



RURAL HISTORY TODAY

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Sustaining the soil

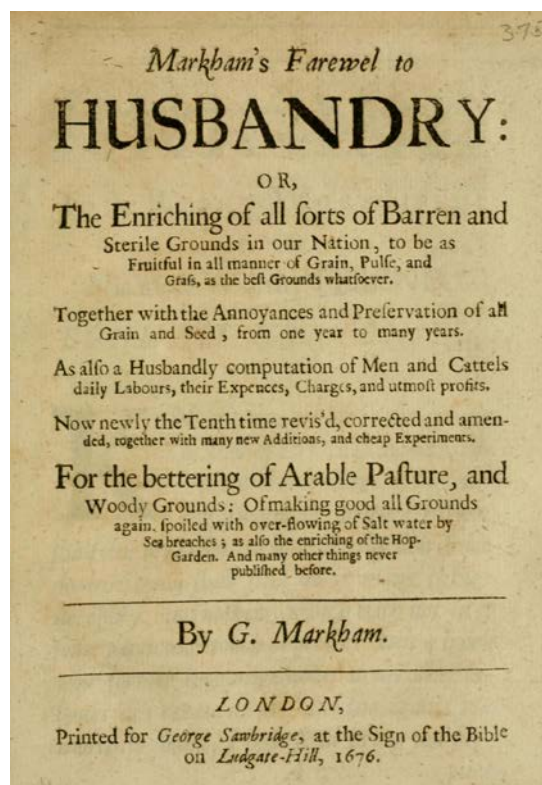
Paul Warde discusses the evolution of ideas about the soil and their role in developing the notion of sustainability.

What is it in the soil that makes plants grow? Is it the soil at all? Even in the middle of the nineteenth century, some writers were repeating the findings of seventeenth-century experiments that declared water was sufficient to feed plants. Yet it was admitted that you couldn't get a crop unless a plant was rooted firmly in the ground. But why? And did that fact, in turn, impose limits on what farmers could achieve? Or even worse, did that mean it was possible to destroy the goodness of the soil, and so lead society into collapse?

For millennia farmers have assessed the quality of their land and how it responds to treatment, without knowing *why* treatments worked. Certainly at the level of the individual farm, specialist knowledge of biological and ecological processes may not have been important until the twentieth century. Yet debates about the condition of the soil in printed literature were important in shaping a more *general* expectation: that it was possible to improve the soil and thus the nation's output.

Humours and husbandry

The first author to structure a book around the condition of the soil, the prolific Gervase Markham with his *Farewel to husbandry* of 1613, called farmers who tilled without knowing why they succeeded, 'Skillful clowns'. Markham wrote as part of a growing body of literature on husbandry. These works were typically organised around the farming calendar, or the spatial organisation of activity (arable, garden, pasture, etc.). Markham's innovation was to start from the soil and its qualities. The dominant theory rested on an Aristotelian understanding of the quality of the soil as being shaped by humours and degrees of heat and moisture; ideas that do seem to have shaped medieval farming practice. The crucial issue was to get the mix right. This led to a view that land being 'out of heart' was a temporary phenomenon. Swept up with the



Title page of Gervase Markham's book on husbandry, 1676 edition

enthusiasm for 'improvement' that became especially marked after 1640, such ideas could allow Walter Blith to argue in 1649 that, "All sorts of lands, of what nature or quality soever they be, under what Climate soever, of what constitution of condition soever, of what face or character soever they be... will admit of a very large Improvement".

