

The V. Gordon Childe Memorial Lecture

Blackheath History Forum
Saturday, 9 September 2017

Dr Marx, Professor Childe and manure: some rather crude materialism.

by Humphrey McQueen

Dirty words

Our text at this Evensong is taken from Deuteronomy, chapter 23, verses 13-14:

And thou shalt have a paddle upon thy weapon; and it shall be, when thou shalt ease thyself abroad, thou shalt dig therewith, and shalt turn back and cover that which cometh from thee:

For the LORD thy God walketh in the midst of thy camp, to deliver thee, and to give up thine enemies before thee; therefore shall thy camp be holy: that he see no unclean thing in thee, and turn away from thee.

I am relieved to see that you were not turned away by the crude title of this talk.

The combining of 'materialism', 'crude' and 'manure' is polite. It could have been 'dung'. Only one book catalogued by the National Library has the S-word in its title, Dominique Laporte's *Histoire de la merde (Prologue)* translated as a *History of 'shit'*. The cover of the paperback is golden as if to overcome the repugnance of soiling one's hand by picking up a book displaying the S-word. Laporte's text opens with the establishment of the Academie Francaisie in the late 1630s to cleanse the French language, and concludes with the call from a French socialist, around 1850, for workers to pay their taxes with their bodily wastes for the general improvement of the French earth.¹

The S-word is avoided not just in speech but in practice in polite societies. As we proceed, we shall encounter instances of how the handling of shit has been an everyday activity for a majority of our forebears, whether in cooking food or in construction.² At the other end of the social order, the Duke of Chandos, dedicatee of Handel's Anthems, had not been not afraid to get his hands dirty when he stole £600,000 from the English army to

¹ Dominique Laporte, *A History of Shit*, MIT, Cambridge, Mass., 2000, pp. 17-19 and 127ff.

² V. Gordon Childe, *Progress and Archeology*, London, Watts, 1944, pp. 46 and 53.

which was paymaster. His Grace also instructed his hay wagoners never to return from London without a load of dung.³ Matters were more genteel in Georgette Heyer's 1961 novel, *A Civil Contract*. Perhaps weary of being treated as a second- or third-rate Jane Austen, Heyer includes an exchange in which the heroine perplexes her beloved with a question about the Tullian drill:

'Where did you read about it, Jenny?'

'In one of your books. I have been looking into them, and trying to learn a little from them.'

'My poor girl! Were you reduced so low? I had thought you brought a boxful of books down from London!'

'O, I did! But *Mansfield Park* is the only one I've read yet. I kept it by me, and took it up whenever Artificial Manures, and the Four-Course System began to pall. And I must own, Adam, they do pall! ...'

The couple proceed to discuss the relative merits as manures of Sticklebacks, gorse for turnips, burnt straw, lime, marl and rape-cake.⁴ Nothing so unseemly is to be heard in the Jane-ite parlours of Hampshire and at Bath.

Our distancing from unpleasant words is in keeping with the distancing that has taken place in lived experience. When my family moved to a new house 14 kms from the Brisbane GPO late in 1949, my father buried our night soil at the far end of the 48-perch block. How the family of eight next door managed on their 24-perches I dare not think. After a few months, the dunnyman appeared, taking away the pans and leaving sawdust. Ratepayers relied on torn-up newsprint before two-ply Sorbent. At the Australian National Univeristy in 1970, a student from one of the nearby towns submitted an essay with one footnote missing because, as he explained, he had been reading the article in his outhouse after someone had used the bottom half of the page that gave its date.⁵

The low rates of return of the bowel-screening tests are evidence of the prevailing response to what the author of Deuteronomy called 'that which cometh from thee.' 'Twas not so with Childe who made a reputation digging through the 'revolting quantity of refuse' from past civilisations.⁶ To illustrate that we acquire our human nature through social evolution, he offers this instance of historical materialism: 'The human infant has to learn from parents and seniors how to talk, how to dispose of his excrement, what to eat

³ Joan Johnson, *Princely Chandos, James Brydges, 1674-1744*, Allan Sutton, Gloucester, 1984, pp. 141-2.

⁴ Georgette Heyer, *A Civil Contract*, Heinemann, London, 1961, p. 256; cf. Victor Hugo, *The Wretched*, Penguin, Lomond, 2013, pp. 1126ff; Mark S.R. Jenner, 'Follow Your Nose? Smell, Smelling, and Their Histories', *American Historical Review*, 116 (2), April 2011, pp. 335-51.

⁵ Visits to the outhouse were occasions for spider bites. I recall a Sunday evening in the 1950s when Martin Royal, reading the 7 p.m. ABC news, fell victim a Spoonerism: 'A woman in Sydney has been bitten on the funnel by a finger web spider.'

⁶ V. Gordon Childe, *Skara Brae*, Keagan Paul, Trench, Trubner, London, 1931, p. 18.

and how to prepare it, and so on.’⁷ These rude facts serve as a lead into V. Gordon Childe the man, his career and the manner of death. Given the significance he places on the agricultural revolution and then the urban revolution,⁸ to circle his life and writings is far from arbitrary in considering manure.

Childe Gordon

A recent *TLS* reviewer of an intellectual biography of M.I. Finley, Childe’s fellow Classicist and an erstwhile Marxist, set three criteria for how to judge a scholar: how many second-rate professors did you piss off?; how many brilliant 16-year olds did you inspire to follow your discipline?; and how many of your books are being argued over decades after your demise?⁹ Childe scores on all counts. For the rest of us, fame is to be a footnote in someone else’s Ph.D.

Vere Gordon Childe remains the finest scholar in the arts, humanities and social sciences ever produced in Australia. His fellow Marxist, Bernard Smith, refocussed how anthropologists and art historians viewed the Enlightenment, in *European Vision in the South Pacific* (1960). Childe’s greater distinction is that he systematised a discipline by crafting archeology with anthropology, Classics and history into Prehistory.¹⁰

Pre-History is not prehistoric in any sense of ranking but derives from the need to rely on pre-written sources. As Childe asks in *Man Makes Himself*:

Why assume that, when the Arunta had created a material culture adapted to their environment, they at once stopped thinking together? They may have gone on thinking just as much as our own cultural ancestors, although their thoughts followed different lines and did not lead them to the same practical results, applied sciences, and arithmetic, but along what we regard as blind-alleys of superstition.¹¹

⁷ V. Gordon Childe, *Social Evolution*, Watts, London, 1951, p. 41; South American Indians utilized rubber ‘for inventions like the enema’, V. Gordon Childe, *History*, The Cobbe Press, London, 1947, p. 49.

⁸ The choice of terms for social relationships is never going to be neutral. From the mid-1920s Childe called the move from nomadism to agriculture some 10,000 years ago the ‘Neolithic Revolution’ – a choice of noun in keeping with his support for the Bolshevik Revolution, Kevin Greene, ‘V. Gordon Childe and the vocabulary of revolutionary change’, *Antiquity*, 279, March 1999, pp. 97-109. Not long after, the ultra-conservative J. Nef sought to distance himself from the Russian outrage through disarming even the ‘Industrial Revolution’ by giving it a 500-year lineage, J.U. Nef, ‘The Progress of Technology and the Growth of Large-Scale Industry in Great Britain, 1540-1640’, *Economic History Review*, 5 (1), October 1934, pp. 3-4.

⁹ Peter Thonemann reviewing M.I. Finley, *An ancient historian and his impact*, Cambridge, *TLS*, 24 February 2017, p. 27.

¹⁰ V. Gordon Childe, *What Happened in History*, Penguin, Harmondsworth, 1964, chapter 1; Bruce G. Trigger, *Gordon Childe, Revolutions in Archeology*, Thames and Hudson, London, 1980; David R. Harris (ed.), *The Archeology of V. Gordon Childe*, MUP, Carlton, 1994.

