



## Supplement

### An Ethnoecology for the Anthropocene: How A Former Brown-Coal Mine in Denmark Shows Us the Feral Dynamics of Post-Industrial Ruin

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This special section is a field-guide-in-process; in this online supplement, we expand upon the hardcopy introduction to offer further nuances of our approach to more fully describe how papers in this special section are integrated. We gathered our team as a part of an experiment: might a common commitment to careful field observation allow social scientists and natural scientists to work together to study the still-emerging histories of Anthropocene landscapes? If the Anthropocene is that time in which nature and culture can no longer be studied independently (Latour 2017), we will need new forms of collaboration across this disciplinary divide. While there is no dearth of calls for cross-disciplinary collaboration to understand the Anthropocene (Brondizio et al. 2016; Castree et al. 2014; Harden et al. 2014; Pálsson et al. 2013), the question of how such collaboration might fruitfully be undertaken in concrete research practice remains up for grabs. The challenge our team chose has been to retain both a rigorous empirical orientation and an analytic attention to the predicaments and critical problems of culture, power, and history (Castree 2014; Szabó 2015). In contrast to “divide-and-juxtapose” interdisciplinarity (e.g., Harden et al. 2014), we want natural science’s curiosity about the world *and* the power of critical social theory simultaneously. For the study of the Anthropocene, we need to watch landscapes in motion and in empirical detail. It takes combined attention to both multi-species interactions and critical history

to follow the contingent developments we call feral dynamics. Anthropocene landscapes emerge from cascades of more-than-human action and reaction; such cascades shape both what players enter the scene and how they interact. It is from the perspective of this dilemma that our team has attempted to build a different bridge across the natural-vs-human science rift: we focus on *critical description* of field-based observations (Tsing 2013; Tsing, Swanson, Gan and Bubandt 2017). This special section seeks to apply this approach to a regionally situated landscape. It provides an entry into a “patchy Anthropocene” (Bubandt, Matthews and Tsing, *forthc.*) by tracing the historical ecology of a particular political multispecies landscape, namely that northern Europe. This is a landscape in which the unintended ecological consequences of modern projects of progress—the double process of human management and more-than-human excess for which our term “feral dynamics” is a short-hand—loom large.

#### **The Great Acceleration Viewed from Søby**

In 1942, at the height of the Second World War and following the coldest winter in twentieth-century European history, the train station of Fæstervang, a small and unremarkable village in the center of Jutland, became the busiest in occupied Denmark, handling almost twice the tonnage of the train station in Copenhagen, the capital (Svendsen 2010:151). This dramatic acceleration, in local terms, marked a larger shift to a new resource in war-time Denmark:

brown coal, a lowly fuel with poor heat content, a strong sulphuric odor, and a proclivity to self-combust. Fasterholt was the transport hub of the Søby brown coal mining district (Søby Brunkulslejer), developed to serve domestic energy needs after Denmark was invaded by German forces in 1940 and the import of coal from Great Britain was cut off. Up to 3500 workers, mostly men, dug trenches to depths of seven meters or more in the sandy Søby soil to access the brown coal deposits. At the height of production in the first five months of 1942, 50,000 train carriages with brown coal left the Fasterholt station in the direction of the nearby towns of Herning and Brande to eventually feed the furnaces of factories and electricity plants in bigger cities (Svendsen 2010:143). Between 1940 and 1954, seven million tons of brown coal were shipped out of Søby, a third of the national production of brown coal for the period (Svendsen 2010:134).

