

Agriculture and the Origins of the State in Ancient Egypt

Robert C. Allen*

Department of Economics, University of British Columbia

In Egypt, state formation occurred much more rapidly after the adoption of farming than in many other parts of the ancient Near East. Furthermore, the Egyptian state lasted longer and was more stable than most Empires established elsewhere. This paper argues that successful states in the ancient world depended on the ability of elites to extract a surplus from farmers and other producers. This ability was greatest when the population was immobile. The success of the Pharaohs was due to the geography of Egypt—the deserts bordering the Nile meant that habitation was confined to the valley. Farmers could flee tax or rent collectors only along the river. The population control problem was, thus, simpler than elsewhere and was the reason a unified state was created and lasted for millenia. © 1997

Academic Press

According to tradition, the Egyptian state was established around 3000 B.C. when Menes, King of Upper Egypt, conquered the Delta, unified the country, and created a regime that lasted, with only two brief interruptions, for almost 3000 years. Writing, government bureaucracy, corvée labor, warfare, and monumental architecture quickly followed. The result was one of the first great civilizations.

How can this civilization be explained? The origin of the state has been a central problem for anthropologists and archaeologists since the 1950s, and several approaches have been proposed. Some of these have been applied Egypt, although, it should be noted, the exceptional nature of Egyptian society has rendered its history peripheral to the main lines of social science inquiry (Mann 1985). This is unfortunate, for Egypt is important in its own right, and understanding Egypt clarifies the factors operating in other situations.

The point of departure for all recent scholarship is V. Gordon Childe's highly influential *Man Makes Himself* (1936). Childe reformulated evolutionary theories of human development (like the Marx–Engels stage theory of history) in terms of modern archaeological knowledge. In essence, Childe argued that the invention of agriculture created a food surplus that allowed the emergence of cities and a state bureaucracy. The emphasis on agriculture as precondition for the state has

* I thank Kathryn Bard, Karl Butzer, Evsey Domar, Stan Engerman, Neil Guppy, Ashok Kotwal, Carl Lamberg-Karlovsky, Richard Pearson, Gideon Rosenbluth, Tony Scott, Scott Taylor, Peter Temin, and Bruce Trigger for helpful comments and discussions. Remaining errors are my own.

persisted, with some criticism (Price and Feinman, 1995), in modern work. The problem is to analyze whether agriculture inevitably leads to state formation and, when the transition occurs, how and why it happens. Five main approaches have been taken to these questions.

The first approach is the hydraulic theory of Steward (1949) and Wittfogel (1957). This interpretation owes much to Childe himself. According to this view, the state emerged to construct and manage irrigation systems in the Nile flood plane. The theory has been discredited, in the case of Egypt, by Butzer (1976), who pointed out that basin irrigation was a small scale matter organized at the local level rather than by the Pharaoh. Park (1992) has persuasively argued that local irrigation accompanied by some inequality in access rights to land—but not the mammoth state apparatus found in Egypt—is an efficient response to the problems posed by flood recession agriculture in arid regions.¹

The second approach postulates population growth as the cause of increasing complexity. According to Johnson and Earle (1987), all species, human and otherwise, tend to expand their number. The growth of population within any mode of production leads to diminishing returns and eventually to the reorganization of society in a more complex and efficient form. One problem with this theory, so far as Egypt is concerned, is that the Nile Valley was underpopulated—not overpopulated—at the time the Egyptian state was created. The Pharaoh's rule was not the result of diminishing returns to labor in Egypt.

The third approach emphasizes trade.² There was considerable trade between Egypt and the Near East in the Predynastic period. Sumerian cylinder seals excavated at Buto in the Delta show that there was contact between Sumer and Egypt immediately before the unification of the country and raise the possibility that idea of a state was imported from Mesopotamia. On a more mundane level, the predynastic period witnessed an expansion of river traffic on the Nile. Boats were made with cedars imported from Lebanon, while gold from Upper Egypt was an important export. Upper Egypt, thus, had a stake in both the import and export trade of the Delta, which may have provided a motive for political intervention. Certainly, after unification, the Egyptian state monopolized international trade and the production of tradable goods. (Trigger, 1993, p. 74).

The fourth approach is the ecosystems approach.³ It emphasizes that states emerge when they are efficient adaptations to the natural environment. Ecosystem theorists reject single cause theories as oversimplified. Instead, they envisage the world as an elaborate feedback system involving many variables. Rulers are important as managers who may increase the efficiency of the system. A system will prosper only if its efficiency grows, taking full account of the unintended consequences of actions as they are amplified through the social feedback loops.

¹ See Ostrom (1988) for a discussion of parallel situations.

² On the general importance of trade in the ancient near east, see Sabloff and Lamberg-Karlovsky (1975).

³ Important examples include Binford (1962), Flannery (1967), Sanders and Price (1968), Redman (1978), and Streuver and Holton (1979).

Most applications of ecosystem theory have been to societies besides Egypt, although Butzer (1981) has suggested viewing Egyptian development in these terms.

The ecosystem approach has been criticized for several reasons. The emphasis on successful system adaptation obscures the roles of gender and class conflict (Brumfiel, 1992). Indeed, the usual view in system theory is that everyone gains from successful social innovation. Moreover, the possibility of working all potential causal factors into the model is a weakness rather than a strength: By emphasizing the complexities of dynamic interaction, simple regularities disappear from view.

My analysis of state formation in Egypt emphasizes environmental factors (like ecosystem theory) and class conflict, which plays little role in that approach. A point of departure for my analysis is the fifth approach to explaining the origins of the state—Carneiro's (1970) circumscription theory. He contended that all early states

have one thing in common: *they are all areas of circumscribed agricultural land*. Each of them is set off by mountains, seas, or deserts, and these environmental features sharply delimit the area that simple farming peoples could occupy and cultivate.

He contrasted the regions with states to places like “the Amazon basin or the eastern woodlands of North America, where extensive and unbroken forests provide almost unlimited agricultural land” (Carneiro, 1970, pp. 734–735).

Carneiro reasoned that circumscription was related to state formation in the following way. In Peru, where states emerged, settlement was in narrow valleys. As population grew, land became scarce, and its rising value led to war. When a village was conquered, its population was enslaved or forced to pay tribute to the victor. A state resulted. In contrast, in the Amazon basin, warfare did not lead to enslavement but rather to the flight of the defeated to establish new settlements on unoccupied land. So states emerged where population movement was circumscribed but not otherwise. To economic historians reared on Domar (1970), these thoughts have a familiar ring, although differing in some important ways.

Service (1975, p. 226) pointed out the applicability of Carneiro's theory to Egypt, where the deserts hemmed in settlement along the Nile. Bard and Carneiro (1989) explicitly applied the theory to Egypt arguing that rising population in the late Predynastic led to warfare between villages, which eventually resulted in the unification of the whole country.

