...] You cannot be changed, but your children – in genetic terms, if not physical ones – they can be made fertile, a part of the natural world’ (Bacigalupi, 358–59). Since the novel opens with Anderson Lake pondering fruit-as-knowledge in

a scene evoking a postmodern Eden moment, this final semi-religious return to an Eden of flooded, toxic Bangkok that holds the promise of new life provides a rounded narrative. In the end, knowing genes, having seeds, and creating post-human hybrids that are safe from plant diseases is the final strange hope for transformation in *The Windup Girl*.

Beyond the mythological fruit and promise of fertility, the novel's action is also sparked (annoyingly) by spontaneous 'female or nature' eruptions: algae mutate, Emiko rebels and kills, the enraged megadont in the beginning explodes with rage, destroying much of the factory where Anderson Lake and Hock Seng try to create the algae, and, at the end, Kanya suddenly decides to switch her allegiance back from trade to the environmental ministry so that she can save the entire Thai seed bank from the new 'calorie men' (and women). These unplanned acts express, like the elements in Herbert's *Dune*, the idea that neither the non-human nor the human (or post-human) elements can ever be fully controlled. In Bacigalupi's world, the less agential a character or living thing *seems to be*, the more power it turns out to have in the end – which is a very fine description of our vegetal kin.

As a conclusion of this study of dark green petro-texts and failed road trips, I reiterate the strange interweaving of post-oil or spice-as-oil and calorie-energy games with the challenge of navigating plant power. Bacigalupi, McCarthy, and Herbert each portray different aspects of mobility such that human quests for energy go awry whereas plants continue to dominate with diseases, ongoing transformations into food or petro-fuels, or as the blatantly absent options for life in the *Road*. There emerges no coherence among the three except for the congruence of exploding petro-cultures imagined in various forms of conflict with their vegetal basis. While petro-cultures remain all-too blind to either origins or outcomes of their dark green burning, these petro-novels visibly juxtapose green power with the seemingly dominant forms of energy, whether spice, whatever exploded the world in *The Road*, or all the calories of Bangkok. The dark green sheds new, or rather, quite ancient, light on petro-cultures and their energy quests. While it is unclear if such illumination offers hopeful solutions, it does bring attention to the concrete pathways of green energy – dark or otherwise – and to the value of knowing our physical connection to vegetal energy. Insisting on the value of knowing ecology as Herbert does, we can perhaps alter our failed petro-fueled road-trips by purposefully tracing plant-energy transformations and letting their example guide us towards a more solid grasp of our 'enabling conditions,' which might inspire a quest for more sustainable strategies. Herbert's *Dune* brings attention to the advantages of actually knowing ecological secrets of the planet; McCarthy's *The Road* makes plant energy obvious by highlighting its absence, leaving only the tarry petro-culture Road itself as a mystical artifact of fossil fuels traced by the Boy; and Bacigalupi's *The Windup Girl* exposes plant development, seeds, mutations, and calories as the basis of survival with both mythical-religious implications and futuristic hopes of hybrid humans who might find better fuel sources or, at least survive, transformed, the aftermath of our petro-cultural choices. All three of these texts circle around the issues of plant-blindness and awareness, intertwining direct plant energy and mobility with various forms of the devastated or devastating plant-product petroleum. In the end, the novels suggest that understanding plant ecology brings radical power and that such power almost seems mystical, although actually it should merely be a straightforward vision of our blatantly

plant-fueled biospheric existence that continually takes on new forms whether aided or impeded by humanity.

Notes

1. For a literary portrayal of this contrast in scales, or the difference of animal versus the vegetal speed-scale, see Le Guin's (1971) tale, 'Vaster than Empires and More Slow.'
2. There is prolific work from critical plant studies and plant science in the past ten years; I only mention a few here of the authors, scientists, and ecocritics who document plant 'intelligence,' communication, and sensitivity to their environment.
3. See the above-mentioned critical plant-studies scholars, plant scientists, and the volumes on the *Language of Plants* and *Plant Horror*. See also the Plant Studies group in Germanics led by Joela Jacobs at the University of Arizona and Solvejg Nitzke at Dresden University.
4. For discussions of the ecology of Arrakis and its relationship to capitalism, see Palumbo (1998), Morton (2001), Strattan (2001), and Gough (2003).
5. See especially studies of the 'monstrous' and un-killable pigweed now overtaking agricultural lands across the United States discussed on NPR by Charles on 11 April (2019).

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