

The materiality of plants: plant–people entanglements

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Abstract

Plants in archaeology tend to be studied from an anthropocentric point of view, in which they are seen as passive objects (domestication, farming, deforestation, diet, trade, food and status). Here the concept of materiality is applied to view plant–people relationships from the plant’s point of view, that is, to afford plants agency. It is argued that this brings into clearer focus the complex entanglements or meshworks that are created, often unintentionally, when plants and people interact. Concepts such as materiality, relationality and entanglement help us not only to foreground the vital importance of plants in human (and animal) life, but to appreciate that these plants are best studied within the complex webs of relationships that exist between plants, animals, objects, environments and people.

Keywords

Agency; agriculture; embodiment; entanglement; materiality; meshworks; plants; relationality.

Introduction

Materiality is a concept now widely used in archaeology to explore relationships between people and objects, encouraging a move away from a focus on what objects ‘mean’ to what they ‘do’ and what they ‘are’. The exact use and definition of ‘materiality’ has changed over time, from an initial focus on the agency of objects, that is the recognition of ‘material and non-human agency’ (Knappett and Malafouris 2008, ix–xix; see also, e.g., Gosden 2005), to a greater emphasis on relationships, networks and meshworks, rather than on the individual agency of either person or object (e.g., Ingold 2007; Knappett 2011; Robb 2010). Increasingly, animals are brought into these discussions too, with a desire to move away from anthropocentric approaches within zooarchaeology (e.g., Overton and Hamilakis 2013), but plants have yet to feature prominently, though see Fuller, Allaby, and Stevens (2010); Head, Atchison, and Gates (2012), and Jones and Cloke (2008). Here I seek to explore the materiality

of plants and to highlight their centrality in all aspects of human interactions. I am taking a deliberately broad view of what ‘materiality’ means, considering both the material properties of plants *and* the material and social implications of plant–people relations. After a quick look at ‘what plants want’, the various aspects of plant–people interconnections are discussed under the headings of embodiment, investment, praxis and entanglement.

What do plants want?

Plants are essential to human and animal life on earth: they create the oxygen we breathe and the food we consume. Additionally, plants provide the fibres for our clothes, the building materials for our shelter, the fuel that keeps us warm, and the flowers that give us beauty.

Following previous studies by Mitchell (1996) and Gosden (2005), it is helpful to consider briefly: ‘what do plants want?’ The answer is quite simple. Fundamentally, the primary desire of plants is to reproduce, to make copies of themselves, metaphorically speaking.¹ A variety of strategies has evolved to achieve this. For example, some (many trees) rely on the wind to disperse their pollen and produce large quantities of pollen to increase the chance of successful pollination. Others (many flowers) use brightly coloured petals or a sweet smell and ample nectar to attract bees and other insects to visit them and aid pollen dispersal, thus requiring less pollen. In contrast, many cereals do not rely on others for fertilization, but self-pollinate, while yet other plants (including weeds) can self-propagate from root fragments. Some produce seeds or nuts that are edible, ensuring that small animals are happy to eat and disperse them, others have developed seeds with aerodynamic properties to allow the wind to carry them, or burs that attach themselves to the coats of passing animals. Plants also use chemical warfare; they use phytochemicals (so-called secondary compounds) to ward off predators (poisonous substances, unpleasant smell or flavour), or to attract pollinators (e.g., pigments). Some of the phytochemicals and other material aspects of plants have become very attractive to humans (poison, medicine, mind-altering substances, as well as food, fibres, sweet smell and beauty). Furthermore, the fact that some of the properties that originally evolved to deter herbivores have subsequently been embraced by some humans as pleasurable or desirable (e.g., herbs, spices), highlights that these properties exist only within the context of specific relationships and entanglements, see below. The most fundamental reason why plants produce these chemicals and strategies is because they cannot locomote. They cannot run away from predators or move to a nearby plant to achieve fertilization, nor can they move outside of their region of origin. To overcome this disadvantage, they have developed strategies to get others to help them to do so, and these agents include wind, insects, birds, and other animals, as well as humans.

