

Article

Climates of Change: A Tuatara's-Eye View

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Abstract: The tuatara or New Zealand “spiny-backed lizard” (*Sphenodon punctatus*) is the sole surviving member of an order of reptiles that pre-dates the dinosaurs. Among its characteristics and peculiarities, the tuatara is renowned for being slow-breathing and long-lived; it possesses a third eye on the top of its skull for sensing ultraviolet light; and the sex of its progeny is determined by soil temperatures. This article unravels a tuatara’s-eye view of climate change, considering this creature’s survival across geological epochs, its indigenous lineage and its sensitivities to the fast-shifting conditions of the Anthropocene. This article examines the tuatara’s evolving role as an icon of biodiversity-under-threat and the evolving role of zoos and sanctuaries as explicators of climate change, forestallers of extinction, and implementers of the reproductive interventions that are increasingly required to secure the future of climate-vulnerable species. It is also interested in the tuatara as a witness to the rapid and ongoing human-wrought climate change which has secured the lifeworld reconstruction that is foundational to the settler colonial enterprise in Aotearoa/New Zealand. Linking this to the Waitangi Tribunal’s Wai 262 report (*Ko Aotearoa Tēnei*, 2011), the article considers what the tuatara teaches about kaitiakitanga (guardianship) and climates of change.

Keywords: climate crisis; biodiversity; extinction; settler colonialism; tuatara; zoo; Wai 262; kaitiakitanga; lifeworld; animate topography

1. Introduction

On 12 January 2020, the New Zealand Ministers for Education and Climate Change announced that climate crisis would begin to be taught in New Zealand schools during the forthcoming academic year. This news made waves across the globe, with *The Guardian*, for instance, pronouncing that the proposed changes to the school curriculum “will put the country at the forefront of climate crisis education worldwide” (Graham-McLay 2020).

In one sense, it is distinctly unremarkable for Aotearoa/New Zealand to be heralded as a global leader in respect of environmental matters. The mythology—partly homespun, partly imported—of the nation as an enlightened South Seas eco-wonderland gained widespread public currency in respect of its nuclear-free stance in the 1980s and has subsequently been bolstered through long-running national tourism campaigns with the branding “100% Pure New Zealand”. More recently, the mythology of the country’s environmental progressiveness has found expression in radical measures implemented on a national level to secure the country’s remaining endemic biodiversity. When the New Zealand government unveiled its “Predator Free 2050” campaign in 2016, for instance, it trumpeted this as an ambitious global first (see, for example, Kirk 2016).

In this context, given the national zeal for what might be understood as *the performance* of biodiversity salvation, what *is* perhaps remarkable is that Aotearoa/New Zealand has lagged in developing understandings about links between climate crisis and threats to biodiversity (see Green and Clarkson 2005, pp. 42–43; McGlone and Walker 2011, p. 6; Keey 2016, p. 13). As a phenomenon, biodiversity presents distinct descriptive difficulties because of the complexity and scope of its variables—encompassing the multiplicity, abundance and interactions of organisms and

their ecosystems (McGlone and Walker 2011, p. 11), or the “profusion of life” (Gibbs 2008, p. 6). Clear links between climate crisis and biodiversity have nevertheless become well recognised around the globe, with scientific observations, extrapolations and modelling in respect of projected disruptions to ecosystems that support life-in-place, and in respect of looming mass extinctions (see Lovejoy and Hannah 2005; Hannah 2012; Kolbert 2014). In the opening paragraphs of *Mediating Climate Change*, Julie Doyle proposes that the plight of climate-vulnerable creatures offers the most resonant and compelling angle for focalising communication about the dangers of climate crisis, describing the task of educating the public about impacts on animals and biodiversity as “the easy part” of an otherwise difficult mission (Doyle 2011, p. 1). Yet, despite the undeniable charisma of the country’s fauna, the patterns observable in Aotearoa/New Zealand challenge Doyle’s suggestion.

The New Zealand government’s recent announcement about the new climate change curriculum begins to expose likely reasons. Even as the world applauded, responses in the local media have been tepid, centring on whether the proposal amounts to “state-organised bullying of kids” and whether the suggestion that New Zealanders might consider consuming less meat and dairy amounts to unpatriotic “dietary dogma” (see, for example, Small 2020). These surface ripples bely deeper difficulties. In recent decades, discussion of environmental matters in the public domain in Aotearoa/New Zealand has become increasingly blunt and uncompromising. At the same time, in practice, conservation efforts have become ever more ritualised, focused on targeting so-called invasive pests, developing new technologies for their eradication, and celebrating their demise. Such efforts deal in dramatic frontier escapades, pioneering innovations and military-style campaigns. By contrast, climate crisis appears nebulous and vague. It lacks a singular identifiable enemy. It offers little scope for the caricature-driven transferential displacements that enable New Zealanders to identify with endemic nature and its experience of being under threat (see Boswell 2018). And, moreover, it begins to surface bedrock problems—such as vast-scale deforestation; fragmentation and destruction of native habitats; entrenched reliance on agricultural industries; and ever-worsening impacts on endemic biodiversity caused by the deliberate introduction of exotic fauna—which threaten the foundations of the modern nation and its ongoing premises (and businesses). In a place where transferential displacements are habitual and normalised, to approach climate crisis through the prism of biodiversity is to invite full-scale identity crisis.

As noted above, the notion that Aotearoa/New Zealand is “exceptional” finds many of its most ordinary expressions in respect of the environment. Moreover, it is apparent that exceptionalist logics and self-exceptionalising stories are unexceptional in settler colonial places (see Fairburn 2006; Boswell 2017). Yet, Aotearoa/New Zealand is a special place in which to consider the workings and impacts of climate change, particularly in respect of biodiversity. As an indigenous territory made over for settler colonial purposes within a recent and tightly compressed timeframe, it offers lessons with regard to climate crisis that are formidable, delicate and damning. A vast and diverse array of contenders for resonant case studies emerges from the “naturewreck” in Aotearoa/New Zealand (Pöschl 2016). The kea (*Nestor notabilis*), for instance, which is the planet’s sole alpine parrot and one of its very oldest living forms of parrot, is a former climate refugee whose subsequent subjection to a campaign of willed extermination by settler culture—as a perceived threat to the success of high country sheep farming—has been near complete (see Lockley 1980; Carter 2006). Meanwhile, a recent drought in the northernmost region of the country triggered sightings of malnourished kiwi (*Apteryx mantelli*) staggering around during the daytime in a state of severe dehydration. News reports noted “that the ground had become so dry that kiwi couldn’t poke their beaks into [it] to feed and people made serious suggestions of putting out bowls of milk, water and even pet food on back doorsteps to keep our national icon alive” (Baigent-Mercer 2016, p. 28). As this poignant example suggests, there are “dots to be joined between collapsing native forests, possum density, thinning leaf litter, topsoil loss, dehydrated kiwi, and what this means in the context of the [global] climate emergency” (Ibid.).