The Søby area, housing the laborers and their families in temporary barracks, has since become a national icon of Danish war-time history. The brown coal museum that opened on the former excavation site in 1977 tells the particular story of wartime hardship of this brown coal mine: Of the dangerous mining work that killed 79 people and injured over 400, of the fortunes made by local entrepreneurs and the fortunes lost by miners in gambling, and of local Nazis, as well as of members of the Danish resistance, in hiding here. It is the story of a “weedy” cultural landscape of venture capitalists and manual laborers, gamblers and outlaws co-inhabiting what locals still today describe as a Danish “Klondike” (Duedahl 1943). This wild sociocultural landscape was, ironically, to a large extent enabled by the emergent Danish welfare state. Brown coal was, for the Danish government, part of a delicate political gamble of cooperation, but not collaboration, with Nazi Germany, a balancing act engineered by the pacifist policies of Eric

Scavenius, who was Secretary of State from 1940 until he was elected Prime Minister in 1942 (Lidegaard 2005). Brown coal was a source of energy for a nation deprived of outside fossil fuels, a source of employment amidst skyrocketing unemployment and potential social unrest, and a bargaining chip to limit the number of Danish laborers who were sent to work in Nazi Germany or put to work on German construction sites in occupied Denmark. The procurement of domestic fossil fuels had the potential to allay all these political concerns at once. So, between 1940 and 1945, an estimated 50,000 people were employed in the extraction of brown coal and peat, keeping workers relatively content, at home, and employed, while contributing to a drop in the unemployment rate in the summer months over this period from around 16 to 4 percent (Svendsen 2010:43). The wild brown coal “adventure” of the Søby Klondike was directly facilitated by the state: all laborers in brown coal and peat excavation site had to be approved by and assigned through the Danish Ministry of Employment, which also produced and transported mobile homes to Søby; contractors were licensed by the Ministry of Agriculture under the “Brown Coal Law of 1940” (Svendsen 2010:124); and brown coal sites were monitored by the state Brown Coal Surveillance Board (Brunkulstilsynet). The head of this board was Holger Flensburg, who was also head of the Danish National Railroads (DSB) (Svendsen 2010:135). It was the Danish National Railroad system, expanded into the brown coal bearing regions during the war years, that accommodated the corporate enterprise of brown coal mining, allowing private fortunes to be made. Among the celebrated rags-to-riches examples of this state-sanctioned Klondike is that of Per Aarsleff. On the basis of a hydraulic excavator that he acquired in 1947 and contracted out in Søby, Per Aarsleff established what is today Denmark’s largest construction company,

Per Aarsleff A/S, with an annual turnover of 10 billion Danish kroner (1.4 billion US dollars). Ejnar Hessel is another example. He worked as a truck driver in Søby until an accident cost him his arm (Svensen 2010:154). He then took to importing used trucks from Sweden and went on to found the largest car dealership in the country. Weedy entrepreneurship, under the watchful eye of the state, provided capital for the post-war economic boom across many sectors.

Søby war stories open an important point for this special section: disciplined governance plans and wild excesses develop in dialogue. Industrial modernity offers the most radically simplified, intensively controlled ecologies humans have ever attempted—and yet it also sponsors the most unpredictable and out-of-control feral dynamics of human history. There is a *complicity* here between human-generated order and ecological disorder. In their paper about human-microbial relations at the Søby dump, Hoag et al. (this issue) use the term “undomestication” to describe this process of unintentionality whereby attempts at infrastructural control enable weedy and unmanaged assemblages. Like the system of human-made pipes in the Søby landfill designed to capture the methane of an unmanaged bacterial assemblage (see Hoag et al.), the state system of

laws, tracks, and roads established in the 1940s was the infrastructure through which new feral dynamics were enabled. When brown coal became a resource, it created the conditions for a weedy social world of Søby that was beyond the control of state designs, but that still played a role in kick-starting a Danish version of a fossil-fueled Great Acceleration after the Second World War.

It is these weedy ecologies of humans and nonhumans, shaped by yet exceeding the designs of human industriousness, that drew our attention to Søby. For the weedy landscape of war-time brown coal mining became the scene for a multispecies assemblage of feral dynamics that have in turn reshaped the landscape multiple times over. This special section is a contribution to the burgeoning literature that seeks to understand how “emergent ecologies” of more-than-human wilderness are produced in the post-industrial scarred landscapes of the Anthropocene (Kirksey 2015; Lorimer 2015)—one that seeks to trace the unintentionality of these ecologies as a feral effect of their multispecies, weedy historicities. This means seeing the historical ecology of such landscapes as histories of modern order and human classification, but also of more-than-human excess. Ferality is for us a dynamic of the contemporary world, to be traced empirically, rather than a

