

Ingrained

A Human Bio-geography of Wheat

Lesley Head, Jennifer Atchison
and Alison Gates



INGRAINED

To Alison and Keith (LH)

To Erik and Freja, who would happily eat pasta every day of the week (JA)

To Mum and Dad with love (AG)

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A Human Bio-geography of Wheat

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ASHGATE

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List of Abbreviations

AWB	Australian Wheat Board
BCE	Before the Christian Era
BP	years Before Present
bya	billion years ago
CE	Christian Era
DPI	NSW Department of Primary Industries and Agriculture
GM	Genetically Modified
GR	Green Revolution
mya	million years ago
NSW	New South Wales, Australia
SA	South Australia

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Chapter 1

Ingrained

Having picked up this book and turned to this page, you have continued the human relationship with wheat, whose starch has been an important component of paper production since the ancient Egyptians made papyrus. Wheat is embedded in Western consciousness as the biblical staff of life, one of the founding grains of the Neolithic revolution, a marker of colonial productivity and progress in the settlement of new lands, and a globalised commodity. It is embedded in everyday lives, including urban lives, and most of us ate it for breakfast without thinking too much about it, unless that is, we suffer from coeliac disease and need to follow its presence everywhere in order to avoid it.

If you were sleepily reading the cereal or bread packet this morning, a picture of a stylised head of wheat or a golden sheaf may have drawn your attention to the fact that you were eating a plant. That plant's ancestors had evolved its cellulose stalk and starchy seeds many millions of years before your ancestors decided to collect those seeds and grind them. Such a picture, or a claim like '97 per cent whole grain' – possibly even a smiling farmer – subtly connotes a natural product and connects your consumer subconscious to the conditions of its production. Perhaps this book is made from 'Nature's paper', fashioned from wheat straw:

For centuries the farmer has been using the left-over wheat straw for alternative uses. He has put a roof over his head, using it for thatch. He has fed his cattle with it during the winter months. This is a story of recycling long before the word recycle existed. (www.naturespaper.com.au)

However, if your jam or vitamin tablet this morning contained wheat, as is highly possible, the packaging is unlikely to have drawn attention to it with golden sheaves, since to do so would be to render the industrial nature of their production visible. But many legal jurisdictions would have required the label to tell you this somewhere, in case you are allergic to wheat and need to avoid it. Labelling is less stringent in non-food items but if you fed your dog or cat, washed your hair or took a painkiller, wheat was probably involved. Other parts of your putative breakfast were energised by wheat fed to animals. For example, it took half a kilogram of grain to produce a litre of your breakfast milk or yogurt.

Wheat may have not only helped physically constitute your morning newspaper, but also have been on the front page if drought, flood or plague provided a dramatic hook to bring the difficulties of the farming experience into wider community consciousness, if food prices were on the rise or if currency fluctuations were making life hard for exporters. It would certainly have been in the financial pages,

where wheat prices and futures on the Chicago Board of Trade are tracked with as much interest as those of tapis crude and gold. Local farmers and traders may also have been celebrating in these pages if poor harvests in the opposite hemisphere promised them higher prices in the forthcoming season.

However ordinary our interactions are with wheat, they are not trivial. It is immensely significant in the global food supply, being the second largest crop produced and consumed by volume, and supplying 19 per cent of calorific supply in the human world (Mitchelle and Milke 2005). Wheat is the crop with the largest production area and a lower global average yield than corn or rice, making its production more energy intensive. It is the largest volume crop traded on an international scale; in 2008 for example 131 million tonnes at a value of 45 billion US dollars was traded internationally (FAOSTATS 2011).

Wheat is the most significant crop for international food aid, and the most significant crop stored as a buffer against production shortages (Mitchelle and Milke 2005, Barret and Maxwell 2005). In 2006, all combined donor countries contributed over 2 million tonnes of wheat and wheat flour in food aid shipments to all combined recipient countries (FAOSTATS 2011). Wheat has been a major agent of landscape change on most continents.

