

## ‘PUT THE LIME IN THE COCONUT’

The rise and decline of lime juice in the Cook Islands, c. 1850s–1930

Judith A. Bennett

University of Otago

### *Abstract*

Lime juice appears as an export from the Cook Islands in the 1860s and continued to be produced in quantity into the 1910s but then is all but gone. The main destination of the juice was New Zealand. Here it was on-sold mainly from Auckland to sailing ships and certain institutions to be part of the daily diet of crews, passengers and inmates in the belief it would be an effective antiscorbutic. By the turn of the century, the demand lessened due to steam ships being used for long distance travel, virtually removing all threat of scurvy. By the late 1900s the British mercantile marine abandoned its use. In the late 1910s a body of evidence indicated lime juice was inferior in comparison to lemon and orange juice as an antiscorbutic, so the demand continued to decline helped by the British navy’s abandoning the lime juice ration in the 1920s. In New Zealand, Cook Islands’ lime juice was often still used in cordials and aerated drinks as well as cosmetics until less expensive sources sealed its decline by 1920.

### *Keywords*

Limes, coconut, copra, scurvy, shipping

I have recently been working on a history of coconut commodities in the Pacific. While researching this in regard to the Cook Islands I noticed that for some decades from about 1850 lime juice featured as a regular export to New Zealand, often along with copra on the same ships. I wondered who in New Zealand wanted gallons of lime juice and why. So, I started to examine this more closely and how limes, a non-native species, came to be important in the Cook Islands. By the early twentieth century the prominence of lime juice fades and it has largely been forgotten as a significant island export and commodity. So, what is its narrative and why did it decline?

While coconuts were largely native or introduced to the tropical islands by the first Pacific settlers, citrus fruits were not part of the Indigenous peoples’ register of flora. Once Westerners came to Oceania seeking products from the sea and land as well as land itself, they quickly introduced new food crops, many of which were readily accepted and grown by the Indigenous people. Several, such as papaya, pineapples, citrus fruits, mango, coffee, beans, corn or maize, arrowroot, tapioca and avocado may be considered naturalised. Missionaries of the London Missionary Society (LMS) brought most of these to the Cook Islands. Perhaps the most surprising missionary introduction in the 1830s was the sweet potato (*Ipomoea batatas*), given that archaeologists have found ancient pre-European sweet potato (*kumara*) in on Mangaia, Rarotonga’s nearest neighbour (Hather and Kirch, 1991: 887–93). The Rarotongan people strongly resisted the entreaties of the LMS missionaries to cultivate what was to them a new plant.<sup>1</sup> The missionaries had to convince the people of its worth by a demonstration garden. Once that crop matured, the people planted “hundreds of acres” of *kumara*, which soon became a popular trade item with visiting whaling ships (Buzacott, 1866: 90–91).

Between 1828 and 1857, missionaries had brought to the scattered Cook Islands most of these novel foods, including oranges and limes. After witnessing a severe famine in 1831 in the wake of a devastating cyclone, the missionaries believed some these new foods could be preserved and thus better feed the people of the Cook Islands in such hard times (Buzacott, 1866: 84–91, 240–241). The limes probably came from the pioneer LMS mission base in Tahiti where lime seeds had been

introduced by the English explorers, Samuel Wallis with the second mate, John Gore on the *Dolphin* in 1767 and by several plantings by Joseph Banks in 1769 with seeds from Rio de Janeiro, Brazil, a Portuguese colony (Beaglehole, 1922: xcv, Hooker, 1896: 107). One introduced lime to the Cook Islands has been identified as *Citrus aurantifolia*, quite aromatic, but not greatly cultivated. The more common Tahitian lime (*Citrus latifolia*) is believed to have originated in Persia and thence to the Mediterranean region, and is considered to be a hybrid of West Indian lime (*Citrus aurantifolia*) and citron (*Citrus medica*) (Morton, 1987: 172–175).<sup>2</sup>

