One of the most persistent and possibly pernicious ideas in Western thought is the distinction commonly made between things seen as natural, wild, uncultivated, and undomesticated, and things seen instead as unnatural, tamed, cultivated, and domesticated. This distinction is easy to visualize as the difference, for example, between a large field of wheat in the American Midwest and an Amazonian rain forest. The former is a landscape with all the hallmarks of domestication, including the crop itself, mechanized plowing, and the use of petroleum-derived fertilizers. In stark contrast, the latter is perceived as a landscape in a pristine state of being that has been little, if at all, changed or corrupted by human intervention to make such a seemingly wild place suitable for human settlement and land use.

This conceptual divide between the wild and the domesticated, the natural and the unnatural, has been a part of Western intellectual heritage for longer than anyone can say. Elliot Sober (1994) has noted, for instance, that a key idea behind Aristotle's worldview is one that he refers to as Aristotle's natural state model. This is the thought that it is possible to distinguish between the natural and unnatural states of any given kind or type. According to Aristotle, variation arises when something is subjected to interfering forces that keep it from realizing its normal or natural state of being. Variation can thus be seen as deviation from what is natural (Sober 1994: 210). Newton's first law of motion is an example of such thinking in the physical sciences; so, too, are certain statements about the behavior of objects in the geometry of spacetime made under the general theory of relativity in post-Newtonian physics.

Given how entrenched in our Western cultural heritage is the distinction between the natural and the unnatural, it is hardly surprising that domestication as a condition or a phenomenon is still commonly being defined as "a process of increasing mutual dependence between human societies and the plant and animal populations they target" (Zeder et al. 2006: 1). This process may be true, but must human beings always be part of the equation before a species—or a place—can be labeled as "domesticated?"

From a scientific perspective, rather than just from a humanistic point of view, domestication is a form of biological mutualism. What, if anything, sets human domestication apart from other kinds of mutualistic relationships among species except that human beings are somehow involved, intentionally or unintentionally? There is no denying that for human beings, adding us to the picture is key. Yet why limit the study of domestication even in the social sciences so drastically? Why make the circular assertion that what sets domestication
"apart from other successful mutualistic relationships is the role of sustained human agency in the propagation and care of plants and animals within the anthropogenic context of domestication" (Zeder et al. 2006: 1).

It is true that how plants and animals are domesticated by human beings must be unique in at least some respects. Yet every known instance of mutualism in the biological world is undoubtedly unique, or at any rate distinctive. All species are by definition to some degree distinguishable or unique. Therefore, how any two or more species mutually interact with one another is more than likely to be similarly distinguishable. But is "sustained agency" solely characteristic of instances of human mutualism with other species? Or is this just another example of the dubious claim, much beloved by our kind, that what we do as human beings has to be exceptionally unique, because human beings are involved?

In the social sciences, separating out what is judged to be natural out from what is seen as unnatural (or "artificial" [e.g., Simon 1996]) continues to make perfect sense to many—for instance, in framing research on the "origins" of agriculture (see Hart 1999, 2001). However, such a distinctly humanistic understanding of plant and animal domestication weakens the value of archaeological research in the evolutionary and ecological sciences. After all, Aristotle's natural state model was long ago discredited in biology precisely because it has long been obvious to many scientists that variation within sexually reproducing species is phenotypical. Hence "there is no biologically plausible way to single out some genetic characteristics as natural while viewing others as the upshot of interfering forces" (Sober 1994: 225). For comparable reasons, we think there is much to be gained by reconfiguring archaeological approaches to the study of domestication to make what archaeologists do and say more compatible with the biological, ecological, and evolutionary sciences. This reconfiguration will in turn inform our understandings of how humans interact with their landscapes and how archaeologists approach human-plant and human-animal interactions on those landscapes.

The Conundrum

For many social scientists—and many conservationists would agree—Homo sapiens is the quintessential disturbing force. From such a perspective, what we as a species have been doing to Mother Nature at least since the end of the Pleistocene would otherwise be the Earth's normal pace and course of historical development. For example, as the archaeologist Bruce Smith (2001) writes, many people continue to see the beginnings of agriculture after the Pleistocene as a revolution in history, a turning point marked by two alternative states or end points, one natural (hunting and foraging), the other unnatural (domestication and farming).