This ambiguous status of wheat – fluctuating between global dominance and everyday invisibility – characterises its treatment within geography. In becoming domesticated, wheat has, for many geographers, crossed from nature into culture, and surrendered its status as a plant. Although it is a grass, you will not find wheat on most vegetation maps, even in places where it dominates the landscape. Nor, although wheatlands were historically part of a system of colonial dispossession and ecological transformation in the Americas, Australasia, South Africa and elsewhere, will you find it in lists of invasive species or weeds of national significance. It has surrendered its status as an autonomous, albeit backgrounded, plant on the stage of human history, and is mapped instead as an economic or cultural category – a regional wheat belt, a flow of trade, a patented variety.

In this book we take a fresh look at the times and spaces of human-wheat relations that are so easy to take for granted. We ask what might be gained by re-approaching these important relations as ones between humans and plants, as beings who are ingrained in one another's lives. This is a smaller scale of analysis than usually undertaken in relation to wheat geographies, but it is a common approach in ethnobotanical studies of the ways hunter-gatherers say, or suburban gardeners, engage with plants. For most of us in the affluent West there is apparently nothing earthy or animated about our relationship with wheat. It is a hard edged industrial relationship, if we notice it at all. How might we approach an ethnobotany, we wondered, among people whose relationship with the plant is via a picture on the cereal packet?

Methodologically, we draw here on a range of approaches from within human geography, biogeography and archaeology. Our empirical contribution is to focus at selected everyday intersections between people and wheat, understanding that these furl in a much wider network of connections between people, places, plants

and times. We approach human-plant relations as networks comprising not only plants and people, but also rain, machines, soil, silos, government policies and financial instruments among other things. Our ethnographic windows are through the lives of diverse wheat people – farmers, truckers, millers, scientists, bakers, bankers, pet food manufacturers, traders, and consumers. We also aim to keep the wheat itself front and centre, drawing inspiration from cultural geographers such as Ian Cook’s (2004) ‘following’ studies, Hitchings and Jones’ (2004) discussion of mobile and bodily methods for approaching human-plant encounters, and what anthropologists would call multi-sited ethnography. Unlike many ‘following’ studies, we tried to do so in a way that did not reify wheat as a pre-constituted ‘thing’ (Figure 1.1). We paid attention to, on the one hand, its material deconstruction and transformation into things other than wheat, and on the other, its interactions with the bodies of humans and nonhumans. This meant following its invisibility as well as its visibility, via food labels and grading standards. It also meant stopping to be aware of the ways wheat was already present and ingrained in our own lives.



Figure 1.1 Following wheat

We argue that our relationships with wheat are just as intimate as those of our ancestors who gathered starchy plants or ground grain on a daily basis. It is deeply ingrained in the fabric of our lives. Nor has it lost what we will call its plantiness, a concept elaborated in Chapter 2. Plantiness is the assemblage of qualities that makes a plant a plant, and that existed many millions of years

before humans evolved. Plantiness still requires sun and rain – just enough, not too much, and at the right times. Most of our farming fieldwork took place in southeastern Australia during the extreme drought years of 2005–07, providing unique insights into the interplay of climate with other factors. Our argument hence connects to the wider issues of human-plant mutuality that are so fundamental to the health of the earth's systems.

The book is structured to provide a more theoretical overview in the first half (Chapters 2–4), and more empirical detail in the second half (Chapters 5–9). However this is not fixed, as part of our argument is that the space/times of wheat are simultaneously local and global, of the present day and carrying the past. That is, we understand our ethnographic moments not as small scale contemporary happenings situated within the wider fields of globalisation and evolutionary history; rather each is in a continuing process of becoming that we attempt to convey in the unfolding narrative.

