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Foragers or Farmers: *Dark Emu* and the Controversy over Aboriginal Agriculture

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ABSTRACT

Bruce Pascoe's book *Dark Emu*, which has been a publishing phenomenon in Australia, argues that Aboriginal people were not 'mere' hunter-gatherers in 1788, but were farming. This article sets the argument of the book within the context of the views of archaeologists and anthropologists, as well as other historians, about Aboriginal agriculture. Some have argued that Aboriginal people were hunter-gatherers and asked why they did not adopt agriculture, while others have suggested that at least some groups were practicing farming. The article finds that while the boundary between foraging and farming is a fuzzy one, Aboriginal people were indeed hunters, gatherers and fishers at the time of the British colonisation of Australia.

KEYWORDS

Aboriginal Australia; agriculture; hunter-gatherers; *Dark Emu*; critique

Introduction

Dark Emu (Pascoe 2014, 2018a) has been a publishing phenomenon. It is a best seller, has won a number of prizes, is accompanied by a children's version, which has also won a prize, and apparently there is going to be a film version. In a TED talk its author Bruce Pascoe explained:

In 2014 I wrote a book, *Dark Emu*, which exploded the myth that Aboriginal people were mere hunters and gatherers and did nothing with the land. I wrote the book because I found it hard to convince Australians that Aboriginal people were farming. Using colonial journals, the sources Australians hold to be true, I was able to form a radically different view of Australian history. Aboriginal people were farming. There's no other conclusion to draw. (Pascoe 2018b)

In fact, there is another conclusion to draw: that Aboriginal people in 1788 were hunter-gatherers, and along rivers, lakes and the coast, they were also fishers. Pascoe thought, however, that settler journals:

revealed a much more complicated Aboriginal economy than the primitive hunter-gatherer lifestyle we had been told was the simple lot of Australia's First People. Hunter-gatherer societies forage and hunt for food and do not employ agricultural methods or build permanent dwellings; they are nomadic. (2018a, 2)

Note the evaluative judgement in ‘mere hunter-gatherers’ and the assumption that hunting and gathering is both simple and primitive. It is not clear who has promoted a view of a ‘primitive hunter-gatherer lifestyle’ in Australia. Is Pascoe referring to lay opinion, anthropological or historical accounts? Sutton and Walshe ([forthcoming](#); chapter 8) show that many well-informed publications and educational materials on pre-colonial Aboriginal economy and society have in fact been available to the Australian public for many decades.

Dark Emu appears to have been received by the public and government bodies as if the thesis that Aboriginal people were farming were original. It is, however, just the latest in a series of publications, mainly academic ones, arguing that before the British colonisation of Australia, and in at least some regions, Aboriginal people were farmers or proto-farmers rather than hunter-gatherers. In its use of source materials, Pascoe’s account is highly dependent on Rudolph Gerritsen’s book *Australia and the Origins of Agriculture*, published in 2008, and is in effect a popularisation of Gerritsen while taking a stronger stance on agriculture (see also Gerritsen 2010).

Gerritsen (2008) characterises Aboriginal economies as lying at the threshold of agriculture. His work focusses on several key case studies: supposed yam cultivation in the southwest of Western Australia, supposed grain cultivation across the centre of the continent, irrigation in various localities, and reports by explorers and others of Aboriginal housing that suggest settled communities, a characteristic of agricultural societies.

The ostensible motivation for promulgating arguments that at least some Aboriginal peoples were farming at the time of British colonisation has been to counter the idea that Aboriginal people were ‘primitive hunter-gatherers’. As Florin and Carah (2018, 48) point out, in the nineteenth and early twentieth centuries, indigenous Tasmanians were regarded as representative of the lower Palaeolithic, while peoples of the Australian mainland were seen as representative of the middle Palaeolithic (e.g. Solla 1911). Ironically, like Gerritsen, Pascoe seems to buy into the evolutionist attitudes shared by those they critique, seeing agriculture as ‘advanced’ and desirable, ignoring the profound environmental destruction wrought by agricultural societies, and especially industrial societies, which have agriculture as their foundation.

Many critiques of *Dark Emu* have come from the political right. They include the writings and broadcasts of Andrew Bolt (Morton 2019); articles in, and a book published by *Quadrant* magazine (O’Brien 2019), whose editor Keith Windschuttle engaged extensively in the ‘history wars’; and the *Dark Emu Exposed* (Anon. 2020) as well as the *Quadrant online* (quadrant.org.au) websites. Unfortunately, in my judgement these critiques of Pascoe’s treatment of his historical sources are largely correct. The forthcoming book by the anthropologist and linguist Peter Sutton and the archaeologist Keryn Walshe (Sutton and Walshe, [forthcoming](#)), brings a high standard of scholarship in scrutinising Pascoe’s claims, and adopts a non-political stance.

Defences of *Dark Emu* have come from the political left. Rick Morton of *The Saturday Paper*, for example, writes: ‘after reading the explorer journals on which the book is based’ he was ‘unable to find any errors’ in *Dark Emu* (Morton 2019). This is quite surprising, as we shall see. Professor Marcia Langton is reported to have said that *Dark Emu* ‘is the most important book on Australia and should be read by every Australian’ (Lee 2020). Again, coming as it does from an eminent scholar, this is an unexpected judgement.

Dark Emu shares with certain of its critics an evolutionist stance characteristic of the nineteenth century, according to which hunter-gatherers were and are ‘primitive’ nomads, whereas farmers are more advanced and civilised, and live in settled communities. The ‘Dark Emu Exposed’ website (Anon. 2020) provides an egregious example of evolutionist thinking: ‘Australian Aboriginal Society was a classic Stone-Age Hunter Gatherer Society prior to British settlement, with albeit a glimmer of an expected Neolithic advancement underway ...’ While critical of the attitude expressed here, Pascoe adopts a related perspective in writing of ‘the level of development of Aboriginal and Torres Strait Islander people’ (2018a, 146).

Rather than simply offering a critique of *Dark Emu*, this article sets out to position the argument in *Dark Emu* in the context of other opinions about Aboriginal agriculture, to subject the evidence for Aboriginal farming presented in *Dark Emu* to scrutiny, and to consider alternative views.

The Question, ‘Why Did Aboriginal Groups Not Take up Agriculture?’

