The Origin and Development of Sumerian Civilization and Its Relation to Environment

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That civilization is a complex adaptation to the environment is nowhere so evident as in southern Mesopotamia, the site of the world's earliest civilization. But correlations between environmental conditions and developments in civilization are probably more difficult to demonstrate here than elsewhere. The difficulty has been created by two causes: a) the relatively slight body of data in the form of geomorphological cores, sections, or other exposures that have been collected and analyzed; and b) a set of ecological processes that has damaged, destroyed, or masked the record. It must be said, however, that the data base for southern Mesopotamia (southern Iraq /Babylonia/and earlier Sumer and Akkad), is far better than for nothern Mesopotamia (northern Iraq/Assyria/and earlier Subartu).

The lack of analyzed geomorphological samples from Iraq might seem surprising, given the hundreds of core samples that have been taken in connection with oil exploration. But access to those cores, even those from the 1950s that are in the laboratories of European oil companies, apparently has been strictly controlled and only a few have been studied and published (see Lees *et al.* 1952, Macfayden *et al.* 1978, and Sanlaville 1989 for discussion and bibliography). Of course, the very parts of those cores that would be of interest to anyone trying to understand developments in the Holocene are of little or no interest to an oil geologist. Therefore, the upper part of most cores might have been discarded in the field. In the mid-1970s, there was an Iraqi project, directed by the Iraqi Geological Survey, to investigate the nature of the alluvial plain by means of several hundred cores to bedrock drilled throughout the alluvial plain. I have been told that the project was completed and a report was submitted, but it is not yet a public record.

The ecological processes alluded to above as obscuring the record involve natural and human actions that form a complex cycle of development, collapse, and redevelopment that I will detail in this presentation.

Since I have been asked to deal with the origins of Sumer, I will be concentrating on southern Mesopotamia, but I need to put that area in a broader context (Fig. 1). Iraq is a complex landscape, with mountains and foothills in the north and east that received sufficient rainfall for agriculture. Most of Mesopotamia/modern Iraq is, however, below the 200 mm isohyet and the arable southern alluvial plain must rely on irrigation. To the west, beyond the Euphrates, much of Iraq is made up of the gravel and

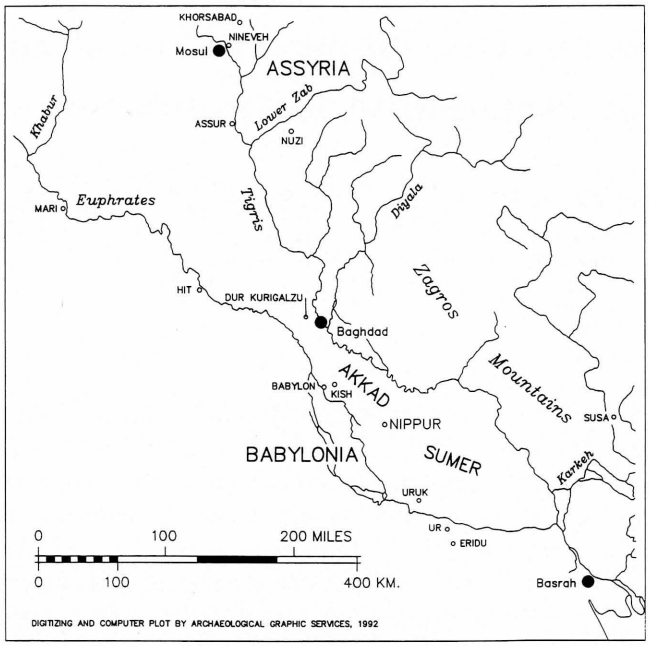

Fig. 1. Map of Mesopotamia.

sand desert of the Arabian peninsula.

Life in Mesopotamia was and is dominated by the two great rivers, the Euphrates and Tigris, which originate in the mountains of Turkey. The Taurus/Zagros mountains, rising as high as 4,000 m, help create in rainfall and snowmelt the water that feeds those rivers and their tributaries. Travelling a much greater distance through the rain-fed steppe and arid desert of Syria and northwestern Iraq, the Euphrates in the period before modern dams lost almost half of its water and silt before it entered the alluvial plain near Fallujah in Iraq. With today's dams in Turkey, Syria, and Iraq, the river is even more reduced. Upon reaching the alluvial plain, the river has a tendency to meander, to divide into several channels, and form relatively broad levees. Riding above the level of the plain, the Euphrates has always been easy to tap for flow irrigation. Extensive survey work by geomorphologists and archaeologists (Buringh, 1957, 1960, Adams 1981, and Gibson 1972) has shown that in ancient times, the river divided into four or more branches in the area north of Sippar (Fig. 2). For the greatest part of ancient Babylonian history, the bed that ran from Sippar through Kish, Nippur, Shuruppak, Uruk and Ur was considered to be the main line (Gibson 1972, and Postgate 1992: 44) and was called the Euphrates, while the other branches carried different names. In later periods, when stream capture took the bulk of the flow into one or more of the western branches, the term Euphrates was given to whichever channel was then the dominant one. Texts as well as visible remains of ancient canals indicate that there were interconnections among the branches, making the system much more complex than the reconstructions based on surface survey can indicate (Adams

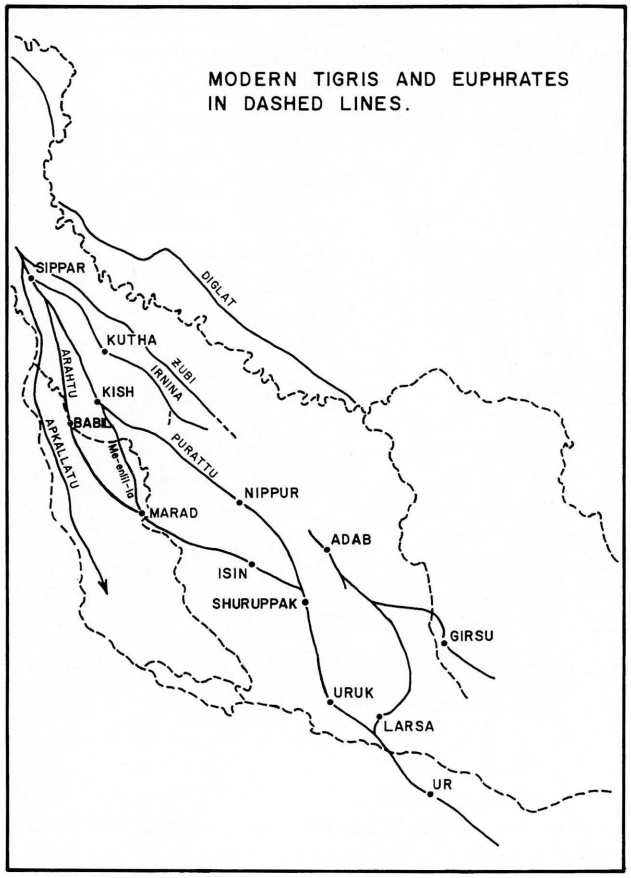

Fig. 2. Reconstruction of main lines of ancient Euphrates. Gibson 1972.

1981).

The settlement pattern and reconstructed canals of the earliest known period of occupation, the Ubaid, *c.* 5,000–3,500 B.C., reflect the general slope of the alluvium from the northwest to the southeast. The sediment from floods and irrigation drawn from the Euphrates has built out the plain farther than the occasional flooding of the Tigris in the upper stretch of the alluvium. The outfall between the two rivers, running down the plain nearer the Tigris (Fig. 3), is today being cut to create the Main Drain, usually referred to as "The Third River." When finished the "Third River" will take salt water from controlled leaching projects as well as the excess water from other irrigation areas, and empty it into the Gulf.

