Life after chemistry or a carbon anthropology

Life After Chemistry or A Carbon Anthropology (http://somatosphere.net/forumpost/life-after-chemistry-or-a-carbon-anthropology/)

Science, Medicine, and Anthropology

A collaborative website covering the intersections of medical anthropology, science and technology studies, cultural psychiatry, psychology and bioethics.

By Jamie Cross (http://somatosphere.net/author/jamiecross/)

Carbon: a chemical element, C, fifteenth most abundant element in the earth's crust, fourth most abundant element in the universe, second most abundant element in the human body, the key element for all known human and non-human life on earth.

What might persuade you that anthropology should discard the distinction between life and non-life if not carbon?

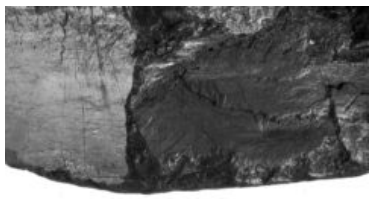


Image Credit/The Guardian 2015

415 Parts Per Million and Beyond

The most pressing political, scientific and public debates about the reproduction of human, animal and plant life on earth today are, fundamentally, about our relationship with carbon. They are about our relationship to carbon bound to hydrogen in the earth as hydrocarbons, or fossil fuels; and about our relationship to carbon bound to oxygen in the air as carbon dioxide.

Concentrations of carbon dioxide in the atmosphere have become a 'universal measure of planetary environmental health' (Clark 2011, 114). Yet, while carbon is necessary for all known forms of life, the chemical relationships that have been made possible by taking carbon out of the ground through industrial extraction and processing are depleting life.

In 2015, *The Guardian* newspaper launched an international climate change campaign, called *Keep It In The Ground* (https://www.theguardian.com/environment/ng-interactive/2015/mar/16/keep-it-in-the-ground-guardian-climate-change-campaign?CMP=ema-61).

"You do not need much of a grasp of maths to work out the implications," then-editor Alan Rusbridger wrote, introducing *The Guardian's* position. "There are trillions of dollars' worth of fossil fuels currently underground which, for our safety, simply cannot be extracted and burned. All else is up for debate: that much is not."

The campaign aimed to persuade governments and corporations to stop digging up known reserves of coal, gas and oil in order to limit the concentration of carbon dioxide in the earth's atmosphere to 500 parts per million and prevent a global rise in temperature beyond 2 degrees centigrade by the end of the 21st century.

Four years later, on May 11th, 2019, an observatory in Hawaii recorded (https://www.theguardian.pe.ca/news/world/the-level-of-carbon-dioxide-on-earth-is-highest-its-ever-been-since-the-existence-of-mankind-311081/) the highest concentration of carbon dioxide in the earth's atmosphere in human history: over 415 parts per million. By the time you read this, that record is likely to have been broken.

A Carbon Anthropology

Given this and other similarly alarming observations, what does climate change demand of anthropology? In recent years, anthropologists have answered this question (Whitington 2016a) by following carbon.

Some have responded by following hydrocarbons, tracing the lifeblood of modern carbon economies and societies through the infrastructures and ethics of fossil fuel extraction, transportation and consumption (e.g. Behrends 2011; Appel 2012; 2015). Others have responded by following the social life of carbon, tracking its production as an object of value and valuation, something that can be quantified, priced and traded, as in schemes to offset carbon emissions (e.g. Gunel 2016, Whitington 2016b).

But what if we follow carbon as organic chemists do? What if we follow the movement of carbon as it is absorbed and ingested, recycled and reused by living organisms?

In organic chemistry, the carbon cycle erases the distinction between life and non-life. If dead matter comes alive in taxidermy, as Petra Tjitske Kalshoven argues in her contribution to this forum, we might say that dead matter is always alive in the carbon cycle.

As the literary scholar and chemist Philip Ball (2004) explains:

"Carbon is constantly taken in by living organisms. Plants pluck it from the air and fix it in their tissues by photosynthesis. Animals consume the carbon compounds of plants and other animals. The flux of carbon through living bodies means that they maintain a more or less constant level of radiocarbon" (155).

For scholars writing across anthropology, the social sciences and humanities, the carbon cycle demands that we address our "inescapable, non-reckonable, and irrecompensable debt to other entities" (Clark 2010). As Nigel Clark and Myra Hird (2014) write:

"Every extant being on this planet belongs to an unbroken chain of bodies that wends its way through time, from one birthing or fission to another, all the way back to the emergence of life from non-living matter" (44).

Just as carbon binds to oxygen or hydrogen in air and water, in the carbon cycle, dead matter binds to life in blood and bone, in soil and skin, in every exchange, across all time. In this sense, we might say, all organic dead matter is both "a sign of the form of life to which it once belonged" (Reno 2014) as well as a sign of the potentiality of life to come.

