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Barker, C orcid.org/0000-0002-8984-8256 (2019) Biocolonial Fictions: Medical Ethics and New Extinction Discourse in Contemporary Biopiracy Narratives. Moving Worlds: A Journal of Transcultural Writings, 19 (2). pp. 94-109. ISSN 1474-4600

Biocolonial Fictions: Medical Ethics and New Extinction Discourse in Contemporary Biopiracy Narratives

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The age of big pharma, population genetics, and global health initiatives that transcend national borders has ushered in new forms of extractivism that consist of mining the bodies of Indigenous people, their medicinal plants, and their traditional ecological knowledge (TEK) for their pharmacological potential. These new forms of scientific endeavour echo and reconfigure the colonialist appropriations of the past. As scholar and activist, Vandana Shiva, writes, '[t]he colonies have now been extended to the interior spaces, the "genetic codes" of life-forms from microbes and plants to animals, including humans'.[1] Shiva terms the expropriation of Indigenous biological resources 'biopiracy', while other activists and critics apply the broader term 'biocolonialism' to the range of practices that extend colonialist logic to the acquisition of human and plant organic materials, genetic 'data', and medicinal knowledge. This term in particular highlights the marked continuities between European colonialist practices of land and resource appropriation and the research practices within what Laurelyn Whitt calls the 'new imperial science', which, 'marked by the confluence of science with capitalism' and acting 'in the service of western pharmaceutical … industries' (among others), 'enabl[es] the appropriation of indigenous knowledge and resources at a prodigious and escalating rate'.[2]

The logic of biocolonial extractivism operates through a reorientation of the temporal formations of settler colonialism, which equate settler practices with development and consign Indigenous peoples to the past. The land dispossessions of the colonial era were facilitated by powerful narratives of inevitable Indigenous extinction: 'vanishing Indians', Māori and Aboriginal 'dying races'. As critics have shown, contemporary biocolonialist

initiatives operate on similar assumptions, under which indigenous biospecimens must be preserved and biological data acquired before they vanish forever. Joanna Radin demonstrates that, since the mid-twentieth century, the ability to freeze and store blood and other organic samples has 'emerged as a potentially powerful strategy for preserving fragments of a world that appeared to be increasingly in flux'. It enables 'biological material to be studied in the present and especially in the future', when (whether due to genetic admixture, European diseases, or environmental damage produced by the industrialized global North) 'the individuals from whom it had been extracted were expected to have disappeared or changed beyond recognition'.[3]

In this article, I explore the intertwined relationship between medical research ethics and the logic and ideology of biocolonialism as it is represented in two contemporary American novels, Ann Patchett's *State of Wonder* (2011) and Hanya Yanagihara's *The People in the Trees* (2013). These novels depict 'medical adventurer[s]'[4] undertaking biocolonialist excursions into the remote jungles of, respectively, the Amazon and the Pacific, and are centrally concerned with the methods and infrastructure of biomedical and pharmaceutical research. In both cases, the fictional scientists' ethically problematic research practices implicate them in what Pauline Wakeford calls 'two entangled narratives of death and disappearance: the *grand récits* of wildlife extinction and the vanishing Indian'.[5] I focus in particular on how these texts, by presenting us with fictional bioethical quandaries related to human longevity and reproduction, engage with the new formulations of extinction discourse produced by the life sciences. Patrick Brantlinger asserts that colonial 'extinction discourse was performative in the sense that it acted on the world as well as described it'.[6] *State of Wonder* and *The People in the Trees* both imagine biological discoveries with the potential to extend human lifecycles, but these research endeavours are steeped in extinctionist ideology and themselves set in motion the decimation of previously thriving

Indigenous communities. Aspirational narratives of 'eternal life' (in Yanagihara) and 'world health' (in Patchett) are underpinned by the knowledge that these communities, reframed as research subjects, are likely to vanish in the wake of what Warwick Anderson calls 'scientific colonialism', along with their unique ecosystems.[7] The different narrative temporalities of these texts – Patchett's anticipating a significant breakthrough in global health, Yanagihara's narrated retrospectively from a position of irreversible loss – produce divergent valuations of human and nonhuman lives and different perspectives on the ethics of biopiracy, as I shall discuss. But in reading them together, I demonstrate how fictional engagements with biocolonial science illuminate the continuities between colonial-era extractivism and contemporary research practices. In their temporal reorientations and their ability to imagine actual and potential acts of extinction, these texts resituate extinction discourse squarely within the context of twentieth- and twenty-first-century bioscientific experimentation.

