

Why Corn Never Came to California

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To the Reader

The discussion below is sufficiently complex, and in some places so rambling, that the reader may find a road map useful. There are three parts. The first (*The Rise and Fall of Agriculture in Western North America*) argues that the culture history of western North America is at variance with traditional culture evolutionary schemes in which agriculture always replaces hunting and gathering and attributes this to the development of an intensive form of hunting and gathering superior to agriculture. The second part details this intensive hunter-gatherer system (*The Evolution of Intensive Hunting and Gathering*) and offers a scenario for its evolution (*The Evolution of Storage*) and later development (*Aftermath*). The third part returns to the traditional model of cultural development. I criticize the fundamental assumption that cultural evolutionary advancement always proceeds from the “top down” through the formation of complex institutions and structures (*Observations*) and argue for an alternative mode in which extremely sophisticated economic behaviors can arise in the absence of sociopolitical complexity, from the “bottom up” through a group selection-like process (*An Alternative Mode of Cultural Development*). Readers wishing to save time can probably skim the archaeological and ethnographic detail contained in the *The Evolution of Storage* section – the idea there is simply to observe that storage is a public goods problem that was solved by group selection. Relating to that, while I was writing this, Sam Bowles sent me a copy of the paper (co-authored with J-K Choi) he will present at the workshop, which deals with the kind of group selection processes that I argue are important in hunter-gatherer western North America. I did not attempt to incorporate their ideas in this paper, preferring to save the connections as a basis for workshop discussion.

Introduction

I have been interested for some time in the development of intensive hunting and gathering economies in western North America, the contrast they provide to the development of corn-fed polities to the south and salmon-rich cultures the north, and the insights this comparison provides for understanding pre-industrial economic and sociopolitical evolution. I am motivated particularly by the growing perception that warfare and inequality are the most potent forces in pre-industrial sociopolitical evolution and the companion view that the rise of complex sociopolitical formations that feature warfare and inequality was the dominant mode of pre-industrial political evolution. I have drawn heavily on the work of Joseph Jorgensen (1980; 1987), who shares my concerns.

The Rise and Fall of Agriculture in Western North America

Despite multiple cautionary tales and a generally sophisticated understanding among anthropologists that evolution is neither directional nor progressive, textbooks typically portray North American prehistory in just that way: they start with hunters (Paleoindian), who become hunter-gatherers (Archaic), who become simple

agriculturalists (Formative), who become complex agriculturalists with complex sociopolitical organization (Classic). As its early critics noted (Baumhoff 1963; Caldwell 1958; Heizer 1958; McKern 1956), this scheme (as first employed implicitly by McKern (1939), and first set forth explicitly by Willey and Phillips (1958), makes corn and agriculture the prime movers of North American culture history.¹ The successful domestication of *Zea mays* in Mesoamerica around 5500 BP (and three of four other key genera slightly later, e.g., beans, squash, cotton) dominates this sequence and prefigures its outcome, culminating in the corn-fed states of Meso- and South America. There is certainly no doubt that this remarkable tropical grass profoundly influenced North American prehistory. Following its domestication, corn spread north from Mesoamerica to the American Southwest by 3000 BP, where it crossed the Colorado River and kept right on going north, reaching northern Utah (at Steinacker Gap near Vernal) complete with irrigation systems and sophisticated subterranean bell-shaped storage pits by 1700 BP. Corn agriculture quickly entrenched. By 800 BP it supported settled communities with stone and adobe architecture not just in the Southwest proper (Arizona, New Mexico, and Colorado) but north of there, from southern Nevada (Virgin Branch Anasazi) to northern Utah (Virgin-Kayenta Anasazi, Fremont). During these same centuries, of course, corn was also moving in the eastern United States, up the Mississippi River to the Great Lakes and along the eastern seaboard to Canada. A snapshot of prehistoric North America at 900 BP would show corn agriculture dominating most of North America, supporting sedentary or semi-sedentary communities along with the occasional spectacular multi-level chiefdom with quasi-urban centers outfitted with monumental architecture in the Mississippian east (Cahokia, Moundville). Textbook treatments usually stop here, having traced a complete evolutionary sequence in North America in which complex agricultural society rises from primitive hunter-gatherer beginnings. It is more convenient to ignore the next four centuries before the Spanish Entrada, during which these directional trends all reverse.

By the time Columbus arrived things had changed significantly. My concern is with events in the west, but the situation in the east is worth mentioning to show that the trend in which I am interested was to some extent continental, for the major Mississippian centers of the east were deserted. So stark was the contrast between the archaeological manifestations of Mississippian greatness and modest trappings of agricultural peoples observed by early ethnographers, the Mississippian mound builders came to be a "lost civilization" that had been over-run by barbarians. The contrast in the west figured less prominently in the popular view but was equally dramatic. When the Spanish arrived the Southwest was a sea of hunter-gatherers - Navaho and Apache - recently arrived from somewhere north. The Pima, Papago, and Pai rimmed its the western shore and the classic Puebloans were mere islands, all of them south of the Colorado River. North of the Colorado River no real corn growers remained. Such classic Anasazi centers as Mesa Verde were now in territory frequented only by Numic speaking hunter-gatherers - Ute and Southern Paiute, also recently arrived but from the west.

