

## A CASE FOR TARO PRECEDING KUMARA AS THE DOMINANT DOMESTICATE IN ANCIENT NEW ZEALAND

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ABSTRACT.—The assumed function of pre-Columbian earthen pits in New Zealand as over-wintering storage facilities for sweet potatoes concomitantly infers a pre-Columbian introduction of that American Indian crop. This, in turn, has led to the further assumption that *Ipomoea batatas* (L.) Lam., known locally as *kumara*, was the dominant prehistoric domesticate on North Island. In contradistinction to these concepts, a case is presented suggesting that the common Polynesian root crop, taro (*Colocasia esculenta* (L.) Schott.), may have been more adaptable to northern New Zealand climate than has been assumed, and was equally capable of having its seed corms over-wintered in storage pits. Thus, it may have been the dominant pre-Columbian domesticate of northern New Zealand, with the more productive sweet potato having arrived in post-Columbian times and been readily adapted to northern New Zealand environment by applying the field and storage techniques already developed by the Maori for taro.

Ever since Roland Dixon (1932) presented his historically based argument for the sweet potato having been introduced into Polynesia in pre-Columbian times, his view has been generally accepted by most Polynesianists. In fact, to such an extent has this occurred that it has led to the creation of several dubious cultural interpretations of Polynesians' prehistoric past. These have been based not only on Dixon's questionable assessment of the historic records, but upon assumptions which, perhaps because they fit his hypothesis, remain unchallenged. One of these is the archaeological interpretation of the presence of ancient Maori storage pits as being indicators of an early pre-Columbian presence of *Ipomoea batatas* (L.) Lam. in New Zealand. This, in turn, suggests a still earlier introduction of that tuber into central Polynesia, if one accepts Yen's assumption that there was a single, prehistoric transfer from South America which was first implanted in that area of Polynesia (Yen 1974:259-260).

The archaeological interpretation of the function of early Maori storage pits has been based upon a seemingly logical, but not necessarily correct, series of assumptions. The clearest of these has been best stated by Janet Davidson who wrote: "Of all the tropical crops available to migrating Polynesians, the *kumara* has adapted best in New Zealand conditions; it is reasonable to assume that the earliest settlers, like their descendants, concentrated their attention on the most successful of their cultigens (Davidson 1979:234)."

No one could argue with Davidson regarding the adaptive qualities of the sweet potato, nor her logical reasoning that the earliest settlers would probably have concentrated on their most successful cultigens. What is questionable, however, is the assumption that the sweet potato was one of the crops of the earliest settlers in New Zealand.

This idea seems to have been given its strongest support by yet another assumption based upon an attempt to interpret the function of a special type of prehistoric structure, thought to have been for storage, by applying historic ethnographic analogy. This was the rectangular, roofed, semi-pit structure whose function as a sweet potato storage facility was originally suggested by Jack Golson in 1959. These had been excavated by him at an Archaic site at Sarah's Gully. Since it was known that historic Maori had stored sweet potatoes in pits to serve as seed stock for the following spring planting, Golson applied ethnographic analogy to suggest a similar function for the Sarah's Gully structures. Since the radiocarbon dates for the site fell within the fourteenth century, by inference sweet potatoes had to have been in cultivation during that period of time (Golson 1959:45). This initial interpretation became sufficiently accepted that by 1970 R. G. Law found no reason to hesitate in stating in a footnote that "The vast majority of pits excavated in New Zealand can have served no other function but *kumara* storage (Law 1970:114, ft. nt. 2)." However, in his final remarks he confessed that while evidence pointed to agriculture being early in New Zealand, the presence of the sweet potato at that time could only be inferred (Law 1970:125).

Yet another argument for an early pre-Columbian introduction of the sweet potato has to do with what is seen as the need for an extended length of time for it to have adapted to New Zealand's cooler climates (O'Brian 1972:349; Yen 1974:307). While varieties of *I. batatas* must vary in their adaptive capabilities, the time factor need not have been overly excessive. At least we know that those that were introduced into the eastern seaboard of the United States, almost certainly from the Caribbean islands, appear not to have required a particularly long time to adapt to those cooler climates. Consider, for example, that the first English settlement in that region was Jamestown, Virginia, founded in 1607, and that by 1642 sweet potatoes were reported as one of the crops growing in Virginia. Thus, no more than 35 years was needed for the sweet potato to adapt to the climatic conditions of the seaboard between the latitudes of 37 and 38 degrees North. By 1764, 122 years later, the tuber was reported as being in general use in New England, which would place the sweet potato about 40°N. (Hedrick 1972:315). A time span of no more than 157 years, and probably less, was required for adaptation to those more extreme temperate environments.