Various authors have emphasized how the historic relationship between people and plants is often reciprocal, one of co-evolution. For example, Pollan (2001) highlights how the domestication and selective breeding of plants – the examples he uses are the apple, the tulip, marijuana and the potato – did not only benefit people, but plants too, in that their primary desire, to make copies of themselves, was met, in that it facilitated and enhanced their reproduction and proliferation. ‘Through trial and error these plant species have found that the best way to do that [reproduce themselves] is to induce animals – bees or people, it hardly matters – to spread their genes’ (Pollan 2001, xiii). By playing on and enabling our desire for sweetness, beauty, intoxication or control, conscious or otherwise, the plants have been able to reproduce and multiply and spread across the

globe. Thus, while the process of domestication has often been regarded as a process brought about by people, we might equally consider it something that plants and animals have done to us, 'a clever evolutionary strategy for advancing their own interests' (Pollan 2001, xiv). After all, 'domesticated' species such as wheat, potatoes, apples, tulips, sheep and dogs are much more common today, present over much larger geographical areas and in much greater variety than their original wild ancestors (Pollan 2001, xv).

Crops are not the only group of plants that have entered into a mutualistic relationship with people; weeds are another. In ecology they are referred to as synanthropes: wild species that live near people and benefit from a close relationship with people and their artificially created habitats – equivalents in the animal world are grain beetles, head lice and rats. They tend to be perceived as pests; for example, despite the large-scale use of herbicides in modern agriculture, weeds still reduce arable productivity by 10 to 20 per cent (Mabey 2010, 4). There are many definitions of weeds; most describe weeds from the point of view of farmers and gardeners, that is, as plants growing where they are not wanted, but a broader ecological view sees them as: plants that contest with man for the possession of the soil (Blatchley 1912), as opportunistic species that follow human disturbance of the habitat (Pritchard 1960), as artefacts or camp followers (Anderson 1954), as pioneers (Bunting 1960) or as plants uniquely able to thrive in land subject to the plough (Isely 1960) (for references, see Harlan 1992, Table 4.1). In all cases the link between weeds and people is clear: 'the history of weeds is the history of man' (Anderson 1954, as quoted in Harlan 1992, 84); 'the decision to cultivate also meant having to weed' (Pollan 1989).

Weeds are important in archaeology, because of their close association with arable crops. Their life form (annual/perennial) and ecology (preference for nutrient rich/poor, acid/neutral and wet/dry soils) help to identify the conditions in the arable fields, from which cultivation techniques, arable strategies (manuring, weeding, ploughing, etc.) and scales of production can be inferred. Significantly, these synanthropes also highlight how problematic the nature/culture dichotomy, so prevalent in our western thinking, actually is. Weeds are wild species, but they live in cultural, i.e., human-created, habitats. Their history is bound up with their mutual relationships with people and human practices, just as much as that of 'domesticates' is. Thus, to regard 'crops' as pertaining to the world of 'culture' and 'weeds' as unwanted intruders from an external world of 'nature', misses the point entirely – people, crops and weeds (as well as animals, artefacts, etc.) all occupy the same, mutually constructed ontological realm.

Weeds too apply various strategies for survival and reproduction. Annuals with short growth cycles produce many seeds; even if they are weeded out during the growing season of the cereal crop, they have usually already cast some seed – or seed from a previous year still lies dormant in the soil – and they can thus quickly reproduce. Some perennial weeds, such as bindweed, have underground rhizomes from which they can regenerate and they have become pernicious weeds in fields and gardens. Pollan (1989) describes it as follows: 'the evolution of bindweed took the hoe into account. By attacking it at the root, we play right into its insidious strategy for world domination.' Others are so-called 'professional' weeds, such as wild oat, brome grass, darnel and false flax; they mimic the crop in terms of growth cycle, seed size and shape, so that their seeds are harvested with that of the crop, and sown with it again at the start of the next season, thus ensuring reproduction (Harlan 1992, 93).

