
Article:
Barker, C orcid.org/0000-0002-8984-8256 (2020) Warrior Genes. MFS - Modern Fiction Studies, 66 (4). pp. 755-779. ISSN 0026-7724

https://doi.org/10.1353/mfs.2020.0050

Warrior Genes

Since the sequencing of the human genome was completed in 2003, we have entered into what Jenny Reardon calls "the postgenomic condition". The findings of the Human Genome Project revealed the prospect of "decod[ing] the message" written in the "book of life" (Keller, *Century* 7, 54) to be based on "a simplistic, deterministic, and atomistic understanding of the relationship between genes and human characters" (Stevens and Richardson 3). The emerging field of epigenetics has established that

> genes are expressed, or activated, in response to complex environmental factors which include social factors. In consequence, genes are no longer conceptualised as stable entities which contain a blueprint for life, nor are they viewed as the sole agents that lead to the production of traits. (Bloomfield and Hanson 405)

With the "emphasis [now] on complexity, indeterminacy, and gene-environment interactions" (Stevens and Richardson 3), the postgenomic condition is marked by a "turn to the question of meaning – the question of the uses, significance, and value of the human genome sequence" (Reardon 2). Acts of interpretation – making sense of the data yielded by genetic code – are now central to genomic science, giving rise to new questions regarding what kinds of genomic knowledge we need or want and what place this new knowledge should have in the contemporary world. With interpretation foregrounded in this way, Reardon stresses the indispensability of stories for thinking through genetic research, its contexts, and its implications:

> While codes and algorithms can compel action, they do not help us to critically think and understand why or how we should act. They are instrumental, but not revelatory. They promise control, not the freedom to contest. They process data, but do little to

> cultivate meaning. For this we require stories, stories that help us 'to think what we are doing,' to critically engage with and respond to that which lies between us. (21)[1]

Literary texts form a rich archive of stories that can help us to think through the implications of postgenomic science in the critically engaged way that Reardon advocates. In fictional texts, we may find "the emergence of a rhetorical and visual vocabulary that inflects public understanding of science", while "the information produced by scientific research" both "emerges within and in turn shapes the assumptions and classifications that structure social existence" (Wald and Clayton ix). Biocultural scholarship that attends to the complex entanglements between literature and science therefore has a significant role to play in the epistemological, interpretive, and bioethical recalibrations of the postgenomic era.

In this article I read a trilogy of literary texts, the *Once Were Warriors* novels (1990-2002) by the Aotearoa New Zealand Māori writer Alan Duff,[2] in relation to a specific research project in genetic science, the now notorious 2006 "warrior genes" study carried out by researchers from New Zealand's Institute for Environmental Science and Research (ESR). I shall argue that not only was the *Warriors* trilogy deeply influenced by genetic discourse, but also that the exposition and interpretation of the ESR research data on the functions of a variant of the MAO (monoamine oxidase) gene, in media coverage but also crucially in scientific scholarship and peer-reviewed journals, were conditioned directly and demonstrably by constructions of the "Māori warrior" popularized by Duff's texts and the film adaptations of the first two instalments. The kinds of postgenomic reckoning demanded by this juxtaposition emerge from the historically fraught relationship between Indigenous peoples and scientific research. In the last few decades, genetic science's interactions with Indigenous groups have faced particular scrutiny, with many commentators and activists seeing genetic research as "biocolonialism", a new form of extractive scientific practice that this time mines Indigenous bodies for their valuable genetic data and sometimes distinctive

biological resources.[3] Aside from concerns about the "theft of genetic biological resources and knowledge", genetics "is often seen as deterministic and victim blaming, diverting attention and resources from social and political causes of ill health", and "reinforcing ideologies of Indigenous inferiority within Western science" (Kowal and Warin 822). As I shall discuss, the ESR research was criticized robustly in precisely these terms for a series of problematic assumptions, ethical blunders, and preemptive hypotheses, all of which had ideological and material consequences for the Indigenous population in question.

Duff's trilogy, comprising *Once Were Warriors* (1990), *What Becomes of the Broken Hearted?* (1996), and *Jake's Long Shadow* (2002), does not engage overtly with genetic science, but the texts are suffused with lay understandings of the gene and related notions of heredity, adaptation, and evolution. They focus on a working-class urban Māori community, and their significant impact derived from Duff's presentation as lived reality of what had long been accepted as statistical fact in Aotearoa New Zealand – the disproportionately high rates of crime, unemployment, illiteracy, violence, and alcoholism among the Māori population. The novels themselves have been roundly criticized for victim blaming in their response to these social problems,[4] but as yet no critical attention has been paid to the centrality of genetic discourse to Duff's controversial politics. In what follows, I analyze how Duff's texts dramatize an examination of the perceived genetic and environmental factors leading to violent behavior.[5] Their exploration of how best to deal with endemic violence is underpinned by, and dependent on, what I call their "epigenetic imaginary": their staging of a culturally situated nature-nurture debate; their recurring motifs of degenerated warriorhood, inherited trauma, and genetic memory; their engagement with a very contemporary 1990s vocabulary of genetic science and with Māori models of heredity.[6] Published in the last decade of what Evelyn Fox Keller calls "the century of the gene" and as the Human Genome Project was underway (1990-2003), the novels register increasingly gene-centric perspectives

on Māori identity and behavior. I trace how Duff's genetic discourse evolves over the course of the trilogy, beginning with an intuitive and exploratory evocation of a nature-nurture dilemma in *Once Were Warriors* which, by the time of *Jake's Long Shadow*, has solidified into hardline genetic reductionism. This geneticization of Māori behavior is directly implicated in the texts' increasing political conservatism: by the end of the trilogy, the narrative is dominated by an inflexible neoliberalist outlook hostile to state intervention into social crises, and its anti-welfarism is enabled by the notion that "bad genes" (*Jake's Long Shadow* 213) are responsible for the worst forms of criminal violence.[7] In reading Duff's epigenetic imaginary through a postcolonial lens, exploring the political implications of his "gene talk" (Keller, *Century* 138-39) for Māori, I contribute to the "decolonizing" process currently taking place in biocultural disciplines (Gill, "Decolonizing"), and which should also be a priority in genomic science as part of the reconfiguration of values and priorities that is a hallmark of the postgenomic condition.

