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The history I have followed led in many directions, but in the end, the argument of the book is simple. I find I can sum it up in five theses.

1. The first thesis is straightforward: history is embodied. We sometimes think as if history is made of names, dates, and ideas that interact in an abstract space of relations and influences. But history is not at all abstract: it is a matter of flesh-and-blood individuals interacting in material space. History is not like chess; it is more like wrestling. Of course, this point is hardly new, and already Marx has taught us that before people do anything else, they must eat, drink, and clothe themselves. In this book, I have stressed that even before people do those things, they must move, and they must occupy space. Thus history is not just about sociology or economics. History takes place as flesh moves inside space; it is thus, among other things, about the biology of flesh—as well as about the topology of space.

2. The second thesis is less widely accepted than the first, though I believe it follows directly from it. If history is about flesh-and-blood individuals interacting in material space, it also follows that history is not confined to humanity alone. Once again, history is not like chess, where you can take the thirty-two pieces on the board and ignore all the rest. We often think that we can take humans apart from their world, but everything counts, on the board, if only because it is on the same board—inside the same space. Or perhaps another simile would be more precise. We tend to concentrate on humans because we consider humans as actors in history—they have desires, they move about, and thus they shape reality. But all living beings have desires and move about, and so they shape reality as well; and in another way, the same is true even of material reality itself. Thus there are no extras, and they are all actors—humans, animals, and their shared terrain. And because all these actors occupy the same stage, they cannot fail to interact; no species is an island. Thus history is embodied—and not only inside human bodies but in the bodies of all species.

These first two principles can be taken as a summary of the general approach of environmental history. In this book, I have made three further specific claims.

3. One of the main features of history is the prevention of motion. Biologically, animals just move around: history arrives when they are confined to a place. We usually start our histories with the tilling of fields, the domestication of animals, and the rise of towns—all emanating from the same principle: space is no longer open. Some parts are marked out from others, and certain humans and animals are confined out of a field, inside a pen, away from a city. We have seen, through this book, how the prevention of motion is tied to landownership and exploitation, to military history, and to forms of political control. The prevention of motion has to have this kind of wide application because it is elementary: to be affected by it, all you need to do is to be able to move. So it directly brings together all the actors of history. In a formula, this is history: humans change the terrain to prevent the motion of animals as well as other humans. And much of what matters in history is this: different periods are defined by different equations between humans, terrain, and animals, so that different forms of prevention of motion are made possible.

4. In particular, one can point to a modern equation between the actors. With industrial production—particularly of iron—humans could lay out, quickly and cheaply, effective barriers extending along large spaces. The prevention of motion could be dictated from a single center, on a mass scale. This was a new development. In the premodern world, control reached to points and to the lines connecting them; there simply was not enough prevention of motion to go around to cover an entire plane and
bring it all under control. In the modern world, this changed, and the
topology was inverted: control reached everywhere, and only
isolated points were left for motion, that is, not controlled from a
center. The historical significance of barbed wire is that it served
as an agent in this topological inversion.

§ To have our motion prevented is unpleasant, at the basic
biological level. We want to move around, and to be denied that is
in itself painful. Even more directly, prevention of motion is usu-
ally painful for a simple reason: usually, the way to prevent us
from doing what we wish is to cause us pain. There is thus a di-
rect relationship between the prevention of motion and violence.
The reason barbed wire was so effective was that it could exert
pain, on a mass scale, quickly and cheaply; and it was used to
achieve control over a mass scale. It thus led, naturally, to violence
and pain on a mass scale. This was the main feature of the period
from 1874 to 1954.