People have developed needs and desires for food, flavour, beauty, intoxication, fibres, resins, dyes, timber and shade, all properties and materials that plants can provide. Plants use those

human (and non-human animal) needs to achieve their own desire, that is, to reproduce themselves. Those that have made themselves the most attractive, have been the most successful in reproducing and spreading themselves. While the relationship was often one of mutual benefit, it also altered both the plants and the people. Biologists tend to use the term ‘co-evolution’ to describe this process; in archaeology the terms entanglement and relationality are more common, as discussed below.

Embodiment – you are what you eat

All food we eat is either directly or indirectly derived from plants; thus we consume plants on a daily basis. In contrast to the consumption of objects, the consumption of plants also involves the physical ingestion into the body; they become incorporated and embedded into the body. This material aspect of the body is now a growing research area within archaeology (e.g., Robb and Harris 2013; Sofaer 2006).

The first, and at face value the most immediate, impact of plants on people may be that of food and their nutritional value. The ingestion of plant foods has a physical effect on us, it maintains life, just as the lack of food, or the lack of healthy foods, can make us ill or lethargic. The mild sedative properties of some plants help us to relax or sleep, while others help us to stay awake and alert, or have other properties in terms of assisting in the healing of wounds, knitting bones together, clearing the airways, tackling infections, etc. Having access to enough and adequate quality food, and being able to share food, form significant components of our well-being, physically, mentally and socially.

The material effect of food ingestion can be studied through the chemical signature that certain classes of food leave behind in the body. Most of the ‘you are what you eat’ research in archaeology focuses on two broad aspects: what was eaten (together with the associated aspects of subsistence, agriculture and trade) and the social/cultural role of foods. For example, stable isotope analysis uses chemical signatures left in the bones by the consumption of certain foods (plant and animal based) to determine diet, while archaeobotany and zooarchaeology use the actual food preparation and consumption left-overs to do the same. Both also study social and cultural aspects of food, such as differential access to certain foods (especially meat and exotics), and the use of food as an indicator of, or a means to acquire, a specific identity (social, ethnic, religious, etc.). Both aspects are immensely valuable, offering information on changes in subsistence, agricultural strategies, long-distance trade, different consumer groups, diversity within the population, etc. But the emphasis is firmly on how people used the plants (and animals), that is, on plants as objects.

A second type of impact concerns plants and plant substances that have addictive or even mind-altering properties. The consumption of certain stimulants and intoxicants, such as alcohol, tobacco, cannabis and opium, but also substances such as sugar, and to a lesser extent tea and coffee, can result in forms of addiction; their consumption has us (or at least some of us) craving for more. These plant substances all tend to affect our chemical make-up; they alter our physiological and our psychological being. This may result in a relationship of dependency, which can and does have significant material effects on the lives of those afflicted, both in terms of their physical and mental well-being and thus their social life. Yet, how do we distinguish between the various types of plant substances? In western society we differentiate between

plants that are nutritious, remedial, psychoactive and toxic, but these categories are not always clear-cut. A small amount or low concentration may be remedial or give pleasure, while a large amount or regular intake can be toxic or addictive. Furthermore, 'nutritious' foods can also affect one's mental state; the concept of a separate mind and body is problematic.

Studies dealing with these effects of ingestion are still rare in archaeology, despite the fact that psychoactive substances are an integral part of human culture and social life (Goodman, Lovejoy, and Sherratt 1995). Most of the work on alcohol, for example, focuses on its role in feasting, in ritual and as a social lubricant, and in-depth studies on mind- or behaviour-altering substances and the contexts in which these were used by people, are few; though see Lewis-Williams (2004). These issues may seem unrelated to the relationships usually considered under the umbrella of 'materiality', but, as we shall see below, the human desire for certain foods and plant substances and the plants' desire for reproduction have created complex entanglements between plants and people.