There is a very important grain of truth to Carneiro's theory: The deserts bordering the Nile did, indeed, limit the chance of flight, thereby simplifying the establishment of nonproductive social classes. However, Carneiro's insistence that the military conquest that formed the state was preceded by a full occupation of the land does not apply to Egypt and, furthermore, obscures the logic of the situation. While war and empire in Peru may have proceeded as Cairnero states,

the salient fact of Egypt is that state formation occurred when the population density was low.

In addition to this fact, there are three others with which any theory of the Egyptian state must contend.

First, as many historians have remarked, Egypt was an agrarian civilization while other early states were based on cities. The study of Egypt, therefore, can proceed without consideration of the urban economy.

Second, the relationship between the adoption of agriculture and the rise of the state was different in Egypt from other parts of the Near East. In Palestine, Syria, and Iraq, there was a lag of perhaps 5000 years between the neolithic revolution and the rise of the state. In Egypt, the lag was much shorter, perhaps 1000 years, and much of that period included warfare among incipient states that was part of the process of state formation in Egypt. "The beginning of the First Dynasty was only about 1000 years after the earliest farming villages appeared on the Nile, so the Predynastic period, during the 4th millennium B.C., was one of fairly rapid social and political evolution" (Bard, 1994a, p. 267). Why did the adoption of agriculture unleash a dynamic that led to a unified state in Egypt while no comparable process occurred elsewhere in the Near East?

Third, the Egyptian state governed a broad territory—namely, the whole Nile Valley from the First or Second Cataract to the Delta—and lasted about 3000 years. In other parts of the ancient Near East, there were many attempts to establish empires over wide territories, but these states always collapsed in short order. Even though the Pharaonic regime fell twice, it was reestablished quickly. In Egypt the stable political order embraced the whole country; elsewhere broad empires were unstable. Why?

The answers to these questions lie ultimately in geography and the technology of food production. However, these factors were significant only through their effects on the relationships that obtained among Egyptians. I will analyze those relationships in terms of the logic of exploitation. In other words, I will show that the geography of Egypt presented a would be ruling class with a peculiar set of possibilities, and that the Pharaonic state was the sort of political system that best served the interests of such a class in such an environment.

This approach is somewhat at odds with theories that claim that all Egyptians gained from Pharaoh's rule (e.g., Janssen, 1978, p. 227; Hassan, 1988, p. 170). Even if it was true that the standard of living of the peasant under the Old Kingdom was higher than that of his forager ancestors—a proposition that has never been proven and that is doubtful in view of much paleopathologic evidence⁴—it would not follow that the rate of exploitation had not also increased. I take it that there was little exploitation in the predynastic hunting and

⁴ The evidence from many cultures summarized in Cohen and Armelagos (1984a) shows a decline in physical well-being fairly shortly after the adoption of agriculture. In many cases, however, the adoption of farming led to a temporary improvement in living standards. See, in particular, the concluding chapters by Roosevelt (1984, pp. 572–578) and Cohen and Armelagos (1984, pp. 586–594).

gathering society; in other words, all production in that society accrued to the foragers themselves (Lee 1968). In Pharaonic society, that was certainly not true. The Pharaoh and his family, a host of officials, priests, and scribes, and private landowners (who were also often officials) were supported by the Egyptian peasantry and absorbed a considerable fraction of the country's output (Trigger, 1993, pp. 44–46). Despite the Pharaoh's claim to control the Nile's flood, it is difficult to discern any productive contribution that the Pharaoh, the priesthood, or the aristocracy made. The main function of the Pharaonic state was to transfer a considerable fraction of the income produced by Egypt's farmers to an unproductive aristocracy.

AGRICULTURE AND THE CREATION OF A SOCIAL SURPLUS

Any stratified society presupposes a surplus. In the case of ancient Egypt, there are two relevant concepts of "surplus."⁵ The most fundamental is the "production surplus," i.e., the difference between total agricultural output and the consumption needs of its farmers. The Pharaoh and other members of the privileged class appropriated that surplus and used it to pay officials, hire craftsmen, and support soldiers and servants. The second sense is the "labor surplus," i.e., the difference between the maximum amount of time that a farmer could work over the course of the year and the time he actually worked. In Egypt there was a labor surplus that was mobilized for building pyramids and, perhaps, for fighting wars. The size and even existence of these surpluses depended on the technology of production, in particular food production. The adoption of agriculture was a necessary condition for the Pharaonic state since the foraging economy that preceded it did not generate either a production or a labor surplus that could be utilized off the farm.

Before the advent of agriculture, most Egyptians were engaged in foraging for food along the Nile. The most important foods were catfish and tubers from the roots of wetland plants. Large numbers of catfish were caught when they spawned at the beginning of the Nile flood in early July and again when they were trapped in pools left by the receding river in the autumn. Many were probably dried or smoked, and they might have lasted a few months. Date palms may also have been harvested and acacia seeds gathered in the summer. During the autumn, first the tubers of nut grass and then of club rush were harvested—when they were fresh they needed little preparation—and finally the rhizomes and flower buds of waterlilies were gathered. During the winter, the tubers became less tasty and harder to prepare but seeds from wetland plants became available. In January and February, the wetland plants began to form storage rhizomes. These could have

⁵ See Ghatak and Ingersent (1984, pp. 82–86) for discussion of the various concepts of agricultural surplus. Several anthropologists (e.g., Carneiro, 1970, p. 734) have introduced the important qualification that agriculture may have created the potential for a surplus rather than a surplus per se. My discussion of farm size develops this possibility.

been dug until the July flood began. From February through the spring, dom palm and acacia seeds were in season (Wetterstrom, 1993, pp. 173–179).

While Egyptian foragers could avail themselves of a variety of plants and animals, there was probably neither a labor surplus nor a production surplus that a state could mobilize.

First, consider the labor surplus. There was always a labor surplus in the sense that the foragers were working only a small fraction of the year—at least that is what most studies of hunter–gather societies find (Boserup, 1965; Cohen, 1977, pp. 28–35; Lee, 1968). However, that labor was not available for use anywhere other than in the immediate vicinity of the resources that were being harvested: the foragers had to remain near their established harvesting sites to catch the various foods as they came into season. One can imagine some complexity even in this society if the foragers harvested enough in each season to support priests or craftsmen as well as themselves. But the foragers were not available to fight at the other end of the country or to build pyramids in Memphis since they always had to be on the river catching fish or digging tubers.