State of Wonder follows Marina Singh, a pharmacologist for a multinational pharmaceutical corporation, Vogel, on her expedition into the Amazon to investigate the death in the field of her colleague, Anders Eckman, and to assess the progress of a senior scientist, Annick Swenson, who is developing a fertility drug for Vogel while living with a remote tribe, the Lakashi. Swenson has discovered that the Lakashi women's practice of chewing bark from a particular local tree (the Martin tree) not only alters their reproductive chemistry, allowing them to conceive and give birth into their seventies and eighties, but also inoculates them against malaria. Alongside their work on the fertility drug, Swenson and her team are surreptitiously developing a malaria vaccine at Vogel's expense, which will have little appeal to company shareholders even though it 'will have enormous benefits to world health', since '[t]he people who need a malarial vaccine will never have the means to pay for it'.[8] As the narrative unfolds, the protection of the Lakashi, their lifeways, and their environment is pitted against this urgent global health imperative to save the lives of the

'[e]ight hundred thousand children' who, as Swenson tells Marina, 'die every year of malaria' in the so-called 'Third World'.[9]

The People in the Trees is framed as the memoirs of Norton Perina, a 'renowned immunologist' who, as a young doctor in 1950, joins an anthropological expedition to U'ivu, a fictional Micronesian state.[10] Along with his anthropologist colleagues, he 'discovers' a 'lost tribe' living on the island of Ivu'ivu whose ritual ingestion of a sacred turtle endemic to the island, the opa'ivu'eke, causes extended longevity, with some tribe members apparently living for several hundred years. Perina's research on this phenomenon earns him a Nobel Prize for Medicine, but also kickstarts a rapid process of biocolonial incursion on this island that has 'never [before] been colonized', beginning with pharmaceutical companies, seeking to develop 'age-retarding drugs, … anti-aging skin creams, [and] elixirs to restore male potency', 'swarming throughout Ivu'ivu on the hunt for the opa'ivu'eke'.[11] It results in the extinction of the turtle, the razing of the island, and the decimation of the Ivu'ivuan community through an accelerated experience of the impacts of colonization, including forced displacement, alcoholism, and disease.

Both texts emphasize the overdetermination of their respective jungle environments by longstanding colonialist tropes of exotic difference that are inflected by bioscientific discourse. The Pacific island, as Elizabeth DeLoughrey has demonstrated, has long been figured as a remote, 'hermetically sealed laboratory', 'deemed ahistorical and isolated' from modernity and therefore ideal for experimentation in anthropology, ecology, and nuclear science.[12] The Amazon, meanwhile, is imagined as what Veronica Davidov terms a 'pharmacopia' that holds within its rich ecosystems 'fantastic cures for illnesses that defy the capacities of the Western pharmaceutical industry', or, as Dr Swenson puts it in *State of Wonder*, 'some sort of magical medicine chest'.[13] Under the globalized conditions of the biomedical and pharmaceutical industries, the jungle spaces outside the West are vulnerable

to exploitation due to their construction as 'global commons' or 'global resource frontier[s]' available to be harvested for their medical riches.[14] As Swenson asserts in an unapologetic utilization of extractivist rhetoric: 'there is much to be taken from the jungle'.[15] Through their focus on the activities of life scientists in the interconnected fields of big pharma and global health, both novels appear to offer a critique of the impacts of biocolonialism on Indigenous people and the ecosystems in which they exist. But, as I will show, Perina's retrospective narration in *The People in the Trees* brings into critical focus the extinctionist logic of biocolonial science, while *State of Wonder*'s anticipatory positioning is ultimately bound up with the future-oriented rhetoric used to justify much exploitative and damaging scientific research.

The People in the Trees introduces its Ivu'ivuan 'lost tribe' through the lens of 1950s anthropology. As an ambitious junior doctor on an anthropological expedition, Perina observes his anthropologist colleagues with a degree of scorn regarding their research activities, which seem to consist of conducting 'fruitless interviews with the dreamers' – the elderly Ivu'ivuans who have ingested opa'ivu'eke flesh and who are consequently aged between one and three hundred years old – and 'filling entire notebooks with minute descriptions of the most mundane of activities'.[16] The text enacts a forensic examination of anthropological method and ideology, presenting us with anthropologists who are, in line with recent critiques of the discipline, 'entrenched in island boundedness, isolation, and atemporality' in this period before the field's critical turn.[17] In thematizing this mid-twentieth-century anthropological perspective on the Indigenous tribe, Yanagihara draws attention to anthropology's foundational role in establishing problematic research engagements with Indigenous people. The 'funereal but very modern science of anthropology', as Brantlinger terms it, was heavily implicated in, and dependent upon,

extinction discourse 'in its attempt to learn as much as possible about primitive societies and cultures before they vanish forever'.[18]

The People in the Trees dramatizes what Johannes Fabian famously termed 'the denial of coevalness' – the assumption that supposedly 'primitive' Indigenous subjects of anthropological study exist on a different temporal plane from the 'modern' scientists studying them.[19] Yanagihara employs contrasting notions of time in Perina's account of the villagers and the scientists. The researchers obey a 'definition of time … determined in the part of the world where people consulted clocks and made and kept appointments' (consonant with Mark Rifkin's notion of 'settler time'), while in the Ivu'ivuan jungle, Perina recounts, 'time twirled itself into long, spiraling whorls, defying biology and evolution; not even the human body respected it'.[20] He understands the villagers to possess 'no notion of time, no notion of history', despite being aware of their 400-day year and system for measuring birthdays.[21] While extinction discourse in the colonial era was mobilized to make way for the settler, conveniently bypassing Indigenous sovereignty on the land with the assumption of their inevitable elimination, in this context of 1950s Pacific anthropology, the denial of coevalness makes way for biocolonial exploitation of natural resources and Indigenous knowledge. The research of the lead anthropologist, Paul Tallent, on a U'ivuan origin story linking the opa'ivu'eke to immortality, as well as on recent island histories rich in ecological and climatic knowledge, forms the basis for Perina's biomedical experimentation on the dreamers and turtles.