It has been only in the past decade or so, as a result of closer collaboration with geomorphologists (DeMeyer 1980) that we have begun to appreciate the role of buried levees, such as a major one that ran from the area of the present Euphrates over to and under the present Tigris (Fig. 4). Not only does that levee impinge upon any reconstructions of the ancient river systems, but it must be understood that all subse-

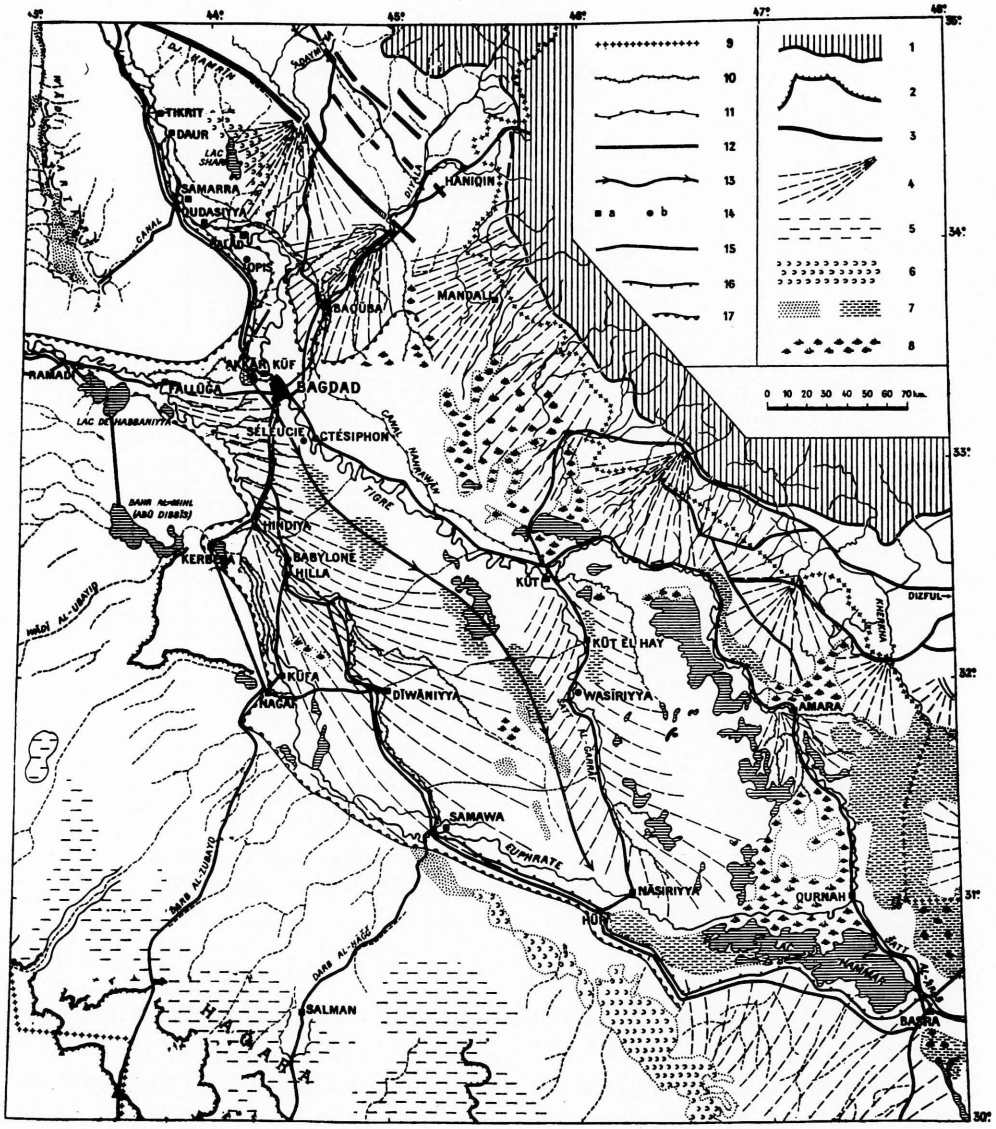

Fig. 3. Drainage pattern in the alluvial plain of Iraq. From Vaumas, *Arabical* IX.

quent irrigation projects in the northern part of the alluvium had to take into account that ancient feature, and that our simplified reconstructions of river channels (e.g. Fig. 2) must be re-worked with that ancient levee entered as a factor. Only thus can we begin to understand the history of the water courses in southern Mesopotamia.

The Tigris, descending from the mountains on a much shorter run than the Euphrates and fed by several rivers along its length inside Iraq, arrives in the alluvium at a greater speed than the Euphrates and carries a greater silt load. It has apparently always had a tendency to meander markedly and to cut deeply, so that its waters have

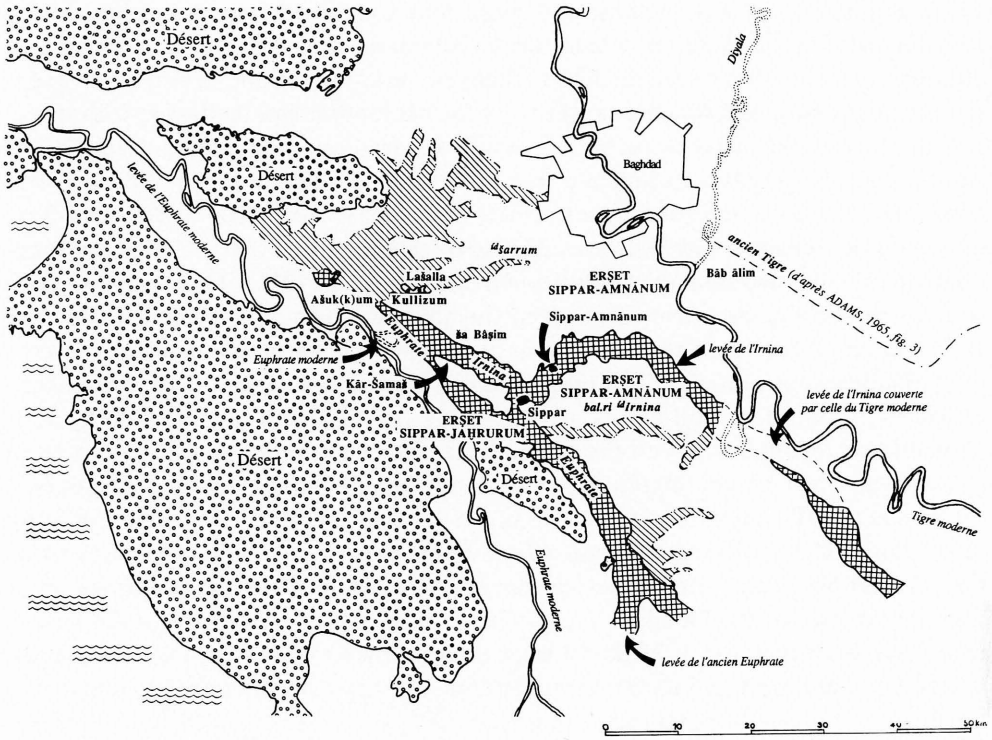

Fig. 4. Babylonian alluvial plain, with very ancient levee of a branch of the Euphrates running over to and under the Tigris. From Gasche, *Northern Akkad Project Reports* 3 (1989): p. 14.

not been available for flow irrigation throughout most of antiquity in the area north of Kut. Although lifting devices such as the *shedouf* and water wheel did exist in antiquity, it was only with the introduction of mechanical pumps in the late-nineteenth century A.D. that any appreciable irrigation was made possible from the Tigris north of Kut. To the south of that town, the main line of the Tigris probably ran in what is now called the Gharraf channel, where it as well as the Euphrates could be tapped to water the fields of Sumer. Since virtually no archaelogical survey has been done along the Tigris in the southern part of the alluvium, we have no data to draw on for that area. At present, the Tigris and Euphrates both empty into marshes, chiefly the Hor al-Hammar, and then join to form the Shatt al-Arab.

Stream flow is dependent on climatic conditions, and some attempts have been made to relate the Tigris-Euphrates system to reconstructed environmental patterns (Butzer 1958, 1975; Larsen 1975, Brice 1978, Kay *et al.* 1981, Bintliff 1982, Naumann *et al.* 1987, Purser *et al.* 1982, Sanlaville 1989, and Zarins 1992). It has been concluded that from a long-term perspective the climate of the Near East has not altered drastically since the end of the Pleistocene, but that there was one slightly warmer, wetter period, a subpluvial, from the sixth to the end of the third Millennium, B.C., allowing a greater variety of fauna and flora to exist in the area than is the case today (Butzer

1958, and 1975). In was in those millennia that southern Mesopotamia made the transformation to civilization. Recent work (Naumann *et al.* 1987) has suggested that although there may have been no drastic changes, variations of one or two degrees centigrade might have had significant effects on the Mesopotamian landscape with its extremes of daily and yearly temperature, as well as variations in annual rainfall. For instance, evidence appears to indicate that there was a colder, wetter period between 1500 and 1200 B.C., followed by a warmer, dryer phase from 1200 to 900 B.C. This drying phase coincided with "catastrophic historical processes" that included the abandonment of cities and nomadic infiltration (Naumann *et al.* 1987). There was an equally catastrophic abandonment of much of the alluvium during the eighteenth century B.C. (Gasche 1989), when the climate was also somewhat warmer than normal, according to indications of earlier than normal harvests (Neumann *et al.* 1978). These coincidences of conditions and events are intriguing, but it is still not possible to posit verifiable correlations between the phenomena and the effects. As will be indicated below, even when climatic conditions remained relatively stable, there could be drastic changes in the alluvial plain caused by a single flooding event, a stream capture, or by degradation of the soil due to human action. Even one governmental decision, such as the erection of a water-control device, can have tremendous effects. In this regard, I can cite the case of the filling of Syria's Tabqa dam, which decreased the Euphrates flow to such an extent in 1975 that a large area southeast of Afak, in southern Iraq, had to be abandoned and its 20,000 inhabitants relocated in the rainfall zone of the north for a number of years (pers. observation).