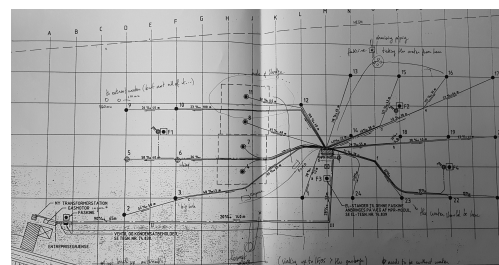
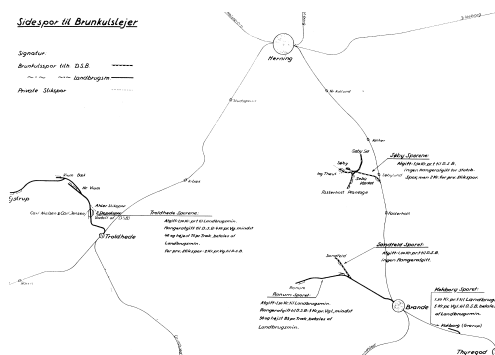


Figure 1. Cartographies of undomestication. Left: Railroad tracks in the Søby brown coal Klondyke, 1943. From Svendsen (2010), used with permission of the author. Right: Methane pipes in the Søby landfill, 2017. Map from AFLD FASTERHOLT, used with permission.

commitment one pursues politically (cf., Monbiot 2014). The feral dynamics of the socially and ecologically weedy landscapes of Søby are thus intimately involved in the high modernist designs that they also exceed (cf., Scott 1998). To trace them, we combine the descriptive tools of ethnography and ecology, of social as well as natural history. This method locates ecological changes within an overlapping set of complicities between modernist projects and unplanned exuberance. In our efforts to understand modernity, we must learn to forget the modern inattention to nonhuman agency (see also Latour 2013). This also implies uncovering from the history of modern progress the denied and ignored multispecies relationships that have co-shaped it.

### Succession as a Social Process

Human and nonhuman histories are everywhere entangled; in a post-industrial landscape such as Søby this is particularly evident. The regrowth of vegetation and the resurgence of wildlife that happened in this area after the 1970s cannot be understood without considering the continuing history of human disturbance, including that of brown coal mining. Conversely, as the contributions to this special section highlight, nonhuman

histories of disturbance also re-shape human actions. Continual relational becoming is too often ignored in ecological literature on human disturbance, which simplifies human impact as discrete events in order to maintain useful but ahistorical frameworks of ecological analysis. Thus, while we draw on the literature on novel ecosystems (e.g., Higgs 2017; Seastedt et al. 2008), we bring to it a historical perspective in which both humans and nonhumans continuously produce new landscape effects. This special section recounts succession histories that become evident across its papers to argue for a landscape-history perspective in which contingent events and encounters shape shifting modes of human-nonhuman interaction.

At Søby, it would be disingenuous to begin an account of anthropogenic landscape effects with mining, as the effects of human presence have radically reshaped vegetation there since the Mesolithic formation of Jutland's heath. However, our special section begins in the mid-nineteenth century, when the forms of industrial modernity that most directly shape contemporary feral dynamics come into play. Brichet and Hastrup (this issue) take us into this earlier moment of landscape re-formation, as it inspires the resource ontologies that have continued into the present. These, in turn, cannot be tracked without the historical specificity of the Danish situation involving the formation of a distinctive brand of resource modernity that followed a different war. In 1864, Denmark suffered a devastating defeat to Prussian forces at Dybbøl and thereby lost both the Second Schleswig War and the three duchies of Schleswig, Holstein, and Lauenborg in the southern part of Jutland that, until then, had been affiliated with the Danish crown.

The loss of 30 percent of its population and almost 40 percent of its land area, much of it fertile agricultural fields, was a shock for the emergent Danish nation that had turned from an absolutist kingdom into a constitutional monarchy only 15 years earlier. It



Figure 2. Map of Søby. Drawn by Louise Hilmar, Moesgaard Museum cartography.



