> dogs and, later in the Neolithic era the pigs kept in the household compounds. A shared diet between humans, dogs, and pigs—one that was becoming softer in consistency—might partly explain shared gracilization [loss of bone mass due to evolution] and cranio-facial and dental reduction in these species.[18]

Beyond the morphological and physiological consequences of domestication for man and beast lie changes in behavior and sensibility that are more difficult to codify. The physical and cultural realms are closely connected. Is it the case, for example, that like their domesticates, sedentary, grain-planting, domus-sheltered people have experienced a comparable decline in emotional reactivity and are less intently alert to their immediate surroundings? If so, is it related, as in domestic animals, to changes in the limbic system, which governs fear, aggression, and flight responses? I know of no evidence bearing directly on this question, nor is it easy to imagine how the question could be addressed in an objective way.

As far as biological changes associated with agriculture itself are concerned, we must be doubly cautious. Selection works by variation and inheritance, and only 240 human generations have elapsed since the first adoption of agriculture and perhaps no more than 160 generations since it became widespread. We are, therefore, hardly in a position to reach sweeping conclusions.[19] While issues of this scope may be beyond our capacity to resolve, we may be able to say more about how sedentism, animal and plant domestication, and a largely grain diet has shaped our behavior, routines and our health.

THE DOMESTICATION OF US

We, as a species, are inclined to see ourselves as the "agent" in narratives of domestication. "We" domesticated wheat, rice, the sheep, the pig, the goat. But if we squint at the matter from a slightly different angle, one could argue that it is we who have been domesticated. Michael Pollan sees it this way in his sudden and memorable aperçu while gardening.[20] As he is weeding and hoeing around his thriving potato plants, it dawns on him that he has, unwittingly, become the slave of the potato. Here he is, on his hands and knees, day after day, weeding, fertilizing, untangling, protecting, and in general reshaping the immediate environment to the utopian expectations of his potato plants. Looked at from this angle, who is doing whose bidding becomes almost a problem in metaphysics. If our domesticated plants cannot thrive without our help, it is equally true that our survival as a species has likewise become dependent on a handful of domesticated cultivars.

The domestication of animals can be seen in virtually identical terms. Who is serving whom is no simple matter while cattle and other livestock are being reared, led to pasture, given fodder, and protected. Evans-Pritchard, in his famous monograph on the ultimate cattle people, the Nuer, had much the same insight about the Nuer and their cattle as Pollan had about his potatoes.

> It has been remarked that the Nuer might be called parasites of the cow. But it might be said with equal force that the cow is a parasite of the Nuer, who lives are spent in insuring its welfare: they build byres, kindle fires, and clear kraals for its comfort,

> move from villages to camps, from camp to camp, from camps back to villages for its health, defy wild beasts for its protection and fashion ornaments for its adornment. It lives its gentle, indolent, sluggish life thanks to the Nuer's devotion.[21]

One might well object to this line of reasoning by observing that, in the final analysis, Pollan eats his potato and the Nuer eat (trade, barter, and tan the skin of) their cattle. The final disposition is not in doubt. But this overlooks the fact that while it lives, the potato and the cow are the objects of a demanding and solicitous routine that caters to their well-being and safety.

Thus, while larger questions of how our brains and limbic systems have been shaped by domestication cannot yet be determined, we can nevertheless say something about how life in the late Neolithic has been shaped by our relationship to our domesticates in the domus.

First let us compare, broadly, the life world of the hunter-forager with that of the farmer, with or without livestock. Close observers of hunter-gatherer life have been struck by how it is punctuated by bursts of intense activity over short periods of time. The activity itself is enormously varied—hunting and collecting, fishing, picking, making traps and weirs—and designed in one way or another to take best advantage of the natural tempo of food availability. "Tempo," I think, is the key word here. The lives of hunter-gatherers are orchestrated by a host of natural rhythms of which they must be keen observers: the movement of herds of game (deer, gazelle, antelope, pigs); the seasonal migrations of birds, especially waterfowl, which can be intercepted and netted at their resting or nesting places; the runs of desirable fish upstream