However, while anthropology as a discipline is certainly not exonerated regarding its complicity with biocolonial formations, Yanagihara's characterization of Tallent and Perina underlines the significant contrast in their ethical decision-making. Tallent is 'of Sioux extraction' and 'know[s] what it's like to be studied', having been subjected to intrusive physical examination in his orphanage at the hands of a phrenologist who is convinced that

skull measurements prove that 'the Indians had been biologically ordained to lose their lands to the Europeans'.[22] This kind of racial pseudoscience, of course, underpinned nineteenth- and early twentieth-century extinction discourse, so Tallent's childhood experience of pathologization foreshadows the consequences of his own research with the Ivu'ivuans. Aware of the potential for the island's exploitation if the connection between longevity and ingesting turtle meat is publicized, Tallent protects this revelation, restricting his publications on the 'lost tribe' to knowledge that is '[c]ertainly of no profit to anyone'.[23]

Perina has no such qualms, and is introduced to the reader in a context of ethical turmoil. As a series of framing devices – two press releases and a preface to his memoirs – inform us, his life writing is undertaken in the late 1990s from prison, where he is serving a custodial sentence for the rape and sexual assault of one of the forty-three children he has adopted from U'ivu.[24] Deliberately and incongruously, Yanagihara juxtaposes Perina's intimate narrative voice with meticulous academic footnotes provided by his friend and self-appointed editor, Ronald Kubodera, M.D. These contexualize Perina's personal moral decision-making within the wider systemic structures in which biomedical science operates, serving not to confirm Perina's status as a 'great mind' as the acolyte editor intends, but rather to emphasize his institutional privilege.[25] While Perina self-presents as a maverick scientist, an iconoclastic institutional outsider whose rule-breaking is fundamental to scientific progress, his extraction of biomedical data, fauna, and knowledge from Ivu'ivu results, as Kubodera documents, in career-building publications, research funding, and professional prestige.

Perina's abuse of his children is intimately tied up with his dehumanizing professional treatment of their fellow U'ivuans. A physician with – beyond 'the unslakability of [his] intellectual thirst' – self-professedly 'no interest' in 'cur[ing] diseases', 'eradicat[ing] illnesses' or 'prolong[ing] life', Perina sees the 'dreamers' as less-than-human lab fodder –

'boring specimens to work with', 'not dissimilar to those dim white mice I had spent all those mornings killing' in the laboratory.[26] His medical tests are invasive and non-consensual, and he removes four of the dreamers from their island home, without their understanding or consent, and transports them to the United States heavily sedated. In 1950, he notes, this was 'back when you could do such things without ethics boards howling at you'.[27] Confined in Perina's US lab over subsequent decades, the dreamers are 'pricked and poked and swabbed and made to urinate in plastic cups (something they had never seen before)', and have 'substantial quantities of blood … siphoned from their veins each week'.[28] Perina frames their resulting deterioration in energy and mental health in terms that tellingly echo dying race discourse: 'It was necessary, this work, and their decline was inevitable, but I still sentimentally wished it could have gone better for them.'[29]

Yanagihara carefully situates her narration of Perina's abuses within a wider history of racialized medical ethics. The dreamers are removed from Perina's care in 1975, 'after Willowbrook, after Tuskegee, after the birth of the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research'.[30] Kubodera's three-page-long footnote documenting Perina's encounters with ethical review boards and the inadequacy of the dreamers' treatment after this removal, when they are ensconced in an American retirement community, offers a critical perspective on the efficacy of the ethics system in its early days. However, Yanagihara's detailed contextualization of the infrastructure of biomedical research leaves no doubt regarding Perina's individual culpability for both the direct mistreatment of research subjects and the scaled up, systemic biopiracy that follows his expeditions to Ivu'ivu. The narrative makes clear that the dreamers' initial removal from the island, along with a sacred opa'ivu'eke that Perina butchers and smuggles back to the USA for lab testing, constitute the island's founding acts of biopiracy.