Second, foragers probably did not produce more than they needed for their own consumption, so there was not a production surplus. It would have probably been possible to create one, as just argued, if the foragers had harvested more intensively. However, such a surplus would not have done a would-be king much good since the food that foragers produced was, by and large, perishable. Two foods gathered by foragers—dom palm fruits and acacia seeds—were “eminently storable” (Wetterstrom, 1993, p. 179), but the rest, like the tubers and rhizomes, were either perishable or, like catfish, could be preserved for only a few months. If all a tax collector could get from foragers was a load of waterlilies that would wilt by the next morning, what was the point in taxing them? Even dried fish that would rot in a few months were probably not going to be of much help in feeding the capital or the army, especially since fish were available only on a seasonal basis.⁶ Some perishables were perhaps nice supplements to the diet, but a complex civilization required a food base that would not rot quickly. The perishability of their food rendered Egypt’s foragers nonexploitable.⁷

Agriculture made it possible for the state to exploit Egyptians. The food produced by agriculture was much more storable than the food produced by foragers. The transition to agriculture increased food production per hectare and also probably per worker. The seasonality of work in food production also

⁶ Based on modern experience along the Nile, Van Neer (1989, pp. 55–56) reported that “loss of fish meat occurs in the first stages of drying because of the infestation by blowfly larvae. Once the fish meat is dry, dermestid beetles are attracted and within a few months leave nothing but skins and skeletons.” He concluded that fish caught in residual pools after the annual flood “will[,] in our opinion, not preserve until the next inundation.”

⁷ Hawaii is the exception that proves the rule. The main thing that chiefs exacted from subservient villages was feathers rather than storable food (Peebles and Kus, 1977). Obviously, feathers were not perishable. More important, however, Hawaiian chiefs lacked the Pharaoh’s capacity to mobilize and redeploy labor since they could not feed it.

increased. Together these changes created production and labor surpluses that formed the basis of the Egyptian state.

Agriculture was not an Egyptian invention. Wheat and barley, the principal cereals in Egypt,⁸ were first cultivated during the Pre-Pottery Neolithic A in Palestine c. 8000 B.C., and sheep and goats were domesticated in the Taurus and Zagros mountains at about the same time. By 6500 B.C., crops and animals had been combined into mixed farming systems that were practiced across the Near East. Initially these farming activities were pursued in conjunction with hunting and gathering. It was only after 6000 B.C. that the food production system became purely agricultural (Redman, 1978, pp. 88–140; Moore 1985, p. 23, 39–43, 61; Lamberg-Karlovsky, 1988, p. 8; Bar-Yosef and Meadow, 1995).

Much recent research on the origins of agriculture (e.g., Harris and Hillman, 1989) has denied Childe's (1936, pp. 74–117) belief in a sharp break between foraging and farming—the Neolithic Revolution. The revisionists have made their case for those places where agriculture emerged through the domestication of local, indigenous species. For the purposes of this paper, it is important to emphasize that Egypt was *not* one of those places. As just indicated, the important domesticated plants and animals were introduced into Egypt from the Near East and did, indeed, represent a sharp break with past practice. One reason that the shift to agriculture had more far-reaching effects on social life in Egypt than it did elsewhere was because Egyptian agriculture was a foreign transplant very different from the foraging economy that preceded it.

In Egypt, each step in the shift from foraging to farming occurred millennia later than it had in the Near East. Domesticated crops and animals were not used in Egypt until after 6000 B.C. Between 6000 and 5000, they were simply adjuncts to the dominant system of foraging. It was not until 5000 B.C. that purely agricultural villages pursuing a system of mixed husbandry appeared in the Delta and not until 4000 B.C. that they appeared in Upper Egypt (Hassan, 1988, pp. 135, 146; Wetterstrom, 1993, pp. 165–167, 201, 203; Bard, 194, p. 267). It is likely that there was a long transitional phase lasting into the Third Millennium when purely agricultural villages coexisted with settlements pursuing combinations of foraging and farming (Krzyzaniak 1977, pp. 85, 89, 90, 103, 132, 140; Martin *et al.* 1984, pp. 196–197).

The adoption of agriculture affected the food production system in four important ways.

1. *Storability*

Agriculture produced new kinds of foods that had novel characteristics. One such characteristic was storability. As already noted, most of the foods produced

⁸ There is evidence of the harvesting of wild millet and sorghum—and some suggestion that the sorghum was in the process of domestication—from a site in the southern Egypt desert c. 6000 B.C. (Wendorf *et al.*, 1992, pp. 721–724). However, the relevance of this discovery for Egyptian history is limited since agriculture of the Nile was not based on sorghum or millet.

by foragers were perishable or could be preserved for only a short period. Food produced by farming lasted much longer. Grain was routinely kept for a year, i.e., until the next harvest, and some was kept longer. Likewise, livestock is, literally, a “living inventory” of food that can be kept for years by feeding the animals. While the Biblical story of Joseph may be apocryphal, it is not far fetched to believe that food could be stored for years in order to survive famines.

The enhanced storability of food had two important implications for social evolution. In the first place, storability allowed a more effective approach to risk. The well-being of foragers in the Nile basin depended critically on each year’s flood. Too much water or too little sharply reduced the output of food. Domesticated crops and livestock were not immune to vagaries in water flow, but the annual fluctuations in production could be met by building up and drawing down stocks of food—either grain in the barn or meat on the hoof. Early farmers certainly took advantage of the storability of cereals: grain storage pits are among the most common features of neolithic settlements. No analogous structures are found in preagrarian sites.

Second, the enhanced storability of cultivated food made early farmers more exploitable than their foraging predecessors had been. One could feed an army, or the servants in a palace, or the workers on a construction site with grain shipped from other parts of the river valley. By storing grain from one year to the next, these activities could be prosecuted year after year even if there was a very high or very low flood. When Egyptian foragers became farmers, they also became prime targets for tax and rent collectors.

2. Production per Hectare

The transition to agriculture probably increased the production of food per hectare (Bender, 1975, pp. 5–7; Cohen 1977, p. 39). Butzer (1976, pp. 82–84) reviewed evidence about population density in hunting/gathering societies and primitive agriculture. He concluded that agriculture increased the population density—and thus the production of food per hectare—from 30 per square kilometer of utilized land to 120 per square kilometer. In Egypt, this shift had far reaching demographic implications, as will be discussed shortly.

3. Production per Worker

Whether the shift from foraging to farming led to a production surplus depends on what happened to output per worker rather than on what happened to output per hectare. There is no direct evidence bearing on this issue, but we can infer something from collateral evidence.

Clearly, the amount of food a family produced over the course of a year depended on how much land they cultivated and how many animals they kept. There was a minimum size farm that would have produced just enough to support the farmer and his family. Larger scale farms would have yielded a surplus. These farms would also have required more hours of labor to cultivate. Given the low

population density in predynastic Egypt, a theme to be developed presently, many families probably had a lot of choice in the amount of land they cultivated. I suggest that they probably cultivated more than the minimum for two reasons. First, more production would have provided more insurance against risk. Second, more production would have created surpluses that could have been traded for other commodities. This almost certainly happened. In Upper Egypt, for instance, the adoption of farming meant the establishment of permanent villages and the appearance of pottery. More building and more pottery were symptomatic of the production surplus—and consequent division of labor—that followed the shift to farming. In this brief period, Egypt may have been developing the sort of stateless village society that was typical of Palestine, Syria, Iraq, etc. from c. 8000 B.C. to 3400 B.C. or later.