or downstream; the cycles of the ripening of fruits and nuts, which must be collected before other competitors arrive or before they spoil; and, less predictably, appearances of game, fish, turtles, and mushrooms, which must be exploited quickly. The list could be expanded almost indefinitely, but several aspects of this activity stand out. First, each activity requires a different "tool kit" and techniques of capture or collecting that must be mastered. Second, we should not forget that foragers have long gathered grains from natural stands of cereals and had, for this purpose, already developed virtually all the tools we associate with the Neolithic tool kit: sickles, threshing mats and baskets, winnowing trays, pounding mortars and grinding stones, and the like. Third, each of these activities represents a distinct problem in coordination such that the cooperative group and division of labor for each is different. Finally, the activities, like those of the earliest village in the Mesopotamian alluvium, span several food webs—wetlands, forest, savanna, and arid—each of which has its own distinct seasonality. While hunter-gatherers depend vitally on these rhythms, they are, at the same time, generalists and opportunists ever alert to take advantage of the scattered and episodic bounty nature may bring their way.

Botanists and naturalists have been continually amazed by the degree and breadth of knowledge hunters-gatherers have of the natural world around them. Their taxonomies of plants are not classified in Linnaean categories, but they are both more practical (good to eat, will heal wounds, will make blue dye) and quite as elaborate.[22] Codifications of farming knowledge in America, by contrast, have traditionally taken the form of the *Farmers' Almanac*, which suggests, among other

things, when maize should be planted. We might, in this context, think of hunters and gatherers as having an entire library of almanacs: one for natural stands of cereals, subdivided into wheats, barleys, and oats; one for forest nuts and fruits, subdivided into acorns, beechnuts, and various berries; one for fishing, subdivided by shellfish, eels, herring, and shad; and so on. What is perhaps just as astonishing is that this veritable encyclopedia of knowledge, including its historical depth of past experience, is preserved entirely in the collective memory and oral tradition of the band.

To return to the concept of tempo, one might think of hunters and gatherers as attentive to the distinct metronome of a great diversity of natural rhythms. Farmers, especially fixed-field, cereal-grain farmers, are largely confined to a single food web, and their routines are geared to its particular tempo. Bringing a handful of crops successfully to harvest is to be sure a demanding and complex activity, but it is usually dominated by the requirements of one dominant starch plant. It is no exaggeration to say that hunting and foraging are, in terms of complexity, as different from cereal-grain farming as cereal-grain farming is, in turn, removed from repetitive work on a modern assembly line. Each step represents a substantial narrowing of focus and a simplification of tasks.[23]

The domestication of plants as represented ultimately by fixed-field farming, then, enmeshed us in an annual set of routines that organized our work life, our settlement patterns, our social structure, the built environment of the domus, and much of our ritual life. From field clearing (by fire, plough, harrow), to sowing, to weeding, to watering, to constant vigilance as the crop ripens, the dominant cultivar organizes

much of our timetable. The harvest itself sets in train another sequence of routines: in the case of cereal crops, cutting, bundling, threshing, gleaning, separation of straw, winnowing chaff, sieving, drying, sorting—most of which has historically been coded as women's work. Then, the daily preparation of grains for consumption—pounding, grinding, fire making, cooking, and baking throughout the year—set the tempo of the domus.

These meticulous, demanding, interlocked, and mandatory annual and daily routines, I would argue, belong at the center of any comprehensive account of the "civilizing process." They strap agriculturalists to a minutely choreographed routine of dance steps; they shape their physical bodies, they shape the architecture and layout of the domus; they insist, as it were, on a certain pattern of cooperation and coordination. In that sense, to pursue the metaphor, they are the background musical beat of the domus. Once Homo sapiens took that fateful step into agriculture, our species entered an austere monastery whose taskmaster consists mostly of the demanding genetic clockwork of a few plants and, in Mesopotamia particularly, wheat or barley.