Investment – seeds as archives

A reverse form of embodiment is one where human/plant interactions have left a signature in the physical make-up of the plant ('emplantment' instead of 'embodiment'). Two examples spring to mind, one relating to the impact of agricultural practices, the other to the effect of plant selection and mutation in the process of crop dispersal. For example, it is now evident that certain types of soil improvements, i.e., the manuring and irrigation of arable fields, leave a chemical signature in the seeds of the crops grown in those fields; that is, manuring results in high nitrogen values ($\delta^{15}\text{N}$), while water availability and irrigation can be inferred from stable carbon values ($\Delta^{13}\text{C}$) (Fraser et al. 2013; Wallace et al. 2013). Here the relationship between people and plants is one of mutual benefit. When the growing conditions in the fields are improved, the crops benefit by being able to survive, thrive and reproduce in environments otherwise marginal or hostile to them. Other plants, i.e., weeds, will take advantage too, grateful for the new availability of suitable habitats. People are rewarded for their efforts through gaining higher or more reliable yields, while we archaeologists benefit too, in that both the chemical signatures in the actual crop seeds, *and* the types of weeds thriving in those fields (and harvested with the crops) provide us with valuable information about past people's relationships with plants, e.g., how they cultivated their crops, how much they invested in soil improvement, etc.

Similarly, the DNA of historical landraces of crops (and of archaeological seeds once we can successfully extract it) provides information about the spread of these crops out of their area of origin, and about the complex interconnected roles of plants, people and climate. For example, DNA analysis now points to multiple domestication events of several Near Eastern crops (e.g., barley, emmer and einkorn), which has implications for our understanding of the intentionality or otherwise of the domestication process (see below under 'Entanglement'). In the case of barley, this same evidence also suggests that this crop was introduced into Europe more than once. Current evidence identifies three separate groups of barley in Europe, each originating from a different part of South-West Asia, and showing a clear latitudinal distribution pattern (Jones et al. 2012, 2013). One of them is a so-called 'day-length non-responsive type', i.e., a strain of barley that can cope with a long growing season and wet summers, and this is the group found predominantly in north-west Europe. Archaeobotanical and genetic evidence combined suggest that this strain of barley was a later introduction into Europe, possibly in

the fourth millennium BC – simultaneous with other introductions and agricultural changes – having previously been domesticated in Iran. This offers an important new perspective in debates concerning the spread of agriculture into Europe and may help to explain why the spread of agriculture northwards into Europe was not continuous, slowing down at certain locations (north of the Hungarian plain, in the Alpine region, and in Scandinavia). Previous explanations for this phenomenon have included the relative success of the hunter–gather lifestyle, cultural preferences for certain foodstuffs, and the time needed for crops to adapt to new climatic conditions. This new DNA evidence suggests that the latter explanation, i.e., the introduction of a day-length non-responsive barley, is likely to have been one of the key factors involved, without, of course, ruling out additional factors (Jones et al. 2012, 2013). Thus, here too the material properties of the plants allow us to unravel the complex interactions between plants, climate and people. These properties of plants, as we have seen, are not fixed. They change in the context of their relation with people – and this process is mutual; people are changed too – and the properties of plants thus form archives of past human and plant behaviour.

Praxis – a way of life

Yet another form of embodiment is that generated by the routine, day-to-day engagement with plants, in the sense of gathering, tending, cultivating or growing plants (Ingold 1993). In the case of cereal farmers, their daily, monthly and yearly rhythms are tied to the life cycle of the cereals they grow. The soil needs to be prepared at a certain time of the year, just as do the acts of sowing, weeding, harvesting, threshing, and storing, and the tools of the trade and the movements made with those tools (spade, plough, traction animals, scythe, threshing stick or sledge, sieves) are fixed too. This engagement with the process of farming, enacting the same set of actions over and over again, year after year, makes farmers who they are. By doing it they become farmers, a particular mode of being, an ontology that is rooted not in some unchanging essence but in particular, historically arisen relationships that are in a continuous process of becoming.² These embodied routines condition how farmers see and interact with the world, the landscape, the plants and the animals, as well as other humans; they are their life. A good illustration of this identification of the work with the life is given by Harlan (1992, 8). A farmer and his family were seen harvesting a field in eastern Turkey. Asked why he did not use a scythe and cradle, as that would halve the time needed to harvest the field, the farmer answered: ‘*Then what would I do?*’ A farmer’s engagement with the plants and the associated rhythms and communications with the world around him/her (plants, animals, tools, buildings and humans) is thus fundamentally different from that of, for example, the hunter–gatherer. Both need to plan, to ensure enough food for family and future needs, but the necessary time management and scheduling varies considerably, as does their engagement with material culture (Bradley 2004).