While the shift to farming probably increased output per worker, it may not have increased output per hour worked. Boserup (1965) has argued that the work year increased when agriculture replaced hunting and gathering.⁹ Whether the total number of hours worked per year increased or not, however, is a less important question in understanding the rise of the Egyptian state than is the question of whether farm families produced more than their consumption requirements over the course of the year or, indeed, the seasonality of their work year.

4. *Seasonality of Labor*

Agriculture changed the seasonal pattern of labor and generated a labor surplus that could be mobilized for work away from the farm. The forager may have had free time—even a lot of free time—every day, but he could not leave his foraging area since he could not produce food that could be stockpiled. Agriculture changed that. Employment became seasonal. While this is generally true of farming, it was particularly so in Egypt due to the flooding of the Nile. From July to Autumn, the farmland was under water, so there was little for the farmer to do except tend the animals. Farmers worked intensively the rest of the year cultivating grain. The time of the flood was the time when labor was available for off farm use. This was the labor surplus mobilized for pyramid building.¹⁰

Evidently, the shift to agriculture affected rural life in many ways. Why was it adopted by Egyptian foragers? There are two aspects to this question.

1. What were the advantages and drawbacks of farming compared to the foraging system? The major drawback was probably the greater work effort that farming involved (although, as previously noted, this point has been debated). There were two offsetting advantages. The first was the greater production of

⁹ There is conflicting evidence on the point. Lee's (1968) work on the !Kung San suggests that total hours worked increased with the rise of agriculture. Roosevelt (1984, pp. 575, 577) interpreted the skeletal remains of prehistorical foragers and farmers as showing "that labor costs did not increase but decreased with the implementation of effective agriculture." However, Cohen and Armelagos (1984b, pp. 590–591) interpret the same evidence to mean that foraging increased only peak demands on the muscles and skeleton. Farmers still might have worked more hours over the year.

¹⁰ For discussion of labour organization, see Bierbrier (1982), David (1986), and Eyre (1987).

food. This point is also controversial, for the evidence of prehistoric skeletons indicates that human physical well-being declined with the general adoption of agriculture. There are important examples, however, of an improvement in health following the first practice of farming (Roosevelt, 1984, p. 576). This improvement was later reversed as the varied and high protein diet of the foragers was replaced by a high carbohydrate diet. The second advantage was the production of more storable food. This was of cardinal importance. Together, these advantages provided a way of reducing risk, although the first may not have persisted long after the shift to farming.

2. Why did the shift to agriculture occur millenia after it had been adopted in the Near East? There are three possible explanations: First, knowledge diffused slowly. This may have been a consideration in Upper Egypt, which was a long way from the Near East and which lagged behind the Delta. However, a lag in adoption does not, by itself, prove ignorance. The lag may, simply, indicate that the Upper Egyptians did not find agriculture desirable for either economic or cultural reasons. Second, a practical reason for the lag in the adoption of agriculture might have been the low population density in the Nile valley. Reasoning along the lines of Boserup (1965), the corollary is that the adoption of agriculture was a response to a population rise that could not be accommodated within the foraging mode of production. This theory is hard to accept in view of the underpopulation of predynastic Egypt. It is, perhaps, not a surprise that Egypt is ignored in Cohen's (1977) work asserting that population pressure explains the origins of agriculture. Third, Wetterstrom (1993, pp. 196–198, 225) has suggested that a period of unusually low floods immediately preceded the first experiments with farming c. 5200 B.C. Agriculture was taken up as a way of producing storable foods (grain and livestock) that helped foragers meet shortfalls in consumption in this period. This pressure was maintained from 4750 to 3500 B.C. when Nile flooding was unusually high (Butzer 1976, p. 31). Unfavorable climatic conditions were perhaps the decisive factor.¹¹

MIGRATION AND EXPLOITATION

By 4000 B.C., the practice of agriculture was widespread—but not necessarily universal—in Egypt. The storability of grain and animals had made farming attractive to foragers since it reduced the risk of starvation. Farming, in its turn, generated an output surplus and a labor surplus both of which could be mobilized off the farm. Indeed, the division of labor became more elaborate immediately after the inception of farming. These developments laid the basis for the Pharaonic state, but they did not entail it. Agriculture was practiced for about

¹¹ For analyses of risk in foraging and tribal societies, see Cashdan (1990), Colson (1979), Halstead and O'Shea (1989), Isbell (1978), Park (1992), Smith (1988). Hayden (1990, 1995) and others (cf. discussion in Price and Gebauer, 1995, pp. 17–18) agree that “an occurrence of resource stress or a desire to reduce risk might initiate the domestication process” among “complex hunter-gatherers.” It is not clear how “complex” the Egyptian foragers were.

5000 years in the near East before the first city states were established. Many rulers attempted to establish empires, but they invariably collapsed. Only in Egypt was the state so stable and only in Egypt did its formation follow so quickly the adoption of farming.¹² It is the peculiar geography of the Nile valley that explains those developments.

The Egyptian state was essentially an institution for exploiting farmers, so the importance of geography can be explained only in terms of the economics of exploitation. Recent work by economists and historians such as Domar (1970), Engerman (1973, 1982), and Klein and Engerman (1985), building on the insights of the ethnographer Nieboer (1910), offers a more penetrating treatment of the economics of exploitation than has previously been available. The key question is: How can a nonworking elite extract income from the actual producers? In agrarian economies like Egypt, the answer depends critically on the balance between population and land. When the population is dense and land is scarce, farmers will bid against each other to get farms. Hence, a system of private property and competitive markets are sufficient to generate an income for nonworking landlords. This was the institutional arrangement of eighteenth century England so effectively analyzed by Ricardo.

The situation is different when labor is scarce and land is abundant. In that case, land does not command a rent, and labor is valuable. The ownership or control of labor—rather than land—is the basis of wealth. The Egyptian situation—especially at the end of the predynastic period—is closer to this paradigm, as I will show.

The scarcity of labor is implicit in the different population densities supportable by foraging and farming—roughly 30 persons per square kilometer of harvested land for the former and 120 for the latter. At these rates the shift from foraging to agriculture would have increased the Egyptian population from just under a half million to almost 2 million.¹³ These calculations, which of course indicate only orders of magnitude, assume that all of the harvestable land was utilized. Butzer (1976) thought that, in fact, much land was underutilized in the fourth millennium so that population was only about 350 thousand c. 4000 B.C. A population of 2 million was not reached until about 1800 B.C. Reclamation, productivity growth, and further utilization increases pushed the population to a high of almost 5 million c. 150 B.C. Clearly, Egypt was underpopulated at the time the Pharaonic state was created.

The underpopulation of the Nile valley at the inception of agriculture meant that Egypt was a “frontier” economy—there was about 6 times as much land available as there were farmers to crop it.¹⁴ At the beginning of the Old Kingdom,

¹² There are examples in other parts of the world of a similar lag between the adoption of farming and the rise of the state. See Pearson (1992, pp. 85, 129–151) for the case of Japan.