Academic discussions about Aboriginal agriculture go back at least to the 1970s.

The archaeologist Peter White brought the issue into prominence in 1971 with his article on the ‘Neolithic problem’ in Australia (White 1971). The question was, given the similarities in the environments of New Guinea and northern Australia, why was it that Aboriginal people did not develop agriculture? Archaeologists and anthropologists posited several possible reasons, including Aboriginal religious and cultural conservatism, the aridity of Australia environments, and the affluence of coastal Aboriginal economies (Meggett 1964; Golson 1971; White 1971). The barrier of the Arafura Sea was taken to be an additional factor (Florin and Carah 2018, 47).

The Argument that Aboriginal People Were Farmers

The idea that Aboriginal people were farming goes back a long way. In 1963 Norman Tindale reported that

[o]n Cape York Peninsula, when a woman dug up a wild yam, she would scold a shoot of the plant, command it to grow a bigger tuber next time, then replace it and cover it with soil. This is the very beginning of gardening. (Tindale and Lindsay 1963, 121; cited in Sutton and Walshe, [forthcoming](#), 94)

Sutton and Walshe comment (94) that this comprises conservation rather than gardening. Tindale also thought the storage of grain among Alyawarre, Yuwalaray and Wadjari people to be evidence of proto-agriculture (Tindale 1974, 104; cited in Sutton and Walshe, [forthcoming](#), 71). This characterisation of hunting and gathering as proto-agriculture is echoed by the biologist and writer Colin Tudge (1998, 3), who argues ‘from at least 40,000 years ago ... people were managing their environment to such an extent that they can properly be called “proto-farmers”’.

Before proceeding further, it will be useful to define what is meant by ‘farming’, ‘agriculture’ and ‘horticulture’. Agriculture has been defined in terms of cultivation and domestication. Cultivation involves preparation of the soil through a variety of means including swidden, tillage, and irrigation, as well as propagation through the sowing of

seeds and vegetative reproduction. The archaeological presence of agriculture may be recognised by the presence of weed assemblages (Harris and Fuller 2014, 103).

The domestication of plants results from cultivation over an extended period. The traits of domesticated grain plants are selected for, first, by harvesting and the crops' growing reliance on humans for seed dispersal, and second by soil conditions, especially those allowing the deeper burial of seeds (Harris and Fuller 2014, 105). Roots and tubers, however, 'can be cultivated for long periods and on an extensive field scale without undergoing morphological domestication' (Harris and Fuller 2014, 105). Agriculture and horticulture may be differentiated by scale; the word 'agriculture' derives from the Latin word *ager* meaning 'field', and 'horticulture' from the Latin word *hortus* meaning 'garden'. The word 'farming' covers both. The question of animal domestication does not arise here, as the only example in precolonial Australia was the dingo.

The question of Aboriginal agriculture was reconfigured in a variety of ways. First, the archaeologist Rhys Jones (1969) depicted Aboriginal people as 'fire-stick farmers'. He pointed to the ubiquitous use of fire in Australia to manage the environment and enhance the reproduction of food species including macropods. Jones's use of the word 'farmers' is perhaps metaphorical, but he was pointing to people's intervention in the reproduction of food species, and hence engagement in food 'production' rather than simply procurement. Second was the view that Aboriginal people may have experimented with plant domestication in the past (Jones and Meehan 1989; Denham, Donohue, and Booth 2009). Third, some questioned the implication of a clear boundary between foraging and farming (Jones 1975; Zeder 2006).

The apparent distance between hunting-gathering and farming practices has been narrowed by a focus on production practices. For example, Harris (1977, 429) draws a parallel between the use of fire by Aboriginal people to stimulate the reproduction of cycad palm nuts, and gardening in the Torres Strait and Papua (Saggers and Gray 1982–1983, 113). Furthermore, economies that combined foraging with farming point to the fuzziness of the forager-farmer divide; the Torres Strait islands exhibit a mosaic of combinations of the two modalities (Beckett 1972; Moore 1972; Harris 1977; Saggers and Gray 1982–1983, 113). Harris posited a gradient, moving from north to south through the Strait, from an emphasis on farming to an emphasis on foraging (Harris 1977; Saggers and Gray 1982–1983, 114; see also Williams et al. 2020).

Elsewhere I have proposed that Australian production systems before British colonisation were those of 'hunter-gatherer-cultivators' on the basis of practices including the modification of the environment through the use of fire and interventions in the reproduction of species such as the replanting of yam tops (Keen 2006, 13). It might be argued that this is a misuse of the term 'cultivator', for cultivation entails a suite of related activities including the production and storage of seed (or the equivalent in roots and tubers), preparation of the soil through tillage, etc., sowing or planting, tending crops through such practices as weeding and fencing, harvesting and storage. One might add the importance of translocation in shaping the distribution of food plants (Silcock 2018).

The ethnobotanist Beth Gott argued that systematic and repeated digging up of edible roots by Aboriginal people aerated the soil and loosened it, so facilitating germination and root penetration, and incorporating ash and composted vegetable matter into the soil. '[T]his regime of firing, gathering and digging might well be regarded as a form of "natural cultivation" on the part of the southern Australian Aborigines' (Gott 1982,

65). Perhaps this is so, but the process did not include all the procedures required to constitute horticulture, in particular the deliberate selection of plant varieties for planting, and the reservation of seed for propagation.

The archaeologist Peter White revisits the question of Aboriginal agriculture in a 2011 article. He infers the possibility of Aboriginal agriculture in light of a number of considerations. These include: Gott's suggestion that the treatment of plants included the fertilisation of soil through burning, and tilling as the result of harvesting, would have increased harvests (Gott 1982, 1983, 1999a; see White 2011, 88); the elaborate water control systems of Western Victoria (White 2011, 88); the high population densities, relatively settled communities, and evidence of a diet high in starches on the Central Murray River (2011, 89); and what White took to be evidence of yam 'gardens' in southwest Western Australia, drawing on the work of Sylvia Hallam. He concluded that it is 'time to break away from the current attitude and accept that agriculture may have occurred in parts of Australia' (89).