Of course, in 1874, people did not think the next eighty years
would be based on pain and violence. But we can easily explain
the mistake of the optimists: they did not think in terms of envi-
ronmental history. They thought of humans as essentially differ-
ent from everything else. Marx, whom we can take as an example,
thought of history as a process of growing human control over na-
ture (which was of course correct), and he also thought that as
this control became total, humans would no longer need to ex-
plain one another: modernity would usher in the kingdom of free-
dom. The promise of Marxism—the essence of the promise of
modernity—was to enslave nature so as to free humanity. But
what if humanity itself is part of nature? Modernity, indeed,
brought everything under control—the world with all its species
—and humans, naturally, shared the same fate. In this particular
case, at least, it turned out like this: a species that enslaves another
forgets its own chains.

Is this a simple cause-and-effect story—the enslavement of
animals leading to the enslavement of humans? This book has un-
folded, generally speaking, chronologically, from the invention of
barbed wire in the American West, through its military applica-
tions in colonial wars and in World War I, leading to its well-
known uses in the Gulag and Auschwitz. It would be too simplis-
tic to argue that in this sequence, each link in the chain caused the
following. After all, the Nazis would have persecuted the Jews
with or without barbed wire. But there are some important causal
links.

Barbed wire would probably have been invented with or with-
out Henry Rose's experiments with his breacky cow. But the in-
vention's early agricultural history was significant for its later de-
development. A bit of barbed wire is, literally, no more than a thorn,
a meaningless piece of iron. It is the fact that miles upon miles of
such pieces of iron can be arranged in lines that turns this into a
new tool of special significance for control. But how to get to have
those thousands of miles? Arguably, these would never have been
formed without American agriculture.

The same materials and the same ingenuity that led to the in-
vention of barbed wire in 1874 had been there, no more than a
decade earlier, when the American Civil War spawned all kinds of
military inventions (the machine gun, the ironclad ship, the sub-
marine). The need for something like barbed wire was also
there—in the war itself, and in its prisoner-of-war camps. And yet
barbed wire was not used. How could it be? This is what we have
learned in this book: for barbed wire to be used in war or political
control, it first had to be cheap and widely available. And the
profitable use of barbed wire, even when relatively expansive,
came from agriculture—with the need to exploit huge spaces
quickly. This took place in America during the 1870s. Barbed wire
entered human history—effectively, in the Boer War—only after
its price had been pushed down through two decades of agricul-
tural development. In retrospect, barbed wire could be seen to be
an effective tool for military and political purposes. But it is
likely that without the direct economic incentive of agriculture,
barbed wire could never have passed the enormous gap separat-
ing a little bit of barbed wire (which, historically speaking, is
nothing) from lots of barbed wire (which, historically speaking,
is so much). To precede the uses of barbed wire in war and human
repression, barbed wire had to undergo what may be conceived as its period of capital formation—when, quite literally, miles of barbed wire were put into stock. Only then could the later applications arrive.

In this limited sense, we can say that barbed wire did in fact arise from American agricultural history and, possibly, would not have been invented otherwise, so that, without the American West, the persecution of the Jews would possibly have taken a different form. Strange as this may sound, then, it may be that without the barbed wire ranches imprisoning Texan cows, there might have been no Auschwitz, either. I wish to make myself clear, so I rephrase: I do not make the preposterous suggestion that, without the ranches, there might have been no Holocaust. I'm just saying that without the ranches, there might have been no Auschwitz. The Holocaust was the product of a huge historical process involving European and German ideologies and the failure of modern German society, which was all independent from the history of barbed wire as such. And yet the form of the Holocaust—the death camps—was certainly a product of the technological and environmental history surveyed in this book. Without barbed wire, camps would have been too expensive to build in the first place and so would not have formed the obvious technique they came to be by the mid-twentieth century. Regimes would have relied on other tools of control. And so the Nazi persecution of the Jews would have taken different forms, as well. For instance, it might have taken the form of large-scale pogroms—which was what contemporary Jews mostly feared. The specific novelty of the Holocaust—the death camps—represented a specific technical development, starting in 1874; there is nothing implausible in suggesting that without this technical development, there would have been no death camps, either. And while merely a matter of form, this is by no means a trivial consideration—for in Auschwitz not the most powerful symbol of the catastrophes of the twentieth century?