The chosen focus of this article, however, is the tuatara (*Sphenodon punctatus*)—commonly referred to as the “spiny-backed lizard”, but more properly understood as the sole surviving representative of

an order of reptiles that pre-dates the dinosaurs. Mounting and interwoven reasons for my selection will, I hope, become apparent as the article's own spiny ridge—of ideas, logics and concerns—becomes exposed to view. By way of preface, however, I would note that the tuatara is of immense global and local significance and its story is pre-eminently one of deep timescales, of life-in-place, of adaptability and precarity, of traditional ecological knowledges and of climate crisis mediation. As a species, the tuatara is understood by Māori to have access to realms of environmental wisdom beyond those able to be apprehended by humans and it is “exceptional” for its place in the Waitangi Tribunal's report on the so-called “Wai 262” or flora and fauna claim (Waitangi Tribunal 2011), which itself offers an exceptional blueprint for sustaining life and reimagining relationships in a world irreversibly reshaped by settler colonial histories and their environmental legacies. The Wai 262 report addresses issues raised by Māori about ongoing and imminent threats to the survival of taonga (treasured) species and to the ability of iwi (tribal groups) to exercise due care for their taonga. Among those species discussed in the Wai 262 report, tuatara are identified as being of paramount concern.

In what follows, I consider what climate crisis might look like from the perspective of the tuatara, and what the tuatara appears to embody or “know” about the modalities, intensities and durations of climate change. I also consider what this species reveals about the stakes and obligations of exceptionalism. Ultimately, I suggest, the story of the tuatara teaches that the term “biodiversity”—with its “normative loading” and underlying anthropocentrism (see Mathews 2016; Rose 2013)—fails to describe an indigenous world and is thus inadequate as a category of thought and criterion for action in preparing for what lies ahead. Before turning to these tasks, however, I excavate and flesh out some contextual matters that pertain to Aotearoa/New Zealand specifically—and the settler south more generally—as a locus for advance and advanced consideration of climate crisis.

2. Negative Exceptionalism

Epithets abound for the unique and ancient biodiversity found in Aotearoa/New Zealand. Prized as “Ghosts of Gondwana” (Gibbs 2008), or as denizens of “Moa's Ark” (Bellamy et al. 1990) or “The Southern Ark” (Andrews 1986), the country's faunal species invoke fascination and inspire strong language, with the country itself conceived as a paradise, haven, refuge or sanctuary for their conservation and care. As the New Zealand government's *Biodiversity Strategy* states, “New Zealand's high level of endemic biodiversity makes a unique contribution to global biodiversity and places on us an obligation to ensure its continued existence” (New Zealand Government 2000, n. p.). Ecologists, geographers, historians and anthropologists have made bold pronouncements about this precious inheritance. Aotearoa/New Zealand has been proclaimed “a completely different experiment in evolution to the rest of the world”, showing what the earth might have looked like “if mammals as well as dinosaurs had become extinct 65 million years ago” (Flannery 1994, p. 55; see also Hutton and Drummond 1923, p. 21), while the country's landmass is said to have served as the stage for the evolution of plants and animals so distinct that it is the closest scientists will get to studying life on another planet (Diamond 1990, pp. 3–8).

This latter statement is quoted with pride in the government's *Biodiversity Strategy* (New Zealand Government 2000, p. 1). Yet, the same *Strategy* goes on to make a related and startling claim to global pre-eminence which doubles as a troubling admission—as well as serving to remind that exceptionalism does not always have positive valence. Aotearoa/New Zealand was one of the last places on earth to be settled by humans, the *Strategy* notes, but has “one of the worst records of biodiversity loss” (Ibid., p. 4). “Nothing since the extinction of the dinosaurs (65 million years ago) compares with the loss of biodiversity in New Zealand in the last 100 years,” it goes on to explain. Consideration of the timeframes at stake serves to put this statement in context. In rounded terms, it is 800 years or so since Māori first established tribal homelands in Aotearoa/New Zealand; just 250 years since James Cook made landfall; just 200 years since the founding of the handful of Church Missionary Society settlements that instigated agricultural transformation of the land; and just 160 years since the launch of the planned immigration schemes that seeded almost all of the major New Zealand centres of urban

population. What is striking about these timeframes in respect of European settlement, too, is that they map directly onto the inauguration of the industrial age, and onto the inauguration of climate science as a field of scientific study (see [Christianson 1999](#); [Weart 2003](#); [Kolbert 2006](#)). In other words, the dawn of the global era of anthropogenic climate crisis coincided with the arrival of Europeans in Aotearoa/New Zealand, and the unfolding of this era has corresponded to the country's lifespan-to-date as a modern nation state. Indeed, despite its clean, green branding, Aotearoa/New Zealand can more properly be understood as a test bed or "Ground Zero" for the rest of the planet in respect of industrial-powered and industrial-scale climate change; this is its deeper and more disturbing claim to exceptionalism.

If climate science and its understandings about the potential dangers of rising atmospheric carbon dioxide concentrations were still in the future when Europeans arrived in Aotearoa/New Zealand, what the newcomers did experience and comment on with relief was that the country had a temperate (that is, oceanic and variable) climate. Aotearoa/New Zealand is the southernmost and coolest of the Polynesian islands and it possesses a topographically complex landmass. It was found by European newcomers to be free from the soaring heat and stifling humidity characteristic of the tropics. Yet, to return proper historical context to the notion that Aotearoa/New Zealand is the closest scientists will get to studying life on another planet, these European newcomers *did* conceive of themselves as having landed in a profoundly alien place. In particular, they were disconcerted by the biota they found, which appeared to them to be impoverished and/or degenerate: the country was seen to "lack" terrestrial mammals; many of its birds were flightless and/or songless; its bats crawled through leaf-litter; its penguins inhabited forests; its parrots were mountain-dwellers; its frogs laid eggs that hatched miniature frogs rather than tadpoles; its invertebrates fulfilled scavenging roles elsewhere undertaken by rodents, and so on.

Despite having met a reassuringly temperate climate, too, the newcomers nevertheless sought to make adjustments to that climate, and it was clear to them that profits beckoned. Surveying the towering lowland forests from the deck of *HMS Endeavour* in 1769, and perceiving scope for expansion of the fenland drainage schemes being undertaken at that time in England and across swathes of Europe, Joseph Banks reported on "swamps which might doubtless Easily be drained" (quoted in [Park 2013](#), p. 174). Almost a century later, in *New Zealand or Zealandia, the Britain of the South*, the immigrant-farmer Charles Hursthouse offered a fuller explication of this ethos:

The cultivation of a new country materially improves its climate. Damp and dripping forests, exhaling pestilent vapours from rank and rotten vegetation, fall before the axe; and light and air get in, and sunshine ripening goodly plants. Fen and march and swamp, the bittern's dank domain, fertile only in miasma, are drained; and the plough converts them into wholesome plains of fruit, and grain, and grass ([Hursthouse 1857](#), p. 69.).

Confident in the rightness and value of their actions, settlers duly set about felling the ancient forests of Aotearoa/New Zealand, draining the country's swamps, diverting its waterways, carving up its newly dried-out surface into alienable parcels of farmland, and sowing swathes of pasture in a place which hitherto had none. They also began importing and acclimatising a vast array of exotic (predominantly northern-world) species—some for their perceived utility, and some for their familiarity and comfort—in order to create what might be termed a "pastiche lifeworld".¹ Through these means, they constructed the seemingly ordinary agronomic patchwork of Aotearoa/New Zealand's productive, workaday landscapes, and they laid over the remaining terrain (that is, terrain unsuitable for farming) a topographic imaginary of sublime mountain peaks and glacierscapes that have come to star in the country's tourism campaigns and film industry.