The anti-biocolonial narrative in *The People in the Trees* is powerful because the lure of eternal life remains elusive, since Perina and his successors are unable to overcome the problem that the dreamers' condition prevents physical ageing but not an age-related decline in mental faculties, and pointedly disconnected from any narrative of global health benefit. *State of Wonder* seems to offer a similar critique when its focus is on Swenson's Vogel-funded fertility drug, which is represented in relatively clear-cut terms as a case of Indigenous TEK (the practice of bark chewing and its prevention of ova deterioration) being exploited to benefit wealthy global pharmaceutical consumers. Taking a self-righteous stance on reproductive agency by framing childbearing as a lifestyle choice, Swenson opines, 'I've never believed the women of the world are entitled to leave every one of their options open for a lifetime'.[31] After experimenting on herself and going through a pregnancy and dangerous stillbirth at the age of seventy-three, she moralizes towards the end of the novel that she has 'been punished' for 'straying into the territory of the biologically young' and revokes her plan to eventually deliver the drug she has spent years developing: 'Let the fifty-year-olds console themselves with in vitro as they have in the past.'[32] The manipulation of natural reproductive rhythms – the 'biological clock' – to meet consumer desires is presented as a luxury rather than a necessity, and one that could come at a huge cost to the delicately balanced ecosystem in which the Lakashi live.

But while the fertility plotline seems to open the way for anti-biocolonial critique, this is undermined by the revelation of the Lakashi women's resistance to malaria, which introduces a narrative of seemingly greater, and global, need. The fertility drug and the malaria vaccine are chemically 'intertwined', their effects both produced by a particular species of moths (purple martinets) laying eggs in the bark of a particular tree (Martins), meaning that '[w]hen we get one drug we'll have the other'.[33] Swenson's exploitation of Indigenous ethnomedicinal resources is ultimately represented as justifiable in light of a

'fantasy of the common good'[34] – the appeal to the 'world health' benefits of a malaria vaccine – especially since her commitment to, as she puts it, making 'an American pharmaceutical company … foot the bill for Third World do-gooding' seems subversive.[35] But while some postcolonial writers, as Jessica Howell argues, 'rewr[i]te the significance of malaria science and malarial illness … in order to critique colonial and postcolonial health politics', in the pharmaceutical imaginary of Patchett's text malaria is thematized only in terms of its inconvenience to first-world travellers, when Marina experiences an extreme adverse reaction to the antimalarial drug, Lariam, as she prepares for her Vogel-funded expedition down the Rio Negro.[36] 'World health', in contrast, operates as a somewhat empty signifier in this novel. It is exploited as a plot device that, as Shital Pravinchandra argues, 'effectively allow[s] Patchett to carefully re-write biocolonialism as a benevolent concern for the optimized health and longevity of the entire human species', even while it is used to justify the characters' flagrant breaches of medical ethics and present the potential extinction of the Lakashi as a fair price to pay for the solution to a global health crisis.[37]

In *State of Wonder*, set in the millennial period when ethical review boards *are* firmly established, medical surveillance of indigenous bodies has been naturalized: Swenson has transformed the Lakashi into 'patient subjects, submitting themselves to constant weighing and measurement, allowing their menstrual cycles to be charted and their children to be pricked for blood samples' in the service of the intertwined fertility and malarial research.[38] The Lakashi women routinely '[s]elf-swab' their vaginal fluid in order for the doctors to monitor 'the levels of estrogen in [their] cervical mucus',[39] while the men are regularly infected with malaria (without their informed consent) in order to act as a control group for the women, who are inoculated by the Martin bark. Swenson's stories of 'the tireless cajoling and gift giving that had once been required for even the most basic examinations' and her imperious declaration, 'I tamed them', leaves the reader in no doubt that the production of

docile, compliant Lakashi research subjects is achieved through the medical colonization of their bodies and lifeways.[40]

As in *The People in the Trees*, Tuskegee features as an ethical touchstone in Patchett's text. 'Don't make this out to be the Tuskegee Institute', Swenson's colleague, Alan Saturn, cautions Marina. 'The difference is that when they get it [malaria] in this room we're also going to cure it.'[41] The novel rather blithely acknowledges this landmark case in medical ethics in order to dismiss any comparison and to confirm, in contrast, the overarching benevolence of its scientists' actions. Saturn argues that 'It's good to get out of the American medical system from time to time', pitting the ethical stop-checks of this system – and the welfare of the infected men – against the global health benefits of the malaria vaccine: 'If they get sick for a couple of days in the name of developing a drug that could protect the entire tribe, the entire world, then I say so be it.'[42] In this self-exemption from ethical protocols, Saturn prioritizes global and heroic medical goals over the wellbeing of Indigenous patients and displays a deeply biocolonialist mindset regarding the relative worth of human lives. But while Marina feels 'a little uncomfortable with [Saturn's] argument', within the logic of the novel the moral certainty of the maverick scientists legitimately overrides the system of ethical review that is a basic requirement of field research in the life sciences.[43]