Hallam's (1975, 1989) argument about the exploitation of the yam *Dioscorea hastifolia* in the southwest of Western Australia is concisely summarised by Atchison and Head (2012, 67):

Using a combination of historical and archaeological evidence, she argued that Aboriginal burning 'opened up' vegetation, leading to considerable geomorphological impact and the creation of new environments suitable for yam growth on the Swan coastal plain. Hallam also maintained that, in the context of wider landscape burning, particular areas where resources such as yams were located were carefully left unburnt. This combination of fire management in association with repeated digging of *D. hastifolia*, she concluded, extended and then intensified the range of *D. hastifolia* on the coastal plain.

Like Peter White, the historian Bill Gammage also describes Aboriginal people as practising agriculture before the British colonisation of Australia. As Sutton and Walshe (forthcoming, 22) show, Gammage (2011) overgeneralises from a few isolated cases to give the impression of comprehensive farming practice. Paradoxically he writes that Aboriginal people were 'farming but were not farmers':

So people burnt, tilled, planted, transplanted, watered, irrigated, weeded, thinned, cropped, stored and traded. On present evidence not all groups did all these, and few Tasmanians may have, but many mainlanders did. What farm process did they miss? (Gammage 2011, 301)

In *Dark Emu*, Bruce Pascoe (2014, 2018a) has made one of the strongest claims that Aboriginal people were practicing farming at the time of the British colonisation of Australia, as suggested by the subtitle of the book: 'Aboriginal Australia and the Birth of Agriculture'. In the first chapter, he states:

The use of the word 'agriculture' in relation to Australian Aboriginal people is not something many Australians would have heard. However, if we go back to the country's very first records of European occupation we discover some extraordinary observations that provide a picture of what the Australian explorers and pioneers witnessed, and how it refutes the notion that Aboriginal people were *only* hunter-gatherers. (Pascoe 2018a, 13 emphasis added)

Note the denigrating use of 'only', as if hunting, gathering and fishing were something to be ashamed of.

As Sutton and Walshe ([forthcoming](#)) show, *Dark Emu* ignores the extensive anthropological corpus of ethnographies based on long-term fieldwork among groups still reliant on hunting and gathering, in favour of the casual observations of particular groups by travellers passing through the country, as well as early settlers. In a very strong argument against the thesis that Aboriginal people were farming in 1788, Sutton and Walshe ([forthcoming](#): chapter 3) show comprehensively that, with the exception of some clearly introduced examples and recent modifications of local expressions, Aboriginal languages lack vocabularies associated with gardening and agriculture. This evidence for the absence of agriculture among speakers of the languages examined appears to be conclusive, since one would expect the languages of peoples who have practised agriculture over a long period to have adopted or developed a specialised vocabulary for food species, implements, procedures, etc., as is the case in proto-Korean and proto-Japanese (Whitman 2011, 156).

The current consensus in archaeology is that before the British colonisation of Australia, Aboriginal people engaged in practices to do with the intensification of food resources. These included some replanting and transplantation, and some rudimentary sowing. Many genetic studies of food plants, including Baobab and Livistona palm, suggest that people also moved them around (Tim Denham pers. com. and see above on translocation). How does other evidence of Aboriginal agriculture stack up?

Yam Cultivation

The first case of supposed Aboriginal agriculture to be considered here concerns yams, various species of which were exploited in several regions of the continent. Citing Hunter (1968 [1793]) Pascoe describes yam fields around Sydney (presumably yam daisy or Murnong) as ‘gardens’. Pascoe writes:

Captain John Hunter, captain on the first fleet, reported in 1788 that the people around Sydney were dependent on their yam gardens. ‘The natives here appear to live chiefly on the roots which they dig from the ground; for these low banks appear to have been ploughed up, as if a vast herd of swine had been living on them.’ (20)

Pascoe omits the next sentence or two:

We put on shore and examined the places which had been dug, and found the *wild* yam in considerable quantities, but in general very small, not larger than a walnut; they appear to be in the greatest quantity on the banks of the river; a little way back they are scarce. (Hunter 1968 [1793]) *emphasis added*”

Odd that Pascoe leaves out the sentence describing the yams as ‘wild’.

Later, on the banks of a river, Hunter recounts:

... here also we found yams and other roots, and had evident marks of the natives frequenting these parts in search of them for food. They have no doubt some method of preparing these roots, before they can eat them; for we found one kind which some of the company had seen the natives dig up; and with which being pleased, as it had much the appearance of horse-radish, and had a sweetish taste, and having swallowed a small quantity, it occasioned violent spasms, cramps in the bowels, and sickness at the stomach: it might probably be the casada root.¹

We found here many traps, for catching animals, in which we observed the feathers of many birds, particularly the quail. (106)

These are descriptions of the practices of hunter-gatherers.

Pascoe also refers to Sunbury Victoria:

In Sunbury, Victoria, in 1836, settlers, including Isaac Batey and Edward Page, observed that people had worked their gardens [*sic*] so well and for so long that large earthen mounds had been created during the process – but so little consideration was given to this land management that, only a few years, later Europeans couldn't say who or what had created these prominent terraces. (Pascoe 2018a, 20)

These references to working their 'gardens' appear to derive from Gerritsen (2008, 113 footnotes 196, 197; citing Frankel 1982, 44). The problem is that Gerritsen cites Page as referring to Aboriginal practices in Victoria as 'natural cultivation', otherwise known as 'accidental gardening' (113). Earth mounds have been widely documented in Australia, associated with yam daisies (*Microseris* spp.), which colonise disturbed soil. One view is that they are the remains of earth ovens (Stone 1989; Balme and Beck 1996; Ross et al. 2019; Johnson 2020).

It has long been reported that when harvesting yams, Aboriginal people in the north of the continent cut the tops off and replanted them, so that they grew in the following season: an example of vegetative reproduction (Gregory 1886; 3 cited in Gerritsen 2008, 19; Hale and Tindale 1933, 113; McConnel 1957, 2; Campbell 1965, 208; Lawrence 1968, 205; Goodale 1970 cited in Hallam 1975, 12; Harris 1977, 437; Hynes and Chase 1982; 40 cited in Gerritsen 2008, 19). As noted earlier, however, this practice could more accurately be regarded as conservation of a wild crop rather than cultivation (Sutton and Walshe, *forthcoming*, 94). Nevertheless, there may have been an element of selection through this process if, for example, people chose the largest tubers to harvest.

