

Horticultural experimentation in northern Australia reconsidered

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Did the banana, yam and taro arrive in Australia at the hands of Europeans or come across the Torres Strait 2000 years before? Reviewing the evidence from herbaria histories and anthropology, the authors propose a 'hierarchy of hypotheses' and consider a still earlier option, that these food plants were potentially grown in Australia at least 8000 years ago, while it was still joined to New Guinea. This hypothesis, first proposed by Jones and Meehan in 1989, locates early horticultural experiments among peoples too often seen as inveterate hunter-gatherers.

Keywords: Australia, Torres Strait, Pleistocene, Holocene, palaeobotany, banana, taro, yam

Introduction

In 1770, Joseph Banks portrayed Aborigines living along the Queensland coast as being 'ignorant of the arts of cultivation' (Beaglehole 1962: 123). Since that time, prehistorians working inside and outside Australia have persistently restated its unique character as a 'continent of hunter-gatherers' (e.g. Lourandos 1997; Bellwood 2005; cf. Barker 2006: 227–8). An assessment of multi-disciplinary data from northern Australia, primarily botany and geomorphology, challenges this view. Rather than locking Aboriginal Australians into a relatively timeless and static historical template (David & Denham 2006), the available data for northern Australia suggests that there were major cultural transformations during the Holocene, structured by environmental and social contingencies. This dynamic history requires consideration of mid- or late Holocene interaction between Australia and New Guinea, and potentially Island Southeast Asia, and resurrects a hypothesis proposed by Jones and Meehan (1989) for the earlier existence of an 'experimental horticultural province' in northern Australia before sea levels rose to form the Torres Strait during the early Holocene:

'It is possible that the first experimental cultivation of such plants as Colocasia and possibly yams, bananas, sugar cane, and Pandanus, took place at th[e] time when New Guinea and Australia were part of the same landmass. The southern boundary of this experimental horticultural province may have been on what is now Australia' (Jones & Meehan 1989: 132).

The three important cultivated domesticates in New Guinea that are minor 'wild' food plants in northern Australia are the banana (*Musa acuminata* ssp. *banksii*), taro (*Colocasia*

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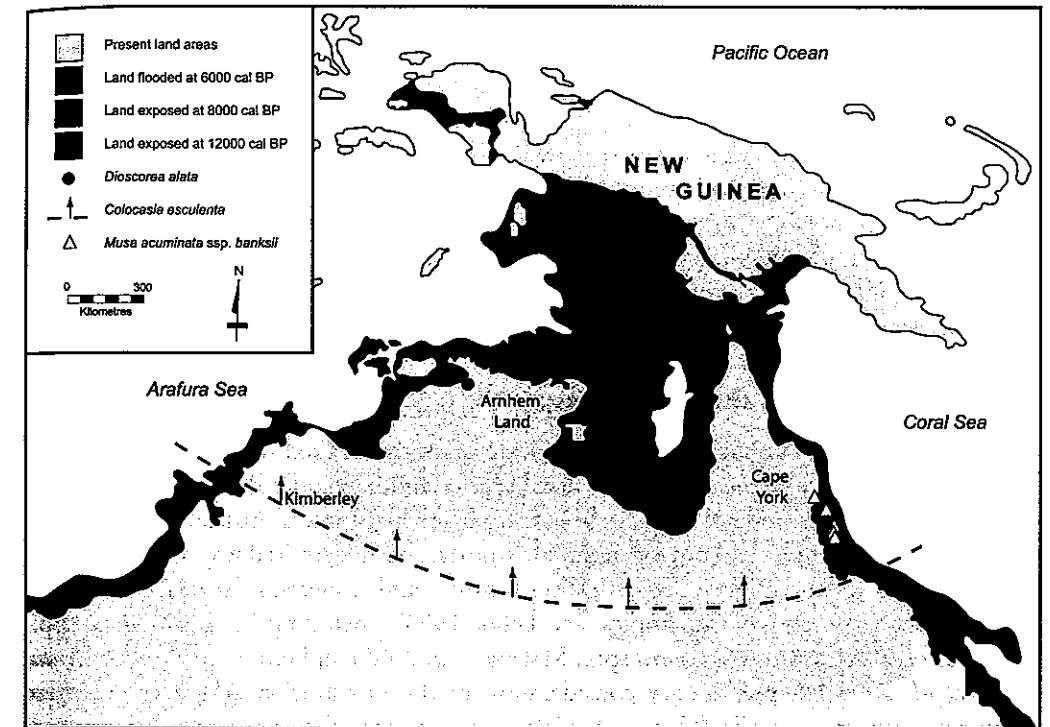