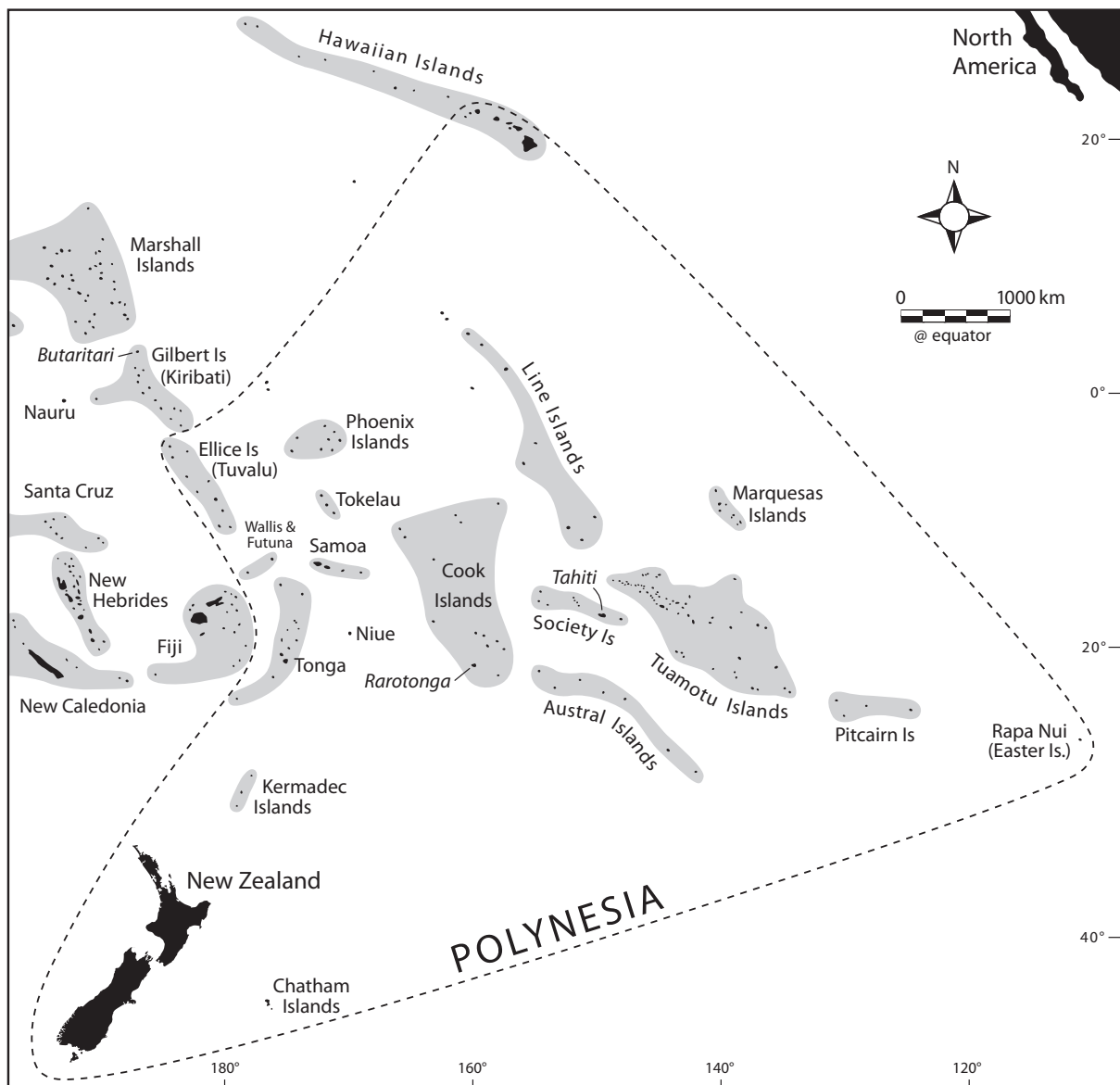


Figure 1: Polynesia

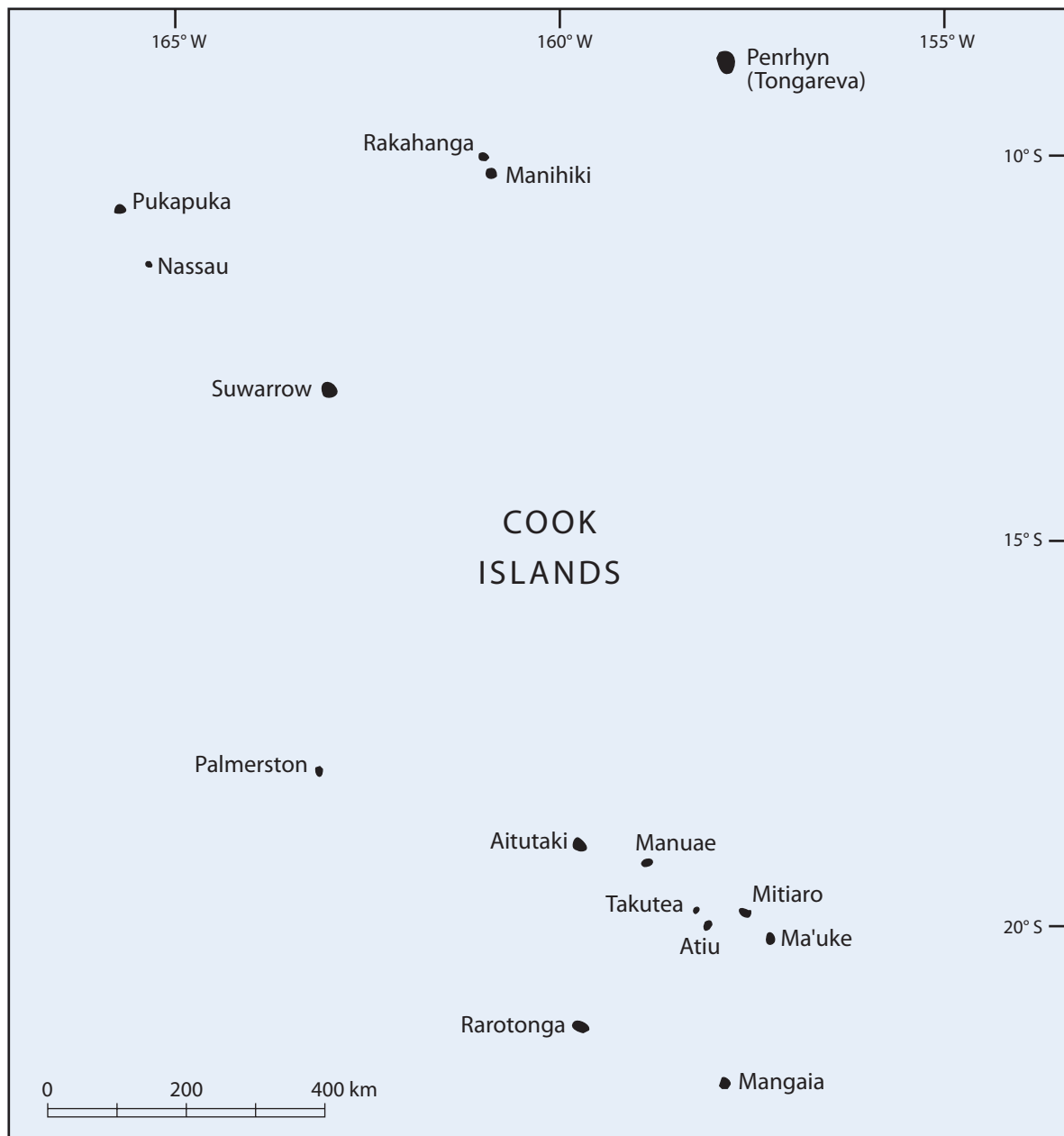


Figure 2: Cook Islands

The Christian message of both the Indigenous and foreign missionaries brought peace among warring factions within each of the Cook Islands (Maretu, 1983; Lamont, 1896). This plus supplies of an expanded variety of fresh food, along with potable water and the hope of female hospitality brought whalers to the Cook Islands, particularly Rarotonga, the biggest island. Whaling captains and crew understood that fresh fruit and vegetables, including coconuts, prevented or indeed cured scurvy although none knew that it was a disease that resulted from lack of vitamin C, since the

presence and action of vitamins was not discovered until the early twentieth century. Once away from a port for a few weeks, regular shipboard rations were deficient in this (Sterndale, 1874:16; Busch and Busch, 1995: 163–172).<sup>3</sup> If sailors lacked the vitamin for one to three months they began to bleed at the gums, soon the skin haemorrhaged, bones broke easily and they suffered great pain, sometimes disordered mental states, and simply could not work. By about the third or fourth month or even earlier, they died. Even if quite ill, once the sick had food containing the vitamin, recovery was usually rapid (Wolbach, 1937:10).

## In the limelight

The tortuous and haphazard story of adoption of regular fresh food and vegetables by European navies and sea captains to prevent scurvy is a long one dating from the sixteenth century and the use of lemon juice by the ships of the British East India company in the 1600s to James Lind’s experimental work in the mid-eighteenth century (Carpenter, 1986; Lind, 1772). Yet even then, there were relatively few early adopters and many dead ends in what then constituted experimentation and complete proof of concept. Explorer James Cook in the Pacific followed Lind’s advice re fresh food and a regular diet for ship’s crew as well as clean quarters with marked success. In 1795, fifty years on from Lind’s research and spurred on by the dynamic naval physician, Sir Gilbert Blane, the British Navy made citrus juice its regular daily antiscorbutic, mainly lemon juice mixed with rum, water and sugar, known as “grog” (Williams, 2013: 37–45; Price, 2017; Pack, 1995: 23–24). The British merchant marine, however, was slower to adopt this practice though the Merchant Shipping Act of 1854 stated that lime juice had to be part of the provisions for seamen. Under the 1855 Passengers Act, vital in an age of mass emigration by sail from the British Isles to the Australasian colonies, the amount of provisions for passengers was highly regulated with lime juice being given to each passenger at the rate of one gill (118.29 millilitres) a week (*Colonisation Circular*, 1857).<sup>4</sup> Limes from became preferred to lemons because Britain from the 1860s found not only a relatively cheap but also reliable supply in its colonies in the West Indies where British entrepreneurs invested in it in the face of the failing sugar industry (Small, 2009: 309; Fergus, 1982:10–18). The

British government amended the Merchant Shipping Act in 1867 to tighten controls for quality as well as for the supervised administration of one ounce of lime or lemon juice daily which would be 8.5 mg of vitamin C, well below today’s recommended minimum daily dose which is 65 mg for an adult female to 90 mg for a male (Boyd, 1876:198, 503). Other ships’ foods such as sauerkraut and potatoes, rich in the vitamin, could make up the dose, though the latter often rotted because of poor storage.