Another much-discussed case is the extensive fields of *Dioscorea hastifolia*, a yam endemic to Western Australia, distributed between what are now Perth and Geraldton. The explorer George Grey encountered the plant in 1839 in the Hutt River district. Grey came upon numerous water holes some 3–4 metres in depth, and in the vicinity of the water holes extensive tracts of *Dioscorea hastifolia*, crossing some 5.6 km of ground peppered with holes where the roots had been dug up. His party encountered another tract on the other side of a ridge. They also passed two clusters of huts plastered in turf and clay, which they took to be 'fixed places of residence'. They also found similar yam fields in other river valleys in the district (Grey 1841 vol. II, 12,19; Gerritsen 2008, 33).

R.H. Malden commented in 1889 that *Dioscorea hastifolia* was the only plant in Australia on which Aboriginal people 'bestow any kind of cultivation' (Gerritsen 2008, 19). Malden's comment referred specifically to the practice of replanting the crown of the yam. Inferences that *Dioscorea hastifolia* was 'cultivated' entail many leaps, however. Hallam provides evidence of yam processing for over a long period, usefully summarised by Atchison and Head (2012):

Hallam (1989) argued that yam utilisation was part of the repertoire of the original inhabitants of south-western Western Australia. Directly dated evidence of yams or yam use is difficult to obtain, but pounding and grinding material as well as high levels of artefact

densities and charcoal in suitable alluvial deposits from the escarpment and coastal plains are suggested by Hallam to support plant processing across a 40,000 year time span, with some individual sites in use for over 8000 years. (Atchison and Head 2012, 65)

Gerritsen (2008, 4–5) argues that the isolation of *Dioscorea hastifolia* in Western Australia, and its relation to other species of the *Enantiophyllum* section in the Pacific, suggests that it was brought to Australia by the crew of *The Batavia* and introduced to Aboriginal people of the Victoria District of Western Australia (2008, 34–35). Gerritsen appears, however, to confuse species and section, which is a taxonomic rank between species and genus. If *D. hastifolia* had been brought on the *Batavia* then the species ought to be identical not just to the section of the source but to the source species.² Botanists, however, consider the plant to be endemic to Western Australia (Beard, Chapman, and Gioia 2000; Florabase 2020), although its unusual location outside of the wet tropics suggests that it may have been introduced millennia ago (Tim Denham, pers. com.).

Gerritsen (2008, 37–38) tries to bolster his argument that the yam and its domestication came with the Dutch by claiming that Dutch phonemes and vocabulary contributed to the Nhandu language of the region. It is extraordinary that he repeats these claims, first proposed in Gerritsen (1994), even after Blevins (1998, 2001) had so effectively refuted his amateur linguistic analysis by showing that the linguistic features in question were indigenous.

What is the evidence for the domestication of *D. hastifolia*? Denham (2008, 246–247) points out that the recurrent harvesting of tubers including murnong (yam daisy, *Microseris lanceolata*) and *D. hastifolia* creates conditions for larger tubers, but this has ‘nothing to do with planting, inter-generational selection or domestication’. Furthermore, ‘once modifications to the soil environment cease, tubers revert to wild type’.

There also appears to be no direct evidence of systematic tillage or storage of tubers for planting in the Hutt River district, both hallmarks of yam cultivation. Nevertheless, the extent of tracts of *D. hastifolia* may have been partly the result of replanting, tending and what has been referred to as the ‘management’ of a wild resource.

Grain Cultivation?

The range of seed-bearing and sporocarp-bearing plants in what Tindale (1974, 99) called the ‘Aboriginal grain belt’ included *Panicum decompositum* (native millet, umbrella grass), *Portulaca oleracea* (purslane, pigweed), and *Marsilea drumondii* (ngardu, nardoo, an aquatic fern). Gerritsen (2008) reviews multiple reports from explorers and others on Aboriginal practices of seed gathering, preparation and storage, in the context of hunter-gatherer economies, stressing the range of technologies and techniques. He does not go so far as to say that Aboriginal people were farming, but writes more generally of ‘sedentary communities who may be about to begin practising agriculture’ (2008, 55).

The range of techniques of seed gathering and processing is usefully summarised by Warwick Jones (1979).³ In the Cooper Basin, stone knives were used to harvest certain cereals (Jones 1979; 144 citing Gregory 1886, 172; Sturt 1849 I, 294; Welch 1861, Sept.7). Where grasses grew relatively sparsely, they were pulled rather than cut (Jones

1979, 144); the difference in method of harvesting related to the extent and density of the plants. *Portulaca* tends to grow in clumps, so was pulled and not cut even in the Cooper Basin (1979, 144–145).

Pascoe (2018a, 35) expands the area of the ‘Aboriginal grain belt’ from Tindale’s original suggestion (Sutton and Walshe, *forthcoming*, 90; cf. Tindale 1974, 99). He also exaggerates the quantities of grains gathered, and the populations sustained. He writes: ‘The grain harvest supported populations so large that many hearing of this for the first time will be amazed’ (2018a, 35). In contrast, I have estimated Yuwaaliyaay population density (Darling-Barwon River region) to have been about one person per 30–60 square kilometres (Keen 2004, 112), although the sightings on which this figure is based took place during or after the ravages of smallpox (Campbell 1965).

Pascoe (2018a, 39) implies that there is evidence that grasses in the Corners region of southwestern Queensland, northwestern New South Wales and northeastern South Australia showed signs of domestication:

Gerritsen brought together the work of Zohary and others to show that Aboriginal people were performing the same cropping activities as those that led to the domestication of wild wheat and barley in Europe [*sic*]. These researchers claim that a tough rachis developed within just twenty to thirty years of this style of cropping to the extent that it prevented germination without an artificial watering regime.

Australian grains depended on the interventions of Aboriginal peoples, and the wide grasslands, monocultures of grain, were the result of this deliberate manipulation. (Pascoe 2018a, 39)

Jones (1979, 148) shows, however, that grain-bearing plants of the region do not display the non-brittle rachis (stem) characteristic of domesticated grains (see below). The grasslands were also not, of course, monocultures (see New South Wales Government 2020 for the variety of grassland species).