Figure 3: Denmark and the lost territories. Map drawn by Louise Hilmar, Moesgaard Museum cartography.

changed the self-image and political visions of the country from those of a colonial power into those of a small nation. Giving up an imagined parity with the colonial powers of England, France, and the German Confederation meant that the Danish nationstate had to reinvent itself. Instead of pursuing a dream of global colonial power, following the 1864 defeat Denmark embarked on a process of internal colonization of Jutland, promoted in particular by the Heath Society, a private association of modernist visionaries established in 1866 (Olwig 1984). Theirs was a project of industriousness that, through irrigation, fertilization, and cultivation, sought to turn the sandy soils of Jutland into a resource and redirect the economic orientation of Jutland, which, until then, had faced the now-German duchies in the south, toward Copenhagen, the capital of the new democratic Danish nation in the east (Frandsen 1996). Industry, in the double sense of carbon-fuel production and hard work driven by a Protestant ethic, was to be the backbone of this reimagined Danish nation. Rural agriculture and urban productivity were to be united. In this new logic, Jutland became a focus for building national productivity (that is, a resource) in a trajectory that has continued into the present.

The efforts of the Heath Society to fertilize the heathland and transform it into managed agriculture and forest plantations went hand in hand with the emerging modernism of the agricultural coop movement, established in 1882, which laid the cultural, political, and economic foundations for the modern Danish nation (Lidegaard 2009:39). This transformation was, one might say, Denmark's entry into that anthropogenic era of carbon-fueled industry, liberal capitalism, and modern simplification schemes of the late nineteenth century that some mark as the beginning of the Anthropocene (see Crutzen 2002). The transformation of the heath was the first of a series of modernist schemes in which natural resources are not given units, but rather results of shifting industrious projects in Danish history, as both Brichet and Hastrup (this issue) and Hoag et al. (this issue) demonstrate.

Brown coal digging in Søby, which escalated during the 1940s, continued until 1970, increasingly substituting manual labor with machinery. As Højrup and Swanson (this issue) trace in their contribution the excavation of brown coal layers down to a depth of 35 meters disturbed and fundamentally altered the geology of the landscape. As layers of sand and soil were mixed with groundwater, human industry scrambled the geological sediment layers and turned the geology of the landscape into an active agent, remaking society and ecology. There was no way to unscramble the geological layers from each other. Some commentators have described the Anthropocene in just this way, as that period when "human history intersected decisively with geological time" (Morton 2013a:37; see also Chakrabarty 2009). As Raymond Williams (1980:83) puts it: "We have mixed our labour with the earth, our forces with its forces too deeply to be able to draw back and separate either out." This "bioturbation", the mixing of layers that is happening of a global scale in the Anthropocene (Zalasiewicz et al 2014), has

important historical consequences. In Søby, brown coal excavation brought geology irrevocably to life. This lively instability of sand and water are our special issue's first example of feral dynamics.

As the contributions to this special section go on to demonstrate, the instability of sand and water, in turn, shaped histories of flora and fauna. Mechanical equipment risked sinking into the sand; post-war development schemes were variously frustrated, delayed, or ruled out. Following a 1958 law requiring mining operations to cofinance a state-supported revegetation fund (Svendsen 2010: 210), botanical experiments with both broadleaf and coniferous trees were carried out. Many of the planted trees grew; only a few kinds flourished, sending seedlings into the mining spoil. At one point, land managers thought the sand tips left by mining would remain bare if they were not planted, but, over time, exotic conifers spread into them, creating ecologically simplified woodlands. Gan and Tsing's paper (this issue) explores how some trees, such as lodgepole (*Pinus contorta*), developed weedy characteristics, even as other species died out. Interactions with fungi and brown coal fragments in the sand, they argue, encouraged the spread of some species more than others.