The extent and speed of the environmental transformation that has been achieved in Aotearoa/New Zealand is globally unprecedented (see, for instance, [Lockley 1980](#), p. 110; [New Zealand Government](#)

¹ I borrow the term "pastiche" from ([Fairburn 2006](#), p. 146).

2000; Park 2013). On one view, as Hursthouse makes plain, this is a story of pioneering zeal, resourcefulness, progress and advancement, an unfolding source of national pride and identity. European settlers undertook this work on the explicit understanding that they were founding a “new world” by grafting a better climate onto the place where they had arrived (see Boswell 2017). Yet, on another view, this settler activity sets about sowing death, degrading resources and reservoirs of knowledge, and “unmaking” a world (Rose 2013, p. 208)—that is, a place already inhabited by an indigenous population, and already understood in radically different terms: covered in boggy swamps and tangled forests, teeming with its own creatures, and woven through with regulatory practices and with understandings about the genealogical interrelationship of all elements within the lifeworld. As Hursthouse makes plain, too, this settler activity actively sets about *changing the climate in that place*. Acclimatisation works to import new species that are expected to adapt to living in a place where they have never before lived. In the process, however, the place itself is made to adapt through this action, such that its climate is forcibly altered. This is effected through and/or accompanied by drastic deforestation, alteration of the water table and the flow of waterways, displacement and decline of endemic species, re-organisation of predation chains and pollination sequences and so on, with the result that the entire biogeography of the place is destabilised. What is acclimatised, too, are foreign ways of life and modes of thinking, and the institutions—such as legal and educational systems, economic systems, universities, libraries, museums, zoos and so on—that have historically supported and embedded the very practices, conditions and worldviews that have fuelled anthropogenic climate change.

In a very real sense, the current-and-looming planet-wide climate crisis is a matter of air and soil and water temperatures, humidity, rainfall, greenhouse gas emissions and so on, and I do not seek to diminish or deny the relevant specialist observations and projections. Scientists report that mean annual temperatures in Aotearoa/New Zealand have risen by almost 1 °C since the year 1900 and they predict that nearly every aspect of the country’s terrestrial and marine-dependent ecosystems and biota stands to be affected by global climate change and increasing concentrations of atmospheric carbon dioxide (see Green and Clarkson 2005, pp. 42–43; McGlone and Walker 2011, pp. 5–6, 8). As a 2005 commissioned review of the New Zealand government’s *Biodiversity Strategy* explains,

The possible consequences of climate change for indigenous and valued introduced biodiversity are profound. This applies to all levels of biodiversity—genes, species and ecosystems—and to productive landscapes as well as indigenous ecosystems (Green and Clarkson 2005, p. 43).

Yet it is also apparent from the history outlined above that climate crisis has imaginative or ambient dimensions: it is to do with environments or atmospheres that enable certain kinds of things to upwell and flourish while preventing other kinds of things from upwelling and flourishing. In this sense, settler colonial places such as Aotearoa/New Zealand may be understood as global forerunners for the arrival of “an era in which human action has become a planetary force” (Rose 2013, p. 208). Anthropogenic environmental changes have already been visited in advanced and accelerated form in such places, which have been subject to deluge or flood in the form of European modes of life and knowledge systems that have swamped and attempted to sweep away those which already pertained in place.

This history of negative exceptionalism explains Aotearoa/New Zealand’s reticence in respect of linking biodiversity loss with climate crisis. First, the deliberate and vast-scale land use changes which have converted the country’s wetland forests into farmlands dedicated to industrialised agriculture have, quite uncomfortably, occurred at the same time as climate science has begun to identify problems with attendant deforestation, carbon dioxide release, greenhouse gas emissions and methane production. In this sense, Aotearoa/New Zealand is distinctly behind-the-curve, a latecomer to understanding the environmental peril for which its inaugurating activities and defining industries stand. And, second, because Aotearoa/New Zealand was founded in and through climate crisis, the consequences for biodiversity of what is yet-to-come might be expected to differ here. Across the globe, climate scientists

have begun modelling a range of forecast impacts. These encompass large-scale habitat disturbance, degradation, fragmentation and loss; changes to seasonal patterns of flowering, breeding, growth and migration; abundance, distribution and range reductions and shifts experienced by endemic fauna; the rise and spread of exotic organisms; increasing reliance on small, isolated reserves that are vulnerable to extreme weather events, fires, floods, high winds and outbreaks of disease; and, ultimately, disruptions to evolutionary trajectories which are set to produce cascading extinctions. What is striking is that this range of impacts *is already exceptionally well-established* in Aotearoa/New Zealand, where endemic biodiversity continues to reel from the disequilibrium caused by the settler colonial enterprise. Climate crisis is not a disastrous event waiting to happen in the future in this part of the world; rather, it has been with us for two centuries already (see [Rose 2013](#), p. 214). As Geoff Keey has observed, “[a]n underlying problem for New Zealand’s nature is that the resilience provided by landscape-scale ecosystems has been undermined by the dramatic changes people have made to the landscape” ([Keey 2016](#), p. 13). Keey notes that Aotearoa/New Zealand is not presently well-placed to protect its endemic biodiversity from projected forthcoming global climate disruption, which may well “be the tipping point between survival and oblivion for many of our vulnerable species” (*Ibid.*).

Moreover, it is apparent that the types of climate change mitigation measures being implemented in other parts of the globe are unlikely to benefit—and may in fact wreak further damage within—a lifeworld in Aotearoa/New Zealand which is already under colossal strain. As the authors of a recent report commissioned by the New Zealand Department of Conservation have noted,

While during the next 50 years climate change itself is a significant risk to [the country’s endemic] biodiversity, in the short term the risks associated with combating climate change (through carbon sequestration, carbon-neutral energy development, irrigation and land use intensification) are greater. Exotic forestry for carbon capture, and more hydroelectric installations and water abstraction, carry the greatest potential risk to biodiversity ([McGlone and Walker 2011](#), p. 5).

As these combined factors suggest, the extent of Aotearoa/New Zealand’s “exceptionalism” in respect of biodiversity–climate linkages is exceptional indeed, and there is little remaining tolerance for human-wrought error. The Aotearoa/New Zealand example cautions, too, that thinking-as-usual and action-as-usual in respect of climate crisis may need to be suspended. Environmental knowledges and practices that have arisen within the place—as distinct from those out-sourced or pastiched from elsewhere—are what seem to be most urgently required here. Indeed, to re-purpose Hursthouse’s observations, to turn towards place-based knowledges at this particular historical juncture might be to “un-swamp” in an imaginative or ambient sense (see [Boswell 2015](#); [Collinson and Boswell 2017](#)) and to return to the swamps—and the fertility of their miasma—in a practical one.