Theories of nutrition

Little of this writing paid any attention to the *nutritional* qualities of the soil. However in the seventeenth century, experiment on such matters grew, influenced by traditions of alchemy established

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Image: Wikimedia/Nifantion

by Paracelsus. Writers posited that there was some 'nitre', or 'salt', or even a 'fifth element' that imbued plants with life and allowed them to flourish. Yet there was little consensus about how this was delivered and what this meant in practice, and it did not displace the prevalent idea that the humours were crucial to agricultural success. As late as the mid-eighteenth century, the French writer Duhamel de Monceau could observe there was no consensus. Fifty years later, a writer in the *Annals of Agriculture* scoffed at the 'absurdity of those theories concerning the food of plants with which so many volumes are stuffed.' An outlier from more widely held ideas was Jethro Tull, who argued that the direct food of plants was simply earth itself, and thus a very fine tilth was desirable because it allowed the assimilation of that earth through the plants' roots. This provided a justification for his emphasis on the mechanical approach to agriculture, given that breaking up the soil enabled crops to flourish. His reply to the objection that manure surely provided nutrition, was that it bloated on putrefaction, so fragmenting the earth into a finer tilth. It did not have any nutritional qualities itself.

The Enlightenment

This changed in the late 1740s, and the change came in Scotland. The men who effected this shift – such as William Cullen and Francis Home – belonged to the tightly-knit intellectual circles of Glasgow and Edinburgh, that brought together learned associations and economic projects, university men, medical practitioners, experimentalists, noble improvers, philosophers, and government agents. In 1748 Cullen was delivering talks on agriculture that provided the inspiration for a never-completed book, in which he came to the conclusion that, 'we need to seek for the nourishment of vegetables no where else than in the destroyed matter of Vegetables themselves.'

Plants were recycled plants, although it remained a question as to how that recycling was achieved. This statement marks the emergence of a belief – albeit one that never became universal – that agricultural success required the recycling of plant matter. Eventually it would suggest the idea that the food of plants was finite, and at risk of dissipation. Both these notions seem so commonsensical now that it is hard to believe

they were not previously theorized. It is hard to say exactly where Cullen's ideas came from, but a good candidate is the Comte du Buffon, whose experiments were publicized in his 1749 essay 'De la reproduction engénéral', which argued that material was divided into 'organic' (i.e. life-giving) and 'inorganic' molecules.

Circulatory theory

The idea of 'organic molecules' or recycled plants could in turn be fitted into new ideas of farming as a circulatory system. This was popularised in Arthur Young's theorem that it was necessary to recycle the material bodies of plants, via animal manure, to maintain yields in an organic cycle. Crucial was finding 'a peculiar *proportion* between the parts', starting with balancing the arable and pasture. In England, the theory of organic circulation was not universally held; Young's peer and to some degree rival, William Marshall held that, 'the value of Land does not depend more on the soil, or vegetative stratum, than it does on the sub-soil.' Circulatory theory and the 'vitalism' of organic molecules were much more prevalent as ideas on the continent, especially Germany.

By the 1840s, arguments about 'vitalism' were replaced with ones based on the chemical elements. However, the notion of recycling began to underpin theories that attributed the fall of empires to overexploitation of the soil. None of these were based on any clear historical or empirical evidence, but became grounded in the theoretical possibility of nutrients leaching away. So could the fall of Rome be attributed to over-use of the bread baskets of North Africa? Equally, according to the German chemist Justus Liebig, Britain was a vampire harvesting the bones of the world for fertiliser: 'It is impossible to think that such a sinful intervention in the divine ordering of the world will remain without punishment...'. American thinkers too, pondered whether signs of exhaustion in the eastern states portended a similar fate to that of Rome.

By this convoluted route, the mundane activity of farmers in tilling the soil had become the centre of a mission of national improvement. Such ideas would prove crucial in shaping modern environmental attitudes, feeding into stories of progress and failure, and what we might call 'sustainability' today.

► Paul Warde's book *The Invention of Sustainability: Nature and Destiny 1500–1870*, is out now, published by Cambridge University Press, £34.99

Back to the land

Shelley Savage, from the Tring & District Local History & Museum Society, on a reminder of rural reconstruction in interwar Hertfordshire

Tring is in the western part of Hertfordshire. The land protrudes into Buckinghamshire, which surrounds it on three sides. In the late nineteenth century, this was an area favoured by the extended Rothschild family for their five country estates. On the edge of the town is a small cottage, now Grade II listed, which was built in 1921 as part of the Land Settlement (Facilities) Bill 1919. Unusually, and possibly uniquely, not only is the building itself unchanged except for minor upgrades to its heating, but the two acres of land surrounding it are also intact.