¹¹ V. Gordon Childe, *Man Makes Himself*, Watts, London, 1936, p. 46.

As a mere archeologist, Childe confessed himself unable to decide whether an ancient Egyptian got 'more fun out of his back-gammon than a contemporary derives from two-up ...'¹²

Sixty years ago, come October 20, Childe 'gave himself to death', as the French put it. To conclude that he chose to end his life because he feared surgery for prostate would be as simplistic as to suppose that he did so because he was disillusioned with his scholarly quest or with his political ideals after Khrushchev's denunciation of Stalin. As a confirmed bachelor, he had friends but no family to consider. His farewell letter concludes with serenity rather than despair:

I have enormously enjoyed revisiting the haunts of my boyhood, above all the Blue Mountains. I have answered to my own satisfaction questions that intrigued me then. Now I have seen the Australian spring; I have smelt the boronia, watched the snakes and lizards, listened to the 'locusts'. There is nothing more I want to do here; nothing I feel I ought and could do. I hate the prospect of summer, but I hate still more the fogs and snows of a British winter. Life ends best when one is happy and strong.¹³

The euthanasia legislation in Victoria falls a long way short of that Roman sentiment. Much as I endorse Childe's right to choose when to end his life, I cannot approve of his putting the lives of others at risk to retrieve his body. Yet, such methods are imposed on us by those who deny us sure and affordable exits.¹⁴

Childe became a thoroughly orthodox Marxist, which is to say that he conceptualised on the basis of relentless empirical research, disagreeing with no one more than with his earlier selves.¹⁵ Two short passages give us glimpses of how his mind worked:

Almost every statement in prehistory should be qualified by the phrase: 'On the evidence available to-day the balance of probability favours the view that ...'

Dates in years before 3000 B.C. are just guesses.¹⁶

His writings are the quintessence of a speculative sensibility tempered by relentless research into those possibilities. His suggestive explanations have nothing of the

¹² Childe, *Progress and Archeology*, pp. 106-7; 'It is permissible to doubt whether the "Highland Cattle" on the sitting-room wall or the diamond necklace on the dowager's throat be an advance on the bison in the lime-stone cave or the shell necklace of the Cro-Magnon savage.' *What Happened in History*, p. 50.

¹³ V. Gordon Childe. 'Testament', in Peter Gathercole, T.H. Irving and Gregory Melleuish (eds), *Childe and Australia, Archeology, Politics and Ideas*, University of Queensland Press, St Lucia, 1995, p. 47.

¹⁴ See my Pascal's other wager under Philosophy on www.surplusvalue.org.au

¹⁵ Childe, *History*, pp. 68-9; for a 1949 re-statement see 'Prehistory and Marxism', *Antiquity*, LIII (208), July 1979, pp. 93-5.

¹⁶ V Childe, *Man Makes Himself*, pp. v and vii.

Robinsonade, or about pre-formed individuals signing up to a social contract, or some such fairy story for how we re-make our social worlds.¹⁷

A ready wit, he could be very naughty. His hand-made index for *How Labour Governs* (1923) is replete with cross entries such as 'Australian Workers Union – a machine for making politicians'.¹⁸

Offered Childe's qualities of mind, this lecture in his honour will draw on his writings as often as possible.

Crisis theory

In thanking you for the honour of giving the 2017 V. Gordon Childe Memorial Lecture, I should explain that my topic is your fault. Five years ago, in 2012, Gary asked me to address your Forum on 'The Two Depressions', meaning the 1930s and the crises that were still rolling out from the financial eruption of September 2008. No sooner had I accepted than I realised that there had been depressions before the 1930s. That strand in my thinking intersected with an understanding that capitalism is unique in as much as it must expand in order to exist. Moreover, capitalism needs a particular kind of expansion, not necessarily spatial or in the volume of products but of the value present in them. The commodities bearing those values have to be sold to secure a profit out of which some money-capital must be accumulated to fund the next bout of expanded reproduction. One result is a crisis-prone system, no longer subject to crises of sustenance,¹⁹ although famines have not disappeared for the poorest. Instead, crises of over-production arise from the need that capital-within-capitalism has to add value in excess of effective demand for its surges of commodities.

What part could manure play in this transformation? First, if there had been no continuing surplus of farm produce, then there could be no system of exchange; and if no regular exchanges then no pathways towards capitalism. Secondly, farm produce had to increase in order to supply larger populations, fewer of whom were engaged in their own sustenance because of urbanisation.

That tangle of problems provides the context of today's presentation. How to link that mighty question with manure? I've piled up more than enough material than I can

¹⁷ Cf. Karl Marx, *Capital*, I, Penguin, London, 1976, pp. 169-72 and 933-5. Louis Althusser discerns that the proponents of an original social contract did not believe that one had ever been made; rather, they invented that 'history' to install a contract better suited to bourgeois society, *Politics and History, Montesquieu, Rousseau, Hegel and Marx*, New Left Books, London, 1972, pp. 25-9 and 113-20.

¹⁸ V. Gordon Childe, *How Labour Governs*, Melbourne University Press, Carlton, 1964, p. 189.

¹⁹ John D. Post, *Food shortage, Climatic Variability, and Epidemic Disease in Preindustrial Europe, the Morality Peak in the early 1740s*, Cornell University Press, Ithaca, 1995; Cormac O Grada, 'Markets and Famines in Pre-Industrial Europe', *Journal of Interdisciplinary History*, 36 (2), Autumn 2005, pp. 143-66.

even touch on this afternoon.²⁰ But if we don't get down to it, our hour will be up and not a furrow will be turned. We shall set out from the four key words in the lecture's title: Marx, Childe, manure and materialism, though not strictly in that order.

Dr Marx

In this sesqui-centenary of *Capital*, one conventional wisdom surrounding that masterwork is that Marx wrote about an industrial revolution and hence had little to say about agriculture. Not so. Indeed, here is Marx: 'In the strict sense the farmer is just as much an industrial capitalist as the manufacturer.'²¹ How can that be? When Marx speaks of 'industrial', he is thinking in terms of what we can call the Four Cs:

- Co-operation, allowing for workshop divisions of labour;
- Centralisation of control over production and of money-capital;
- Concentration of productive resources, of which the fourth C,
- Conglomeration of labour, is pivotal because labour alone can add more value than goes into its reproduction.²²

Agriculture is there with enclosure as engrossment, that concentration of resources and centralisation of control. Moreover, the last third of volume III of *Capital* is devoted to theories of ground rent.²³ (The links between manure and landed property rights – wrongs - will have to be the subject of separate essay.)

The phrase 'Industrial revolution' is a way of avoiding class relationships, of ignoring what I call 'the revolution inside capital'. For Marx, the 'industrial revolution' was not confined to dark satanic mills driven by steam engines, which, by 1830, employed only 250,000 horse-power throughout the United Kingdom,²⁴ or about the same as all the infernal combustion engines polluting Katoomba.

That Marx's account of capitalism is tied to agriculture and to 'manure' involves more than his absorption of Justus von Liebig's *Agricultural Science (Die Chemie in ihrer Anwendung auf Agricultur und Physiologie)* shortly after its publication in 1840, which Engels had read before they met.²⁵ Throughout their writing lives, they drew on Liebig to

²⁰ Marx pictured himself as 'a machine condemned to devour books and then, throw them, in a changed form, on the dunghill of history.' Marx to his daughter Laura, 11 April 1868, *MECW*, v. 43, Lawrence & Wishart, London, 1988, p. 10.

²¹ Karl Marx, *Capital*, I, Penguin, London, 1976, p. 916, n. 1.

²² Marx, *Capital*, I, pp. 775-7, 804 and 1083.