Several environmental syntheses have centered upon the history of the formation of the Mesopotamian delta. Since the early-nineteenth century, scholars have debated whether the delta, which has a very shallow slope (Baghdad is only about 33 meters above sea level), formed over time, gradually reaching its present coastline (Beke 1835) or was in more or less its present position throughout ancient history (Carter 1835). Jacques de Morgan (1900), at the turn of the century, laid out a schema assuming a gradual building out of the head of the delta, and his reconstructions became standard (Fig. 5). In the early 1950s, Lees and Falcon (1952), on the basis of data from cores taken in southern Iraq, argued that the situation was much more complex than the simple deposit of silts, but involved an offsetting and stabilizing process of tectonic movements, including downwarping and local uplift, and compaction of the alluvium. Later, re-examination of some of the cores, especially one from Amara that yielded marine fauna, led some scholars to conclude that the head of the Gulf had, in fact, intruded upon the alluvial plain. Bolstering this information was a body of data gathered by the research ship Meteor (Seibold *et al.* 1969, and 1973) on the Persian side of the Gulf; because the Meteor findings supported oscillations of sea level tied to world-wide events, it was proposed that the Mesopotamian plain had also experienced marked transgressions and shore line changes in historical periods, resulting in reconstructions similar to de Morgan's, but based on new theories (Larsen 1975, and Larsen and Evens, 1978). Two recent surveys of the older evidence and newer data by Sanlaville (1989) and Zarins (1992) have resulted in somewhat similar conclusions, pointing to a transgression of up to 200 km from the present head of the Gulf during

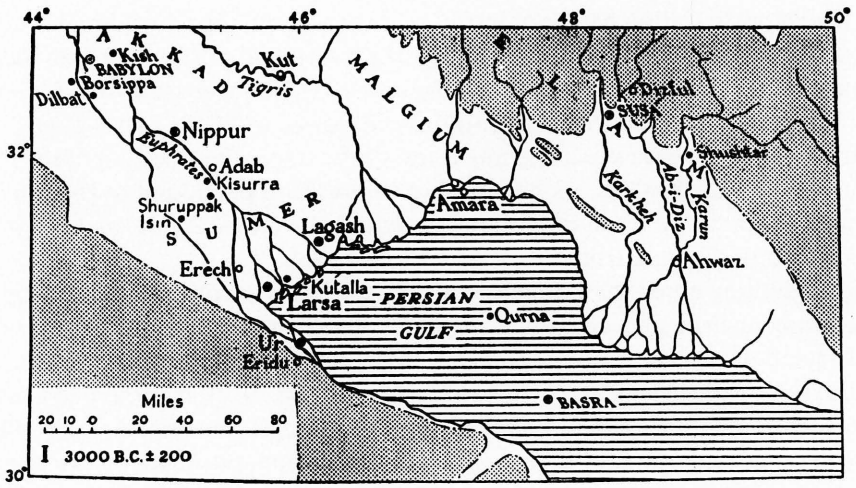

Fig. 5. Proposed head of the Gulf at about 3,000 B.C., according to de Morgan 1900.

the Ubaid period (*c.* 5000–3500 B.C.). Zarins' work reflects assumptions that one can safely apply the Persian-side data to the Saudi coast, while Sanlaville relies on newer evidence that indicates that the Saudi side seems to have much lower rises in sea level. Given that evidence, I wonder if this finding does not imply uplift of the Arabian shield, which would call into question the extent and nature of the transgression of the Gulf into Mesopotamia that both authors agree upon. If uplift was involved, even at times of marked sea-level rise, such as the one suggested for 5000 B.C. when Sumerian culture may have had its beginnings, the transgression more likely resulted in an estuary rather than a broad Gulf shore line. This difference in interpretation is important because it explains better the mixed nature of some of the fauna of the cores. The still inadequate number of core samples from Iraq proper has led to different interpretations, even of the same sample, ranging from a marine transgression to an estuary to a mixed picture (compare Larsen 1975, and Larsen *et al.* 1978, with Macfayden *et al.* 1978, and Sanlaville 1989).

As ingenious as the recent summaries have been, and as multi-variate as they have become (especially Sanlaville 1989), they still lack vital elements. Not enough attention has been paid to compaction of sediments in an active delta (pointed out by Santema 1966, and Gibson 1972), nor has much of an attempt been made to incorporate information on differential rainfall and climatic change that may have been occurring during the periods of the "transgressions," especially the one proposed for the Ubaid period (*c.* 5000–3500 B.C.), when Butzer has suggested a warmer, wetter climate.

Perhaps as important a lack in these general syntheses of ecology in Mesopotamia, and especially the history of the formation of the delta, is the ignoring of the human facor, i.e. the expansion of irrigation. The absence of irrigation, or a diminution of it, would result in much greater water and silt loads reaching the southernmost part of the plain. The posited transgression of 200 km in the Ubaid would have occurred cen-

turies after flow irrigation had been introduced throughout the alluvial plain. Lack of evidence for early settlements in what is now the marshland of southern Iraq has been taken as evidence of Gulf transgressions (Sanlaville 1989), but could as well be explained as the result of a subsidence in a centuries-old marsh, or by the fact that marsh settlements would have been small and might leave little trace. The question of the formation of the head of the Gulf, its relationship to the Delta plain, and to the history of the marshes cannot be resolved without systematic investigation around the present marshes, and in the area from the marshes to the Gulf.

Scholars writing about the formation of the delta stress the difficulty caused by siltation covering ancient soils and any evidence of human activity (e.g. Sanlaville 1990). The entire alluvial plain is a very complex, humanly altered, patchwork of localized soil conditions (Buringh 1960, Adams 1981, and Gibson 1972). Natural barriers, such as old levees, and man-made barriers, such as canals, can create very different sediments in adjacent areas because they divert or impound flood waters and their sediments, which may vary greatly from year to year. The annual alternation of irrigation in a fallowing system can lead to a differential buildup of good quality or bad quality sediments in adjacent fields. Fields near the river or nearer the heads of larger canals have soils with larger grains, and therefore they are better drained and less salty. Even in relatively small areas, water-logged basins can exist alongside well-drained fields. Although the siltation rate is generally higher in the northern part of the plain (Akkad) and therefore a greater percentage of early sites may be covered there than in the south (Sumer), this is only one factor in the masking of ancient land use and settlement. The plain is narrower in Akkad and the engineering of large-scale canals and the shifting of river beds, have served to cover a much larger proportion of sites there. But compaction of the alluvial soils by the weight of levees, canals, and ancient sites also caused the disappearance of early occupations. The effect of differential siltation rates, compaction, and/or human engineering can be illustrated by the following situation. At the site of Kish, a major city with a huge mass of superimposed mudbrick debris built over several millennia, the earliest period in evidence is the Jemdet Nasr (*c.* 3000 B.C.), which was found in a deep trench at 9 meters below the present plain. Not more than eight kilometers northeast of Kish, the site of Ras al-Amiya, datable to the Ubaid period (*c.* 4500 B.C.), was found when a drainage canal was cut: the site was completely buried with its base at 4 meters below the plain and its top at 1 meter. Clearly, no generalized rate of silt deposit can account for this seeming disparity of evidence, with the earlier site lying at a much higher level under the present plain level than the later site.

To illustrate an opposing phenomenon—wind erosion—I can describe the situation at the site of Umm al-Hafriyat, a town east of Nippur, where wind erosion has made visible canal banks dating as early as 3000 B.C., and has eroded the plain around the site to such an extent that virgin soil under three of the mounds is fifty centimeters *above* the present plain. That means that the plain has been more heavily eroded than the mounds, which are protected somewhat by their mass and by the sherd cover on the surface, and as a result are pedestaled. In a pit cut below one of the mounds, occupied at about 2300 B.C., there were black soils and even decayed plants that Steven

Lintner, the expedition geomorphologist, interpreted as marsh deposits. This evidence of marsh was especially striking because in a number of pits made by Lintner around Umm al-Hafriyat and Nippur, and in several sections of drainage canals in the area (7 meters deep), only two or three displayed easily-visible layers of different soils because defferences had been effacecl by extensive reworking of the soils. In the most striking section, alternating layers of soil in the top few meters were interpreted as evidence of desert, marsh, and irrigation agriculture. There was even a trapped dune in one part of the section. In 1990, T. J. Wilkinson, who has made a number of soil investigations in the Nippur area and other locations in southern Iraq, responded to our request to examine a section of the Main Drain, the "Third River," that had been freshly cut directly east of Nippur. Here, in a trench 35 meters wide and 7 meters deep, he was able to determine that there was evidence of humanly-altered soils down to about 4 meters. At this level, on the edge of what was clearly a point bar of a large channel, was found evidence of human activity in the form of charcoal, potsherds, a clay sickle, and some shells. Evidence thus far leads us to date the site to late in the Ubaid period, about 4000 B.C. To judge from this site, from Ras al-Amiya and from other evidence, one might suggest that the general surface level in the Ubaid period would have been at about 4 meters below present plain. However, it must be reiterated that the alluvium was not a simple plain, but was divided by man-made and natural barriers into high areas and basins. These small sites must have lain alongside canals that ran on older levees, with the offtake canals heading out into lower basins. The large, long-lasting sites, such as Kish, Nippur, and Uruk, though also, presumably, built on old levees, pressed down into the soil as their massive burdens of construction debris increased, driving the early levels into the alluvium.