3. Climates of Knowledge

Among the peculiar endemic fauna for which Aotearoa/New Zealand has become famed, none is more ancient or unique than the tuatara. In tangible ways the crest formed by the twinned themes of absence and exceptionalism—outlined above—has shaped this creature’s niche in the western imagination. As one of the very oldest species on earth, tuatara have come to be recognised by western science as an evolutionary and biodiversity treasure, a breathing remnant “of remote periods of our earth” ([Sharell 1966](#), p. 15). In *The Animals of New Zealand* (1923), F. W. Hutton and James Drummond declare that “if ancient lineage, combined with unchanged habits, mark the aristocrat, [the tuatara] is the most aristocratic animal in the world” ([Hutton and Drummond 1923](#), p. 22). At the time when the tuatara was first encountered by Europeans and when it entered the written scientific record, however, the force of its exceptionalism was not immediately apparent.

From the time of James Cook’s arrival in Aotearoa/New Zealand in 1769, reports and rumoured sightings began to materialise in respect of a fearsome lizard which was said to inhabit the country. As a reptile that “had been struggling to free itself from the myths that surrounded it” ([Andrews 1986](#), p. 104),

the tuatara officially entered the European record in 1831 amid ongoing confusion. Upon receiving the first skull to be shipped to England, the zoologist John E. Gray, of the British Museum, named it *Sphaenodon*, meaning “wedge-toothed”, in reference to the appearance of its jaw. Despite its distinctive anatomy, the species was considered at this time to be “just another large lizard” (see [Lockley 1980](#), p. 93), and further specimens were erroneously re-classified by Gray eleven years later—such that the tuatara was known under two names and two descriptions for the next quarter century. The slow uptake of interest in the tuatara may also be attributable in part to western-world attitudes to reptiles—creatures that have tended to elicit “alarm and revulsion”, to be underestimated for the ecological roles they fulfil and the evolutionary histories they bespeak, to be reviled as “creeping things of the earth” and/or to be considered valuable primarily for their “afterlives” as collectors’ trophies or as leather-goods-in-the-making (see [Durrell 1966](#), p. 5; [Sharell 1966](#), pp. 11, 15–21; [Hutton and Drummond 1923](#), p. 22; [Alberti 2011](#)).

Yet, the tuatara sloughed off any such destined ignominy when it proved to be the only remaining species of its order. In 1867, Gray’s successor, Albert Günther, re-examined the tuatara and pronounced that it was not a lizard at all. As Richard Sharell has explained in his landmark study *The Tuatara, Lizards and Frogs of New Zealand*, Günther’s further research “resulted in the sensational finding that the tuatara’s skeleton differs from those of all other living reptiles, but is similar to those ancient reptiles, whose fossil remains were found in layers of rocks two hundred million years old” ([Sharell 1966](#), p. 25). Re-deploying a descriptor earlier bestowed by Richard Owen in 1842, Günther placed the tuatara and its long-dead relatives in a new order, *Rhynchocephalia* (meaning “beak-headed”), igniting a frenzy of scientific interest worldwide. Specifically, the tuatara was seen to afford opportunities for “astonished witnessing” (see [Sharell 1966](#), p. 42); that is, for “the excitement of having the chance to see, to study, to observe a true saurian of Mesozoic times in the flesh, still living, but only on this tiny speck of the earth, New Zealand, while all its ancestors, once spread over many parts of the world, died about one hundred and thirty-five million years ago” (*Ibid.*, p. 25).

As this history makes plain, the special status of the tuatara within the schemas of western science—and, specifically, its renown as a so-called “living fossil” (see [Sharell 1966](#), p. 25; [Lockley 1980](#), p. 93; [Andrews 1986](#), p. 104; [British Broadcasting Corporation 2016](#))—has been excavated only recently. And, moreover, this renown hinges on what western scientific traditions have perceived as the absence of this creature’s living genetic relatives, whose fossil remains have been unearthed in Europe, Africa, Madagascar, India, China and North and South America. Tuatara have, however, long held special status as a taonga or treasured species in Māori epistemologies, featuring in a range of creation stories where their ancestral descent lines are described by different climates and archaeologies of knowledge. In one tribal tradition, the first tuatara is said to have hatched from a clay egg created by a god who was the son of the earth mother and the sky father (see [Haami 2007](#)). In other traditions, tuatara are descended from Punga or from Peketua, the sons of Tangaroa who is the god of the sea (see [Waitangi Tribunal 2011](#), p. 134). In another tradition, recounted by Karanga te Kere, the origin of reptiles (including tuatara) is given as follows:

Lizards were in former times water animals and lived in the sea. They lived there together with the fishes, and the shark was the chief. They were together until a meeting took place at which it was decided which of the tribes should go on land, which at this time was not settled by animals [. . .] The lizards were told that if they went they would be thrown into the fire by man. But the lizards replied that they would frighten man by rearing up, staring and laughing at him; besides they could return to the sea whenever they wished. They told the sharks that they would also be caught by man, hung up, dried and pounded and placed on the fire (Quoted in [Sharell 1966](#), p. 58; see also [Haami 2007](#)).

As these traditions suggest, tuatara are recognised by Māori as ancient beings and as sources of erudition in respect of humans and their interactions with the lifeworld. It is clear that Māori have long been aware of the so-called “third eye” or pineal organ located on top of the tuatara’s skull, just under the skin, which has excited immense scientific interest and which is understood to have evolved as a

climate-sensing and thermo-regulatory gland. This vestigial eye—which enables the tuatara to monitor the degree of solar warmth and thus informs its activities, including sun-bathing—is not regarded by Māori as a quaint quirk of physiology. Rather, as the Waitangi Tribunal has noted, “[i]t is said by all of the tribes that the tuatara is a seer, able to see into the spiritual realm through a ‘third eye’ granted to it by Tangaroa” (Waitangi Tribunal 2011, p. 134).

While tuatara are not believed to have been a major human food source, surviving tribal legends—as well as midden deposits—indicate that they were eaten in occasional and ritualised ways: for ceremonial purposes, to demonstrate courage, and/or for the enhancement or gaining of knowledge (see Sharell 1966, pp. 58–59; Lockley 1980, p. 93; Andrews 1986, p. 34). Indeed, in line with their own highly tuned sensory skills and ability to accumulate knowledge from the environment, and, in line with Māori beliefs about the sacred nature of lizards more generally, tuatara have traditionally been revered and somewhat feared in Māori culture. Sharell notes that “[t]he tapu of a burial place, a *kumara* plot, a special tree or bird snares was often marked by a post on which a lizard was carved as a guardian” (Sharell 1966, p. 57). Tuatara also feature in carvings on poles and posts supporting the gables of meeting houses, as well as on doors and cross-beams, and on the “thwarts” of war canoes above the place reserved for the *tohunga* or priest (Ibid.). The safeguarding provided by tuatara was not merely symbolic, however. Because they are understood to possess access to spiritual realms, because they are relatively sedentary, because of their longevity, and because they are somewhat tame-able (that is, they recognise people readily and are sensitive to the presence of strangers), living tuatara have traditionally been stationed by Māori in the landscape. Such tuatara have been charged with protecting sacred places—such as *urupā* (burial grounds) and battle sites—as well as guarding food stores and the identified talismans that secure the health and vitality of forests, waterways and cultivations (see Hutton and Drummond 1923, p. 382; Haami 2007; Waitangi Tribunal 2011, p. 134).