Human-Plant Geographies

Considering that plants are fundamental players in human lives, underpinning our food supply and contributing to the air we breathe, they have received insufficient attention in the social sciences (Hall 2011). In the now well established critique of the nature/culture dualism in Western thought, animal-society relations have received much more scholarly attention than human-plant relations. This is particularly puzzling as relationships between plants and people are central to pressing sustainability issues such as biodiversity protection, food production, invasive species management, biofuel production and carbon sequestration. Jones and Cloke commented a decade ago that, while there had been considerable recent interest in animals and society within human geography and anthropology, 'flora ... remains an even more ghost-like presence in contemporary theoretical approaches' (2002: 4). Chapter 2 goes in search of these ghostly flora, pausing at Matthew Hall's recent (2011) work to consider how the backgrounding of plants became so entrenched in Western life and scholarship. We note that plant related studies are flourishing within the more-than-human turn in geography, and argue that more can be done in response to Jones and Cloke's challenge to take plants seriously. This requires tackling the ontological question, *what is a plant?*, and the epistemological questions that flow from that; *how are plant worlds approached in different human framings?* We forward the concept of plantiness to help us advance thinking about what it means to be a plant, how plants act in their worlds, and how we can we better understand our shared worlds. A further challenge is the question of what the relevant unit of study and engagement might be. In contrast to animals, humans are more inclined to think of plants not as individuals but as different types of collectives or assemblages – forests, food, commodities, vegetation communities, habitat, biodiversity and, more recently, carbon storage devices. These differences have consequences for our ethical engagement.

If human geographies have been rather slow to take plants seriously, within biogeography there has until recently been a converse gap on the question of humans. Although biogeography, as part of the natural sciences, would in theory claim a holistic remit that includes humans as part of earth's biota, its usual practice has reinforced humans as different and separate to the rest of nature, with anthropologists or archaeologists more likely to consider humans within an explicitly biogeographical perspective. As Terrell argues, 'the expression "human biogeography" sounds both self-evident and yet peculiar' (2006: 2088). Most physical biogeographers now recognise that the vegetation patterns they are studying reflect both deep time evolutionary pathways and the 'muddy and indecipherable blur' of human influence (Mackey 2008: 392), but 'an outdated view of the world as "natural ecosystems with humans disturbing them"... remains the mainstream view' (Ellis and Ramankutty 2008: 445). Ellis and Ramankutty have recently put forward the concept of anthropogenic biomes to challenge this view, work we also examine in Chapter 2. We review literature that shows the continuation of dualistic frameworks, as well as challenges to them, and also consider the problematic place of agricultural landscapes in separationist understandings of nature. Recent reconceptualisations of domestication in archaeological thought are discussed as a way of developing more-than-human perspectives over deep time.

Our own take on human-plant geographies (expressed in the human bio-geography of the book's title) draws together plantiness, becoming, and webs of relationality and multiple agency. It considers questions of difference, identity and collectivity, since many of our relations with wheat are not with the individual plant itself.

What is Wheat? And How Did it Become Itself?

'Wheat' is a plant collective that defies our efforts at defining and describing its geography in several ways. Its botanical taxonomy is enormously complicated, with all attempts at its systematic classification proving very difficult (Morrison 2001). Wheat is an ethnobotanical term rather than a specific taxonomic identity. It encompasses two genera (*Triticum* and *Aegilops*, Morrison 2001) and approximately 600 species (Cornell and Hovelings 1998). The taxonomy is complicated by the existence of multiple genetic strains, and by its huge genetic diversity, which is about six times larger than the maize genome (Huttner and Debrand 2001), the result of complicated historical and ongoing interbreeding and hybridisation by humans over thousands of years of domestication (Feldman, 2001). Just as other domesticated food plants emerge as 'countless', 'impossible to avoid' (Cook 2004) and 'invisibly ubiquitous' (Whatmore 2002), wheat is – even more so – simultaneously visible and invisible, obvious and hidden, everywhere and nowhere.

Chapter 3 starts to untangle this history by examining how wheat became itself. Although we use four long moments in an historical trajectory, we are interested in emphasising that this was, and continues to be, a messy and contingent process, an experiment that is still in progress. The chapter discusses becoming grass,

becoming domesticated, becoming Australian and becoming a global commodity. To emphasise that the process of becoming is a constant one, we draw attention to different ways in which wheat's identity has been stabilised and disrupted. The process of becoming is also and always a spatial process; this chapter uses examples from many different places and scales.