The Warrior Gene Hypothesis

In August 2006, a media storm arose in Aotearoa New Zealand around the so-called "warrior gene", a variant of the monoamine oxidase (MAO-A) gene that has reported associations with aggression and risk-taking behavior. The source of the furore was a presentation at a human genetics congress in Brisbane, in which the ESR research team revealed its discovery that Māori men were significantly more likely than Caucasians to carry this gene (Lea and Chambers). News reportage immediately connected the genetic research with the high levels of violence, crime, and incarceration experienced within the Māori population. Although previous studies had noted relationships between MAOs and a group of "anti-social" traits (including addictions, gambling, and violence), the ESR project, led by Rod Lea and Geoffrey Chambers, was the first to link the gene sequence "to a racial or ethnically defined

group" (Wensley and King 507). That the group in question was Māori, a socioeconomically deprived Indigenous minority with historical traditions of warriorhood, was nothing short of incendiary. The notion that genetic determinism may be a factor in the struggles of contemporary Māori posed a challenge to the argument that the community was continuing to suffer from the aftermath of colonial oppression, and that reducing inequality was the answer to symptomatic violent behaviors. The researchers themselves stoked the headlines: Lea is reported as saying that the MAO-A gene "goes a long way to explaining some of the problems Maori have. Obviously, this means they are going to be more aggressive and violent and more likely to get involved in risk-taking behaviour like gambling" ("Once Were Warriors"). Subsequently, the "warriorhood" debates raged across all sectors of New Zealand society. Seemingly inadequately aware of the social implications of their findings, the scientists had intervened in a national conversation – crisis even – with its roots in New Zealand's colonial history.[8]

In the uproar that ensued, the science and ethics of the study were scrutinized carefully. The most notable critiques (among many) were that other ethnic groups studied (including Chinese, Africans, and Pacific Islanders) manifested even higher rates of the 3-repeat allele without attracting a "warrior gene" label, and – the most common protest – that the sample size of seventeen individuals was nowhere near substantial enough to generalize regarding the genetic make-up, evolution, and behavior of a whole ethnic group.[9] Epigenetic concerns intersected with postcolonial objections to the study: the "warrior gene" tag bypassed the issue of gene-environment interaction, ignoring factors related to (neo)colonial oppression and urban deprivation that clearly contribute to violence within Indigenous populations (Gillett and Tamatea 41). In their reductive use of the singular "gene", the researchers downplayed the multifaceted challenges facing Māori and perpetuated erroneous beliefs about human trait formation.

Lea and Chambers published their study in a defensive article in the *New Zealand Medical Journal* in which they blamed "media hype and misconception" (9) for the social fallout from their work. Rather incredibly, they used the article to promote their "warrior gene hypothesis": a speculative theory about why, in evolutionary terms, Māori may have developed the tendency towards carrying the gene. They hypothesized that the "MAO-A gene may have conferred some selective advantage during the canoe voyages and inter-tribal wars that occurred during the Polynesian migrations" (7-8), resulting in its selection across the generations. These speculations were based on the premise that, historically, Māori were known as "fearless warriors" (7). While seemingly keen to offer a positive endorsement of a noble and heroic Māori heritage, this was derived from a simplistic account of Māori history that owed much to popular cultural framings of warriorhood. As G. Raumati Hook points out, "[p]art of the 'evidence' used in the construction of this 'warrior' gene hypothesis is the rather romantic picture that Europeans have regarding the world of the pre-contact Polynesian" (6). Lea and Chambers evoked a glorified notion of the warrior past, even quoting from *Alan Duff's Maori Heroes* – a book for children designed to address a deficit in representations of positive Māori role models – about the legendary voyager Kupe's "monumental courage and […] huge sense of adventure" (7). This citation evidences real naivety regarding cultural tropes, narratives, and representations; Lea and Chambers attempted to explain this romanticized figuration in genetic terms, without acknowledging the highly mediated nature of the "warrior" in New Zealand culture.

The reference to Duff, though, is indicative of his influence on the warrior genes debate. A few years prior to the ESR study, the *Once Were Warriors* trilogy set controversial new terms for the ongoing discourse on Māori identity (and New Zealand national culture). As hard-hitting portrayals of the problems besetting urban Māori communities penned by an author of Māori heritage, these were hugely significant cultural texts. *Once Were Warriors*

the novel was a runaway bestseller, while *Once Were Warriors* the movie, directed by Lee Tamahori, was New Zealand's biggest box-office hit to date, as well as achieving widespread international distribution and acclaim.[10] Duff's representations drastically split critical opinions. The first novel was lauded for its gritty social realism and vernacular style, but many commentators were angered by "the victim-blaming, Maori-bashing Duff *stuff*" (Ihimaera ix; original emphasis), fearing it would shore up colonialist pathologizations of the Indigenous community and play into the hands of neoliberal detractors of the welfare state. Christina Stachurski refers to the problematic ghettoization within New Zealand news media of domestic violence, sexual abuse, and rape as Māori problems as "*Once Were Warriors* Syndrome" (130), with the novel and film operating as a ubiquitous "cultural shorthand" (130) for these associations.

The Duff reference was taken up frequently in the wake of the warrior gene debate. Indeed, as Mark Munsterhjelm asserts, Lea and Chambers' "usage of the term 'warrior gene' […] was shaped by […] Alan Duff's very controversial novel as well as a subsequent movie" (149), and reports of the study "activated and mobilized the existing 'Once Were Warriors' stereotype and its connotations of violence and criminality" (150). Cultural commentaries on the controversy routinely reference Duff and the film adaptations, as do responses in scientific and bioethical journals. D. Wensley and M. King's article in the *Journal of Medical Ethics*, for example, begins with the subheading "Once Were Warriors? Now Are Criminals: The Flawed Depiction of the 'Warrior Gene'" (507). Duff himself was called upon by the media to comment on the ESR research, opining that "the last thing we [Māori] need is another excuse" for violence (qtd. in Munsterhjelm 152-53). "*Once Were Warriors* syndrome" was instrumental in shaping the interpretations of the ESR study, including the "warrior gene hypothesis", as it disproportionately framed domestic and sexual violence as problems located in the Māori community rather than in systemic inequality, pathologizing

that community through the perpetuation of racist stereotypes of "Indigenous deficiency" (Justice 2-3) and presenting this problem as being in need of a Māoricentric explanation and solution. In the remainder of this article, my readings of Duff's trilogy offer a corrective to reductive applications of his work, analyzing in depth the novels' explorations of causality – the nature-nurture question – and solution.

"Unrealised Potential": *Once Were Warriors*' Epigenetic Imaginary

Set on the Pine Block housing estate in the town of Two Lakes (a thinly disguised Rotorua), the trilogy enacts an uncompromising portrayal of the cycles of drinking and domestic violence that, Duff suggests, characterize the urban Māori underclass. Rather than stressing the ongoing damage caused by settler colonialism and the entitlement to resources, reparation, and self-determination of the Indigenous population (the dominant viewpoint at the time at least in liberal circles, due to the momentum behind Māori "Renaissance" politics of the 1980s),[11] Duff depicts his Māori community as lazy, violent, "going-nowhere nobodies" (*OWW* 7). For the central Heke family, poverty, disenfranchisement, and the domestic violence regularly inflicted by Jake upon his wife Beth, have devastating consequences for their six children: by the end of the first volume Mark (Boogie) has been taken into juvenile detention, Nig is killed in a gang fight, and Grace hangs herself after being raped in the family home by a man she believes (incorrectly, it turns out) to be her father. Controversially, *Once Were Warriors* suggests that disenfranchisement can be countered not by progressive social policy, but through embedding a "self-help" (166) ethic within Māori communities themselves. Following Grace's suicide, Beth initiates a programme of social and cultural regeneration, taking in street kids and feeding them, and, with the help of local tribal elders, she begins to restore a sense of cultural pride – mana – to the Pine Block residents by educating them about their "rightful warrior inheritance" (167).

