

## CORDYLINE AND PHORMIUM

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THE SAN DIEGO CONFERENCE and New Zealand may be a little thinly threaded together in these pages, but threaded together they are. For this bicentenary of San Diego's founding is also the bicentenary of Captain James Cook's first visit to New Zealand in 1769, an event which issued in the discovery of two plants which now flourish in California gardens, *Cordyline australis* and *Phormium tenax*.

But Cook's discovery was not the first time these species caught the eye of man. Perhaps a thousand years earlier—if current dating holds good—the Polynesians sought compensation for their lost *Cordyline terminalis*, the *ti* (or *ti pore*) of the myriad isles of tropical Oceania. Not that the cordylines were confined to Oceania. In wild form or tame, they flourished across a broad swath of tropical Asia and the Pacific, and, as Sauer pointed out, they were probably first domesticated in the ancient culture hearth he postulates for Southeast Asia.<sup>1</sup> The Polynesians preserved *C. terminalis* in more than a dozen varieties—Henry, indeed, pronounced it “perhaps the most notable of all Polynesian plants”<sup>2</sup>—and various *ti* not only provided foliage for thatch and oven, hula skirts, and sacred temple grounds, but they also provided saccharine-rich roots for a relish. Their very name, *Cordyline*, in fact refers to the club shape of their root.

But when the Polynesian ancestors of the Maori came to New Zealand, they all but lost their favorite *ti* root. True enough, some *ti pore* grew in the warmer parts of the north, but not very extensively; in fact, some think they were confined to the far north of Auckland peninsula<sup>3</sup> and even there they were “a very occasional ‘occasional’” in the diet<sup>4</sup>—a sugary morsel to boost the warrior's energy on the warpath.

But in its place the New Zealanders found the native *C. australis*, the rugged *ti whanake* or *ti kouka* of Maori terminology. And this species could be put to something of the same use as *ti pore*. The leaves were strong and fibrous, excellent when extra toughness was required by the native craftsman; the great rhizome, baked or steamed in the Maori oven, provided a sugary nourishment analogous to *ti pore*, and the green leaf-heart provided a modicum of vegetable food—whence the “cabbage tree” of practical *pakeha* nomenclature.

There were other native cordylines too—the long-leaved *C. banksii*, the grass-like *C. pumilio* of the north, and the exceptionally tough-leaved *C. indivisa*. But it was *C. australis* that was the cordyline *par excellence* of Maori New Zealand. It was abundant enough, flourishing throughout the length and breadth of the land, crowding the margins of stream and swamp, and even lending a rather deceptive touch of tropicality to the semi-arid grasslands of the eastern South Island. But the Maori was not content to view it solely as a plant to be gathered. In some regions, at least, he planted groves near his villages and across the tussocky plains, but even so, it seems to have been merely a planted rather than a truly cultivated species—somewhere in the twilight zone where gathering faded into arboriculture.

Another native species was also fitted into this intermediate zone, namely *Phormium tenax*, a much more significant species in the ecology of the Maori. For as with *Cordyline terminalis*, so with the sennit-and-leaf-yielding coconut and *Brousonettia papyrifera*, the *aute* or paper mulberry tree that provided the *tapa* cloth of the islands. The coconut was completely expunged, while the *aute*, like the *ti pore*, could grow in warmer northern New Zealand—but only just. All Cook found when he arrived were a few stunted specimens that provided nothing but a little cloth for ear ornaments and kites.

So, once again, the Maori was driven to cull the indigenous plant associations for

replacements. If tradition yields a valid clue, he may well have done some experimentation with the native *nikau* palm (*Rhopalostylis sapida*) and the "lacebark" of the ribbonwood tree (*Hoheria populnea*), while the leaves of the *kiekie* (*Freycinetia banksii*) had a modicum of utility, especially in some cool upland areas. But it was *Phormium tenax*—the *harakeke* or New Zealand "flax"—that emerged as the dominant textile and cordage plant of Maoriland.

As von Hochstetter wrote, "What the bamboo is to the inhabitants of southern and eastern Asia, this plant is to the natives of New Zealand. The various uses it is put to are innumerable."<sup>5</sup> The leaves, of course were what mattered most, but the flower-stalks or *korari*, up to a dozen or more feet in length, made good fire-sticks or were bound into bundles and built into simple rafts or *mohiki* for river-crossings. In the Chatham Islands, some hundreds of miles to the east, the Moriori people replaced their canoes with great wash-through sea-rafts to fish and fowl by cliff and outlying islet. And the flowers themselves were rich in nectar which was collected in gourds for human consumption or left to attract the bellbird, the *tui*, and the *kaka* parrot that thronged the flax-reserves at flowering time, both cross-pollinating the phormium and providing an abundant catch for the fowler. As for the flax-root and leaf-base, medicinal elements could be extracted and the gum that bedeviled later European machinery found its role in the caulking of native canoes as well for Maori chewing gum.