Figure 1.2 Wheat in the paddock

Spaces of Wheat: Shadow Places

Chapter 4 starts with an overview of landscapes of wheat as conventionally understood – where it grows, and why (Figure 1.2). But we aim to go further and disrupt that view, drawing on more dynamic conceptualisations of spatiality in recent human geography and related disciplines. Plumwood (2008: 139) used the idea of ‘shadow places’ to bring to light the many unrecognised ‘places that provide our material and ecological support, most of which, in a global market, are likely to elude our knowledge and responsibility’. Many urban dwellers are groping for some sort of connection to rural landscapes; our contention is that they already exist. Indeed cities cannot have developed without the underpinnings provided by wheat and related crops, and the storable surplus they generated. These crops are still threaded through cities via markets, transport, products and

of course consumers. To cross the conceptual boundary between rural and urban spaces is to also challenge the notion that cities are places of pure culture, outside nature. The material connections between cities and their shadow places have been demonstrated by a number of scholars, showing how cities are networked into broader ecosystem processes, such as those that supply water (Gandy 2002, Kaika 2005, Heynen et al. 2006). This is consistent with the idea that cities are just as much ecosystems as remote wilderness areas (Botkin and Beveridge 1997).

Hence the shadow places of wheat extend far beyond the iconic farm; wheat is ingrained into the nooks and crannies of complex globalised lives and bodies (Figure 1.3). Its shadow places include the branded shapes of pet food, vaginal pessaries, Saddam Hussein's Iraq, and financial markets from Chicago to Singapore. And nor do most wheat farms conform to the stereotype of degraded shadow places, remote from the cosmopolitan centre. Many farmers expressed to us their annoyance at the cliché of drought and farming as represented in the metropolitan media; a sad family standing in a cracking clay pan. Rather they wanted to express their business savvy, the normality of drought, and the necessity of living with risk and uncertainty.



Figure 1.3 Wheat and bodies

Chapter 5 examines the seasonal wheat cycle on the farm, considering what it takes to grow a crop in the wheat belt of New South Wales, Australia. We present the growing of wheat as a complex coproduction between human, plant and other

bodies. The human bodies, in the drought years of our fieldwork, underwent as many stresses and strains as the wheat itself. The chapter also emphasises multiple temporalities; it juxtaposes cyclic and rhythmic notions of time with interruptions and unpredictability, in order to cut across a simplistic linear reading of the flow of wheat.

As wheat is harvested and leaves the farm, it is no longer constituted as an individual, or even necessarily a collective, plant. This sets up a number of tensions and issues which are explored in the following three chapters. On the face of things the sequence of mobility (Chapter 6), becoming food (Chapter 7) and industrial transformation (Chapter 8) is a linear process through which wheat further loses its identity as a plant, and increasingly becomes a commodity or a collection of chemically interesting starches and proteins. However, we show that wheat retains its plantiness; indeed that is precisely its attraction to the many humans who engage with it in the contexts of these chapters. Just as, following the argument of Chapter 3, wheat has always had multiple identities, so this continues in various forms of transformation. For those who deconstruct wheat and reassemble it into other things in the industrial laboratory, it is the planty qualities of starch chemistry with which they engage. Others who are turning wheat into meat or milk are more interested in the aggregated plantiness of wheat as energy.

Mobility, Friction and Fungibility

Chapter 6 considers the conceptual and physical interplay of lines and boundaries on the ground, using themes of mobility and friction. The archaeological legacy of older wheat infrastructures in country towns – silos, mills, railways – is one important expression of wheaten landscapes. While today they can look less than dynamic, in their heyday they represented movement and flow just as much as storage and sedentism. Wheat has long been more mobile than its non-perishable character would suggest. An important thread through this and the following chapters is the role of quality standards and other forms of measurement in fixing – or unfixing – wheat's identity, to enhance human connections with it and reduce the friction associated with various forms of movement. We trace wheat's integration into a single stream, and then its differentiation into wheats with a range of different identities.

When you spend a lot of time thinking about the infrastructures that move wheat around, it seems somewhat quaint that it is still pinned to the ground for the growth cycle, dependent on rain to not only fall in the right amounts, but at the right time. From the moment of harvest it is on the move. Friction in this flow is expensive – it costs time and money to load and unload trucks, trains and silos. In his book on Chicago, William Cronon (1991) described the way the movement of wheat from the US mid-west gradually became more fluid with changes in technology. This process is intensified – it is literally a flow – in contemporary

grain movements. Not only does it flow, but it is monitored and accounted for like the waters of an intensively managed river, or the rivers of global capital. Today, just-in-time processing drives and punctuates its flow even more. Sydney's largest biscuit factory keeps only two days supply of flour.