Figure 1. Coastal change and selected plant distributions in northern Australia. Light blue and light brown show present-day sea and land, respectively. Two shaded areas of darker brown indicate the extent of land exposed at c. 12 000 cal BP and c. 8000 cal BP. The darker blue region indicates an area flooded at 6000 years ago, much of which along the southern coast of New Guinea is today exposed as land (following Chappell 2005). Historically recorded and previously attested plant distributions are shown for yam (*Dioscorea alata*, Telford 1986), taro (*Colocasia esculenta*, Matthews 1991) and a banana (*Musa acuminata ssp. banksii*, INIBAP 2006).

esculenta) and the greater yam (*Dioscorea alata*). In this paper, we begin with a consideration of the changing geography of northern Australia since the Terminal Pleistocene, in order to characterise the environmental context for human and botanical processes. Following this, we review the botanical and historical records for these three food plants in Australia. Although many details remain to be elicited, the histories of these food plants require us to reconsider depictions of Australia as always having been a 'continent of hunter-gatherers'.

Sea levels, landmasses and social interaction

Figure 1 shows the geometry of the coastline of northern Sahul before and immediately after the severing of the land bridge (after Lambeck & Chappell 2001; Chappell 2005). The flooding of the region north and west of Arnhem Land to form the Arafura Sea and Gulf of Carpentaria, respectively, occurred in the Terminal Pleistocene (c. 12 000 years ago). From this time, communities in present-day Arnhem Land became increasingly isolated from their former neighbours living to the north, as did communities living on Cape York and the present-day islands of the Torres Strait from approximately 8500 years ago following the flooding of the land bridge between Australia and New Guinea. Maritime interaction

occurred within and across the Torres Strait from at least c. 2500 years ago (McNiven *et al.* 2006).

Approximately 6000 years ago, much of the southern coast of New Guinea was further north than today (Figure 1). Coastal progradation has extended the coastline southward during the last several thousand years; it was fed by deposition from several major river systems draining the highland spine of New Guinea (Swadling & Hope 1992). As well as being further north, much of the low-lying coastline at this time would have been subject to periodic and major flooding. Consequently, there are strong environmental factors disrupting regional social continuity between northern Australia, islands of the Torres Strait and southern New Guinea.

Plant distributions and human agency

Bean (2007: 4–6) has argued that botanists have often overlooked or underestimated the role of human agency in the dispersal of floral species and concludes that a range of plants formerly thought to be indigenous have been introduced by people to Australia in the recent and distant past. Genetic and phylogeographic studies, and in a limited way archaeobotany, have shed light on the origins, domestication histories and dispersal of several major food plants through the Old World tropics (see Lebot 1999), including bananas (*Musa* spp., Carreel *et al.* 2002), yams (*Dioscorea* spp., Malapa *et al.* 2005) and taro (*Colocasia esculenta*, Lebot *et al.* 2004). A preliminary consideration of the distribution and status of these plants in northern Australia (Figure 1) might conclude that they are either components of the natural, 'wild' flora of Sahul (that is they are indigenous to Australia), or else were introduced to Australia by contact with agricultural peoples in Indo-Malaysia and New Guinea during the late Holocene. Certainly, relatively recent contact has been documented (Barham 2000) and the idea of planting accounts for the occurrence of isolates such as the *Dioscorea pentaphylla* var. *papuana* found on Thursday Island in the Torres Strait (Telford 1986: 199, 219).

The published botanical and ethnobotanical evidence from northern Australia is shown in Figure 1. A fuller distribution is given in Figure 2a–c for each of the three plants under consideration. These maps include data taken from herbaria records, but given the patchiness and selectivity of these collections, additional populations of each plant are likely to be present in northern Australia.

Banana (*Musa acuminata* ssp. *banksii*)

During a voyage along the Queensland coast by Captain Cook in *The Endeavour* during June 1770, Joseph Banks sampled bananas growing near the Endeavour River, describing them as 'a kind of Wild Plantain whose fruit was so full of stones that it was scarce eatable' (Beaglehole 1962: 85). Early historical records suggested three species of banana (*Musa* spp.) were present in the wet tropics of north-eastern Queensland. Following a collecting expedition to Queensland in 1954, Simmonds reported only *Musa acuminata* ssp. *banksii* (formerly reported as *Musa banksii*) to be extant and concluded that the other two taxonomically uncertain species were extinct (Simmonds 1956a: 254, 257) 1956b: 463–6; see also Ross 1987). *Musa acuminata* ssp. *banksii* is considered a natural component of secondary growth