As with most regulations sailors found a way to comment wryly on the dictates of the Board of Trade that pertained in British colonies. Said to have originated from American ridicule of British seamen as “Limeys”, a popular song was ‘The Limejuice Ship’:

*Now, if you want a merchant ship to sail the sea at large  
We'll not have any trouble if ye have a good discharge,  
Signed by the Board o' Trade an' ev'rything exact,  
For there's nothin' done on a Limejuice ship contrary to the Act.*

*Chorus:  
So haul, boys, yer weather main brace an' ease a-way yer lee  
Hoist jibs an' tops'ls lads an' let the ship go free,  
Hurrah, boys, hurrah! We'll sing this Jubilee,  
Damn and bugger the Navy, boys, A merchant ship for me!*

*Now when ye join a merchant ship ye'll hear yer Articles read.  
They'll tell ye of yer beef an' pork, yer butter an' yer bread,  
Yer sugar, tea an' coffee, boys, yer peas an' beans exact,  
Yer limejuice an' vinegar, boys, according to the Act  
(Hugill, 1994: n.p.)*

Lime juice was to be supplied by the captain to all aboard, including passengers (Cook, 2004: 224–229). Generally, sailing ships from Europe to New Zealand via Cape of Good Hope would take

around three to four months to make the voyage with a similar time to return via Cape Horn to Europe. Each journey, when unbroken by port calls, had time enough for scurvy to strike if people lacked fresh food that contained vitamin C. Most voyages of migrant carriers did stop off at some intermediate ports. Even so, emigrants who came in from Scotland to Dunedin, New Zealand for example, were conscious of their need and right for good provisions on the barque *Vectis* in 1864 when they complained to the magistrate’s court regarding the rations issued by Captain McCaskell, including lack of lime juice for six weeks (*Otago Daily Times*, 6 May 1864, 4; New Zealand migrant ships, 1861–1875). For all that, poor preparation and length of storage often reduced the vitamin value of this antiscorbutic.

## The Cook Islands and New Zealand

Thus the exigencies of long distance travel, whether for navies, mercantile marine, or passenger carriers, all created a demand for lime juice, the fresher the better. Chemists and druggists, such as Sharland and Co in Auckland, filtered the lime juice from the islands so that it was ‘perfectly clear and with its pristine taste’ (*New Zealand Herald*, 16 Jan. 1892, 3). Institutions including hospitals also frequently sought tenders for supply of lime juice for patients (*Press*, 6 June 1864, 1; *Otago Daily Times*, 23 December 1861, 7; 18 March 1862, 7). For several decades, the common opinion was that in its antiscorbutic properties, lime juice was as effective as lemon juice although later research in 1910s showed lemon juice was far superior (Carpenter, 1986: 184–186). In New Zealand, though lime juice was on sold to ship’s suppliers, domestic demand too was strong. It found a wide market particularly in cordials, since sugar enhanced flavour. Local New Zealand manufacturers sold bottled carbonated or aerated drinks as well as tonics based on lime juice, some mentioning its origin as Rarotonga in their advertising (*New Zealand Herald*, 4 November 1864, 7; 23 December 1865, 9; 18 February 1875, 8; 11 August 1875, 2; 27 January 1886, 7; 16 April 1886, 7; 20 January 1910, 2; 27 January 1919, 9; *Otago Daily Times*, 10 February 1874, 2; 4 January 1875, 4; *Evening Post*, 23 December 1889, 5; 27 September 1870, 4; 4 January 1881, 1; 8 February 1881, 1; 26 January 1892, 4; *Auckland Star*, 21 December 1886, 4; 27 January 1900, 8; 30 May 1900, 7; 3 December 1910,

22). Cosmetic uses also appeared in hair pomades and skin cleansers (*Evening Post*, 12 January 1866, 4; 23 February 1870, 4; *Otago Daily Times*, 6 January 1875, 6; 21 February 1881, 4). Yet for all its significance in the age of sail, lime juice, mainly supplied from the Cook Islands to New Zealand rates little, if any mention in the standard historical accounts of the group (Ross, 1964; Ross, 1969; Crocombe, 1987; Gilson, 1980:158; Scott, 1991:40) and citrus industry surveys (Johnston, 1951:121–138).

Until the late 1840s, the Cook Islands’ district chiefs, the *ariki*, restricted settlement by foreigners, except for missionaries. The *ariki* also set up market houses and controlled trade relations, particularly policing whalers looking for female company. Excluding LMS missionaries, foreigners were not allowed to stay for any length of time. By the early 1860s, however, growing fear of French annexation plus the decline of the whaling barter trade saw easier conditions for overseas traders and *ariki* petitions for British annexation, which Britain declined (Gilson, 1980: 43–44). Meanwhile, Polynesians in the Cook Islands and beyond soon found uses for the lime. Limes had entered the local cuisine as *Ika mata*, raw fish marinated in lime juice for a few hours and served in coconut cream. Along with the “water” from the young coconut it is probable that Cook Islanders, given their love of sugar, used lime juice, water and sugar to make a refreshing drink, particularly after the missionaries discouraged kava consumption and later “bush beer” made from oranges. In some places the women used limes to lighten their hair, the bleaching giving it a reddish or golden look (Grimshaw, 1907: 257).<sup>5</sup>

The first recorded export cargoes of lime juice came to New Zealand from Tahiti and soon Rarotonga along with coconut oil in the early 1850s. Most oil was for re-export to Europe, mainly for soap and candle making (*New Zealander*, 22 June 1850, 2; 31 May 1851, 2). By the 1860s, the demand for lime juice as well as other tropical fruit expanded and was met by imports from the “South Seas” including the Cook Islands, mainly Rarotonga. Lime juice was sold in Auckland for between a shilling (1s) to a shilling and eight pence (1s 8d) a gallon (4.55 litres), a price range that remained constant for some years.<sup>6</sup> Almost every ship from the islands carried casks, kegs, barrels (all



of unspecified volume and size) as well as a mix of hogsheads, tuns, tons and gallons of lime juice, making exact statistics beyond counting at least until the mid 1880s. Even so, the *ariki* and eleven White settlers in 1865 calculated that 20 tons (18.14 tonnes) of lime juice was being exported from Rarotonga annually (Gilson, 1980: 43).

Among the exports from the Cook Islands, coconut oil gradually gave way to copra—the dried kernel of the mature coconut. Easier to transport and less likely to become rancid than island-made oil, the copra went to crushers in Britain or European ports such as Bremen or Marseille. There, the oil was extracted and the residue sold as cattle feed, useful in the northern winters. Copra-making was first introduced to Samoa in the late 1860s and then spread among and by German traders, mainly working for Godeffroy and Son. In the Cook Islands, the first copra exports were in 1875, its slower uptake perhaps a reflection of the absence of major German traders there. (Kelly, 1884: 54).