²³ The comparative fertility of soils, their depletion and replenishment, underpin Marx's concept of differential rent and his critique of Ricardo's theory of rent and Marx's assumptions about diminishing returns, *Capital*, III, pp. 790, 798 916 and 950; see also Karl Marx, *Theories of Surplus-Value*, Part II, Progress Publishers, Moscow, 1968, chapters IX, XI, XII and XIII.

²⁴ G.N. von Tunzelmann, *Steam Power and the Industrial Revolution*, Cambridge University Press, Cambridge, 1978, chapter 2.

²⁵ Tristram Hunt, *The Frock-Coated Communist, The Revolutionary Life of Friedrich Engels*, Allen Lane, London, 2009, pp. 282-5.

denounce the plunder of nature by capitalists while ridiculing a ruling class who 'can do nothing better with the excrement produced by 4 million people than pollute the Thames with it, at monstrous expense.'²⁶ The sense of what Marx took from von Liebig is clear in this extract on capitalist agriculture, which, he writes,

... disturbs the metabolic interaction between man and the earth, ... hence it hinders the operation of the eternal natural conditions for the lasting fertility of the soil. Moreover, all progress in capitalist agriculture is a progress in the art, not only of robbing the worker, but of robbing the soil; all progress in increasing the fertility of the soil for a given time is a progress towards ruining the long-lasting sources of that fertility.²⁷

Returning to this concern, Marx enriches his adaption of Liebig's notion of 'metabolism' to deplore the imbalance that capitalism enforces between urban and rural populations, producing

conditions which provoke an irreparable rift in the interdependent process of social metabolism, a metabolism prescribed by the natural laws of life itself. The result of this is a squandering of the vitality of the soil, which is carried by trade far beyond the bounds of a single country. (Liebig)²⁸

Twenty years earlier, Liebig's influence could be spotted in Marx's 1847 book-length critique of Proudhon's *La Philosophie de la misère*,²⁹ while two of the ten immediate demands which Marx and Engels advanced in the 1848 *Communist Manifesto* were:

7. The bringing into cultivation of waste-lands, and the improvement of the soil generally in accordance with a common plan.
9. Combination of agriculture with manufacturing industries; gradual abolition of the distinction between town and country, by a more equable distribution of the population over the country.³⁰

²⁶ Karl Marx, *Capital*, volume III, Penguin, London, 1981, p. 195. Leslie B. Wood, *The Restoration of the Tidal Thames*, Bristol, 1982, pp. 17-24; Bill Luckin, *Pollution and Control: A Social History of the Thames in the Nineteenth Century*, Bristol, 1986, pp. 11-68; Nicholas Goddard, '“A mine of wealth”? The Victorians and the agricultural value of sewage', *Journal of Historical Geography*, 22 (3), July 1996, pp. 274-90.

For other schemes and other cities see Matthew Gandy, 'The Paris Sewers in the Rationalization of Urban Space', *Transactions of the Institute of British Geographers*, New Series, 24 (1), 1999, pp. 23-44; Sabine Barles, 'A Metabolic Approach to the City: Nineteenth and Twentieth Century Paris', Dieter Schott et al. (eds), *Resources of the City, Contributions to an Environmental History of Modern Europe*, Ashgate, Burlington, VT, 2005 pp. 28-47; Craig E. Colten, 'Chicago's waste lands: refuse disposal and urban growth, 1840-1890', *Journal of Historical Geography*, 20 (2), 1994, pp. 124-42; Martin V. Melosi, *The Sanitary City: Urban Infrastructure in America from Colonial Times to the Present*, Johns Hopkins University Press, 2000.

²⁷ Marx, *Capital*, I, p. 638; in volume one of *Capital*, Marx quotes the 'immortal' Liebig five times, pp. 349, 416 n. 10, 638-9, 718 and 973, and three times in volume III, pp. 878, 904 and 949. More significant is his incorporation of Liebig's notion of 'metabolism' (*Stoffwechsel*) into his analysis of capitalist reproduction, for instance in chapter 7 of volume one, unlike his afterthought in the 'Preface' of calling the commodity the 'cell' of his analysis, p. 90.

²⁸ Marx, *Capital*, III, p. 949.

²⁹ Karl Marx Frederick Engels *Collected Works (M-ECW)*, volume 6, Lawrence & Wishart, London, 1976, pp. 201-6.

³⁰ M-ECW, volume 6, 1976, p. 505.

In rebalancing the rural and the urban, Marx and Engels are thinking about both living conditions for labourers and the transfer of urban wastes to replenish the soil.³¹ In Marx's critique of the 1875 draft programme of the German Workers Party, he repeats that '[I]labour is not the source of all wealth. Nature is just as much the source of use values ... as labour, which itself is only the manifestation of a force of nature, human labour power.' The contrary view, he chided, is 'to be found in all children's primers'.³² This afternoon we enter the realms of scholarship through the portals of historical materialism.

Materialism

Gustav Flaubert, in compiling his collection of bourgeois stupidities into 'A Dictionary of Received Ideas', offers this entry for MATERIALISM:

'Utter this word with horror, stressing each syllable.'³³ MA-TER-I-AL-ISM

'Materialism' carries at least two meanings, one ethical, the other philosophical, with two opposed senses in the latter: the eighteenth-century French 'mechanistic' kind and a dialectical form.³⁴ No necessary connection operates between materialism as avarice and the conviction that there are no spooks. Here, Marx is exemplary as someone who spurns worldly goods, is fired with a fierce morality against injustice, and rejects the presence of other-worldly powers. Equally, to be idealistic has no taproot in Plato's Forms or the Hegelian Idea. Historical materialists allow plenty of space for ideas, as we shall see in connecting manure to magic and, in a different way, with the emergence of agricultural science.

Were I to boil historical materialism down to a single sentence, it would go like this: *We become what we do, as a species and as individuals*. One way to elaborate on that summary is by reconstructing the title to Gordon Childe's *Man Makes Himself*, first published in 1936. No challenge will be offered to its substantive intent of its title. Instead, each of its three words will be replaced the better to bring out Childe's lines of intent. In short, we shall replace 'Man' with 'Humans'; extend 'makes' into 'made and re-makes'; amend and expand 'himself' to 'Themselves' but then slip across to 'Ourselves'. The result is *Humans made and re-make ourselves*. In sabotaging the snappiness of Childe's title, I am not putting words into his mind. Rather, my unmarketable version is an almost exact summation of the case he presents across his life's work.

³¹ Cf. Peter Kropotkin, *Fields, Factories and Workshops Tomorrow*, George Allen & Unwin, London, 1974.

³² *Karl Marx and Frederick Engels, Selected Works*, volume 3, Progress Publishers, Moscow, 1970, p. 13.

³³ Gustav Flaubert, 'Dictionary of Received Opinions', *Bouvard and Pechuchet*, Penguin, Harmondsworth, 1976, p. 316.

³⁴ Raymond Williams, *Keywords, A Vocabulary of Culture and Society*, Fontana, London, 1976, pp. 163-9; Sebastiano Timpanaro, *On Materialism*, New Left Books, London, 1975.

'Man' as species

I say 'almost exact' because, for a start, 'Humans' is inadequate. Childe's book opens with the processes of hominisation, that is, how our progenitors remade themselves into *homo sapiens*. He begins by inviting us to time-travel back 500,000 years until 'human history joins on to natural history. Through pre-history, history is seen growing out of the 'natural sciences' of biology, palaeontology and geology.'³⁵ An accurate rephrasing of the title would have to begin some two million years ago to allow for the branching from which pre-humans 'made' and 're-made' the animals we call humans.