The consistently dehumanizing treatment of the Lakashi research subjects is premised on the fact that, like Perina, Swenson buys into the denial of coevalness, characterizing the Lakashi as 'an intractable race', impervious to '[a]ny progress you advance to them'.[44] Like the Ivu'ivuans, the Lakashi 'have no apparent system for marking time' as far as Swenson and her researchers (none of whom speak their language) can tell, and the women's regularity in visiting a forest glade to chew the Martin bark is laughingly put down to the 'Lakashi biological clock', a designation that upholds stereotypes of Indigenous knowledge as

instinctive and embodied rather than rational.[45] Their medicinal knowledge, too, is dismissed by Swenson as guesswork and superstition:

> "I have very little respect for what passes as science around here. … [f]or these people there is no concept of a dosage, no set lengths for treatments. When something works it seems to me to be nothing short of a miracle."[46]

This declaration follows exactly the logic of biopiracy, according to which the colonialist practice of 'appropriat[ing] biodiversity from the original owners and innovators' is justified by 'defining their seeds, medicinal plants, and medical knowledge as nature, as nonscience'.[47] Swenson's construction of the Lakashi as intractable and their TEK as 'nonscience', then, is crucial to the proposed pharmaceutical exploitation of their ecosystem. For a malaria vaccine to be mass-produced and marketed, any Lakashi claim to the TEK must be undermined, an ideological move achieved by annexing them outside of scientific progress.

The novel's continuities with the extinctionist logic of high colonialism are most apparent in Swenson's declaration that

> "You can't draw the world a map to this place and have everyone come running in, trampling the Rapps [a rare species of hallucinogenic mushroom], killing off the martinets, displacing the tribe. By the time they understood what they were doing, it would all be dead."[48]

Here, the novel employs a distinctive rhetorical feature of extinction discourse, a construction that Brantlinger terms 'the future-perfect mode of proleptic elegy', which 'mourns the lost object before it is completely lost'.[49] This proleptic mode, which looks back at a future action from a projected point beyond its completion, functions to position Swenson as a protector of the tribe, someone who is buying the Lakashi time even while confirming the inevitability of their demise (which is, of course, in her hands, since she does eventually intend to publicize

at least the malaria research). Moreover, she reframes her extractive fertility research as, ironically, the gift of time freely given by the Lakashi to the world at large: 'There will be nothing but time, don't you understand? That's what the Lakashi are offering.'[50] The disingenuousness here resembles what Wakeford identifies as a 'semiotics of taxidermy' in various contemporary spheres of Indigenous encounter including ethnographic representations and genomic research. As a mode of representation that suggests 'the conquest of time and mortality through the preservation of the semblance of life in death', in taxidermic figurations 'the denial of coevalness is reinvented and reinscribed through various forms of time-lagging and time-warping', temporal manipulations that once more relegate Indigenous subjects to the past and 'find fresh ways to reinforce fantasies of colonial mastery in the current era'.[51] In Swenson's ruminations, biocolonial mastery is secured by rendering the Lakashi as taxidermic specimens of biomedical research: their own survival is impossible but their legacy is preserved through the gift of time (via the fertility drug), and of life itself (via the malaria vaccine), that they will offer to the world.

In the most material terms, the Lakashi are subject to taxidermic time-warping through their frozen biosamples, indefinitely preserved, that will result in the production of these medicines. As Radin explains, biocolonial ideology is characterized by the investment of the life sciences in the 'as yet unknown' uses of frozen biospecimens.[52] Facilitating the preservation of human tissue in a state somewhere between life and death, the freezer functions 'as a time capsule, a means of making a biological freeze-frame for the future'.[53] In *State of Wonder*, in the heart of the jungle, 'the blood samples in the freezers [are] flash-frozen to arctic levels', their value immeasurable.[54] Towards the end of the novel, after the stillbirth delivery of Swenson's child, born with a condition, '*Sirenomelia, Mermaid Syndrome*', characterized by fused legs and no visible genitalia, 'the freezer where they stored the blood samples' also becomes 'the same freezer where she kept the child with the

curving tail' in anticipation of testing the baby's body 'to see what levels of the compound are in the tissues'.[55] The father of this child is never disclosed by Swenson, but is likely Lakashi, and the placement of the infant in the freezer alongside Lakashi blood samples functions as a symbol, in the text's logic, of inevitable and rightful demise. Born to a seventy-three-year-old white woman, this seemingly unnatural child cannot be allowed to survive without irreparably altering the Western world's expectations of women's 'biological clocks'. But for the Lakashi, in Swenson's opinion, bearing 'late-life children' is their 'particular fate', and one that confirms their exclusion from modernity and their unfitness for survival in the contemporary world.[56] The Lakashi must die out or be displaced from their habitat in order for the Martins and martinets to be harvested, and with this destruction of their ecosystem will come the end of their extended fertility. The frozen infant, itself with no discernible physiological means of reproduction, serves as a proleptic relic of Lakashi reproductive difference, preserving the biochemical traces of the Martins' impact on fertility even while it anticipates the inevitable – and 'natural' – erasure of their practice of late-life pregnancy.