Acquisition of Rothschild Land

In 1918 Lloyd George's Liberal government was faced with huge problems. Ex-servicemen, many of whom had been wounded, were returning to a country whose economy had been shaken by war, with huge industrial unrest, high inflation, a shortage of jobs and housing, and high food prices. Also present was the fear of revolution spreading from the Continent. Land reform was a subject very close to the Prime Minister's heart. From his earliest campaigning days, he favoured taking land from aristocrats and giving it to ordinary

people. The Act of 1919 confined itself to empowering and assisting local authorities to acquire land for small-holdings and allotments for ex-servicemen.

Hertfordshire was one of the County Councils which undertook the responsibility thoroughly. The existing Agricultural Sub-Committee was expanded and a Land Agent recruited. His first task was to identify landowners who could be persuaded to lease or sell land. Naturally, the Rothschild family in Tring was one of them. The land had to be of good quality, have proximity to markets and transport facilities, and opportunities for other employment. The Hon. Charles Rothschild made available 180 acres, part of Dunsley Farm, and sold it to the County Council for the sum of £5,110. However, "in view of the advantageous terms upon which he offered the land" this was subject to shooting rights over the property for 14 years at a nominal rent of £1 per annum.

Selection process

By October 1919, applications had been received from keen ex-service men. At Tring, a small group interviewed and selected the 27 prospective tenants or purchasers. The formal process included finding out about their land

'We think that it may lead to a large increase in that intensive cultivation of the soil which is so desirable, and we regard this Bill not merely as a Land Settlement Bill for soldiers, but as part of that general reconstruction of rural life which we all desire...'

The Parliamentary Secretary to the Board of Agriculture, Colonel Sir Arthur Boscawen, on the Land Settlement (Facilities) Bill. House of Commons Debate 14 April 1919, Hansard online, vol 114 cc2576-663

work experience, the acreage required, whether a cottage was wanted, how much capital they had and their war service record. The notes of these sessions, chaired by a Hertfordshire landowner or a senior army officer, were recorded in the County Council Minute books (the source of the material here). Then at the same meeting, together with any other relevant local information, decisions were made about the allocation of land. It seems that only those who had experience of land work were successful.

Mr E.A. Jeacock applied for two acres and a cottage – the only one to be built in Tring. He was 35 years of age, married and had worked as a Head Gardener. He proposed growing fruit trees and setting up a nursery. It was therefore important that he should live on site. The Committee recommended the financing of this cottage and fencing up to £1000. He moved in at a rental of £30 per annum. However there must have been water supply problems, because although a well 35 feet deep was sunk, it had to be extended to a further 26 feet costing in all £1,030 14s od.

Little appears to have been written about the success or otherwise of the scheme nationally. Locally, it is known that two men who acquired land under this scheme did well. Both held plots which had been owned by Rothschild, and their grandchildren still live in the town. The cottage, still owned by Hertfordshire County Council, is let to an employee who keeps goats and some sheep on the land.



Image: Mike Bass, supplied by Shelley Savage.

The cottage is clad with elm boards. The design is almost certainly the same as for all Hertfordshire County Council properties built under the scheme at that time. The blossoming cherry trees were planted by Mr Jeacock, the first occupant.

Agriculture's forgotten **genius**



Bob Mason on Jean Baptiste Boussingault and the development of fertiliser theory

The identification of nitrogen's role in plant growth in the nineteenth century is arguably one of the most important of all scientific discoveries. The application of nitrogenous fertilisers has contributed to the increased yields of grain and other food crops. In the chapter on agricultural scientific research in the *Agrarian History of England and Wales, 1850–1914*, a number of figures involved in this research are named but one of the most important, Jean Baptiste Boussingault, is missing.