'Man' as gendered

The other reason for replacing 'Man' with 'Humans' is to avoid gender bias. On this matter, Childe's text is replete with surprises, such as in this sentence: 'The casting of bronze is too difficult a process to be carried out by anyone in the intervals of growing or catching his food or minding her babies.'³⁶ Even today, it comes a bit of shock to associate women with metal work. The import of this passing reference is as nothing in comparison with what Childe contends when he takes four pages to investigate the origins, development and consequences of pottery-making:

The constructive character of the potter's craft reacted on human thought. Building up a pot was a supreme instance of creation by man. The lump of clay was perfectly plastic; man could mould it as he would. In making a tool of stone or bone he was always limited by the shape and size of the original material: he could only take bits away from it.³⁷ No such limitations restrict the activity of the potter. She can form her lump as she wishes; she can go on adding to it without any doubts as to the solidity of the joins. In thinking of 'creation', the free activity of the potter in 'making form where there was no form' constantly recurs to man's mind; the similes in the Bible taken from the potter's craft illustrate the point.³⁸

Hence, it is women who lead the way towards the appreciation of a great truth in materialist dialectics: the natural world is malleable. That understanding came from activity, just as all knowledges, like language, were social products and collective possessions. Throughout *Man Makes Himself*, Childe is expanding on leads which Engels presented in his essay, 'On the Part Played by Labour in the Transition from Ape to Man'.³⁹

³⁵ Childe, *Man Makes Himself*, p. 9.

³⁶ Childe, *Man Makes Himself*, p. 8.

³⁷ For a reassertion of the preeminence of boys' toys in brain development see Dietrich Stout, 'Tales of a Stone Age Neuroscientist', *Scientific American*, April 2016, pp. 30-35.

³⁸ Childe, *Man Makes Himself*, pp. 93-97 and 125.

³⁹ Frederick Engels, 'The Part Played by Labour in the Transition from Ape to Man', *Karl Marx and Frederick Engels, Selected Works*, Volume Three, Progress Publishers, Moscow, 1970, pp. 66-77.

Re-makes

Every point in favour of changing 'Man' to 'Humans' adds to the need to replace 'makes' with 'remakes'. Childe links the plasticity of pottery to the re-making of our mental capacities, then to magic in craft, and onto the experimentally-based sciences.

Despite the fad for the plastic brain, A.B.C. presenters persist in the oxymoron of alleging that we are 'hard-wired for plasticity'. The 'in-our-genes' variant of fixedness and determinism is shadowed by the racism of bloodlines.⁴⁰ An indigenous man on ABC around 21 August declared that he had '40-80,000 years of culture in my DNA.' It is disputable whether any of us has any culture in our genes. What we do all carry are more than three billion years of evolution through natural selection. We share some DNA with the Second Chimpanzee and also with bananas – indeed, with every living form, plants, as well as animals.

How then are cultures transmitted? We inherit social traits from our families and can pass them on, but not physiologically. Nonetheless, there is some overlap. Being able to manipulate their digits and tongues allowed our distant ancestors to develop tools and language: 'In the same way we do not have to discover for ourselves how to operate a screwdriver, or a brace. Most of us are taught by our parents, schoolfellows, or the dealer who sold us our car.'⁴¹ Childe explores such processes throughout his 1951 book, *Social Evolution*. Marx gives an instance from a different domain by noting that, by the middle of the nineteenth-century, a schoolboy could learn the binomial theorem in an hour, an intellectual achievement which had taken humankind centuries to master.⁴² Evidence for the social evolution of that mental capacity is in school primers. We can even know a little about the motivation for the originating mathematicians from the social needs that their equations went towards meeting.⁴³ By contrast, how much can ever be known about the origins of practices such as manuring which left few if any traces?

Origins

In the absence of written evidence, as Childe reiterated, prehistorians must rely on their skills at interpreting artifacts but they can also read the marks written into the earth, such as patterns of ploughing. It is harder to trace the addition of mineral fertilisers and harder

⁴⁰ Richard Lewontin, *The Doctrine of DNA, Biology as Ideology* Penguin, London, 1992, as Childe had perceived by 1947, Childe, *History*, p. 52.

⁴¹ Childe, *History*, p. 14.

⁴² Karl Marx, *Theories of Surplus-Value*, I, Foreign Languages Publishing House, Moscow, n.d., p. 343, where Marx criticises Hobbes for saying that the inventions of war come from pure science rather than from human labour.

⁴³ I. Bernard Cohen, 'Isaac Newton, the Calculus of Variations, and the Design of Ships', R.S. Cohen, J.J. Strachel and M.W. Wartofsky (eds), *For Dirk Struik*, D. Reidel, Dordrecht, 1974, pp. 169-87. For Struik's approach as a Marxist and a mathematician see his 'On the Sociology of Mathematics', *Science & Society*, 6 (1), Winter 1942, pp. 58-70, and 'The Sociology of Mathematics Revisited: A Personal Note', 50 (3), Fall 1986, pp. 280-99. The needs of capital present problems: they cannot solve quadratic equations.

again for any application of organic ones from two or more millennia ago. The mineral additive which the left the most obvious tracks was the iron on a plough.

Who invented manuring? The answer is simple. The same people who invented farming, funerals, weaving, pottery and song. In short, everyone and no one. The archaeological record gives us some idea of when and where those practices appeared, when they became widespread and how they changed,⁴⁴ but less than nothing on why our ancestors stumbled onto them. Some alertness to the worth of fertilising might have been arrived at by extrapolating from natural processes, such as the silt from floods. Or the earliest cultivators might have come to realise that their fire clearing produced ash which had enriched the soil.⁴⁵ Childe hazards a further guess about the recognition of benefits from animal wastes: 'It might be noticed that crops flourished best on plots that had been grazed over. Ultimately, the value of dung as a fertiliser would be realised.'⁴⁶ 'Ultimately' explains nothing. Moreover, how long would that recognition have taken where deposits of dung killed off plants around their edges? To speculate about when and where manuring began, is to ask the same about the move from hunting to the domestication of large animals so as to have access to piles of dung.⁴⁷ Did cultivating the soil come before getting the 'dung' to work its magic? Sedentary occupation is evidence of having discovered some way of replenishing the soil and thus not having to keep moving camp. The application of dung or other fertilisers is a likely inference from prolonged settlement, yet that conclusion is still miles away an exact answer to when one or other fertiliser was first applied, and where? Rather than a diffusion of the worth of manuring from a single group of cultivators, it is more than likely that the practice had to be discovered over and over again, even in the same areas over time.⁴⁸

Given reports of dung's being used as a fuel and a building material,⁴⁹ how much was left for manuring? Childe was put wondering too:

On the other hand, societies do seem to have discovered after several thousand years that flint-armed darts accurately aimed with a spear-thrower secured more meat

⁴⁴ C.G. Bakels, 'The beginnings of manuring in Western Europe', *Antiquity*, 71 (272), June 1997, p. 444.

⁴⁵ Childe, *What Happened in History*, p. 62.

⁴⁶ Childe, *Man Makes Himself*, p. 79; he presumes that the tethering of cattle on Shetland was to collect manure for crops, *Prehistoric Communities of the British Isles*, W.R. Chambers, London, 1940, p. 182; he does not connect the use of privies on treeless Skara Brae with the collection of dung for fuel, *Skara Brae*, pp. 18 and 97.

⁴⁷ That combination was far from straightforward as Rene Dumont learned when investigating poverty in the Cameroons. In a village with low soil fertility but with a vast pile of cattle manure, the chief explained his refusal to allow its use as fertiliser: 'I am old and shall soon die. Then when passers-by see this great dunghill, they will think of me and will say to themselves, "He was a great chief, for he must have had a great herd of cattle to leave such a pile of manure."' , *Types of Rural Economy, Studies in World Agriculture*, Methuen, London, 1957, p. 85.