The spread of trees shaped the possibilities for animals; animals, in turn, allowed some trees, but not others, to succeed. Most dramatically for human land managers, red deer (*Cervus elaphus*) spread into Søby once tree cover was available, opening a new frontier economy of game hunting. Red deer are native to Denmark, but free-roaming deer were gone by the eighteenth century, leaving only those in deer parks. In a process of undomestication, escapees trickled into the countryside, gathering in unmanaged places; hunters shot their first red deer at Søby in 2002. Forsmann and Root-Bernstein's contribution (this issue) traces the landscape practices of both humans and

red deer in this novel ecological economy, arguing that the Søby landscape of lodgepoles, red deer, and hunters constitutes a doubly inverted Panopticon, where hunters tinker with the forest to create a landscape where red deer are encouraged to behave as they would if they do not feel they are being observed, but where hunters behave as if they are always observed by the deer. Meanwhile, the hunting economy allowed lodgepole to continue spreading, which in turn encouraged red deer.

Distrust in the area's potential for ordinary development encouraged "waste" and "dirty" industries. An aluminum galvanizing factory was placed on the former mining fields, as was a landfill. After 1979, the latter began to receive household waste from much of the central Jutland area. As Hoag et al. (this issue) show in their paper, "waste" resources are produced in bio-political assemblages; humans may even come to rely on unsolicited and often unnoticed collaboration with other species that flourish in the waste. The landfill encouraged methanogenic bacteria; after European Union directives required methane use from landfills, managers at Søby began to work with those bacteria to produce new resources for humans. Hoag et al. (this issue) introduce the notion of "marginal gains" to show how humans and other species build off the unpredictable gifts of each other's presence—even in non-ideal situations. In the landfill's drainage area, nitrogen-loving plants, such as nettles, flourished; garden plants sprouted from discarded seeds in the garbage. Deer came to browse on this rich pasture, making marginal gains. Humans tracked them and, even as the Søby dump turned into a modern recycling plant that sought to "optimize" waste, human hunters vied for the best red deer hunting seats on the edge of the landfill.

Meanwhile, all kinds of traffic, from tourism at the historical museum to the landfill's recycling, bring new species to

Søby. One reason for the continued instability of local ecologies is the continuing entry of exotic species, some of which thrive on the multispecies disturbance history and the comparatively hands-off management of the area. More than 500 unintentionally introduced terrestrial animal species have been catalogued in Denmark since 2000, many of them detrimental to local organisms and, thus, “invasive” (Hansen et al 2015). In the simplified landscape left by mining in Søby, it is irrelevant to worry about invasive species: pre-mining ecologies cannot be reconstituted. At the same time, even in simplified novel ecologies varied kinds of organisms should not be carelessly lumped together in their landscape histories and effects. Each organism remakes the landscape in a different way, presenting humans with a separate suite of opportunities and challenges. Modernist sensibilities, which take “resources” for granted, have obscured this issue: we moderns see ourselves making the world but forget that other organisms are constantly reworking our works. It is in this context that the most recent, and perhaps most easy-to-miss, of our succession stories tells so much about contemporary feral dynamics. Mediterranean harvestmen arachnids—new to Denmark—have traveled to Søby by hitchhiking on motor vehicles and probably making particular use of compost and recycling transport at the landfill. As Vestbo et al. (this issue) show, this is the forgotten story of human infrastructure: it doesn’t just carry humans nor is it restricted to human projects. Parking lots are spaces not just for cars and human visitors but also for newly arrived species of harvestmen. Can we appreciate motor transport from a harvestman’s perspective? What landscape histories do “motorized” harvestmen set in motion? Such reversal of perspective is one of our essential contributions: to see feral dynamics we need to appreciate both human and nonhuman acts of landscape making, as these alternatives jostle or augment each other, despite

refusals to acknowledge each other directly. This doubled perspective is the heart of the transdisciplinary dialogue we aim to spark.

