



THE FIVE THINGS I THOUGHT ABOUT
THIS YEAR
HANNAH LANDECKER

Hannah Landecker is a historian and sociologist of the life sciences. She holds a joint appointment in the Life and Social Sciences at UCLA, where she is a Professor in the Sociology Department and in the Institute for Society and Genetics, an interdisciplinary unit at UCLA committed to cultivating research and pedagogy at the interface of the life and human sciences. Landecker is the author of *Culturing Life: How Cells Became Technologies* (Harvard UP, 2007) and has written widely on biotechnology and the intersection of biology and film. Her more recent work concerns the rise of antibiotic resistance and the way the biological sciences are changing as they confront the anthropogenic effects of human industrial activity on cells, human and non-human. Her work at the Wissenschaftskolleg focused on the intersection of armed conflict and antibiotic resistance and on the science of metabolism in the wake of the industrialization of manufacturing and food systems. – Address: Department of Sociology and the Institute for Society and Genetics, University of California at Los Angeles, 264 Haines Hall, 375 Portola Plaza, Los Angeles, CA 90095-1551, USA. E-mail: landecker@soc.ucla.edu.

Every morning, I set out to work in my office in the New Building from my apartment in the Villa Walther. As it is approximately a four-minute walk, I usually first went in the opposite direction, crossing the Hasensprung and looping through the meadow near the S-Bahn tracks or doing a circuit around the Herthasee, particularly in the spring when there were nesting swans to check in on every day. Every morning I thought about what I was working on, walking for twenty or thirty minutes before sitting down to write or read. For me, the hallmark of this year was what felt like a reinhabiting of my own mind.

How can you feel evicted from your own mind? Perhaps it seems anti-intuitive, but I expect many people will understand what I mean. After years of administrative work, accentuated by the demands of making decisions and running things during the pandemic, and a year of social turmoil about racist violence and what should be the University's appropriate response to it, my stream of consciousness had begun to fracture into a thousand disconnected yet intrusive pieces, and I couldn't feel at home or restful in my own thoughts. It took a while to repair. I have structured this report around what I thought about this year, because this is what it has all been about, for me. If I have feedback for the Institute, it is only that facilitating this kind of mental peace and concentration should continue to be a priority and a core value, as it is an increasingly rare opportunity in our times.

One. Antioxidants.

In September and October of 2021, I confronted the profound paucity of my chemical education and finally began to really understand reduction and oxidation after only ever having memorized it before, in a charade of understanding. This is partly due to the fact that chemistry (and many other sciences) are often taught to students *as if they are not interesting* and therefore one only needs to know enough to pass the test. The other reason that real understanding had eluded me is that the language of reduction and oxidation in chemistry is one of history's great travesties in terms of explaining with words that actively make it more confusing – something is reduced because it gains electrons! That is not intuitive. Finally, no one ever thinks that a historian or a sociologist needs to understand things like electrons, which of course is totally misguided. I learned to think about it simply, about plants soaking up the sun and turning it into chemical energy. All those plant-made things such as wood, or rubber (from rubber trees), or grain – they've all been charged up, wound tight. A chemist would say that photosynthesis produces all these *reduced* forms of carbon because of their gain in electrons or the way they pull other molecules close to them, energy that is released again when they are *oxidized*, in eating, or combustion, or weathering.

In terms of human social history, the control of the processes of oxidation can be understood as the effort to stop butter and lard from going rancid; to prevent explosions in stored oil and gas; to halt the cracking of rubber and the weathering of infrastructure; to stop photos from developing all the way to complete blackness; and to keep the fluids of gas warfare liquid until they can be vaporized at the moment of use. This profound manipulation of how long things last led to the discovery that vitamin E and many plant-derived substances are antioxidants; but so are many synthetic chemicals. During World War II,

the exigencies of making synthetic rubber, and keeping fuel and food chains flowing, redoubled research into antioxidants, leading to the now ubiquitously used BHT and BHA. These petroleum derivatives showed the highly desirable characteristics of “carry-through” – not only would they keep the lard fresh on the way to the factory, but they would keep the crackers made with the lard fresh as they travelled the railways and shelves of the new lifespans of modern commodities. Another key use of the antioxidant just postwar was the preservation of animal fats used in animal feed – cheap tallow and grease from rendering could now be added to mass-produced chicken feed, for example, which before had been impractical because it all went rancid too quickly. This completely reordered the way fats flow through society.

In short, antioxidants are key technologies of duration in modernity.

Two. Shift work.

In November, I turned to shift work. This may seem totally unconnected, but antioxidants and shift work are linked by a photograph I found in the 1953 issue of *Fortune* magazine, in a photo essay titled “Chicago Industry at Night.” It shows workers at the National Biscuit Co., laboring through the night to produce packaged crackers and cookies, which were quickly becoming the staple of the snack culture that America has since spread throughout the world. Over the course of the twentieth century, profoundly accelerated by World War II, the rise of continuous-process manufacturing in chemicals and food commodities such as high-fructose corn syrup significantly changed workplaces in the United States and Europe, and to a certain extent globally. The time a chemical process takes from beginning to end, such as the polymerization processes for making synthetic textiles, was rarely the length of a day shift. The machinery was expensive and the processes were difficult to start up and shut down, so the solution was to run them continuously.