Unfortunately there is little agreement today on what are the best constituent definitions of foraging and farming as distinct states or stages of human subsistence life. Without agreement on what these terms mean (Bailey and Headland 1991: 266), there is no dependable way to sort people or societies into one or the other of these two categories— foragers versus farmers—or place any given society, modern or ancient, in a sensible way somewhere along what many now concede is the logical continuum between these two ostensibly polarized end-states (Smith 2001: 27).

It is not hard to see why labeling people as foragers or farmers is hard to do. Most people, except perhaps for modern urban dwellers who forage almost exclusively in the supermarket, do both. Even more fundamental, when looked at closely, foraging is not as different from farming as popularly believed; farming, too, is a hazy category that covers a truly diverse range of human behaviors and relationships with other species (for additional discussion and references, see Terrell et al. 2003).

In spite of this ambiguity, when it comes to talk about such long-established issues in world prehistory as the origins of domestication and the beginnings of agriculture, the research agenda in archaeology has changed little over the years. It is still widely taken for granted that archaeologists should be able to pin down when and where some of the Earth's prehistoric inhabitants finally stopped behaving like foragers long enough and successfully enough to be called farmers. And the lucky souls who recover vestiges of those ancient activities are the fortunate few who will be able to announce to the rest of us that they have successfully tracked down the culinary innovators who can be designated posthumously as "the world's first farmers." At the very least, these happy scholars will be able to proclaim that they have discovered a "new cradle of agriculture" (Neumann 2003).

As glamorous as such archaeological discoveries may be, looking for the beginnings of domestication (and we would add, agriculture) is a research pursuit doomed from the start. Why? Because (a) species do not have to be discernibly altered, morphologically or genetically, before they can be domesticated; (b) morphological and genetic changes that some-
time to develop, and consequently they show up, if they are going to show up at all, \textit{after the fact of domestication} by human beings; and (c) concluding that \textit{only} plants and animals exhibiting plainly detectable signs of human use and cultivation can be called ‘domesticated’ risks underestimating the generality and force of human domestication in the world we live in.

Here, then, is an archaeological conundrum. If identifying the origins of domestication and the beginnings of agriculture is as pivotal an issue in archaeology as many still maintain (e.g., Price 2000; Smith 2001), then how are archaeologists to get beyond the concern that they are looking for something they cannot find? One Solution: Seeing Domestication for What It Is

It is a credit to archaeologists that they have been so persistent in looking for the beginnings of agriculture and domestication, but we think it would help if they now opted to take roads less traveled by. One way to do so would be to begin with the wisdom at the heart of these four basic observations (Terrell et al. 2003):

1. How human beings domesticated other species varies, and has always varied, depending on the species in question and on how extensively people want, or wanted, to exploit them;
2. It follows that domestication can be gauged more consistently by its performance—by the manipulative skills characterizing it for each species in question—than by its (only sometimes discernible) consequences, that is, the morphological and genetic changes that in due course may or may not become apparent as an upshot of human exploitation;
3. As counterintuitive as it may at first seem, when gauged by its performance, it also follows that \textit{any species may be called domesticated when another species knows how to exploit it}; in spite of what the Book of Genesis tells us, domestication is a \textit{generic fact of life} not a peculiar human endowment; and
4. Finally, and perhaps most important from a scientific point of view, it follows that since people usually exploit \textit{not just a few but in fact many different species} of plants and animals, human beings domesticate (that is, know how to exploit) not only many species but also in effect entire \textit{landscapes}—a word that in this instance should be taken to mean not only certain \textit{places}, or \textit{types of places} such as estuaries, coastal plains, and tropical forests, but also the \textit{species pool}, or \textit{range of species} inhabiting such places that a particular species (in this case \textit{Homo sapiens}) exploits.

Variation Is Real

Two obvious points arise. First, there is no doubt that people over time, intentionally or unintentionally, have altered some species genetically and behaviorally to such a marked degree that nowadays these hapless organisms are no longer viable on their own if they do not receive human care and protection (Gepts 2004). Classic examples of such dependent, or symbiotic, species are maize (\textit{Zea mays} ssp. \textit{Mays}) and bananas (\textit{Musa} spp.). Second, it is absolutely true that for some species of plants and animals, archaeologically visible signs that they have been the focus of a great deal of human attention are, for plants, increasing seed size over time, and for animals, decreasing bone size (Gepts 2004).