### **A Patchy Anthropocene?**

Geologists and climate scientists have suggested the term Anthropocene to describe an epoch in which humans have become a major geological force (Crutzen et al. 2000; Steffen et al. 2007). The term, and the concept behind it, are debated across many disciplines (Swanson et al. 2015). In this special section, we argue that, while earth-systems analyses are important, they distort our planetary dilemmas if deployed without attention to the heterogeneity of human-made environmental effects. Indeed, we argue, there is important work for historical ecologists and anthropologists interested in more-than-human socialities to do here. This work is not that of “filling in blank spaces” or “ground checking planetary truths,” but rather the work of investigating the social and ecological heterogeneity that is *constitutive* of the Anthropocene. In this, we join scholars who point to the role of colonial conquest, capitalist political economy, and Cold War history in every period proposed as “Anthropocene” since the fifteenth century (e.g., Lewis and Maslin 2015; McNeill 2016; Moore 2015). The violence and destruction of these Anthropocene datelines of the last 500 years can only be understood in relation to the multi-scale ecological effects of particular political and economic projects, rather than merely the presence of the human species. Furthermore, if we take the post-World War II Great Acceleration as our dateline, as many geologists suggest, we can easily trace the effects of war, the expansion of capital, and state consolidation and empire building (Brown 2013; Tsing forthcoming). The planetary Anthropocene emerges only as an epistemological side effect of what we call the “patchy Anthropocene,” that is, the articulation across many social and ecologi-

ical processes, as these create varied and unequal zones of livability and nonlivability for both humans and other species.

One important critical approach to the Anthropocene, at least in the social sciences, has been to disentangle the etymology of the term and to define alternative concepts that designate other dimensions, perspectives, and intellectual trajectories of our contemporary crises (Bonneuil and Fressoz 2015; Danowski and Vivieros de Castro 2017; Haraway 2016; Latour 2017; Moore 2015; Morton 2013b; Stengers 2015). In a critical engagement with this approach, we stress the need to experiment not just with new terms and concepts, but with novel empirical approaches that allow us not merely to think of the Anthropocene critically, but to study it critically and empirically. Key to such empirically grounded approaches is to break with the assumed homogeneity and holism of the Anthropocene, to question the Anthropocene as an “it.” This special section explores what we might need to notice to chart our way into a patchy Anthropocene.

Søby’s feral sociality, venture capital, unstable geology, and weedy ecology move within the regulated welfare state and intensively groomed agricultural ecology of Denmark. Denmark’s specificity, in turn, responds to the history in which it was “caressed,” rather than devastated, by recent world wars; this allowed a benevolent and pervasive welfare state to emerge after WWII. Denmark is a place of moderation rather than excess, a site of diminutives rather than superlatives—whether in cultural, economic, ecological, or demographic terms. It is also a place that, to date, experiences only the mildest effects of global anthropogenic change. What can this, almost unbearably mild, place possibly teach us about the Anthropocene (see Brichet et al 2017)? Surely, the dramas of species extinction in the Amazon or the melting icecaps of the Arctic are much more obvious sites in which to study the environ-

mental crises of a carbon-driven accelerated world? Our answer is that the specificity of our site is the point. Relatively benign governance within a relatively benign patch of anthropogenic landscape provides a privileged site in which to notice the complicity at stake in the political ecology of humans and nonhumans. Søby is for us a site of perturbations where the lack of massive political or ecological tragedy that characterizes much of Anthropocene elsewhere makes the complicity between human world-making practices—that often go under the label of power, culture, or history—and the non-human forms of landscape-making that are studied by geology and ecology more studiable. Drawing on political ecology, this special issue emphasizes both the politics of ecology and the unheralded nonhuman excess that escapes it.

The undramatic mundaneness of our site brings into focus entanglements between intensive human management and weedy refusals of planners’ imagined discipline. From here, we can see the importance of the interspecies experiments of more-than-human landscape-making negotiations. Deer and fungi make landscapes alongside human foresters, and parking lots and waste dumps turn out to be lively sites for interspecies engagements. In these “unheralded collaborations,” landscapes are transformed in a process of succession that cannot be held separate from the political and economic histories of management and unmanagement.