Pascoe implies that Australian grasses were domesticated because they depended on human intervention for their reproduction. This is not what Gerritsen says, or what other research shows. Gerritsen argued that in the pre-Neolithic, eastern Mediterranean people harvested grain-bearing plants when green, and that Aboriginal people in the Corners region also harvested grain-bearing plants when green. Together with evidence he adduces for the distribution of seeds, Gerritsen (2008, 84–85) infers that Aboriginal people were at a similar stage of proto-agriculture to pre-Neolithic eastern Mediterranean people: that agriculture was ‘incipient’ in Australia.

Storage

Gerritsen (2008) documents multiple examples of food storage in the Corners region, in some cases on quite a large scale. He takes storage to be ‘[y]et another sign of sedentary communities who may be about to begin practising agriculture’ (2008, 55). Gerritsen cites reports of Western Desert people storing small quantities of eucalypt, acacia and spinifex seeds, and dried desert fruits, as well as stockpiling foods for ceremonies (2008, 55–56; citing Cane 1984, 1989).

The Corners region was ‘[o]ne of the few areas where storage proper appears to have had a significant role in the local subsistence regime’ (Gerritsen 2008, 56). Reports

include up to 50 kg of *munyeroo* seeds (Purslane, *Portulaca oleracea*), ‘vast’ quantities of gum cakes, grass seed packed in skin bags each holding about 45 kg – how many is not reported; 50 kg of seed in skin bags; and an unspecified quantity of ground seed in clay covered pits (Gerritsen 2008, 57).

Gerritsen’s sources include Withnell (1901) on spinifex seed; a raft of sources on short-term storage of desert fruits, including on the stockpiling of foods for ceremonies Oldfield (1865), Carnegie (1898), Horne and Aiston (1924) and Donald Thomson (1939). On what he calls ‘storage proper’ Gerritsen records 18 separate references by a range of scholars to storage in a variety of regions. These include Worsnop (1897), Parker (1905), Duncan-Kemp (1934), Thomson (1939), Harvey (1945), McCarthy (1962), Simpson and Blackwood (1973), Tindale (1974), and Berndt, Berndt, and Stanton (1993). Parker (1905) observed the use of skin bags by Yuwaaliyaay people for storing grains, whereas Diyari people used clay-covered pits (Reuther 1981). In all, a wide array of wild foods were stored (Gerritsen 2008, 56–57).

Except where Gerritsen notes otherwise, these sources appear to be reliable, but in *Dark Emu*, Pascoe (2018a, 147) exaggerates somewhat in writing of ‘[l]arge grain stores of more than 50 kilograms’ whereas Gerritsen reports only one skin bag weighing over 50 kg. An exceptionally large store was, however, seen by Ashwin in 1871 among Tjingili people (Ashwin 1932). A group of about 50 structures enclosed by a fence included a large shelter some five metres across and two metres high, containing 17 large wooden dishes up to 1.5 m long, filled with grass seed, and covered with paperbark. Ashwin estimated the total weight at about a ton (2240 lb or 1016 kg) (Ashwin 1932). Note that this report was exceptional and only indirectly corroborated (Gerritsen 2008, 57).⁴

Key features of grain cultivation are not reported in the sources appealed to by Gerritsen, or indeed by Pascoe. Grain does not appear to have been stored for future use as seed. Indeed, Norman Tindale (1974, 104) reports that storage of grains ‘was always for use and never for returning to the soil’, that is, it was not stored as seed for cultivation. The ground was not tilled, and where there are reports of the deliberate sowing of seed it was on a very small scale, and perhaps mainly for ritual purposes such as species maintenance (Sutton and Walshe, *forthcoming*, 105). Thus, Aboriginal people appear not to have cultivated seed-bearing plants but rather harvested and stored wild grains.

As noted earlier, there is strong evidence that the seed-bearing plants in question were not domesticated. Also noted earlier, Jones (1979, 148) writes that the seed-bearing species of the Cooper Basin had a brittle rachis (stem) such that a slight disturbance such as a puff of wind would shatter it, allowing the seed to disperse. Domesticated species bear larger grains with a non-shattering rachis, enabling the grain to be harvested from the plant. Domesticated plants have several other functional traits such as a reduced underground structure (Roucou et al. 2018).⁵

Seed-bearing plants in the Cooper Basin were gathered before being fully ripe, and with a high moisture content; this prevented shattering and premature seed dispersal, but inhibited long-term storage (Jones 1979, 149). In order to store food grains successfully for extended periods, grains must have a moisture content below 12% (Jones 1979, 147–148; Douglas 1975, 91).

Pascoe exaggerates the extent of storage and the amount of grain stored, and omits references to sources for certain of his claims:

In this land of extreme heat and aridity, the Aboriginal inhabitants had built comfortable houses and produced grain surplus to their immediate requirement. This is an important social and economic achievement – surplus food production is one of the acknowledged characteristics of sedentary agriculture. (Pascoe 2018a, 32)⁶

In his Speakola Lecture, Pascoe (2009, location 7.44) claimed that a brother of Ernest Giles observed three-metre-high storage platforms each holding a ton of grain (see also Anon 2020). No sources are provided, and the report does not appear to be reproduced in *Dark Emu* (Pascoe 2018a). Ernest Giles does not appear to have had a brother, but it may be that Pascoe was referring to Christopher Giles, the brother of Alfred Giles, who was also known as an explorer.

How does the store reported by Ashwin (1932) compare with grain stores in traditional agricultural societies?

Grain Storage in Agricultural Societies

To put reports of Aboriginal grain storage in perspective, where grains provide the staple food in the diet, each person consumes on average about 200 kg of cereal per year (Garfinkel, Ben-Shlomo, and Kuperman 2009; 322 citing Hole 1991 and Mazar 2001), so a group of 10 people require about 2 tonnes for a year's supply.⁷ Communal grain stores in Nyasaland, Africa, in the late 1930s, for example, held 5–6 tons (approx. 4.5–5.4 tonnes) (Lawrence 1939), sufficient for some 25–30 people for a year. In this perspective, a store of 1 tonne of grain is relatively modest, and if cereals were the main staple, such a store would last a group of 30 for only a couple of months. Reports of stores even of this size are, as we have seen, rare. Cereals, then, were a significant part of the diet on the Aboriginal grain belt only for part of the year, or a small part of the diet for longer (Keen 2004, 41–43). Supplies and storage in traditional agricultural societies are far larger than reported for the Aboriginal grain belt. Reports of food storage in the Australian historical and ethnographic literature are thus inconsistent with agriculture.