Traders had begun to be interested in the products of the Cook Islands in the 1860s, often combining a voyage to Tahiti to fill their ships with a mixture of coconut products, fruit, including lime juice as well as oranges, pearl shell, cotton, coffee, arrowroot and odd cargoes of *bêche-de-mer* or any other item than might find a market. As early as 1862, Auckland merchants and agents began to appreciate this. In the monthly survey of trading in Auckland, a commentator noted,

*An interesting commercial feature has during the last year or two sprung up—the trade in fruit between the islands and the Pacific... there is little doubt but that when it is once known that a regular market is established here the cultivation of these fruits will be largely entered into in these islands (New Zealander, 5 August 1862, 6).*

As traders settled in the Cook Islands they collected cargoes which they either shipped themselves or acted as agents for Auckland-based businesses. Some, by the late 1860s, were able to lease or buy plots for cultivation (Gilson, 1980: 44). This in turn increased exports. Some chiefly Cook Islanders

also became involved in shipping. Cook Islanders had already interacted with their distant kin in New Zealand. In 1863, visiting New Zealand Māori chief Paul (Paora) Tuhaere of Hauraki, accompanied the *ariki* Kanuka of Rarotonga and nineteen kinsmen on the *Victoria*’s voyage from Rarotonga to Auckland, accompanying their produce, and learning much about the way goods were offered in public auction. And several of those Māori youths brought home Rarotongan wives (*New Zealander*, 23 May 1863, 3; 6, 30 May 1863, 9; 9 June 1863, 2; *Waka Maori*, 27 June 1863, np; 25 July 1863, np; Kelly, 1884: 52).

The number of ships coming from the Cook Islands to Auckland increased during the 1860s except when cyclones struck Rarotonga, the largest and most productive island. Cyclones stripped the vegetation of fruit and leaves and often deposited salt water on land, so crops largely failed or went rotten. The severe cyclone of 1831 had seen “hundreds” die from ensuing starvation on Rarotonga (Buzacott, 1886: 84–97). Cyclones usually occurred from December to April, so fewer ships frequented the seas at this time, well reflected in the shipping columns of New Zealand newspapers. Moreover, the most productive southern Cook Islands were more prone to cyclones than their northern neighbours, which were all small atolls. In 1866 and 1867 cyclones hit respectively Mangaia and Rarotonga in the southern group. Waves as high as 25 feet (7.62 metres) swept over parts of Rarotonga’s coast. Thus there were fewer or no exports reported from the Cook Islands to New Zealand in such years (de Scally, 2008: 443–59; *New Zealand Herald*, 27 May 1867, 4).

In spite of these challenges, traders had begun to set up stores in the islands, usually on Rarotonga to barter for or sell goods. By 1880, Auckland-based traders, Donald and Edenborough opened trade on Rarotonga where their business and shipping flourished (Donald, biography, np). Their trade was substantial with Auckland, to the extent they proffered this as a reason for the Auckland Harbour Board to reduce tariffs on their island lime juice and other products.<sup>7</sup> Other traders were also active. A sea captain, George Trayte who had traded among the islands since the late 1860s, had a store in Rarotonga at the same time, along with Henry Nicholas as a competitor, and soon the French offshoot of Godeffroy and Son from Tahiti, Société Commercial de l’Océanie also opened a

store. A German, Captain Emil Piltz married to Rao ariki o Arera, established a store in the 1880s at Avarua on Rarotonga (*New Zealand Herald*, 11 November 1868, 2, 17 August 1885, 6; Kelly, 1884: 52).<sup>8</sup>



Figure 3: Donald and Edenborough Trading House, circa 1900, Cook Islands. Photographer: George Crummer. Museum of New Zealand, Te Papa Tongarewa, Wellington.

Though some *ariki* organised the collection of exports, most Islanders made relatively little concerted effort to extend cash crop planting. With the exception of plots of coffee and cotton, in the main what was there was largely wild and scattered about the island. This was especially the case with limes, oranges and coconuts except for those planted around households for domestic use (Sterndale, 1874:16; *New Zealand Herald* 17 August 1885, 5; *Auckland Star*, 10 October 1885, 4).

## Empires on the move

By the 1880s the Australian colonies and New Zealand were concerned with the growth of both German and French influence and colonies in the Pacific. Inspired by the annexation of Fiji to the British empire with cession in 1874, these colonies had done their best to prompt Britain to annex more island groups. A vociferous advocate of annexation was Julius Vogel, former agent general for New Zealand in England. On his return to New Zealand he had dreams of a major company to trade and colonise the Polynesian islands to counter the German firm, *Deutsche Handel und Plantation Gesellschaft* (DHPG) under refinancing in 1880 to replace the pioneering German firm of Godeffroy and Son in liquidation. Vogel had even gone so far as urging the annexation of Samoa where German interests were dominant. Britain refused to allow New Zealand, a mere colony itself, to form some kind of confederation with Samoa and Tonga in 1883. All this took on more momentum in 1884 with the German annexation of north eastern New Guinea and the setting up of a huge German chartered company to develop and basically run it. The French too were extending their control in the islands around Tahiti and nearer the Cook Islands, much to the concern of the *ariki* and the British traders as well as the British missionaries there.<sup>9</sup> Their fears threatened their dreams. They and others, influenced by Vogel’s sunny predictions of expansive trade, over-rated the economic potential of the islands, as soon would become clear (Gilson, 1980: 57).

By 1885, New Zealand business interests that dealt with the Cook Islands were especially nervous of other powers, because their Auckland trade with that group had indeed grown. To loosen Auckland’s grip on trade, even Oamaru on New Zealand’s South Island’s east coast sent a representative there and to other groups to find potential imports and markets. For the year 1885, the Acting British Consul and employee of Donald and Edenborough kept details of exports and imports via Rarotonga. Lime juice came to 23,609 gallons (about 107,329 litres) and copra 830 tons (843 tonnes), much of it going to Auckland. Traders in the Cook Islands paid six pence a gallon for lime juice and about £11.11s a ton for copra, a good price for the time (*New Zealand Herald*, 7 December 1885, 3).

Finally, in 1888, Britain, at the behest of the *ariki*, traders and the New Zealand government that feared renewed encroachment by the French, agreed to a Protectorate with a British resident, providing New Zealand funded the tiny administration and supplied a candidate. The first resident, Frederick Moss persuaded the *ariki* in 1891 to unite and create a self-governing federation of all the islands.<sup>10</sup>

The 1880s had seen harbingers of other changes in the Cook Islands and New Zealand trade. The first auxiliary steamer for Donald and Edenborough, the *Janet Nicol* arrived in 1883 to be followed in 1887 by their steel-hulled steamer *Richmond*. This steamer could travel faster and carry bigger cargos than most sailing ships, so usually called not only at Tahiti and the Cook Islands but also Tonga and Samoa, collecting mainly copra and fruit. Steamers became increasingly dominant too on the Fiji run which saw more fruit coming into Auckland as well as Sydney and Melbourne. By the 1890s steamers were common in transoceanic transport. Almost all immigrants from the United Kingdom and Europe to New Zealand and Australia journeyed on steamers, not sailing ships, and after 1914, often via the Panama Canal (Wilson, 2005, np). A voyage that has taken between 75 to 125 days under sail was reduced to an average of 40 days. This massive leap in technology with a succession of improved engines on passenger and naval vessels meant the chances of scurvy were lessened because the voyage was shorter, steamers could stop off at regular ports to collect fresh food and several had installed refrigeration to preserve food.