¹³ Following Butzer (1976, p. 83), I assume that there were 16,100 square kilometers of cultivable land. Multiplication by 30 and 120 gives populations of 483 and 1932 thousands.

¹⁴ The area of harvestable land c. 4000 B.C. (16,100 square kilometers) would have supported 1932 thousand people at a density of 120 per square kilometer, and Butzer (1976, p. 83) estimated the population c. 4000 B.C. to have been 350 thousand.

population density was highest in Upper Egypt—in particular, in the far south between Aswan and Qift and much further down stream immediately before the Delta. The very long, intervening stretch of Nile was not fully settled until the Christian era (Butzer, 1976, pp. 100, 108). The Delta, which includes about half of the Egyptian farmland, was especially underpopulated. Only about one quarter of its land was utilized at the beginning of the Old Kingdom. The northern third of the Delta was virtually unoccupied, and settlement was light elsewhere. Settlement of the Delta continued throughout the Pharaonic period and was not completed until the Ptolemaic era (Butzer, 1976, pp. 83, 94, 96).

Underpopulation has far reaching implications for social organization because it limits the ability of elites to extract surplus from farmers. When there is “free land,” farmers who are dissatisfied with their circumstances can move to other locations to improve their lot. Suppose, for instance, that an individual announced his ownership of 100 hectares of land near Aswan and demanded rent from the farmers there. They would have been in a strong position to resist his demand since they could always have relocated to empty land. They might have been willing to pay some rent since the land was “improved,” or particularly fertile, or to avoid the costs of moving. Nevertheless, the scope for extracting surplus would have been limited. Carneiro’s (1970) analysis of the Amazon basin is consistent with this theory. The American and Canadian West are good examples of this sort of situation, for land was “free” (in two senses) during the frontier period—there was a lot of empty land and it was cheap. Consequently, these were societies of owner-occupying farmers. Rent-paying tenants or sharecroppers were rare since homesteading a new farm was comparatively inexpensive.

The assumption of a mobile population in Egypt is plausible in view of the experience of other early civilizations. Bronze Age Palestine exhibited a high rate of population mobility immediately before the appearance of complex social formations (Esse, 1989) as did Mesopotamia at the end of the Ubaid. “The range and rate of movement of prehistoric peoples, under conditions of low population density and hence limited competition for the use of land, may often have been much greater than seems ‘natural’ on a priori grounds” (Adams, 1981, p. 70). In view of these parallels, a highly mobile population is a reasonable characterization of predynastic Egypt.

Recent evidence situates Egypt in this paradigm. During the fourth millenium, two distinct cultures developed in Egypt—the Maadi in the North and the Nagada in the South. The Maadi culture remained relatively egalitarian during the fourth millenium, while Bard’s (1994b, pp. 111–112) analysis of Nagada tombs indicates a rise in inequality and social hierarchy beginning in 3600 B.C. (the Nagada II period). This change in the mortuary evidence is probably the counterpart of early state formation in Upper Egypt.

The analysis developed in this paper implies an out migration of farmers towards Lower Egypt beginning at the same time. The evolution of material culture in the Delta supports that prediction, for Nagada culture displaced the Maadi culture in Northern Egypt (Kaiser 1964). The northward expansion of

Nagada culture was not associated with warfare and may have been related to the rise of trade (Wildung, 1984; van den Brink, 1989; Köhler, 1992; Fuksch, 1991). In an argument that dovetails with the analysis of this paper, Trigger (1987) has proposed that the Nagada culture was carried northward by migrants escaping the new state or states in Upper Egypt. In total, there was a substantial redistribution of population, for, by the First Dynasty, the population density was greater in the North than in the South (Mortenson, 1991).¹⁵

The chain of causation that limited surplus extraction in predynastic Egypt was: free land (which provided economic opportunities beyond the reach of the would-be elites) leading to population mobility (which was the farmers' taking advantage of those opportunities) leading, in turn, to negligible rents or taxes. To obtain a surplus, would-be rentiers had to break this chain, and the obvious way was to limit labor mobility. This, indeed, has been the standard strategy of elites in this situation. Nonworking landowners in the American South secured their fortunes through slavery. Ownership of the workforce limited its mobility, which was further reduced by the Fugitive Slave Act (Fogel and Engerman, 1974). After Emancipation, the southern aristocracy continued (less effectively) to extract a surplus from their estates with debt peonage, crop liens, and other impediments to mobility.¹⁶ These institutions were important in keeping the freed slaves from moving West. In central Europe, serfdom played a role similar to slavery. The territorial expansion of the Moscovite state in the sixteenth century added vast tracts of free land to its domain. In order to maintain a nonproductive nobility, it was necessary to check the flight of their tenants to these new lands. The Tsars imposed a particularly savage serfdom that tied the peasants to the land in order to end this drift and protect the economic position of the state and the nobility (Kliuchevsky, 1907, pp. 174–199).

The same considerations operated in predynastic Egypt and led to the unification of the country. Consider the situation in Upper Egypt in the fourth millennium. The introduction of agriculture probably increased output per worker and freed labor for use off the farm. The situation was ripe for a would-be exploiter if he could figure out how to obtain the surplus. Military force based on surplus labor could establish local rule, perhaps on the scale of a nome, but the opportunity to levy rents or taxes or to conscript labor depended on limiting its mobility.

Here geography enters the story. The task of the would-be ruler was greatly simplified since settlement was limited to a narrow band along the river. Between 15,000 and 3,000 B.C., the desert allowed at most light seasonal hunting and grazing. A drier trend beginning c. 3400 B.C. then eliminated even those meager opportunities so that by 2500 B.C. land back from the river flood plane had reached its modern, arid condition (Butzer, 1976, pp. 14, 26–27; Hoffman, 1993,

¹⁵ The preceding two paragraphs draw heavily from Bard (1992a). See also Krzyzaniak (1977, p. 140).

¹⁶ See Ransom and Sutch (1977) and Wright (1986) for analyses of labor mobility in the postbellum South.

p. 307; Wendorf *et al.*, 1985, p. 140). The depopulation of the desert frontiers was further enforced by the armies of the new states (Hoffman, 1993, pp. 246–268). Consequently, people could not have moved away from the river to secure their livelihood. Butzer (1976, pp. 83, 97–98) estimated the desert population at less than 50,000—a negligible number. The only chance for mobility was along the river. In this respect, geography favored the farmers, at least initially, since they could drift to free land downstream—either between Qift and the Faiyum entrance or into the Delta.

To render themselves viable, the embryonic states of predynastic Egypt had to expand their territory in order to offset population mobility. The pressures were most extreme in Upper Egypt where the population density was high, social stratification pronounced, and the river provided a natural route for escape toward the Delta. The result was the territorial expansion of Southern states. Unlike Carneiro's (1970) account of Peru, the wars were for the control of labor—not land. In the end, Upper Egypt conquered Lower Egypt since that was the best solution to Upper Egypt's labor control problem.