⁴⁸ By the late 1940s, Childe was edging away from a strict diffusionist position to allow for the repetition of localised discoveries, *Progress and Archeology*, chapter V; *Social Evolution*, pp. 24-5; *The Dawn of European Civilization*, Paladin, London, 1957, Sixth Edition, pp. 395-6.

⁴⁹ On the Orkneys 'coos shit fire', Alexander Fenton, *The Shape of the Past 1, Essays in Scottish Ethnology*, John Donald, Edinburgh, 1985, pp. 96-111; Childe, *Progress and Archeology*, pp. 46 and 53.

than the most realistic picture of a bison laboriously drawn in a dark cave. It apparently took longer to recognise that the dung of oxen spread upon the fields ensured better crops than the blood of oxen sacrificed on altars.⁵⁰

Fertilising would not become widespread for as long as its benefits could be attributed to the Goddess Fortuna, whose name implies the bringer of fertility.⁵¹ Cultivators could cling to ill practices for as long as populations remained small and fresh soils could be farmed to the point of depletion.

Dark earths

A cornerstone of historical materialism is how human labour remakes our physical environments as we adapt to survive. Those processes lead to the question: are soils natural? How much is rubble and rubbish? The building of settlements on the detritus of earlier ones is a staple of archeology, notoriously so in the futile search for Homer's Troy.⁵²

From where did the soils come? Were they yet another free gift of nature, like sunlight, or are they one more consequence of sensuous human activities as our kind remade itself?⁵³ Australia Felix is the outcome of millennia of fire-culture removing the forests, thereby enriching the soil with carbon.⁵⁴ *Anthrosols* result from both farming and extractive industries, such as quarrying and mining, as well as terracing and irrigation (water meadows), but are also the outcome of land reclamation from the seas, or the drainage of bogs, fens and swamps.⁵⁵ One ill-consequence has been soil erosion leading to dust bowls, which raised doubts in Childe regarding mechanised farms.⁵⁶

Agricultural Revolutions had their origins in the fertile crescent of the Nile and the Euphrates but, as Childe emphasises, enormous amounts of human labour had to go into taking advantage of that flood:

the swamps had to be drained by channels, the violence of the flood-waters to be restrained by banks, the thickets to be cleared away, the wild beast lurking in them to be exterminated. No small group could hope to make headway against such obstacles. It needed a strong force capable of acting together to cope with recurrent

⁵⁰ Childe, *Progress and Archeology*, p. 107.

⁵¹ N.G.L. Hammond and H.H. Scullard (eds), *The Oxford Classical Dictionary*, OUP, Oxford, 1970, p. 445.

⁵² M.I. Finley, *The World of Odysseus*, Chatto and Windus, 1977, revised edition.

⁵³ Richard D. Oram, 'Waste management and peri-urban agriculture in the early modern Scottish burgh', *The Agricultural History Review*, 59 (1), 2011, pp. 1-17.

⁵⁴ John Mulvaney and Johan Kamminga, *Prehistory of Australia*, Allen & Unwin, St. Leonards, 1999, pp. 60-62.

⁵⁵ Edward Hyams, *Soil and Civilisation*, Thames and Hudson, London, 1952, chapters 13-15; Richard I. Macphail, Henri Galinie and Frans Verhaeghe, 'A future for Dark Earth?', *Antiquity*, 77 (296), June 2003, 349-58; Rebecca Jones, 'Soil: A Real and Imagined Environment for Australian Organic Farmers and Gardeners in the 1940s', *Environment and History*, 14 (2) May 2008, pp. 205-15.

⁵⁶ Childe, *Progress and Archeology*, p. 24.

crises that threatened drainage channels and banks. The few original patches of habitable and cultivatable land had to be extended with sweat and blood.⁵⁷

Soils owe something to our labours, albeit not as much as our survival owes to the earth. The management of the workings that transformed both called for social structures based on landed property, with their class relations upheld by magic and religion.

Less natural selection

The first agricultural revolution 'gave man control over his own food supply',⁵⁸ even though those farmers were by no means sedentary, but had to keep moving to virgin soils.⁵⁹ The second agricultural revolution in England – more accurately called the opening phase of the industrial revolution - revived that spatial element through the reclamation of wastes and, from 1750, a burst of the enclosure of most commons.⁶⁰ At the same time, the old imbalances of arable and pasture were reduced by concentrating each kind of production in areas for which they were better suited, with grains in 'the free-draining, light soils' while 'some of the clays went down to grass.'⁶¹ These rearrangements in part answered the Medieval question: how many sheep are needed to raise an acre of corn?⁶² Meanwhile, the transformation in Scotland involved introducing a different breed of sheep, the Cheviot, to the Highlands.⁶³

The rupturing of ties between blood and soil got underway with grain shipments from Sicily to Rome, declined with the Muslim closure of the Mediterranean to revive after

⁵⁷ Childe, *Man Makes Himself*, pp. 106-8; *What Happened in History*, p.100; *The Prehistory of European Society*, Penguin, Harmondsworth, 1958, p. 55.

⁵⁸ Childe, *Man Makes Himself*, p. 66.

⁵⁹ Childe, *Progress and Archeology*, pp. 19-20.

⁶⁰ J.R. Wordie, 'The Chronology of English Enclosure, 1500-1914', *The Economic History Review*, New Series, 36 (4), November 1983, pp. 483-505.

⁶¹ E.L. Jones, 'Agriculture and Economic growth, 1660-1750', E.L. Jones (ed.) *Agriculture and Economic Growth in England 1650-1815*, Methuen, London, 1967, pp. 161-8; Eric Kerridge, *The Farmers of Old England*, George Allen & Unwin, London, 1971, pp. 20-27, 79-95 and 115; G.G.S. Bowie, 'Northern Wolds and Wessex Downlands: Contrasts in Sheep Husbandry and Farming Practice, 1770-1850', *The Agricultural History*, 38 (2), 1990, pp. 117-26; Liam Brunt, 'Nature of Nurture? Explaining English Wheat Yields in the Industrial Revolution, c. 1770', *The Journal of Economic History*, 64 (1), March 2004, pp. 93-125.

⁶² Edward I. Newman, 'Medieval Sheep-Corn Farming: How Much Grain Yield Could Each Sheep Support?', *Agricultural History Review*, 50 (2), 2002, pp. 164-80; for Roman times, Childe, *What Happened in History*, p. 244; B.H. Slicher Van Bath, *The Agrarian History of Western Europe, A.D. 500-1850*, Edward Arnold, London, 1963, pp. 205, 237-41, 255-63 and 293-5.

⁶³ John Prebble, *The Highland Clearances*, Penguin, London, 1969, pp. 24-9; T.M. Devine, *The Scottish Nation, A Modern History*, Penguin, London, 1999, pp. 174-8; Redcliffe N. Salaman, *History and Social Impact of the Potato*, Cambridge University Press, Cambridge, 1985 edition, pp. 359-61; for the Lowlands, see Robert A. Dodgshon, 'Land Improvement in Scottish Farming: Marl and Lime in Roxboroughshire and Berwickshire in the Eighteenth Century', *Agricultural History Review*, 26 (1) 1976, pp. 1-14.

900,⁶⁴ before taking off in the 1500s with exports from the Baltic to Western Europe.⁶⁵ Meanwhile diets were being transformed by the arrival of corn, potatoes and tapioca from the Americas.⁶⁶

Niles Eldridge spells out the global dimension of our re-making of the earth in his book *Dominion*:

Taking control over production of our own food supply, we became the first species in the 3.5-billion year history of life to live outside the confines of the local ecosystem.

... in stepping away from local ecosystems and in substituting cultural devices for physiological and anatomical adaptations, we have unwittingly changed the rules of the evolutionary game.⁶⁷

The environments to which all species must now adapt continue to be transformed by social practices. The significance that Darwin allotted to isolation for speciation on the Galapagos has been diminished. Where is such isolation to be found today? Perhaps only in some of the warm waters under the Antarctic ice sheet, though scientists are boring into those hideouts.

