PARA-WHENUA-MEA -MUDDY-SOIL-OF-MOTHER-EARTH. PERSONIFICATIONS OF WATER IN TE AO MĀORI (THE MĀORI WORLD).

NATALIE ROBERTSON

Māori elder Keri Kaa, of the tribes Ngāti Porou and Ngāti Kahungunu, wrote an *oriori* – a form of lullaby – that describes the original primordial parents Papatūānuku and Ranginui (Earth Mother and Sky Parent), and how everything in the heavens and everything on earth originated through this coupling.¹ Out of their separation emerged all forms of life, commencing with the elemental deities.

Oriori	Lullaby
Nāna ko Papatūānuku	Papatūān
Piri ai ki a Ranginui	Clung to I
Ka puta ki waho	And the f
ko te whānau atua	of gods
Te Tini te mano	came fort
Noho pōkaikaha ana	their mul
i te poho mātua	Crowded
Koinā tō tātai, e te tau e.	That is yo

Papatūānuku Clung to Ranginui And the family of gods came forth in their multitudes Crowded in the parental bosom That is your lineage. My beloved.

(Kahukiwa, Robyn; Potiki, Roma 1999)

Indigenous ways of thinking about the intricate interconnectedness of all life on earth and in the atmosphere offer vitally important whole-of-landscape and seascape

paradigms that could stimulate creative environmental reinvigoration and reparation internationally. Māori experience the world as a relational space-place matrix where all things in it are holistically connected through *whakapapa* – genealogies and kinship. For Māori biologist Mere Roberts, *whakapapa* is *»a philosophical construct* [that] *implies that all things have an origin (in the form of a primal ancestor from which they are descended), and that ontologically things come into being through the process of descent from an ancestor or ancestors«.* (Roberts, Mere 2013: 93) The kin from whom we descend are higher in the cosmological order than humans, thus favouring the agency of the higher-order beings over humans. Roberts draws attention to how *whakapapa* as a cognitive genealogical framework embraces multiple ontologies including the natural sciences and spiritual knowledge, describing this as providing a *»*cosmoscape« of a particular place, or habitat.

Cosmoscapes are a culture's overarching model of the scope of their cosmos, including the lived world. (Reichel, Elizabeth 2012: 136)² Māori cosmoscapes found in customary *whakapapa* genealogical chants embody whole-of-landscape and seascape thought illuminating ancestral connections with the natural world. I argue that these cosmoscapes embedded in *whakapapa* – a cognitive genealogical paradigm that connects us back to ancient ancestral deities – are as relevant today as they were in the previous millennium, and in fact can be a »repowering«³ strategy in environmental reinvigoration. In centring indigenous thought and reviving cultural knowledge, we can re-learn how to relate to non-human and more-than-human beings as our ancestors rather than as resources. In doing so, the human role of environmental custodianship takes on new possibilities.

As chief constituent of life, water in all its forms – liquid, solid, and gas – can be found in Māori mythopoetic narrations of genealogies. (Best, Elsdon 1921: 2) In these ecosystemic narrations, Māori personified water in its many forms – freshwater, saltwater, floodwater, oceans, rivers, streams, springs, hot springs, rain, hail, ice, snow, clouds, mist – with different names for each persona. This article unpacks significant philosophical connections with water as an ancestral phenomenon, and through introducing Para-whenua-mea – an *atua wāhine* (a female ancestral deity of water) – delves into an extract from a *moteatea* – a customary Māori genealogical chant from the Horouta tradition.

KI UTA KI TAL - FROM THE MOUNTAINS TO THE SEA

»Ko wai ko au, ko au ko wai – I am the water and the water is me.« This Māori aphorism reflects a general philosophical understanding of the relationship between people and water, in which specific waterways – especially rivers – are known as ancestors. Shifting from personal identity – »I am the water and the water is me« to ecological management, Harmsworth and Awatere outline the philosophy of »Ki uta ki tai – a whole-of-landscape approach [...] from the mountains to the sea«. (Harmsworth, Garth; Awatere, Shaun 2013: 275) Customarily within this whole-of-landscape framework, Māori do not see themselves as above or outside of the natural

world but as offspring who have responsibilities to care for the antecedent, parental phenomena. It reinforces another observation that connects our human birthing with the relationship with the land. When you were born your mother's waters broke, signalling the commencement of labour. Perhaps you took your time coming into the world, or perhaps you came in a rush. Either way, you came from a saline watery womb, from a body that was your whole world, housing you until that moment. Within a Māori world view, Papatūānuku is our Earth mother, she who feeds us with her breast waters – *Te Waiū* – and sustains us with all that she provides. Several homonyms communicate the significant philosophical connections that Māori perceive between the body and the land and water. As Jacinta Ruru – the pre-eminent scholar on the legal personality of water – states:

The link between land and water and humans is a common feature of the Māori language. For instance, iwi means both >tribe< and >bone<; hapū means both >subtribe< and >to be pregnant<, whānau means both >extended family< and >to give birth<; whenua means >land< and >afterbirth<; and wai means >water< but also >memory< and >who< (Williams 1971; Mead 2016). (Ruru, Jacinta 2018: 216)

Wai is a word for water common throughout the Pacific, and \bar{u} is a word for breast. Te Wai \bar{u} can refer to breastmilk, but it can also refer to rivers and vital waterways that sustain land and people. The cosmogonic birthing of the universe parallels our birthing, when we emerge from a place of watery darkness into a world of light. This knowledge is reflected in the common saying *»no wai koe? –* Whose waters do you



Te Mimi o Te Huinga puna wai and Kahikatea trees, Tikapa-a-Hinekopeka I. $\hfill N.$ Robertson, 2019

come from?« This question asks »Whose birth waters are you from?« This enquiry parallels a Māori understanding of the creation of the planet we live on, that land was born out of the saline oceans. It connects the concept of water with place and with birth. The waters of our birthing and the waters of our living are both sacred. Marei Apatu, Te Kaihautu (Chief Executive) for Te Taiwhenua o Heretaunga (a tribal Māori local authority for the Heretaunga region) explains a Māori way of understanding the body-earth-water relationship. He describes how *muriwaihou* (aquifers) are sacred because they resemble Papatūānuku's womb and amniotic fluid when she was carrying Rūaumoko (ancestral deity of earthquakes, volcanoes and seasons) at the time Ranginui (Sky Father) and Papatūānuku (Earth Mother) were split apart by their children. »*We liken it to a mother carrying a child* [...] *The crucial aspect of muriwaihou is that they act as the cleansers and purifiers of new life and energy.*«⁴ For example, a freshwater spring can be an exit place for the amniotic fluids of Papatūānuku from an aquifer deep below. These ancestral paradigms reveal ancient understandings of the sacred significance of the earthly female body and the value of water in Te Ao Māori.

PARA-WHENUA-MEA: MUDDY-SOIL-OF-MOTHER-EARTH. AND ANCESTRAL CONNECTIONS WITH WATER.

Māori cosmological chants communicate the relationality of the natural world often through demonstrating scientific knowledge of geology and biology. Used as a noun for floods, avalanches, and large waves, Parawhenua references the destructive action caused by natural events such as earthquakes. Parawhenua may also be a personal name.⁵ In Māori cosmogony, Para-whenua-mea (also rendered as Parawhenuamea) is a *wahine tīpuna*, an ancient feminine ancestor of the waters of earth – the springs, streams, and rivulets that run off the hills and mountains – that exist in relationship to rock.⁶ In most, but not all tribal *pūrakau* (narratives), Para-whenua-mea is a female born from the union of Tane (the male principle ancestral deity of the forests) and Hinetūparimaunga who is the female principle ancestral deity of mountains. Māori scholar Margaret Forster, of the tribes Rongomaiwāhine and Ngāti Kahungunu, states that »Parawhenuamea is referred to as water that springs forth from the land. Her name alludes to an understanding of the water cycle and the relationship between the sky, land, rivers and sea.« (Forster, Margaret 2019: 8). Forster goes on to show that ancestries associated with Para-whenua-mea link her »to natural features associated with river systems – cliffs and different types of rocks and stones«. (Ibid.)