Contact western North America completes a more complex picture of cultural development in which neither (corn) agriculture nor complex socio-political formations terminate the sequence. Very simple social formations of hunter-gatherers were completely in charge north of the Colorado and west of the Rockies. In California their

densities were higher than anywhere in agricultural North America except the eastern Pueblos. South of the Colorado on both sides of the Rio Grande down almost to the Gulf of Mexico, even simpler and more thinly spread hunter-gatherers sometimes traded amicably but more usually made life difficult for agriculturalists by raiding them. Hunter-gatherer persistence to contact can be laid to environment and cultural isolation in the Arctic, Subarctic, Plateau, and perhaps the Northwest Coast, but surely not in the Southwest, Southern California, or Southern Great Basin, where hunter-gatherers knew firsthand that corn would grow and surviving agriculturalists provided a working agricultural model that could have been, but was not, adopted.

Understand that the systems of corn agriculture entirely displaced north of the Colorado River and substantially displaced south of the Colorado River were not crude. They were as sophisticated and highly developed as a thousand years of trials, innovations, and experiments could make them. A multiplicity of genetic strains had been nurtured to tolerate cold and drought, and a variety of alternative organizational solutions had evolved to mobilize labor for field improvement and irrigation. Indeed, without industrial-era innovations – genetic manipulation, mechanization, fertilizers, and soil complements or such – it is difficult to imagine how Southwestern corn agriculture could have been made markedly more productive than it was at contact. Thus the contraction of corn agriculture in western North America in the centuries just before Euroamerican contact was not a passing thing. Corn agriculture had been given a thorough trial, had enjoyed substantial initial success, but in the long run hunting and gathering proved superior.

It is generally held that agricultural contraction in the Southwest was less the result of direct hunter-gatherer competition than a combination of climatic reversals and internal conflict. The demise of the Fremont and Virgin Branch Anasazi is often laid to climatic cooling and drought that together made growing seasons too short at elevations high enough to receive the required rainwater (e.g., Coltrain and Leavitt 2002). The same combination of cold and drought, this time fed by intense internal social conflict, is held to account for agricultural contraction in the classic Southwest (e.g. LeBlanc 1997). From this perspective, the demise of agriculture in much of western North America might be thought to demonstrate only that the limits of sustainable corn agriculture were further south. This ignores that the climatic anomalies said to have unseated agriculture were relatively short-lived. Were only climate involved, agriculturalist should have expanded and again spread north within a century or two, when temperature and rainfall regimes became more benign (in the manner of the Havasupai who, on a smaller-scale, reoccupied the Coconino Plateau after A.D. 1300). A general northern re-expansion of agriculture failed to occur because the area vacated had been completely occupied in the interim by Apachean and Numic hunter-gatherers.² That agriculture failed to make significant inroads against these groups in the remaining centuries before contact (and in fact continued to withdraw, e.g., Apachean against Pima) tells us that Apachean and Numic hunter-gatherers were behaving differently than the earlier hunter-gatherers who had either been displaced by agriculture (as in the Southwest and Virgin and Virgin-Kayenta Anasazi) or adopted it themselves (as in Fremont). Agriculture was again possible in most the places it had been before, but agricultural groups could not compete with these hunter-gatherers.

The fault must partly lie with the agriculturalists. Specialists are fond of noting

that corn was never the backbone staple for the Fremont and Virgin Branch Anasazi that it was further south (Madsen and Simms 1998). They further stress evidence indicating that the more northern Fremont (especially around the Great Salt Lake) may have relied more on wild plants and animals than corn, fielding a spectrum of farming and foraging strategies, emphasizing one over the other as conditions dictated. At the very least, however, corn was central to Fremont in this way: when corn disappeared, Fremont culture disappeared (This also holds for the Virgin Branch Anasazi). Nothing of the distinctive Fremont cultural repertoire (one-rod-and-bundle basketry, dew-claw moccasins, a distinctive art motif depicting trapezoidal human figures, and thin-walled gray pottery) persists anywhere much after A.D. 1250. So complete and abrupt a termination would be surprising, indeed improbable, for a cultural system with the technology, knowledge, and organizational flexibility turn wild resources from minor dietary supplements to major dietary staples, and back, at will. What is indisputably true about Fremont flexibility is that it worked only so long as climatic conditions permitted corn agriculture; when corn failed the Fremont, foraging did too. Perhaps Fremont foraging was suited only to the very same, effectively Southwestern, climatic regime and microenvironments that suited corn, as would be the case if wild plant foraging were conducted mainly around agricultural sites, for example. Alternatively, if specialized Fremont foragers obtained corn mainly by trade, they may have specialized in the wild species least available to corn-growers, and thus, the microenvironments least suited to corn, an activity that may have been deemed worthwhile only so long as at least small amounts of corn could be obtained in exchange. Either way, the record will show that Fremont foraging could not sustain Fremont culture. The abundance of wild plant foods in Fremont assemblages indicates that women made important contributions to subsistence, but either Fremont women were not as industrious, skilled, or resourceful, or were simply not allowed to be as economically important, as female foragers in Nevada and southeastern California, who were the major underwriters of hunter-gatherer subsistence economies that thrived high and low during the Fremont collapse.