As the title *Once Were Warriors* suggests, the texts enact a sustained, often romanticized, meditation on precolonial warrior culture, and a lament for the values of pride, honor, staunchness, and ferocity in warfare that have seemingly degenerated into mindless brutality. The notion that there is a *genetic* provenance to contemporary violence is addressed directly: the texts repeatedly feature a notion that Māori "blood [is] still running strong with those ferocious genes" (*OWW* 127) of the Polynesian voyaging ancestors and that there is (in Beth's words) "something in the Maori make-up makes us wilder, more inclined to breaking the law" (43) – Duff's anticipatory articulation of a warrior gene hypothesis. But in *Once Were Warriors* especially, this deterministic narrative sits uneasily alongside social explanations for a culture of violence. When, as a newly initiated member of the Brown Fist gang, Nig ponders on the strain of "havin to fit a role, a race role", "havin to act tough and only tough or ya die" (141), the "warrior" mentality is shown to dictate behavior not through genetic transmission but through social conditioning and posturing. The omniscient narrator, meanwhile, emphasizes nurture by repeatedly evoking a Romantic notion of childhood innocence: the "choiceless children" (8) of Pine Block are "lovely children corrupted, ruined, *raped*" (26; original emphasis) by the presence of violence. The working through of these competing narratives of nature and nurture is, as Michelle Keown writes, "central to Duff's vision in *Once Were Warriors*" (172). The tension between biological essentialism and social models of causality enables the novel to undertake "a complex and dialectical exploration of the nature-nurture debate" that not only "complicat[es] the essentializing distinctions Duff has made elsewhere in his writing" (Keown 172),[12] but also taps into a form of intuitive epigenetic reasoning that acknowledges the complexity of "inheritance".

Epigenetics takes us beyond a nature-nurture binary to the understanding that genes are reactive to environmental factors (from cellular to cultural levels) rather than agentic (Keller, "Postgenomic" 29). It teaches us that environmental stress factors can alter our

biology, that "social experience (e.g. the experience of poverty or of conflict) has long-term, heritable, somatic effects and that experience is […] 'written on the body'" (Bloomfield and Hanson 406). Studies of the trauma produced by colonization have long emphasized the heritability of traumatic symptoms, meaning that new theories of transgenerational epigenetic inheritance are now confirming what many Indigenous subjects have always known (Kowal and Warin 823). Indeed, epigenetics has been taken up enthusiastically by many Indigenous researchers as a "compelling framework with which to link social pasts with biological presents, providing a culturally relevant way of understanding" Indigenous experience (Kowal and Warin 822).

While the nature-nurture quandary is openly disputed in *Once Were Warriors*, it is also possible to discern emergent epigenetic thinking in the text, particularly in a narrative of "unrealised potential" (119) that runs throughout the trilogy and refers to a child's "right" to "reach our potential as like a birthright" (*WBBH* 170). Symbolically introduced in Grace's interior monologue at the moment of her suicide, this concept resembles in a loose metaphorical sense Conrad Waddington's pre-molecular topographical model of the "epigenetic landscape", with its channels and branches denoting routes for developmental differentiation (see Squier). "Unrealised potential" implies that early experiences may cause deviations from normative developmental pathways ("potential", in Duff's terms) and that these changes may then be locked in to the "corrupted" lifecourse. In the trilogy (and in line with problematic contemporary applications of environmental epigenetics) negligent or abusive parenting is presented as the most significant impediment to self-actualization; a pronounced narrative of parental blame runs through the novels (as it does through Duff's nonfiction writing) from Beth's early condemnation of "[p]arents too drunk or half the time missing" (*OWW* 14) to Jake's eventual confrontation with his own abusive mother (*JLS* 160).[13]

However, *Once Were Warriors* complicates this focus on parenting with a narrative of heredity on a collective level that approximates recent discussions of transgenerational epigenetic inheritance; Duff's uneven assertions of genetic determinism never quite lose sight of the reverberating impacts of settlement, colonial violence, and racial discrimination. This is most apparent in Beth's "half-enlightened, half-befuddled" drunken meditation (48), in which her investment in a lost ancestral "warrior" past resolves itself into a narrative of evolutionary degeneration:

> We used to be a race of warriors, O audience out there. You know that? […] We were savages. But warriors, eh. It's very important to remember that. Warriors. Because, you see, it was what we lost when you, the white audience out there, defeated us. Conquered us. Took our land, our *mana*, left us with nothing. But the warrior thing got handed down, see. Well, sort of handed down; in a mixed-up sense it did. It was more toughness that got handed down from generation to generation. (47)

In this notion of "mixed-up" inheritance, Beth imagines a heritable, collective transformation brought about as a consequence of colonial dispossession and violence (both martial and epistemic). Similarly, Jake is descended from a slave captured in battle, and his heightened somatic responses to perceived threat – his almost constant state of muscular tension and frequent adrenaline surges – and his arrested emotional development are, the text suggests, the result of inherited stigma and exclusion: "[f]ive hundred years of the slave curse bein on our heads" (*OWW* 103). But as an embryonic "postcolonial" interpretation of Māori history – one that centralizes the damaging effects of colonialism and frames them in systemic terms – Beth's soliloquy is overlaid with an anxious version of evolutionary determinism that characterizes the sense of rupture in the warrior inheritance as a kind of biological degeneration (rather than adaptation). The idea that present-day Māori retain only "toughness", a diluted and now "redundant" (48) quality that has lost the discipline of

warriorhood and has left contemporary Māori out of step with modernity, "clinging onto this toughness thing, like it's all we got, while the rest of the world's leaving us behind" (48), chimes with a troubling narrative of Indigenous deficiency. The idea of being "left behind", of an Indigenous population that has not adapted to its changing environment and is consequently endangered, haunts the trilogy and is, of course, an internalized echo of the "dying race" discourse that underpinned colonial policies of land alienation and assimilation. The discrepancy between warriorhood and "toughness" is emphasized further through the motif of tattooing: an opposition is upheld between the skin deep "[e]lectric job" tattoos of the Brown Fist gang members, "a replica of olden-day moko [facial tattoos]" (181), and the deeply painful "real thing back in the old days" (181), when "*[w]arriorhood* […] was *chiselled* in" (180; original emphasis). Chiselling here functions as a metaphor for depth and endurance, once again bringing to mind the idea of robust developmental channels (or, to use Waddington's neologism, chreodes) in the epigenetic landscape. Its effect is to tie the degeneration narrative into a parallel and equally problematic narrative of Indigenous authenticity, according to which the ancestors are "true" warriors (proven by their ability to silently withstand pain) and the contemporary gangs – merely "tough" – are somehow inauthentically Māori, and thus, once again, deficient.