As shift work began to occupy a larger proportion of the workforce, the epidemiological links between shift work and illnesses such as atherosclerosis and diabetes began to be made in the context of rising concern about chronic illnesses in industrialized nations. From this has come an entire realm of biomedical research on the relationship between circadian rhythms and metabolic health – indeed, the shift worker has served as a kind of model organism for the long-term physiological effects of night work. One does not have to suppose that the shift workers were eating the high-fructose corn syrup and crackers to understand that the entire biochemical milieu of human life – including its rhythmicity – is shifted by these developments in manufacturing and the temporality of chemistry.

Three. Compartmentalization.

January becomes February as 2022 unfolds. Everyone says it is dark and depressing but I don't notice. In retrospect I probably should have given my kids vitamin D supplements, as their delicate Californian constitutions were apparently in shock from prolonged darkness. But I was too busy thinking. There is a tendency these days in critical and cultural theory to celebrate things that break down boundaries or binaries and to reify flow as superior to stasis or structure. There is a rather uninterrogated admiration of entanglement, as if to be entangled or to realize that things are entangled is morally superior to being separate or to hew to categories. But many of the examples I thought about this year showed the importance of organization in time and space, what researchers working on issues such as the human microbiome and health often refer to as *compartmentalization*. The human gut is a great example of the importance of compartmentalization. The symbiotic microbes that live in the gut and are essential to human health live in a thick mucus layer at the surface of the epithelium lining the intestine and colon. The mucus is nutritious for these microbes; they in turn digest complex carbohydrates and synthesize vitamins, metabolic processes that human cells are not equipped for. In short, human cells feed the microbes that feed human cells. But the way that they are organized in the space and time of the gut is essential to this relationship – the microbes are kept very close, but not *in*, the host's tissues. The relationship between host and symbiont actually maintains the boundary between them.

Many things can degrade the integrity of this dynamic boundedness. Many of the emulsifiers, detergents, colors, preservatives, and agricultural pesticides and herbicides that structure human food ways today are damaging to the integrity of the mucosal boundary, leading to inflammation and a decrease in the tightness of the junctions between the epithelial cells lining the gut, a condition colloquially known as leaky gut. Disruptions in the sleep-wake cycle, such as in shift work, can also lead to a breakdown in the organization of the mucosal boundary at the gut wall. Compartmentalization can also be temporal, in that some reactions happen at night and others during the day – the microbiome also sleeps and wakes. It is a little hard to tease out the cause-and-effect relationships, but leaky gut is linked to obesity, liver disease, diabetes, and their accompanying chronic inflammatory states. In short, it is important to stay organized. The chronicity of industrial life is being explored in biomedical science today as a dis-ordering force. Resilient boundedness is a hallmark of health.

Four. Covid and the Underlying Condition.

March, onward. How could one *not* think about Covid this year? From the very outset of the pandemic in China, and echoed and confirmed in populations in Europe, the United Kingdom, India, Brazil, and North America, the disproportionate impact of the virus in individuals with so-called *underlying* metabolic conditions such as diabetes and hypertension has been clear. Epidemiology and modeling have shown that diabetes, obesity, hypertension, and heart failure were the conditions that made the difference between hospitalization and death and a milder disease course with SARS-Cov-2. If these conditions were not so prevalent – and fundamental parameters such as blood sugar were not so clearly stratified by race and class – the individual and community suffering of so many people in the hospital all at once would not at all resemble what has in fact unfolded. Many scientists were referring to this as the collision of two epidemics – one chronic and one infectious. In the meeting of the acute and the chronic, the underlying condition is foregrounded and made differently urgent because of its role as the enabling ecology for acute illness.

What *is* an underlying condition? Why at this particular historical juncture has a novel virus intersected with a landscape of high blood sugar and blunted immune responses? It is an open question whether the human condition *has* or *is* an underlying condition; but it is this human condition that SARS-CoV-2 explores. The anthropogenically contoured living surface – if we imagine the population’s lungs as a fairly continuous surface from an airborne viral point of view – is as much a part of the event that is the Covid-19 pandemic as any origin point of this or that virus among millions of viruses. Metabolism today does not reflect the workings of a nature underlying human life, but is nature after industrialization, which is its own historically specific formation. See antioxidants, shift work, emulsifiers, etc. above. This is the historical-metabolic body of Covid.

Five. Intellectual friendship.

June. I have a robust schematic in my head of the Fellows at Wiko in 2021/2022 that sorts fairly clearly into those people who asked questions and those who did not ask questions. I don’t mean ask questions in colloquium, but in conversation. Then there is a second-tier sorting: those people who ask questions about work and thought, in a manner that suggests that *they actually want to know*, and to tell you, similarly, what they have been thinking about. A few people were willing to really get into ideas or research problems or things they’d read recently. These few have become friends for life. Even one such new

bond would be more than a person could hope for in a year, really, and I feel a universe of gratitude for such gain.

July and the loop of a year. When you walk the streets and forest paths around Wiko, you frequently end up on the same street you turned off of earlier. Just at a different point.