Consigning the "Human Motor" to the History of Agricultural Work: Reflections on the Fractured Trajectory of Scientific Management and the Rationalization of Labor

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Abstract: Scientific management and work rationalization are usually associated with the rise of industrial capitalism and factory labor. This narrow perspective, however, obscures the rural and agricultural spaces in which practices of labor management and work rationalization were important throughout the 19th and 20th centuries. Following up on Caitlin Rosenthal's book *Accounting for Slavery*, this essay explores how our view of the history of work under the conditions of industrial capitalism changes if we account for the multiple and fractured lineages that connected visions of rationalized work on plantations, factory floors, and family farms. This approach not only renders visible the ecological and metabolic complexity of agricultural work, but it also provokes new questions on how agricultural labor was incorporated into the expanding frontiers of modern capitalism and how the transformative forces of industrialization changed the perception of work in modernity.

When one thinks of scientific management, the rationalization of work, and the training of the working body for most efficient performance, the modern factory usually comes first and foremost to mind. The industrial shop floor is an iconic place of labor in the age of "high modernity" (Herbert, 2007), a key component in what Anson Rabinbach calls the "social imaginary of productivism" (Rabinbach, 2018: vii). It appears in our imagination as a space governed by a high degree of division of labor, in which the manufacturing process is reduced to simple mechanical movements of synchronized bodies, driven by the linear and tireless rhythm of the steam engine and later the assembly line (Freeman, 2018).

In "Modern Times," as Charlie Chaplin's classical movie suggests, the living human body with its metabolic cycles and its proneness to fatigue becomes the sole grain of sand in an otherwise well-lubricated mechanical manufacturing process. Yet, as much as factory work is associated with alienation and degradation, it is also acclaimed as a site of yet unknown efficiency and productivity of work. Whatever the ambivalent and conflicting normative judgments may be, in their very contrariness they share, somehow paradoxically, a common pattern of interpretation: Modern work, it seems, can only be industrial work.

Max Weber noted this cognitive association as early as 1893:

> Nowadays, when the "workers' question" is discussed in the press or elsewhere, it is self-evident – and this is a peculiar phenomenon – that the crowds of workers in the large cities and industrial centers are regularly thought of. Smoking chimneys, enormous drive belts and the wheezing of steam engines, cellar and attic apartments in the back houses of the big cities and the liquor bars on their street corners form the background. […] This is the air of life in which the "workers' question" involuntarily

> dwells in the imagination of those who speak, write, and read (Weber, 1993: 123, translated by JA).

For workers who were not to be found in the big cities and industrial towns, whose "background" was not necessarily chimneys, driving belts, and steam engines, but farmhouses, stables, livestock, agricultural machinery, arable land, planted fields, and meadows – for these workers, and that's Weber's punch line, there is hardly any place in this imagined world of "modern" work.

This "peculiar phenomenon," that alleges labor conflicts and efforts to increase the productivity of work by changing bodily techniques could only be found in the sphere of industrial manufacturing and hardly in the sphere of agricultural work, not only determines collective imaginations in industrial or, as some might be a bit hasty to think, post-industrial societies. This particular industrial bias also deposited itself in historiography with some displacing weight.

The history of work in the 19th and 20th centuries has long been written predominantly as a history of industrial wage labor; for a long time, historiography showed little sensitivity or interest in the transformation of agricultural work under the conditions of industrial capitalism, nor, for that matter, in subsistence and domestic work or in unpaid care work. To be sure, there have always been voices calling for adequate consideration of the history of agricultural work. The American historian T.H. Breen, for example, demanded in the early 1980s that "historians must bring the same kinds of qualitative and temporal distinctions to agricultural work as they reflexively bring to industrial labor" (Breen, 1980: 248). It cannot be said that many historians have heeded this call.

In recent years, however, there has been some movement in the history of labor to recognize agricultural work as an essential part of the modern world, and therefore a subject of historical research that merits our scrutiny. For those who are not persuaded to think of agricultural work as simply a relic of bygone times that somehow strangely survived under the conditions of modern industrial capitalism, this movement has been welcome. It is worthwhile to remember Raymond Williams' cautionary words regarding the familiar tendency to associate agricultural work with "tradition" and the "past" and to misrepresent it as "archaic" and "primitive:"

> There's been an extraordinary acquiescence and drift towards the sort of brisk progressivism that talks of rationalizing archaic production when as a matter of fact there is nothing archaic about it (Williams, 2015: 314).