It is reasonable to conclude that Numic and Apachean hunter-gatherers maintained and expanded their hold on formerly agricultural areas principally because their foraging was more intensive and technologically sophisticated than that of earlier (pre-agricultural) hunter-gatherers and competitively superior to that of remnant agriculturalists. Agriculture might support higher average population densities than hunting and gathering but even in agricultural strongholds where conditions were presumably ideal, agriculturalists supplemented their diet with wild plants (which made up 5% - 25% of their diet), especially when crops were poor. Once intensive hunting and gathering developed and spread, agricultural reliance on wild plants as reserve food negated any real opportunity for agricultural expansion in western North America. The wild plants on which agriculturalists depended upon as reserves were invariably the major staples of surrounding hunter-gatherers, who were better at extracting them, used them more regularly, and often pre-empted the best patches by making them primary places of residence. Agriculturalists relied on wild plants as supplements and reserves; the hunter-gatherers who grew corn, used it as a supplement but not a reserve. Thus, the competition between agriculture and hunting and gathering in western North America was waged on grounds inherently favorable to hunter-gatherers, a relationship that was at contact quite stable and unlikely to change barring some sort of catastrophic

hunter-gatherer extinction.

The Evolution of Intensive Hunting and Gathering

Taken in total, the contact landscape of western North America was more profoundly shaped by the emergence and spread of intensive hunting and gathering than by the domestication and spread of corn. This is perhaps clearest in the areas where hunting and gathering replaced agriculture, but the effect was equally profound, and in many ways more interesting, beyond the areas of agricultural penetration, where the development of intensive hunting and gathering radically reshaped the cultural landscape relatively late in time, about A.D. 600, closely coinciding with the northward spread of agriculture into Nevada and Utah. The case with which I am most familiar is that attending the rapid radial expansion of Numic-speaking peoples from southeastern California north and east across and beyond the Great Basin (Bettinger 1991; Bettinger 1993; Bettinger 1994; Bettinger and Baumhoff 1982; Bettinger and Baumhoff 1983).

Several lines of evidence link Numic expansion to a distinctive adaptive strategy that caused groups limit their residential mobility to facilitate the procurement and storage in bulk of resources, mainly seeds and nuts, which were abundant and easy to store but costly to process. This replaced an earlier pattern that placed greater emphasis on residential mobility that enhanced access to resources that were less densely concentrated but less costly to process, especially large game. The contrast is between the amount of time spent traveling to places to hunt and gather (travel time) relative to time actually spent hunting and gathering (foraging time) on the one hand, and between the amount of foraging time spent locating resources (search time) relative to time spent procuring and processing (handling time; Bettinger 2001).

The more intensive Numic pattern is a **processor strategy** that invests more in foraging and processing than traveling and searching. The less intensive pre-Numic pattern is a **traveler strategy** that invests more in traveling and searching than in foraging and processing. The relative importance of time and energy (resources) distinguish these strategies. Because population is small in the traveler strategy, resources are relatively abundant, so time is more precious than energy. The traveler strategy employs settlement itineraries, technologies, and species that minimize time. In the processor strategy, population is large relative to resources, so energy is more precious than time. Settlement, technology, and subsistence therefore maximize energy acquired overall and per unit of space. Because they value time more than energy maximizers, time minimizers discount the value of expected returns exponentially with time. Given subsistence choices with the same expected rates of return, time minimizers will strongly prefer those with the lowest expected time.³

Multiple lines of evidence suggest that western North American hunter-gatherers did not gradually shift from time minimizing to energy maximizing. The success of Numic speaking peoples was remarkable, spreading so rapidly over an area so vast and environmentally variable – the bulk of it occupied by very capable hunter-gatherers who knew its resources and seasons much more intimately. This could only have occurred if the Numic adaptive strategy was qualitatively different from, and superior to, the kind of hunting and gathering it replaced. This makes it unlikely that the more or less

constant force of population growth was a root cause. If population growth were sufficient, western North American groups would have developed the intensive hunting and gathering patterns observed at contact within the first few millennia after New World colonization, certainly by 7000 BP. In the Great Basin population seems to have grown very slowly until about 1400 BP, just before the beginning of the Numic spread, after which it increased almost exponentially. Energy maximizers quickly achieved population densities that were three to four times greater than those of the time minimizers they replaced. This pattern is repeated nearly everywhere in hunter-gatherer western North America and it is consistent with the idea that population growth is the result rather than cause of intensive energy maximizing.

Rapid population growth fairly late in time strongly suggests that energy maximizers solved an especially difficult adaptive problem that had previously limited hunter-gatherer populations. It is unlikely this is the direct result of a major technological breakthrough. The rise of energy maximizing does coincide almost exactly with the appearance and spread of bow and arrow technology in western North America, which is frequently said to explain it. The Numic case is again instructive here, because the spread of Numic energy maximizing occurred at least 400 years after the bow and arrow came into general use in the Great Basin. The peoples replaced by Numic speakers were well-armed time minimizers.

Most of the other observed changes in subsistence technology that occur at this time appear to be the consequence, rather than the cause, of energy maximizing.⁴ It is clear, for example, that while the technologies directly connected with plant procurement and processing became more elaborate and varied (e.g., the seed beater and specialized seed milling tools), at base they were variations on very simple, long obvious, principles that were simply turned to good use when seeds became important. The situation is different with storage, which also becomes much more prominent at this time.