Although marshes are a major feature in southern Iraq, they can appear and disappear in short time spans, and when a marsh appears or disappears, a major ecological niche comes into being or is lost. Written accounts of travelers of the past few centuries, as well as my own observations, can serve to illustrate this point. To the north east of Nippur, the Delmaj Marsh was replenished annually by Tigris flooding. It was noted by travelers as early as the mid-nineteenth century and was still much alive when I spent part of a day there on a boat in 1964. By 1972 it had completely dried up, leaving almost no traces of marsh sediments and vegetation because of the heat and wind erosion. But with the completion of a new escape reservoir for drainage projects, a new lake/marsh has formed in the same area since 1980.

The Mesopotamian marshes serve as escapes for the water that comes down in flood, but are also a necessary adjunct to normal irrigation, taking the excess after waterings. Because the rivers' highest floods usually reach the alluvium after the optimum period for irrigation, they must be diverted into local, short-term marshes or into larger permanent marshes in the south. No matter where the head of the Gulf was in any period, there would have been marshes in the alluvium because high floods would have crested above bank level long before they reached the Gulf. The size of the marshes would have fluctuated with climatic conditions such as increased or decreased rainfall. But they would also have been affected by the amount of irrigation being practiced. Whenever the alluvium was more heavily cultivated, more of the water would

have evaporated and the marshes would have been smaller. To gain an idea of the amounts involved, consider that in the 1950s, when southern Iraq had much less than half of its arable land under cultivation and the marshes were much larger than today, an estimated 30 cubic kilometers of water was evaporated from the irrigated zone each year, with a consequent addition to the delta of 22 million metric tons of dissolved chemicals (Cressey 1958: 448). The amount of evaporation would have been much greater in ancient times when much larger parts of the alluvium were irrigated and the marshes would have been correspondingly smaller. The great increase in cultivated area today, as compared with the situation ten years ago, along with the draw-down of water for dams in Turkey, Syria, and northern Iraq, has resulted in the marked decrease in the marshes of southern Iraq. In a trip to the Hor al-Hammar in 1985, I passed through more than ten kilometers of desert strewn with boats and other remnants of marsh life before reaching the reed beds. With new dams being filled upstream and more desert areas being brought under cultivation in the intervening years, the marshes today are even more reduced.

Projecting the recent pattern into antiquity, we must conclude that some ancient marshes in the southernmost plain must have been long-term, but others would have reappeared in a number of locations with each spring flood and disappeared in the heat of summer. Archaeological surface reconnaissance in southern Iraq has indicated in numerous areas the presence of sizable basins, with few if any sites, that appear to have been marshes in the past. For instance, to the southwest of Kish and to the southwest of Nippur, along the main line of the old Euphrates, there are low areas with little evidence of sites for any period, and the soil from canal upcast shows evidence of clays and dark soils. I would propose that for most of antiquity there was probably a belt of annually-renewed, localized marshes along the entire course of the branches of the river. Ancient texts mention marshes around or near many cities in Sumer and Akkad, and they seem to have been desired, presumably for the resources that they provided. There is no doubt that marshes existed in very early periods. Adams has found evidence of an actual marsh settlement of the Jemdet Nasr Period (*c.* 3000 B.C.) in the area notheast of Uruk (Adams *et al.* 1972). No one has made a systematic archaeological survey of the great marshes themselves, but some sites have been examined. Thus far, the earliest site recorded in the Hor al-Hammar is from the Kassite period (*c.* 1300 B.C.).

Whether perennial or annual, the marshes form a rich ecological niche, with local and migratory birds, a variety of fish, turtles, pigs, and other animals, as well as edible plants and reeds that have a multiplicity of uses. Regardless of where located, marshes were clearly exploited in antiquity, with administrative texts recording thousands of birds, bird eggs, turtles, and fish gathered for use in the cities (e.g., Owen 1981). From early periods, we have representations of reed houses, archaelogically excavated remains of roofing, baskets, and mats, as well as texts mentioning reed mats, implements, etc. We even have early representations of the water buffalo, which is supposed to have been introduced to Iraq in Islamic times (Postgate 1992: 7, but cf. Adams *et al.* 1972: 25) but was surely in Mesopotamia by the third Millennium (Postgate 1992: 164–65), and I think it unlikely that this admirably adapted marsh

animal was not retained in southern Iraq throughout antiquity.

The marshes served in ancient times, as they continue to do today, as a refuge for people escaping from governmental, social, economic, and other problems. Thus, marsh communities could be composed of people who formerly were city-dwellers, nomads, farmers, soldiers, and slaves.

The banks of the two rivers in antiquity formed a niche somewhat similar to the marshes, with poplar, willows, date palms, usable shrubs, and many of the same fauna as the marshes. Lions were reported on the river banks as late as the 1920s. It would have been possible to live along the river as fishermen, hunters, and/or as transporters of goods, even without agriculture. But irrigation would have been a simple technology to begin mastering. In the Shatt al-Arab today, the rising tide of the Gulf backs up the water in the river for about 200 kilometers, in some reaches to a height of several meters (Gholizadeh 1963). In antiquity, as today, it would have been simple enough to take advantage of the daily rise of the river for irrigation purposes. But tapping the Euphrates anywhere in the alluvium would have been easy enough for flow irrigation to have been practiced, long before our earliest evidence for it at about 6000 B.C.

Between the two rivers, and above the great marshes, the alluvial plain is today partly a desert. This desert may appear to be empty and devoid of life, but it is the habitat of a wide variety of lizards, Snakes, frogs, rodents, insects, birds, gazelle, deer, and onagers. Valuable shrubs (camel thorn, prosopis, and tamarisk) and even grasses flourish in the dry alluvium. For millennia, herders have used the desert between the rivers as grazing land, moving out from the river banks according to the capability of their particular animals to withstand thirst. Donkeys, probably from early in Mesopotamia's history, furnished transport for persons and goods in this zone. Until recently, sizable numbers of "Little Nomads" still subsisted by herding in the desert between the rivers and doing some hauling between villages and towns on both sides. Now, only a few of these groups still make their rounds. But it can be seen from this particular adaptation, and from the presence of abundant wildlife in the desert between the rivers, that life could be sustained on a herding or hunting-and-gathering basis before irrigation farming was introduced. Some theories on the beginnings of civilization in Mesopotamia imply that southern Mesopotamia was unoccupied until it was gradually filled with farmers coming down out of the foothills of Assyria. The lack of pre-Ubaid sites in the alluvial plain has helped to create this notion of colonization from the rain-fed zone, but as I have indicated above, many early sites are surely buried. Sanlaville has pointed out (1989) that not only has alluviation masked such settlements, but also the present day high water table probably prevents their discovery. In the Pleistocene, the Tigris and Euphrates ran through the area that is now the alluvial plain, and even with a drying up of the entire region in the early Holocene, it is unlikely that all ancient hunters and gatherers, who are evidenced by Paleolithic remains just to the west of the Euphrates, would have abandoned southern Iraq entirely. Someone must have remained to exploit the rich food resources of the rivers, the marshes, and the coast of the Gulf (cf. Sanlaville 1989: 24). In short, the area that was later to be called Sumer and Akkad was most probably not unoccupied in Mesolithic and Neoliothic times, but was being exploited in a different way than it was after irriga-

tion agriculture was adopted as the main subsistence mode.

The situation in southern Iraq before irrigation can be reconstructed from condition in periods of major desertification in historical periods. At least six times during the past six thousand years, the alluvial plain between the rivers has been rendered a desert for centuries at a time.