Ignoring insights such as Williams' would reinforce the stereotypical view of allegedly conservative farmers tangled up in a web of tradition and reluctance to progress and would tend to perpetuate the relative indifference of historians to the challenges, problems, and changes of rural society in the age of industrial capitalism.

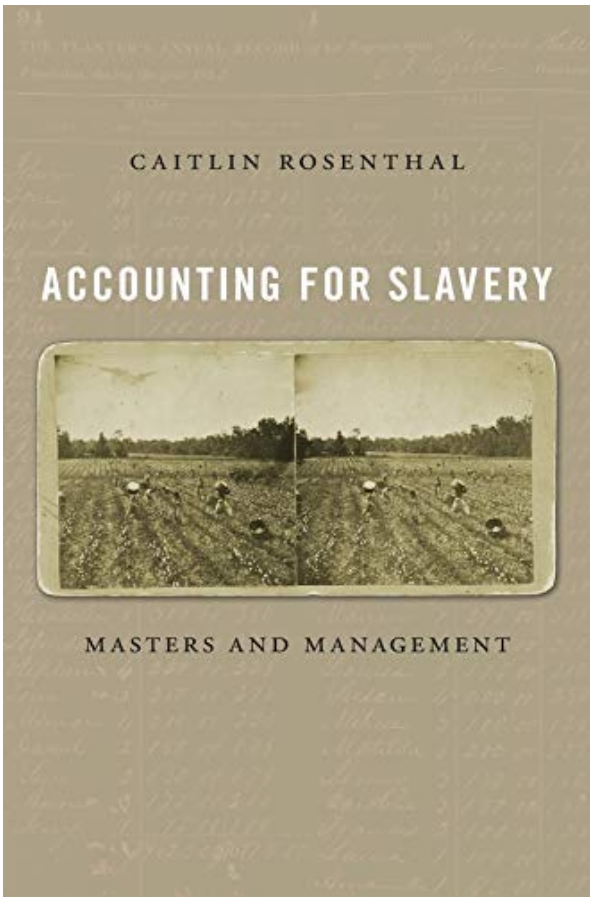
The "new history of capitalism," as well as global labor history, have recently brought an important counterweight to such tendencies in historical writing and have contributed to the "rediscovery" of the countryside and agricultural production as inherent components of modern commodity frontiers. As Sven Beckert argues,

> Any understanding of capitalism needs to take into account the transformation of the global countryside, historically the most important source of labor, raw materials, and markets – and, at times, of capital. (Beckert, 2016: 242).

Indeed, that is a crucial observation, yet the countryside was not only a "source of labor," but a very heterogeneous, diverse, and sometimes enigmatic world of agricultural working practices and human bodies interacting in myriad and contingent ways and in complex ecological environments and webs of social relations with the earth, plants, and animals (Vanhaute, 2021: 3–5).

Bringing this complexity of agricultural work more into focus may also go along with important shifts in the way we look at the history of scientific management, work rationalization, and the history of bodies at work. Caitlin Rosenthal recently provided a particularly stimulating example of this historiographical current in her book *Accounting for Slavery*. While management practices of exact and systematic supervision of labor as well as the establishment of a regime of strict labor discipline are usually associated with the rise of scientific management and Taylorism towards the end of the 19th century, Rosenthal draws such practices back to the plantation economies in the British Caribbean and the US South in the late 18th and 19th centuries.

In contrast to other historical interpretations of the relationship between slavery and capitalism that stress the economic backwardness of what contemporaries called euphemistically the "peculiar institution," Rosenthal argues that the plantation economy and slave labor were by no means incompatible with capitalism. In



accordance with recent research on the interplay between slavery, the emergence of modern capitalism, and industrialization (Beckert/Rockman, 2016), Rosenthal emphasizes the entrepreneurial view of planters who turned the working bodies of enslaved human beings into quantified, abstract, and commodified "hands," a view that was quite in tune with the market logics of capitalism.

Southern planters in fact developed sophisticated "paper technologies" of pre-printed account books that allowed them to monitor prices and weights of picked cotton and to measure the exchange and market value of the human beings they included as their property. Moreover, these paper technologies also provided a means to document the labor of the enslaved and to introduce rating systems for categorizing their brutally exploited labor force along different classes of work performance. Thus, Rosenthal paints a picture of plantation economies as modern business enterprises longing for control over their labor force, being obsessed with performance and work productivity, and foreshadowing later forms of labor management in industrial plants.