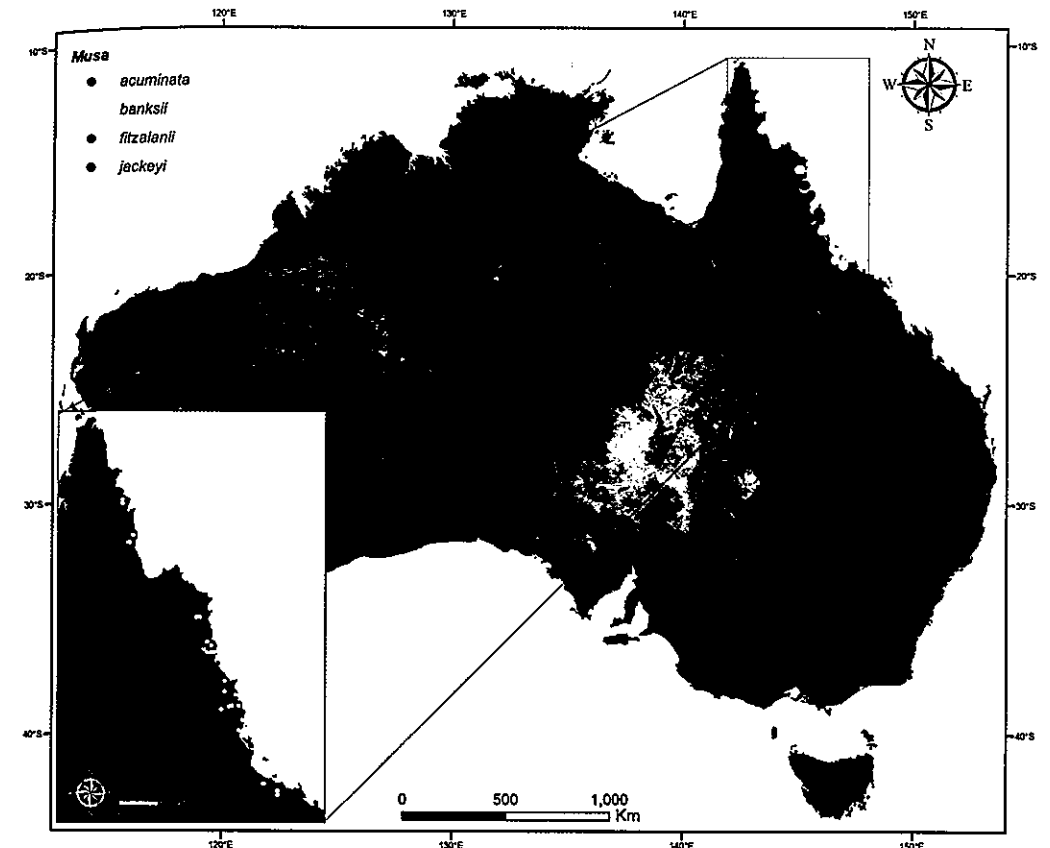


Figure 2a. Australian herbaria records: bananas (*Musa* spp.). Herbaria records incorrectly classify *M. acuminata* ssp. *banksii* as either *M. acuminata* or *M. banksii* banana species. Another banana species, *M. jackeyi* is still extant, whereas *M. fitzalanii* is considered extinct in the wild (Simmonds 1956a & b).

and an edge coloniser within the wet tropical rainforest flora (Simmonds 1956a: 254; Ross 1987: 17). Historically, its distribution is variably reported, but extends from the Iron Range, Cape York, to Townsville (Ross 1987; Dick 1994; see Figure 1). However, herbaria specimens in Australia indicate a broader distribution along the north-eastern coast of Queensland (Figure 2a). Seed dispersal is facilitated by animals and watercourses (Jeff Daniells *pers. comm.*).

Various parts of *Musa acuminata* ssp. *banksii* have been reported as being eaten by Aborigines. Dick (1994) notes that Aborigines south of Cairns ate the seed-filled fruit, whereas Aborigines north of Mossman ate starch extracted from the interior pseudo-stem:

Aborigines in the areas north of Mossman used to cut the tree down just as the flower emerged. The trunk was cut into lengths and the lengths peeled of leaf-sheaths until only two or three were left covering the flowering stem which, of course, had grown up from the corm or butt. These lengths of stem were baked on hot stones or in hot ashes. It contains a fair amount of starch and the flavour was very like cooked green bananas or plantains' (Dick 1994: 266).