While this is no attempt to equate precisely the environmental factors of the eastern seaboard with those of North Island, New Zealand, the historically recorded adaptive time element in the former region strongly suggests that no overly great amount of time need be envisaged for the adaptation of the sweet potato to at least the northern portion of the latter region. Therefore, the argument that its adaptation is an indication of its early pre-Columbian introduction into New Zealand would appear to be doubtful at best.

Since there is no solid evidence that the sweet potato was a pre-Columbian crop in New Zealand, there remains the possibility of its having been an early post-Columbian introduction. It would thus seem equally plausible to assume that the store of crops brought by the earliest agricultural settlers were only those of southeast Asian origin. Of these, historical records would seem to show that taro, *Colocasia esculenta* [L.] Schott, has proven to have adaptive qualities that have allowed it to grow in the warmer areas of the subtropics both to the north and south of the equator. For example, in Europe it was reported at an early date to be growing in Portugal and southern Italy, which would place it in the latitude of 40°N. (Candolle 1967:74). It was also noted as being cultivated in Japan (Hedrick 1972:186), where it was probably limited to that country's subtropical zone. This latter extends north on the east coast of Honshu to about 36°N. and on its west coast to only about 34°30'N. (Spencer 1954:403, Fig. 136).

South of the equator, in New Zealand, there appears to have been a belief that taro was limited to the more northern areas of North Island (Groube 1967:21-22). However, although Cook recorded sweet potatoes and yams (*Dioscorea* spp.) growing around Tolaga

Bay on the east coast of North Island at about 38°30'S. (Cook 1955, 1:186-87), his naturalist, Sydney Parkinson, identified the latter crop not as yams but as taro (Parkinson 1784:96-98). That this was correct is supported by both Parkinson and the other expedition naturalist, Joseph Banks, who reported no yams until the Bay of Islands was reached at about 34°30'S. In addition, the latter noted "cocos," the early vernacular name for taro, growing at Anauru Bay, just north of Tolaga Bay (Banks 1963, 1:417). That some unidentified varieties of taro have been known to grow somewhat farther south than 40°S. is indicated by R. Garry Law who cited E. Dieffenbach as referring to taro being grown in Queen Charlotte Sound (Law 1969:26). While this may have represented a historically introduced variety, at least it illustrated the adaptive capabilities of the plant. Regardless, on the basis of Parkinson and Banks, it would appear that taro was not always limited to the northernmost portion of North Island, and thus could have been a far more important prehistoric food crop than has been assumed. Accepting this as a possibility, it is worth returning to the subject of the pre-Columbian storage structures.

So well established has been the assumption of an early cultivation and storage of sweet potatoes that nobody in recent years seems to have seriously investigated the possibility that such facilities might have originally been used for taro. Yet, not only did Elsdon Best mention the use of storage pits for the taro cormlets used for seed stock (Best 1976:238, 243), but some of Douglas Yen's Maori informants on the east coast of North Island confirmed that such a practice had been common until quite recently. Furthermore, Yen noted that there were varieties of taro still being grown by the Maori in Northland and along the east coast that were capable of over-wintering in the ground in favorable locations (Yen 1961:345).