The lime juice ration, especially on smaller sailing vessels, at least in the view of consumers was often hardly appealing, even with added rum. Well-travelled Beatrice Grimshaw, a lover of the fresh lime, when aboard a schooner in the Cook Islands in 1904 remarked,

*Board-of-trade limejuice, which is nauseous at best, we were obliged by law to carry, and I think we must have run rather near scurvy in the course of that long trip, for the amount of the oily, drug-flavoured liquid that the mates and myself used to drink at times, seemed to argue a special craving of nature* (Grimshaw, 1907: 213).<sup>11</sup>

## Squeezing the limes

In New Zealand the market for limes and lime juice had hit other barriers. Citric acid was replacing it in some uses as a flavouring agent, while cheaper lime juice was being offered from Ceylon. By the mid 1890s, the resident commissioner Frederick Moss encouraged Rev Lawrence of the LMS, about to leave on furlough to England, to seek out investors for the introduction of a processing plant to concentrate juice to export: “It will do for limes what drying instead of oil making has done for the coconuts”, but no investment came from business interests contacted in England (*New Zealand Herald*, 30 September 1896, 5). On Rarotonga, in spite of traders using new, more efficient cider presses to extract the juice, the export demand was not increasing, so leaving “hundreds of thousands” of limes “perishing on the ground... and making the air offensive to a degree that can only be appreciated by those living near them”. Cattle did not like to eat them. The only solution was a bigger market. Although the *ariki* Queen Makea saw to it in 1896 that her annual gift of fruit, including limes, went to Bellamy’s, the caterers for New Zealand parliamentarians in Wellington, none of these gentlemen was moved to give the Cook Islands’ exporters any concessions (*New Zealand Herald*, 13 June 1896). Throughout the 1890s lime juice went to New Zealand where most of it was for restocking ships that called, cordials, carbonised drinks and tonics or on-sold to Australia. Its peak year was 1896, with over 57,000 gallons exported (Gilson 1980: 222).<sup>12</sup>

In 1901, with Britain’s blessing, New Zealand extended its territorial boundaries to include the Cook Islands and Niue. Traders rejoiced as they believed this would mean more trade with New Zealand. A year later the first New Zealand trade commissioner was off to South Africa and the United Kingdom to publicize New Zealand’s products, including lime juice “from the islands”, but unsurprisingly no major importing of lime juice resulted. South Africa had an established citrus industry dating back to the seventeenth century and the United Kingdom had been well served first with lemon imports from the Mediterranean and by the mid nineteenth century from the West Indies, including the famous Monserrat limes and lime juice. With 1000 acres (approximately 405 hectares) under limes, the main Monserrat company too had diversified its lime products in the

1880s with a range unimagined in the South Pacific. It offered not simply lime juice and fresh limes but also concentrated juice, lime essence and pickled limes (Lloyd, 1963:361–362; Fergus, 1982: 10–18).

In New Zealand, a worry was “adulteration” of the lime juice by the addition of water in the islands and a concern with presses that were faulty, causing loss of juice (*New Zealand Herald*, 26 November 1881, 6).<sup>13</sup> Of course, some of this adulteration was done deliberately to fill up a cask but often conditions of loading onto trading ships left the product open to this. At Atiu in the Cook Islands in 1904, the people were “busy rolling down the casks into the water, where the outgoing tide took them, and floated them across the reef to the schooner”, a practice common in such reef-fringed islands (Grimshaw, 1907: 148). While resident commissioner W. Gudgeon urged renewed planting of coconuts for future exports, the New Zealand market wanted other crops to suit its winter needs—bananas, pineapples, oranges and other fruit. Yet the problem here was that the actual distribution of such imports around New Zealand meant that except for Auckland, these perishables soon lost their freshness and some began to rot by the time they reached other distant ports by the slow coastal shipping (Gilson, 1980: 149–57).<sup>14</sup>

### **The lime proves to be a lemon!**

At this time the New Zealand-based, Union Steam Ship Company (USSC) had its regular steamers carrying big cargos of Fiji fruit, not only to Auckland but also to Wellington where USSC coastal vessels took it to other centres in the South Island, creating economies of volume that saw the Cook Islands’ marketing opportunities reduced.<sup>15</sup> Following on the annexation of the Cook Islands to New Zealand in 1901, growers, both Indigenous and others, sought protection from the government in 1904–05 for their fruit and juice in the face of this competition from Fiji and an influx of oranges from productive Tahiti.<sup>16</sup> This culminated three years later in a petition to the New Zealand government for protective tariffs, since the Cook Island cargoes were charged higher freights to Auckland in comparison with those USSC charged for fruit cargoes from Fiji, yet, “Our

fruit invariable arrives South in a cooked and damaged condition due to wretched handling in Auckland and carriage south. Southern market is thus practically closed to us” (*New Zealand Herald*, 16 February 1907, 6). A committee in the Cook Islands formed to report to the New Zealand government suggested a scale for duty to be applied on “foreign fruits” entering New Zealand, including lime juice and requested more than the one steamer that came monthly to get fruit to the market from the Cook Islands. The committee in 1906 also summed up the position of the islands’ copra and lime juice:

*At present we have to go outside of New Zealand to find a market for the bulk of our copra and lime-juice. In the case of the former article Tonga enters largely into competition with us, and in the latter instance lime-juice is unsaleable largely through the importations into New Zealand of acids for the manufacture of so-called lime-juice cordials.*<sup>17</sup>

But from a marketing perspective, neither growers nor merchants had worked to present the lime at its best. Travelling in the South Pacific and with an eye to the cuisine culture, the writer, Beatrice Grimshaw summed up its virtues as well as missed opportunities for the Cook Islands:

*...limes, a fruit which grows wild very freely. The lime is like a small round shaped lemon, and is not an attractive fruit in appearance. It also suffers under the disadvantage of being very badly represented as to flavour by the bottled “shop” lime-juice, with which the taste of the fresh lime has hardly anything in common. Where it can be obtained fresh, however, no one ever thinks of using lemon as a flavouring in food or drink. The lime is incomparably more delicate and refreshing than the best lemon ever grown. For some unknown reason, however, it is not used in New Zealand, or in the cities of Australia, to which it could be easily and profitably exported from many of the Pacific groups. Instead, the juice of limes is squeezed out by a very rough process, the fruit being run through a wooden hand-press, and is shipped away in casks. The lime trade would certainly rival the orange trade, if worked up (Grimshaw, 1907: 62–63).*



Limes were not faring well when Grimshaw was in the Cook Islands in 1904. For the people, if time were to be spent in cash crop cultivation in the islands, it was on whole fruits such as bananas and oranges that did not require the added effort and tedium of a hand press. In early 1909 lime juice and other fruit received a boost as a USSC steamer, albeit unrefrigerated, was put on the route between Rarotonga, Tahiti and Wellington, subsidised as a mail carrier by the New Zealand government. Despite this, late arrivals and missed island calls made export of perishables a risky guessing game since there was no wireless transmitting Morse Code messages until late 1918 and then only on Rarotonga (Papeete radio; Maritime radio, 1910–1919).<sup>18</sup> Even though the growers, if their cargoes were collected on time, had hopes of a better price, the steamer to Wellington often coincided with the fruit-carrying steamer from Fiji, which then glutted the market (*Evening Post*, 25 January 1909, 6).<sup>19</sup>