There are two powerful episodes in *Once Were Warriors* in which Beth and other community members experience an affirmative identification with their "warrior" ancestors, and these draw as much on Māori epistemologies regarding inheritance as on those from genetic science. In te reo Māori (the Māori language), the term most frequently used to refer to human genes is whakapapa, which also means genealogy. As Aroha Te Pareake Mead explains, "for Māori, the physical human gene is inextricably linked to the metaphysical whakapapa, that is, the direct heritage from ancestors which must be transmitted to descendants" ("Human" 129). Genes are not simply units of biological matter or information

but are invested with mauri (life-force), keeping the ancestors present. At Grace's tangi (traditional Māori funeral), and later in a chapter called Deep Tattoo (the title a metaphor for authentic embodied experience), the performance of a haka awakens in Beth and others what is framed as dormant genetic memory. In the Deep Tattoo scene of community cultural instruction,

> this incredible beat of war set[…] off things in their heads: of understanding themselves, some locked away part of themselves suddenly opened up […]. And in every line of mad, rhythmic shout, this familiarity just impossible to know where it was coming from or why. Just this sense of: This is me. (179-80)

At the tangi, similarly, the haka arouses Beth to feel a form of visceral, deeply embodied identification with the ancestors:

> Gone they were. Quite gone of this century and much of the last. Oh man. And a woman feeling, you know, her heart just *racing*, and proud. (I feel warrior too.) Inspired. (I feel as my ancestors must've felt.) Skin alive with power, stomach on fire with jolts of electric excitement. (128; original emphasis)

As the mourners listen to a waiata tangi (lament for the dead), the singing elders seem to collapse distinctions between generations and to re-embody the ancestors: "a reincarnation of what was, a resurgence of fierce pride, a come-again of a people who once were warriors" (127). These figurations serve to corroborate the idea – in this context, an empowering one – that warriorhood exists in some essential, biological, heritable form, and hold out the epigenetic possibility that the degenerative process is not irreversible – that developmental pathways may be rerouted and that warriorhood, "deeply tattooed" in the Māori genetic script or etched into the epigenetic landscape, is the source of "unrealised potential", a trait that may be resurrected in the present.

In the final chapters of *Once Were Warriors*, Beth reinvigorates the warrior trope with a sense of social purpose focused on the previously "choiceless children" (8) of Pine Block. Through her programme of cultural instruction, she endeavors to "give you kids your rightful warrior inheritance. Pride in yourself, your poor selves. Not attacking, violent pride but *heart* pride" (167; original emphasis). The implication here is one of plasticity – the idea that in the right environment the degenerated inheritance of "toughness" can be transformed and authentic ("rightful") mana recuperated. The significance of "potential" within Duff's epigenetic imaginary, then, is that it resists wholesale determinism and engages discourses of plasticity and development in socially and culturally meaningful terms. The recommended mechanism for this transformation, though – "self-help" (166) – is a neoliberal "catchcry" (166) that problematically alleviates postcolonial guilt from settler society: the cultural leader Te Tupaea is not "into blamin people, the Pakeha, the system, the anything" for the Māori "drop in standards", counselling that "[w]e work our way out. Same way as we lazed ourselves into this mess" (191).

The political ambivalence in this ending to the novel, which combines victim blaming with potential for empowerment, intuitively preempts current, postgenomic debates about the politics of epigenetics. For some commentators, epigenetics is potentially "anti-eugenicist", "progressive and transformative" (Kowal and Warin 823), particularly since it "reasserts the significance of the history of racism, as well as the contemporary lived experience of racial inequality" (Gill, "Under" 481). Others worry that it once again pathologizes those from disadvantaged or traumatic backgrounds, "further entrenching biomedical reductionism" and "increas[ing] the already unrealistic pressure on Indigenous parents to overcome the structural barriers their children face" (Kowal and Warin 823). Epigenetic science has the potential, of course, to do both, and through its fictional epigenetic imaginary, *Once Were*

Warriors stages an anticipatory working through of such issues that remains – as does the current debate – emergent, complex and unresolved.

"Bad Genes": Race and Eugenics in the *Warriors* Sequels

In its recommendation of hard work and personal responsibility, *Once Were Warriors* was complicit with a neoliberal turn in New Zealand's social and economic policy, first initiated by mid-1980s government reforms that instituted "a market-oriented liberal individualist ideology (self-help and user-pays)" (Prentice 92) at the heart of national culture. New Zealand's particular brand of neoliberalism was, as Jennifer Lawn argues, "culturally affirmative [for Māori] but socially corrosive" (221), celebrating Māori culture and promoting self-determination "while compromising it at a subjective level through processes of social abjection and punishment" (136), including "a punitive turn in welfare policy" (143). The *Warriors* sequels reflect the national shift to the right in 1990s public discourse and government strategy in their increasing cynicism about state intervention and their shutting down of "culturalist" approaches to Māori empowerment. They open out from the largely family-centred concerns of *Once Were Warriors* to locate the community of Pine Block within larger national contexts, shifting in focus from domestic violence to gang culture and street violence, and exploring the justice system and the prison service. They also extend the central metaphors of the first volume: there is a marked increase in the frequency of genetic tropes and reference points in *Broken Hearted* and then again in *Jake's Long Shadow*, likely reflecting the global public's escalating media exposure to genetic science throughout the 1990s. When *What Becomes of the Broken Hearted?* opens, six years after the first novel, Beth's social intervention has stalled and the majority of Pine Blockers continue to exist on the poverty line with little access to social and spiritual resources. By the time of *Jake's Long Shadow*, another six years later, we see an increasingly reductive recourse to

notions of genetic determinism and "race", belying the complexity of *Once Were Warriors*' nature-nurture dilemma and further entrenching a conservative stance on how to tackle Māori social problems. It is this volume, in which Duff "comes close to suggesting that the high incidence of violent offending among Māori males can only be explained as the result of some hard-wired genetic flaw" (Fox 189), that is the main focus of my analysis here.