In contrast, gardening and horticulture have different rhythms. Here the focus tends to be on root and tuber crops, vegetables, herbs and fruits – cereals can also be grown in small garden plots – grown mixed together in the same garden, in contrast to large fields with one or two annual crops. Many of these plants thrive under intensive cultivation with regular monitoring and nurturing, using a strategy of ‘little and often’, and garden plots are thus often located close to the home. The plants are, consequently, nearer and the plant–people relations closer, incorporating more handling of individual plants, such as planting, division and taking cuttings,

as well as weeding, watering and feeding (Hastorf 1998; Leach 1997). This closer familiarity between cultivator and plant may have given rise to greater experimentation and the development of new varieties, and may have generated a more prominent role for plants in people's ritual life, medicine, etc. The proximity of the garden plot to the house may help to explain why gardening is perceived by some as a 'domestic' activity, carried out foremost by women. Here the intimacy of the daily tending of the plants evokes similarities with that of rearing or nurturing children. There is, in fact, considerable ethnographic evidence for gender differences between farming systems, with women more actively associated with hoe-based cultivation (gardening, horticulture), and men with plough-based agriculture (field crops). This foregrounds dissimilarity between nurturing or mothering and husbandry, levels of engagement and associated rhythms (e.g., Hastorf 1998; Ingold 1996; Leach 1997; Sherratt 1981).

Each type of crop will bring its own rhythm. For example, several so-called summer crops were introduced into the Middle East, North Africa and Spain during the Islamic period, including citrus fruits, sugar cane, cotton, rice, and banana (AD 700–1200; Van der Veen 2011; Watson 1983). These are tropical or sub-tropical crops that originate in South or South-East Asia and/or the Pacific and require high temperatures, plenty of sunlight and large amounts of water. The lack of sufficient rainfall during the summer months in North Africa and the Middle East meant that irrigation was an essential component of their cultivation here. Not only did this require a considerable investment in terms of infrastructure (digging and maintaining irrigation canals, building and maintaining water wheels, arranging access to the available water; fertilizer), it also drastically changed the agricultural year and, thus, the lives of the farmers. Previously, the emphasis had been on temperate crops, with the key staples (cereals, pulses and oil/fibre crops) grown during the winter and harvested in spring. The summer had been the quieter season of the agricultural calendar, with much of the land lying fallow, except for some cultivation of fruit and vegetables, using irrigation on a small scale. By the tenth or eleventh century large-scale irrigation had become commonplace. For example, al-Masudi (tenth century) refers to the Egyptians as the richest of all men in sugar and al-Idrisi (twelfth century) describes the area around Cairo as one well-watered field of sugar cane (Watson 1983, 28). No longer was the summer a period of slowing down; the agricultural year now lasted all year round, greatly increasing farmers' workloads and practices. Large-scale irrigation is often paired with large-scale land ownership, and several of the new crops lend themselves to a form of plantation or 'industrial' cultivation. Thus, lives will have changed too, both in terms of the new annual rhythms, different tools and techniques used and embodied, but also in terms of new labour relations (Van der Veen 2011, 231–3).

Fruit tree cultivation brings its own conditions. Trees are long-lived plants – lasting as long as or longer than a human generation – and they can take up to ten years to start fruiting. The produce then arrives all at the same time of the year, while often not being suitable for long-term storage, unlike the cereals – gardeners with apple or plum trees will recognize the annual glut of fruit. Here, farmers engage not just with the demands for long-term planning, investment and different practices needed when growing trees (time, land, finance, know-how, pruning, grafting), but also with the need for an outlet for their produce, which is why orchards and market gardens are often found in close proximity to centres of population such as towns. Thus, the reality of being a cereal farmer, a gardener, a landowner growing sugar cane or a horticulturalist growing fruit for a market, is directly tied into the materiality of the crops they grow and look after. Their lives are regulated by the life cycles, the needs and the idiosyncrasies of their plants. A simple dichotomy between hunter–gatherer and farming lifestyles is thus unhelpful.