In the Māori language, there are no third-person gendered personal pronouns. Instead, there is a singular form *ia*.⁷ Indeed, each human being, non-human being and more-than-human being is understood to incorporate male and female gender. The body has a masculine side *taha tane*, represented on the right-hand side of the body, and a feminine side *taha wahine*, represented on the left-hand side. Therefore, when recalling ancient knowledge, unless there are other clear indicators, the gender of an *atua* (ancestral deity) may be assigned according to the tribal region, the speaker, or the story content. Also, colonial ethnographers sometimes assumed that a heroic character was a male, as the pronoun did not indicate gender. Māori Scholar Aroha Yates-Smith (Te Arawa waka – canoe –), however, has become renowned for her work in responding to such interpretations and reviving stories of the female ancestral deities. Here, she brings to life the personhood of Para-whenua-mea:

Parawhenuamea emerged from her mother as pure (alluvial) spring waters. She then cascaded down the slopes of her mother, falling as a waterfall, then gliding across the surface of the plains. The term Parawhenuamea connotes fine grains of silt deposits rising up out of the ground with the water's force, and being carried along by the flow of the stream, merging with other streams to form large rivers, while depositing silt along the river banks. As Parawhenuamea approached the coastline, she saw the form of Kiwa, the ocean entity in the distance. Kiwa moved forward to embrace Parawhenuamea as she drew closer. Their bodies merged creating Hinemoana, the sea [...]« (Yates-Smith, Aroha 2019: 2)

This bringing alive of the persona of Para-whenua-mea illustrates the way Māori may refer to mountains, rivers and other natural phenomena by a personal name. The relationship between Para-whenua-mea and Rakahore – a deity of rocks – shows that, if it were not for rock, we would not have flowing water. *»E kore a Parawhenuamea e haere ki te kore a Rakahore.* (Mead, Hirini Moko; Groves, Neil 2001) The translation *»Parawhenuamea would not flow, if it were not for Rakahore*« describes the interconnectedness of particular elements while also demonstrating the intimate geological knowledge of Māori. In some genealogies, Para-whenua-mea is a mother to Rakahore, and in others a partner.

Para-whenua-mea is also a name found in *whakapapa* (ancestry) of the Waiapu River people, as the daughter of Ruawaipu, who came on the Kurahaupo *waka* (canoe), landing at Maraehara close to the present day Waiapu River Mouth. The use of a name that references an *atua* (deity) for a person could indicate a significant event of a great wave or a deluge or a flood at the time of her birth. This following customary cosmogonic chant reveals the richness and depth of understanding that Māori had of the world around them – their cosmoscape.

MUDDY-SOIL-OF-MOTHER-EARTH

This verse – part of a lengthier chant *He Oriori Mo Te Whakatahakiterangi* – comes from the *Moana* (Oceanic) people of the Horouta *waka* (canoe) who made landfall on the East Coast of Aotearoa/New Zealand. It offers another variation on the genealogy.

Ka noho Wai-nui, ka noho i a Rangi, Puta mai ki waho rā Moana-nui a Kiwa; Ka maringi kai raro ko Para-whenua-mea, Nā Moana-nui, ē, nā Moana-roa, ē. Nā Tu-i-te-repo, nā Tu-i-te-wao, Nā Tu-te-hemo-rere, nana Rangi-tahuri; Nāna te whitau, ka roia hei kaka, Ka mahana i ahau.

The Mighty-waters did abide with the Sky-father, And unto them was born the Great-ocean of Kiwa; Poured down here below was the Muddy-soil-of-Mother-Earth. Begotten, too, by the Mighty-ocean were the Open-seas, The Oozy-swamp, the Oozy-forest-swamp; Tu-te-hemo-rere begat Rangi-tahuri; She grew the flax from which the cloaks were woven That now keep me warm. (Ngata, Apirana 2006: 220-233)⁸

In this verse, the name Para-whenua-mea is translated by distinguished Māori literary scholar Pei Te Hurinui Jones (Ngāti Maniapoto) as the Muddy-soil-of-Mother-Earth. (Best, Elsdon 1923: 53-69) This female tutelary being can personify the liquid state of soil when mixed with water to become mud. Para-whenua-mea symbolises deluges, floods and huge waves such as tsunamis caused by earthquakes. In these forms, Para-whenua-mea is a powerful destructive, spirited, and potent force. The word *para* translates into English as sediment and *whenua* as land, while *mea* has multiple meanings such as thing or things. Collectively, these meanings suggest that Para-whenua-mea is an apt name also for liquefaction, the phenomenon when solid land becomes fluid after an earthquake. Yates-Smith's thinking infers another more bodily reading. According to H.W. Williams' Dictionary, the term *mea* can refer to the colour red, or reddish, in specific contexts. (Williams, Herbert W. 71975: 200)⁹ It forms part of the word *karamea*, or *kākaramea* for red ochre, or coloured with ochre. (Ibid.: 98) This could indicate the phenomenon of reddish earthy ochre colouring water. Yates-Smith offers her interpretation:

I sense a connection between Para-whenua-mea of Aotearoa and Pelehonuamea of Hawai'i, (one of our Hawaiki) not only because of their names but equally with their body fluids – Parawhenuamea's waters coursing down the slopes toward the moana [sea], and Pelehonuamea's red hot lava flowing down the upper slopes of her mauna [mountain] to the sea. Pele's mana and power are known throughout the world, while relatively few know Parawhenuamea – para referring to the alluvial deposits, whenua (land) and mea (an ancient term for red, rarely used today). (Yates-Smith 2019: 2)

Here, we can now understand more fully why in his translation Jones uses Muddysoil-of-Mother-Earth as his poetic interpretation rather than something more suggestive of clear mountain waters springing forth. These accumulative meanings reveal ancient Māori understandings of the very formation of the earth and waters.



Te Mimi o Te Huinga puna wai and Kahikatea trees, Tikapa-a-Hinekopeka II. (photo cropped) © N. Robertson, 2019.

WAI TAI - TIDAL WATERS / WAI MĀORI - FRESHWATERS

Māori scholar Te Ahukaramū Charles Royal (of Marutūahu, Ngāti Raukawa and Ngā Puhi tribal groupings) explains that all phenomena arise from at least two antecedent, parental phenomena, in a repeatable relationship with future beings, which through reciting genealogies builds up a picture of the phenomenal world. (Royal, Te Ahukaramū Charles 1998: 7) Critically, Royal asserts that whakapapa linking us to the origins of Mātauranga Māori (Māori knowledge) always return to Papatūānuku and Ranginui, the primordial parents Earth Mother and Sky Father. Anthropologist Elsdon Best notes that »in some Maori recitals Rangi is credited with having taken two beings to wife, Papa and Wainui-atea, representing the earth and the ocean«. (Best 1982: 299) The whakapapa (genealogy) that accompanies this cosmological moteatea commences with Wainui-atea (the Clear Mighty Waters) coupling with Rangi. This reproductive union resulted in the creation of Moana-nui, the mighty ocean, and Moana-roa, the open seas, then the intensely dark deep ocean, Moana-pōtango, and Moana-hakere, the gloomy sea. These characterising names for the vast seas arise out of seafaring cultures that had traversed the oceanic realm for millennia. The numerous terminologies for the sea, the ocean, the waves, indicate deep knowing of the maritime world. Tides, currents, rips, waves, breakers, rollers, whitecaps, seasprays were all named, following this system of reciting genealogies. For ancient Māori and Pacific peoples, the ocean was central to their world, a life-giving and life-taking realm to be respected as a parental phenomenon.

Wai-nui-atea is the progenitor of inland waters, rivers and swamps. (Ngata 2006: 231)¹⁰ This symbiotic primal relationship indicates the interdependency between rain and freshwater. The wetlands Tu-i-te-repo, Tu-i-te-wao and Tu-te-hemo-rere are then birthed out of the sea. These primeval parents precede the environmental atua such as Tanga-roa (ancestral deity of the sea) by many generations. From the swampy wetlands, Rangi-tahuri was born, the progenitor of the versatile *harakeke* (flax plants) from which *te whītau* (fibre) is extracted. Here, the author of this chant, Tupai Whakarongo Tarawhare, last priest of the house of learning Tokitoki in the Tūranga district, shifts the focus to his present-day moment and to the interdependent human relationship with the natural world creating a visual image that can be seen in the mind's eye, before returning to the immensity of the ocean realm. ¹¹

Within this cosmos, these atua – ancestral deities with influence over particular environmental domains – have agency above that of humans. Capable of great destruction and abundant creative forces, these energetic and dynamic natural beings are the parents to us human beings. This is a cosmological, whole-systems knowledge paradigm that accounts for the origins of life, as do environmental changes observed and recorded. It is a holistic approach that embraces interconnectivity with all things. In these times of anthropogenic ecological crises and the imminent collapse of whole systems, it is important to remember the ancient sacred understandings of the earthly female body and the value of water. Māori ancestral paradigms that developed out of their cosmoscapes – from the heavens to the deep oceans, from



Te Puna a Te Rangitauaki, Te Rimu. © N. Robertson, 2018.