But such items were a mere bagatelle in comparison with the foliage. The great sword-shaped leaves were packed with a fiber which, even if it lacked something of the softness of *tapa*, was ruggedly adequate for Maori needs. As Sir Joseph Banks—the first botanist to view it—wrote in his Journal:

"Of all the plants we have seen among these people that which is the most excellent in its kind . . . is the plant which serves them instead of Hemp and flax . . . Of the leaves of these plants with very little preparation all their common wearing apparel are made and all strings, lines, and cordage for every purpose, and that of a strength so much superior to hemp as scarce to bear a comparison with it. From the same leaves also by another preparation a kind of snow white fibres are drawn, shining almost as silk and likewise surprisingly strong, of which all their finer clothes are made; and of the leaves without any other preparation than splitting them into proper breadths and tying those strips together are made their fishing nets."<sup>6</sup>

The fishing nets were often huge—up to 500 fathoms or more in length in some cases—and Banks could have gone on and on with an account of the utility of phormium and its significance to Maori culture. And, in fact, he did touch on its hardness and ubiquity, the way it flourished "on hills and in valleys, in dry soil and the deepest bogs,"<sup>7</sup> but most particularly in the latter. For though it grew without let or hindrance in a fair range of ecological niches, and though *Phormium colensoi* was a species of the dry hill slopes, the common flax was partial to the swampy flats.

The very name that was conferred upon it—*Phormium tenax*—signified its utility as a tough basket-making material, but to the Maori, as has been intimated, its uses were legion and many a variety was selected for special purposes. Some, particularly those with variegated leaf edges, were deemed particularly decorative and planted accordingly around the hamlets, but most were selected for utility rather than decoration. The *korako*, for instance, was used for the best cloaks of the Taranaki district<sup>8</sup>—a notable exporting center—while the *ngaro* (an excellent all-purpose plant elsewhere) was selected for rough garments in that region. The *tapoto* was chosen for fine mats, and the *ate* for eel nets and baskets. More than 60 varieties were recognized . . . and by no means all were cultivated. Some particularly common kinds needed for baskets and some superior varieties used for cord, fishing lines, and mats were oft-times planted handily near the villages, and communities which lacked easy access to swamplands were inclined to carve out some patches in the bush. Indeed, Colenso, early missionary and botanist, affirmed he could often detect the sites of abandoned villages by their lingering phormium plantations.<sup>9</sup> But flax was spontaneously so abundant that real tillage was scarcely necessary: most communities could rely on the sea of wild flax that flourished nearby. Like cordyline it was only partially assimilated into the crop complex of the Maori.

Then came the *pakeha* or European, and with him a new surge of interest in the

flax plant. As was quickly observed by Banks and publicized by Hawkesworth, “so usefull a plant would doub[t]less be a great acquisition to England, especially as one might hope that it would thrive there with little trouble.”<sup>10</sup> And the prediction proved true. Even if the particular seeds Banks took home with him failed to thrive, some New Zealand flax was growing in Kew gardens by 1789 and, by the turn of the century, the plant was flourishing in the bogs of Ireland and western Scotland.<sup>11</sup> The widespread dissemination of both cordyline and phormium was under way.

But it was in New Zealand that the main economic impact was felt. The primary fibers that were used in the industry and on the sailing ships of maritime Europe and Britain in particular came from the shores of the Baltic Sea, and sources east of the Sound were notoriously unreliable in wartime. Besides, the settlers arriving (often willy-nilly) in Australia were in need of clothing. James Matra, an American Loyalist who had sailed with Cook, wrote that the New Zealand species might well “serve the purposes of hemp, flax and silk,”<sup>12</sup> and Governor King of New South Wales rather cavalierly ordered the kidnapping of a “flax-dresser or two”<sup>13</sup> to teach the art of flax-dressing to the colonists in Norfolk Island—a subtropical outlier where phormium flourished luxuriantly. The Maoris, duly feted and enriched by their adventure, were returned home, but they proved to be too high in rank to have been bothered with such a mundane matter as flax-dressing. Nevertheless, the idea caught on, and by 1810 the flax trade was fairly under way. During the next four or five decades, many a ship that called to do commerce with the Maori sailed away with bundles of phormium fiber stacked in its hold.