Entanglement – webs of relationality

So far, the plant–people relations have been described as mutualistic, as examples of co-evolution or co-dependency (terms used commonly by biologists), or as impacting on or creating new ways of living. The relationships often go further, however, and here the concepts of ‘meshwork’ and ‘entanglement’ are appropriate. Ingold (2007) coined the term meshwork to describe the interwoven lines along which materials flow, mix and mutate, in contrast to the term ‘network’ which implies connections between specific points. Hodder (2011, 164) uses the term ‘entanglement’ to try and capture the fact that both plants and humans become caught up or trapped in the relationships: ‘humans get caught up in a double-bind, depending on things [plants] that depend on humans.’

An example of such entanglement is that of the transition to farming. For example, Harlan (1992, 3) regards cereal crops as ‘artefacts’, while at the same time recognizing that people have become so dependent on these crop plants that, in some way, the plants have ‘domesticated’ people. ‘A fully domesticated plant cannot survive without the aid of man, but only a minute fraction of the human population could survive without cultivated plants. Crops and man are mutually dependent’ (Harlan 1992, 3). Harlan refers here to the fact that, in the process of domestication, the cereals and pulses lost their natural dispersal mechanisms (loss of the brittle rachis or pod dehiscence at maturity), making the plants dependent on human dispersal for their reproduction. The loss of natural seed dispersal in cereals is in many instances based on just a single mutation, and the selection for those mutants may have been the unintentional result of, for example, a change in the way the wild cereals were harvested. People may thus unwittingly have become entangled into a closer relationship with the plants, hence becoming trapped in a set of complex labour-demanding activities (Fuller, Allaby, and Stevens 2010).

The ‘materiality’ of the plants (not a term Harlan used, of course) resulted in the farmers becoming bound to them, in that crops need to be rooted in one place till maturity, tend to produce fruit at a fixed time of the year, and need care and attention before and during the growing season. While sedentism is not a pre-requisite for agriculture – small plots of land can be and are cultivated by primarily mobile groups – it often leads to or flows from agriculture. One of the more significant aspects of the transition to farming is the fact that cereal grain (and certain other crops, e.g., pulses) can be stored for long periods, allowing permanent settlement and the creation of a food surplus, which could be used to alleviate periods of shortage, but also facilitated periodic feasting and gift exchange. This, in turn, expedited a new and more abundant and permanent material culture, wealth accumulation and the rise of social inequality, with ownership of land becoming a key factor in social relations within larger scale farming systems, and the emergence of different and asymmetrical modes of being, e.g., those of the landlord and the tenant farmer. The payback would have been increased reliability of harvest and yield and increased control over resources, while it allowed the plant to spread and reproduce beyond its natural habitat. But the changes in vegetation, fauna, landscape, material culture and social relations meant that often there was no way back to the old way of life (e.g., Robb 2013). The transition to farming and the associated emergence of sedentism, ownership and wealth accumulation, may be regarded one of the best examples of the people–plant entanglement, in that it brought about fundamental changes in society, vegetation and the material world.

Such entanglements can be seen in many other situations, for example when new crops are introduced to new regions. The introduction of summer crops into the Middle East, referred to above, is a case in point. Watson (1983) identified complex interdependencies (entanglements or

meshworks we would now say) between the introduction of the new crops, new agricultural techniques (irrigation, water wheel, greater use of crop rotation, fertilizer), changes in land tenure, the unification of the Middle East under Islam (political stability, greater mobility), economic growth, rapid urbanization, the flourishing of Islamic culture, the unusual receptivity of early Muslim civilization to all that was new, and an eagerness by the new wealthy classes to learn and improve their lives. The new crops offered rich rewards: many were potential cash crops (sugar cane, cotton, banana, citrus fruits), and those living close to the new urban centres could profit from selling their produce to these emerging and growing markets. Yet, it also enhanced exposure to taxation and created a greater dependency on those markets, just as too great a distance from the new markets or from water for irrigation meant not being able to participate in the new prosperity. The specific properties of the plants, combined with local environment and socioeconomic developments created opportunities, as well as dependencies, inequalities and greater regional diversities (Van der Veen 2011, 231–3).