This counterfactual exercise, however, assumes a world in which barbed wire would not have been invented in agriculture and yet would have been required in war and politics. This is a fundamentally false premise. Barbed wire was invented for a reason: because an entire panoply of technological advances led in a single direction, and the possibility arose—and with it, the desire—to control space not merely as a sequence of isolated points but in a total way extending across a plane. One therefore required—in agriculture, in war, and in politics—a cheap tool of control over space, quickly deployed on a mass scale. Considered from this perspective, the order of events is almost immaterial. In retrospect, we can see why agriculture—with its economic incentive—would be where the invention itself could most naturally take place. But the need was the same everywhere, and this is why the same tool was everywhere used. This idea, rather than cause and effect, structures the argument of my book. I do not suggest that the enslavement of cows in the American West caused World War I, the Gallipoli, or the Holocaust. The main theme, rather, is the similarity and continuity between these events. They all involved, on a mass scale, control over space, which is tantamount to the prevention of motion, which is tantamount to violence.

There is an inherent mistake in a statement such as "the Nazis did to the Jews what is normally done to animals." This makes us think in terms of a false picture. On the one hand are the European Jews, who, in the normal run of things, would go about their life—perhaps take the train to work, board ships, ride in passenger trains. On the other hand there are certain animals—for example, cows—who, in the normal run of things, live enclosed inside barbed wire and are then concentrated to be killed. Then came the Final Solution, with Jews treated as cows normally are. But this is false: in the normal run of things, cows seek food through an open space of great grasslands; they graze, bear offspring, form herds, move on. They try as best they can to avoid predators and, when successful, die in old age. This is the natural life of the cow, and the ranch—its opposite—is every bit as artificial as the death camp. The Nazis, then, did not focus on some primordial treatment of animals; both what they did to Jews, and what ranchers did to cows, was in a sense contemptuous.
an expression of the same order of historical control. Primo Levi has asked, about the inmate of Auschwitz, "if this is a man?" one can equally ask, about the ranch inmate, "if this is a cow?" and the question, in both cases, is difficult to answer. In both cases, what we have is not a natural animal but the product of a special historical process—the same in both. Modernity made possible a total asymmetry between the powerful and the powerless. With this asymmetry of power, everything about an organism's life could be controlled, and as a result, a new kind of living being was created. Both cows and humans suffered the same modern equation of iron over flesh, and so both were transformed into what may be considered an altogether new species: the victim of extreme control. This victim—animal or human—is the hero of the twentieth century.

Barbed wire has by now lost the centrality to history that it enjoyed from 1874 to 1943. Why is that? An obvious suggestion is that we have moved from the prevention of motion to its facilitation, that ours is an age of globalization. Of course, we are now used to the boosterism or criticism of globalization. People have been equally enthusiastic or dismayed about the same phenomenon ever since the sixteenth century, and in a wider view still, the world has accumulated lines of connection throughout its history. Of course, different ages do have qualitatively different levels of connection. But it is simply an illusion to think of our own age as constituting a major transition in this respect; probably, the major transition took place in the middle of the nineteenth century. Much of the recent illusion has to do with the journalistic celebration of the Internet as a revolution. The Internet is an interesting historical phenomenon: it is also, essentially, a user-friendly interface of the telephone, which in turn is essentially a user-friendly interface of the telegraph. Although this growing user-friendliness is certainly of great importance, we should keep a sense of what has actually been achieved. The crucial function of the Internet in terms of world history—that it allows the global synchronization of commerce and politics—is precisely the achievement of the telegraph. When we say that in terms of world history, we live in the age of the Internet, we really mean—which is true—that we live in the age of the telegraph. This must be stressed: ours is a world that, in many ways, is contemporary with the entire period from the mid-nineteenth century onward. Massive ocean and continental transportation, government control that reaches everywhere, global economic and political interdependence—this has been the shape of the world for the last 150 years.