One would expect a state created under these conditions to follow certain policies. First, it would control labor mobility by tying people to the land. Second, the state would impose uniform land taxation across the country, so that farmers could not escape taxation by moving. Third, the state would take charge of settling vacant land so that the fruits of settlement were secured as taxes and rents.

While Egyptian administration is not understood in detail, many of its features are in accord with these principles. First, labor utilization was largely under state control and most Egyptians could be forced to work for the state. Peasant labor was conscripted during the floods and these *corvées* provided the workforce to build the pyramids. Hassan has argued that Herodotus' account of the building of the Great Pyramid was essentially correct and that it involved 84,000 men working 80 days a year for 20 years (Butzer, 1976, p. 87n4). If the Egyptian population was 2 million, there were perhaps 500,000 adult males, so the pyramid building labor force was about one sixth of the adult male population. An administration that could conscript labor at that rate had firm control over the labor force.

Second, taxation was highly organized across the state (Trigger, 1993, p. 44). A biennial cattle census was carried out for taxation purposes, but most property could be taxed. "One must imagine a network of government agencies spread throughout the country, attempting by bureaucratic methods total assessment and management of resources" (Kemp, 1987, p. 83).

Third, the state played a role in founding estates and settlements in undeveloped parts of the Delta and the Faiyum (Butzer, 1976, pp. 51, 94, 1981). Certainly, taxation was quickly instituted in newly settled areas, which were not allowed to develop into societies of independent owner-occupiers (Trigger, 1993, pp. 33, 43).

It needs to be emphasized that the effectiveness of these policies would have been impaired had they been pursued by private landowners or independent states

located along the river. Specifically, private landowners or competing states might have tried to apply the first policy—limitations on labor mobility—but the possibility of escaping down river would have limited its effectiveness. Second, in a situation of labor scarcity, private landowners and independent states would have had trouble colluding to maintain high rents or taxes since each owner or state would have had an incentive to attract settlers by cutting rents or taxes. Third, the owners of vacant land would have been the most ardent in offering concessions since they received no income from unimproved farms. In the middle ages, for instance, peasant settlers were induced to move from the Rheinland to the empty lands of eastern Germany only by the lords giving them very favorable terms (Slicher van Bath, 1963, pp. 153–155). As a result, the surplus obtainable from land development would have remained with the farmers if the developers had been competing land owners or states. Only a unified, national state could have effectively exploited Egyptian farmers, at least until the land become fully populated during the Ptolemaic period.

This analysis of exploitation raises one further—highly speculative—possibility about Egyptian development; namely that the establishment of a national state may have pushed the transition from foraging to farming to its completion. Anthropologists and archaeologists have occasionally argued that social inequality led to farming rather than the reverse,¹⁷ and Egypt may be an example—at least in part—of such a development. As argued earlier, it is highly unlikely that all Egyptians had abandoned foraging by 4000 B.C. While environmental conditions in the Nile were probably less favorable for foraging between 5500 and 3500 B.C. than they had been at other times, it was still a viable mode of production, although perhaps on a reduced scale. Consequently, I conjecture that there was a fairly complete transition to agriculture in the regions where population density was high but a persistence of foraging (perhaps in conjunction with farming as a sideline) in much of the Delta and in the central portion of the Nile Valley. State formation began where population density was high, and refugees from those regions swelled the ranks of foragers. In itself, these population increases may have made foraging less rewarding than it had been, thereby leading to greater cultivation of crops. (If true, this would be an example of population pressure leading to the adoption of agriculture.) Moreover, as the incipient states extended their control over the unorganized portions of the Nile, their demands for grain and labor forced foragers to shift to farming. How else were those demands to have been met? Thus, the initial transformation in the mode of production led to the formation of the first states, and the expansion of those states to secure their economic base created the incentives that completed the shift to farming in Egypt.

¹⁷ See for instance, Bender (1978), Hayden (1990, 1992), Jennbert (1985), Price (1995), Price and Gebauer (1992).

EGYPT IN A BROADER CONTEXT

Egypt's rulers were not the only ones in the Ancient World that tried to exploit their populations, but the Pharaohs were unusually successful. This paper has advanced the view that their success was rooted in geography, which made the task of controlling labor mobility relatively easy. While the evidence presently available supports this interpretation, the argument invites further archaeological testing.

To establish the limits of its applicability, the theory advanced here also requires testing against the histories of other places. Was state formation usually related to migration and labor control, and, if so, how? What other factors led to the formation of early states and how did these factors interact with the population issues that were so important in Egypt? While these questions cannot be settled here, comparisons with Egypt suggest how the analysis might develop. There are two regions in the Near East to consider.¹⁸

The first is Sumer, where state formation occurred slightly before Egypt. On the face of it, Sumer appears similar in that the deserts surrounding the early cities might have prevented population escape just as in Egypt. There is an important difference, however. The Sumerian population exploded during the urban revolution, and this growth was accomplished by immigration. Conceivably people were "pushed" from the sending areas, but it is more likely that they were "pulled" into southern Mesopotamia as irrigation raised the productivity of agriculture and as urbanization did the same for manufacturing. Since the Sumerian problem was to attract a labor force (rather than exploit one already present, as in Egypt), geographical circumscription was not relevant in southern Mesopotamia as it was along the Nile. Sumerian civilization, in other words, depended on raising productivity rather than exploitation.

The second important region is the great sweep of rainfed agriculture extending from the Levant through Syria, Anatolia, northern Mesopotamia, to the flanks of the Zagros Mountains. Agriculture originated in this region and flourished for thousands of years before the formation of states. Social evolution was limited to village based, ranked societies without great inequality. An important question in the theory of social evolution is whether agriculture inevitably leads to highly stratified states or whether agricultural village societies are stable. The many millenia that elapsed between the onset of farming and the appearance of states in this region shows that social complexity did not automatically follow farming. The contrast with Egypt suggests why: In the absence of geographical circumscription, would be exploiters could not control the agricultural populations, so the scope for surplus extraction was limited. Even in much later times, there are examples of emigration into inhospitable areas to escape taxation. An example is the origin of the Israelite nation through the settlement of the Galilean hills by refugees from districts controlled by Canaanite cities.¹⁹ The two factors that

¹⁸ Redman (1978) surveys the development of these regions.

¹⁹ For a discussion of this and other models of the formation of ancient Israel, see Gottwald (1985, pp. 261–276).

led to state formation outside of Sumer and the Nile were, first, the expansion of the urban economy, which developed since cities were an efficient locale for manufacturing, and, second, the gradual rise in population, which eliminated free land and, thereby, simplified the problem of population control.