Discussion about the development of fertiliser theory in Britain tends to focus on the German scientist Justus von Liebig, who described the essential plant nutrients; and John Bennett Lawes – landowner, scientist and producer of Britain's first fertilizer – together with Joseph Henry Gilbert, his scientific collaborator. These last two were responsible for founding Rothamsted Agricultural Research Station. There was a heated debate between Liebig and the British researchers on the question of whether plants obtained nitrogen from the soil or the air. Liebig was so convinced that plants obtained nitrogen from the air, that he proposed

marketing a fertiliser with no expensive nitrogen salts in it.¹ Lawes and Gilbert's opposing arguments were supported by Boussingault's research.

South American mines

Boussingault was born in 1802 in a Parisian barrack room and essentially self-educated. After attending the mining school at St. Etienne, where he received his only formal scientific education, he went to South America for ten years working for the revolutionary government under Bolívar as a teacher, surveyor, prospector, inspector and manager of mines. This was highly dangerous, as the residual Spanish army tended to cut the throat of any captured revolutionary government employee. He wrote scientific papers on geology, mineralogy, chemistry, medicine, meteorology and volcanology. His most significant agricultural work stemmed from his time in the goldmine; its remote location meant feeding the workforce was difficult, so he established a farm on site. He later identified this as the beginning of his

interest in agricultural science. He noticed, for instance, how native people were able to grow crops in a sterile sandy soil by using locally mined caliche – an impure form of sodium nitrate, or any available guano.

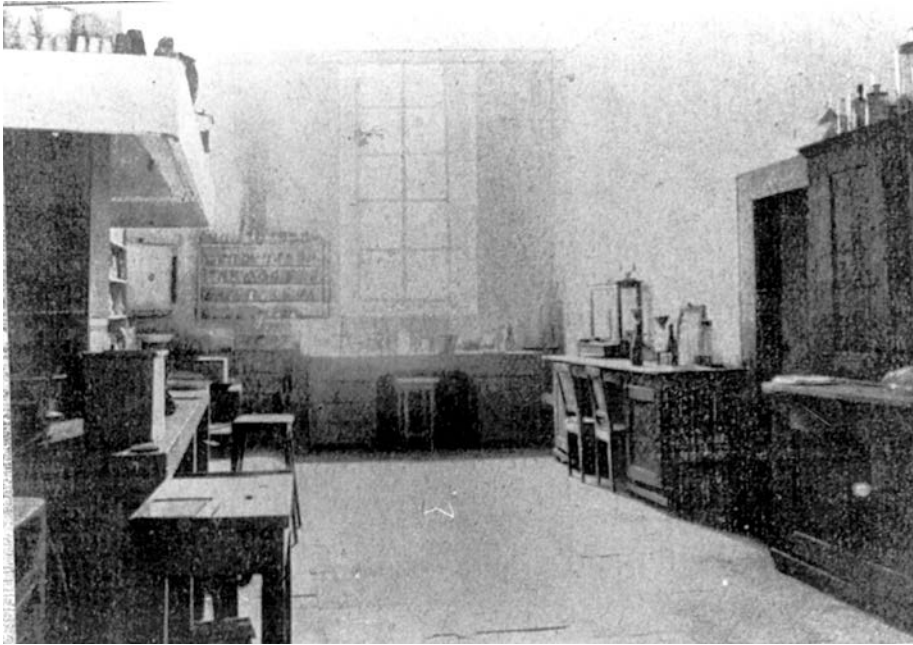
Bechelbronn Research Station

On his return to France, he began to concentrate on agricultural research. The farm at Bechelbronn, where he conducted these investigations between 1836 and 1841, is considered to be Europe's first experimental agricultural station. Initially, Boussingault concentrated on two topics: crop rotation and the origin of fat in herbivores. During his initial researches on crop rotation he systematically weighed crops and manure and analysed both. The result was a balance sheet showing the quantities of carbon and nitrogen added in manure and removed in the crops. It showed an imbalance between the amount of carbon in the plant and in the soil humus, so revealing how much atmospheric carbon was absorbed. This



Above: Boussingault's Experimental Farm in France (on the right).

Top: Portrait of Boussingault.