Seed Dispersal

An aspect of the case for proto-agriculture or agriculture in Australia is the existence of reports of Aboriginal people deliberately sowing seeds of food plants. Mary Gilmore (1934) recounted observing Wiradjuri women collecting and planting de-husked 'grass' seeds into the ground after burning it off, and watering them in with urine. Only larger seeds were selected for planting (Gilmore 1934, 221–222; Gerritsen 2008, 20–21). The species included quandong (*Santalum acuminatum*, 'groundberry' and grasses. Gerritsen casts some doubt on the veracity of her uncorroborated account, however.

According to Pascoe (2018a, 29), R.G. Kimber 'compiled an enormous body of evidence from people who observed Central Australian Aboriginals engaged in seed propagation, irrigation, harvest, storage, and the trade of seed across the region'. This seems overblown. Fiona Walsh (1990, 34) reports the dispersal of seeds of *Solanum diversiflorum* ('bush tomatoes'), broadcasting the seed over burnt ground near the camp

(Gerritsen 2008, 22), while Latz (1995, 63) reports the planting of *Nicotiana* species. Kimber (1984, 16–17) recorded Walter Smith’s reminiscence of broadcasting the seed of grasses (possibly *Panicum decompositum*) and *ngardu* (*Marsilea drumondii*). The planting of *Ipomea* species was recorded by Yen (1989, 60). Gerritsen (2008, 23) argues that at least seven species were probably propagated deliberately and independently of outsider influence. Pascoe quotes Kimber’s informant Walter Smith:

They chuck a bit there [at a favourable locality]. Not much you know, wouldn’t be a handful. [They] chuck a little bit, spread it [broadcasting fashion] you see – one seed there, one seed there ... [of] course they chuck a little bit dirt on, not too much though. And soon as first rain comes ... it will grow then. (Kimber 1984, 16; cited in Pascoe 2018a, 29)

As noted, Sutton and Walshe (forthcoming, Chapter 2) argue that these practices of seed dispersal had a religious rather than horticultural significance, as an aspect of so-called ‘increase rites’.

If such reports are correct, this suggest that Indigenous practices contributed to the maintenance and distribution of seed-bearing food plants in Australia. However, they did not take place in a context of gardens or field systems, seed selection and preservation, tillage, planting, and tending. It would be extraordinary, of course, if Aboriginal people in 1788 had possessed little or no knowledge of the properties of seeds, soil and water, their forebears having occupied the continent at least 50,000 years. Small scale and incidental sowing, however, does not constitute agriculture.

Irrigation

Pascoe recounts Gammage’s descriptions of Aboriginal wells, and how they were curated, but goes further to claim that ‘[a]bout these areas, glades and grasslands had been cultivated after water had been assured by industry and innovation’ (Pascoe 2018a, 108). Pascoe cites Gammage (2011, 231) and Mitchell (1839 Vol. I: 6–7). I have found no mention in Mitchell’s volume of the cultivation of grasslands or plains, except by settlers. Mitchell writes of the ‘resemblance’ to cultivation in an area called Mulluba in northeastern New South Wales:

... the whole territory bore a remarkable resemblance to an enclosed and cultivated country. The ridges, of the kind already described, I observed in directions, both with the slopes, and across them, exactly resembling furrows in fallow land. Trees grew in rows, as if connected with field enclosures, and parts, where bushes or grass had been recently burnt, looked red or black, thus contributing to the appearance of cultivation. The soil was, indeed, well worthy of being cultivated, for it consisted of a rich black mould, so loose and deep that it yawned in cracks, as if for want of feet to tread it down. (Mitchell 1839 vol. 1, ch.2:37–38)

Far from observing Aboriginal agriculture, Mitchell wrote of the Murrumbidgee River:

Steep and rugged ridges, occasionally approached its banks; and, in following the beaten track, I, this day, crossed acclivities much more difficult for the passage of wheel carriages, than any we had traversed throughout *those uncultivated wastes*, where even the pastoral age had not commenced. (Mitchell 1839 vol.1, 407, emphasis added)

A few reports from the colonial era have indicated the use of Aboriginal dams for water retention, and possibly small-scale, local irrigation of grasslands. The main purpose of

dams, however, appears to have been storage of drinking water in arid zones. In his journals of travels in the Ooldea region, Giles (1889) records a number of dams, evidently for water storage. He describes the largest as follows:

... we soon emerged upon a piece of open ground where there was a large white clay-pan, or bare patch of white clay soil, glistening in the moon's rays, and upon this there appeared an astonishing object – something like the wall of an old house or a ruined chimney. On arriving, we saw that it was a circular wall or dam of clay, nearly five feet high [1.524 metres], with a segment open to the south to admit and retain the rain-water that occasionally flows over the flat into this artificial receptacle. (Giles 1889 Book 3 [online edition] Ch.3.1 #6)

In the same passage, Giles goes on to report that in all his travels he had not encountered a similar structure. Tindale also recorded a dam, apparently used for irrigation:

... [I]n 1963 a Wanji man from the Nicholson River country indicated that his people knew it was an advantage to get as large an area as possible flooded by these freshets and at certain places where the country was suitable, they choked up the channels with stones, earth and other debris. Areas such as these were well known as grainfields and were visited at the proper times to gather and harvest ... [This] suggestion of manipulation of water in the most rudimentary fashion in such areas may be worthy of attention, since it hints at the beginning of agricultural irrigation. (Tindale 1977, 347)

In writing that the practice 'hints at the beginning of agricultural irrigation' Tindale expresses an evolutionist mindset similar to that of Gerritsen and Pascoe. He stops short, however, of presenting it as an example of existing agricultural practices.

Citing R.J. and J.M. Rowlands (1969), Gerritsen (2008, 44) records a dam on the Bulloo floodplain (NW New South Wales) some 100 m long and 2 m high at the centre of the dam wall, and with a base of six metres. It required 180 cubic metres of water to fill. So, if it averaged one metre deep, the surface area was 180 square metres, or about 18 m × 10 m. Similar dams were found in the Coopers, Farrars and Whitula creeks and in the Brewarrina region (Gerritsen 2008, 44). Their main function, it seems, was to hold live fish (Duncan-Kemp 1968, 46). Small storage dams were numerous in the Great Victoria and Simpson deserts, according to Gerritsen (2008, 44), who also suggests that dams were a 'simple form of irrigation' akin to the blocking of creeks.