REFERENCES

- Adams, R. McC. (1966), *The Evolution of Urban Society*. Chicago: Aldine.
- Adams, R. McC. (1981), *Heartland of Cities*. Chicago: Univ. of Chicago Press.
- Bard, K. (1994a), "The Egyptian Predynastic: A Review of the Evidence." *Journal of Field Archaeology*, **21**, 265–288.
- Bard, K. (1994b), *From Farmers to Pharaohs: Mortuary Evidence for the Rise of Complex Society in Egypt*. Sheffield: Sheffield Academic Press Ltd.
- Bard, K., and Carneiro, R. (1989), "Patterns of Predynastic Settlement Location, Social Evolution and the Circumscription Theory." In *Sociétés Urbaines en Égypte et au Soudan*, Cahiers de Recherches de l'Institut de Papyrologie et d'Égyptologie de Lille, Vol. 11, pp. 15–23.
- Bar-Yosef, O., and Meadow, R. H. (1995), "The Origins of Agriculture in the Near East." In *Last Hunters, First Farmers*. Santa Fe: School of American Research Press. Pp. 39–94.
- Bender, B. (1975), *Farming in Prehistory: From Hunter–Gatherer to Food–Producer*. London: John Baker Ltd.
- Bender, B. (1978), "From Gatherer–Hunter to Farmer: A Social Perspective," *World Archaeology* **10**, 204–222.
- Bierbrier, M. (1982), *The Tomb-Builders of the Pharaohs*. London: British Museum Publications.
- Binford, L. R. (1962), "Archaeology as Anthropology." *American Antiquity* **28**, 217–225.
- Boserup, E. (1965), *The Conditions of Agricultural Growth*. Chicago: Aldine.
- Butzer, K. W. (1976), *Early Hydraulic Civilization in Egypt*. Chicago: Univ. of Chicago Press.
- Butzer, K. W. (1981), "Civilizations: Organisms or Systems?" *American Scientist* **68**, 517–524.
- Carneiro, R. (1970), "A Theory of the Origin of the State." *Science* **169**, 733–738.
- Cashan, E. (Ed.) (1990), *Risk and Uncertainty in Tribal and Peasant Economies*. Boulder: CO, Westview Press.
- Colson, E. (1979), "In Good Years and in Bad: Food Strategies of Self-Reliant Societies." *Journal of Anthropological Research*, **35**, 18–29.
- Childe, V. G. (1936), *Man Makes Himself*. London: Watts & Co.
- Cohen, M. N. (1977), *The Food Crisis in Prehistory*. New Haven: Yale Univ. Press.
- Cohen, M. N., and Armelagos, G. J. (Eds.) (1984a), *Paleopathology at the Origins of Agriculture*. Orlando: Academic Press.
- Cohen, M. N., and Armelagos, G. J. (1984b), "Paleopathology at the Origins of Agriculture: Editors' Summation." In M. N. Cohen and G. J. Armelagos (Eds.). *Paleopathology at the Origins of Agriculture*. Orlando: Academic Press. Pp. 585–601.
- David, A. R. (1986), *The Pyramid Builder of Ancient Egypt: A Modern Investigation of Pharaoh's Workforce*. London: Routledge and Kegan Paul.
- Domar, E. (1970), "The Causes of Slavery or Serfdom: A Hypothesis." *Journal of Economic History* **30**, 18–32.
- Engerman, S. L. (1973), "Some Considerations Relating to Property Rights in Man." *Journal of Economic History* **33**, 43–65.
- Engerman, S. L. (1982), "Economic Adjustments to Emancipation in the United States and British West Indies." *Journal of Interdisciplinary History* **13**, 191–220.
- Esse, D. L. (1989), "Secondary State Formation and Collapse in Early Bronze Age Palestine." In P. de Miroschedji (Ed.). *L'Urbanisation de la Palestine à l'âge du bronze ancien*. BAR International Series 527. Pp. 81–96.
- Eyre, C. J. (1987), "Work and the Organisation of Work in the Old Kingdom," In M. Powell (Ed.), *Labor in the Ancient Near East*. New Haven: American Oriental Society. Pp. 167–221.

- Flannery, K. V. (1967), "Culture History v. Cultural Process: A Debate in American Archaeology." *Scientific American* **217**, 119–122.
- Fogel, R. W., and Engerman, S. (1974), *Time on the Cross: The Economics of American Negro Slavery*. Boston: Little Brown.
- Ghatak, S., and Ingersent, K. (1984), *Agriculture and Economic Development*. Baltimore: Johns Hopkins Press.
- Gottwald, N. K. (1985), *The Hebrew Bible: A Socio-Literary Introduction*. Philadelphia: Fortress Press.
- Guksch, C. E. (1991), "Ethnological Models and Processes of State Formation—Chiefdom Survivals in the Old Kingdom." *Gottlinger Miszellen* **125**, 37–50.
- Harris, D. R., and Hillman, G. C. (1989), *Foraging and Farming: The Evolution of Plant Exploitation*. London: Unwin Hyman.
- Hassan, F. A. (1988), "The Predynastic of Egypt." *Journal of World Prehistory* **2**, 135–185.
- Halstead, P., and O'Shea, J. (1989), *Bad Year Economics: Cultural Responses to Risk and Uncertainty*. Cambridge: Cambridge Univ. Press.
- Hayden, B. (1990), "Nimrods, Piscators, Pluckers, and Planters: The Emergence of Food Production." *Journal of Anthropological Archaeology* **9**, 31–69.
- Hayden, B. (1992), "Contrasting Expectations in Theories of Domestication." In A. B. Gebauer and T. Douglas Price (Eds.). *Transitions to Agriculture in Prehistory*. Madison: Prehistory Press. Pp. 11–20.
- Hayden, B. (1995), "A New Overview of Domestication." In T. D. Price and A. B. Gebauer (Eds.), *Last Hunters, First Farmers*, Santa Fe: School of American Research Press. Pp. 273–99.
- Hoffman, M. A. (1993), *Egypt Before the Pharaohs*. New York: Barnes & Noble.
- Isbell, W. H. (1978), "Environmental Perturbations and the Origin of the Andean State." In C. L. Redman, M. J. Berman, E. V. Curtin, W. T. Langhorne, Jr., N. M. Versaggi, and J. C. Wanser (Eds.). *Social Archeology: Beyond Subsistence and Dating*, New York: Academic Press. Pp. 303–13.
- Janssen, J. J. (1978), "The Early State in Ancient Egypt." In H. J. M. Claessen and P. Skalnik (Eds.). *The Early State*. The Hague: Mouton Publishers. Pp. 213–234.
- Jennert, K. (1985), "Neolithisation—A Scanian Perspective." *Journal of Danish Archaeology* **4**, 196–7.
- Kaiser, W. (1964), "Eine Bemerkungen zur ägyptischen Frühzeit." *Zeitschrift für ägyptische Sprache und Altertumskunde* **91**, 86–125.
- Kemp, B. J. (1987), "Old Kingdom, Middle Kingdom and Second Intermediate Period." In *Ancient Egypt: A Social History*. Pp. 71–147.
- Klein, H. S., and Engerman, S. L. (1985), "The Transition from Slave to Free Labor: Notes on a Comparative Economic Model." In M. M. Fraginals, F. M. Pons, and S. L. Engerman (Eds.). *Between Slavery and Free Labor: The Spanish-Speaking Caribbean in the Nineteenth Century*. Baltimore: Johns Hopkins Press. Pp. 255–269.
- Kliuchevsky, V. O. (1907), *A Course in Russian History*. (Trans. by N. Duddington (1984) Armonk, NY: M. E. Sharpe.)
- Krzyzankiaki, L. (1977), *Early Farming Cultures on the Lower Nile: The Predynastic Period in Egypt*. Warszawa: Panstwowe Wydawnictwo Naukowe.
- Lamberg-Karlovsky, C. C. (1988), "Indo-European Prehistory." *Quarterly Review of Archaeology*. Spring, 1, 8–10.
- Lee, R. B. (1968), "What Hunters do for a Living, or, How to Make Out on Scarce Resources." In R. B. Lee and I. Devore (Eds.). *Man the Hunter*. pp. 30–48.
- Mann, M. (1986), *The Sources of Social Power*, Vol. I, *A History of Power from the Beginning to A.D. 1760*. Cambridge: Cambridge Univ. Press.
- Martin, D. L., Armelago, G. J., Goodman, A. H., and Van Gerven, D. P. (1984), "The Effects of Socioeconomic Change in Prehistoric Africa: Sudanese Nubia as a Case Study." In M. N. Cohen and G. J. Armelagos (Eds.). *Paleopathology at the Origins of Agriculture*. Orlando: Academic Press. Pp. 193–214.