Himself

To conclude this segment on historical materialism as sensuous human activity, we return to the book's title. As with 'Man' and 'Makes', 'Himself' presents a double problem. One objection can be overcome by replacing the gendered pronoun 'Himself' with 'Themselves'. That substitution is inadequate. From the gender-neutral third-person plural 'Themselves' we must move to the first-person plural 'Ourselves'. The pronoun must be plural because our remaking is nothing if not social, though not necessarily sociable, as is shown by class and gender oppressions. 'Our' is less than satisfactory since it is confined to a re-making during no more than the last 120,000 years. 'Them' suffers from the opposite inadequacy. We want a pronoun to convey 'them' becoming 'our'.

Having taken up so much time defining 'materialism' though refining one of Childe's book titles, I now need to refine 'materialism' from the angle of how historical materialists deal with the power of ideas. We can do so by heading into Childe's thoughts

⁶⁴ Jeremy Edwards and Sheilagh Ogilvie, 'Contract enforcement, institutions, and social capital: the Maghribi traders reappraised', *Economic History Review*, 65 (2), 2012, pp. 421-44; Anver Greif, 'The Maghribi traders: a reappraisal?', pp. 445-69.

⁶⁵ Witold Kula, *An Economic Theory of the Feudal System, Towards Model of the Polish Economy, 1500-1800*, New Left Books, London, 1976, pp. 89-99; Shiela Pelizzon, 'Grain Flour, 1590-1790', *Review (Fernand Braudel Center)*, 23 (1), 2000, pp. 87-195.

⁶⁶ Alfred W. Crosby, Jr, *The Columbian Exchange, Biological and Cultural Consequences of 1492*, Greenwood Press, Westport, 1972, chapters 3 and 5.

⁶⁷ Niles Eldredge, *Dominion*, Henry Holt, New York, 1995, p. xiv and 139, yet one more overturning overlooked by inventors of an Anthropocene.

about magic in agriculture, before considering the degree to which those practices differed from those developed for the emergence of agricultural science after the 1760s.

Magic

Just as Childe was not afraid to deal with the crudity of manure, so he delved into magic. In delivering the 1949 Sir James Fraser lecture, he displays how subtle and refined an historical materialist can –and should - be. The lecture's title was *Magic, Craftsmanship and Science*, rather than Fraser's triad of magic, religion and science. Craft has dislodged religion, with 'doing' taking the place of prayer: 'The acts were the ideas, not expressions of them.'⁶⁸ Yet crafts call for more than action. They call forth magic: 'Every operation of every craft must be accompanied by the proper spells and the prescribed ritual acts.'⁶⁹ How could it have otherwise? How amazing must it have been to have taken part in – or even to observe - the transformation of copper ore into bronze, a procedure not unlike an act of creation: 'The Bronze Age gods were conceived in the form of man, the ruler of other men, and also man, the artificer, moulding and creating form in the shapeless matter like the potter.'⁷⁰ Small wonder societies invested metals with mystical properties which required taboos and rituals. Eventually, the actuality of such transmutations encouraged alchemists.⁷¹ Such occult practices aimed at forcing nature to reveal its secrets whereas miracles arrive from outside the natural order, requiring its suspension.⁷² Magic combines material elements with incantations and ritual to wrest power from nature to serve human ends, unlike just praying for rain.

In dealing with the power of magic over our imaginings, Childe recognised that '[t]he question is not whether magic was a substitute for the craftsman's technique but rather was it supplementary or only complementary to applied science.'⁷³ Taking magic to be supplementary, Childe would be the last to dismiss magic as irrational and illogical: '... it is above all in societies where skill in craftsmanship is highly developed that importance is attached to magic precautions and ceremonies.'⁷⁴ He spots a dynamic which flows from even the rudimentary capacity to make natural resources serve human need: 'Again, technological progress depends ... also on a multiplication of wants.'⁷⁵ In the absence of

⁶⁸ Childe, *Progress and Archeology*, p. 79.

⁶⁹ Childe, *Man Makes Himself*, p. 96

⁷⁰ Childe, *History*, pp. 34-5.

⁷¹ Childe, *Man Makes Himself*, pp. 116-9.

⁷² William Eamon, *The History of Science and Religion in the Western Tradition: An Encyclopedia*, Garland, New York, 2000, pp. 533-40.

⁷³ Childe, *Magic, Craftsmanship and Science*, p. 5.

⁷⁴ Childe quoting Richard Thurnwald, *Magic, Craftsmanship and Science*, p. 8.

⁷⁵ Childe, *Magic, Craftsmanship and Science*, p. 9.

The link between abundance and mumbo-jumbo has never died, see Theodor Adorno, 'The Stars Down to Earth: The Los Angeles Times Astrology Column', *Telos*, 19, Spring 1974, pp. 13-90; Carl Jung, *Flying Saucers, a modern myth of things seen in the skies*, Routledge, London, 1959; Monica Black, 'Miracles in the Shadow of the Economic Miracle: The "Supernatural '50s" in West Germany', *Journal of Modern History*, 84 (4), December 2012, pp. 833-60.

any more efficacious offering, the want to go on living was met by a talisman from craftsmen whose spells put magical powers into it during its manufacture.⁷⁶

The inexplicable that connects the commonplace to magic is even stronger for our relations with plants because they come to life independently of us, yet our existence depends on their doing so. The seemingly spontaneous generation of life out of apparently dead matter fascinated the finest scientific minds until microscopes put an end to their speculations,⁷⁷ yet will never silence the poets: 'April is the cruellest month,' Eliot wrote, 'breeding/ Lilacs out of the dead land ...'.⁷⁸

Underpinning the crafts of pottery and metallurgy are those of food production. In *The Golden Bough*, Fraser contends '[t]hat, in instituting rites designed to assist the revival of plant life in spring,' humans knew they would not survive were plants to perish.⁷⁹ Hence, they believed that their ceremonies could 'influence the course of nature directly through a physical sympathy or resemblance between the rite and the effect which it is the intention of the rite to produce.'⁸⁰ A Marxist contemporary of Childe's, the Professor of Classics at Birmingham, George Thompson, observes that 'by comparison with cattle-raising, the work of tilling, sowing and reaping is slow, arduous and uncertain. It requires patience, foresight, faith. Accordingly, it is characterised by the extensive development of magic.'⁸¹ Childe gives the example of the Bundi in the New Guinea Highlands who wrapped up 'pebbles bark and bury them in their gardens to ensure the fertility of the crops;' Swiss excavators uncovered 'rounded pebbles carefully wrapped in birch bark' from thousands of years back.⁸²

In this vein, Childe sees more in cave painting than an aesthetic impulse since our forebears had no concept of Art with a capital-A, that is, of marketable items infused with the aura of individual genius:

All these considerations show that cave art had a magic purpose. An artistic production is, after all, an act of creation. The artist scratches upon the blank wall, and lo, there is a bison where formerly there had been none! To the logic of the pre-scientific minds such a creation must have a counterpart in the outside world that could be tasted as well as seen. As surely as the artist drew a bison in the dark

⁷⁶ Childe, *Man Makes Himself*, pp. 114-5.

⁷⁷ Elizabeth Gasking, *Investigations into Generation 1651-1828*, Hutchinson, London, 1967; John Farley, *The Spontaneous Generation Controversy from Descartes to Oparin*, The Johns Hopkins University Press, Baltimore, 1977; Steven Rose, *The Chemistry of Life*, Penguin, London, 1999, chapter 4.

⁷⁸ T.S. Eliot, 'The Waste Land', *Collected Poems*, Faber and Faber, London, 1974, p. 63.