1) There is evidence of an abandonment of the area along the easternmost branch of the Euphrates during the Uruk period, apparently as a result of a shift of the water into more western channels (Gibson 1973, and Adams 1981: 60–64). I have suggested (1973) that the abandonment of this channel and the shifting of population onto the other branches of the river acted as a stimulus that brought about the establishment of strong states in the late Uruk Period (*c.* 3500 B.C.).
2) In the Old Babylonian Period (eighteenth century B.C.), there was a generalized abandonment of much of central Babylonia, including major cities such as Nippur, Uruk, and Ur (Gasche 1989). The recovery of the area did not take place until after 1400 B.C. At Nippur, we have found evidence of desert conditions in excavated stratification datable to this gap in occupation.
3) Some time after 1,200 B.C., the area collapsed again, and once again major cities were abandoned, not to revive fully until some time around 800 B.C.
4) Major floods in the Sasanian period (*c.* A.D. 600) are credited by Arab authors with the demolition of a good part of the irrigation in southern Iraq, and this event may have helped to weaken that state (Gibson 1972: 52–54). Adams has pointed to a more general lack of flexibility in a system grown too rigid. "Short term advances in scale, complexity, revenues, and all the other convenient indexes turned out to have been purchased at the expense of increasing ecological fragility. In this sense the essential dynamic of the Sasanian demise was an internal one" (Adams 1981: 214).
5) The collapse of the Abbasid state and the destruction of its irrigation works is traditionally blamed on the Mongol conquest (A.D. 1258), but it is clear that an even more developed irrigation system, entailing an even more exaggerated lack of flexibility, and the destruction of the environment due to over-engineering and over-salinization had already rendered the caliphate a weakened shell. The Mongols merely took advantage of that weakness. The Ilkhans tried to restore the damage, with repairs on old canals and the cutting of new ones. By the fifteenth century A.D., however, much of the alluvium was abandoned, not to be completely restored to cultivation even today.
6) The gradual weakening and failure of the Hindiyah barrage on the Euphrates during the last half of the nineteenth century resulted in the desertification of most areas that depended on the Hilla Branch of the river (Gibson 1972: 26–29), with resultant drastic shifts in the social, economic, and subsistence systems.

In summary, in the past 6,000 years, sizable portions of southern Mesopotamia's arable land have been lost to desert for a total of more than 1,500 years. Each of these great abandonments was accompanied by the expansion of marshes. It is no accident, therefore, that during two of these collapses of irrigation, the one after the Old Babylonian Period of the eighteenth century B.C. and the one after 1200 B.C.,

Babylonia came to be ruled by kings who are termed the First and Second Dynasties of the Sealands. The Sealands probably included the coast of the Gulf, but it were preeminently composed of the marshes. With the central alluvium out of production, and irrigation existing along only the western branches of the Euphrates and presumably on the lower reaches of the Tigris, the marshes and the Gulf coast would have been the most productive, stable economic area in Babylonia.

The deserts that came into existence in previously irrigated areas are probably the major source of material for the sandstorms and duststorms that envelope Iraq in summer. Some of these storms are real sand storms, deriving their material from the Saudi desert and its extension in western Iraq. The greatest part of what we call sandstorms, however, are derived from the dunes between the two rivers. In a previous article, I reported on early analyses of the composition of the dunes in Iraq (Gibson 1982: 1228), mistakenly concluding from that limited sample that since they were predominantly composed of sand (presumably in great part of aeolian origin from the western desert), the dune belt formation was therefore independent of agriculture. My thinking was influenced by a field season near Hasa Oasis in Arabia, where I saw irrigated fields being overrun by sand dunes. More thorough sampling and analysis of the Iraqi dunes by Stephen Lintner and Margaret Brandt showed that these were aparna dunes, overwhelmingly made up of clay pellets, with an admixture of sands from river levees and aeolian sources, as well was minute fragments of shell (Brandt 1989). Aparna dunes, in southern Iraq as elsewhere, are derived from abandoned, salt-affected agricultural lands and dried-up marshes. The minute fragments of shell are the remnants of fresh-water molluscs (mainly *Unio*) left behind; the movement of the dunes causes the disintegration of the shells. What had not been appreciated until our work at Nippur in the past two decades is the speed with which the dunes can form, then be replaced by marsh or irrigated fields, and reform once again. European and American travelers and archaeologists have given us written observations of conditions in the Nippur area from at least 1839 until the present. Since that date, the immediate area of the site has gone from irrigated fields, to marsh, to irrigated fields, to desert with a few dunes in the distance, to irrigated fields, to desert with an extensive dune field, and back to irrigated fields again. In my first season at Nippur in 1964, the site was under the western edge of a dune belt that stretched eastwards almost to the Tigris and ran from north of Kish to south of Uruk (about 250 km). In subsequent years, I recorded the gradual movement of the dunes toward the east. During the past eight years, the dunes have moved completely off the site, and the edge of the dune belt is more than a kilometer away. Not only has the dune belt moved, but it has thinned out and is about to disappear entirely. As it moves and thins, farmers introduce new canals and resume agriculture to the east of Nippur for the first time in fifty or more years. Farther off, irrigation is beginning in areas that have not been farmed since the thirteenth century. If the Iraqi government completes development schemes that were already planned in the 1950s, there will be no desert between the two rivers in a decade. Likewise, the southern marshes, already reduced by upstream dams and irrigation, will be drastically reduced.

The key to understanding the formation of the dunes is salinization caused by over-

irrigation, which leads to abandonment of fields and the drying up of their tail-end marshes; subsequently, the salty crust of clayey topsoil breaks up into minute pellets which then are formed into dunes through wind action. T. J. Wilkinson has suggested (pers. comm.) that the formation and disappearance of the dunes is explainable in terms of supply and demand. As irrigation is resumed in areas that the dunes evacuate, the new ground cover stabilizes the soil, reducing the supply of material for dune formation. Wind, moving over the dunes, bears away some of their material. Since that material is no longer being replaced from abandoned areas, the dunes themselves begin to dwindle at an increasingly accelerated rate. It is one of the ironies of this complex ecological system that the profit-motive reflected in the investment of capital for the cutting of new canals and the creation of new fields will also, in time, be one of the causes of over-watering and violation of the fallowing principle that controls the rate of salinization. Overwatering and salinization must lead, once again, to the abandonment of fields and the revival of dunes (Gibson 1974, 1982).

Salinization has acted as the critical limiter of development in Mesopotamia from early times (Jacobsen *et al.* 1958, but cf. Powell 1985). In previous publications (e.g. Gibson 1972, and 1982), I have proposed that there is a cycle of development and collapse in which the environmental factors outlined above react to and are reacted upon by human action, especially the interference of centralized government in the ecologically-sound tribal system of cultivation (Gibson 1972). When states become strong, they tend not only to press farmers for more production and taxes, but also to draw off labor to the developing cities. The need to increase production leads to violation of fallow, which causes acceleration in salinization. Lower yields due to salinization create debts, which eventually force some farmers into other modes of subsistence in the cities, the marshes, or nomadism. In fairly short periods, areas can become so salty that they are abandoned. The salinization of the countryside must lead, eventually, to the weakening and downfall of the state itself. In historical Mesopotamia, states that failed were replaced by new states in other parts of the alluvium; with each state's collapse, its territory would revert once again to desert, marsh, and a gradual revival of tribally-organized farming. Later, the cycle would repeat itself. I have a suspicion that through time, the desertification became progressively more severe. Perhaps in early periods the recovery period was much shorter, but by the second Millennium B.C., the desertification phase lasted several hundred years.

Thus far, I have sketched in some environmental elements of a complex ecological system, and have linked them explicitly or implicitly to attested subsistence patterns that include irrigation farming, date palm cultivation and other horticulture, fishing, fowling, hunting, gathering of natural plants, nomadic or semi-nomadic herding, land and river transport, seafaring, and reed product manufacture. I would add to this list the best-documented ancient subsistence pattern, urban life. It is the city that creates and innovates, but it is atso the needs and the wants of the city that bring about the environmental degradation I have described.

I would emphasize that even with the natural resources of southern Mesopotamia's variegated environment, it was relatively poor in resources that make civilized life

possible. Except for river pebbles and a low grade limestone and flint on the western desert escarpment, the area has no usable stone. There are, even in northern Iraq, only traces of metal ores, which must be imported from Iran, Turkey, Oman and farther afield. Although there were poplar and palm in southern Iraq, and in early times oak and other trees in the Assyrian mountains, timbers and stones for large buildings and monuments had to be brought, presumably by raft, down the rivers from Turkey, and Syria/Lebanon. Luxury goods that might be manufactured in Mesopotamia, such as jewelry, containers inlaid with ivory or shell, furniture, etc., were made with raw materials from outside the area. Southern Mesopotamia's greatest resources were its potentially rich agricultural soil, its orchards, its grazing lands and animals, its marshes and rivers teeming with wild life, and the ingenuity and energy of its people. Mesopotamia traded grain-products, date products, textiles and other finished goods in exchange for the raw materials of its neighbors. Lacking stone, it created a tradition of mudbrick architecture that was admirably adapted to the extremes of environment. In times of political expansiveness, it expended immense amounts of fuel to bake bricks for major buildings, in the process probably causing local deficits in groundcover and leading to crises in fuel sources and even shortages of straw, thus reducing available fodder needed by animals in seasons of stress.