- Moore, A. M. T. (1985), "The Development of Neolithic Societies in the Near East." *Advances in World Archaeology* **4**, 1–69.
- Mortensen, B. (1991), "Change in the Settlement Pattern and Population in the Beginning of the Historical Period," In M. Bietak (Ed.). *Ägypten und Levante II*. Wien: Osterreichishchen Akademie deer Wissenschaften. Pp. 11–37.
- Nieboer, H. J. (1910), *Slavery as an Industrial System: Ethnological Researches*. Second, revised edition (1971). New York: Burt Franklin.
- Ostrom, E. (1988), "Institutional Arrangements and the Commons Dilemma." In V. Ostrom, D. Feeny, and H. Picht (Eds.). *Rethinking Institutional Analysis and Development*. San Francisco: International Center for Economic Growth. Pp. 101–139.
- Park, T. K. (1992), "Early Trends Toward Class Stratification: Chaos, Common Property, and Flood Recession Agriculture." *American Anthropologist*, **94**, 90–117.
- Pearson, R. (1992), *Ancient Japan*. New York: G. Braziller.
- Peebles, C. S., and Kus, S. M. (1977), "Some Archaeological Correlates of Ranked Society." *American Antiquity* **42**, 421–448.
- Price, T. D. (1995), "Social Inequality at the Origins of Agriculture." In T. D. Price and G. M. Feinman (Eds.) *Foundations of Social Inequality*. New York: Plenum. Pp. 129–151.
- Price, T. D., and Gebauer, A. B. (1992), "The Final Frontier: First Farmers in Northern Europe." In A. B. Gebauer and T. Douglas Price (Eds.). *Transitions to Agriculture in Prehistory*. Madison: Prehistory Press. Pp. 97–116.
- Ransom, R., and Sutch, R. (1977), *One Kind of Freedom: The Economic Consequences of Emancipation*. Cambridge: Cambridge Univ. Press.
- Redman, C. (1978), *The Rise of Civilization: From Early Farmers to Urban Society in the Ancient Near East*. San Francisco: Freeman.
- Renfrew, C. (1987), *Archaeology and Language: The Puzzle of Indo-European Origins*. Cambridge: Cambridge Univ. Press.
- Roosevelt, A. C. (1984), "Population, Health, and the Evolution of Subsistence: Conclusions of the Conference." In M. N. Cohen and G. J. Armelagos (Eds.). *Paleopathology at the Origins of Agriculture*. Orlando: Academic Press. Pp. 559–583.
- Sabloff, J. A., and Lamberg-Karlovsky, C. C. (Eds.) (1975), *Ancient Civilization and Trade*. Albuquerque: Univ. of New Mexico Press.
- Sanders, W. T., and Price, B. J. (1968), *Mesoamerica: The Evolution of a Civilization*. New York: Random House.
- Service, E. (1975), *Origins of the State and Civilization: The Process of Cultural Evolution*. Norton: New York.
- Slicher van Bath, B. H. (1963), *The Agrarian History of Western Europe*. Trans. by O. Ordish. London: Edward Arnold Ltd.
- Smith, E. A. (1988), "Risk and Uncertainty in the 'Original Affluent Society': Evolutionary Ecology of Resource Sharing and Land Tenure." In T. Ingold, D. Riches, and J. Woodburn (Eds.). *Hunters and Gatherers: History, Evolution, and Social Change*. Oxford: Berg. Pp. 222–252.
- Steward, J. H. (1949), "Cultural Causality and Law: A Trial Formulation of the Development of Early Civilizations." *American Anthropologist* **51**, 1–27.
- Struever, S., and Holton, F. A. (1979), *Koster: Americans in Search of Their Prehistoric Past*. New York: Signet.
- Trigger, B. (1987), "The Rise of Egyptian Civilisation." In *Ancient Egypt: A Social History*. Pp. 13–70.
- Trigger, B. (1993), *Early Civilizations: Ancient Egypt in Context*. Cairo: Am. Univ. in Cairo Press.
- Van Neer, W. (1989), "Fishing Along the Prehistoric Nile." In L. Krzyzaniak and M. Kobusiewicz (Eds.). *Late Prehistory of the Nile Basin and the Sahara*. Poznan: Poznan Archaeological Museum. Pp. 49–56.
- Wendorf, F., Close, A. E., and Schild, R. (1985), "Prehistoric Settlements in the Nubian Desert." *American Scientist* **73**, 132–141.

- Wendorf, F., Close, A. E., Schild, R., Wasylikowa, K., Housley, R. A., Harlan, J. R., and Krolik, H., (1992), "Saharan Exploitation of Plants 8,000 years BP." *Nature* **359**, 721–724.
- Wenke, R. J. (1989), "Egypt: Origins of Complex Societies." *Annual Review of Anthropology* **18**, 129–155.
- Wetterstrom, W. (1993), "Foraging and Farming in Egypt: The Transition from hunting and gathering to horticulture in the Nile Valley." In T. Shaw, P. Sinclair, B. Andah, and A. Okpoko (Eds.). *The Archaeology of Africa: Food Metals and Towns*. London and New York: Routledge. Pp. 165–226.
- Wildung, D. (1984), "Terminal Prehistory of the Nile Delta: Theses." In L. Krzyzaniak and M. Kobusiewicz (Eds). *Origin and Early Development of Food-Producing Cultures in North-eastern Africa*. Poznan: Polska Akademia Nauk-Oddzial W. Poznaniu. Pp. 265–9.
- Wittfogel, K. A. (1957), *Oriental Despotism*. New Haven: Yale Univ. Press.
- Wright, G. (1986), *Old South, New South*. New York: Basic Books.