Our succession histories trace the undomestication that produced feral landscapes of humans and nonhumans in the heart of a country that grew into a model welfare state in Northern Europe characterized by an inclusive welfare system, egalitarian policies, and intensive landscape management. Key to telling these succession stories is cross-disciplinary collaboration as well as imagination. While some of the contributions are written by authors with different disciplinary backgrounds—such



as anthropology, ecology, and science and technology studies (Hoag et al.), science studies and ecology (Forssman and Root-Bernstein), critical theory and anthropology (Gan and Tsing)—and others are written by either anthropologists (Hastrup and Brichet; Højrup and Swanson) or biologists (Vestbo et al.), all cultivate a cross-disciplinary imagination, a dedication to venturing outside the comfort zone of one's own disciplinary background for insights to help one to better tell intertwined human and nonhuman succession stories.

### **An Ethnoecology for the Anthropocene**

We are aware of the challenges of communicating within and about a new form of experimental interdisciplinarity. Consider just the problems of citation and professional dialogue: on the one hand, our authors feel responsible to interlocutors in many directions, ranging from cultural theory to molecular genetics; on the other hand, we imagine each reader is likely to feel overwhelmed by unfamiliar scholarly debates. One way to make the intellectual confluence our project explores more legible is to recognize some of the scholarship that has opened the space for our experiments. Several figures stand out not only for their individual contributions but also for the scholarly terrain they have made available.

Botanist Oliver Rackham, a specialist in temperate woodlands, created an intellectual style that is equally accessible to humanists and natural scientists. Rackham was interested not only in trees, but also in the social histories through which people and trees came to manage and mutate each other's spaces. In his magisterial book *Woodlands* (Rackham 2015), for example, he shows how archaeological and historical research concerning anthropogenic woodlands changes botany, as well as social history. Woodlands are places for both humans and trees and it is impossible

to understand ecologies without human histories. This is a historical ecology of temperate Europe in which scientific and vernacular knowledge involving plants are equally relevant. Furthermore, Rackham (2015) draws our attention to *practices* through which people shape woodlands and woodlands shape human places. Our study of the Søby brown coal site makes use of this interdisciplinary terrain to ask about the feral dynamics of industrial disturbance.

Sometimes interdisciplinary practices are made possible by scholars willing to think together over time. This has been the case with feminist theorist Donna Haraway and developmental biologist Scott Gilbert. Haraway (2008) has been a key figure in moving the humanities out of a commitment to separate arenas of "nature" and "culture"; a single *natureculture* brings humans and nonhumans into relations in which both show *responsibility*, that is, the ability to respond to each other. Haraway (2008) shows us how scholars trained across many disciplines might tell multispecies stories in which humans and nonhumans make worlds together. Gilbert is a pioneer in the emerging field called "ecological evolutionary developmental biology" (or "eco-evo-devo"; Gilbert et al 2015). Instead of studying each organism as a self-contained unit, this field shows how individual development *depends on* encounters—and often encounters across species. The role of gut bacteria in creating our digestive systems is one small example. The importance of interspecies interactions, in turn, changes how biologists see ecology and evolution. Organisms-in-relations are units of evolution, rather than isolated and mechanical enactments of the genetic code.

Gilbert and Haraway have developed their understandings of biology and history in relation to each other's work. Gilbert discusses Haraway's theoretical insights in his textbook on biology (Gilbert and

Epel 2015); Haraway uses Gilbert's work to develop her notions of multispecies world building (Haraway 2016). Together, they create an intellectual space in which humanists and natural scientists might find each other's work important—and not because humanists are studying scientists (or worse yet, dumbing them down for the public). Through attention to relations and encounters, they build a new way to approach both biology and the humanities. Both kinds of training are needed.