One of the ways in which the sequels' genetic discourse is appreciably more reductive than that in *Once Were Warriors* is that the possible *meanings* of heredity – explored in diverse ways in that text – contract and harden into gene-centric definitions. The idea of genetic inheritance is divested of the historicized, affirmative and collective cultural resonances evident in *Warriors* and is recast more negatively in relation to fears about the direct transmission of traits from parent to child. In multiple instances, notions of "genes stirring" (*JLS* 147, 171) and "genetic memories" (*WBBH* 72; *JLS* 205) are evoked to express the remaining Heke children's anxiety about inheriting Jake's violent behaviour. Huata "could feel the strength in him[self]. But refused to consider from what genetic source. (I hate him.)" (*WBBH* 73), while Polly, when attacked by a group of schoolgirls, "felt like the daughter of her father, ready to lash back, to – (go to work) the words flashed through her mind like some genetic memory" (*WBBH* 72). In scenarios of conflict, Abe (a central character in *Jake's Long Shadow*) internally "fought the process of being Jake Heke's son. He really struggled with it" (*JLS* 67). Although repeatedly placed in threatening situations, Abe interprets his readiness to fight as the influence of "my father whose genes have never stopped stirring in me" (*JLS* 171).

There is a slippage here from a notion of inheritance at the level of *population* in Beth's soliloquy and the haka scenes of *Once Were Warriors* to this reiterated concern with inheritance of traits on an *individual* level.[14] Relatedly, there is a significant difference between *Once Were Warriors*' romanticized image of Māori "blood still running strong" with

the ancestors' "ferocious genes" (127) – with "blood" here employed as an overarching metaphor for kinship, tribal affiliation, and heredity – and the direct lines of behavioral transmission evoked by "stirring genes" in the sequels. As both Kim TallBear and Judith Roof have outlined, a discursive turn from "blood" to "gene talk" (TallBear 8) in recent years "signal[s] […] a shift from a mode of substitution (or metaphor) to a more mechanical (metonymic) concept of order" (Roof 170), since genes offer a mechanistic explanation of the causality of traits. The shift to a gene-centric model of behavior in the *Warriors* sequels – at precisely the moment when genome sequencing was rendering gene-centrism out of date – echoes this logic of mechanical, direct causality and in doing so narrows the definition of heredity. Consequently, these genetic explanations for aggressive impulses firstly intensify the parental blame narrative, concentrating the 'source' of violence within one generation of the nuclear family rather than attributing it to wider systemic failings with transgenerational effects, and secondly, they shut down altogether the influence of environmental factors – including contexts of threat and racism – in the initiation of violent episodes. The title *Jake's Long Shadow* itself centralizes this narrative of individual transmission and parental blame. As young adults, the Heke children demonstrate that given a nurturing environment, even deprived children may reach their "potential": once Jake leaves the family home and Beth remarries Charlie Bennett, a more positive role model, Boogie reforms his behavior, goes to university, and eventually migrates from "one side of the courtroom to the other" (*JLS* 20) as a successful commercial lawyer, while Polly becomes a high-earning property developer. However, the success narrative is always one of resisting or overcoming one's genetic heritage – as in Abe's inner struggle to avoid fighting. Duff explicitly resists the notion that traits such as violence might be produced by social oppressions and the (post)colonial political condition for Indigenous citizens.

In the sequels a disturbing, economically and racially inflected notion of genetic hierarchy comes to the fore. Polly's rich white friends attribute their success to the idea that "some people are just born genetically superior" (*JLS* 134). Conversely, the interior monologue of the white middle-class Gordon Trambert describes his depressed and unemployed son Alistair as "a genetic mistake" (*WBBH* 131), the "misshapen happenstance of the worst of each parent's genes" (129). Evoking metaphors of selective breeding and eugenics, Gordon thinks that "the boy was little different to a sheep any farmer would have culled from his flock, rid from his breeding lines" (129). We are not necessarily meant to endorse these ideas about genetic privilege – Gordon's meditations in particular function as a self-incriminating extension of the parental blame narrative – but they form a narrative backdrop in which differences between individuals are consistently measured in hierarchical genetic terms and cast a eugenic shadow across the Heke saga.

This is most prominent in the narrative in *Jake's Long Shadow* of a mysterious social commentator known as Nameless, who is later revealed to be Jake's estranged brother Mattie Heke. Speaking from jail, Nameless is a serial offender serving a double life sentence for murder (168), but has reformed and "woke[n] up" (167) to the problematic relationship between Māori and violence, and is now searching for "truth" regarding his burning question: "I'm talking twelve per cent of the population and over fifty per cent of prison inmates the same race – why?" (81). Nameless buys into the notion of innate racial differences, opining repeatedly that Māori are "gifted with natural sporting skills", "talented musically", and in possession of "such a sense of humour" (81) – all common stereotypes – but are mindless or thoughtless, "[n]ot as intelligent as the average, absolutely" (80). He also echoes Beth's ideas about degenerate warriorhood, sneering at Māori inmates' "comic-book" "electric-needled maori warrior masks": "we wouldn't know true Maori warriorhood till it confronted us with the truth of ourselves, that we're nothings" (79). While Nameless's views are full of vitriol

towards himself and his Māori jailmates, his diatribes are offered, in the context of the novel as a whole, as the articulation of hard truths about his community.

Nameless's first narrated chapter consists of a series of questions regarding the reasons behind Māori incarceration rates, and fixates on the concept of "race". He asks:

> Why us? What the hell are we doing wrong? What are we notioning wrong? Is it that our race can't, genetically, capitulate to another race's perceptions? Is it because we're most of us illiterate? But why, when we went to school? Are we so genetically, culturally hard-wired we're fated to be the idiot race […] Are we a bad race? (81)

In this conflation of genetic and cultural "hard-wiring", racial determinism combined with awareness of the effects of schooling and "perceptions", some kind of nature-nurture dualism is still in evidence, although later, when cataloguing the horrific offences of his jailmates Nameless decides "[i]t might be genes, could be genes, must be genes. No one can be nurtured to become *that* evil" (165; original emphasis). And yet despite Nameless's compulsive interrogations of causality, it hardly seems to matter whether Māori racial difference (as he perceives it) is attributable to nature or nurture; the difference itself – the perceived racial *inferiority* of Māori – is his central obsession. His repeated answer to his questions – "some process of thinking, of outlook, or conceptual blindness, ended us up here" (82) – is dependent upon the internalized racist view that Māori are constitutionally *unable* to think in the same ways as white New Zealanders. Nameless employs pseudo-scientific discourse to reify a sense of absolute racial difference that shores up his narrative of Indigenous deficiency.