Though there was knowledge of the former storage of taro corms in pits, it appears not to have been applied as a plausible alternative to the presumed sweet potato storage function of at least the Archaic pits. Such an alternative would do away with the need to assume a warmer climate having had to exist in order for the sweet potato to have initially survived early introduction using only traditional tropical agricultural techniques which did not require storage, as envisaged by Yen (Yen 1974:29, 298-301). In other words, had the earliest agricultural settlers arrived on North Island *without* the sweet potato, but with an adaptive variety of taro, such as was still growing in Northland in 1961, climatic deterioration need not have had to be a consideration. The initial agricultural requirements of what surely was a small founding population could have been served by those initial corms and their offspring that had been planted in the more favorable locations, not to mention the gourd and the less adaptive yam that may have come with them. As the population increased, and the need to grow additional taro beyond the limited favorable locations became necessary, the time factor involved in such population growth would have been sufficient for the innovative experimentation in developing a technique of over-wintering the seed taro in prepared storage pits. Having once developed this technique, such knowledge, perhaps accompanied by minor variations, would have been available when the sweet potato finally did make its appearance in New Zealand at a later date.

That taro can be stored in subtropical regions has been proven in the United States in at least one area. Experiments by the U.S. Department of Agriculture in growing taro for commercial purposes in the humid subtropical southern states, found that extended storage for such a crop was quite feasible. It was determined that both the corms and cormlets, especially the latter, could be stored in ventilated, dry basements for a number of months, the cormlets up to six months, without sprouting. However, the temperature had to be maintained at around 50°F. (10°C.). Lower temperatures, especially those approaching freezing, killed the buds. The foremost requirement before undertaking such storage was the need to cure the corms and cormlets under conditions of free ventilation for several days at the time of harvest (Young 1924:17). That such open air curing

before storage may have been practiced by the Maori was suggested by a statement by Best. He reported that in many cases harvested taro was not stored in food storage pits but stacked outdoors in conical heaps and covered with rushes or sedge grass (Best 1976:238). While this was interpreted by him as an optional storage technique, its real purpose may have been to cure the seed stock before final storage. Thus, considering the need for ventilation, dryness, and freedom from frost, the New Zealand rectangular, roofed, semi-pit structures, especially those with presumed drainage channels, may well have originally been made to accommodate the more limited storage time requirements for over-wintering taro, rather than sweet potato.

Adding to this scenario that taro may have been the important early crop is the matter of its soil requirements. While wetland taro is best served by alluvial soils in valley floors, dryland taro, although adaptable to a variety of soils, is reported to give best results when planted in well drained, friable soils (de la Pena 1983:167). This latter condition corresponds quite well with what has been assumed to represent prehistoric sweet potato soils in New Zealand, especially those in which sand or gravel has been added (Law 1970:117; Bellwood 1979:382). Indeed, Best (1976:236) referred to Colenso's observation of taro fields covered with white sand, as well as judge J. A. Nilson's account of sand or gravel being placed in a layer over the soil (Best 1976:241). He also referred to yet another source in which it was claimed that in planting taro in a hole, the comlets were surrounded with gravel (Best 1976:236). In other words, the very soil additives that have been used as indicators of former plantings of sweet potatoes, apply equally well in assuming the former presence of taro. That both may be correct is a possibility in that, with the introduction of the more productive sweet potato, fields formerly used for planting taro were turned over to the production of sweet potatoes.

Based upon the above considerations, it would seem that Groube was indeed correct when, in 1967, he warned that the place of taro as a possible significant agricultural food had not been sufficiently considered in archaeological interpretation in New Zealand, and that the importance of the sweet potato was only based upon ethnographic analogy (Groube 1967:21-22). Nonetheless, there cannot be much doubt that when the more productive and adaptive sweet potato did arrive, it soon became the more significant of the two crops. Again, it is a question of when it arrived in New Zealand, and there are as yet no firm indications in the New Zealand archaeological record of when that might have taken place. It could have been a post-Columbian introduction from a source much closer to New Zealand than the often presumed Society Islands region. Gonzalez de Leza, chief pilot of Quiros' 1605-6 colonizing expedition from Peru, specifically stated that they had planted potatoes on Espiritu Santo in the New Hebrides (Markham 1967:387). Although Dixon (1932:43) chose to accept this as a reference to the common potato, *Solanum tuberosum* L., such seems highly unlikely since *S. tuberosum* is a temperate crop of which varieties have only recently been successfully introduced into some of the tropical islands of the Pacific (Barrau 1958:58, 87, 1961:61). It thus appears more probable, given Quiros' expedition having been victualled on the coast of Peru where *I. batatas* thrived, that de Leza's potatoes were sweet potatoes. Such could have diffused southward to New Caledonia and, as with Yen and Wheeler's 42-chromosome form of taro (1968:264), been transferred by an intentional or accidental human voyage southward to New Zealand. As previously noted, its adaptation to at least the northern portion of North Island need not have taken as long as has been conjectured, and with a pit storage technique for taro already in place, it would have been but a matter of applying this proven procedure to the more productive sweet potato to allow its further spread.