With this realization, we can offer a more sober assessment of global connection. Let us concentrate on the railroad, probably the single most important technology of connection in world history. This vividly brings out the relationship between connection and disconnection: the first, I argue, is reciprocally related to the second. The same lines serve both, and it is simply that connection is easier to perceive. Everyone thought of the railroads as great connectors, not as disconnectors. But they did disconnect. The railroad network was put into place, and soon barbed wire protected the railroads, and the network became a vehicle for the parceling of space into cells limited by barbed wire. The same lines of connection acted as lines of disconnection. This can be generalized as a geometrical law of which we have seen many examples in the book, which I will now set out formally: Every connection has an equal disconnection orthogonal to it.

A railroad, say, connects New York and Chicago, in a line connecting East to West; and soon a line of barbed wire is erected, disconnecting North from South. History, of course, is not geometry, and the law cannot be applied with the same mathematical necessity in some other cases, but it is widely applicable. The car and the telephone connected families to their distant relatives and friends and ultimately disconnected them from their neighbors; television, arguably, then went on to disconnect members of the family from each other. This is not a value judgment—the telephone is better than some neighborhoods, and the television is better than some families. But the principle is worth bearing in mind. After all, we have just one body to occupy space with and to connect with: if we move here, we do not move there; if we listen
or look here, we do not listen or look there. It is as simple as that, and so it is impossible to change the net connectivity of the world. What has happened with the rise of the technologies of connection is not a rise in net connectivity but a change in the nature of connectivity. There is the same amount of connection between people as there ever was, but now more and more of it is channelled through artificial networks. These can then become sources of profit as well as of control, and this is the fundamental reason for their construction in the first place. We live not in a world where connection has grown but merely in a world where it has grown as an economic and political asset. Once again, I do not mean this as a criticism of our world: what is important for my argument here is that it would be false to ascribe the diminishing role of barbed wire to the rise of a new age of connectivity. For one thing, this age has been going on for the last century and a half; for another, it has always been simultaneously an age not only of connection but also of disconnection.

Still, it might be suggested now that the relative roles of connection and disconnection have changed: as the technologies of connection become greater sources of profit, there is less importance to disconnection itself. There is less need to prevent motion, then, and the world has become less violent. And this is certainly, to a certain extent, true. The second half of the twentieth century never did produce quite the equal of Auschwitz. Even more important, violence seems to have been historically marginalized. There were in fact tremendous outbursts of violence in the second half of the twentieth century. In China during the 1950s and 1960s, Stalinism—its a mad, imitative modernization—was even more madly imitated by Maoism. This led to history’s greatest human catastrophe, as measured in the absolute number of victims—many tens of millions dead of government-induced famine and repression. Then the Cambodian imitation of Maoism from 1975 to 1979, while much smaller in absolute terms, was—relative to the size of the population as a whole—worse even than Maoism. We can mention much more: in Rwanda, as late as 1996, more people were killed every day on average, than at Auschwitz—using no more than machetes and clubs. All the while, violence had been sliding down the technological scale, just as it was sliding away from the centers of world history. Violence no longer mattered as much. The events we have followed in this book—colonialism, the two world wars, the Soviet experiment, the Holocaust—were also the major events of the period: the events that determined everything else. But Rwanda or Cambodia, and even, arguably, Maoism, were no more than sideshows.