Norbert Elias wrote convincingly of the growing chains of dependence among ever denser populations in medieval Europe that made for the mutual accommodation and restraint that he termed "the civilizing process."[24] But literally thousands of years before the social changes Elias describes—and quite apart from any hypothetical changes to our limbic system—much of our species was already disciplined and subordinated to the metronome of our own crops.

Once cereals became established as a staple in the early

Middle East, it is striking how the agricultural calendar came to determine much of public ritual life: ceremonial ploughing by priests and kings, harvest rites and celebrations, prayers and sacrifices for an abundant harvest, gods for particular grains. The metaphors with which people reasoned were increasingly dominated by domesticated grains and domesticated animals: "a time to sow and a time to reap," being "a good shepherd." There is hardly a passage in the Old Testament that fails to make use of such imagery. This codification of subsistence and ritual life around the domus was powerful evidence that, with domestication, Homo sapiens had traded a wide spectrum of wild flora for a handful of cereals and a wide spectrum of wild fauna for a handful of livestock.

I am tempted to see the late Neolithic revolution, for all its contributions to large-scale societies, as something of a deskilling. Adam Smith's iconic example of the productivity gains achievable through the division of labor was the pin factory, where each minute step of pin making was broken down into a task carried out by a different worker. Alexis de Tocqueville read *The Wealth of Nations* sympathetically but asked, "What can be expected of a man who has spent twenty years of his life putting heads on pins."[25]

If this is a too bleak view of a breakthrough credited with making civilization possible, let us at least say that it represented a contraction of our species' attention to and practical knowledge of the natural world, a contraction of diet, a contraction of space, and perhaps a contraction, as well, in the breadth of ritual life.

CHAPTER THREE

Zoonoses: A Perfect Epidemiological Storm

DRUDGERY AND ITS HISTORY

AGRO-PASTORALISM—ploughed fields and domestic animals—comes to dominate much of Mesopotamia and the Fertile Crescent well before the appearance of states. With the exception of areas favored by flood-retreat agriculture, this fact represents a paradox that, in my view, has still not been satisfactorily explained. Why would foragers in their right mind choose the huge increase in drudgery entailed by fixed-field agriculture and animal husbandry unless they had, as it were, a pistol at their collective temple? We know that even contemporary hunter-gatherers, reduced to living in resource-poor environments, still spend only half their time in anything we might call subsistence labor. As the students of a rare archaeological site in Mesopotamia (Abu Hureyra), where the entire transition from hunting and gathering to full-blown agriculture can be traced, put it, "No hunter-gatherers occupying a productive locality with a range of wild foods able to provide for all seasons are likely to have started cultivating their caloric staples willingly. Energy investment per unit

tial concentration made it easier to protect them, and their value made the effort worthwhile. There is every reason why a peasantry would do what it could to hold on to its fields and orchards, its homes and its granaries, and its livestock as a matter of life and death. No wonder, then, that the Epic of Gilgamesh, a founding king, erects the city walls to protect his people. On that premise alone, might one see the creation of the state as a joint creation—a social contract, perhaps?—between cultivating subjects and their ruler (and his warriors and engineers) to defend their harvests, families, and livestock from attacks by other statelets or nonstate raider?

But the matter is more complicated. Just as a farmer may have to defend his crops against human and nonhuman predators, so state elites have an overwhelming interest in safeguarding the sinews of their own power: a cultivating population and its grain stores, its privileges and wealth, and its political and ritual powers. As Owen Lattimore and others have observed for the Great Wall(s) of China: they were built quite as much to keep Chinese taxpaying cultivators inside as to keep the barbarians (nomads) outside. City walls were thus intended to keep the essentials of state preservation inside. The so-called anti-Amorite walls between the Tigris and Euphrates may also have been designed more to keep cultivators in the state "zone" than to keep out the Amorites (who were, in any case, already settled in substantial numbers in the alluvium). The walls were, in the view of one scholar, a result of the vastly increased centralization of Ur III and were erected either to contain mobile populations fleeing state control or to defend against those who had been forcibly expelled. It was, in any event, "intended to define the limits of political con-

trol."[30] The control and confinement of populations as the reason and function of city walls depends in large part on demonstrating that the flight of subjects was a real preoccupation of the early state—the subject of Chapter 5.