The history of sugar shows that its impact and entanglement did not stop with its introduction into the Middle East (see Mintz 1985). From there the consumption of sugar quickly spread to Europe. Initially it was an expensive and exotic luxury, but the demand for cheap sugar led to its introduction into the Caribbean and the creation of large plantations there. It is a very labour-demanding crop and the price could only be driven down with the help of cheap labour, in the form of slaves. The local population, not resistant to the new diseases brought from Europe, was quickly decimated and over time they were replaced by slaves from Africa, as part of the transatlantic slave trade. The African slaves made sugar cheap to produce and thus profitable, and they also became the dominant ethnic group in the Caribbean, while the new plantations caused the destruction of the region's rainforests (Viola 1991). This mode of production meant that sugar became cheap enough to be combined with tea, offering factory owners in Britain the ideal break-time 'food' (energy plus stimulant) to sustain their workforce during their long working hours (Mintz 1985, 149), and even today its cheapness and addictive properties impact on our lives (obesity). Further entanglements may be clear from the fact that the introduction of maize from America into West Africa, while providing a reliable and nutritious staple there, thus sustaining population growth, may have provided additional African manpower for the American plantations that produced sugar, cotton and tobacco (Viola 1991). Other examples of plants that have had similarly long-lasting effects on human society, linked as they are to slavery and/or colonialism are tea, cotton, coffee, cocoa and potato, but also the medicine quinine which, by alleviating the effects of malaria, allowed Europeans to settle in parts of Africa and Asia (Hobhouse 1992).

A very different effect of newly introduced food plants concerned their ability to raise strong emotional reactions, and the archaeology of emotions is a growing field of study (e.g., Gosden 2004; Harris and Sørensen 2010; Tarlow 2000). The close links between food, emotions and social relations make that plant foods play a powerful role in our social worlds. Just as groups of related objects may shape new social entities and relationships (e.g., ceramics: Gosden 2005), so can new foods. These may be associated with a foreign culture, for example the Mediterranean foods brought into north-west Europe during the Roman conquest of this region. In Roman Britain this concerned some fifty food introductions, ranging from exotics such as black pepper and Mediterranean foods such as grapes, olives, various herbs and wine, to what are now common 'English' fruits and vegetables, such as apples, plums and cabbage (Van der Veen 2008). Their physical presence and otherness will have demanded an emotional reaction: one of curiosity and delight in the new tastes, one of indifference, one of disgust and aversion, or one

of economic and social opportunity. In the first instance the new foods will have been associated with the new ruling power and this will have had a social effect too, with some individuals and groups of individuals desiring access to the new foods in order to belong to the new elite and/or feeling the need to change their foodways in order to belong, and with others feeling a sense of exclusion, inferiority or inadequacy for not being able to afford the new and expensive foods or not knowing how to eat them. Others may have felt antipathy, wanting to spurn things foreign or rejecting everything associated with the alien culture. While these new foods were initially part of a foreign culture, they did not necessarily stay that for long. Some were quickly incorporated into local agriculture and foodways (Van der Veen 2008). The introduction and physical presence of these new foods created the need for new cultivation practices and tools, and forced people to make choices and new alliances, thus taking part in the changing social and material realities of life in Roman Britain.

The ‘materiality’ of plants seems very obvious in these examples, affecting both production and consumption processes as well as social relations on a vast scale. Plants affect the physical and psychological well-being of those who consume them, and they register the selections and treatments received. Their ability not only to entice people but also to mutate – and thus to thrive successfully in new environments – combined with people’s desire for their nutrition, beauty or many other properties (stimulants, fibre, etc.) has created complex entanglements and varied webs of relationships. Plants have come out of this entanglement well; they may have lost their freedom, their reproduction mechanisms (at least in the case of certain crops), but they have gained an increased reproduction rate and a spread over much larger parts of the globe than their wild predecessors. People have gained too, through access to a greater variety of food and flavours and plant fibres, more control over food, a wider range of nutrients, and access to a wider range of animal products, through growing fodder crops. But their lives were altered too: less freedom, sedentism, ownership, living in larger groups, altered social structures, becoming enslaved to certain foods, or tied into exploitative modes of production. While humans may, up to a point, have become willing slaves in the plants’ reproductive processes, some crops literally enslaved people.