Any potential recovery for lime juice exports vanished in the face of declining demand, however. The lime or lemon juice provision at sea on passenger vessels had been repealed on steamers under the British Merchant Shipping Act of 1906, since voyages were far shorter.<sup>20</sup> The Royal Navy was soon to fit this pattern. In 1907, after forty years of much the same ship’s victualing ration, a special committee of the Admiralty had considered the nutrition of British naval seamen. They reduced the allocation of bread and meat and increased the fresh vegetables as well as regulating for better storage and cooking methods, all processes that enhanced variety and preserved much of the vitamin content (Malone, 1930: 363–368). Moreover, in light of the alarming failure of lime juice as an antiscorbutic among some British polar expeditions in the late 19<sup>th</sup> century and early 20<sup>th</sup> century and among troops in World War One, a scientist with historical skills sought and found, on the existing evidence, the fundamental cause. West Indies lime juice had been used from the 1860s instead of Mediterranean lemon juice to prevent the disease, indicating the lesser efficacy of lime juice. With three women scientists, Alice Henderson Smith published her findings first in 1918 in the *Lancet* and as sole author in 1919. Their work filtered through to medical circles (Chick et al, 1918: 735–738; Smith, 1919: 93–116, 188–208; Carpenter 1986: 187–197, 230, 236). In 1928, a naval physician, perhaps overstating Henderson’s conclusions regarding lime juice, claimed, “the Service

lime juice, made from West Indian limes, has no antiscorbutic properties, and the Admiralty have under consideration the issue of orange juice made from Californian oranges” (Rivaz, 1919: 379–384). By the early 1930s, following the discovery of vitamin C, the low value of that vitamin in lime juice in comparison to that of lemon (and orange) juice was fully proven in scientific circles. Its regulated use, however, had been abandoned since by then steamers had been for some years well supplied with a range of fresh and refrigerated foods (*Lancet* 1918: 735–738).<sup>21</sup> Though the custom of the rum ration for the British naval personnel persisted until 1970, from 1929 it was diluted only with water (Moore, 2017: 67–79; Pack, 1995: 111–117).<sup>22</sup>

By the 1920s, lime juice had all but vanished from the regular exports from the Cook Islands though whole lemons and limes occasionally featured in a mixed cargo along with the dominant whole oranges. In 1919, lime exports from the Cooks were valued at a mere £32 with oranges earning £36,030 and copra £45,235—a relativity that prevailed throughout the next decade.<sup>23</sup> With a life span of about 50 years, most of the lime trees on Rarotonga were old and unproductive. Younger trees were neglected and had returned fully to the wild (Gilson, 1980:158).

With the manufacture of vegetable oil-based margarines, copra in the first two decades of the twentieth century, on the other hand, generally had increased in price on the world market. Renewed interest in coconuts saw the development of new commercial plantations in the larger high islands of the Pacific, such as the Solomon Islands. Even when lime juice had been a significant export from the Cook Islands, its value had been always only a tenth or less than that of the islands’ copra while other export crops such as coffee and bananas made more money than lime juice at various times. Although copra prices had risen in the Cook Islands most people saw coconuts as largely self-caring and left them to grow where the nuts fell, except for particular trees near homesteads, much to the despair of the government, as palms are less productive when crowded together. Administrators urged more systematic planting of the nuts, if only to feed the growing population’s food needs. The people found it was easier while the prices remained high to collect whole oranges and to make copra than to put much time into care for citrus fruit trees, most in need of pruning or replacement.

Though the administration did much to encourage new plantings of fruit trees and coconuts, once the Depression set in after 1929, the market remained sluggish with low prices for commodities—all of which meant few coconuts were planted before World War Two to replace old palms.<sup>24</sup>

To revive the economy during the Depression, the New Zealand government invested much time and money in surveying the citrus industry in 1936, and began to lay the foundation to revitalise it with new varieties, experimental plantings and research on citrus diseases. The government set about a massive replanting scheme in 1939 with productive varieties mainly of oranges, only to falter when land disputes arose, with World War Two soon supervening (Gilson, 1980: 186–191). This had no impact on the limes because they were no longer a major export focus, given little demand in New Zealand.

## Conclusion

Experienced British colonial official, Harry Maude, an advisor to the Cook Islands administration in 1951 to find ways to extend the economic base, could refer to the glory days of 1896 when lime juice exports reached their peak. Yet he failed to consider the context of those times that had fuelled demand.<sup>25</sup> The technology that made for shorter voyages and better diet aboard ships as well as medical awareness of the limitations of limes as an antiscorbutic and subsequent understanding of the action of vitamins all spelt the decline and end of the lime juice export from the Cook Islands. Had Moss’s hopes for technical innovation in the 1890s won support from England to develop the industry in Rarotonga to not only help market distribution in New Zealand and beyond but also diversify the commodities that used limes as their base, limes as an island product may have had a brighter future. But neither the British government nor New Zealand was interested in what to them was a minor export from a tiny group of scattered islands. In the words of Harry Nilsson’s song, the “doctor” no longer recommended putting “the lime in the coconut” (1972).<sup>26</sup> The coconut as copra was still an export standby in the Cook Islands where timing of its collection was less vital than soft fruit or juice. Economies of scale and transport have remained a challenge to any export crop for

these islands. Though the limes’ importance beyond the islands has long faded, some of the renewed local demand today comes because tourists enjoy them in fresh juice and culinary dishes, as indeed do Cook Islanders.<sup>27</sup>

Yet beyond the islands, the spirit of the lime lives on, or, more correctly, the lime lives on in the spirit. Since about 2006, a fine new gin with lime tones manufactured in New Zealand came on the market. Called “Vaione”, its entrepreneurial founder came from a family with Cook Islands, Niuean, Samoan, and Tongan connections, the last being a copra plantation once run by his German ancestor. Vaione is advertised nostalgically with epithets such as: “The islands of the South Pacific were renowned for their abundance of wild lime trees. The colonial planters brought the gin.” All true, but these limes that give Vaione its memorable “crisp citrus tang” come, not from any warm South Pacific Island, but from New Zealand, Australia and the Americas.<sup>28</sup> Such is the fate of the limes of the modern Cook Islands.



Figure 4: Advertising for Vaione online at <http://www.vaione.net/>. With kind permission of Anthony Sexton.

## Acknowledgements

I wish to thank the Marsden Fund of the Royal Society of New Zealand for funding this research. I am very grateful to Professor Helen Leach for information about sources relating to the introduction of limes to Tahiti and for her comments on other parts of this paper. Many thanks too to the late John Sexton for introducing me to Vaione and to his son Anthony for permission to reproduce an image of the product. Les O'Neill has helped on technical matters and developed the maps — thank you.