So how might we tell these stories of carbon in anthropology?

Science-fiction writing has long provided inspiration for post-human and multi-species anthropology (e.g. Swanson, Bubant and Tsing 2015). However, I propose that inspiration for a carbon anthropology might also come from works of biographical and autobiographical writing about chemistry. Two

classic books, in particular, lay the groundwork for an anthropology of carbon that erases the distinction between life and non-life by following carbon into and through living bodies.

Life in The Periodic Table

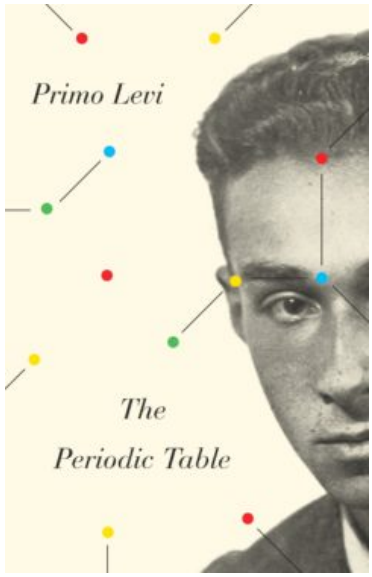


Image Credit /The Everyman Library 1995

Italian chemist, Auschwitz survivor and writer Primo Levi ends his book, *The Periodic Table* (https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=2ahUKEwjMl-D-k6ziAhXQTxUIHbkKBH0QFjABegQIABAB&url=https%3A%2F%2Fen.wikipedia.org%2Fwiki%2FThe_Periodic_Table_(short_st (1975), with a short story called, simply, "Carbon." The text operates simultaneously as the biography of an elementary particle of carbon, a history of the author's family, and a story of the author's self-discovery and salvation through chemistry. Here, chemistry provides the author with a rational perspective on the cosmos that shows one life connected to another, to all life, and to the very matter from which life itself is derived (Woolf 2016; Magavern 2009).

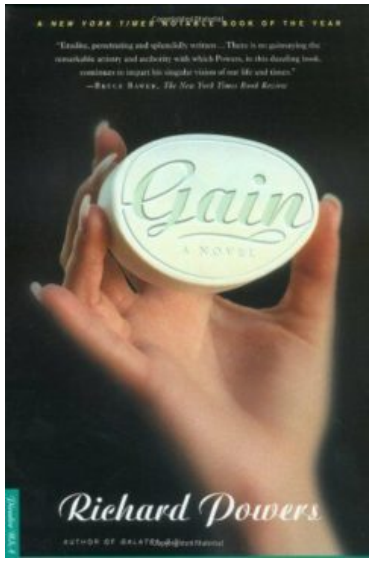
Levi's story begins with a particle of carbon lying still on a rock edge "for hundreds of millions of years, bound to three atoms of oxygen and one of calcium, in the form of limestone." (page number) One day, in 1840, the carbon particle is detached by a blow from a pickaxe, thrown into a lime kiln, and plunged "into the world of things that change" (page number). Just as all that is solid turns into air, the roasting carbon is separated from the atom of calcium and rises, clinging to the atoms of oxygen.

"It is caught by the wind...it is breathed in by a falcon...it dissolves three times in the water of the sea...rises three times into the air...and is carried over forests, deserts and ice....before brushing against a leaf and, nailed there by the sun, enters the leaf, where bound again to oxygen and nitrogen...it forms a molecule of sugar, travels at the pace of vegetal juices through the stem and into a ripening bunch of grapes...which picked become wine...and when consumed...sits in his father's liver for a week, until a sudden flurry of activity when the man runs after a horse that has bolted. The carbon is oxidised, dragged by the bloodstream to a muscle in the thigh, split into two molecules of lactic acid, re-oxidised, and exhaled as his father pants for breath, and returns to the atmosphere as carbon dioxide...."(190-192)

Four pages later, the particle of carbon is in a glass of milk, being swallowed by the author. Then it is in his bloodstream, in a nerve cell, in his brain, "guiding this hand of mine," Levi writes, "to impress on the paper, 'this dot, here, this one'" (195). "Such is life," he concludes, "though rarely is it described in this manner" (193).

The task confronting a biographer of carbon is infinite, Levi writes: “I could recount an endless number of stories about carbon atoms, stories about carbon atoms becoming colours or scents, plants or fish or the human seed from which each of us is born” (194). Stories, he might have continued, about the carbon atoms that lie buried in the earth, in combustible geologic deposits of coal, oil, and natural gas; formed as decaying organic matter, as plants and animals are exposed to heat and pressure in the earth’s crust over hundreds of millions of years; stories that link a single particle of carbon to 19th century struggles for rights and entitlements by people employed to extract, transport and process fossil fuels; or to desires for cleaning and beauty products, like soap.