The variety of subsistence adaptations in the alluvial plain, existing even today, formed an interlocking and interdependent system to allow life to continue in Mesopotamia in the face of state collapse, natural catastrophe, or invasion. Robert Adams (1978) has treated the variety of adaptations as alternate strategies of maximization, stability, and resilience. In Mesopotamia, people could shift from one subsistence mode to another as need arose. Thus, nomads could settle as farmers, or take up marsh life, or move into the city. Farmers could take their animals and join a nomadic group, or shift to the marshes, or move to the city. Marsh dwellers, similarly, could become full-time farmers, could join a nomadic group, or move into the city. City dwellers could turn to farming, or escape the law by fleeing to the marshes or into nomadism. I do not think that such a shift was an easy decision to make. People are very conservative when their basic subsistence is involved. But ancient people in Mesopotamia and modern people in Iraq did and still do make such shifts. The key to the system, that which makes it possible to change livelihoods, is a shared paradigm of kinship, the adherence to general ideas of social organization based on kinship, even when the kin-ties are fictitious. There are enough indications in cuneiform documents (Glassner 1986, and Postgate 1992), from even the earliest readable texts, that there was a patrilineal, patrilocal bias very similar to the underlying kinship paradigm that still operates in the Middle East today. By this, I mean that in most of the important features of society, in most of the key transactions such as marriage, inheritance, sharing of land, sharing of risk, protection of honor, and duties toward the dead, the essential organizational principle was the passage of authority and goods from father to son(s). At marriage, a woman left her father's house and went to her husband's family; their sons were part of her husband's lineage. There are indications, as expected in a patrilineal system, that the father's brother (*emu*, cognate with Arabic 'amm) had a special role in ancient Mesopotamia. In such systems, the father's brother is responsi-

ble for furnishing his brother's son with a wife; in ideal conditions, the bride is chosen from among his daughters. If a man dies and his sons are not grown, the man's brother(s) is (are) obliged to take care of the widow and her children.

I have stated that this pattern of kinship organization is a paradigm—an ideal arrangement, a model. I would emphasize that such a paradigm may be breached in a society as often as it is adhered to. There are ancient Mesopotamian marriage contracts between men and women who were not related at all, or who were related through the father's sister, the mother's brother, or a more distant relation. It is significant that there are only about two hundred extant marriage contracts out of the hundreds of thousands of cuneiform texts in Mesopotamia, implying that in the overwhelming number of cases, marriage was not something that required a legal, written contract. Most of the written contracts detail marriages that link important families, who, in my opinion, were going against tradition and therefore had to resort to legal steps to assure the passing on of inheritance. Matters related to family—births, marriages, divorces, normal inheritance, and so on—would not usually be recorded in legal texts, but would be taken care of in the traditional, customary way prescribed by the unwritten rules of kinship. Disputes would be adjudicated, in most cases, without recourse to law, but through mediation by kinship figures or groups. The fact that legal texts in general, other than business contracts, are a relatively minor part of the cuneiform record is explicable by the normal recourse to customary law. Under even the strongest of ancient states with their formalized structures, there existed a more enduring structure based on kinship, shared area of origin, ethnicity, and other informal relations.

The strength of the patrilineal kinship system, the level of corporality at which it operated in any given time or locality, would have depended on circumstances. Today, in Iraqi cities, most people in most situations relate to others either as individuals, as members of a family or extended family (especially in successful businesses), often as members of a professional association, and only rarely as members of some larger kinship unit such as a lineage. In ancient Mesopotamia, people living in cities also probably would not normally have acted consciously as members of a corporate kin group larger than a lineage, but would have had a multiplicity of bonds that cut across kinship lines and ethnic boundaries. On the other hand, in modern Iraq, people tend to visit, do business with, find help to cut through bureaucratic tangles, and marry within a group that may be defined by religion, but is also often definable by lineage and even clan or tribe. I would propose that the same situation was even more the case in ancient Mesopotamia, even in the largest, most sophisticated cities.

There are enough hints in cuneiform texts to allow a suggestion that there were actively-operating kinship organizations, probably lineages, sometimes occupying a specific ward (*babtum*), and occasionally cooperating with other lineages in informal groupings under a leader who would be given a government title. Thus, elders of a city, recognized by the government and functioning as governmental officials, would in fact have been heads of major lineages or groups of lineages, representing their constituencies. I would stress that in neither the modern nor ancient case would urban individuals normally have interacted as members of a "tribe," i.e. as members of a con-

sciously perceived, effectively operating, autonomous corporate kinship organization under the leadership of a chief. But any modern Iraqi can (and I would wager any Sumerian or Akkadian could) give you the name of his tribe—a group usually still operating actively in some small towns and in the countryside as farming and nomadic groups. In the current post-Gulf war crisis in Iraq, as evidenced in Baghdad newspapers, settled tribal chiefs are once more taking a high-profile role in re-establishing stability, pledging their support and their tribes' support to the government. Some city dwellers of my acquaintance, who have been "urban" for thirty years or more, have been welcomed back to their tribal territory in the country, where farm produce will allow them to survive. Usually, the linkage between people in the country and the city has been maintained over many years, by the sending of men from the farms or the marshes to the cities to do labor in off-seasons; these men at least initially stay with city relatives, who usually help them to find employment. Often, there have been marriages to link the city and country kinsmen. Between agricultural villagers and nomads, similar ties of kinship, even when fictive, are solidified by economic cooperation and intermarriage. The same is true of the relationship between marsh-dwellers and farmers, nomads, and city people. To reiterate, it is the continued acceptance of "tribal" values, the unwritten rules of hospitality, of obligation to kin, and the concept of group honor, that has formed the enduring, non-governmental, social and economic underpinning of Iraq, and, I propose, of ancient Mesopotamia. Governments come into being and reduce the effectiveness of the kin-based groups by taking over key roles such as policing, warfare, and even may attempt to regulate religious institutions. The kin groups in some areas, especially cities, lose their corporateness on the upper levels (tribe, clan) but still operate as extended families and even lineages. In the countryside, it is probable that at no time have higher-level tribal structures been entirely eliminated. They might have been weakened, but the close fit between tribal structure and the environmental situation in irrigated agriculture, as well as in the marshes and among nomads, is too ecologically sound to allow tribal organization to disappear entirely. Central governments act against tribes because tribes can do for their people all the basic things that a govenment does—they furnish defense from enemies, a stable subsistence, a political system, a legal system, a moral code, and social welfare. It is this alternate socio-politico-economic system, summed up in the term "tribal," that has allowed life to continue in the alluvial plain during the long periods of civilizational collapse, and has furnished the basis for the eventual revival of the cities and centralized government.

Now I will turn to the formation of civilization in Mesopotamia, presumably with the Sumerians as the main protagonists. In prehistory, in the early Ubaid period but perhaps even earlier (sixth Millennium) there already existed, with the exception of cities, the multiplicity of ecological niches and subsistence strategies that I have discussed above. Assuming that irrigation was already beginning to spread throughout the alluvium, to supplement produce from the marshes and rivers and the items gained through trade with neighboring areas, this area was capable of producing grains and other agricultural products on a scale that was unprecedented. With the creation of agricultural wealth, inequalities would have appeared within kinship

groups, resulting in a range of organizational complexity within the general social system, sometimes allowing the creation of unusually strong tribal leaders. Ethnographically-based studies of change in authority (Rosenfeld 1965, and Fernea 1970) have led me (Gibson 1974) to suggest that similar processes transformed tribal leaders and their groups in ancient Mesopotamia. Under certain circumstances, chiefs, who is tribal contexts act as the embodiment of the group's traditions and values and should not strive to rise beyond the position of first among equals, are faced with the opportunity or the necessity to exercise real power. In those circumstances, if the chief can wield power that allows him to execute or order the execution of a kinsman without incurring group sancition or blood feud, he has stepped over an invisible line and has become a ruler, in effect a king. In historical parallels (e.g., Rosenfeld 1965), a chief who would become a king must first create a force made up of non-kinsmen, of people loyal only to himself, to act as the enforcer of his will against his own kinsmen. Conversely, a king who cannot exercise power over his own group without adverse sanction is no longer functioning as a ruler, but has reverted to the position of chief even though he is still called "king". I maintain that shifts on either side of that line occurred often in the ancient world, and that the achievement of kingship was not a rare event, even in prehistory. A new king might maintain his old title as chief, and even continue to meet with his kinsmen as if they were equals, but by then the tribal council of qualified men would have become a royal council, an audience dominated by one man rather than a group seeking concensus.