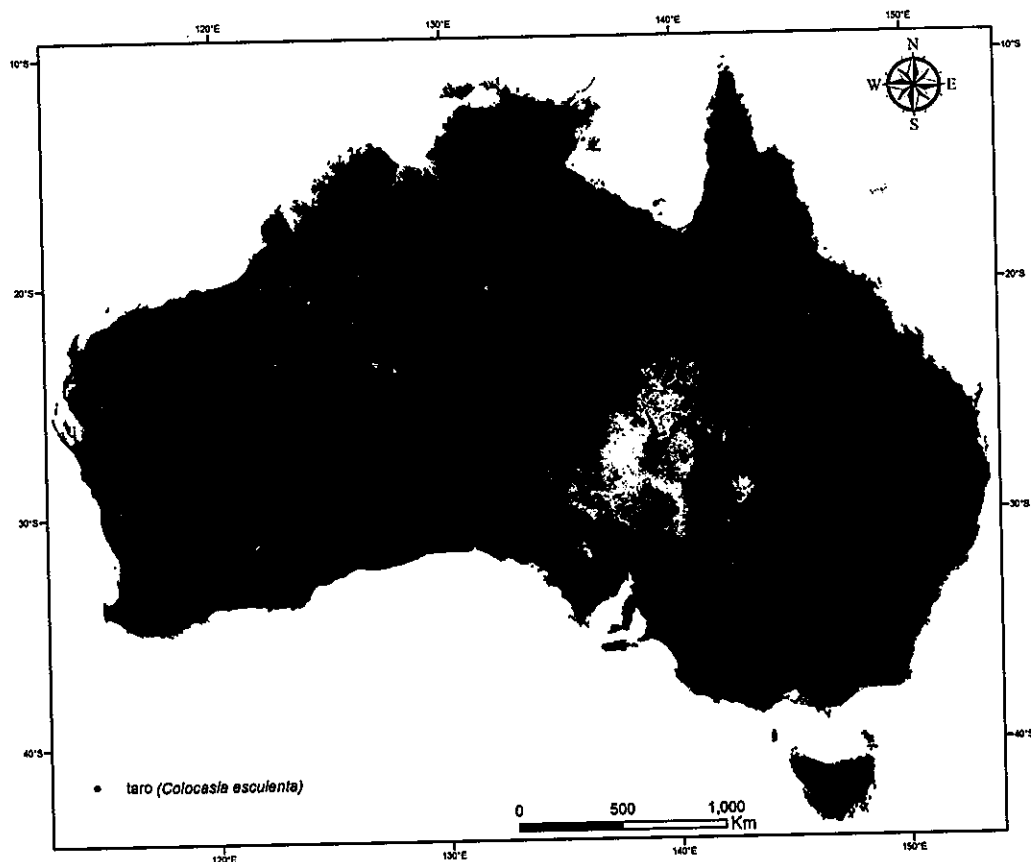


Figure 2b. Australian herbaria records: taro (*Colocasia esculenta*).

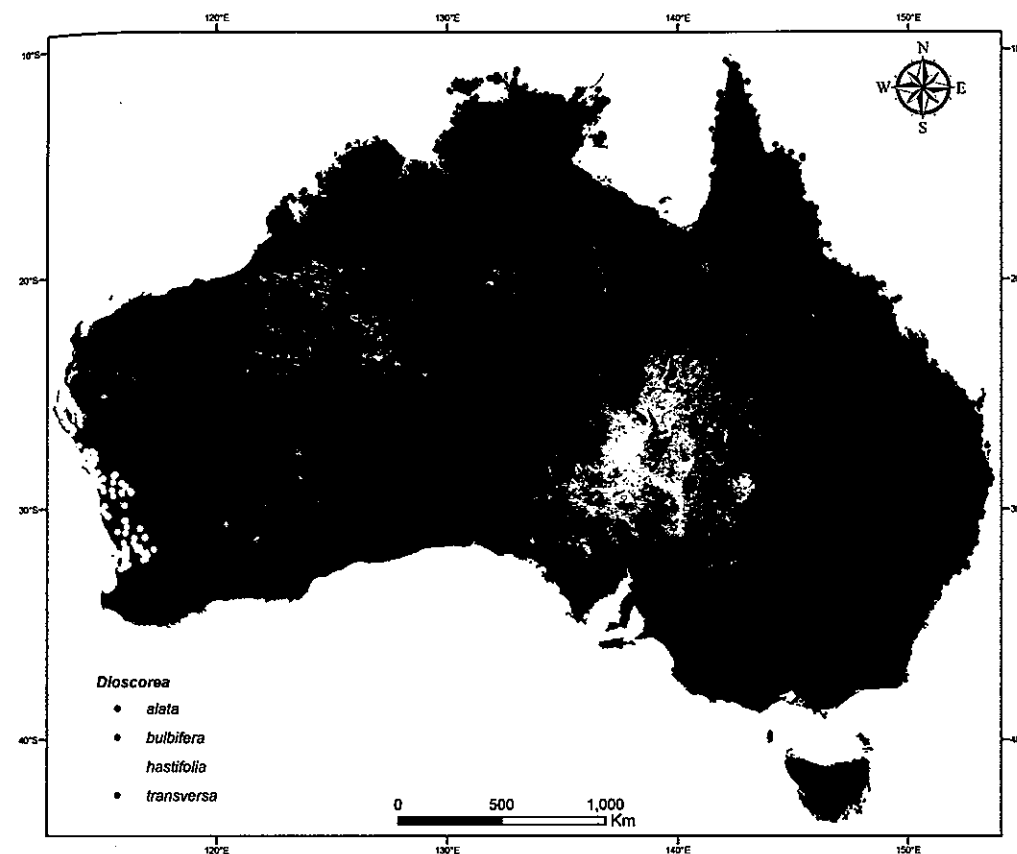


Figure 2c. Australian herbaria records: yams (*Dioscorea* spp.). Other yam species in Australia are depicted to show the relative paucity of *D. alata* records in contrast to other species.