The repercussions were considerable, and they spread through Maori society. Good flax fiber and solid timber were eagerly exchanged for iron hoes and European cloth, grog, and, above all, muskets and powder—more than ever vital if enemy tribes secured them first. Whole communities reshaped their lives to take full advantage of the trade. Fortified villages were shifted nearer the wet swamplands rather than built on the healthier ridges, warfare and slavery were exacerbated as the demand for labor outgrew the immediate supply, and, in a self-defeating cycle, the patient and discriminating art of Maori flax-dressing gave way to more hectic and slovenly methods as tribe after tribe hustled to join the game.

For all the praise it sometimes attracted, phormium was always liable to swell or break in somewhat brittle fashion, and the new flood of hastily scutched and poorly dried flax did nothing to build a reputation on the discriminating European market. Despite the incentives given by the British government—anxious to reduce reliance on Baltic sources—the factory built at Grimsby in England in 1831 soon failed, and the Maori flax-trade remained a sporadic and uneven affair. It struggled on with only intermittent success until the Maori wars of the sixties closed the era.

It is not the intention here to do more than touch upon the ups and downs of successive European enterprise save to note that by the eighteen-forties *pakeha* plantations were beginning to supplement the Maori swamps. As Sparrow records the fact, some 30 acres of Wanganui land were given over to a European flax plantation in the forties, and a patch of Taranaki soil was planted with 75,000 selected plants.<sup>14</sup> The settlers imported and tested some newly invented flax-dressing machinery, and a few “ropewalks” were established in the burgeoning centers of settlement. It was even hoped that “the flax may become, eventually, the staple of the colony, as wool is of New South Wales,”<sup>15</sup> and after the Maori wars were over, a flurry of mechanical inventions—some 28 patents were taken out between 1861 and 1871—together with considerable talk of well-run flax plantations, seemed to herald substantial progress. In 1873 some 300 flax mills were in operation, and over 6,000 tons were exported.<sup>16</sup>

But phormium was fated to disappoint its promoters and lose ground in international competition. Tropical fibers all began to find their place in the sun, and sisal, manila hemp, and Bengal jute yielded more flexible and durable fibers that kept coarse and high-cost phormium in a state of almost chronic depression. The flax mills were scarcely models of efficiency, either. Small and generally shoddily built, they exemplified a form of “primitive shifting industry” that cut out the neighboring swamps and constantly moved on to fresh fields and marshes new.

Thus, there was no real plantation development, and precious little in the pattern of price fluctuations to encourage it. True enough, there were occasional winds that blew New Zealand good, like the epidemic in the Philippines that disrupted the *abaca* harvest and the socio-political unrest that reduced the sisal crop of Mexico, and the Spanish-American war. But these brought only temporary bonuses to phormium. More solid progress, perhaps, accompanied developments in the rigging of sailing ships and the invention of the mechanical binder for the harvest—for flax fiber was good enough for binder twine, especially after quality standards were imposed in 1902. And demand peaked again when World War I broke out; the 32,000 tons exported in 1916 was an all-time record. But collapse came with the armistice and the surplus cordage that was released, and sisal plantations flourished in Africa and Indonesia.

So the pattern of sporadic growth and general depression has gone on, though a measure of stability came, especially as phormium production contracted to fit the New Zealand market and the leveling effect of government action was felt. In 1933 the "woolpacks" factory was established near Foxton and the government thereafter purchased the Moutoa Estate and turned it into the "Phormium Development Area." More recently the biological base of the industry has been improved by a scientific attack on the main threat from the virus-induced "yellow leaf disease," while varieties resistant to "yellow leaf"—stronger in fiber and better adapted to milling—have been searched out. The technological aspects of flax growing—planting, spacing, and cutting—have shown promise of progress through mechanization. New patterns of farming—the integration of planted flax with pastureland and the exploitation of otherwise intransigent patches of swamp—have been tentatively tried, while a government bonus to the flax grower has sought to lift his income to the sheep farmers' level. Furthermore, phormium has found new or modified uses—pure or in combination with sisal or rayon—for matting and upholstery, for fibrous plaster and for carpets. But it is woolpacks that provide the primary market: about one-third of New Zealand's wool is baled in native flax and, given the pressures on overseas funds, there are prospects for expansion.

But—to put this in perspective—neither phormium nor cordyline are really significant as economic species today, though a dozen or so flax-stripping mills are at work in New Zealand and phormium has been a mainstay for the island of St. Helena far off in the South Atlantic. But both cordyline and phormium continue to play their distinctive roles in the green parks and wild swamp-and-bush landscapes of New Zealand, as they also do—in a curious reassociation—in the trimly landscaped gardens of Southern California.

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