The Evolution of Storage

The technology was simple. The outdoor storage facilities of California and the Great Basin were functional but rudimentary, requiring neither extensive labor nor special skill. And it had long been obvious, that nuts and seeds would remain edible if stored in almost any kind shelter, in caves for example, as the archaeological record demonstrates. What makes storage different from the other technologies connected with plants is that it makes procurement harder; all the others make it easier. To store plants requires an investment of effort greater than is required for daily maintenance, although this is offset by future benefits. Time discounting weighed against storage, but a group saved once or twice from starvation would presumably adjust its discount rate accordingly. It is surprising, then that storage took so long to develop in western North America, the idea and benefits being both so obvious. The problem, of course, is that the extra effort invested in storage is discouraged not just by discount rates, but more fundamentally by the probability that those who did not contribute this extra effort may still lay claim to enjoy its benefits – the well-known “freeloader” problem. Simply put, if stored resources are public goods, the rational forager should gather resources

sufficient for daily use but minimize time spent procuring stored resources to which others can lay future claim.

In a recent piece in *American Antiquity*, Flannery (2002) notes the critical role that the recognition of stored food as private property played in subsistence intensification connected with the rise of agricultural villages. He links this to a change in archaeological ground plans that initially locate storage facilities in the open, suggesting communal storage and common use, then shift to ground plans where storage facilities are cutoff from public view, suggesting private storage and restricted use. He implies that the problem resolved itself naturally: as agricultural settlements grew, the social obligations between individual families weakened and storage was privatized simply by removing storage facilities from public view, walling them off or moving them inside the family dwelling. This is surely wrong. (Hayden, too, seems to treat the transformation too lightly, as though it were unproblematic; Hayden 1995).

Moving stores into dwellings may signify that privatization has occurred, but could not possibly have precipitated it. The use rights that the members of sharing hunter-gatherer communities enjoy to resources acquired by others are jealously guarded. Despite the outward conceit that everything is freely given without expectation of an equal return, people are careful to note what is going in, what is going out, and to whom. The stingy are heavily censured and punished far more than laggards, who are merely held in contempt. That the members of sharing communities place stores in public view is less a matter of community camaraderie than of mutual distrust: people suspect others are hoarding and fear being identified as hoarders themselves. A residential segment removing its stores from public view would confirm these suspicions, bringing negative social sanctions immediately into play. The force of this increases rather than decreases as community size grows; as Winterhalder (1996) shows, the overall utility of sharing (resource transfers) increases with group size. Under these circumstances it is unthinkable that stores could be transformed into private property merely by removing them from public view. Even in the largest community, this would not be taken lightly.

To the extent that it depends on the idea of food as private property, storage is a frequency-dependent public goods problem. Despite its obvious benefits for individuals, storage cannot be the innovation of a bright individual whose success is then emulated by others. The few can never hide stored resources well enough or defend them forcibly enough to escape the claims of the many. For storage to develop in full, there must first be a shared group tenet that stored food – and more generally all harvested food – is restricted (private or family) property. This does not assure that people will not clandestinely pilfer, or openly seize, food from others; it merely means that this will be regarded as stealing.

Community size and privatization are probably connected, but perhaps not in the way Flannery suggests. By protecting the labor that individuals invest in stores, privatization may encourage larger communities, but larger communities alone do not encourage privatization. Community size is determined by what communities do. Sharing groups that form large communities likely do so because circumstances require large pools of sharing individuals, for example, where prey size is large but individual capture rates are low or highly variable. Storage and privatization can evolve in these circumstances only if socio-political institutions develop to enforce them, which is

scenario envisioned in traditional accounts of cultural evolution. Alternatively, privatization leading to storage can evolve without socio-political enforcement, by group selection, where relatively constant foraging returns diminish the benefits of sharing enough produce small, isolated kin-limited groups. Privatization ultimately developed in this latter (small group) context in the Great Basin (see further below), but there are suggestions of earlier experiments in the large group context.

It is impossible to be sure, but there are hints that in the first few centuries A.D. the atlatl-using groups of the western Great Basin attempted a socio-political solution of the conflict between storage and sharing in large groups. The evidence comes from rock art, which in the western Great Basin is predominantly abstract (Heizer and Baumhoff 1962). Representative glyphs are few, mainly animals and their tracks. Anthropomorphs are particularly rare, especially in comparison to Fremont rock art (and the pre-Fremont Barrier Canyon style from which it may have derived), where life-size anthropomorphs dominate (Schaafsma 1971). The western Great Basin preference for abstract expression admits one glaring exception, the rock art of the Coso Range, southeastern California, dating roughly between 1000 BC and 1000 A.D., which features impressively large human figures and mountain sheep (Grant, et al. 1968).

What the life-size Coso and Fremont anthropomorphs seem to convey is a notion of power that resides in humans, presumably special individuals, living or dead (ancestors), rather than in nature. It is tempting to connect the Coso (and Fremont) anthropomorphs with the emergence of the kind political leadership that anthropologists call "the great man" (Hayden's "entrepreneur"; Hayden 1995), who gathers followers around him through a combination of hard work, talent, and charisma. This seems important because one obvious way to resolve the conflict between sharing and storage, which pits individuals against groups, is to subvert the interests of individuals to the interests of a group drawn together and led by a charismatic individual. Storing and sharing are not in conflict if the interests of individuals are identified with the interest of the group. That Coso art also features immense, uniquely stylized mountain sheep (the horns appear head on rather than in side view as was true everywhere else in North America) further hints that hunting success, and perhaps the ability to organize and lead successful communal hunts capable of supplying large feasts, may have provided the nexus of leadership around which such groups formed.