Other plant parts were eaten including the conical bud at the apex of the flowering stalk and the young, white parts of new shoots at the base of the plant (Cribb & Cribb 1974: 44, 108–9).

Until the last decade, cultivated bananas of *Musa* section (formerly *Eumusa* section), which include *M. acuminata* ssp. *banksii*, were generally considered to have been introduced from Southeast Asia to New Guinea (Yen 1995), even though wild-types of these bananas were known to exist in the latter region (Argent 1976). Recent genetic research suggests that initial domestication of a *Musa acuminata* ssp. *banksii* wild-type occurred in the New Guinea region first, prior to subsequent westward dispersal and hybridisation with Southeast Asian *Musa* species and other *Musa acuminata* subspecies (De Langhe & De Maret 1999; Lebot 1999; Carreel *et al.* 2002); this interpretation has received some archaeobotanical (Denham *et al.* 2003) and linguistic (Denham & Donohue 2009) corroboration.

Taro (*Colocasia esculenta* var. *aquatilis*)

A wild-type taro (*Colocasia esculenta* var. *aquatilis*) occurs across a broad region (Matthews 1991), including northern Australia and New Guinea, and is considered to be the precursor

of domesticated taro (*C. esculenta*). Wild-type taro populations occur in northern Australia from the east Kimberley region to Arnhem Land to the coast of southern Cape York (Jones & Meehan 1989: 126–7; Matthews & Terauchi 1994: 254; see previously attested and herbaria distributions in Figures 1 and 2b, respectively). Taro has been present in the north-eastern rainforests of Queensland for at least the last 10 000 years (Haberle 2005).

Wild taro in Australia produces small corms with little edible starch, although records vary, and both leaf and corm are highly acrid and require cooking or processing prior to consumption (cf. Cribb & Cribb 1974: 148). Jones & Meehan (1989: 126) noted that people consider taro a minor food plant in Arnhem Land, although it could have been a more important food plant in the past. In June 1770, Joseph Banks noted that taro grew plentifully near the Endeavour River in eastern Cape York, but that the roots were small and too acrid to eat; large quantities of leaves were gathered at this place because 'the leaves however when boiled were little inferior to spinach' (Beaglehole 1962: 85). Banks' record suggests a considerable number of taro plants were growing in the vicinity. In August of that year, Banks went on to note: 'Whether they [Aborigines] knew or ever made use of the Cocos [taro] I cannot tell; the immense sharpness of every part of this vegetable before it is dressed makes

it probable that any people who have not learned the uses of it from others may remain for ever ignorant of them' (Beaglehole 1962: 127).

The wild type distribution, particularly in northern Australia, may represent ancient biogeographic distributions, dispersal by birds, or human dispersal without cultivation (Matthews 1991). Plants in Queensland produce flowers, fruit and viable seed suggesting the possibility of animal dispersal (Matthews & Terauchi 1994). The presence of distinct genetic subpopulations (using ribosomal DNA) in taro populations from the east Kimberley, Arnhem Land and north-east Queensland implies limited inter-breeding and genetic flow between populations in each region (Matthews & Terauchi 1994). Genetic patterns with strong inter-regional variation would not be anticipated if animals and birds were the predominant mechanism for the dispersal of viable seed, since less inter-regional variability among resultant taro populations would be expected. Additionally, preliminary genetic analysis suggested some gene flow between taro populations in north-east Queensland and New Guinea; the timeframe over which this occurred is uncertain (Matthews & Terauchi 1994; Peter Matthews *pers. comm.*).

Greater yam (*Dioscorea alata*)

In contrast to banana and taro, no wild populations of the greater yam (*Dioscorea alata*) are known, only cultivars. The greater yam is the most widely dispersed yam species globally (Mignouna & Dansi 2003), even though the 'original geographic and wild sources are still unidentified' (Lebot *et al.* 1998: 508). A study of genetic variation within greater yam from various regions of the world concluded that some genetic variation reflects sexual reproduction (Lebot *et al.* 1998), but widely dispersed cultivars are considered clones with a narrow genetic base (Lebot 1999: 625). Greater yam cultivars overwhelmingly reproduce asexually, as reflected genetically, although sexual reproduction has been induced artificially (Abraham & Gopinathan Nair 1991). The establishment of geographically dispersed subpopulations is a product of human agency, namely transplanting and vegetative propagation.