How might this way to study our environments form a dialogue with existing ethnoecologies? One way to approach this question is to look back at the history in which classic norms of ethnoecology were formed. One figure who stands out is Harold Conklin, an anthropologist who combined interest in human modes of classification, on the one hand, and people's relation to the natural world, especially its plants, on the other. Conklin's 1954 dissertation, "The Relation of Hanunoo Culture to the Plant World," coined the term ethnoecology. Under the influence of Conklin, ethnoecology spread in two directions: to a cognitive science in which hierarchies of taxa revealed cultural differences in habits of mind and to a cultural ecology in which scholars might appreciate the environmental management practices of non-Western peoples. Because Conklin combined a charismatic exuberance with a meticulous eye for detail, whether of plants or of language, the intellectual conjuncture worked brilliantly, bringing the field to prominence. Classic norms of ethnobiology draw from this conjuncture: naming practices, for example, continue to hold a special place for ethnobiologists.

Looking back, we can see the specificity of the challenges of this time. After World War II, American development projects took charge in much of the Global South; American anthropologists, including Conklin, felt the importance of explaining

that non-American ways of doing things were not necessarily impediments, as most development experts thought. It was a time for a robust relativism, or at least what Clifford Geertz (1984) once called an "anti-anti relativism," that is, a heated opposition against forced-march modernization. Some of Conklin's most important work refused the truisms of the neocolonial development apparatus to argue for the ecological benefits of shifting cultivation (e.g., Conklin 1961). There were dangers too for the world of living things, including the eclipse of native knowledges from Green Revolution science. Indigenous knowledge helped researchers learn about the still awe-inspiring bounties of the plant world in places such as the Philippines, where Conklin worked.

The contemporary world includes these same challenges, but the stakes have gotten higher. With skyrocketing extinction rates, neither plants nor other forms of life present themselves to us as a bottomless cornucopia. We still need to learn to know them, with the help of local knowledge, but we also need to understand them within the feral dynamics of the ruins our civilization has made. It seems to us that a new conjuncture between anthropology and ecology is in order—not to displace classic forms of ethnoecology but to offer an urgent supplement (Honn 2014). In this new form of ethnoecology, the common sense of northern Europeans would be as exotic as that of indigenous Filipinos; we need to see its exoticness to understand the mess we are in. It also means seeing multispecies worlds anew, to discover the exotic proliferation within the mundane. Amidst the global spaces of modern political and ecological domestication, sites of undo-domestication can be found in any parking lot, any community park, or any post-industrial ruin, if we pay attention. Our field guide to feral dynamics is an ethnoecology of these sites of the Anthropocene.

### Notes

<sup>1</sup>Italicized words are in Danish.

<sup>2</sup>Our study, while adding to the literature of post-mining landscapes (e.g. Dulias 2016; Isenberg 2006; Jacka 2015; Robins 2011; Storm 2014), is not, as such, a political and ecological study of the history of mining. We take the Søby mining site as an exemplar of the wider phenomenon of ruination that characterizes the Anthropocene, insisting on its specificity while emphasizing also, in anthropological fashion, in the ability of this specific site to speak to a general, indeed global, phenomenon, namely the feral dynamics that go into the making of the heterogeneity of the Anthropocene.

<sup>3</sup>The saying “What is lost on the outside, must be gained on the inside” (*Hvad udad tabes, skal indad vindes*), taught to Danish school children today as the motto of the Heath Society and its towering hero Enrico Dalgas (1828-1894), was actually the inscription of a commemorative coin for the Industry and Arts Fair in Copenhagen in 1872 (see [http://danmarkshistorien.dk/leksikon-og-kilder/vis/materiale/myte-sagde-dalgas-hvad-udad-tabes-skal-indad-vindes/?no\\_cache=1&cHash=81fa4e8ad7aafb793f10989548d8c3c1](http://danmarkshistorien.dk/leksikon-og-kilder/vis/materiale/myte-sagde-dalgas-hvad-udad-tabes-skal-indad-vindes/?no_cache=1&cHash=81fa4e8ad7aafb793f10989548d8c3c1))

<sup>4</sup>Note that geological agency offers an alternative to anthropocentric Anthropocene narratives (see Haraway 2016; Povenelli 2016).

<sup>5</sup>With a population of 5.7 million, a little more than the state of South Carolina, the land area of Denmark—some 43, 000 square kilometers—is half the size of South Carolina.

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