In an extraordinary chapter Nameless uses accusatory second-person address to speak directly to Māori youth in gangs, "murderers waiting to fulfil [their] genetic destiny" (137). He mobilizes pseudo-evolutionary terminology to present these youth as "genetic monsters"

(139), evolutionary throwbacks defined by genetic deficit, biologically distinct from "white youths" who have "evolved past mindless murder in packs like this" (139):

> You're warriors, admit it, boys, from days of old, looking for an excuse to let your limited genes be cut loose. You're not human. You're from when they didn't have to be humans. You're from warrior stock, dumbest spear-and-club-fodder stock. Your ancestors never lasted long in the long ago 'cos they had no intelligence. They were mindless. Like they passed down to you, bad-gifted, mongrel-legacy, no minds that can reflect.
>
> You're not of the true warrior strain. Your ancestors were the scum of their time, the outcasts turned out. Your strain is going to pass on down, unless someone does this back to you on a grander scale. (139)

There are clear echoes of Beth's soliloquy in this passage, but here the idealized 'noble savage' warrior ancestor (the "true warrior strain") is paired with an inferior breed of ancestor – an unthinking prehuman beast, prehistoric rather than precolonial. The narrative of a proud warrior past degenerating into "toughness" due to colonialism is superseded by a discourse of atavism (a discourse, of course, that underpinned scientific racism) based on the persistent presence of "limited genes". The categories of "true warrior" and "dumbest spear-and-club-fodder stock" create a genetic hierarchy within the perceived racial category that enables a reinterpretation of Māori history in terms of eugenic social cleansing: the "warrior stock" ancestors are "outcasts turned out" *because of* their innate mindlessness, their genetic deficit.

Nameless's views are given credence by their alignment with those of Charlie Bennett, the kindly and wise welfare officer (now married to Beth), who is a moral compass throughout the trilogy. Against the tide of "these politically correct times" (94), Charlie similarly believes that "their [Māori] collective mind was locked in the past, where

physicality ruled supreme and intellect didn't – couldn't – get a look in" (*JLS* 215). He decides to quit his job in the belief that his people "could not be saved. Not until they decided to do it themselves" (215), effectively disqualifying the welfare system from the narrative's strategies for combating violence and incarceration. That even the most professionally qualified and morally secure character in the trilogy is mobilized as a mouthpiece for deterministic ideas of Māori atavism demonstrates the remarkable homogeneity in *Jake's Long Shadow*'s social diagnoses and prescriptions. Over and over again, we are presented with a portrait of deficiency, of arrested intellectual development over generations, and while compulsively returning to the warrior past as a point of comparison, evidence of transgenerational colonial damage or epigenetic inheritance – explored in good faith in *Once Were Warriors* – is now ridiculed as an "excuse" for deviance. With welfare rendered ineffective, the criminal justice system is also represented as being broken by its lenient "culturalist" approach to Māori offending. Nameless's imaginary young offenders are, in his view, "insanely protect[ed]" by a "political process" that sees them as "victims" of "upbringing and the far-reaching effects of colonialism" (140). Here, and in his caricatured portrayals of "cultural Maori" (111) and "bleeding-heart white liberal" (111) members of the prison board, Duff undermines the politics of reparation that was at the heart of New Zealand state policy towards Māori during the Renaissance of the 1970s and 80s.

In the seeming absence of any effective alternatives from state institutions for dealing with street violence, Nameless resorts to eugenicist imaginings in an extension of Gordon Trambert's fantasy of selective breeding. In Nameless's own eugenic vision, not only is the "pass[ing] on down" of the warrior stock "strain" presented as a social scourge to be prevented, but he also dreams of euthanasia: "The good guys, good gene guys should climb through your window and put you quietly to sleep […]. Vigilantes should get hold of you and […] quietly see you off this mortal coil" (139-40). In this extraordinary fantasy of

extermination, a perceived genetic deficiency is presented as a valid basis for "Justified Death" (139). That this is facilitated by vigilantes is significant: *Jake's Long Shadow* takes us full circle back to the idea of "self-help", but this novel "unabashedly advocates vigilantism as the proper response to a problem that Duff's earlier novels deemed solvable by education" (Heim 2).

At the climax of *Jake's Long Shadow*, a vigilante group attacks Pine Block gang members in response to their brutal beating of Alistair Trambert. The attack is coordinated by Jake following Gordon's appeal that this "could not be left to the police" (202), and is framed positively: the vigilantes are described unironically as "real men" possessing a "moral, physical force" (214), and see themselves as "[t]aking back the streets […] so they never hurt any of our children again!" (211). In contrast with the hurt and rage that motivated his earlier violence, Jake is driven by a sense of "righteous" (234) moral purpose that is unshaken by Beth's protestations that vigilantism represents "the law of the jungle" (237): "*I'm a man. A true man, not a bar brawler warrior.* […] *I'd know, I'd feel it deep down, now I would, if this was wrong. I'm a man again. Acting as a man should*" (211; original emphasis). Vigilantism is therefore framed as an authentic mode of contemporary warriorhood, a serious, disciplined, purposeful, and morally nuanced act, and violence as something that can be "necessary. You bring it out like a weapon if you're threatened" (239). More effective than policing and the criminal justice system, vigilantism allows the residents of Pine Block to "take back control" (212) and improves morale on the housing estate: walking through the neighbourhood, Polly Heke encounters "glee […] smiles of relief", the feeling that "something profound had taken place" and that despite "soft laws", "[g]ood had triumphed over evil" (212). The gang is "devastated" (213) by this attack: "Splintered, shattered, broken in pieces they were, these youths of bad birth, bad genes, choiceless in growing up bad" (213). The "choiceless children" of *Once Were Warriors*, whose vulnerability to environment was stressed in that

text, have grown up into the "youths of bad genes" of *Jake's Long Shadow*, the emphasis of the trilogy shifting from culturally situated intervention to a kind of genetic determinism that precludes social action of any kind except retributive violence.

Conclusion

In the final pages of *Jake's Long Shadow*, Beth and Jake circle back to the nature-nurture debate that has been the trilogy's abiding preoccupation. Beth informs Jake that "your son [Abe] was trying to reject violence but got claimed by your genes" (234). "What if it was Maori warrior genes?" Jake replies. "Is it in our genes, from centuries of nothing but fighting?" (234). This question remains unanswered, and indeed seems largely immaterial given that, as Keller argues, in the age of epigenetics, nature-nurture dilemmas are "not only unanswerable but […] actually meaningless" (*Mirage* 5). The more pressing question in the *Warriors* trilogy – ultimately not answered in any satisfactory way either – is what to do about the seeming crisis of violence within the Pine Block community. But while the question of nature versus nurture may now be outdated, the impact of this line of questioning in the trilogy is powerful, with resonance beyond the pages of the novels. What Duff's story of genetic determinism – of warrior genes – facilitates is a reduction of occasions for social justice and postcolonial reparation, a dismissal of state and community action, until vigilantism and fantasies of race-based social cleansing are presented as the only options for dealing with gang violence.

To engage effectively with Duff's often incendiary "gene talk", it is necessary to consider "how gene discourse and scientific practices are entangled in ongoing colonialisms" (TallBear 9). The connection Duff makes between so-called "bad genes" and social problems is of course predicated on a long history of Indigenous communities being pathologized, and a pre-existing problematic relationship between Indigenous groups and genetics. In turn, the

"bad genes" cultural discourse to which the trilogy contributes has tangible material and epistemic effects, serving to legitimate new scientific explorations into perceived Indigenous deficiencies. Mead notes the preponderance of genetic studies exploring negative traits within Polynesian populations and wonders:

> Perhaps if my first exposure [to genetics] had been one of news about the discovery of a 'Polynesian Excellence Gene', or some other study of a culturally affirming nature, I might be more conducive to the promises and claims made by genetics and biotechnology. What if the science had been used to answer a question that plagues millions of the world's indigenous peoples – is there a 'racism' gene? and if so, can it be removed or bred out? ("Polynesian" 35).