In *The People in the Trees*, there is no such sense that the demise of the Ivu'ivuans – or the opa'ivu'ekes – is an inevitable restoration of natural order. The consequences of Perina's abuses are narrated, from the 1990s, in an extraordinary passage spanning several pages that Eleanor Byrne describes as a 'confession of ecocide' and an 'archive of extinction'.[57] Here, Perina performs temporal reorientations by accelerating the telling of these events at the heart of the narrative. He prefaces his catalogue of devastation with the statement that 'You know, we all know, what happened next',[58] but combined with the intimate rhetorical formulation, 'shall I tell you?', this positions the reader simultaneously in the narrative present, armed with hindsight regarding the technoscientific violence wrought on the island, and in the process of this violence unfolding:

> Shall I tell you of how the pharmacists and neuroscientists and biologists hurried home with their carrier bags heavy with turtles[?] … Shall I tell you of how by the time telomeres were discovered, and then by the time genetic sequencing became sophisticated enough to conjecture exactly how the opa'ivu'eke was affecting normal telomerase, there were no more opa'ivu'ekes to be studied? … shall I tell you how the island was stripped of everything, whole forests razed[?][59]

The accelerated narration of these incursions mirrors the accelerated experience of colonization that pharmaceutical extractivism brings to U'ivu. In the space of a decade – a decade characterized by *de*colonization elsewhere in the world – the small but stable island community is forced through all the stages of colonization and cultural fragmentation that Indigenous populations worldwide experienced during decades and centuries of European colonialism: land dispossession and ecological depletion; conversions to western religions; exposure to alcohol and venereal diseases; industrialization and new labour practices; dietary transformations, and so on.[60] As Perina writes, 'there are really no new stories in cases like these'.[61] The 'newness' here is in the scientific impetus behind *bio*colonial fatal impact – the major players in the island's destruction being pharmaceutical corporations along with US and European universities – and the speed with which it precipitates the extinction of the opa'ivu'eke and the transformation beyond recognition (or the disappearance, if we buy into anthropological notions of Indigenous cultures as static, bounded, and pure) of Ivu'ivuan lifeways.

The central irony of this text lies in the 'time-warping' fact that the incursion of the biopirates results in the extinction of the life-extending turtle species before the biological mechanism causing this effect – the inactivation of telomerase – can be fully identified or replicated. There is no contemplation of 'as yet unknown' bioscientific knowledge emerging from the time capsule of the freezer in this text; Perina's account 'of Pfizer's sorrow, of

Lilly's dismay, of Johnson and Johnson's agony, of Merck's rage' makes it clear that the promise of eternal life has died with the opa'ivu'eke.[62] Unlike Patchett, then, Yanagihara does not buy into either the proleptic assumption of inevitable disappearance or the compensatory narrative of preserved 'biovalue' built into what Radin terms 'salvage biology'.[63] Instead, she presents the opa'ivu'ekes' extinction as a fait accompli, an irreversible loss that is produced entirely by human activity and is thus entirely preventable. She tells what Deborah Bird Rose, Thom van Dooren and Matthew Chrulew call an 'extinction story', a genealogy of a species' decline that 'grapple[s] with, and respond[s] to, the complexity and ethical significance of specific sites of loss'.[64]

But while the turtles are gone forever in this narrative, the dreamers are purportedly preserved in a state of death-in-life, reduced to biospecimens, their bodies transformed into biomedical cyborgs:

> [T]here were stories that [the remaining dreamers on Ivu'ivu] were divvied up like candies by the pharmaceutical companies and flown away to live their lives in sterile labs, where they may be living still, punctured with needles, their arms sprouting tangles of IVs, their legs harvested for scrapings of skin, of muscle, of bone[.][65]

In this nightmarish scenario, these Indigenous elders, affected by a condition that preserves youth, are physically *unable* to conveniently die out in the way that extinction discourse demands in order to justify their exploitation. The only 'vanishing Indian' in this novel, in fact, turns out to be Tallent, whose mysterious disappearance into the jungle of Ivu'ivu at the height of the island's pillaging is interpreted by his biographer as 'self-inflicted penance' for his role in its exploitation.[66] This dual rewriting of the colonialist trope therefore resists any narrative of 'natural' Indigenous decline and retains a firm sense of the researchers' culpability. The still-living dreamers haunt the narrative present in a material, embodied form that disallows the erasure of Indigenous presence or their relegation to the past.