In short, violence has not been reduced; it has been more concentrated on the margins and has thus become less visible to the people of the center. In other words, we have returned to the pre-1914 world. I suspect that this is how the late twentieth century will be remembered: not as a period of a break with the past but as exactly the opposite: a closing of the circle that began at the beginning of the century. The beginning of the century was a period of transition—the period of the coming of modernity. The technological revolution of the second half of the nineteenth century led to a crisis of transition. The new technologies allowed total control and concentrated it in a few centers of power. The world did not know quite what to do with this: fear of the potential of the railroad gave rise to World War I; dreams of the potential of modern control gave rise to the Soviet experiment; the transition to a single world center in America gave rise to the Great Depression; all of this gave rise to World War II. By this time, the center had learned its lesson. Europe was re-formed as a single entity, world finance was rearranged with an American center, the Cold War was managed to avoid eruption and finally folded. There was no longer a need for violence because effective control had already been established. The world had finally become a single system, which was, apparently, stable. So we can definitely see the role of barbed wire: it was a tool of transition, when world domination from a center had to be established through violence. It is not the case that barbed wire diminished in importance because history changed its course: instead, it succeeded, and for this reason was no longer needed.
If barbed wire retreated from the center stage of human history because of the lesser role of violence there, barbed wire has also largely retreated from animal history because, in that history, violence and control grew considerably. The subtle control of barbed wire was no longer sufficiently effective. Barbed wire, used to prevent the motion of animals, presupposes considerable animal movement: they can, at the very least, go as far as the fence. Such is no longer the case in the contemporary animal industry. Operating on a much larger scale than in the past, the industry needs to accommodate many more animals in a space that—with the growing number of humans and with ever-cheaper transportation—becomes more valuable. The result is that animals are not so much fenced as caged. The space allowed individual animals inside the contemporary structures of the animal industry extends, generally speaking, to their flesh and nothing more—replicating the bunks of Auschwitz. Cows tied to their milking machines; calves fixed inside dungeons of absolute nonmobility; chickens packed together in immense wire cages—we see that against such animals, barbed wire has become redundant. The comparison to the bunks of Auschwitz is meaningful: contemporary animals, even while alive, are being squeezed out of space. In this case, this squeezing is motivated not by politics but by economics: space is an element of cost and therefore must be reduced.

Here we can clearly see the correlation between center and margins. The growing violence against animals has been directly correlated with the peace at the human centers. Animals are mass-produced because of the growth of consumption in a prosperous economy, in turn the result of the long period of peace. Having killed and tortured each other enough, as it were, the people of the center now take a break as they concentrate on killing and torturing animals. Our view of that process is of course a question of ethics, not of history, and so, at this point, I bring my book to an end.

NOTES

1. There is a long tradition of writing on the history of barbed wire from the perspective of the history of the American West. This history—a mixture of patriotic history and guide to the barbed wire collector—reaches its culmination in McCallum 1966. In such histories, the use of barbed wire for human repression is never mentioned. Histories of human repression, on the other hand, never mention animal history as such and, when discussing the history of barbed wire, would not even register its beginning in the American West. Two recent books—Razza 2000 and Kewl 2002—do mention that origin of barbed wire. The first, however, mentions it in the context of the fate of Native Americans, while the second (an excellent study of the iconography of barbed wire) is essentially focused on the human cultural perceptions of the artifact. Thus, surprisingly, this book (following my article [Netz 2000]) is indeed the first work to recognize the history of barbed wire as crossing species—from the animal to the human.

1. INTRODUCTION, pp. 6–9

1. The term "Great Plains" refers to the area of today's United States between the Mississippi River and the Rocky Mountains. There is much continuity between the plains and their surroundings. The lack of simple boundaries may, indeed, be seen as the main theme of the area's history. It is a largely flat space, short on distinguishing features, allowing unhindered movement for thousands of miles: a challenge to the would-be preventer of motion.


4. I follow—as we all do—Brubaker 1995.


7. Both terms, "bison" and "cow," call for some explanation. "Bison" is simple: this is the term biologists (and most contemporary historians) prefer when speaking about the species Bison bison, frequently referred to also as buffalo. My rationale for the term "cow" is more complex. Of course, it is only cows that can be forced to produce milk or, indeed, further cows, for human consumption. Hence, in the agricultural setting, male calves tend to be killed younger, creating a gender disparity in the population as a whole. Cows are therefore historically much more common than steers. (Steers are castrated bulls;