Life Is Chemistry



“Gain, Richard Powers” Image Credit/Dewey 1999

In *Gain* (https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=4&ved=2ahUKEwjQlbKJlKziAhULUBUIHVPNCP4QFjADegQIABAB&url=https%3A (1998), the American novelist Richard Powers takes Levi’s invitation seriously and pursues stories of carbon in our life with pharmaceuticals, examining its place in life, chemistry and capitalism through the biographies of a soap company and a woman with cancer.

Gain tells the story Clare International and Laura Bodey. Clare is a tiny family enterprise making candles and soap in America’s 19th century Spermaceti boom, before the acquisition of contraband plant material from the South Pacific allows it to get ahead of its competitors and become a global multinational making domestic products, disinfectants and bleach, foods and fertilisers. Laura is a real estate agent who moves to the small town that springs up around Clare’s industrial headquarters and who, late in middle age, when she is married with two children, is diagnosed with a terminal cancer.

At the heart of the novel is the ubiquitous and ambivalent way that organic and industrial chemistry have come to constitute modern life; matters of increasing interest for anthropology (Shapiro 2015, Khalikova 2016). As Ball (2007) has written, the reader is never clear whether terminal illness is definitively connected to the manufacture of soap or to the settling of carcinogens in the soil where Laura weeds her garden, nor are they clear whether Laura’s pursuit of legal action is driven by moral outrage or a culture of compensation. Either way, in the late stages of cancer, Laura concludes that establishing culpability would make little difference because co-existing with chemical products is how she and others like her have chosen to live. Life after chemistry is more synthetic and more manufactured, Laura concludes, but it is also much easier; maybe even better. Or, as Clare’s marketing department puts it:

"Life without chemistry would look a lot like no life at all...Chemical processes are not the problem. They're the rules of the game. It's elementary: your life is chemistry" (Powers 2001: 153, in Ball 2007: 113).

Ingesting Carbon in Ethnographies of Work and Energy

For literary scholars, *The Periodic Table* and *Gain* share a "material aesthetic, a delight in the textures and responsiveness of the substances and fabrics that make up our lives"(Ball 2007: 65). We could also say that both works share a 'carbon aesthetic': a fascination with the organic elements and compounds that become part of manufactured substances and fabrics, and which are always bound to human life and sociality, whether dead or alive. Both Levi and Powers share not only the provocative ability to "discern the vitality of matter" (Bennett 2009:119) but also a willingness to challenge the boundaries between dead and living matter. What kind of purchase does this carbon aesthetic offer anthropology?

If advances in genetics and biotechnology have made the 'margins' between life and death "mobile and multiple," "open to dispute and reformulation" and any clear boundary between life and non-life difficult to maintain (Lock 2002: 11), *so too* have advances in industry and chemistry. If our ability to replace a vital organ function like breathing with a mechanical ventilator or our ability to extract eggs and seed from the human body for freezing has blurred the boundary between life and non-life, perhaps even "re-articulated the truth of life itself" (Vermeulen et al 201: 204), *so too* has our ability to intervene in the carbon cycle. As we penetrate the earth's surface, transforming geological strata into a "subservient underground for the extraction of hydrocarbons'"(Yusoff 2017); and as we grind, process, refine, and burn fossil fuels, we are tinkering with the movement of carbon into and out of living bodies; we are transforming the elemental grounds not only of social, political and economic relationships but, also, perhaps, life itself.

Let me offer two examples from my own ethnographic research in contemporary India. Both examples centre on the ingestion of fine particulate matter derived from carbon-based organic compounds. In both examples, I propose, following carbon into and through the human body offers new traction for engaging with the politics of labour, everyday sociality, fossil economies and capitalism.

Diamond Work

"Diamond Work" Image
Credit/Jamie Cross 2005

First, take diamond: carbon in its hardest form.

Approximately 80 per cent of the world's consumer diamonds are cut and polished in India. Fifteen years ago, I spent twelve months learning to cut and polish diamonds at an offshore subcontracting unit for the global gemstone industry in the South Indian state of Andhra Pradesh (Cross 2012a, 2014). As I learned, struggles over working conditions and social reproduction here were not only sparked by low wages. They were also generated by uncertainties and ambiguities regarding what exactly the effects of grinding

diamond in a poorly ventilated workspace might be for the human body; specifically, the effects on of inhaling particles of diamond on lungs, the chest, the throat (Cross 2010).

Being alive and staying alive in this factory was about nothing if not an intimate, everyday relationship to diamond dust, and about the relationship between the human body and carbon as it bonded with the silica in diamond cutting machines and wheels.