Discussion and conclusion

Plants are central to human life and people–plant relationships have been central to archaeology and environmental archaeology from the start. Apart from questions such as ‘what did they eat?’ and ‘what was the vegetation like?’, research in this area has focused on three broad aspects: how people were able to gain control over nature (domestication, field systems, secondary products, soil improvement, colonization of marginal land, etc.), how they damaged it (deforestation, soil erosion, loss of bio-diversity), as well as how they utilized plants (and animals) in the creation of identity and social relations (feasting, social status, food avoidance). Plants were studied from an anthropocentric point of view, understandably so in the context of archaeology rather than biology. What I have tried to do in this paper, however, is to bring into clearer focus the fact that plants have agency too; that they affect us, as much as we affect them. All gardeners will know that plants have a will of their own. We only have to turn our back for a few weeks and plants are growing where we did not want them to, new ones have arrived, and others have strangled or swamped their neighbours. Plants have their own agenda, that is, to make copies of

themselves, and will use a variety of strategies to achieve this. As Pollan (2001) so compellingly illustrates, plants often have something we desire, be that nutrition, sweetness, beauty, or intoxication, but in multiplying their produce we not only directly assist the plants in their desire to reproduce, but we also become affected by them in ways that we never could have envisaged, including the emergence of these very desires. These entanglements between plants and people are felt in the arenas of consumption and production, social life, labour relations, intercontinental contacts, body and mind. Plants are part of our everyday lives; they assist us, define us and create historical associations. Farmers are partly the crops they grow, tomatoes (of New World origin) are intricately linked with Italy, tulips (of SW Asian origin) with Holland, potatoes (of New World origin) in part define the history of Ireland, poppies remind us of Flanders Fields and the horrors of World War I, the apple symbolises the fall from grace in the Garden of Eden, rubber facilitates motorized transport and assists in the fight against AIDS, while sugar enslaved millions of people and has now become the curse of our modern world.

I have deliberately focused on plants in this paper, and used a few thumbnail examples, rather than detailed case studies, to illustrate the breadth of contexts in which plants impact on our lives. As a result, the entanglements with the environment, and with objects, buildings and material culture more widely, have only been briefly mentioned, and in future papers these need further elaboration. I am thinking here of the intricate interrelationships between plants and ecosystems (substratum, rainfall, temperature, living organisms), farm animals (ploughing, manure, transport, fodder), tools and technology (ploughs, mills, grindstones, water-lifting devices, olive/wine presses, carts), storage facilities (barns, granaries, ceramic vessels), processing areas (threshing floors, corn-driers, malting ovens), and trade (shipping, navigation, harbours) and consumption (hearth, table, communal feasting area, coffee shop, restaurant, opium den, pottery, cutlery), to name but a few. These meshworks of entangled relations, in constant mutual transformation, have generated – and continue to generate – new ways of being, for people *and* plants. The concepts of materiality, relationality, meshworks and entanglement allow us to see plants as agents with which we have dynamic relationships. They open up new possibilities to bring together the various strands of archaeology, and to integrate fully archaeological science within theoretical debates. This renewed emphasis on dynamic entanglements allows us to see archaeology again as human ecology (Butzer 1982), but now with people, plants, animals, material culture and environment all receiving equal agency.

Acknowledgements

I would like to thank the Netherlands Institute for Advanced Study for a NIAS Fellowship during which this project was researched. I have benefitted from discussions with Julie-Anne Bouchard-Perron, Chris Gosden, Oliver Harris and Terry Hopkinson, and I am grateful to Richard Bradley, Oliver Harris and Terry Hopkinson for comments on an earlier draft of this paper, and to Eric Cambridge for checking the English text.

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Notes

- 1 Throughout the paper where I refer to the ‘desires’ of plants, this is to be taken metaphorically. It should not be taken to mean that plants, and the history of plant behaviour, have any kind of plant intentionality; that is, no teleological position is implied.
- 2 This concept has a long pedigree, see, for example Marx and Engels 1966, 20.

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