Boussingault's laboratory in France.

balance sheet also indicated that plants derive nitrogen from the soil and, in certain rotations, more nitrogen existed in the crop than was supplied in the manure, pointing the way to the role of legumes in the nitrogen cycle. A series of trials using oats, clover, wheat and peas grown in pots showed that only clover and peas gained nitrogen from the air.

The importance of nitrogen

In 1848 Boussingault terminated the large-scale trials at Bechelbronn, ending its work as an experimental agricultural station. He returned to his research in 1851, albeit as a laboratory chemist principally concerned with soil nitrification. His achievements included proving that plant development was affected by the amount of assimilatory nitrogen provided, and that, if nitrogen was applied with phosphates, development improved still further. He discovered that the organic material in topsoil broke down into nitrates. A series of experiments begun in 1860 into the ratio between the volume of carbon dioxide assimilated, and the volume of oxygen produced by the plant in sunlight, has been described as his outstanding achievement. Boussingault demonstrated that the ratio of the two opposing forces in the plant, the removal and addition of material, depended on temperature and light intensity.

To his contemporaries Boussingault was a significant figure. The Director of Rothamsted Experimental Station

A.D. Hall, in his 1908 book *Fertilisers and Manures*, listed eight researchers particularly significant in the development of theories about plant nutrition: Priestley, de Saussure, Boussingault, Liebig, Lawes and Gilbert, Hellriegel and Wilfarth. Similarly Professor Anderson in his reviews of science and agriculture published in the *Journal of the Highland and Agricultural Society* frequently cited his work.

Written out of history

Clearly then Boussingault should receive more recognition. The question arises as to why he has drifted into the background. His own character appears to have contributed: he was shy, suspicious – especially of Liebig and his researchers, and found difficulty in mastering foreign languages. His work on agricultural chemistry was hard to read. To some extent Boussingault's approach to his experiments also limited his impact. His work on the fixation of nitrogen by legumes aroused the interest of Pasteur, who suggested ways his research could have been extended by investigating the contribution of bacteria, but Boussingault went no further. Liebig on the other hand was confident, multilingual and aggressive, and found no difficulty in publicising himself and his achievements even when it meant turning his own theories on their head.

Boussingault's contribution to science merited inclusion on the Pantheon in Paris, however his name was too long for the space available and he was omitted. While

Lawes and Gilbert clearly respected Boussingault as a scientist, and a letter written in 1863 by Gilbert highlighted his contribution to their work: *'There is no doubt that in 1840 Liebig gave more credit to Ammonia than in 1843, the natural history of the change being that Boussingault & Dumas had in the meantime made claim to the importance of ammonia & Liebig then became more exclusively ashy, & tried to prove Boussingault wrong. Then came our experiments & arguments entirely bearing out, and extending Boussingault's views which made Liebig furious & so on!'*

the name Liebig is likely to be known by most modern scientists, Boussingault's is more likely to puzzle. He is better known in Alsace at the Musée Français du Pétrole, Pechelbronn but this has more to do with his involvement in the petrochemical industry than agriculture, and even there he is on the fringe of the story. There would appear to be some truth in the assertion of Boussingault's biographer, McCosh, that '... the great sea of Justus von Liebig developed a tidal wave which to this day conceals much of the original work and merit of others in the same field.'²

Bob Mason is an independent scholar based in Scotland currently researching the history of fertilisers 1790–1919. He would like to thank the Lawes Agricultural Trust for their assistance and permission to quote from the letter by Gilbert, the Musée Français du Pétrole, Pechelbronn for their assistance particularly regarding photographs; Roger Plumb, and Professor John Martin for his help and encouragement.

- ¹ For a more detailed summary of this topic see Brassley in Collins [ed] *The Agrarian History of England and Wales 1850–1914* pp.598–599
- ² F. W.J. McCosh *Boussingault: Chemist and Agriculturist*. Dordrecht 1984. p.xiii

Turning the tide in Hampshire

Ruth Kerr on the reopening of one of Britain's few tide mills

Nestled in Eling, between the New Forest and Southampton, the Eling Tide Mill Experience reopened in April 2018, having been closed for a major refurbishment since 2015. The tide mill is Grade II* Listed and one of only two left in the country still producing flour regularly. The other is Woodbridge Tide Mill in Suffolk.