---

## Endnotes

<sup>1</sup> It is possible that older varieties of sweet potato arrived at some of the islands but were not highly productive or simply died out. The sweet potato, cultivated by the women, was evident on Mangaia in the early 1850s but there had been LMS mission personnel there since the late 1830s. A raised coral island with volcanic cores, Mangaia had suitable soils for its growth on the valley floors. Lamont who spent months marooned on pre-Christian Tongareva (Penrhyn) in 1853 makes no mention of the sweet potato there, but such coral atolls are unsuited to its growth (Garrett, 1982: 119–120; Lamont, 1867:105, 114).

<sup>2</sup> It seems more recent varieties have been introduced such as the Mexican lime (*Citrus limetta*).

<sup>3</sup> H. B. Sterndale, Memorandum on some of the South Sea Islands, *Appendices to the Journals of the House of Representatives* (hereinafter AJHR), Wellington, New Zealand, A-3B, 1874, 16.

<sup>4</sup> Each passenger was to get one gill of lime juice per week. Abstract of Passengers Act, April 1857, 18 and 19, Vict. c 119, *Colonisation Circular*, HM Colonial Land and Emigration Commissioners, Issues 1–19.

<sup>5</sup> Beatrice Grimshaw was travelling on commission to write for the London *Daily Graphic* (McCotter, 2007: 113).

<sup>6</sup> In New Zealand, an unskilled male worker received about 40–45 shillings a week in wages at this time. There were twelve pence in one shilling, so 1s 8d amounts to 20d (twenty pence).

<sup>7</sup> *New Zealand Herald*, 30 Dec. 1887, 6.

<sup>8</sup> ‘Stephen Savage dictionary reprinted’, 2 January 2013, Cook Islands News, <http://www.cookislandsnews.com/item/17837-stephen-savage-dictionary-reprinted/17837-stephen-savage-dictionary-reprinted> (accessed 4 September 2018)

<sup>9</sup> Papers on Confederation and Annexation, presented to the New Zealand parliament, 1884, AJHR, A-4; 1889, AJHR, A-O2.

<sup>10</sup> Moss, Report on Trade, 17 December 1891, Federation and Annexation: Pacific Islands, AJHR 1892, A-3.

<sup>11</sup> There was little likelihood of scurvy as the writer and the crew, though they suffered a limited diet on board the old copra schooner, ate a varied diet at each island the trading ship visited.

<sup>12</sup> Harry Maude, Recommendations for the Development of the Co-operative movement in the Cook Islands, 31 December 1951, 19, enclosure, Western Samoa: Cooperative movement in the South Pacific, IT 1W2439 19, R14638980, National Archives of New Zealand (hereinafter ANZ), Wellington.

<sup>13</sup> W. Gudgeon, Report, 20 February 1902, The Pacific Islands, AJHR 1902, A-3.

<sup>14</sup> Gudgeon, Report, 20 February 1902.

<sup>15</sup> Cook and Other Islands, AJHR, 1908, 16, Session I, A-03.

<sup>16</sup> Cook and Other Islands, AJHR, 1905, Session I, A-03.

<sup>17</sup> Cook and Other Islands, AJHR, 1905, Session I, A-03.

<sup>18</sup> New Zealand had radio contact only in the South Pacific with Tahiti which opened for commercial messages in Morse Code from 1915, so another reliable form of communication was vital. New Zealand shippers began to install wireless sets in 1911–12, but until the wireless receiver was operating on Rarotonga in late 1918, no direct contact could be made. ‘Papeete radio’, <http://maritimeradio.org/other-stations/pacific-islands/papeete-radio-tahiti/>; ‘Maritime Radio’, <http://maritimeradio.org/all-stations/1910-1919/> (accessed 23 May 2018).

<sup>19</sup> Stevenson to Resident Commissioner, Cook Islands, 8 April 1910, AJHR, 1910, Session I, A-03; Report of the Resident Commissioner, Cook Islands, 5 June 1911, AJHR, 1911, Session I, A-03.

<sup>20</sup> Merchant Shipping Act, 1906. [www.legislation.gov.uk/ukpga/1906/48/pdfs/ukpga\\_19060048\\_en.pdf](http://www.legislation.gov.uk/ukpga/1906/48/pdfs/ukpga_19060048_en.pdf) (accessed 13 June 2018)

<sup>21</sup> Western science had still to show that citrus, including limes, have greater vitamin C content if grown in areas exposed to cool nights, not the case in the Cook Islands. More significant, lime juice deteriorates in prolonged storage longer than two weeks, often losing much of its vitamin C content particularly in high temperatures (V O Ajibola et al, 2009: 79–84).

<sup>22</sup> In tropical areas where men sweated a lot, a powered lime substitute, ‘Pusser’s Limers’ was available for sailors to mix with cold water, if desired. (E-mail from curator, The National Museum, Royal Navy, 17 June 2018)

<sup>23</sup> Cook and Other Islands, 1919–1929, AJHR 1920–1930, A-C.

<sup>24</sup> M. Abraham, Report, Department of Island Territories: Food Conditions, 8 October 1947, File 1 (Cook Islands), R14640369, IT 1W2439, ANZ.

<sup>25</sup> Maude, Recommendations for the Development of the Co-operative movement in the Cook Islands, 31 December 1951, 19.

<sup>26</sup> There are many versions of this song ‘Coconut’, perhaps the most well known is sung by Kermit the frog in the *Muppets* (episode 4.10).

<sup>27</sup> More recent attempts from about 2012 by a number of Pacific Islands, including Cook Islands, to export limes to New Zealand and Australia have had mixed success. Though both countries have developed import protocols, Australian growers in Queensland have opposed imports, ostensibly because of fear of citrus diseases. *The Cook Islands Herald*, 21 December 2012, <http://www.newspapersperiodicos.com/ISLASCOOKS/raratonga.raratonga.cookislandsherald.php>; *Tahitian limes from the Cook Islands, Niue, Samoa, Tonga and Vanuatu*, Draft review, June 2017, Australian Government. <http://www.agriculture.gov.au/SiteCollectionDocuments/biosecurity/risk-analysis/plant-reviews/draft-review-bio-import-req-tahitian-limes-cook-islands-niue-samoa-tonga-vanuatu.pdf>; ‘Proposal to allow lime imports leaves a sour taste for growers’, <http://www.abc.net.au/news/rural/2017-07-03/growers-concerned-proposal-import-pacific-limes/8667126> (accessed 2 June 2018).

<sup>28</sup> ‘Vaione: Premium Pacific Gin’, <http://www.vaione.net/> (accessed 3 June 2018).

## Bibliography

Ajibola, V O., A. Babatunde and S. Suleiman (2009) ‘The Effect of Storage Method on the Vitamin C Content in Some Tropical Fruit Juices’, *Trends in Applied Sciences Research* v4, 79–84.

Alexander Bell, Donald, <https://teara.govt.nz/en/biographies/3d11/donald-alexander-bell> (accessed 17 May 2018)

Australian Government (2017) Tahitian limes from the Cook Islands, Niue, Samoa, Tonga and Vanuatu, Draft review, June 2017, Australian Government. Online at: <http://www.agriculture.gov.au/SiteCollectionDocuments/biosecurity/risk-analysis/plant-reviews/draft-review-bio-import-req-tahitian-limes-cook-islands-niue-samoa-tonga-vanuatu.pdf> (accessed 2 June 2018).