Te Mimi o Te Huinga puna wai and Kahikatea trees III, Tikapa-a-Hinekopeka III. © N. Robertson, 2019.

the mountains to the sea – can offer ancient yet fresh ways of understanding these systems. For indigenous people, these whole-systems paradigms may assist in repowering our ancestral connections, while for others they may offer models that could cultivate creative environmental revitalisation and restitution internationally. For us all and all our relations, it is vital to care for the earth's waters that are the cleansers and purifiers of new life and energy.

NOTES

- The Kaa family tribal links embrace Ngāti Porou, Ngāti Hokopu, Te Whānau a Hunaara, Rongomaiwahine, Rakai-Paaka, and Kahungunu. The two primary tribal confederations of Ngāti Porou and Kahungunu provide overarching affiliations.
- 2. Bill Yidumduma Harney is credited with coining the term »cosmoscape«. I have sourced this definition from Reichel, Elizabeth (2012).
- 3. Māori constitutional lawyer Moana Jackson (Ngāti Kahungunu and Ngāti Porou) uses this term in preference to decolonisation in a Māori Television Service interview with Moana Maniapoto on »Te Ao with Moana: Ihumātao – >Don't forget, the Crown caused this problems, Moana Jackson.« Cf. Maniapoto, Moana (2019).
- 4. Marei Apatu Te Kaihautu (Chief Executive) for Te Taiwhenua o Heretaunga (a tribal Māori local authority for the Heretaunga region) in »Aquifers likened to mother's womb« reported by Ruby Harfield. In: Hawke's Bay Today. https://www.nzherald.co.nz/hawkesbay-today/news/article.cfm?c_id=1503462&objectid=11901240 Accessed on: August 12, 2017.
- 5. Cross-referencing several dictionaries, the online Te Aka Dictionary gives a comprehensive explanation. https://maoridictionary.co.nz.
- 6. Te Ihorangi personifies rain, while Para-whenua-mea is the origin and personification of the waters of the earth. The former was one of the primal offspring, but the latter, a female, was one of the daughters of Tane by Hine-tu-pari-maunga, the Mountain Maid; hence the streams seen descending from the great ranges. The offspring of Para-whenua-mea (water) was Rakahore, who represents rock, and who took to wife Hine-uku-rangi, the Clay Maid, and produced the personified forms of stones, such as Hine-tuakirikiri (Gravel Maid), and Hine-tuahoanga (Sandstone Maid), Hine-tauira (a form of flint), and many others. Another of the family was Tuamatua, who took to wife Waipakihi (Shoal Water), and begat different forms of stones, and sand. Para-whenua-mea was taken to wife by Kiwa, guardian of the ocean, which is known as the Great Ocean of Kiwa. But the ocean is personified in one Hine-moana (Ocean Maid). (Best, Elsdon 1921: 5)
- 7. https://kupu.maori.nz/more/pronouns
- Waiata 234. HE ORIORI MO TE WHAKATAHA-KI-TE-RANGI. Na Tupai (Te Whanau a Kai, Turanga). Na H. Te Kani Te Ua nga kupu, nga whakamarama, na Henare Ruru etahi o nga whakamarama.

Song 234. – A LULLABY FOR TE WHAKATAHA-KI-TE-RANGI. By Tupai (Te Whanau a Kai, Turanga). Text and explanations by H. Te Kani Te Ua. Some explanations by Henare Ruru. Cf. Ngata, A. (2006). 220-233.

- 9. Mea (ii), a. Red, reddish. Ka huki kei waho, te ata mea. (S). Cf. Williams, H. W. (⁷1975).
- 10. Song 234. Cf. Ngata, A. (2006).
- The full name of the author of the lullaby was Tupai Whakarongo Tarawhare, last priest of the house of learning Tokitoki. On the arrival of christianity, the altar from Tokitoki was taken to Waerenga-a-hika. Cf. Te Ua, Te Kani (1932).