The aim of extracting the maximum labor force out of the worker's body, as well as the supervisory observation and re-arrangement of bodily motions at work, might have been crucial features of Taylorism and other labor management practices arising with the industrial rationalization movement in the late 19th and early 20th centuries. Yet, slaveholders had already experimented with comparable techniques, collecting data on labor productivity, observing the plantation as an integrated system of connected laboring processes, and conducting experiments akin to what Taylor and Gilbreth later propagated as time and motion studies. "In exceptional cases," Rosenthal writes, "the level of observation planters applied to their slaves [sic] approached the time and motion studies of scientific management." (Rosenthal, 2018: 117)

To be sure, the stopwatch as an instrument to increase labor output is something quite different from the threat or the bodily experience of physical violence. On the

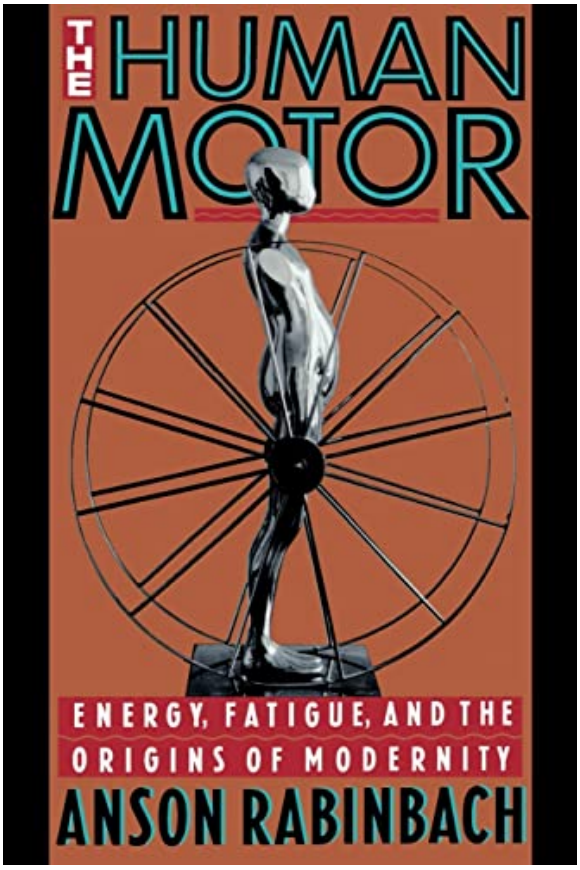
plantations in the American South, it was the slave driver's lash that audibly drove and disciplined the enslaved to increase the productivity of their bodies, rather than the ticking of the clock or the stern gaze of the foreman (Baptist, 2014).

Nevertheless, Rosenthal's detailed reconstruction of resemblances between planters' unfree labor management techniques and scientific management's disciplinary regimes for "free" labor is revealing, even if historians had begun pointing towards such lineages earlier. Marcel van der Linden, for instance, in a thought-provoking essay on the origins of modern labor management, argued that it seemed "obvious that slave [sic] plantations and other institutions based on coercion have been important sources for modern labor management" (van der Linden, 2010: 516).

Apart from these similarities and connections in labor management, Rosenthal offers another path to rethink the links between plantation economies, industrial capitalism, and the history of work in the modern age. This path derives from the imaginary of the working body. As Rosenthal shows, the cotton planters in the American South increasingly conceived of their plantations as "machines," and the enslaved laborers in their property as cogs in the machine of the plantation economy. Their almost unlimited power over enslaved bodies allowed planters to imagine the "plantation itself as a great machine," and the unfree laborers as interchangeable means of production. Even if the enslaved developed their own strategies of resistance and had their repertoire of "weapons of the weak" (Scott, 1985), they could only partially escape, subvert, and constrain their master's controlling and violent power.

The merging of accounting, discipline, and cruel physical violence thus led the planters, as Rosenthal puts it, to think of their plantations "as if a machine of many parts – a continuous-process assembly line on a grand scale" (Rosenthal, 2018: 69 and 112). The fact that planters increasingly thought of their mode of production as an activity that resembled the mechanized functioning of industrial manufacturing is as unsettling as it is revealing, given the fact that enslaved labor was first and foremost directed to the soil, to plants, and to animals. In other words, it was an agricultural activity that became to be regarded *as if* it were like an industrial machine process.