⁷⁹ J.G. Fraser, *The Golden Bough, A Study in Magic and Religion*, Macmillan, London, 1922, p. 425.

⁸⁰ Fraser, *The Golden Bough*, p. 541; Childe, *Magic, Craftsmanship and Science*, pp. 7-8.

⁸¹ George Thompson, *Aeschylus and Athens*, Lawrence & Wishart, London, 1973 edition, pp. 18-19 and 108; Childe, *Man Makes Himself*, pp. 130 and 156-8. Thompson reviewed Childe's *History*, in *Labour Monthly*, 30 (5) May 1948, pp. 157-8, and again for *Modern Quarterly*, 4 (3), Summer 1949, pp. 266-9.

⁸² Childe, *Magic, Craftsmanship and Science*, p. 13; *Progress and Archeology*, p. 19.

cavern, so surely would there be a living bison in the steppes outside for his fellows to kill and eat. To make sure of success, the artists occasionally (but rarely) drew his bison transfixed by a dart, as he desired to see it.⁸³

To Childe's way of reasoning, the Arunta saw themselves as food producers by their dances and ceremonies, not just as seed gatherers:

'Our magic rites,' an Arunta would say, 'are just as necessary and efficacious in keeping up the supply of emus and grubs, as the digging and weeding done by wretched cultivators.'⁸⁴

Many of them were indeed the 'People of Plenty' with lots of spare time for what their un-settlers named 'Dreaming', but whose stories are creation myths and totems with significance for food gathering, hunting and fishing, and as often about water as about 'land', though those resources are inseparable for survival.

For the first Agricultural Revolution to triumph in the fertile crescent required more than a benign hand of nature to send nutrient-rich floods each year. Among the generations who depended on the Nile for their bread, the cycle of flood and fertility underpinned belief in rebirth, and of an after-life. Hoeing, property performed, was deemed an act of piety towards the Earth-god: 'Indeed, canal-building was believed to be a major occupation of those in the blessed world beyond death.' 'Canal-digger' became an important title for rulers who laid claim to the beneficial consequences of the work carried out by labourers who 'dredged channels, dug ditches, built earthen dams, constructed dikes and basins, and raised water with buckets.'⁸⁵ Their activities too were considered to be part of a holy occupation. With the passage of time, astrology overlapped with astronomy from the predicting the inundations.⁸⁶

In no sense need we take spells and rituals seriously in the same ways as did their practitioners. However, materialists must take magic as seriously, as Childe and Thompson did, as one more sensuous human practice. Ask not just why everyone once believed in such spells but also why so many still need to believe. Marx called religion an opiate, not because it put people to sleep, but because it reduced physical pain and mental anguish so that we might retain the strength to go on.⁸⁷

Acceptance of that precept does not resolve the puzzle posed by Marx: how is it that the one mode of production spawns so many distinctive superstitions and institutional

⁸³ Childe, *Man Makes Himself*, p. 62; cf. *The Prehistory of European Society*, p. 23.

⁸⁴ Childe, *Man Makes Himself*, p. 62.

⁸⁵ J. Donald Hughes, 'Sustainable Agriculture in Ancient Egypt', *Agricultural History*, 66 (2), Spring 1992, pp. 12-22.

⁸⁶ Childe, *Man Makes Himself*, p. 136-8.

⁸⁷ Karl Marx, 'Contribution to the Critique of Hegel's Philosophy of Law', *MECW*, volume 3, Lawrence & Wishart, London, 1976, pp. 175-6.

religions? Once we know both the mode of production and the beliefs, it is all too easy to work back from creed and ritual to need and reproduction. The demanding task is to trace the development of 'the forms in which these needs have been apotheosised... from the actual, given relations of life'; only that pursuit, he writes, is historical, materialist, and thereby can be deemed scientific.⁸⁸

Science

When experiments by practitioners of the occult sciences failed, the priests or magi failed most often to learn from those reverses.⁸⁹ There are no grounds for concluding that the practical farmer did much better.⁹⁰ Some killed worms to stop their eating seeds;⁹¹ French farmers who saw the higher yields from farms with natural deposits of lime did not at once add any of it to fields that did not. And it must be added that not all experimental scientists during the nineteenth-century were safe from priest craft to conceal their errors and willful ignorance, or from indulging in self-promotion within the interests of the class to which they had attached themselves. Rudolf Virchow opposed Pasteur's germ theory for infection as a challenge to his own primacy of the cell and denounced Darwinism as a source of socialism.⁹²

We shall make little sense of developments in agricultural science before the 1900s without attending to the even more dramatic changes in how the physical and chemical worlds were understood.⁹³ From the 1640s, the intellectual context for experimentation had been transformed by Descartes, Galileo, Leibniz and Newton, supported by Royal Societies and learned journals. No longer was Aristotle the fifth apostle.⁹⁴ Particular discoveries enriched an understanding of the nature and hence the needs of plants and soil types, although the conceptual and the empirical did not always nourish each other.⁹⁵

⁸⁸ Marx, *Capital*, I, p. 494, n. 4.

⁸⁹ Childe, *Man Makes Himself*, pp. 55-6; *Magic, Craftsmanship and Science*, pp. 18-19.

⁹⁰ G.E. Fussell, *More Old English Farming Books from Tull to the Board of Agriculture, 1731 to 1793*, Crosby Lockwood, London, 1950; G. F. Fussell, 'Crop Nutrition in Tudor and Early Stuart England', *The Agricultural History Review*, 3 (2), 1955, pp. 95-106.

⁹¹ Gilbert White, *The Natural History of Selborne*, Penguin, Harmondsworth, 1977, pp. 196-7; cf. Michael Boulter, *Darwin's Garden, Down House and 'The Origins of Species'*, Constable, London, 2009, pp. 206-12.

⁹² Erwin H. Ackerknecht, *Rudolph Virchow, Doctor, Statesman, Anthropologist*, University of Wisconsin Press, Madison, 1953, pp. 45 and 199-207; Peter J. Bowler, *The Eclipse of Darwinism, Anti-Darwinian Evolutionary Theories in the Decades around 1900*, The Johns Hopkins University Press, Baltimore, 1983, pp. 60, 70, 91 and 195.

⁹³ Mary Jo Nye (ed.), *The Cambridge History of Science, volume 5, The Modern Physical and Mathematical Sciences*, Cambridge University Press, Cambridge, 2003, chapters 9 and 11 to 13.

⁹⁴ Stephen Gaukroger, *Genealogy of Knowledge: analytical essays in the history of philosophy and science*, Ashgate, Aldershot, 1997; *The emergence of a scientific culture: science and the shaping of modernity 1210-1685*, Oxford at the Clarendon Press, 2006.

⁹⁵ Robert C. Allen and Cormac O Grada, 'On the Road Again with Arthur Young: English, Irish and French Agriculture during the Industrial Revolution', *Journal of Economic History*, 48 (1), March 1988, pp. 93-116; Kenneth Hudson, *Patriotism with Profit, British Agricultural Societies in the Eighteenth and Nineteenth Centuries*, Hugh Evelyn, London, 1972.