WRITING MAKES STATES: RECORD KEEPING AND LEGIBILITY

> To be governed is to be at every operation, at every transaction, noted, registered, counted, taxed, stamped, measured, numbered, assessed, licensed, authorized, admonished, prevented, reformed, corrected, punished.
> —Pierre-Joseph Prudhon

Peasantries with long experience of on-the-ground statecraft have always understood that the state is a recording, registering, and measuring machine. So when a government surveyor arrives with a plane table, or census takers come with their clipboards and questionnaires to register households, the subjects understand that trouble in the form of conscription, forced labor, land seizures, head taxes, or new taxes on croplands cannot be far behind. They understand implicitly that behind the coercive machinery lie piles of paperwork: lists, documents, tax rolls, population registers, regulations, requisitions, orders—paperwork that is for the most part mystifying and beyond their ken. The firm identification in their minds between paper documents and the source of their oppressions has meant that the first act of many peasant rebellions has been to burn down the local records office where these documents are housed. Grasping the fact that the state *saw* its land and subjects through record keeping, the peas-

antry implicitly assumed that *blinding* the state might end their woes. As an ancient Sumerian saying aptly puts it: "You can have a king and you can have a lord, but the man to fear is the tax collector."[31]

Southern Mesopotamia was the heartland of not one but several related state-making experiments between roughly 3,300 and 2,350 BCE. Like China's Warring States period or the later Greek city-states, the southern alluvium was the site of rivalrous city-polities whose fortunes waxed and waned. Among the best known were Kish, Ur, and, above all, Uruk. Something utterly remarkable and without historical parallel was taking place here. On one hand, groups of priests, strong men, and local chiefs were scaling up and institutionalizing structures of power that had previously used only the idioms of kinship. They were creating for the first time something along the lines of what we would call a state, though they could not possibly have understood it in those terms. On the other hand, thousands of cultivators, artisans, traders, and laborers were being, as it were, repurposed as subjects and, to this end, counted, taxed, conscripted, put to work, and subordinated to a new form of control.

It is at roughly this time that writing makes its first appearance.[32] The coincidence of the pristine state and pristine writing tempts one to the crude functionalist conclusion that would-be state makers invented the forms of notation that were essential to statecraft. But it would not be too strong to assert that it is virtually impossible to conceive of even the earliest states without a systematic technology of numerical record keeping, even if it took the Inka form of strings of knots (*quipu*). The first condition of state appropriation

(for whatever purpose) must be an inventory of available resources—population, land, crop yields, livestock, storehouse stocks. This information is, however, like a cadastral survey, a snapshot soon out of date. As appropriation proceeds, continuous record keeping is required—of grain deliveries, corvée labor performed, requisitions, receipts, and so on. Once a polity comprises even a few thousand subjects, some form of notation and documentation beyond memory and oral tradition is required.

A powerful case for linking state administration and writing is that it seems to have been used in Mesopotamia essentially for bookkeeping purposes for more than half a millennium before it even began to reflect the civilizational glories we associate with writing: literature, mythology, praise hymns, kings lists and genealogies, chronicles, and religious texts.[33] The magnificent Epic of Gilgamesh, for example, dates from Ur's Third Dynasty (circa 2,100 BCE), a full millennium after cuneiform had been first used for state and commercial purposes.

What can one infer from the trove of cuneiform tablets that have been recovered and translated about actual governance on the ground in Sumer? They reveal, at a minimum, the massive effort through a system of notation to make a society, its manpower, and its production legible to its rulers and temple officials, and to extract grain and labor from it. Surely we know enough about even quite modern bureaucracies to realize that there is no necessary relation between the records on the one hand and the facts on the ground on the other. Documents are forged and fiddled for private advantage or to please superiors. Rules and regulations laid out