As suggested by their role as *kaitiaki* (guardians) of environmental knowledges and keepers of difficult places, tuatara have played a key role in systems of social regulation. Surviving tribal traditions indicate that tuatara were deliberately transported within and across tribal territories in order to keep watch over activities such as harvesting and/or for the duty of guarding sacred sites (see Waitangi Tribunal 2011, p. 134). It is possible that they may have been transported dead as well as alive. For these reasons, it remains difficult to reconstruct the tuatara’s patterns of range and population density decline since the first Polynesian voyagers established tribal territories in Aotearoa/New Zealand. What is clear from the archaeological record is that tuatara were formerly abundant and widespread, with their bones unearthed in former swamplands, limestone caves, middens and sand dunes from Foveaux Strait to North Cape, and in inland sites far from their few remaining habitats.

While young hatchlings may occasionally be taken by hawks and are also vulnerable to predation by adults of their species, tuatara had no terrestrial predators prior to human arrival in Aotearoa/New Zealand. As early as 1843, Ernst Dieffenbach speculated in *Travels in New Zealand* about the declining population densities of tuatara, and about emergent forces of extinction that might have begun to strand this species on off-shore islands (see Dieffenbach 1843, p. 406). According to Sharell (1966, p. 30), European intervention in Aotearoa/New Zealand was the catalyst: “it is most probable that the disappearance of the tuatara on the mainland was due to men, and especially to his introduction of cats and dogs, weasels and pigs”, he proposes. Ronald M. Lockley, however, suggests that tuatara had been exterminated by three principal predators—“the Māori, his dog and the *kiore* rat”—in all mainland haunts by the time the first European settlers arrived at the beginning of the nineteenth century, adding that “[a]ny lingering individuals there would have been wiped out subsequently by feral dogs, cats, pigs, ferrets, stoats and weasels released by the Pakeha [i.e., European newcomers] or escaped from his ships” (Lockley 1980, p. 93).² The haze surrounding this timeline is amplified by

² While there is broad consensus that tuatara cannot survive in areas where European rats are present, commentators have disagreed as to whether tuatara can co-exist with *kiore*. See, for example, (Lockley 1980, p. 93; Gibbs 2008, p. 156).

the environmental “keeper” role bestowed upon tuatara by Māori—which may have coincided with or resulted from the observed dwindling of their populations and/or the emergence of new practices of kaitiakitanga or ecological guardianship arising from other significant pre-European extinction events in mainland Aotearoa/New Zealand (most notably that of the flightless giant moa). Indeed, it is possible that tuatara were deliberately translocated to off-shore islands by Māori for safekeeping and/or that they were stationed there to serve as the islands’ own keepers—or as keepers of other precious fauna sequestered there.

Drastic destruction of former tuatara habitat under the settler colonial regime from the early nineteenth century onwards has precluded any possibility that tuatara might re-establish habitations outside of captivity on the mainland. While unconfirmed sightings in the Wellington district were reported in the nineteenth century, tuatara currently survive only in actively managed—that is, monitored and pest-controlled—areas on scattered offshore islands, as well as in mainland zoo and sanctuary populations. As this confinement suggests, tuatara are functionally “extinct” in almost all of their former wild ranges. While tuatara are currently protected by the *New Zealand Wildlife Act 1953*, the known decline of the tuatara population and emergent understandings of this creature’s global significance prompted urgent calls for its protection as early as the 1890s. Notably, the conservation concerns voiced at this time and those governing the tuatara’s current protection pre-date emergent understandings of the global climate crisis and its looming threats to tuatara and to the remote island sanctuaries on which they depend. These threats foretell new horizons of astonished witnessing, and they raise the prospect that the spectre of tuatara being “thrown into the fire by man” and/or being exiled to return to the sea may yet come to pass.

4. Through the Third Eye

The Māori name bestowed upon tuatara—which may be translated as “peaks on the back”—fuses this species with the larger world of life, instantiating the workings of both an animate topography and what I have elsewhere termed an “anamorphic ecology” (see [Boswell 2018](#)). To encounter a tuatara in the flesh is to encounter a miniature mountain-range as well as to encounter a creature who ranges and keeps watch over mountainous terrains (not to mention hillsides, valleys, swamps, waterways, plains, rocky outcrops and so on). As conduits or mediums for place-based ecological knowledges, tuatara may be understood to focalise enigmatic timescales, to call forth diffracted modes of vision, and to have access—via their third eye—to realms of climate that are beyond human sensory perception. Tuatara are known, too, to be creatures of contrast and contradiction: while they are typically characterised as slow moving and sluggish, for instance, they can be astonishingly lively and brisk. Such conduits, contrasts, doublings and diffractions map onto larger patterns of life seen and described by tuatara. To consider temporality from the perspective of the tuatara, for instance, is to glimpse evolutionary timescales that are unimaginably drawn-out, yet also breathlessly and “frighteningly” fast (see [Rose et al. 2017](#), p. 9). Tuatara may, for example, be understood to exceed those startling claims made by the New Zealand government in its *Biodiversity Strategy*. The time of the tuatara begins far in advance of the 65-million-year period since the extinction of the dinosaurs, and it contracts inside the counterpointed century of human-wrought environmental destruction in Aotearoa/New Zealand—which is shorter than the average life expectancy of a single tuatara.

The tuatara has deservedly earned a reputation as a “venerable survivor” ([Cree 2014](#)), a “deep-time” climate-stayer and “battler” ([Gibbs 2008](#), pp. 155–57), and it is the planet’s oldest living witness to how life-in-place has unfolded to date. Because it has prevailed over millennia and across climatic epochs, the mournfulness and reproachfulness associated with the speed of its decline are acute. The tuatara has been both observer and casualty of the drastic settler colonial lifeworld reconstruction that has produced climatic upheavals viewable—from the tuatara’s perspective—as an accelerated form of “slow violence” ([Nixon 2011](#)). Because tuatara are very long lived—between 100 and 200 years by most estimates (see, for example, [Lockley 1980](#); [Sharell 1966](#); [Cree 2014](#))—the founding of Aotearoa/New Zealand as a modern nation and the unfolding of settler-wrought changes to its environment have

transpired over the course of the lives of perhaps just two tuatara (metaphorically, one might say, in the blink of a tuatara's eye). In this sense, the tuatara testifies to the compressed yet devastating timespan of European settlement and the conditions of embattlement imposed on endemic biodiversity as a result. In the remaining areas of Aotearoa/New Zealand where this species does now live (enclaved and in an enforced state of captivity), tuatara may in some cases be the oldest living inhabitants. Yet, because tuatara have largely been displaced and are now living in conditions radically unlike anything they have seen before, their deep knowledge of place is vulnerable to loss and threat; if the tuatara is a creature of long memory, this memory is at risk of elimination or erasure. Or, to put it another way, long and deep streams of place-based knowledge for which tuatara stand—and for which they stand guard (see [Waitangi Tribunal 2011](#), p. 303)—have been dis-articulated by these catastrophic environmental changes and are at risk of evaporation.