Jacobsen (1957) touched upon the tribal base of ancient Mesopotamia but did not follow the hints to their logical conclusion, i.e. that the patrilineal tribal system makes it relatively easy for chiefs to become kings. He did outline the way in which a strong war-leader might in a crisis take real power and become king, but he inserted a preliminary stage in which the early Sumerian cities were ruled not by tribal chiefs who became kings, but by town councils. To a certain extent, Jacobsen reflected a then-current notion that in ancient Mesopotamia there was a kind of theocracy, in which the town belonged to its chief god and was ruled by priests. Others have developed this theme more completely (Falkenstein 1954). That formulation is still widely accepted, even by anthropologists who should be aware that there is little in the ethnographic record or from history that would support the notion. The idea of a priest-king is derived, ultimately, from a mistaken formulation of a Mesopotamian "temple economy" that generally is rejected now by cuneiformists (e.g. Postgate 1992: 186). That formulation, which colored the thinking of generations of scholars, was the work of Anton Deimel (1931), a priest who spent most of his adult life in and around the Vatican. Diakonoff (1974), Gelb (1969), and others have shown that at the time the temple economy was supposed to have been in operation (Early Dynastic IIIa, *c.* 2700 B.C.), the economy was mixed, with governmental, temple, and private sectors. The very texts used by Deimel to reconstruct the temple economy, when reconsidered (Foster 1981, and Maekawa 1987), indicate that not only was there was a mixed economy but that the temple had to report its holdings and yields to the state. The gradual rejection of the notion of a "temple economy" by Mesopotamian specialists has not yet caused a general rethinking of propositions on the theocratic origins of the

Mesopotamian state and civilization, especially by anthropologists who are increasingly addressing the question. Ironically, syntheses by anthropologists, accepting Deimel's and Falkenstein's formulations, are now being read by Mesopotamian specialists and the idea of a theocracy is re-entering the field as an "anthropological" construct.

To put in perspective the role of the religious specialist in relation to the political leader of kin-organized societies, it can be said that even in the most basic of human groups, the hunting and gathering band, there are religious specialists: persons who know best how ritual should be conducted. All males in the band participate, and family heads and clan leaders may have special roles to play in the ritual, but there is usually an "expert." In lineages, clans, and tribes, the specialization is even more marked, being expressed in terms of a sacred family or lineage. Although the ancient Mesopotamian chief (and later the king) had to have a relationship to the gods in order to make his supreme rule legitimate, it would have been structurally difficult, if not impossible, for him to be a priest. For a king to take on the leading religious role would mean that he would not be able to act in ways that were unusual or untraditional, outside the normal range of accepted behavior. If the chief or ruler were also the religious leader, political decisions that led to bad results, defeats in war, etc. would indicate that there was something drastically wrong not just with the leader, but with the group and maybe even the religion itself. Some societies, especially those with divine rulers such as Egypt, have worked out a solution to that dilemma by having viziers and other officials carry out the duties of rule for a god-king who operates at a remove from everyday affairs. This solution appears to have been compatible with the Egyptian situation, where dynasties continued for longer period than elsewhere. In Mesopotamia, with its more drastic natural disasters and changes in government, divinity was claimed by a few kings, but was usually not attempted.

I would reiterate, however, that tribal leaders and kings, while not being priests *must* carry out some priestly functions. They must seek legitimization through connection with the gods. Irene Winter (1992: 16), in a recent article states the case thus:

> To the extent that 'religious belief involves a prior acceptance of authority' ... and that ritual practice engages power dynamics in the exercise of, or acquiescence to, that authority or its representative ..., religious ritual becomes an arena in which political leaders not only may, but *must* function, if they are to establish and maintain their own authority.

I would add that since the most natural organizational format for a state in ancient Mesopotamia would have included selected members of the new king's kinsmen working alongside people not from the group, the religious leaders were probably brothers or other close relatives of the king. A religious lineage in a tribal situation would easily become the religious "tribe" (e.g., in a Biblical sense) in a state. With a kinship-based connection with the religious lineage, the king could more easily affirm his right to rule through his close affilation with the gods, without losing his freedom of maneuver.

I would also suggest that there were specific locations, at the juncture of ecological or ethnic/linguistic zones, places in which rival groups could meet in peace to adjudicate disputes, carry on trade, and establish linkages through marriage and partner-

ships that would allow them to unite against outside threats. Ancient Eridu, the southen most town in the alluvium between what was probably a perennial marsh and the desert scarp at the edge of the Arabian desert, was in my view one of those critical hinge localities. Here, a major temple to the underwater god Ea/Enki was maintained for several millennia. In excavation at the site (Safar *et al.* 1981) it was found that each constituent part of the town, regardless of its time of foundation, was built on dunes. In other words, this town was founded and maintained under difficult circumstances. Given that fact, its dedication to the water god is even more striking, since it emphasizes the critical factor that allows a town to exist at all in southern Mesopotamia. Nomads on the western fringe of Mesopotamia must have viewed Eridu in much the same way that more recent nomads must have regarded Nejef. In this presently-operating holy city, perched on a gravel outcrop over a rich date-palm oasis at the edge of the desert, neutrality has allowed nomads, townspeople, and farmers, even bitter enemies, to meet, to cooperate, to replenish needed supplies, and trade their goods.

I think that Nippur was, like Eridu, another "hinge" site, located not at the juncture of two ecological zones, but on the border between two linguistic and ethnic groups, Sumer and Akkad. Jacobsen (1957) has suggested that Nippur played an early role as the center of a confederation of cities, not exactly as a political capital but as a religious center around which other cities could organize a sphere of cooperation. In periods before and after that confederation existed, Nippur, the holiest city in Mesopotamia, may have had a religious role similar to Eridu's, but its functions were greatly enhanced; it was the center of Mesopotamian religion and the place where kings sought recognition and legitimization from Enlil, chief god of the pantheon.

At some point in time, and I think it may have occurred already in the Ubaid period, tribal chiefs made the transition to king. By this time, trading contacts linked the entire Near East, from Turkey to the Arabian coast (see, for a recent summary, Edens 1992). Not just pottery, but temples of the Ubaid-type have been found far from the southern alluvium. Some of the elements that have been put forth as parts of the model for understanding the transition to civilization and the state were already in place. Besides long-range trade, there was some evidence of social stratification shown in grave goods, monumental architecture in the form of temples and apparently non-religious buildings, as well as accounting procedures (Schmandt-Besserat 1981) and stamp seals, both of which may indicate some level of administration. To the northeast of Babylon, at the site of Uqair, which is notable for an Uruk period platform and a painted temple, there is also a partially excavated earlier building, dated to the later part of the Ubaid period (*c.* 4000 B.C.). This structure, of substantial size with thick walls, seems in its excavated portion to be the storage and service area of a very important building; in later periods, such a suite of rooms would be assumed to have been part of an administrative building or a palace. More interesting is an earlier set of Ubaid buildings (Ubaid 2–3) at the site of Abada, east of Baghdad. Here, in a village, one building (rebuilt in a subsequent level and in neither level having any religious accoutrements) was larger, more elaborate, and yielded artifacts such as luxury items and accounting devices that the other buildings did not have. I suspect, as did the ex-

cavator (Jasim 1985), that here a tribal leader had made the transition to real power.

The great transformation in Mesopotamia that resulted in what we call the earliest civilization probably took a long time to manifest all of its characteristics, but most of the key steps seem already to have been taken in the Ubaid period. By Uruk times (*c.* 3500 B.C.), when the evidence of civilization is easy to see, southern Mesopotamian cities had established colonies far up the Euphrates in Syria (Algaze 1989), the transition to civilization had already been made, and the state had already been invented. Running down a checklist and noting that, thus far, in the Ubaid period we have no evidence of monumental sculptures, no writing, etc, and arguing that "civilization" could not have existed that early is to prefer a static definition in which all traits must be in existence rather than a dynamic model for this multi-faceted, complex phenomenon.

The city of Uruk in Levels V-III (*c.* 3500–2900 B.C.) is the focus of most attention in the discussion of the first achievement of civilization. Here were excavated numerous buildings of mudbrick, and even of stone, most of which have been called temples. In one part of the site is the so-called Anu ziggurat, a high platform with an elaborately niched and buttressed building on its top. This building is divided into three rooms and has an altar and an offering table in the central space; those features, along with the niched-and-buttressed exterior, make it possible to place this building in the tradition of temple construction in Mesopotamia, traceable from the earliest Ubaid levels at Eridu to the end of Mesopotamian civilization. Partially under the Anu ziggurat, on one side, is a labyrinthine building of stone, built into a slope so that it functioned, in effect, as a subterranean structure (*Steingebäude*). The excavators have called this building a temple. Although it was most probably part of the temple complex, I would suggest that it did not have a role in ritual, but was for the cold storage of such commodities as beer and wine, both of which were major items of Sumerian diet for the gods as well as for human beings, including temple personnel.