While Mead is playful here, it is to make a serious point: priorities in genetic research are predetermined by existing cultural narratives about the groups in question. Seen in this light, while the ESR research project does not conform to a hard definition of extractive biocolonialism as coerced activity that commodifies Indigenous genetic resources (Whitt 23-24), its impact could be described as a form of epistemic biocolonialism, whereby "knowledge" or "data" about the genetic make-up of Indigenous peoples is used to fortify discourses of their biological inferiority and social weaknesses. Whether well-meaningly or otherwise, research like the "warrior genes" study involves the consolidation and exploitation of negative stories told about Indigenous bodies and behaviors.

A more positive outcome of the warrior genes controversy was the initiation of more sophisticated discussion about scientific responsibility. The study generated widespread recognition that scientists have a "duty to ensure that their findings are placed 'in context'", providing "'socially robust' knowledge" whereby "genetic influences on behavioural characteristics" are always reported "alongside other environmental, cultural, and socio-

economic influences that may also contribute to the studied behaviour" (Wensley and King 507-08). Literary texts are spaces in which these various influences and contexts can be explored in depth and in all their entanglement, but in analyzing the intertwinement of genetic concepts and Indigenous lifeworlds in and beyond Duff's novels, it is imperative that we do not fetishize the literary as the site of complexity, contextualization and nuance and vilify the scientific as reductive and data-driven. The stories told by literature can wound (Justice 1-6), as can those by science. They are, of course, mutually constitutive and coproduced (TallBear 11). To ignore the entanglement and cross-fertilization between these stories amounts to a form of ethical negligence that scientists and cultural critics are only just beginning to unpack. At a time when epigenetic science is being taken up enthusiastically by Indigenous groups, and when we are reassessing the kinds of science that are necessary or desirable, the warrior genes controversy forms an instructive warning regarding the power of fiction to shape scientific realities and about some of the dangers of reductive genetic thinking. Scientists and writers alike must remain vigilant about where their narratives might take us, and with the age of postgenomics comes a heightened responsibility to develop more sophisticated ways of analyzing and interpreting scientific "knowledge".

Acknowledgements

Research for this article was funded by a Wellcome Trust Seed Award (grant number 106839/Z/15/Z). I am grateful to Shital Pravinchandra, Hamilton Carroll, an anonymous reviewer from the School of English, University of Leeds, and to the *MFS* reviewers for their insightful and valuable feedback.

Notes

[1] Reardon's imperative "to think what we are doing" comes from Arendt's *The Human Condition* (*Postgenomic* 5).

[2] Duff has Pākehā (white European), Ngāti Rangitihi and Tūwharetoa ancestry.

[3] On biocolonialism see Whitt, and the website and publications of the Indigenous Peoples Council on Biocolonialism: www.ipcb.org [accessed 26 March 2019]. For a field-defining account of Indigenous peoples' relationships with science more generally (with a Māori focus), see Smith.

[4] See Heim for a useful survey of critical responses to Duff's novels.

[5] My analysis focuses on the novels because the film adaptations – Lee Tamahori's *Once Were Warriors* (1994) and Ian Mune's *What Becomes of the Broken Hearted?* (1999) – cut out much of the novels' meditations on the causes of, and solutions to, violence, and the genetic discourse was lost entirely.

[6] I employ "epigenetic imaginary" in a slightly different sense from Maurizio Meloni and Giuseppe Testa, who refer to epigenetic "hype" in popular culture and the "mismatch between what is established and what is at present a source of heated scientific dispute" (439). As Susan Squier attests, the parameters and meaning of epigenetics are far from established; the term resonates differently across disciplinary fields, is subject to linguistic slippage and ambiguity (10), and its emphasis has shifted – "narrowed" significantly towards a focus on molecular-level mechanisms such as DNA methylation and chromatin modification – since Conrad Waddington first used the term with "expansive reach" in 1940 in his work on embryonic development (8). In attributing an "epigenetic imaginary" to Duff's novels, I refer to a set of fictionalized ideas regarding heredity and trait formation that are not necessarily scientifically informed or coherent – indeed they exemplify such ambiguities, mismatches and problems of scale – but that gesture towards, anticipate even, some of the

present moment's debates about the politics of epigenetic research with specific reference to Indigenous communities.

[7] Page references to the trilogy will be abbreviated to *OWW*, *WBBH*, and *JLS* respectively.

[8] This is surprising, given Lea's record of involvement in ethically and culturally engaged research. See Hudson et al for an account of the Raikapaaka Health and Ancestry Study, an envirogenomics project conceived and executed with and for the Raikapaaka iwi (tribe), which conforms to definitions of kaupapa Māori (Māori-centered) research (see Smith).

[9] See Merriman and Cameron; Crampton and Parkin; Perbal; and Hook. See Munsterhjelm 147-64 for a detailed survey of criticisms levelled at the ESR study.

[10] While the sequels have received little critical analysis, they were successful both commercially and on the literary and film prize circuit.

[11] The Māori Renaissance involved a reinvigoration of Indigenous political activism and a resurgence in Māori cultural practices. See Webster; and Prentice.

[12] Duff's stance that Māori are to blame for their own deprivations is repeatedly voiced in his polemical essay collection, *Maori: The Crisis and the Challenge* (1993). His latest volume of nonfiction, *A Conversation With My Country* (2019), reflects on positive social changes for Māori since the publication of *Once Were Warriors* and concedes that some of his earlier "opinions were a bit too blunt, and occasionally plain wrong and/or stupid" (29), but reiterates many of his critical perspectives on Māori leadership, parenting, violence, and prison policy.

[13] See Chapter 3: Parenting in *A Conversation With My Country*. On parenting in relation to environmental epigenetics, see Müller et al.

[14] Keller notes that a "rampant" conflation of population and individual-level inheritance is a problem even in expert iterations of the nature-nurture debate (*Mirage* 55).

Works Cited

Bloomfield, Mandy, and Clare Hanson. "Beyond the Gene: Epigenetic Science in Twenty-First Century Culture." *Textual Practice*, vol. 29, no. 3, 2015, pp. 405-13.

Crampton, Peter, and Chris Parkin. "Warrior Genes and Risk-Taking Science." *New Zealand Medical Journal*, vol. 120, no. 1250, 2007, pp. 63-65.

Duff, Alan. *A Conversation With My Country*. Random House NZ, 2019.

-------. *Jake's Long Shadow*. Vintage, 2002.

-------. *Once Were Warriors*. 1990. Vintage, 1995.