Given the predominant mode of asexual reproduction of the greater yam, and its status as a cultivar, it is surprising that several populations have been documented in two discontinuous regions of northern Australia: Arnhem Land and along the north-eastern Queensland coast (see Figures 1 and Figure 2c; Telford 1986). Assuming that the origin of these greater yam populations is external to Australia, and there is no reason to consider them indigenous, they were almost certainly planted in these disjunctive locations. Telford's description of the greater yam in Australia relies heavily on White (1919), who reports the plant near Innisfail at the Johnstone River. The taxonomic identification reported by White was undertaken by Mr. I.H. Burkill, who is quoted:

'The Dioscorea is D. alata. Though this species is recorded as wild in the interior behind Darwin, I believe that it has not been obtained previously in Queensland' (White 1919: 22).

Telford considers the plant to be 'naturalised in northern N.T. [Northern Territory] and coastal north-eastern Qld [Queensland] in disturbed rainforest' (1986: 200). The occurrence

of naturalised populations of a clonally reproduced plant at several disparate locations of northern Australia is a conundrum.

Discussion

How are the distributions of these three food plants in northern Australia to be accounted for historically? Although the co-occurrence in northern Australia of three food plants that are important domesticates in New Guinea is intriguing, it is unlikely that all three species and their regional populations can be accounted for by the same historical processes. Some plants and populations may reflect biogeographical distributions, whereas others implicate people.

Records of planting by Aborigines are scarce and sometimes only inferential (Chase 1989; Denham 2008). More typical are accounts of replanting the viable portions of a plant during the harvesting of roots and tubers (e.g. Berndt & Berndt 1993). Multiple greater yam (*Dioscorea alata*) populations in northern Australia provide the earliest unambiguous evidence of deliberate planting on the continent, because viable populations of these plants could not have become established without human agency. Planting of greater yam was undertaken by multiple social groups in geographically distinct locales at various, as yet undetermined, times in the past. These acts of planting would not have been isolated events focused on a single plant, rather they represented an orientation to the world and a set of predispositions into which practices of planting made sense within the context of wider practices of landscape management. These predispositions are likely to have been very different to those documented for many Aboriginal groups across Australia in the recent past (Golson 1971; Keen 2003). Positing an earlier, now vanished, predisposition to planting opens up new interpretative possibilities for our understanding of banana (*Musa acuminata* ssp. *banksii*), some regional populations of taro (*Colocasia esculenta*), and other plant distributions in northern Australia.

A hierarchy of hypotheses of different time depths is proposed here to account primarily for the distributions of these three food plants, as well as by implication other plants and associated experimental horticultural practices, in northern Australia.

Introduction by Europeans or Macassans

The earliest historical record of greater yam populations in northern Australia, for both Arnhem Land and north-eastern Queensland, is White (1919). Early European explorers are unlikely sources of introduction; their accounts of landfalls focus on the gathering of indigenous plants for food or herbaria samples. Presumably for European explorers, and particularly English explorers, there was no purpose in introducing crop plants given that Aborigines were considered to be 'ignorant of the arts of cultivation'.

There were unsuccessful attempts by missions, such as the Lockhart River Mission in Queensland, to introduce Melanesian style horticulture and crop plants to Aborigines (Chase 1980, 1989). These attempts postdate and are geographically removed from White's records of naturalised *D. alata* populations. Thus, missionary and government activities within the last 100 years do not account for the naturalised populations of greater yam in Arnhem Land and north-east Queensland. Similarly, other potential nineteenth- and early

twentieth-century sources, such as Chinese gold prospectors and blackbirded plantation labourers from the Pacific Islands, do not account for the observed distributions.

Macassans from central and eastern Indonesia could have introduced the greater yam to Arnhem Land during their visits to northern Australia for *bêche-de-mer* from the early 1700s (Barham 2000). There is substantial, well-documented evidence that the Macassan traders spent time in Arnhem Land waiting for the monsoonal winds that would facilitate their return voyage; during these periods Macassans interacted extensively with local Aboriginal populations (e.g. MacKnight 1976; Walker & Zorc 1981; Clarke & Frederick 2006). Greater yam tubers could feasibly have been brought to sustain these sailors; these tubers are known to be relatively resilient during transport due to a long dormancy period (Martin 1976). However, the establishment of wild populations of the plant in the interior of Arnhem Land would require more than just the introduction of the plant; it would require a predisposition of the indigenous population to adopt and to transplant the new tuber away from the coast.