The question is, what was irrigated? The answer appears to be, wild grasses and the like through processes of resource enhancement that also included the use of fire (Gammage 2011). Irrigation in Australia was not a component of agriculture, however, for the majority of dams appear to have been used for water storage and fish. Where dams were used for irrigation, it appears to have been for increasing the productivity of wild grasslands.

Settled Communities

Gerritsen (2008, 46) picks out explorers' descriptions such as the following from Sturt in early 1829 about his travels on the upper central Darling River:

Early in the day we passed a group of seventy huts, capable of holding twelve to fifteen men each. They appeared to be permanent habitations, and all of them fronted the same point of the compass. (Sturt 1833 I, 93)

This report of permanent dwellings is ambiguous; were the dwellings 'permanent' in the sense of being long-lasting structures, or permanently inhabited? The absence of people

at the time of Sturt's journey rather contradicts the second interpretation. Gerritsen uncritically accepts Sturt's suggestion about the capacity of the huts, the basis for which is unclear, in commenting that '[s]uch a village would have had a population of 800–1000 residents, a town really' (Gerritsen 2008, 46). In the context of what is known about the ecology of the region, this seems highly unlikely. A quotation from J.W. Lewis's journal of his Lake Eyre expedition (1875) is telling: the Ngamini ('Ngameni') people of the Warburton River 'return and live in the same wurlies which are large and well built; the camps may be considered more as villages than anything else' (Gerritsen 2008, 46).⁸ If accurate, it is significant in suggesting that the dwellings in this case were not continuously inhabited but used intermittently and perhaps seasonally.

Discussions of Aboriginal settlement by Gerritsen and Pascoe suffer from a crucial defect: they omit any consideration of seasonal and stochastic variation. The climate of the upper Darling – Barwon river region is highly variable and unpredictable, with a regime of drought and flood connected to the El Niño Southern Oscillation (Keen 2004, 113), leading to considerable mobility on the part of Aboriginal residents before colonisation. According to Allen's (1972) reconstruction, residence groups along the riverbanks were larger in spring and summer, while in winter only small groups lived along the river (Keen 2004, 113–114). Explorers' accounts of the Darling and Barwon Rivers indicate groups of up to 100 people, and groups of 1 to 30 people comprised 51% of cases (Keen 2004, 113). The size of residence groups varied according to season, averaging about 45 residents in summer, about 40 in autumn (of which half were of 10 people or fewer), and about 13 in winter. The largest residence groups in the region occurred in spring when 20% had more than 90 people (Keen 2004, 113; Allen 1972, 59). This information was readily accessible when Gerritsen was writing his book.

Residence groups in north central Arnhem Land between 1939 and 1955, recorded by patrol officer George Sweeney, varied between 14 and 81 (Sutton and Walshe, *forthcoming*, 150), while Peterson and Long record ranges from 4–28 in the Western Desert to 18–63 in Western Arnhem Land (Peterson and Long 1986, 135; cited in Sutton and Walshe, *forthcoming*, 150).

Pascoe (2018a) goes further than Gerritsen when he claims that '[p]ermanent housing was a feature of the pre-contact Aboriginal economy and marked the movement towards agricultural reliance' (2018a, 97). Again, 'permanent housing' is ambiguous. Pascoe over-generalises from the remains of stone-based dwellings in western Victoria, even though in fact these were not continuously occupied, as Dawson (1881, 10–11) and Thomas (1898, 65–66) report (Sutton and Walshe, *forthcoming*, 129–130).

In spite of the fact that Gammage's *The Biggest Estate on Earth* (2011) was one of Pascoe's main sources, Gammage has this to say about Aboriginal settlement:

Neither in Australia's richest nor poorest parts, by European standards, were people tempted to settle. Instead they quit their villages and eels, their crops and stores and templates, to walk their country.

They were mobile. No livestock, no beast of burden anchored them. They did not stay in their houses or by their crops. (Gammage 2011, 301)

The most egregious claim for large settlement in *Dark Emu* is the case of supposed towns in the Western District of Victoria, supposedly based on aquaculture. Pascoe draws on a study by Heather Builth (2000, 2002) according to whom the extensive fish and eel canals found in the Western District were built by Aboriginal people for aquaculture. There is in fact no evidence that the structures were used for breeding fish or eels. Rather the structures channelled waters along the natural drainage lines and so guided the migration of aquatic species, and provided the infrastructure for the insertion and use of woven fish traps (Sutton and Walshe, *forthcoming*, 230). The stone work has been dated at up to 7–6000 years old (McNiven et al. 2012; Sutton and Walshe, *forthcoming*, 248).

Pascoe also uncritically accepts Builth's proposal (2000, 2002) that a hierarchical society with a very high population density and large villages and towns was based on the large scale smoking and storage of eels and fish taken from the canals and traps. The inference of large settlements was based on interpreting the majority of stone circles found in the region as the bases of dwellings, leading, together with assumptions about household size, to an estimate of a population of some 10,000 people (Builth 2000; 2002; Pascoe 2018a). The problem is that stone circles in the region frequently occur naturally, formed by large stones being clustered around the bases of large trees, and left after a tree has burnt and rotted away. Builth claimed to have eliminated such cases through statistical analysis of the distribution of stone in the circles, but Sutton and Walshe (*forthcoming*, 245–247) cast doubt on the adequacy of her methodology. Annie Clarke (1994) has commented that the sites of Lake Condah and surrounding properties have become mythologised in the archaeological literature and in the realm of public knowledge.

Furthermore, Sutton and Walshe question Builth's interpretation of evidence of the presence of fatty acids in the remains of hollow trees, purportedly from the smoking and storage of fish and eels. Not all such fatty acids derive solely from aquatic species, and fatty acids could have been deposited in a variety of ways, for example by predators of fish, including birds and quolls (Sutton and Walshe, *forthcoming*, 253). There is also no evidence of structures used for smoking and drying inside remaining hollow trees (Sutton and Walshe, *forthcoming*, 253–254). In an additional methodological flaw, traces of fatty acids inside hollow trees were not compared with traces in the general area (Keen 2006, 27), so that it is not clear that more eels and fish had been located inside trees than outside. In support of her story Builth (2002, 208) presents a cropped image of an 1862 painting by Blandowski, purporting to show a man smoking eels in a hollow tree. The uncropped image shows people smoking possums out of trees, and preparing possum skins for cloaks (Sayers 1994, 101; Keen 2006, 27). The image therefore appears to have nothing to do with smoking eels.