The force of great man leadership might have been sufficiently strong to allay individual misgivings about contributing to other group activities, including the communal storage of plant food for use in times of shortage. Hayden (1995) argues such a scenario provided the fulcrum for the development of more complex socio-political formations and inequality. The authority of great men is nontransferable (e.g., from father to son or brother), but eventually great men solidify their grip on the communally generated surplus, the means of its production, and evolve into hereditary chiefs at the apex of systems in which resources are stored and privately owned. In the Coso Range, however, any possibility of this was cut short by the appearance of the bow and arrow, which dramatically changed the way game was hunted, and thus the basis of social groupings organized around atlatl hunting.

The most important consequence of the introduction of the bow to California and the Great Basin was decreased residential group size. In contrast to its predecessor, the atlatl or spear thrower, the bow could be shot more accurately at smaller, more

distant targets, and several times in succession without alarming prey. Wounded prey died by hemorrhage (not impact), and could be ambushed and effectively tracked by individuals. By increasing the rate, and decreasing the variance, of hunting success, and by making it practical to target smaller prey less subject sharing, the bow diminished the importance of group hunting, sharing (which centered around large game), and the size of sharing communities. Paradoxically, the advent of bow and arrow technology probably caused the dietary contribution of plants to increase. The bow made more meat available, but a disproportionately large fraction of it was fat-poor small game whose consumption had to be offset by greater inputs of plant fat and carbohydrates (Cordain, et al. 2000). Plant procurement, however, did not govern the pattern of seasonal movement, which remained geared to maximizing the acquisition of less costly but more risky large game. With the advent of the bow (and the increased use of plants), these risks diminished, and residential groups grew smaller and more kin-restricted, the superiority of the bow as an offensive and defensive weapon further contributing to their isolation and autonomy. From this point to contact, these small, autonomous kin-based groups were the dominant socio-political unit of California and the Great Basin (indeed, most of western North America). Archaeological evidence suggests these small social formations were only moderately successful in coping with risk.

Throughout the Great Basin, the centuries immediately following the introduction of the bow and arrow are distinguished by settlement systems more tethered to wetlands than any time earlier or later. This is only partly due to the high quality plants and variety of small game (fish, frogs, birds) that could now more effectively taken from spring to fall; other communities afforded equivalent or better opportunities. What sets wetlands apart is winter resource opportunity. It is possible (barely) to eke out a living on wetland plants, fish, mollusks, and game in the dead of winter, when resources are scarcest. The wetlands intensification that coincides with the advent of the bow thus suggests a fallback tactic of small isolated hunting groups, who lacked the safety net formerly provided by social aggregation and sharing and were often reduced to scrounging for odds and ends in winter marshes.

The plant staples of ethnographic fame, the acorn and pinenut, became more important during this time, more in some places than others, but the wetlands focus shows that the ethnographic pattern of acquiring and storing them in bulk for winter use had not yet developed, presumably because the private property problem remained unsolved. Nuts and seeds are individually too small to worry about dividing, but when stored in quantity clearly ARE valuable and subject to claims by groups with smaller stores or none at all, say because they arrived too late in the season. Because the pinenut and acorn are either spatially restricted or productive in only a few places in poor years, the sharing problem re-emerged every time many independent kin groups converged on a few favored localities when crops were regionally scarce.

Two elements probably aided the transition. For one thing, the newer pattern of small, autonomous kin groups must have partly transformed the idea of that acquired resources were public goods into the idea they were kin goods. Residential groups continued to share, but the basic residential group was now a kin group, thus claims to acquired resources were guaranteed by kinship rather than residence. This transformation remained incomplete, however, because these same autonomous

groups almost certainly continued to join in communal procurement (e.g., game drives) to support periodic ritual or social aggregations that were essential to finding mates, exchanging information, and the like. The sharing of resources that supported these aggregations continued to reinforce the traditional notion that resources acquired by large social aggregations (as one might find at pinyon or oak groves) were public goods available to all. The spectacular increase in hunting productivity the bow may have provided the final push to privatization permitting storage in these problematic communal settings.

Large game hunting peaks in the fall when deer, sheep, and elk have developed prime pelts and substantial winter fat reserves. Acorn and pinenut are harvested in the same season, often in the same places. Despite this juxtaposition, the proceeds of these two activities (meat and nuts) were ethnographically subject to very different rules. Throughout California and the Great Basin large game was generally shared public goods; nuts (and all gathered food) were invariably private goods.⁵ Thus, privatization materialized in a setting (fall nut groves) where both game and nuts were abundantly available simultaneously, and through a process that made one (nuts) private goods but kept the other (game) public goods. Surely this is not a coincidence. Rather, it is reasonable to speculate that nuts became to be regarded as private property precisely because game was simultaneously abundant – and more attractive. The bow made it possible for individual hunters to acquire and distribute enough highly valued meat at fall nut camps to discourage further claims to nut stores acquired by their wives. Most families would benefit more by restricting their sharing rights to the meat generated by a good hunter than by generalizing them to include the nuts gathered by his wife, which risked the possibility the good hunter might either decamp or cease hunting.⁶ That good hunters were frequently noted warriors, and obviously handy with a bow, would have been an added incentive for self-restraint in insisting on sharing rights.