If a Macassan introduction to Arnhem Land is hypothesised, this must have happened among Aboriginal groups who already practiced some form of experimental horticulture and planting. Ethnographic evidence of such practices in Arnhem Land is extremely limited (Jones & Meehan 1989). Additionally, such an explanation fails to account for the greater yam populations in north-eastern Queensland, where there is no independent evidence of Macassan contact.

Introduction from New Guinea during the mid- or late Holocene

In a recent review, McNiven (2008) discusses the active role of Torres Strait Islanders in the management of landscapes and resources over the last 4000 years. Maritime interaction with New Guinea has been documented on islands in the Torres Strait from at least 2600–2400 years ago (McNiven *et al.* 2006), and is generally accredited with the introduction of crops and cultivation practices to islands in the Torres Strait (Harris 1977). Given these documented maritime interactions, greater yam and other cultivated plants could have been introduced, together with associated planting technology and world views, to northern Australia from New Guinea via the Torres Strait during the mid- or late Holocene. Such a scenario is highly plausible and may account for the coastal distribution of *D. alata* populations, as well as potentially those of *Musa acuminata* ssp. *banksii* and some regional populations of taro, along the north-eastern coast of Queensland.

The co-occurrence of banana, taro and greater yam in the wet tropics of north-eastern Queensland seems more than coincidental. As we have already noted, Cape York was the last part of Australia to be connected to New Guinea, with a land bridge remaining until approximately 8000 years ago. Today, this region remains the point of mainland Australia closest to New Guinea. The three food plant species represented have a long history of exploitation and management in New Guinea, where they are all implicated in the early emergence of agriculture (Denham *et al.* 2003). Could the co-occurrence in north-eastern Queensland represent the remnants of now abandoned horticulture based on banana, taro and yams, among other plants, introduced from New Guinea?

A similar scenario of maritime introduction and adoption from New Guinea, or possibly from Island Southeast Asia, could be invoked to account for the *D. alata* populations

in Arnhem Land. The plant could have been introduced twice, presumably by two different maritime groups to Arnhem Land and north-eastern Queensland during the mid- or late Holocene. This explanation invokes multiple introductions to geographically dispersed, receptive communities, a knowledge of rudimentary horticultural exploitation, a predisposition to planting across a vast area and the subsequent establishment of viable 'wild' populations in two regions. Of note, few other traits associated with crop introductions, whether technologies or material culture, have survived or are known from the mid-Holocene. The only well-documented mid- to late Holocene introduction to Australia is the dingo, which could have been introduced either directly from Island Southeast Asia or via New Guinea (Corbett 2001).

Horticultural experimentation in northern Australia during the Terminal Pleistocene or early Holocene

'Colocasia, with its feet in the running freshwater streams of remote interior Arnhemland, probably illustrates the type of condition from which experimentation developed into the full-scale horticultural systems of New Guinea' (Jones & Meehan 1989: 132).

Banana and the greater yam can be added to taro as plants that were potentially subject to varying degrees of management and experimentation in northern Australia prior to the flooding of the Torres Strait. Other plants could certainly be included on this list. For example, the distribution of taro in northern Australia maps very closely to the distribution of bitter yam (*Dioscorea bulbifera*), which was widely eaten and managed by Aborigines (e.g. Russell-Smith *et al.* 1997) and is still a common cultivar in New Guinea. Could these corresponding geographies represent similar land use and resource extraction practices in the distant past? Such a reading of the available evidence would partially address questions concerning why agriculture did not seemingly spread to Australia from New Guinea (e.g. Harris 1995).

Although banana and taro are often considered, perhaps arguably, to be components of the tropical flora of northern Australia (Simmonds 1956a & b; Matthews 1991), the role of human agency in the dispersal of banana and some regional populations of taro to and within northern Australia needs to be reconsidered given the presence of geographically disparate populations of greater yam. The greater yam distributions are unquestionably the product of human selection and dispersal (after Lebot 1999). If the dispersal of greater yam occurred before the separation of New Guinea and Australia, following Jones & Meehan's hypothesis (1989), then horticultural experimentation occurred in northern Australia before at least 10 000 years ago. Earlier or contemporaneous exploitation and likely management of taro and yams have been inferred for Island Melanesia (Loy *et al.* 1992; Barton & White 1993), lowland New Guinea (Hope & Golson 1995; Yen 1995) and highland New Guinea (Denham *et al.* 2003; Fullagar *et al.* 2006).