If tuatara expose acute difficulties in respect of the human-wrought climate change that has occurred in Aotearoa/New Zealand since the advent of European settlement, they also expose sensitivities in respect of the larger planet-wide anthropogenic climate crisis that is known to be underway. As ectotherms whose body temperature fluctuates in accordance with the environmental temperature and is heated by the sun, reptiles stand to be profoundly affected by global warming; climate is coming to be understood as a “potent” ecological factor for this class of creatures ([McGlone and Walker 2011](#), p. 23). For tuatara, however, the risks are compounded. As well as being dependent on—and sensitive to—ambient temperatures, tuatara are particularly vulnerable in respect of their breeding and reproductive patterns. As observed in research conducted on Takapourewa/Stephens Island, tuatara possess extremely low breeding rates; they take 15 years or more to reach sexual maturity and females lay eggs on average only once every four years (see [Gibbs 2008](#), p. 157). Soft-shelled tuatara eggs are laid in clutches of between one and 19 in a depression scooped in the ground, covered in a layer of soil, and left to develop over a period that can take anywhere from 12 to 15 months. The sex of the offspring is determined by the temperature at which the eggs are incubated: scientific studies have revealed that 21 °C is the pivotal point, with the ratio skewed towards males at soil temperatures above this level (see [Nelson et al. 2002](#); [Huey and Janzen 2008](#); [Mitchell et al. 2008](#); [Gibbs 2008](#), p. 157). As [McGlone and Walker](#) observe, “[r]esults of mechanistic modelling suggest that these particular sex ratios will increasingly tilt towards males due to rising temperatures until, with a mean temperature rise of 4 °C, all will be born male” ([McGlone and Walker 2011](#), p. 23). In other words, the atmospheric changes that are occurring as an integral aspect of global climate crisis have the direct potential to extinguish this most-ancient of faunal species. On its present course, with anything less than “rapid, aggressive action to reduce [greenhouse] emissions”, the planet is forecast to reach 4 °C warming or more by the end of the present century (see [Field 2010](#), p. 6)—or again, to put this in perspective, within the lifespan of a single tuatara.

Larger questions concerning the tuatara's previous adaptability—and the extent of its propensity for further adaptation—arise here. Due to its characterisation as a so-called “living fossil”, the tuatara has widely come to be perceived as an immobile relic: a static trace or embedded impression of former life. Scientific descriptions of tuatara have tended to hold that this creature is “conservative” and “primitive”, possessing an anatomical form that “has not changed much structurally since the Triassic Period of 200 million years ago” and standing as “a striking example of evolutionary stagnation” ([Sharell 1966](#), pp. 21, 70; [Lockley 1980](#), pp. 93–94). As recently as 2008, it has been suggested that the tuatara has “scarcely changed” during its long existence, and that this is a creature “for whom time seems to have stood still” (see [Gibbs 2008](#), pp. 59, 157). Yet, as the descendants of amphibians, reptiles as a class are known to have excelled in adaptation to life on land, and to have coped well as the swamps and forests of deep evolutionary time disappeared (see [Sharell 1966](#), p. 17). As suggested by [Karanga te Kere](#), this understanding is longstanding in Māori culture. In western scientific traditions, however, dawning recognition of the tuatara's capacity for change has only been floated since the 1960s; [Sharell](#) conceded at this time that findings arising from the study of the tuatara's anatomy and way of life cannot directly be applied to the other Rhynchocephalians because “our reptile may have

gone through many adaptations to the change of climate, environment and food habits during those millions of years of its survival" (Sharell 1966, p. 22).

Two key reasons have been proposed for the tuatara's endurance of the conditions that ultimately claimed the other species of its order. First, as Gibbs explains, the tuatara "probably owes its survival to the fact that its ancestors were isolated in New Zealand, away from the impacts of that burgeoning group of warm-blooded hunters, the mammals, which outcompeted or eliminated tuatara relatives elsewhere" (Gibbs 2008, p. 157; see also Lockley 1980, p. 94). And second, tuatara have demonstrated a high degree of success in specialising—that is, managing to adjust to a sufficient degree as successive glacial ages have seen the planet alternately warm and cool, and as the landmass that would eventually become the Aotearoa/New Zealand archipelago acquired its emergent topographies and its climatic and biotic contours. Tuatara are unusual amongst the world's reptiles in that they are nocturnal and cold-adapted; they have evolved to tolerate cool, damp and dark conditions. In so doing, they have developed a very low metabolic rate, making them the coldest blooded of all present-day reptiles. The tuatara has an especially low rate of heart-beat and body temperature and its growth is very slow; embryos take longer to develop "in-shell" than any other known vertebrate, and individual tuatara only increase in size, on average, by a few millimetres each year, with eggs, hatchlings and adults alike entering periods of hibernation or virtual hibernation during the New Zealand winter (see Sharell 1966, p. 33; Lockley 1980, p. 94; Cree 2014).

Over time, too, tuatara have shown demonstrable capacity for adaptation to new environments and new climates. On Takapourewa/Stephens Island, for instance, tuatara have come to live in close association—as burrow-mates—with a large population of petrels on whom they are partly predatory and with whom they are partly commensal. As Lockley explains,

Centuries of burrowing by these petrels [. . .] have enriched the soil with nitrogen and phosphate but bared much of the ground of low plant cover [. . .] and encouraged an abundant invertebrate fauna of scavenging insects, including wetas, crickets, beetles, worms, etc., as well as lizards. The Tuatara, living conveniently in or near the same burrow system, feeds on all these animals, but in addition takes the occasional petrel and young shearwater (Lockley 1980, p. 93; see also Sharell 1966, p. 30.).

On one view, it is possible that the tuatara has withstood periods of climatic upheaval and is presently clinging to life as a limit case for resilience—that is, as a "stoic" organism (Gibbs 2008, p. 156) already pushed to the extreme edges of its ambient tolerance and its capacity to specialise (or perhaps specialised in ways that will preclude ongoing change). On another view, in the wake of the initial shock of realisation about the climate-crisis-induced risk to tuatara, doubt has emerged about whether this threat "is real or not" (McGlone and Walker 2011, p. 23). It is undoubtedly the case that the tuatara lineage has survived warmer temperatures; until recently, as McGlone and Walker note, "tuatara thrived in Northland where mean summer temperatures are about 6 °C warmer than [on] the southern tuatara islands" (McGlone and Walker 2011, 23). As Gibbs has observed, too, tuatara have been flexible in the face of climate change in past epochs, coping, for instance, during the Pleistocene, "when climate change was the order of the day and many warm-adapted plants became extinct," and when "the ratio of females to males in the tuatara world must have been under some pressure" (Gibbs 2008, p. 157). For now, too, the planet's total tuatara population still numbers in the tens of thousands. Yet, as Caroline Wood has explained,

A major problem for our wildlife [. . .] is that they have so few options. Before humans arrived in New Zealand, nature had plenty of room to adapt to change. Tuatara populations, for instance, could move if temperatures were too warm or too cold in one place. Now they are restricted to a few small, pest-free locations because of predators and development (Wood 2016, p. 15.).