Several hundred meters from the Anu Ziggurat is the Eanna Precinct, where to the southeast of the much later ziggurat of Inanna there is a group of elaborately niched-and buttressed mudbrick buildings (Fig. 6). These buildings, some earlier and some later in the Uruk period, have generally all been designated as temples because they were located in the vicinity of the later ziggurat of Inanna. This group of buildings is, par excellence, the basis on which scholars have built up a picture of the pristine "theocratic" state. But if one considers the buildings in the Eanna precinct without needing to find sacred buildings and evidence of a theocracy, one begins to differentiate among the structures. Already in Level V there was a limestone-based building that has been identified as a temple, but it lacked an altar and an offering table. The central space in this building was so wide that it could have been roofed only with huge beams, and may therefore have been left unroofed to serve as a court in a very large, not necessarily sacred, building. Nearby, a large court and a columned hall decorated with cone-mosaic decoration is not, in itself, identifiable as a temple, though an adjacent building on a terrace with a tripartite plan has been so labelled, even without an altar and offering table. Continuing to view later phases of construction here, one finds two or three other tripartite buildings (e.g. Temples C, D) that

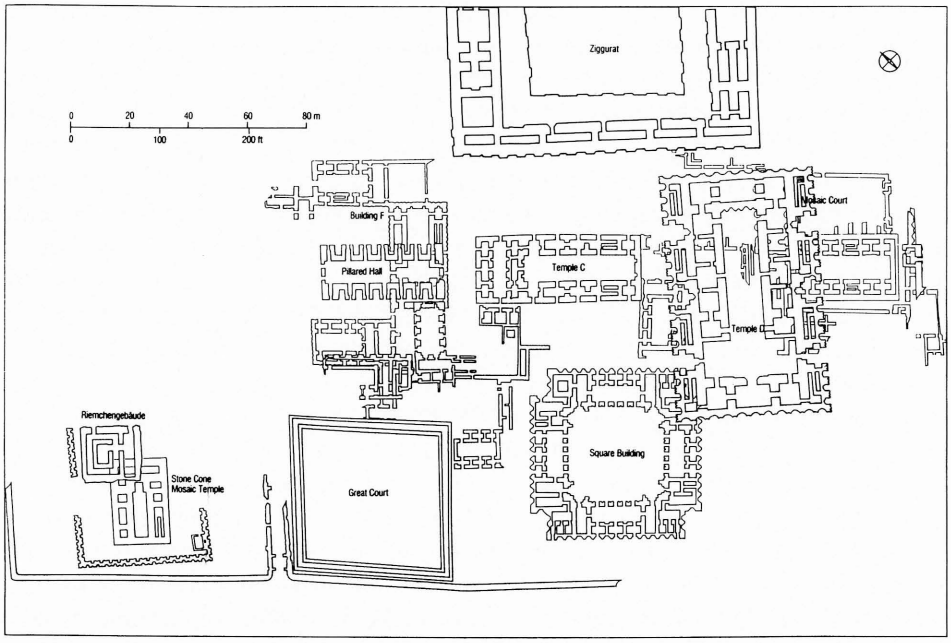

Fig. 6. Plan of the Eanna complex at Uruk, *c.* 3500 B.C. From Roaf 1990: p. 63.

might have been temples, but again there are no altars and offering tables. Some other buildings in the Eanna complex have none of the usual features of temples, and in fact two of them are surely storage buildings, one a subterranean structure with hundreds of jars for liquids alongside other items. One building was so unusual in plan that the excavators were led, finally, to call it Palace E, though others still do not accept it as such (see Fig. 6, "Square Building"). I have thought for some time that the Eanna precinct was, in fact, an area of mixed use, both religious and royal, similar to the area around the Ur III ziggurat at Ur, dating to about 2100 B.C. In this much later precinct at Ur, the kings had a palace and a funerary building located adjacent to the temple complex. I would suggest that most of the buildings exposed in the Eanna complex were, in fact, administrative, but not specifically religious.

In the debris of Uruk IV and in Level III above, thousands of the world's earliest written documents have been found, as well as the precursors of writing—counters enclosed in clay balls which were then sealed. Among the motifs on the sealings and other artifacts are a number of representations of a bearded figure with a particularly distinctive headdress, like a turban, and a long skirt (Fig. 7). This figure is shown in a number of actions: hunting lions, in ritual acts before temples or the symbols of the goddess Inanna, in warfare, and in the act of acquiring or transferring land. This figure, who would have been called a priest a generation ago is usually termed a priest-king by many scholars, but is, I think, better called simply a king who sometimes carries out ritual duties. In the range of activities that he carries out, he prefigures later Mesopotamian kings, who are shown engaged in war, in the hunt, and in ritual. Thus

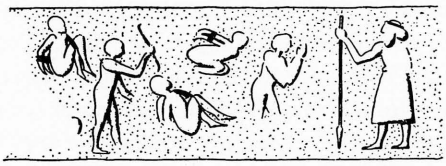

Fig. 7. Drawing of a seal impression from Uruk showing the king on the battlefield. From Frankfort 1939: 23.

far, the Uruk figure is not shown in another of the basic functions of later kings, as the judge of final resort. It is not certain if any of the representations are meant to show him in yet another role, as a builder. But I think that in this figure we see the representation of the first, or one of the first, truly effective king(s).

We assume that the civilization we recognize at Uruk was created by Sumerians, although we know that they were not the only people in the alluvium, nor probably the first to occupy the area. The most ancient cities—such as Eridu, Ur, Uruk, Nippur—all have non-Sumerian/non-Semitic names. Likewise, many of the words for basic professions and tools are non-Sumerian/non-Semitic. There were probably Semitic speakers in the northern part of the plain long before their first appearance in texts of the Early Dynastic period (Postgate 1992: 35–38). But details such as this cannot be ascertained, as yet, because texts from Uruk IV and III cannot really be read as language; they are more like aids to memory than real texts. By the time the tablets can be read, in the Early Dynastic (*c.* 2600 B.C.), it is clear that Mesopotamia was already a mixed ethnic area. Later history was to add several new ethnic and linguistic elements. The culture that bound those disparate parts, that made it possible for Sumerians and Akkadians, and later Babylonians and Assyrians, to share one civilization, was obviously a strong force for unity. In a landscape of sudden and dramatic changes, Mesopotamian civilization ran as a continually renewed but evolving current. Even after the fall of Babylon in 539 B.C., when the area began its existence as part of a series of larger political and cultural wholes, aspects of the culture remained strong. Mesopotamian temples were still being constructed and cuneiform was still being written for a few purposes in Parthian times (*c.* 100 A.D.). Even after all material remains of that civilization had ceased to be produced, some of the artistic elements and motifs remained in force, for instance the symbolic representation of kingship and central motifs such as the tree of life. More importantly, certain economic and social structures remained. For instance, pious foundations (*waaf*) that in Muslim society are established to support religious institutions and specific families for many generations, although thought to be specifically Islamic in origin, find antecedents in ancient Mesopotamia.

The cycle of development and collapse that I have suggested was in operation in Mesopotamia for millennia is still in evidence. Since the 1950s, the Iraqi government has been commissioning and implementing development schemes that are aimed at bringing the entire southern alluvium under irrigation. Desalinization projects, drainage, new ideas of cropping, and other schemes have already resulted in the reduction of the desert between the river to less than half the size it had in 1964. The in-

crease in irrigation, if taken to its planned extent, would reduce the marshes drastically even if there were no other factors leading to the diminution of the waters of the Tigris and Euphrates, such as the new dams and irrigation projects in Turkey, Syria, and northern Iraq. The loss of the incredibly rich ecosystem of the marshes is extremely regrettable, but was predictable. It is also predictable that eventually the marshes will re-form after another collapse of irrigation agriculture due to salinization, as the age-old cycle continues to function. Perhaps technology will work this time, and the desalinization projects and the "Third River" that are currently under development in Iraq will prevent the agricultural collapse that has been a key part of the cycle through millennia. Perhaps the alluvium can continue to produce food enough to support expanding urban populations. I do not, however, see much hope for an agreement on the rational sharing of the waters of the Tigris and Euphrates, any more than I can conceive of any country, even with great oil wealth, taking the politically risky decision to spend the extra money that would be required to reduce or eliminate pollution from new industrial plants, insecticides, and fertilizers.

But it is my expectation that in Iraq, as in other areas of the world, the continuation of kin-based organizational adaptations to ecological conditions will afford the long-term, underlying stability that will assure the eventual re-creation of civilized life after the effects of the ensuing global environmental crisis have left their devastation.

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