The unusually high frequency of sororal polygyny that distinguishes California and the Great Basin from the rest of western North America (Jorgensen 1980), in combination with an ethnographically prevailing pattern in which outstanding hunters were the most likely to marry polygynously, preserves practices that contributed the scenario described above. That there remained so a strong connection between polygyny and hunting success in ethnographic times is remarkable because gathering was by then vastly more important than hunting. It surely reflects a pattern that substantially predates the intensive use and storage of plants (ethnographically, rates of polygyny and dependence on hunting are highly correlated). The institution was pre-adapted to intensive plant procurement, however. A man with two wives would be able to set aside substantial nuts stores, even while sharing some with other less well to do families. Within this basic pattern, the sororal form of polygyny special to California and the Great Basin likely developed as the nut economy intensified. Sister pairs would be attracted to such unions because of the social distinction given to hunters, because their labor would be lessened by an economy of scale (by splitting procurement and processing duties, for example), and because benefits of that labor would be restricted to genetic near-duplicates (nieces and nephews). Even in ethnographic times, polygyny was relatively rare. Nevertheless, it is quite thinkable that these high profile unions established a standard of provisioning that monogamously married women were forced

to emulate, and that this further drew the peoples of California and the Great Basin into a rising spiral of plant intensification.

Aftermath

Much of what transpired following the privatization and storage of nut crops is unremarkable, or at least quite predictable and probably occurred almost immediately.

1. Privatization was generalized to all plants (all female gathered food). Because they were routinely acquired by small, isolated residential kin groups and hidden in secret caches, these taxa were effectively private goods long before the major nuts staples, but could not be used in the presence of other groups, with which they would then have to be shared. Extending privatization to all gathered food opened the possibility of forming larger residential groups.

2. Increased reliance on stored food diminished the incentive for, and possibility of, residential mobility and groups became more sedentary (store-tethered). In California territoriality then rationalized the relationship between people and natural resources in the presence of these conditions. Emphasis on the less reliable pinenut normally precluded this in the Great Basin, but territories invariably formed in localities favored with reliable lowland grasses (Owens Valley, Reese River). Elsewhere, groups aggregated at different groves with different people each fall, following established conventions: groves were public property (first come, first served); gathered nuts were private property. This recalls the old Dyson-Hudson and Smith (1978) generalization that territoriality is the product of environments with resources that are abundant and predictable. As we have seen, however, conventions of ownership strongly determine resource abundance and predictability (e.g., by encouraging storage, privatization makes acorns abundant; that they are private also makes them reliable). Thus, it is quite possible that the Dyson-Hudson and Smith relationship is driven by the interests of individuals seeking to increase the benefit they derive from the resources they acquire, which causes them differentially to target resources that **can be made** abundant and reliable through an appropriate combination of intensive labor and conventions of ownership. The tribelets of California seem to have developed this way, for example (see below).

Observations

In a way, all the above is merely prologue to the issues I want to deal with. At the beginning, I argued that the ethnographic situation in California and the Great Basin was at odds with the conventional wisdom about cultural evolution. I have already shown, at least I have argued, that the replacement of hunting and gathering by agriculture anticipated in most culture evolutionary schemes not only did not occur prior to Euroamerican contact (even in places well-suited to agriculture) but in all probability would **never** have occurred without some cataclysmic change originating outside the system (as eventually happened). By any objective standard, hunting and gathering evolved beyond agriculture and out-competed it. With only minor exceptions (e.g., the

militaristic River Yumans, who mostly preyed on other agriculturalists; Jorgensen 1980), there were no agricultural expansions in western North America after A.D. 1200; the most important expansions were by hunter-gatherers at the expense of agriculturalists and other hunter-gatherers. It is possible to view this as a simple function of population density. Agriculture supported the very highest North American population densities – but only in one or two southwestern localities. Hunter-gatherer densities in California and the Northwest Coast substantially exceeded agricultural densities everywhere else. Competitive success and population density, of course, are not what most theorists have in mind when speaking of cultural evolution. They are mainly concerned with inequality and socio-political complexity, which are taken as measures of evolutionary development: evolved systems are complex; un-evolved systems aren't. Competitive success and population density are epiphenomena of this development.

This is the view I wish to question. It implies that cultural evolution should be viewed as a process that proceeds from the “top down”, i.e., that formal socio-political structures provide a framework that supports and enforces the myriad behaviors that account for the gains in productivity and population density that are the signs of cultural development. The outlines of this argument are familiar and do not require extensive review. In brief, development occurs through institutions that increasingly concentrate and channel resources and power from lower levels (individuals and families) to higher levels (head men, great men, and chiefs). Production at the lowest level increases in response to demands from higher levels. Inequality equates with complexity, and political development equates with behaviors that increase inequality (e.g., warfare). Hayden argues that ambitious, strategizing men are behind all this, but a multitude of other explanations have been essayed over the years: technological change (Childe 1951), warfare (Carniero 1970), irrigation (Wittfogel 1957). Whatever.

An Alternative Mode of Cultural Development

The hunter-gatherers of California and the Great Basin suggest an alternative mode of cultural evolution that proceeds not from the “top down” through cultural institutions but from the “bottom up” through cultural conventions that evolve through supra-individual selection (group, regional, etc.) or related frequency-dependent processes. That such processes must be involved is nicely illustrated by Numic-speaking groups, who were legendary for lacking any social, political, or economic organization beyond the bilineal family band or kin clique (Steward 1938).⁷ Naturally there were no formal dispute-solving institutions. The autonomy of these family bands was absolute. Groups joining communal game drives temporarily relinquished authority to a captain (whose authority ended at completion of the drive), but were free to leave without notice, or not join at all, as they pleased. These groups were without territories. As Steward (1938) observed, they shifted winter residence so often, from one nut grove to another, that holding and defending territories was pointless. Despite this apparent anarchy, and in the absence of any organization to enforce it, Numic groups universally respected the food gathered by other Numic speakers as private property, making it possible for families of complete strangers to gather and store pinenuts for their private use side by side, or at least in the same general neighborhood. This convention was the

key to Numic plant intensification and the rapid expansion of Numic peoples across the Great Basin at the expense of groups lacking it and the intensive plant procurement it promoted.