This mobility is also more complex than we usually think. While railway webs still drain inland areas to coastal ports in a dendritic pattern, the flow of wheat is not only in one direction. It moves around, re-energising other parts of the network, fuelling and feeding as it goes. As encapsulated energy, it can be stored and pooled, moderating seasonality and the variability of drought. Farming households in Western agriculture do not necessarily grow their own food, but buy back supermarket products including bread and pasta. They never know whether their own wheat went to feed the pigs whose chops they are buying.

Food

A finely tuned and 'just in time' food transport and distribution system which 'presents risks of rapid spread of contaminated food and is vulnerable to events such as pandemics' (PMSEIC 2010: 1) is just one of the challenges of global food security. During the period of our research, dramatic increases in the price of food led to riots in many parts of the world. In contributing to these debates, contemporary agri-food geographies aim to work across, and eventually dismantle, a set of binary oppositions that have marked the field: culture and nature; conventional and alternative agriculture; global and local processes; production and consumption; political economy and cultural approaches; foci on materiality and representation (Morgan et al. 2006). Chapter 7 connects to these debates, focusing on wheat as a staple food, via the examples of bread and pasta.

Because food is central to the interactions between human bodies and the nonhuman world, it is not surprising that heated discussions around the concepts and practice of cultures/natures have been central to food geographies over the last decade. Goodman (1999) argued that this field, where nature was 'abstracted from the social domain' (p. 17), was in fact rather late to examine its basis in modernist ontology. He advocated actor-network theory as a potential way forward, an argument challenged by Marsden (2000), who argued that relational approaches, while offering 'a better methodological tool kit' could not sufficiently account for the power differentials evident throughout agricultural networks.

While we are conscious of the political-economic issues that attend wheat as food, we follow here Marsden's suggestion that empirical studies with a 'significantly more micro-sociological stance' (p. 27) provide a way forward. Our ethnographic examples compare and contrast factory-based, large scale production processes (that we call Big Bread and Big Pasta) with artisan

processes (Small Bread and Small Pasta), examining how wheat ‘becomes food’ (Roe 2006a) in each. In these explorations a further set of comparisons emerge; mass and specialist food production, handmade and untouched food, quality as standards and quality as materiality. The everyday experiences of these food producers constitute part of the broader political economy of wheat. In the struggle to make a living by adding economic value to an apparently simple plant, they have to move it around the continent and pull it apart in different ways. Arguably, they have to get further from the plant. At one level this conflicts with the nutritional and health aspirations that our food should be as fresh and unprocessed as possible, but as boutique liquorice maker Nick wryly explained, he would hardly make a living out of putting bowls of flour on the table. This chapter also adds to food geographies that are challenging the simplistic equation of local food with sustainability concerns, by illustrating some of the complexities of moving organic flour around the country.

Transformation

Wheat has been turned into money since our ancestors recognised its starchy, floury and kneadable qualities. The diverse, energetic and functional qualities of wheat plantiness, however, have enabled us to pull it apart in myriad ways. Its distinctive physical characteristics are central to its transformability and contemporary industrial applications. All conventional grain crops are significant sources of carbohydrates (both starch and sugar), but wheat contains considerably more protein than rice, maize, barley or millet (Pomeranz 1988). Although soybeans have a higher protein content, they do not contain comparable quantities of carbohydrates. Wheat can thus become a component of hairspray, paper and milk via contemporary agricultural and industrial modes of production and processing. It moves in nonlinear ways, hides, and in turn transforms other things.

Chapter 8 examines the processes of transformation and in/visibility. Manufacturers, food technologists and industrial scientists value the malleability and unstable identity of wheat. It is easy to hide, break down and reconstitute into different products, from dog food to ice-cream to hairspray. Its capacity to be broken down as different constituent parts and recrafted into other things is fundamental. We follow the wheat as it becomes transformed into different products, both food and non-food.

Chapters 7 and 8 show that food tends to fix the identity; non-food tends to hide, make invisible and disassemble the identity of wheat. These multiple identities and connection to plantiness make the ethical issues complex. Is our responsibility to plants, or to a less essentialised constituency?