According to this hypothesis, experimental horticulture occurred in parts of New Guinea and northern Australia prior to the flooding of the Torres Strait. A Terminal Pleistocene and early Holocene timeframe for plant management in northern Sahul, including transplanting,

is plausible based on the antiquity of the New Guinea evidence (Hope & Golson 1995; Yen 1996). Experimental plant management practices across the region were probably generalised and adapted to whatever food plants were at hand. Although populations of banana, taro and greater yam are all now considered 'wild' in northern Australia, this does not mean that they were always solely components of the natural flora of the regions in which they occur, or that they were never managed. For example, does banana exploitation in Australia reflect some of the practices for which the plant was originally domesticated, namely, for the starch in its stem as well as for its fruit? Globally, several species of yam display a phenotypic response to harvesting practices in Australia (Denham 2008) and cultivation practices in other parts of the world (Chikwendu & Okezie 1989) such that they revert to wild-type when exploitation practices are relaxed. Similarly, and despite genetic variability, wild-type taro in northern Australia is phenotypically similar; plants are '*almost always green and all produce long stolons (vegetative side-shoots) and central corms with very little starch*' (Matthews & Terauchi 1994: 254). The similar phenotype of genetically and geographically distinct taro populations may solely reflect a lack of human intervention in their recent management, which in turn reflects their contemporary status as a minor food plant, rather than anything fundamental about human experimentation and management of them in the more distant past.

From this perspective, present-day populations of banana, taro and the greater yam in northern Australia represent formerly managed plants that were abandoned and phenotypically reverted to 'wild-type'. Effectively, these plants had been subject to the same domesticatory relationships as their counter-parts in New Guinea, but the domestication process was abandoned. In this sense, these populations do not represent 'natural' forms, but plants subject to horticultural experimentation that have subsequently phenotypically reverted to 'wild-type' and have genetically altered through varying degrees of sexual or asexual reproduction. These experimental horticultural tendencies, potentially including transplanting and vegetative propagation, were eventually transformed into various types of agriculture and arboriculture across most of New Guinea. By contrast, they were abandoned in northern Australia after the formation of the Torres Strait for as yet unknown reasons (although see Evans & Jones 1997 for speculation regarding the dynamic social history of Australia during the Holocene) and utilised plants faded into the regional flora. Only some remnant practices survive, such as planting in north-eastern Queensland, and the sustainable harvesting and replanting of tubers.

Conclusion

Revisiting ideas of experimental horticulture opens up debate about plant exploitation in northern Australia, and ways of life in Australia generally. Ethnographic observation has constrained thinking; we conceive of Australia as always having been a hunter-gatherer continent and archaeological assemblages have been interpreted consistently in this light. This perception has little to do with archaeological evidence and more to do with assumptions about past human behaviour inferred from accounts of the last few hundred years, and primarily the last 50 years. If we open up our historical frame of reference, then the hypothesis of experimental horticulture in northern Australia during the Terminal Pleistocene and early Holocene need not seem so strange. During the Terminal Pleistocene

and early Holocene people in northern Australia lived on a landmass contiguous (although decreasingly so) with what is now New Guinea. People in northern Australia shared similar climates, ecologies, food plant resources and – as hypothesised here – plant exploitation practices and lifestyles with the experimental cultivators on New Guinea; indeed, the two groups were indivisible, i.e. they were one-and-the-same, a conclusion consistent with some data from human biology (Birdsell 1993; Hudjashova *et al.* 2007; cf. Kayser *et al.* 2001).

If the experimental horticultural hypothesis, originally posited by Jones & Meehan (1989), is eventually rejected, the naturalised greater yam populations still require explanation and indicate pre-European introduction and planting in northern Australia. Introduction most plausibly occurred during the mid- or late Holocene from New Guinea, although Island Southeast Asia is a possible source region for greater yam populations in Arnhem Land. If the greater yam was introduced and presumably adopted within a context of some rudimentary horticultural practices, then the co-occurrence with banana and taro on the north-eastern coast of Queensland may not be solely coincidental. Although some populations of banana and taro may be ancient, other populations may have been introduced from New Guinea during the last few thousand years, just as cultivated varieties were introduced by European missionaries during the twentieth century.

The strength of any hypothesis rests on its testability and value as a spur to further research. The hypotheses developed here are not exclusive alternatives, rather each may be relevant for understanding certain plant and population distributions in different regions of northern Australia. The hypotheses can be tested in a number of independent ways. We can conduct phylogenetic studies of food plant populations in northern Australia, New Guinea and beyond to determine relatedness, source regions and dispersal histories. Additionally, archaeobotany is crucial to reconstructing the exploitation history of each plant, once microfossil techniques (especially phytolith and starch grain analyses) are applied more systematically by archaeologists to sites in Australia.

The greater yam is a cultivar, with no known wild progenitor, and its global populations display genetic characteristics reflecting predominant clonal reproduction. Such evidence is significant, because it suggests previously unattested planting in Australia before European contact, either during the Terminal Pleistocene/early Holocene or during the mid-/late Holocene. The social and historical contexts for these practices and their eventual demise are unknown, but recognition of these practices is a start towards freeing Australia from stereotypical portrayals of a 'continent of hunter-gatherers'.

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