-------. *What Becomes of the Broken Hearted?* 1996. Vintage, 1997.

Fox, Alistair. *The Ship of Dreams: Masculinity in Contemporary New Zealand Fiction*. Otago UP, 2008.

Gill, Josie. "Decolonizing Literature and Science." *Configurations*, vol. 26, no. 3, 2018, pp. 283-88.

-------. "'Under Extreme Environmental Pressure, Characteristics Were Acquired': Epigenetics, Race and Salman Rushdie's *The Satanic Verses*." *Textual Practice*, vol. 29, no. 3, 2015, pp. 479-98.

Gillett, Grant, and Armon J. Tamatea. "The Warrior Gene: Epigenetic Considerations." *New Genetics and Society*, vol. 31, no. 1, 2012, pp. 41-53.

Heim, Otto. "Fall and Response: Alan Duff's Shameful Autoethnography." *Postcolonial Text*, vol. 3, no. 4, 2007, pp. 1-17.

Hook, G. Raumati. "Warrior Genes and the Disease of Being Maori." *MAI Review*, vol. 2, 2009, pp. 1-11.

Hudson, Maui L., Annabel L. M. Ahuriri-Driscoll, Marino G. Lea, and Rod A. Lea. "Whakapapa – A Foundation for Genetic Research?" *Journal of Bioethical Inquiry*, vol. 4, no. 1, 2007, pp. 43-49.

Ihimaera, Witi. "He Mihi." Foreword to Andrew Eruera Vercoe, *Educating Jake: Pathways to Empowerment*. HarperCollins New Zealand, 1998, p. ix.

Justice, Daniel Heath. *Why Indigenous Literatures Matter*. Wilfred Laurier UP, 2018.

Keller, Evelyn Fox. *The Century of the Gene*. Harvard UP, 2000.

-------. *The Mirage of a Space Between Nature and Nurture*. Duke UP, 2010.

-------. "The Postgenomic Genome." *Postgenomics: Perspectives on Biology After the Genome*, edited by Sarah S. Richardson and Hallam Stevens, Duke UP, 2015, pp. 9-31.

Keown, Michelle. *Postcolonial Pacific Writing: Representations of the Body*. Routledge, 2005.

Kowal, Emma, and Megan Warin. "Anthropology, Indigeneity, and the Epigenome." *American Anthropologist*, vol. 120, no. 4, 2018, pp. 822-25.

Lawn, Jennifer. *Neoliberalism and Cultural Transition in New Zealand Literature, 1984-2008: Market Fictions*. Lexington Books, 2016.

Lea, Rod, and Geoffrey Chambers. "Monoamine Oxidase, Addiction, and the 'Warrior' Gene Hypothesis." *New Zealand Medical Journal*, vol. 120, no. 1250, 2007, pp. 5-10.

Mead, Aroha Te Pareake. "Human Genetic Research and Whakapapa." *Mai I Rangiātea: Māori Wellbeing and Development*, edited by Pania Te Whāiti, Mārie McCarthy and Arohia Durie, Auckland UP, 1997, pp. 126-41.

-------. "The Polynesian 'Excellence' Gene and Life Patent Bottom Trawling." *Pacific Genes and Life Patents: Pacific Indigenous Experiences and Analysis of the Commodification and Ownership of Life*, edited by Aroha Te Pareake Mead and Steven Ratuva, Call of the Earth Llamado de la Tierra and the United Nations University Institute of Advanced Studies, 2007, pp. 34-57.

Meloni, Maurizio, and Giuseppe Testa. "Scrutinizing the Epigenetics Revolution." *BioSocieties*, vol. 9, no. 4, 2014, pp. 431-56.

Merriman, Tony, and Vicky Cameron. "Risk-taking: Behind the Warrior Gene Story." *New Zealand Medical Journal*, vol. 120, no. 1250, 2007, pp. 59-62.

Müller, Ruth, et al. "The Biosocial Genome? Interdisciplinary Perspectives on Environmental Epigenetics, Health and Society." *EMBO Reports*, vol. 18, no. 10, 2017, pp. 1677-82.

Mune, Ian (dir.). *What Becomes of the Broken Hearted?* South Pacific Pictures, 1999.

Munsterhjelm, Mark. *Living Dead in the Pacific: Contested Sovereignty and Racism in Genetic Research on Taiwan Aborigines*. UBC Press, 2014.

"Once Were Warriors: Gene Linked to Maori Violence." *The Sydney Morning Herald*, 9 August 2006. https://www.smh.com.au/world/once-were-warriors-gene-linked-to-maori-violence-20060809-gdo50b.html [accessed 21 August 2019].

Perbal, Laurence. "The 'Warrior Gene' and the Māori People: The Responsibility of the Geneticists." *Bioethics*, vol. 27, no. 7, 2013, pp. 382-87.

Prentice, Chris. "What *Was* the Maori Renaissance?" *Writing at the Edge of the Universe: Essays from the "Creative Writing in New Zealand" Conference, University of Canterbury, 2003*, edited by Mark Williams, Canterbury UP, 2004, pp. 85-108.

Reardon, Jenny. *The Postgenomic Condition: Ethics, Justice and Knowledge After the Genome*. U of Chicago P, 2017.

Roof, Judith. *The Poetics of DNA*. U of Minnesota P, 2007.

Smith, Linda Tuhiwai. *Decolonizing Methodologies: Research and Indigenous Peoples*. Zed Books, 1999.

Squier, Susan. *Epigenetic Landscapes: Drawings as Metaphor*. Duke UP, 2017.

Stachurski, Christina. *Reading Pakeha? Fiction and Identity in Aotearoa New Zealand*. Rodopi, 2009.

Stevens, Hallam, and Sarah S. Richardson. "Beyond the Genome." *Postgenomics: Perspectives on Biology After the Genome*, edited by Sarah S. Richardson and Hallam Stevens, Duke UP, 2015, pp. 1-8.

TallBear, Kim. *Native American DNA: Tribal Belonging and the False Promise of Genetic Science*. U of Minnesota P, 2013.

Tamahori, Lee (dir.). *Once Were Warriors*. Communicado, 1994.

Wald, Priscilla, and Jay Clayton. "Editor's Preface: Genomics in Literature, Visual Arts, and Culture." *Literature and Medicine*, vol. 26, no. 1, 2007, pp. vi-xvi.

Webster, Steven. *Patrons of Maori Culture: Power, Theory and Ideology in the Maori Renaissance*. U of Otago P, 1998.

Wensley, D., and M. King. “Scientific Responsibility For the Dissemination and Interpretation of Genetic Research: Lessons From the ‘Warrior Gene’ Controversy.” *Journal of Medical Ethics*, vol. 34, no. 6, 2008, pp. 507-09.

Whitt, Laurelyn. *Science, Colonialism, and Indigenous Peoples: The Cultural Politics of Law and Knowledge*. Cambridge UP, 2009.