The People in the Trees, then, presents us with a much more *critical* rendering of biopiracy's 'new' extinction discourse than does *State of Wonder*. Patchett's text is future-oriented, leaving us in anticipation of the decimation of the Lakashi and the despoliation of their environment through the invasions yet to come, but 'compensating' for this with the knowledge that their loss will be for the sake of the malaria-stricken global poor. The devastation wrought by biopiracy remains conditional in this narrative, part of a not-yet-arrived future, and in light of the novel's thematic investment in future science (the hope of a malaria vaccine) this anticipatory mode renders the text complicit with biocolonialism's 'new', scientifically oriented, extinction discourse. By approaching wildlife extinction retrospectively while simultaneously making it impossible for its indigenous tribe to die out, Yanagihara's text resists any such reinscription of the ideology of extinction discourse. *The People in the Trees*, spanning the late twentieth century, critically historicizes the emergence of recognizably biocolonial research formations and situates its narrative in relation to the reactive – and woefully belated – development of medical ethics. The retrospective narration in this novel looks back upon the process of cultural and ecological degradation from a point of irreversible damage to the people and ecosystem of Ivu'ivu and gives us no sense that this cost has been worth paying. Rather than anticipating extinction, this novel shows instead how medical research ethics can and should be built upon the anticipation, and interrogation, of future applications of biomedical discovery.

ACKNOWLEDGEMENTS

Research for this article was funded by a Wellcome Trust Seed Award (grant number 106839/Z/15/Z). I am grateful to Hamilton Carroll and Shirley Chew for their insightful feedback, and to Shital Pravinchandra for lively conversations about these texts.

NOTES

[1] Vandana Shiva, *Biopiracy: The Plunder of Nature and Knowledge* (Cambridge, MA: South End Press, 1997), p. 3.
[2] Laurelyn Whitt, *Science, Colonialism, and Indigenous Peoples: The Cultural Politics of Law and Knowledge* (Cambridge: Cambridge University Press, 2009), p. xiv. See also the website and publications of the Indigenous Peoples' Council on Biocolonialism: www.ipcb.org [accessed 26 March 2019].
[3] Joanna Radin, *Life on Ice: A History of New Uses for Cold Blood* (Chicago and London: University of Chicago Press, 2017), p. 56. Indigenous activist groups such as the Indigenous Peoples' Council on Biocolonialism have adeptly deconstructed the extinctionist logic tied up with numerous contemporary research initiatives, particularly the Human Genome Diversity Project. See, for example, Jenny Reardon, *Race to the Finish: Identity and Governance in an Age of Genomics* (Princeton, NJ: Princeton University Press, 2005).
[4] Hanya Yanagihara, *The People in the Trees* (London: Picador, 2018 [2013]), p. 33.
[5] Pauline Wakeford, *Taxidermic Signs: Reconstructing Aboriginality* (Minneapolis: University of Minnesota Press, 2008), p. 18.
[6] Patrick Brantlinger, *Dark Vanishings: Discourse on the Extinction of Primitive Races, 1800-1930* (Ithaca and London: Cornell University Press, 2003), p. 4.
[7] Warwick Anderson, *The Collectors of Lost Souls: Turning Kuru Scientists into Whitemen* (Baltimore: The Johns Hopkins University Press, 2008), p. 134.
[8] Ann Patchett, *State of Wonder* (London: Bloomsbury, 2012), p. 319.
[9] Patchett, *State of Wonder*, p. 319.
[10] Yanagihara, *The People in the Trees*, p. 3.
[11] Yanagihara, *The People in the Trees*, p. 69; p. 284; p. 250.
[12] Elizabeth M. DeLoughrey, *Routes and Roots: Navigating Caribbean and Pacific Island Literatures* (Honolulu: University of Hawai'i Press, 2007), p. 16; p. 2.
[13] Veronica Davidov, 'Amazon as Pharmacopia', *Critique of Anthropology*, 33:3 (2013) 243-62, p. 249; Patchett, *State of Wonder*, p. 180.
[14] Davidov, 'Amazon as Pharmacopia', p. 248; p. 244.
[15] Patchett, *State of Wonder*, p. 180.
[16] Yanagihara, *The People in the Trees*, p. 160.
[17] DeLoughrey, *Routes and Roots*, p. 16.
[18] Brantlinger, *Dark Vanishings*, p. 5.
[19] Johannes Fabian, *Time and the Other: How Anthropology Makes Its Object* (New York: Columbia University Press, 1983).
[20] Yanagihara, *The People in the Trees*, p. 213; Mark Rifkin, *Beyond Settler Time: Temporal Sovereignty and Indigenous Self-Determinism* (Durham and London: Duke University Press, 2017).
[21] Yanagihara, *The People in the Trees*, p. 141; p. 119.
[22] Yanagihara, *The People in the Trees*, p. 75; p. 88.
[23] Yanagihara, *The People in the Trees*, p. 246.
[24] The novel is loosely based on the story of Carleton Gajdusek (1923-2008), a researcher for the US National Institutes of Health, with whom Yanagihara's oncologist father worked at NIH. Gajdusek's research in the 1950s and 60s on kuru, a fatal brain disease affecting the Fore people of Papua New Guinea, won him a 1976 Nobel Prize. He adopted many Melanesian and Micronesian children, and in 1997 served a 12-month prison sentence after pleading guilty to child molestation. Gajdusek's work (like Perina's) was carried out 'just before the widespread acceptance of ethics protocols and institutional review boards'. Anderson, *The Collectors of Lost Souls*, p. 6. See Anderson for a nuanced account of the ethical complexity of kuru research, particularly regarding Gajdusek's procurement of Fore brains for dissemination to research institutions in the global North.
[25] Yanagihara, *The People in the Trees*, p. 9. Kubodera's own ethical qualms about Perina's actions, stubbornly repressed for most of the novel, surface in his excision and then reinstatement in a postscript of a passage in which Perina describes raping his adopted son Vincent (pp. 357-62).
[26] Yanagihara, *The People in the Trees*, p. 108; p. 87; p. 172.
[27] Yanagihara, *The People in the Trees*, p. 229.
[28] Yanagihara, *The People in the Trees*, p. 231.
[29] Yanagihara, *The People in the Trees*, p. 275.
[30] Yanagihara, *The People in the Trees*, p. 285. Willowbrook was a 1963-66 research study in which institutionalized intellectually disabled children were deliberately infected with hepatitis A in order to study that