Fourteenth-century origins

Taking the brunt of stormy coastal weather, tide mills were rebuilt every 200–300 years. This one was built in the 1780s by John Chandler. While the current mill is over 200 years old, its forerunners go back to the 1380s, when the Bishop of Winchester gifted the mill to Winchester College, the school he founded. The College owned it for over 600 years until its sale in 1975. There's a

chance the '2 mills' in Eling mentioned in the Domesday Survey were referring to an earlier tide mill, with two waterwheels, on the same causeway. A 1692 map of Eling in Winchester College Archive shows the mill in the same place as it is today. Along with nearby St Mary's Church, it was central to a once busy quay and shipbuilding area.

Tidal power

The mill is on a causeway, with sea gates at one end; the causeway acts as a dam for our millpond. As the tide comes in, it pushes against one-way hatches in the sea gates. The water flows through the hatches and into our millpond. As the tide drops, the captured water can't escape. Once the tide has gone out, we raise the sluice gate under the mill and control the flow of water from the millpond, under the mill and to our waterwheel. The remains of the second

waterwheel are preserved and we use the sluice gate for that wheel as a storm gate, helping to release extra water that comes down Bartley Water River in the New Forest and flows into our millpond during heavy rain.

New Visitor Centre

Falling into disuse in the 1940s, the mill was bought by New Forest District Council in 1975. A mix of professional and volunteer skill restored one waterwheel and one set of millstones; originally there were two of each. Eling Tide Mill opened as a working heritage site in 1980, producing and selling wholemeal and brown flour, using wheat from the local Cadland Manor Estate.

In 2009, the mill came under the operation of Totton & Eling Town Council, and in 2015 work began on the Eling Experience Project. There is now a Visitor

Image: Brian Pain





Image: Wikimedia

A Bronze Age rapier on display was found by archaeologists at nearby Testwood, along with the remains of the oldest bridge found in England and a Bronze Age boat.

Centre with a café, and an Activity Room. We worked with members of the Mackrell family, relatives of the last commercial miller, to help pin down the story of the mill's final commercial years. During World War Two, the Coastal Defence team were based in what is now our Visitor Centre and had orders to blow up the causeway – and mill – in the event of invasion.

The key aim of the project has been to increase access. The most striking change is the glazing which replaces wooden guarding. Uninterrupted views of the machinery and water wheel give visitors a greater understanding of the building. Millers would have worked to the times of the tides, day or night. Today we work to the tides during our opening hours.

► Ruth Kerr is the Community Engagement Officer for the Eling Tide Mill Experience www.ellingtidemillexperience.co.uk

The Project is delivered by New Forest District Council and Totton & Eling Town Council. It is supported by a Heritage Lottery Fund grant of £1.7m and investment from both councils.

Call for Panels: Rural History 2019

Rural History 2019, the fourth biennial conference of the European Rural History Organisation (EURHO), will take place in Paris from Tuesday 10th to Friday 13th September 2019.



EURHO conferences are international, multidisciplinary meetings intended for all European and other researchers applying comparative approaches. They aim to promote a dialogue between rural history researchers and break down disciplinary boundaries.

The Paris conference will be open to all proposals employing new methods, introducing new approaches, exploring new concepts or yielding new results across a wide range of themes, time periods and spatial boundaries. The organisers particularly welcome panels and papers dealing with the economic, social, political or cultural history of the countryside (agricultural or artisanal production, social reproduction, consumption, material culture, power relations, gender, well-being, village life, political relations, technological and scientific improvements, tourism etc.) and featuring links to environmental, political, anthropological and cultural history – and, beyond these, an interest in the preoccupations of geography, sociology, economy, archeology, agronomy, biology and zoology.