Black Carbon Economies

"Everyday Kerosene" Image
Credit/Jamie Cross 2012

Next, take kerosene: carbon in the form of a refined petroleum product or fossil fuel.

Since 2012 I have been conducting ethnographic fieldwork in the highlands of southern Odisha, Eastern India, as part of a project to understand the material politics of energy in places of chronic energy poverty. For much of the past century, life off the grid in India has been life lived with kerosene. An estimated 380 million people across the country continue to use kerosene-fuelled lamps as a *primary* source of lighting at night. Kerosene lamps are part of the fabric of homes and relationships. In *Adivasi* hamlets in Odisha, purpose-built alcoves built into the walls of mud brick homes reveal how kerosene has shaped notions of domestic comfort and homeliness. Meanwhile, the circulation and exchange of kerosene is deeply implicated in forms of village sociality; indeed, it has been a companion and collaborator of the social and symbolic caste-based politics that define village life. Petty exchanges of kerosene nourish and maintain relationships between households. At the same time, control over the distribution of state-subsidised kerosene sustains the vice-like grip o high caste dairy farmers over Dalits and Adivasis, who comprise the region's majority population (Cross 2016, 2019). Today, however, kerosene is being displaced.

Over the past decade, public health researchers have shown a correlation between the ingestion of 'black carbon' (produced by burning kerosene in confined spaces) with high levels of chronic obstructive pulmonary disease, lung cancer and tuberculosis amongst some of India's poorest populations (Lam et al 2012). Their data has driven new flows of investment into poor markets for clean energy; catalysing a generation of social entrepreneurs who aim to reduce emissions of black carbon by displacing kerosene-fuelled lamps with ultra-affordable, solar powered alternatives (Cross 2018, 2019). The relationship between dead matter and human life is proving good for business: India is now the single largest global market for solar powered lanterns and analysts expect revenues of $US105 million in 2018 to double or triple by 2023. Yet whilst the solar lantern brings black carbon into the light, it throws other petrochemical residues into the shadow. Few solar lantern companies are interested in confronting what happens when their clean, green, mass manufactured, consumer electronic devices reach the end of their product life; when their batteries degrade, their electronic circuitry fails, and their brightly colored, polyethylene plastic casings are discarded (Cross and Murray 2018).

Carbon, Carbon Everywhere

Around the world, anthropologists are working to adapt the discipline to a low carbon or post-carbon economy. For many the focus has been on a professional habit: air travel. From the organization of virtual gatherings, calls for conference boycotts and acts of individual refusal, anthropologists have been working to minimize their carbon footprints by changing their reducing unnecessary international air travel.

Yet, as an ethnographic object – commodity, element or signifier – carbon continues to be made conspicuous by its absence at professional gatherings of anthropologists. Search the online annals of the UK Association for Social Anthropologists, for example, and carbon gets only a handful of hits. Why might that be? Why does our relationship to carbon and the carbon cycle continue to attract such little attention as a matter for ethnographic enquiry?

Perhaps, as Kim Fortun (2014) might have it, the problem is 'constitutional' (317). In an analysis of the Modes of Existence – an online writing project launched by Bruno Latour that invited contributors to examine what we mean by modernization – Fortun noted the total absence of carbon, in the form of petrochemicals and industrial pollution. The problem, Fortun argued, was not a failure of comprehensiveness. Rather it was a failure of habit: the absence of carbon as a cumulative effect of our habits of relation, mind, and politics; habits that "make it difficult to see the conditions of our times" (Fortun 2014, p325).

Seeing the conditions of our times today demands that we change our intellectual habits as well as our professional habits. It means abandoning all anthropology that resembles what Primo Levi once called the "cumbersome, slow and ponderous" work of taxonomic classification and embracing what he called the "refined, minute, and quick-witted organic chemistry" (Levi 1984: 190). It means attending to the chemistry around us as carbon binds with oxygen, hydrogen and nitrogen; entering, animating, composing and degrading all that is human, animal, vegetable, mineral.

It means dispensing with the distinction between life and non-life to see carbon everywhere.

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Jamie Cross (http://www.sps.ed.ac.uk/staff/social_anthropology/cross_jamie) is a Senior Lecturer in Social Anthropology at the University of Edinburgh, where he currently holds grants from the UK's Engineering and Physical Sciences Research Council and the UK's Economic and Social Research Council to study

the techno-politics of off grid solar power in South Asia and Sub Saharan Africa. Earlier research examined the politics of work and labour around India's large-scale export manufacturing zones and he is the author of Dream Zones: Anticipating Capitalism and Development in India (https://www.press.uchicago.edu/ucp/books/book/distributed/D/bo21611124.html).

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