disease. Tuskegee refers to the infamous syphilis study (1932-72) carried out by the US Public Health Service, wherein African-American syphilitic men were monitored but left untreated, despite widespread and effective use of penicillin. The resulting scandal prompted developments in legal protections for clinical research participants and contributed to the establishment of informed consent as a requirement of biomedical research.
[31] Patchett, *State of Wonder*, p. 317.
[32] Patchett, *State of Wonder*, p. 274; p. 344.
[33] Patchett, *State of Wonder*, p. 318; p. 319.
[34] Davidov, 'Amazon as Pharmacopia', p. 249.
[35] Patchett, *State of Wonder*, p. 319.
[36] Jessica Howell, *Malaria and Victorian Fictions of Empire* (Cambridge: Cambridge University Press, 2019), pp. 20-1.
[37] Shital Pravinchandra, *Same Difference: Postcolonial Studies in the Age of Life Science* (unpublished manuscript).
[38] Patchett, *State of Wonder*, p. 235.
[39] Patchett, *State of Wonder*, p. 289; p. 288.
[40] Patchett, *State of Wonder*, p. 235.
[41] Patchett, *State of Wonder*, p. 325.
[42] Patchett, *State of Wonder*, p. 325.
[43] Patchett, *State of Wonder*, p. 325.
[44] Patchett, *State of Wonder*, p. 179.
[45] Patchett, *State of Wonder*, p. 289; p. 281. Just as the opa'ivu'eke are unique to Ivu'ivu in Yanagihara's fictional world, the ecological stakes are similarly high in Patchett's: the ecosystem consisting of the purple martinet moths, Martin trees, and Rapp mushrooms is exclusive to the Lakashis' specific area of the rain forest.
[46] Patchett, *State of Wonder*, pp. 180-1.
[47] Shiva, *Biopiracy*, p. 4.
[48] Patchett, *State of Wonder*, pp. 316-7.
[49] Brantlinger, *Dark Vanishings*, p. 4.
[50] Patchett, *State of Wonder*, p. 271.
[51] Wakeford, *Taxidermic Signs*, p. 17; p. 6.
[52] Radin, *Life on Ice*, p. 4.
[53] Radin, *Life on Ice*, p. 3.
[54] Patchett, *State of Wonder*, p. 233.
[55] Patchett, *State of Wonder*, p. 360 (original emphasis); p. 357.
[56] Patchett, *State of Wonder*, p. 274.
[57] Eleanor Byrne, 'Ecogothic Dislocations in Hanya Yanagihara's *The People in the Trees*', *Interventions*, 19:7 (2017) 962-75, p. 970.
[58] Yanagihara, *The People in the Trees*, p. 282.
[59] Yanagihara, *The People in the Trees*, pp. 282-4.
[60] In interview, Yanagihara reveals that the colonization of U'ivu is modelled on that of Hawai'i, where she grew up. 'Episode 23 – Hanya Yanagihara: *The People in the Trees* – Part 2', *This Writing Life* podcast, 6 August 2015, https://thiswritinglife.co.uk/e/episode-23-hanya-yanagihara-2014-part-2/#more-5755938.
[61] Yanagihara, *The People in the Trees*, p. 289.
[62] Yanagihara, *The People in the Trees*, p. 284.
[63] Radin, *Life on Ice*, p. 6. 'Biovalue' is Catherine Waldby's term; see 'Stem Cells, Tissue Cultures, and the Production of Biovalue', *Health: An Interdisciplinary Journal for the Social Study of Health, Illness and Medicine*, 6:3 (2002) 305-23.
[64] Deborah Bird Rose, Thom van Dooren, and Matthew Chrulew, 'Introduction: Telling Extinction Stories', *Extinction Studies: Stories of Time, Death, and Generations*, eds, Deborah Bird Rose, Thom van Dooren, and Matthew Chrulew (New York: Columbia University Press, 2017), pp. 1-17, p. 3.
[65] Yanagihara, *The People in the Trees*, p. 285.
[66] Yanagihara, *The People in the Trees*, p. 246.