Crucial for establishing such conceptual bridges between agricultural and industrial labor, as well as between the plantation and the factory, was a view of the human body that was itself deeply rooted in 19th century physics, thermodynamics, and mechanical arts: the idea of the human body as a machine for converting chemical into kinetic energy. As Anson Rabinbach has brilliantly shown in his study of the metaphor of the "Human Motor," generations of physiologists, work scientists, and social reformers drew on this powerful epistemic metaphor to explore the possibilities and the limits of incorporating, conserving, transforming, and deploying energy into labor force. In fact, this reductionist mechanical and



industrial image of the body as a thermodynamic motor and energy converter became an obsession in the discourses surrounding the scientific study of work from the mid-19th to the mid-20th century and it altered the perception of work in fundamental ways.
"The metaphor of the human motor," Rabinbach writes, "translated revolutionary scientific discoveries about physical nature into a new vision of social modernity" (Rabinbach, 1992, 1). Reading Rosenthal's account of the planters' perspective on the bodies of the enslaved alongside Rabinbach's intellectual history of the European science of work, the assumption arises that the metaphor of the human body as a motor provided something like a "theoretical metonymy" (Shapin, 2004: 4) that linked the enslaved labor on plantation economies to Taylor's scientific management and European discourses on the scientific study of work.

There are not only paths leading from the plantation economy and enslaved labor to the industrial shop floor and the laboratories of work scientists, but also from there back into the countryside to the stables and fields of farming communities. This side of the story, however, remains in large parts to be written. The following represents an initial effort to unearth the potential of such a historical exploration (Auderset, 2021; Auderset, 2023). First, it is important to emphasize that the languages of Taylorism and work science, as well as the obsessive search for the most efficient and productive solutions to the problems of modern industrial labor, not only zigzagged across the Atlantic Ocean and triggered attempts to rationalize factory work (Nolan, 1994), but soon captured the imagination of agricultural economists, engineers, and social reformers who tried to apply this knowledge to farm work.

Especially in Europe during the interwar years, Taylorism and work rationalization became a crucial leitmotif in agricultural discourses. Nothing less than a "taylorization of agriculture" and a "taylorist reform of the working processes of men, animals, and machines" was on the mind of the German Gustav Winter in 1920, for instance. Other agronomists and agricultural economists reflected in similar, albeit sometimes more cautious ways, on the possibilities and limits of applying Taylorist principles and the findings of the science of work to agriculture.
The 1920s also witnessed several successful attempts at institutionalizing the science of agricultural work as a subdiscipline of the agricultural sciences. In Pommritz, Saxony, for example, an Experimental Station for the Study of Agricultural Work was established in 1919 and by the late 1920s a European-wide web of scientific institutions and initiatives dedicated to the study of agricultural work was firmly in place. These networks linked scholars across national boundaries and released an extensive stream of studies on the physiology, psychology, and practical aspects of agricultural work and its "rationalization," as well as on the treatment, education, and feeding of working animals and the prospects of replacing the workforce of humans and animals with motorized technology. The circulation of scientific knowledge on agricultural work was also proliferated by forums for transnational exchanges like the International Management Congresses or the International Agriculture Congresses which often acted, in the words of Kiran Klaus Patel, as "clearinghouses of global expertise" (Patel, 2016: 39).

At the same time, however, this circulation of knowledge on agricultural work flowed both as streams swollen to remarkable intensities and as dried and thin trickles. Interestingly, for instance, work rationalization and scientific management in farming hardly played a role in the heartland of Taylorism. Observers from the United States reacted with astonishment when they registered the flowering of the science of agricultural work in the knowledge networks of European agronomists and the intense rationalizing fervor that accompanied it in the 1920s. As Asher Hobson, the American delegate at the International Institute of Agriculture in Rome, observed in 1927: "In America the Taylor System is accorded little importance in its application to agriculture. It is exclusively of interest to industry." But among European agronomists and agricultural

Physiological experiments with agricultural workers conducted by Géza Farkas near Budapest, 1929. Courtesy of Harvard Medical Library collection, Francis Gano Benedict Papers, Center for the History of Medicine in the Francis A. Countway Library, Harvard University.

economists, Hobson noted with some wonderment, there were "enthusiastic followers of Taylor" (Hobson, 1927: 423).