Case studies in Keen (2004) show variation in mobility on the part of Aboriginal communities, with some coastal communities being quite settled, and living at relatively high population densities. The most mobile groups were those of the Western Desert, such as Pitjantjatjara people and their neighbours, who lived at very low population densities, of around 1 person per 100km². Except for certain seasons when resources were sufficient for larger aggregations for major ceremonies including male initiation, people were constantly on the move from water source to water source (Keen 2004, 110–112). In rich coastal environments such as eastern Cape York Peninsula or northeast Arnhem Land, groups were minimally mobile in the wet season (approximately December to April), living in quite large camps near the beach or beside the flooded Arafura swamp, and

hemmed in by water and extensive wet-season grasses (Keen 2004, 384–385, *passim*; Peterson 1973; Jones and Meehan 1989). Wet season structures of sheets of stringy bark and timber from the same species (*Eucalyptus tetradonta*) were relatively enduring, requiring only refurbishment each season, unless burnt by dry season fires (Thomson 1948). Peoples living near rich resources along the Murray River in Australia were also seasonally quite sedentary (Pardoe 1988), but this degree of sedentism had nothing to do with agriculture.

The Middle Ground

Aboriginal people, then, were not farmers at the time of British colonisation, at least in the regions considered here. Gerritsen and Pascoe emphasise those aspects of Aboriginal subsistence most closely associated with farming, namely sedentism and long-term storage.⁹ Close scrutiny of the evidence shows that it does not support Pascoe's assertions that Aboriginal people were farming. The forager-farmer dichotomy is far too simple to be useful in comparing the world's production systems (Zeder 2006). Are there alternatives to this dichotomy? After all, 'farming' can include everything from swidden horticulture using wooden hoes to large scale industrial agriculture. The dichotomy is all the more stark when allied to evolutionist schemes in which agricultural societies, or some of them, are regarded as advanced and 'civilised' while hunter-gatherer societies are seen as primitive and uncivilised, and which also assume that hunting and gathering societies, given time, necessarily evolve into farming societies.

In a review of *Dark Emu* Florek (2020), an archaeologist at the Australian Museum, accuses anthropology of lacking conceptual tools for addressing the boundary between hunting and gathering on the one hand and farming on the other. Florek writes that '... there is not yet an adequate model in the anthropology tool box to account for the socio-economic manner of land use and the provisioning of resources, emerging from current research and re-examination of older theories'. This is ill-informed.

A number of conceptual schemes have sought to bridge the gap between foraging and farming by showing how associated techniques may overlap (*e.g.* Ford 1985; Harris 1989; Smith 2001). Other schemes provide categories for production systems that come somewhere between those of hunter-gatherers and farmers. These include the categories of 'complex hunter-gatherers' and 'affluent hunter-gatherers' (Lourandos 1980; Williams 1987; Keeley 1988; Zvevibel 1996; Smith 2001, 4; Sassaman 2004), and non-egalitarian hunter-gatherers in contrast with egalitarian hunter-gatherers (Kelly 1995, 302–303; Sassaman 2004, 233).¹⁰ James Woodburn's contrast between immediate-return and delayed-return economies has been applied to Australian Aboriginal systems (Woodburn 1982). In terms of Smith's (2001) scheme Aboriginal production systems may be regarded as 'low-level production systems'. Ecological approaches seek to dissolve simple contrasts, as between foraging and farming (Hynes and Chase 1982). In archaeology, a practice-based approach tends to avoid the forager-farmer dichotomy. A focus on the constituent practices of various modes of plant exploitation, and how they are combined in particular contexts, both historical and ecological, provides a more subtle basis for analysis (Tim Denham pers. com.; Denham 2009; Denham, Donohue, and Booth 2009). The applicability of the above approaches to Australia, however, requires a separate article.

Notes

1. Casada possibly refers to *Masdenia flavescens*, ‘native potatoes’ (Hunter 1793, 409 note 26 to Ch. 4).
2. Gilligan (2010) appears to have accepted Gerritsen’s suggestion that *D. hastifolia* was introduced, and rejects the case as one of *de novo* development of agriculture.
3. Techniques for separating and collecting seeds and sporocarps included beating plants with sticks and then winnowing, threshing by putting the plants in a hole and grinding with one foot, letting *Portulaca* and *Panicum* seed fall from the heaped plants aided by internal fermentation, setting fire to the heaps and knocking the seeds out, spreading and drying in the sun, rubbing by hand in a coolamon (Jones 1979, 144–145).
4. Ashwin’s estimate seems reasonable; I estimate that a coolamon of the size reported would hold between 72 and 90 litres of grain. Wheat weighs about 79 grams per cc, so that 72 litres of wheat would weigh 56,880 grams. Seventeen of these amounts to close to a tonne (966,960 grams).
5. Tim Denham comments (pers. com.) that, ‘[f]irst, archaeologists in Australia have not really looked and archaeobotanical assemblages are very sparse in Australia. Second, people have not studied modern populations for all traits - rather than just the archaeobotanically visible ones’. Moreover, gene flow between wild and cultivated populations may have persisted. Domestication of food plants cannot, therefore, be categorically ruled out (see also Denham 2009).
6. During the Burke and Wills expedition, King observed a store of grain in an Aboriginal dwelling which he estimated at four tons, according to Pascoe (2018a, 54), who provides no supporting endnote or reference.
7. Garfinkel, Ben-Shlomo, and Kuperman (2009) reckon 1.5 tonnes for a ‘nuclear family’.
8. Gerritsen does not provide a reference for this quotation but it appears to be Lewis (1875). A previous footnote (Gerritsen 2008, 46 n93) cites Lewis (1875, 20).
9. I am grateful to an anonymous referee for making this point.
10. The expression ‘hunter-gatherer’ was seemingly coined by the sociologists Hobhouse, Wheeler, and Ginsberg (1914) in a paper on ‘the material culture and social institutions of the simpler peoples’ (Florin and Carah 2018, 48). It remains a robust anthropological category; indeed, an international conference on hunter-gatherer societies takes place every few years.

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