The major differences between California and the Numic Great Basin are readily traced to the greater reliability of acorn, which was the basic staple everywhere it grew (even the fish-rich northwest). Groves that were productive year in – year out were the core of subsistence territories whose margins were well defined and routinely patrolled by hunters who monitored movements in and out (territory cores were for gathering, territory peripheries for hunting; Jorgensen 1980). Territory-owing groups assumed a variety of socio-political forms, but almost invariably comprised one or more households made up of patrilineal kinsmen (normally father and sons). The dominant organization was the *tribelet*, comprising several such households, unrelated to each other, usually distributed in one major village and three or four outlying hamlets (Kroeber 1962).

Tribelets were generally headed by the senior male of the largest or wealthiest kin group, who was generally advised by the senior males of the other kin groups or a shaman, and was often assisted by a senior from another kin group (Jorgensen 1980;). They helped settle community disputes, organized major tribelet functions, and coordinated preparations for war and defense. However, because individual household groups usually retained ownership of, and absolute authority over, key subsistence areas, the authority of headmen was limited and exercised by mainly by suasion. Headmen occasionally sought to enhance their limited authority through alliances with feared shamans (e.g., among the Yokuts and Mono). More frequently, the shamans, assistants, and elder councils were separate loci of power that limited what headmen could do.

Tribelets were small (50 – 250 individuals), economically and politically autonomous, and fiercely independent (Kroeber 1962). They maintained mutually beneficial relations with neighboring tribelets in trade, marriage, and ceremony, but were exclusively self-interested. They did not routinely support these neighbors in war, for instance. Nor did they engage in any of the practices that hunter-gatherers normally use to establish external alliances, for example, the binding of unilineal kin groups in wife-giver, wife-taker relationships through cross-cousin marriage. Descent was more frequently bilineal than unilineal (increasingly so through time in northern California), and first (cross) cousin marriage was vanishingly rare and never a strategy for alliance building (Jorgensen 1980).

Jorgensen (1980) marshals convincing evidence that the California tribelet evolved as a defensive response to growing population, formerly autonomous household groups joining together for mutual defense of their individual territories. This fits the predominantly defensive pattern of warfare in California. Groups invested much more effort in defense than offense. Raids were motivated mainly as reprisals for the killing of a warrior or the poaching of resources. Raids for booty (including food) were less common. Territorial expansion is never mentioned as an important motive. Territories shifted, of course, but the major boundaries were firmly entrenched by sheer force of population density, which was a function of intensive plant procurement promoted by rules of resource ownership that extended to very small kin groups – and in some places to individuals (see below). The most recent ethnic penetrations – Athapaskan and Wintuan – occurred perhaps 1000-500 years ago. Although these

groups seem to have been more politically unified at the time, they did not replace the more simply organized, but quite densely settled, tribelets. They simply squeezed between them – and frequently then assumed the tribelet as their organizational form.

Contrary to expectations arising from traditional culture evolutionary theory, California developed and intensified by growing small and remaining simple. Groups did not intensify through offensive warfare, territorial expansion, and the development of complex or non-egalitarian political structures. They intensified by maintaining household autonomy and resource use rights, by allying households only in ways that did not fundamentally compromise that autonomy and those use rights, by contracting into territories that could be easily defended, and by maintaining strong defensive fronts. At the heart of this was private property. As Jorgensen (1980) astutely observes, the ownership of key resources by small kin groups (and, by extension, the strategies they used to maintain these rights of ownership) seems to have been the principal force that limited the development of complex sociopolitical institutions in California. Paradoxically, it was precisely this lack of complexity – and the maintenance of private use rights by households – that was the primary motivation for hunter-gatherer production at levels rivaling, and frequently exceeding, those of more complexly organized hunter-gatherers and agriculturalists.

Implications

What seems misguided about the conventional understanding of cultural development is the assumption that complex structures can do important things that simple structures can't. Presuming that complexity *per se* is only a means to an end, it is worth asking what those ends might be. Production, possibly, as in Leslie White's classic formula that equates level of cultural development with the harnessing of energy. Traditional treatments make it clear that complex institutions can motivate increased production and increase its flow. The minimally organized tribelets of California demonstrate that production can intensify essentially to the same levels in the absence of such institutions, without the structural overhead they entail, and thus with greater economy.

I argued earlier that something like group selection was a major force in the alternate mode of cultural development I am proposing and illustrated this by showing that the Numic concept of gathered resources as private property arose as a convention without any formal organization to enforce it. I also noted that the expression of this process was limited by the vicissitudes of natural environment in the Numic case, and more fully expressed in California, where the concept of private property was extended to land and resources claimed by household kin groups not much larger than Numic family bands. The alliance of these groups in defensive tribelets clearly shows that more than just group selection was at work; political organization did, in fact, become more complex to protect private property. That households within tribelets continued to hold their own property, however, demonstrates this tendency (to organizational complexity) was quite limited. That group selection was the more potent force, and essential to the tribelet form of organization itself, is illustrated in two highly sophisticated patterns of economic behavior, individual private property and money, that were present in

California but not in the more politically complex Northwest Coast (or in the Southwest, for that matter).