While US farming in the interwar years certainly provided examples of motorized agriculture, large-scale commodity production and monocultures, rationalization, and standardization and in general strove to accomplish the "industrial ideal" (Fitzgerald, 2003), one of the most prominent features of American industrialization – the emergence and application of scientific management – seemed strikingly absent from the agricultural sphere. It was only in the early 1940s, in the context of the Emergency Farm Labor Program during World War II that American agricultural economists at the United States Department of Agriculture (USDA) re-discovered the scientific work that their European counterparts had launched in the 1920s. Together with Lilian Moller Gilbreth, the wife of Frank Gilbreth, a pioneering scholar in time and motion studies and the doyenne of industrial management techniques in America, they developed the Farm Work Simplification Program and aspired to apply Taylor's and Gilbreth's ideas to agriculture, even though some of the scholars involved admitted that scientific management did not find in agriculture "a very good medium in which to develop" (Black, 1947: 550).

Apart from this remarkable transatlantic trajectory of scientific management in agriculture in the first half of the 20th century, the skepticism gleaming through this quotation points to another puzzling issue that accompanied the discourses on agricultural work and that fueled the debate in how far farm work should be modeled along factory labor. The rise of a science of agricultural work also created a field of contestation between different conceptual approaches to perceiving, analyzing, and transforming agricultural work under the conditions of 20th century industrial capitalism.

As European scholars and scientists began to investigate the complex ecological conditions of agricultural work in the 1920s and as they became aware of the multiple cultural meanings and social values that farming communities attached to their labor beyond the aim of making it more profitable and productive and less physically demanding, the early enthusiasm for Taylorism soon began to crumble.

In contrast to the earlier heralds of a "taylorization of agriculture," some protagonists of the newly proclaimed science of agricultural work now called for a more thoroughgoing consideration of the variable and dynamic conditions of agricultural work. They aimed at the physiological and psychological rationalization of the laboring bodies of the farm population at large, targeting the elimination of fatigue, overwork, physical deformation, and wasteful movements in agricultural work, while at the same time enhancing the "efficiency of the human motor," as the German agricultural scientist and Director of the Experimental Station for the Study of Agricultural Work in Pommritz Georg Derlitzki, put it (Derlitzki, 1927: 135).

Revealingly, the metaphor of the "human motor" continued to shape the scientific imaginary of the working body in agriculture, but at the same time, work scientists like Derlitzki now called for a more systematic consideration of the specific working conditions in agriculture under which the human motor deployed its labor force. And this shift from the working body itself to the interactions between the body and the specific circumstances of work made clear that the rationalization schemes borrowed from the industrial shop floor and from the classic writings of scientific management seemed in many ways at odds with the delicate nature of farm work.

Indeed, work scientists dealing with the idiosyncrasies of agricultural work became increasingly aware of the variable, dynamic and often uncontrollable ecological and metabolic interdependencies that left their marks on the world of farm labor and that often informed the perceptions, the knowledge, and the interpretations of those who toiled on the fields and in the farm households. When it came to working the land, caring for animals, and growing plants, the industrially inspired

ideas of scientific management and the rationalization of work frequently ran up against the complex "taskscapes" of agriculture that were shaped predominantly, as Tim Ingold argues, by a "process of growing, not making" (Ingold, 2000: 81).

Following the traces of labor management and work rationalization beyond the walls of the factories thus renders visible some of the too-long dismissed rural spaces where working bodies and their movements were monitored, observed, trained, disciplined, and formed with the aim of increasing work productivity. Agriculture was by no means an island in the sea of 19th and 20th centuries obsessions with energy, fatigue, and efficient work, yet it did have its idiosyncrasies that rendered it different from industrial labor. These differences, however, are hardly captured by inscribing them in the familiar conceptual dichotomies of "tradition" and "modernity." It was rather the interaction with complex ecological environments, the incertitudes of working with and on biotic resources and organic matter, the constraints of the climate and weather on crop choices and production systems, the seasonal and cyclical temporalities of plants and animals prone to pests and diseases, and the often intangible or ignored effects of certain agricultural practices on soil fertility that shaped agricultural working practices and their changes in time and space.