REFERENCES

- Best E. (1921). The Māori Genius for Personification; with illustrations of Māori Mentality. *The Transactions and Proceedings of the Royal Society*, Volume 53.
- Best E. (1923). Māori Personifications. Anthropogeny, Solar Myths And Phallic Symbolism: As Exemplified In The Demiurgic Concepts Of Tane And Tiki. *The Journal of the Polynesian Society*, June 1923, 32(2) (126):53-69.
- Best E. (1976). Māori Religion and Mythology Part 1. Wellington: Government Printer http://nzetc.victoria.ac.nz/tm/scholarly/tei-Bes01Reli.html Accessed on: January 15, 2019.
- Best E. (1982). Māori Religion and Mythology Part 2. Te Papa Press. Wellington: Government Printer as: Māori Religion and Mythology: Being an Account of the Cosmogony, Anthropogeny, Religious Beliefs and Rites, Magic and Folk Lore of the Māori Folk of New Zealand.
- Forster M. (2019). Restoring the Feminine of Indigenous Environmental Thought. *Genealogy*, 3(1):11. https://doi.org/10.3390/genealogy3010011 Accessed on: August 25, 2019
- Harfield R. (2017). Aquifers likened to mother's womb. Hawke's Bay Today. August 12, 2017, 12:00 p.m. https://www.nzherald.co.nz/hawkes-bay-today/news/article.cfm?c_ id=1503462&objectid=11901240 Accessed on: August 25, 2019.
- Harmsworth G; Awatere S. (2013). Indigenous Māori Knowledge And Perspectives Of Ecosystems. Ecosystem services in New Zealand – conditions and trends. *Manaaki* Whenua Press, Lincoln, New Zealand. 274-286.
- Kahukiwa R; Potiki R. (1999). Oriori. A Māori Child is Born From Conception to Birth. Auckland: Tandem Press.
- Maniapoto M. (2019). Te Ao with Moana: Ihumātao ->Don't forget, the Crown caused this problem, Moana Jackson. Māori Television Service interview. https://teaomaori.news/ ihumatao-dont-forget-crown-caused-problem-moana-jackson Accessed on July 30, 2019.
- Mead H.M.; Groves N. (2001). Ngā Pepeha o ngā Tipuna The sayings of the ancestors.
 Wellington: Victoria University Press. 135:30.
- Moorfield J.C. (³2011). Te Aka Māori-English, English-Māori dictionary and index. Auckland, New Zealand: Pearson.
- Ngata A. (2006). Nga moteatea: he maramara rere no nga waka maha The songs: scattered pieces from many canoe areas. In: Ngata, A. (ed.) Nga Mōteatea – The Songs.
 Vol. 3. Polynesian Society. Auckland, New Zealand: Auckland University Press.
- Roberts M. (2013). Ways of Seeing: Whakapapa. Sites: A Journal of Social Anthropology and Cultural Studies 10(1):93. http://dx.doi.org/10.11157/sites-vol10iss1id236 Accessed on: August 25, 2019.
- Reichel E. (2012). The landscape in the cosmoscape. In: Pungetti, Gloria; Oviedo, Gonzalo; Hooke, Della (eds.) Sacred Species and Sites: Advances in Biocultural Conservation.
 Cambridge, UK: Cambridge University Press.
- Royal Te Ahukaramū Charles (1998). Mātauranga Māori Paradigms and Politics. Paper presented to the Ministry for Research, Science and Technology.
- Ruru J. (2018). Listening to Papatūānuku: a call to reform water law. Journal Of The Royal Society Of New Zealand 2018, (48) 2-3:215-224. https://doi.org/10.1080/03036758.2018.1442358 Accessed on: August 25, 2019.
- Te Kani Te Ua (1932). Spiritualism and Māori Beliefs: The Lore of the Whare Wananga:
 Pre-Pakeha Life in Poverty Bay. In: *Echoes of the Pa: Proceedings of the Tairawhiti Māori* Association, Gisborne: Gisborne Publishing Co.
- Williams H.W. (⁷1975). A Dictionary of the Māori Language. Wellington, New Zealand:
 A. R. Shearer, Government Printer.
- Yates-Smith A. (2019). E Hina e! E Hine e! Exploring Akua/Atua ancestral ties across Ka Moananuiākea/Te Moana-nui-a-Kiwa. Presented with Dr. Nālani Wilson-Hokowhitu at He Au Honua: Indigenous Research Conference, Maui, Hawai'i, March 22, 2019. Notes from an unpublished paper by Dr. Aroha Yates-Smith, in author's possession.