Individual Property. As Jorgensen points out, the concept of private property was more broadly applied in the Northwest Coast than in California; more things and more kinds of things were owned. Northwest Coast property, however, was always kin group property. The Northwest Coast great man held wealth in the name of the kin group to which he belonged, which limited what he could do with it. This was also true for most of southern and central California, but north of San Francisco, property was increasingly held by individuals, and in northwestern California – among the Hupa, Yurok, and Karuk, all the best property (fishing spots, oak groves, and exotic valuables) was invariably owned by individuals who were free to sell, trade, or bequeath it as they wished. This is not especially surprising unless it is understood that these northwestern groups, just like the Great Basin Numic, ***lacked any political organization at all.*** Hupa, Yurok, and Karuk individuals held and dealt in property in the absence of any political structure that protected their individual interests. Indeed, the individuals speaking these three groups freely engaged in transactions that moved property across these ethnolinguistic boundaries, again in the absence of any organization that guaranteed their rights. This can only have evolved through a group selection-like process.

Money. Because it facilitates the accumulation and circulation of value, money ranks even higher as a production-promoting institution than private property – and is much more rare. True fixed value currency (not simple valuables) was absent everywhere north of Mexico except cismontane California, where it was almost universally present (the tusk-shaped *dentalia* shell in the very north, clam-disc beads everywhere else). Money in California is certainly connected with the pattern of property holding by very small units – household groups and individuals – that (unlike hunter-gatherer groups elsewhere in North America and around the world) frequently did not grant temporary procurement rights to others whose resources had failed. At the same time, these units and their holdings were so small that occasional resource shortfall was virtually guaranteed. Money made the whole thing work. In a system comprising many fiercely independent property-holding social units that were covetous and deeply suspicious of their neighbors, money facilitated the transfer of resources (from places where they were abundant to places where they were scarce) without social entailments or obligations, that is, without significant sociopolitical overhead. No organization incorporated the many property holding groups and individuals and ethnolinguistic groups among which California money circulated. No organization issued it. No organization supported the price structure that developed around it. Money was universally accepted in transactions between total strangers that routinely cut across political and ethno-linguistic boundaries. In short, this most sophisticated of economic instruments developed in the absence of the kind of complex sociopolitical structures that traditional culture evolutionary theory assumes are necessary for such things.⁸ As with individual private property, a group selection-like process must have been involved.

Conclusion

It is appropriate to close with a quote from a text that Kroeber prepared in connection with the California Indian Claims Case (Dockets 31-37). He is attempting to

enlighten a court familiar only with western institutions and property law in regard to the situation in aboriginal California.

“Consequently, the absence of any political machinery expressed in writing or by formally constituted authority must not lead us into thinking erroneously that there was no law, that there was no property, that there was no ownership. Property, ownership, the difference between right and wrong were recognized as definitely as among ourselves, though in different ways. Their enforcement was more by common consent than by any specialized institution for their purpose” (Kroeber 1962).

At root, that is why corn never came to California.

Notes

¹Caldwell argued that because North America did not follow it, the Latin American sequence was a Latin American culture history, not a general evolutionary sequence)

²Assuming, of course, these groups were not the direct agents of agricultural withdrawal.

³ Time minimizers, then, may favor activities that produce lower rates of return than those that produce higher rates of return but take longer. Similarly, all else being equal, time minimizers will favor risky alternatives over less risky ones. Given alternatives with the same mean time and mean return, time minimizers will prefer those that are less time certain, i.e., those whose lapsed time varies more around the mean.

⁴ For example, the snares and traps reflecting the use of small game that become common are widely regarded as a signature of the expanding diet breadth associated with energy maximizing. More likely, they reflect increasing reliance on plant foods, especially nuts and small seeds, on which energy maximizing rested everywhere. Simply as a function of body size, rats, gophers, mice, and rabbits store too little fat to be important in any diet that does not offset small game protein with major sources of either fat or, as in the case of energy maximizing, plant carbohydrates.

⁵ Surprisingly, almost all publicly-enacted fertility rituals in California – first fruit rites and the like – were directed to things like plants and fish that were private property, but not to game, which was public property.

⁶ I have noted elsewhere that nuts were more likely candidates for privatization than meat (or roots, or fish) because nuts are “back-loaded” in the sense that labor involved in using them is delayed to the very last. They are easily acquired and stored; most of their cost is incurred in preparing them for immediate consumption. This makes them relatively unattractive to freeloaders, who receive a product that still require extensive processing. Meat (and roots, and fish) are “front-loaded” in the sense that most of the cost is incurred well before consumption. Meat is harder to procure, and much harder to store, than nuts, but is relatively easy to prepare subsequently for consumption. This makes it especially attractive to freeloaders, who receive a product that can be either consumed without much effort or stored with moderate effort.

⁷ This is the nuclear family (father, mother, children) plus an undefined and variable assortment of relatives not attached to another family band: unmarried adult sons and daughters, father’s or mother’s unmarried sister(s), and father’s or mother’s elderly (usually widowed) parents.

⁸ Indeed, the generalized use of money in all exchanges, even with close kinsmen who were expected to pay full value for everything, served to level the tendencies toward inequality that were fostered elsewhere by informal modes of exchange between high-ranking kinsmen.

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