## LITERATURE CITED

- BANKS, JOSEPH. 1963. The Endeavour Journal of Joseph Banks. Angus and Robertson, Sydney. [J. C. Beaglehole, ed.], 2 vols.
- BARRAU, JACQUES. 1958. Subsistence agriculture in Melanesia. B. P. Bishop Mus. Bull. 219:1-111.
- . 1961. Subsistence agriculture in Polynesia and Micronesia. B. P. Bishop Mus. Bull. 223:1-94.
- BELLWOOD, PETER. 1979. Man's conquest of the Pacific. Oxford University Press, New York.
- BEST, ELSDON. 1976. Maori agriculture. Dominion Mus. Bull. 9:1-315. Reprint of 1925 edition with textual alterations.
- CANDOLLE, ALPHONSE DE. 1967. Origin of cultivated plants. Hafner Publishing Co., New York. Third printing of reprint of 2nd edition of 1886.
- COOK, JAMES. 1955-67. The Journals of Captain James Cook. Hakluyt Society, Extra Series, Nos. 34, 35, 36. [J. C. Beaglehole, ed.], 3 vols.
- DAVIDSON, JANET M. 1979. New Zealand. Pp. 222-248 in Jesse D. Jennings (ed.). The prehistory of Polynesia. Harvard Univ. Press, Cambridge.
- DE LA PENA, RAMON S. 1983. Agronomy. Pp. 167-179 in Jaw-Kai Wang (ed.). Taro: A review of *Colocasia esculenta* and its potential. Univ. Hawaii Press, Honolulu.
- DIXON, ROLAND. 1932. The problem of the sweet potato in Polynesia. Am. Anthropol. 34:40-66.
- GOLSON, JACK. 1959. Culture change in prehistoric New Zealand. Pp. 29-74 in J. D. Freeman and W. R. Geddes (eds.) Anthropology in the South Seas. Thomas Avery and Sons, New Plymouth.
- GROUBE, L. M. 1967. Models in prehistory: A consideration of the New Zealand evidence. Arch. and Phys. Anthro. in Oceania 2:1-27.
- HEDRICK, U. P. [ed.]. 1972. Sturtevant's edible plants of the world. Dover Publications, New York.
- LAW, R. GARRY. 1969. Pits and kumara agriculture in the South Island. Polynesian Soc. 78:223-251.
- . 1970. The introduction of kumara into New Zealand. Arch. and Phys. Anthro. in Oceania 5:114-127.
- MARKHAM, CLEMENTS (trans. & ed.). 1967. The voyages of Quiros, 1595 to 1606. The Hakluyt Society, 2nd Series, Vol. 14. Kraus reprint of 1904 edition.
- O'BRIEN, PATRICIA J. 1972. The sweet potato: Its origin and dispersal. Am. Anthropol. 74:342-365.
- PARKINSON, SYDNEY. 1784. A journal of a voyage to the South Seas, in His Majesty's Ship the Endeavour: Faithfully transcribed from the papers of the late Sydney Parkinson. . . . Dilly and Phillips, London.
- SPENCER, JOSEPH E. 1954. Asia, cast by south: A cultural geography. John Wiley and Sons, New York.
- YEN, D. E. 1961. The adaptation of kumara by the New Zealand Maori. Polynesian Soc. 70:338-348.
- . 1974. The sweet potato and Oceania: An essay in ethnobotany. B. P. Bishop Mus. Bull. 236:1-389.
- and JOCELYN M. WHEELER. 1968. Introduction of taro into the Pacific: The indications of chromosome numbers. Ethnology 7(3):259-267.
- YOUNG, ROBERT. 1924. The dasheen: A southern root crop for home use and market. U.S. Department of Agriculture, Farmer's Bull. 1396. Washington, D.C.