Unshackling the history of scientific management and the rationalization of working bodies from the narrow industrial enterprise framework into which it has long been pressed, renders this complexity visible. It allows us to ask new questions about how agricultural labor was incorporated into the expanding frontiers of modern capitalism and how the transformative forces of industrialization changed the perception of work and altered the ties that were forged between humans and the earth by working the land. This perspective does not only account for the multiple lineages that linked plantations, factory floors, and family farms, it also helps to bring agricultural work and its ecological entanglements back onto the canvas of a global history of capitalism and labor. As Richard White reminds us: "labor rather than 'conquering' nature involves human beings with the world so thoroughly that they can never be disentangled" (White, 1996: 7).

References

Auderset, J. (2021). 'Manufacturing Agricultural Working Knowledge: The Scientific Study of Agricultural Work in Industrial Europe, 1920–60s.' *Rural History* 32(2), 233–248.

Auderset, J. (2023). 'Missed Encounters and Unexpected Connections: Transatlantic Crossings in the Study of Agricultural Work, 1920–1960.' In H. Hartmann and J. Tischler (Eds.), *Planting Seeds of Knowledge: Agriculture and Education in Rural Societies in the Twentieth Century*. New York/Oxford: Berghahn, 168–193.

Baptist, E. E. (2014). *The Half Has Never Been Told: Slavery and the Making of American Capitalism*. New York: Basic Books.

Beckert, S. (2016). 'The New History of Capitalism.' In J. Kocka and M. van der Linden (Eds.), *Capitalism: The Reemergence of a Historical Concept*. London etc.: Bloomsbury, 235–250.

Beckert, S./Rockman, S. (Eds.) (2016). *Slavery's Capitalism: A New History of American Economic Development*. Philadelphia: University of Pennsylvania Press.

Black, J. D. et al. (1947). *Farm Management*, New York: Macmillan.

Breen, T.H. (1982). 'Back to Sweat and Toil: Suggestions for the Study of Agricultural Work in Early America.' *Pennsylvania History: A Journal of Mid-Atlantic Studies* 49(4), 241–258.

Derlitzki, G. (1927). 'Die Bedeutung der Landarbeitsforschung in Deutschland.' In *Atti del III Congresso Internazionale di Organizzazione Scientifica del Lavoro, Parte II: Memorie*. Vol. I, Roma: L'Universale, 135–139.
Fitzgerald, D. (2003). *Every Farm a Factory: The Industrial Ideal in American Agriculture*. New Haven: Yale University Press.
Freeman, J.B. (2018). *Behemoth: A History of the Factory and the Making of the Modern World*. New York: Norton.
Hobson, A. (1927). 'Agricultural Economics in Europe.' *Journal of Farm Economics* 9(4), 421–432.
Ingold, T. (2000). *The Perception of the Environment: Essays in Livelihood, Dwelling and Skill*, London: Routledge.
Herbert, U. (2007). 'Europe in High Modernity: Reflections on a Theory of the 20th Century.' *Journal of Modern European History* 5(1), 5–21.
Nolan, M. (1994). *Visions of Modernity: American Business and the Modernization of Germany*. New York: Oxford University Press.
Patel, K. K. (2016). *The New Deal: A Global History*. Princeton: Princeton University Press.
Rabinbach, A. (1992). *The Human Motor: Energy, Fatigue, and the Origins of Modernity*. Berkeley; Los Angeles: University of California Press.
Rabinbach, A. (2018). *The Eclipse of the Utopias of Labor*. New York: Fordham.
Scott, J. (1985). *The Weapons of the Weak: Everyday Forms of Peasant Resistance*. New Haven: Yale University Press.
Shapin, S. (2008). *A Scientific Life: A Moral History of a Late Modern Vocation*. Chicago: Chicago University Press.
van der Linden, M. (2010). 'Re-Constructing the Origins of Modern Labor Management.' *Labor History* 51(4), 509–522.
Vanhaute E. (2021). *Peasants in World History*. London: Routledge.
Weber, M. (1993). 'Die Erhebung des Vereins für Sozialpolitik über die Lage der Landarbeiter (1893).' *Max Weber Gesamtausgabe*. Vol. 4/1. Tübingen: Mohr, 120–153.
White, R. (1996). *The Organic Machine*. New York: Hill and Wang.
Williams R. (2015). *Politics and Letters: Interviews with New Left Review*. London: Verso.

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*All photos provided by the author.

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