Moreover, the remote island locations in which remnant tuatara populations reside are themselves vulnerable to the effects of climate crisis: atmospheric and soil warming, dehydration, fire, inundation, cyclones, storm surges, the uncontrollable spread of pests and/or disease.

Amid ongoing uncertainty about the tuatara's future, one particular detail stands out. As an expression of its slowed metabolic rate, the tuatara has developed the ability to reduce its respiration to one breath per hour—an active breathing rate considerably lower than in any other vertebrate. To hold breath in the face of the unfolding climate crisis being experienced by tuatara, by their ancestral lifeworld and by the planet more largely is one kind of response: to wait and see; to hope; to conserve energy and “go slow” (Lockley 1980, p. 94); to “take each day as it comes” (Gibbs 2008, p. 157). In another sense, however, to reduce carbon dioxide output, as the tuatara has learned over millennia to do, is to know something in advance about the kinds of adaptations that will turn out to have been required, and to have acted on this knowledge.

5. Beyond Biodiversity

For the interwoven reasons detailed above, tuatara themselves may be understood as new arrivals on an alien planet. While they are recognised as time-travellers, tuatara are not typically characterised as rovers or itinerants; under their own steam, they have been observed to range no more than twenty metres or so from their burrows. Yet, tuatara are increasingly detached from their former homelands, with enlarged carbon footprints attached to their movements and lives. From the early period of European settlement in Aotearoa/New Zealand, tuatara began being shipped to the northern hemisphere in order to flesh out (and, quite literally, give flesh to) the collections of museums and zoos.³ From that time, too, tuatara became marooned in refuges within and around Aotearoa/New Zealand, and they began to be translocated to participate in breeding programmes, to establish insurance populations, to enhance the public profile of their species, as visitor draw cards, and so on.

To consider the strange institutional terrains where the tuatara now finds itself detained is to encounter a “border” (Chrulew 2017, p. 50) or threshold of developments in respect of climate change—and in respect of changing climates of knowledge. These may be sketched as follows:

- i. Whereas tuatara have conventionally served as environmental keepers and climate mediators, they are themselves now kept and mediated. Because of their necessary confinement, they are encountered by the public exclusively through the work of zoos and wildlife sanctuaries. Indeed, tuatara are especially useful ambassadors in respect of the current efforts of zoos and sanctuaries to explicate global climate crisis and forestall extinctions; the tuatara's ancient provenance and emergent precarity yoke these aims in incomparable ways.
- ii. Because of their unusual capacity to focalise timescales, tuatara expose and complicate the workings of zoos and sanctuaries as machineries of public memory. Typically, such institutions are conceived as spaces of “real-time” encounter: visitors expect to connect with living, breathing animals on display. Yet, the timescales of the zoo and sanctuary exceed such fleeting, shared moments. They encompass daily or quotidian routines of visiting, feeding and sleeping; the time of individual animals' reproductive and life cycles; the span of empires and nation states, as well as their associated geopolitical, zoological and bio-geographical histories and attendant environmental ideologies and management paradigms; and overarching timescales of evolution and extinction. As a slow mover and slow breather, an ancient-yet-threatened climate change survivor, a living embodiment of landscape, and a latter-day zoological “discovery” and zoo draftee, the tuatara can be seen to keep watch over this range of temporalities.
- iii. What is presently known about tuatara patterns of life has been gleaned from the study of captive individuals and populations—that is, from observations of tuatara adapting to

³ Such actions coincided with—and no doubt contributed in part to—the decline in remaining tuatara populations in Aotearoa/New Zealand.

conditions that may be far from unexceptional in respect of the lifespan of their species to date. Tuatara have recently come to know new things: their dietary, burrowing and nesting preferences must have changed in the last two centuries, for instance, as a result of introduced predators, habitat destruction, the encroachment of human settlements and agricultural land use, the decline and/or extinction of traditional food sources, the arrival and spread of new invertebrates, and so on. More recently, tuatara have had to adjust to new pressures associated with increasing population density; by 1980, for instance, numbers on Takapourewa/Stephens Island had reached 500 tuatara per hectare (see [Lockley 1980](#), p. 93). It remains unclear that tuatara have ever before lived in these kinds of concentrations—or, indeed, whether the tuatara’s present habit of sharing burrows with petrels is a longstanding pattern of life. As noted above, too, tuatara have been subject to nationwide and trans-hemispheric relocations: they have learned to live on ships and in terrariums; they are frequent flyers on aeroplanes; they have adjusted to new environments, new diets, and reversed diurnal and seasonal patterns. Within the confines of their present institutional environments, tuatara have also become subject to newly imposed restrictions on their activities. Because Takapourewa/Stephens Island also serves as the home of the world’s only remnant population of critically endangered Hamilton’s frogs (*Leiopelma hamiltoni*), for instance, an inner enclosure has been established on the island to prevent frog predation by tuatara.

- iv. The history of keeping tuatara in zoos has been fraught, both within and outside of Aotearoa/New Zealand. Mortality rates have been high, with tuatara life expectancy drastically reduced in conditions of captivity. Emergent understandings suggest that tuatara have tended to be kept too warm and to be over-fed on an imbalanced diet and/or to be susceptible to disease and accidents. In 2019, for instance, a sanctuary in Nelson discovered that its tuatara had been inadvertently poisoned through ingesting cockroaches which had consumed rat bait (see [Newman and Gooch 2019](#); [Bohny 2019](#)). Moreover, tuatara held in zoos tend to be subject to artificially stable climatic conditions which can forcibly induce growth and maturation; it is unclear that it is good for the health or the lifespan of tuatara to forego periods of torpor and hibernation each winter, for instance. In the long term, tuatara may be at risk of “immured naivety” under these circumstances (see [Chrulaw 2017](#), p. 50), becoming disconnected from their knowledges about days, seasons, chilly periods and sunny spells—climatic attunements that guide what to do, and when.
- v. Tuatara will now only be born in captivity, where they will be required to surrender agency in respect of their reproductive futures. Because of their status as a climate-vulnerable species, tuatara are becoming subject to what Thom van Dooren terms “the violent-care of captive life” ([Van Dooren 2014](#), pp. 87–122): husbandry decisions designed to regulate genetic variability and optimise resilience; incubation protocols including the use of plantings, shade cloth, refrigeration and/or heat lamps to control temperatures inside enclosures; population management measures such as the permanent quarantining of young hatchlings to prevent predation by adults, and the temporary evacuation of entire populations from island sanctuaries to permit pest-control measures and bring tuatara back into breeding condition (see [McGlone and Walker 2011](#), p. 23; [Cree 2014](#), pp. 157–58; [Cree 2014](#)). It is of especial concern that tuatara reproduction is—or has become—sporadic in captivity, and that tuatara have proven extremely difficult to breed in zoo environments. Despite valiant efforts by other zoos (see [Durrell 1966](#), pp. 5–6; [Sharell 1966](#), pp. 32, 34–35; [Lockley 1980](#), p. 94), Chester Zoo in England is the only institution to have successfully bred, hatched and raised tuatara progeny outside of Aotearoa/New Zealand—and this only occurred for the first time in 2015, after 38 years of painstaking labour by specialist keepers (see [Connor 2016](#); [British Broadcasting Corporation 2016](#)).
- vi. As captive subjects, tuatara are vulnerable to scientific exploitation and to the emergent frontiers of bio-prospecting. Representatives from Ngāti Koata, for instance, have raised concerns about inappropriate uses of tuatara DNA in light of their discovery that a proposal to take blood

samples from tuatara on Takapourewa/Stephens Island for the purposes of gene-mapping research had been approved by Aotearoa/New Zealand's Environmental Risk Management Authority without due consultation (see [Waitangi Tribunal 2011](#), p. 135).