The presence of calcium phosphate in bones was recognised in 1769, to be extracted from bone ash two years later; nitrogen identified in 1772, ammonia gas in 1774, oxygen in the 1770s and potassium in 1808.⁹⁶ Jan Ingenhousz identified respiratory cycles in plants in 1779, showing that oxygen is absorbed at night when carbon dioxide is exhaled, with the reverse cycle by day; at the same time, he saw the importance of sunlight if leaves were to produce oxygen. Linnaeus's writings on the sex lives of plants had been translated by the mid-1780s.⁹⁷ Little progress in understanding the exchanges between soils, plants and the atmosphere could be made for as long as water was considered a single element and not a molecule.⁹⁸ Moving between botany and zoology, Lamarck coined 'biology', identified invertebrates and proposed evolution under the label of transformism around 1800, becoming Professor of Worms at the Jardin de Plants.⁹⁹ Cellular physiology emerged thirty years later with works by M.J. Schleiden of plants and Theodor Schwann for animals; most of their accounts were 'quite wrong' since 'the data were incorrect and the inferences, while logical, were false.'¹⁰⁰ Then came Virchow's lectures on cellular pathology in 1858.¹⁰¹ Evolution within species rather than between them had been widely accepted before Wallace and Darwin presented the novelty of a mechanism for the latter through natural selection.¹⁰² By 1880, Pasteur's work on microbes challenged von Liebig's bias towards minerals as the prime, if not the sole contributor to improving fertility.¹⁰³

With so many fundamental discoveries falling upon each other, it should be no surprise that so many eminent scientists nailed their reputations to at least one huge mistake: Darwin's was 'blending',¹⁰⁴ while Virchow denied the significance of microbes in disease.¹⁰⁵

⁹⁶ Milton Whitney, *Soil and Civilization, A Modern Concept of the Soil and the Historical Development of Agriculture*, Chapman & Hall, London, 1926, p. 10.

⁹⁷ A chronology of publications and discoveries between 1651 and 1915 is in Gasking, 1967, pp. 174-80.

⁹⁸ John Buckingham, *Chasing the Molecule, Discovering the Building Blocks of Life*, Sutton, Stroud, 2005, pp. 16-18.

⁹⁹ L. J. Jordanova, *Lamarck*, Oxford University Press, Oxford, 1984.

¹⁰⁰ Lester S. King, *The Growth of Medical Thought*, University of Chicago Press, Chicago, 1963, pp. 186-8; Ackerknecht, *Rudolph Virchow*, pp. 72-4.

¹⁰¹ Rudolf Virchow, *Cellular Pathology*, John Churchill, London, 1860 - which Marx read in 1867 as he waited for the page proofs of *Capital*, Marx to Kugelmann, 17 April 1868, *MECW*, v. 43, p. 13; King, *Growth of Medical Knowledge*, pp. 206-19.

¹⁰² Ted Benton, *Alfred Russell Wallace, Explorer, Evolutionist, Public Intellectual: a thinker for our own times?*, Siri Science Press, Manchester, 2013; Loren Eiseley, *Darwin's Century*, Anchor Books, New York, 1961.

¹⁰³ Selman A. Waksman, 'Liebig - The Humus Theory and the Role of Humus in Plant Nutrition', pp. 56-63; Harry A. Curtis, 'Liebig and the Chemistry of Mineral Fertilisers', Forest Ray Moulton (ed.), *Liebig and After Liebig, A Century of Progress in Agricultural Chemistry*, American Association for the Advancement of Science, Washington, 1942, pp. 64-70; William H. Brock, *Justus von Liebig*, Cambridge University Press, Cambridge, 1997; Margaret W. Rossiter, *Emergence of Agricultural Science: Justus Liebig and the Americans, 1840-1880*, Yale University Press, New Haven, 1975; Erland Marald, 'Everything Circulates: Agricultural Chemistry and Recycling Theories in the Second Half of the Nineteenth Century', *Environment and History*, 8 (1), February 2002, pp. 650-84.

¹⁰⁴ Michael T. Ghiselin, *The Triumph of the Darwinian method*, University of California Press, Berkeley, 1969, pp. 160-80.

¹⁰⁵ Ackerknecht, *Rudolph Virchow*, pp. 105-18.

In 1917, two British researchers summed what was known and how much remained uncertain after some seventy years of field trials at Rothamsted Experimental Station.¹⁰⁶ Their modest efforts were overshadowed by Fritz Haber's concentration of the forces of production, courtesy of the German warfare state;¹⁰⁷ under his leadership, scientists at the Kaiser Wilhelm Institut, by 1913, had devised a catalyst for the commercial production of ammonia for fertilisers and explosives,¹⁰⁸ without which the war might well have been over before Christmas. Although celebrating 'A Century of Progress in Agricultural Chemistry', one of the speakers at the 1940 symposium on the Liebig's book, had to admit that '[t]he science of plant physiology is so youthful that the recording of new observations of fact still remains generally more attractive than attempts to coordinate and interpret them ...'.¹⁰⁹

Conclusion

We began with the Old Testament and shall close with a much shorter text which served Childe as an old testament. I speak of 'On the part played by Labour in the Transition from Ape to Man' by Frederick Engels. As we saw, in *Man Makes Himself*, Childe gave flesh to its bones. In his *Progress and Archeology* from 1941, he recognised the zig and zag among the consequences of the emergence of *homo sapiens* yet found no grounds for despair, not even in the rise of Nazism.¹¹⁰ I hesitate to project Childe's faith in a degree of progress into the present. Sixty years after his death, he might conclude that it had been a mistake to have to come down from the trees.

Instead of even hinting at what we cannot know about a dead man, I shall quote the caution delivered by Engels. Those pages are at once a marvel of prose and a profane sermon on how our species might yet learn to survive:

Let us not flatter ourselves over much on account of our human victories over nature. For each victory nature takes its revenge on us. Each victory, it is true, in the first place brings about the results we expected, but in the second and third places it has quite different, unforeseen effects which only too often cancel the first.

¹⁰⁶ E.J. Russell and A. Appleyard, 'The influence of soil conditions on the decomposition of organic matter in the soil', *The Journal of Agricultural Science*, VIII (3), June 1917, pp. 385-417; 'The changes taking place during the storage of farmyard manure', VIII (4), December 1917, pp. 495-563.

¹⁰⁷ Vaclav Smil, *Enriching the Earth, Fritz Haber, Carol Bosch, and the Transformation of World Food Production*, The MIT Press, Cambridge, Mass., 2001; Stephen R. Brown, *A Most Damnable Invention: Dynamite, Nitrates and the Making of the Modern World*, Thomas Dunne Books, New York, 2005, chapter 10. Haber also headed the team that produced mustard gas, receiving the Nobel Prize in 1919 before being driven out by Hitler for being a Jew.

¹⁰⁸ Anver Offer, *The First World War: an Agrarian Interpretation*, OUP, Oxford, 1990.

¹⁰⁹ Burton E. Livingston, 'Mineral Requirements of Plants as Indicated by means of Solution Cultures,' Moulton (ed.), *Liebig and After Liebig*, 1942, p. 83.

¹¹⁰ Childe, *Man Makes Himself*, pp. 2-4; Kenneth Maddock, 'Prehistory, Power and Pessimism', *Childe in Australia*, pp. 107-17.

The people, who, in Mesopotamia, Greece, Asia Minor and elsewhere, destroyed the forests to obtain cultivatable land, never dreamed that, by removing along with the forests the collecting centres and reservoirs of moisture, they were laying the basis for the present forlorn state of those countries.

Thus at every step we are reminded that we by no means rule over nature like a conqueror over a foreign people, like someone standing outside nature – but that we, with flesh, blood and brain, belong to nature, and exist in its midst, and that all our mastery of it consists in the fact that we have the advantage over all other creatures of being able to learn its laws and apply them correctly.¹¹¹

¹¹¹ Engels, *Marx Engels, Selected Works*, 1970, pp. 74-75. Peter Singer misrepresents Engels who never denies that other animals can alter their environments but observes that they cannot learn its laws in order to do so. *The Darwinian Left, politics, evolution and co-operation*, Weidenfeld and Nicholson, London, 1999, p. 24; Singer has become an anti-Darwinian teleologist; cf. J.S. Kennedy, *The New Anthropomorphism*, Cambridge University Press, Cambridge, 1992.