Both of these observations, however, point directly to the hidden defect of traditional ways of thinking about domestication and the origins of agriculture. What is being overlooked or underrated is the overarching truth that domestication in such instances is \textit{transformative}—that is, \textit{evolutionary}—and there are “all degrees of plant and animal association with man” (Harlan 1992: 64). The oft-cited continuum between foraging and farming has more than one axis or dimension. One axis is \textit{behavioral}. Different people use different mixes of what might be labeled as farming and foraging behaviors to make their living. A second axis or dimension is \textit{genetic}. The impact of human exploitation changes different species in different ways and to different degrees ranging from nothing obvious at all (as in the case of domesticated elephants, for instance) to the opposite extreme (for example, sunflowers and the many breeds of dogs).

We would add that if you are one of those who absolutely insist that only species unable to survive without human intervention may be properly called “domesticated,” then you should keep in mind that there are even pathogens meeting this restrictive definition of domestication—for example, the virus that causes human acquired immune deficiency syndrome (AIDS). Being stubborn about what is and what is not “true” domest-
It is ironic that those conventionally labeled “hunter-gatherers” are perhaps the people who best show us how to see domestication for what it is. As the renowned cultural evolutionist Leslie White (1959) once observed, hunter-gatherers have and have always had abundant and accurate knowledge of the flora and fauna of the places they inhabit. This being so, the “the origin of agriculture was not, therefore, the result of an idea or discovery; the cultivation of plants required no new facts or knowledge” (White 1959: 284). We would add that knowing how to hunt and gather is not all that different from knowing how to plant and cultivate. In both situations, what counts most of all is knowing what works effectively to put food on the table and a roof over your head.

The Subsistence Spreadsheet

When it is agreed that variation is real and people have varying ways of making a living, then it follows that archaeological research protocols emphasizing only the retrieval and study of the remains of “truly domesticated species” are misleading ways of exploring the evolution of human subsistence. What is needed instead are research protocols directing us to document not just the co-occurrence and morphological (and genetic) state of a handful of species now considered to be the focus of human domestication, but the full range of varying and variable subsistence strategies that have supported our survival in different places on earth and at different times.

We call one such protocol the “subsistence spreadsheet.” Sketched succinctly, this sort of spreadsheet builds on these basic directives (Terrell et al. 2003):

1. **Goal:** provisioning of food, shelter, and raw materials;
2. **Observations to be made:** the occurrence (presence/absence), number of individuals, or amount of each species harvested for food or shelter;
3. **Primary variables:** yield, accessibility, and reliability or yield stability (Cleveland 2001: 252) of each available species including:
   a. The specific yield provided by each resource being harvested, perhaps measured either in terms of calories and profitability (energy gain/time) when what is at stake is survival, and when not, then perhaps in locally specific terms of social value (measured possibly in locally
   b. The specific accessibility of each resource harvested, both temporal (for example, its availability from season to season) and spatial or geographic (possibly assessed as the time and effort needed to find and harvest a specific resource);
   c. The reliability, or yield stability, of each resource harvested—how likely it is that each will live up to expectations over time. In evolutionary ecology, this variable is often described as “risk,” and models exploring alternative risk management strategies are predicated on the assumption that the suite of resources harvested ought to be a mix of more or less reliable foods that optimizes the likelihood of survival during times of scarcity.

4. **Secondary variables:** skills used to achieve the specified goal (behaviors to change or adapt to the yield, accessibility, and reliability of available species populations).

Conclusions

Once it is accepted that people throughout history have been exploiting not only a few but, in fact, many kinds of plants and animals in varying ways and to varying degrees—only some of which might now be described as “true domesticates,” then both in effect as well as in practice *Homo sapiens* has been domesticating not just a few species for untold years but entire landscapes for the provisioning of food, useful materials, and shelter. What is challenging then is not finding precisely when and where a few reference species evidently became morphologically or genetically altered enough (according to some formal scale) to tag them as domesticates and allow us to label those associated with such visibly altered species as “farmers” rather than as “foragers”; instead, the real challenge is developing ways of improving how successfully archaeologists can use what they discover to learn about what people in the past were actually doing on the landscapes they inhabited to put food on the table and a roof over their head.

References