This fast-forming institutional swamp poses a range of risks, not least of which is that intense protection of tuatara in zoos and sanctuaries may distance tuatara from Māori and accelerate the loss of remaining traditional ecological knowledges. In practice, however, very different shifts have been on the wind.

The role presently fulfilled by tuatara in communicating links between climate change and biodiversity decline has a remarkable point of origin, which reveals the pivotal role played by this species in the global history of the zoo. In 1868, in the immediate wake of his scientific discovery of the tuatara's global exceptionalism, Günther deposited a live tuatara in London Zoo, the world's pre-eminent zoological garden (see [Zoological Society of London 1871](#), p. 26). The archives of the Zoological Society of London reveal that more than a hundred live tuatara were subsequently acquisitioned by London Zoo during the late nineteenth century, and that the tuatara has the distinction of marking the transition of the zoo from imperial institution to the bastion of conservation during this period of sojourn; the first explicit mention of any conservation activity to be championed by London Zoo occurred in 1893 and was articulated in relation to the tuatara (see [Zoological Society of London 1893](#), pp. 5–6). Endorsing a world-leading proposal to set aside island sanctuaries for the general protection of Aotearoa/New Zealand's avifauna, the Society's council ventured "to suggest that, besides the native birds to be protected in these reserves, shelter should also be afforded to the remarkable Saurian, the Tuatera Lizard (*Sphenodon punctatus*), which is at present restricted to some small islands on the north coast of New Zealand" (Ibid., p. 6). Notably, the relevant discussions in the Society's records register stress applied to tuatara populations by human-wrought environmental changes in Aotearoa/New Zealand. In other words, this institutional watershed was prompted by the recognition of climate crisis in the settler south and its observed impacts on the world's most longstanding climate survivor.

On an ongoing basis, too, the tuatara is changing the landscape and climate of the zoo as an institution. These developments are articulated in and follow from *Ko Aotearoa Tēnei* (2011), the report published by the Waitangi Tribunal following its deliberations on the path-finding pan-tribal Wai 262 claim (commonly referred to as the "flora and fauna" claim). In dealing with the unfolding environmental and cultural legacies of settler colonialism in Aotearoa/New Zealand, the report features tuatara as a leading example of a taonga or treasured species whose captive management will require the ongoing development of new protocols (kaupapa). These include dedicated areas to be set aside for tuatara in zoos and sanctuaries; arrangements for kaumātua (elders) to accompany tuatara when they are translocated; pōwhiri (ceremonial welcome and blessing) for tuatara on arrival in new institutional homes; the provision of regular updates to the relevant tribal authorities about the welfare of tuatara in a zoo or sanctuary's care, and so on (see [Waitangi Tribunal 2011](#), p. 135). Tuatara are no longer able to be privately owned by zoos or sanctuaries. Rather, they are exchanged between iwi (tribal groups) in order to secure their ongoing connection to tribal territories, and in order to be eligible to host tuatara, institutions must establish working relationships with their local iwi. And, because tuatara are only ever on loan, "ex situ" individuals may be re-called at any time if a significant population within Aotearoa/New Zealand is threatened or lost (Ibid.). Moreover, research conducted on tuatara in captivity is to be approved, overseen and regulated by tribal authorities. As the report explains, "[i]t is clear that the claimants' spiritual relationship with the species, combined with the tuatara's rarity, and a high level of scientific interest in its unique physiology, creates an exceptional situation" (Ibid.).

In this sense, the management of tuatara increasingly requires cultural institutions to recognise the mana (authority and power) of tribal territories and indigenous knowledges and worldviews, and to reconsider what caring for "living heritage" might properly entail. Such changes are akin to the ground-breaking global developments in museum practice precipitated by the landmark *Te Māori* exhibition in the 1980s (see [Clifford 1988](#); [Karp and Lavine 1991](#)), which insisted on acknowledgement of the "live-ness" and genealogical animacy of artefacts held in collections. In the terms of a Māori

worldview, tuatara are ancestors, kin and kaitiaki (guardians), whose care calls forth a complexly woven landscape of social and environmental practices and institutions. These include whakapapa (genealogical connectedness of all living and non-living things), whanaungatanga (relationship, kinship, familial ties), kaitiakitanga (guardianship or stewardship), taonga (treasured possessions), mana (power, authority, prestige), tapu (understood both as sacredness and as taboo or restriction), mauri (life force) and wairua (spirit). The ridgeline of braided strands and peaks formed by such practices and institutions is not reducible to the western scientific concept of biodiversity, not least because it requires and regulates responsible human interaction with the world of life, and because it insists on expanded conceptions of vitality within this world—and who or what is “vital”. In striking ways, the upwelling that is apparent here evokes the tribal tradition recounted by Karenga te Kere: it is possible to see reptiles (“lizards”) making good on their suggestion that they might “frighten man by rearing up, staring and laughing at him” if they found themselves at risk of being thrown into the fire. At the same time as it “unmakes” the western scientific contention that it possesses no living relatives, the tuatara refuses the transference displacements that typify New Zealanders’ engagements with the endemic fauna of their country—pointing up the reductive and self-serving anthropocentrism of such identifications, and the extremity of the environmental campaigns in whose defence they are waged.

It remains unclear whether the tuatara-as-species will find a place as a case study in the climate crisis curriculum proposed for New Zealand schools. Yet, the tuatara offers a local story with profound and provident teachings, not least of which is the limited usefulness of “biodiversity” as a means of focalising understandings of and responses to climate crisis. As a term, biodiversity is a distancing one which seals “us” (humans) from “them” (everything else) (see Mathews 2016). It thus fails to perceive a lifeworld woven through with the workings of whakapapa (genealogical connections), whanaungatanga (familial relations), care, collectivity and reciprocal obligations—as well as the knowledges that are held or kept by other-than-human species and that may turn out to matter most. As Deborah Bird Rose has explained, the “we” of the Anthropocene includes nonhuman animals as well as human beings, and it includes plants, soils, oceans and atmosphere (Rose 2013, p. 207). Viewing climate crisis beyond the lens of biodiversity and focusing attention on time and place, knowledge and action, the tuatara asks us to think anew about kaitiakitanga (guardianship)—who or what will protect the lifeworld and its talismans of health—breath by breath, day by day, epoch by epoch. The tuatara emerges, too, as a keeper of newly difficult knowledges and places. Zoos and sanctuaries are the burial sites or battlegrounds or cultivations that it now protects; climate crisis is the tricky terrain over which it now stands guard.

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