Beaglehole, J C (1955) *The Voyage of the Endeavour 1768–1771*, Cambridge: Cambridge University Press.

Bollard, Alan (1979) *Agricultural project design and evaluation in an island community*, Canberra: Development Studies Centre, Australian National University Press.

Busch, Leslie Cooper and Briton Cooper Busch (1995), ‘The Seaman’s diet revisited’, *Journal of Maritime History* v7n2, 163–172.

Buzacott, Aaron (1866) *Mission Life in the Islands of the Pacific*, London: John Snow and Co.

Carpenter, Kenneth J (1986) *The History of Scurvy and Vitamin C*, New Rochelle, NY: Cambridge University Press.

Chick, H et al., (1918) ‘The relative content of antiscorbutic principle in Limes and Lemons’, *The Lancet* v192n84970, 735–738.

Cook, C C (2004) ‘Scurvy and the British Mercantile Marine in the 19th century and the contribution of the Seamen’s Hospital Society’, *Postgrad Medical Journal* v80n942, 224–9.

Crocombe, R G (1987) *Land Tenure in the Cook Islands*, Melbourne: Oxford University Press.

de Scally, Fes A (2008) ‘Historical Tropical Cyclone Activity and Impacts in the Cook Islands’, *Pacific Science* v62n4, 443–59.

Fergus, Howard (1982) ‘Montserrat’s Days of Lime and Cotton’, *Caribbean Quarterly*, v28n3, 10–18.

Garrett, John (1982) *To Live among the Stars: Christian Origins in Oceania*, Geneva Suva: World Council of Churches; Institute of Pacific Studies, University of the South Pacific.

Gilson, Richard (1980) *The Cook Islands, 1820–1950*, Wellington: Victoria University Press.

Grimshaw, Beatrice (1907) *In the Strange South Seas*, London: Hutchinson and Co.

Haden, Roger (2009) *Food Culture in the Pacific Islands*, Santa Barbara, California: Greenwood Press.

Hather, Jon and P V Kirch (1991) ‘Prehistoric sweet potato (*Ipomoea batatas*) from Mangaia island, central Polynesia’, *Antiquity* v65, 887–93.

Hooker, Joseph D, ed. (1896) *Journal of Right Hon. Sir Joseph Banks*, London: Macmillan and Co. 107.

Hugill, Stan (1994), *Shanties from the Seven Seas*, Mystic, Conn: Mystic Seaport Museum, Conn., n.p.  
Online at: [www.joe-offer.com/folkinfo/songs/496.html](http://www.joe-offer.com/folkinfo/songs/496.html) (accessed 8 June 2018)

Johnston, W B (1951) ‘The Citrus Industry of the Cook Islands’, *New Zealand Geographer* v7n2, 121–138.

Lamont, E H (1867) *Wild Life among the Pacific Islanders*, London: Hurst and Blackett.

Lind, James (1753) *A Treatise of the Scurvy: Containing an Inquiry into the Nature, Causes, and Cure, of That Disease Together with a Critical and Chronological View of What Has Been Published on the Subject*, Edinburgh: Sands, Murray and Cochran for A. Kincaid & A. Donaldson.

Lloyd, CC (1963) ‘The conquest of Scurvy’, *British Journal for the History of Science* v1n4, 361–362.

Malone, E (1930) ‘Some remarks on the Evolution of Naval Hygiene’, *Journal of the Royal Society of Medicine* v23n3, 363–368.

McCotter, Clare (2007) ‘Maintaining a wide margin: the boat as home in Beatrice Grimshaw’s travel writing’, in Helmers, Marguerite and Mazzeo, Tilar (eds) *The traveling and writing self*, Newcastle: Cambridge Scholars Publishing: 97–115.

‘Maritime Radio’, online at: <http://maritimeradio.org/all-stations/1910-1919/> (accessed 23 May 2018).

Merchant Shipping Act, 1906, online at:  
[www.legislation.gov.uk/ukpga/1906/48/pdfs/ukpga\\_19060048\\_en.pdf](http://www.legislation.gov.uk/ukpga/1906/48/pdfs/ukpga_19060048_en.pdf) (accessed 13 June 2018)

Moore, Richard (2017) ‘“We Are a Modern Navy”: Abolishing the Royal Navy’s rum ration’, *The Mariner’s Mirror* v103n1, 67–79.



Morton, J F ed. (1987) *Fruits of warm climates*. Miami, USA: Julia F Morton.

New Zealand migrant ships (1861–1875), online at: <http://members.iinet.net.au/~perthdps/shipping/mig-nz2.htm> (accessed 17 May 2018).

New Zealand, Ministry of Foreign Affairs, ‘Cook Islands’, <https://www.mfat.govt.nz/en/countries-and-regions/pacific/cook-islands/> (accessed 4 March 2019)

Nilsson, Harry (1971) ‘Coconut’. Online at: <https://www.youtube.com/watch?v=Tbgv8PkO9eo> (accessed May 2018)

Pack, James (1995) *Nelson’s Blood: The Story of Naval Rum*, Stroud: Sutton.

‘Papeete radio’, online at: <http://maritimeradio.org/other-stations/pacific-islands/papeete-radio-tahiti/> (accessed 23 May 2018).

Price, Catherine (2017) ‘The age of scurvy’, *Distillations*, Summer, online at: <https://www.sciencehistory.org/distillations/magazine/the-age-of-scurvy> (accessed May 2018).

‘Proposal to allow lime imports leaves a sour taste for growers’ (2017), online at: <http://www.abc.net.au/news/rural/2017-07-03/growers-concerned-proposal-import-pacific-limes/8667126> (accessed 2 June 2018).

Rivaz, P (1919) ‘Some Common Problems in Naval Hygiene’, *Journal of the Royal Society of Medicine* v22n3, 379–384.

Ross, Angus (1964) *New Zealand’s Aspirations in the Pacific in the Nineteenth Century*, Oxford: Clarendon Press.

Ross, Angus ed. (1969) *New Zealand’s Record in the Pacific Islands in the Twentieth Century*, London and New York: Longman Paul.

Royal Navy National Museum, E-mail to author from curator, 17 June 2018.

Scott, Dick (1991) *Years of the Pooh Bah: A Cook Islands History*, Rarotonga and Auckland: Cook Islands Trading Corporation and Hodder and Stoughton.

Small, Ernest (2009) *Top 100 Food Plants*, Ottawa: National Research Council Press.

Smith, Alice Henderson (1919) ‘A historical inquiry into the efficacy of lime juice for the prevention and cure of scurvy’, *Journal of the Royal Army Medical Corps* v32, 93–116, 188–208.

‘Vaione: Premium Pacific Gin’, online at: <http://www.vaione.net/> (accessed 3 June 2018).

Williams, Glyn (2013) ‘Scurvy in the Pacific voyages in the age of Cook’, *Journal of Maritime Research* v15n1, 37–45.

Wilson, John (2005) ‘The voyage out’, online at: <https://teara.govt.nz/en/the-voyage-out/print> (accessed 25 May 2018)

Wolbach, S B (1937) ‘The pathologic changes resulting from vitamin deficiency’, *Journal of the American Medical Association* v108n1, 7–13.