All researchers working on the history

of the countryside are invited to submit panel proposals. A panel should focus on a specific topic and include participants from at least two countries. Organisers will be advised of other paper proposals that may relate to their panels. Double sessions on a particular topic are possible, but triple sessions are not. Each session will last two hours and include four papers. Sessions will be led by a chair and a discussant. The presentation of new research and of work in progress is particularly relevant. Participants may not propose more than two papers.

A session proposal should include a title, the full name and affiliation of the organiser or co-organiser, and a short abstract (up to 500 words) introducing the topic, its scope, themes and approach, and the names and affiliations of at least two of the proposed panel contributors; a draft call for papers may also be included. The deadline for panel proposals is 15 October 2018.

► For any questions, please contact Federico Zemborain: federico.zemborain@ehess.fr
More information: www.ruralhistory.eu/conferences/rural-history-2019
Conference website: <http://ruralhistory2019.ehess.fr>

The making of Ambridge

Cara Courage discusses placemaking in *The Archers* and what this can tell us about rural place today.

The village of Ambridge, Borsetshire, the subject of BBC Radio 4's *The Archers*, as a purportedly archetypal English village, serves as case study of rural placemaking. In my recent paper at the third Academic Archers conference, I discussed what Ambridge placemaking is and what this can tell us about rural place today.

Placemaking is both an approach and a set of tools that places the community at the heart of determining what their place looks like and how it functions. It focuses on solving specific place problems and it often includes work with artists or creative outputs and cultural outcomes.

Village green to green burial

Much placemaking research and practice is focused on the urban setting, but as our rural areas become places for cultural consumption rather than agricultural production, the rural as a whole is an ever more important site of academic research. Ambridge is a rich site of learning for these issues, both for rural and placemaking studies. As Ambridge shows us, rural identity is in constant flux; it's a place of massive social change and has top-down policies enacted on it that mean it is continuously evolving. We also see in Ambridge that local communities actively celebrate place, and work to improve material and lived conditions.



When asked what they associate with Ambridge place identity, Academic Archers Research Fellows named places in the public realm such as the village hall and green, events such as the Flower and Produce Show and panto, and grassroots initiatives such as the green burial ground and Lynda Snell and Elizabeth Pargetter's guerrilla gardening. This leads Ambridge to have a placemaking typology of the traditional and contemporary: the traditional, of the pub for example, is linked to a rural heritage and sense of community; and the contemporary, of the Felpersham pop-up street food festival for instance, indicative of the new rural economy re-imagining, re-packaging and re-presenting rural place for a predominantly urban market.



Charlotte Martin (Susan Carter in *The Archers*) aka Dr Charlotte Connor, Research Psychologist.

Changing identity

The future of rural placemaking is exemplified through the Bridge Farm housing development. Here the past, present and future place identity of Ambridge is being played out with Lynda's fear of demographic change, and Emma's desire for affordable housing. Here too is an opportunity for an injection of cash into improving Ambridge through Justin Elliot's (as yet unmentioned) Section 106 agreement and the introduction of a cohort of village residents with different cultural expectations. We see with Emma too, the archetypal journey of someone with an attachment to place, getting more aware of its issues and then becoming civically active.

Ambridge considers itself a rural idyll; a place of social harmony, tranquillity and safety, of a traditional and fixed place identity. The reality, as listeners know all too well, is much different. Through the placemaking prism we can see that Ambridge, like any rural place, has an identity that is dynamic and in constant flux, made and remade from the grassroots by its communities and subjected to policy from above and society from all around. In this, Ambridge offers us a vision of a rural future at the intersection of global, national, and local forces, along with contests over past, present, and future imaginaries. It signals the need for a bespoke 'graft and grow', not identikit 'cut and paste', approach to placemaking and rural place identity.

▶ About Academic Archers

Cara Courage is co-founder of Academic Archers, an experimental form of academic community with *The Archers* as a lens through which wider issues can be explored. Scholars combine their love of Ambridge with research interests.

The fourth conference will take place 6–7 April 2018, at the University of Sheffield.

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and [Academic Archers on Facebook](#).

Rural History Today

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Front masthead image:
Eling Tide Mill.
(Image credit: Brian Pain)

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