Kom el-Hisn: Excavation of an Old Kingdom Settlement in the Egyptian Delta

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Introduction

Ancient Egypt's most important contributions to comparative analyses of early civilizations may derive from its apparently distinctive, almost contradictory cultural characteristics. Ancient texts suggest Egypt was one of the most centralized of early states, yet it also seems to have been the least urban; its bureaucratic complexity was extraordinary, but the vast majority of ancient Egyptians seem to have lived in largely self-sufficient villages and towns; and although its political cycles were closely related to a single environmental factor (Nile flood levels), within these environmental limits Egypt's socio-political evolution was a baroque interweaving of various factors, personalities, and events.

In trying to account for these apparent characteristics, scholars have used the Egyptian archaeological record to address many of the central issues of ancient cultural evolution, such as the determinants of urbanism,[1] the political correlates of irrigation agriculture,[2] the relationship of ideologies and socio-economic structures,[3] the evolutionary context of monumental architec-

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[1] For example, M. Bietak in *Egyptology and the Social Sciences*, ed. K. R. Weeks (Cairo, 1979) 21-56; B. G. Trigger in *Ancient Egypt. A Social History*, eds. B. G. Trigger, B. J. Kemp, D. O'Connor, A. B. Lloyd (Cambridge, 1983) 1-69; B. G. Trigger, "The Evolution of Pre-industrial Cities: a Multilinear Perspective, *Mélanges offerts à Jean Vercoutter, Editions Recherche sur les Civilisations* (Paris, 1985) 343-53.

[2] M. Harris, *Cannibals and Kings* (New York, 1977) 155-63; K. Wittfogel, *Oriental Despotism: A Comparative Study of Total Power* (New Haven, 1957).

[3] For example, B. G. Trigger, "The Mainlines of Socio-economic Development in Dynastic Egypt to the End of the Old Kingdom," in *Origin and Early Development of Food-Producing Cultures in Northeastern Africa*, eds. L. Krzyzaniak and M. Kobusiewicz (Poznan, 1984) 101-9; M. A. Hoffman, *Egypt Before the Pharaohs* (New York, 1979) and *The Predynastic of Hierakonpolis* (Oxford, 1982); W. Adams, "Invasion, diffusion, evolution?," *Antiquity* 42 (1968) 194-215.

ture,[4] and the ecological and demographic correlates of cultural evolution.[5]

These studies, however, have been greatly limited by grossly inadequate archaeological evidence. Wright,[6] for example, specifically excluded Egypt from his comparative analysis of early civilizations because of the lack of archaeological data about Egypt's regional settlement patterns, and none of the major general explanations of cultural complexity[7] has been based on Egyptian data. Until recently, research in Egypt has been concentrated on ritual centers, not on the settlements constituting the socio-economic structure that supported these centers; and Nile floods and millennia of settlement and cultivation have destroyed or obscured most of Egypt's early settlements.

But the pace of research on early Egyptian settlements has increased markedly in recent years.[8] The outlines of Egypt's socioeconomic history have become clearer, and Egypt can now be compared with other early civilizations.[9]

Our own research has been focused on the provincial socioeconomic structure of the Old Kingdom (c. 2628-2134 B.C.). For reasons explained below, we consider changes in Old Kingdom provincial socioeconomic organization to be a key element in analyzing pharaonic Egypt's developmental history. In this context we have conducted two seasons of excavations and other research at Kom el-Hisn (fig. 1), a large west Delta site. We selected Kom el-Hisn for this analysis because it was occupied during the period when Egypt's national administrative institutions first formed fully and then underwent major changes; because its extensive, well-preserved, Old Kingdom occupations are largely unobscured by later habitation; and because its political status (as a provincial capital) and its location (near the desert/Delta margin and a branch of the Nile, and close to the Libyan frontier and the Mediterranean) are such that its composition probably reflects diverse sectors of early economic and socio-political systems.

In our research at Kom el-Hisn we have attempted to reconstruct elements of economic and social variability within the settlement, in order to relate these elements to relatively simple concepts involving functional specialization and the organization and control of economic production. Our ultimate objective is to relate this analysis to a general interpretation of Egyptian cultural evolution, and to comparisons between Egypt and other early civilizations.

Early Pharaonic Egypt: Kom el-Hisn's Cultural Context

Already by the early Old Kingdom, Egypt was a complexly-organized nation-state, with monumental architecture, a multi-tiered economy, and

[4] H. Haas, M. Lehner, R. J. Wenke, W. Wolfli, J. Devine, and G. Bonani, "A Radiocarbon Chronology for the Egyptian Pyramids," unpublished paper.

[5] For example, K. W. Butzer, *Early Hydraulic Civilization in Egypt* (Chicago, 1976); K. W. Butzer, "Long-term Nile Flood Variation and Political Discontinuities in Pharaonic Egypt," in *From Hunters to Farmers*, eds. J. D. Clark and S. Brandt (Los Angeles, 1984) 102-12; F. Hassan, "Historical Nile Floods and Their Implications for Climate Change," *Science* 212 (1981) 1142-45.

[6] H. T. Wright, "*The Evolution of Civilizations*," in *American Archaeology, Past and Future*, eds. D. Meltzer, D. Fowler, and J. Sabloff (Washington, D.C. 1986) 323-68.

[7] Reviewed in R. J. Wenke, "Explaining the evolution of cultural complexity: a review," in *Advances in Archaeological Method and Theory, Vol. 4*, ed. M. B. Schiffer (New York, 1981) 79-128.

[8] For example, J. Eiwanger, *Merimde-Benisalame I: Die Funde der Urschicht* (Mainz am Rhein, 1984); I. Caneva, M. Frangipane, and A. Palmieri, "Predynastic Egypt: New Data from Maadi," *The African Archaeological Review* 5 (1987) 105-14; T. von der Way, "Untersuchungen des Deutschen Archäologischen Instituts Kairo im nordlichen Delta zwischen Disuq und Tida," *Mitteilungen des Deutsches Archäologisches Institut Abteilung Kairo* 40 (1984) 297-325; M. Bietak, *Tell el-Dabʿa II* (Vienna, 1975); W. A. Fairservis, *The Hierakonpolis Project*, Occasional Papers in Anthropology, Vassar College, Number III, (Poughkeepsie [N.Y.] 1986); F. Harlan, *Predynastic Settlement Patterns: A View from Hierakonpolis* (Saint Louis, 1985); M. A. Hoffman, H. Hamroush, and R. Allen, "A Model of Urban Development for the Hierakonpolis Region from the Predynastic through Old Kingdom Times," *Journal of the American Research Center in Egypt* 23 (1986) 175-88; D. Jeffreys, *The Survey of Memphis I.* (London, 1985); A. Mills, "Research in the Dakhleh Oasis," in L. Krzyzaniak and M. Kobusiewicz, 205-10; K. Kroeper and D. Wildung, *Minshat Abu Omar* (Munich, 1985). F. A. Hassan, "Toward a Model of Agricultural Developments in Predynastic Egypt," in L. Krzyzaniak and M. Kobusiewicz, 221-24; F. A. Hassan, "The Predynastic of Egypt," *Journal of World Prehistory*, in press.

[9] For example, B. G. Trigger, 1985; R. J. Wenke, *Patterns in Prehistory*, 2nd ed., (New York, 1984) 301-4.

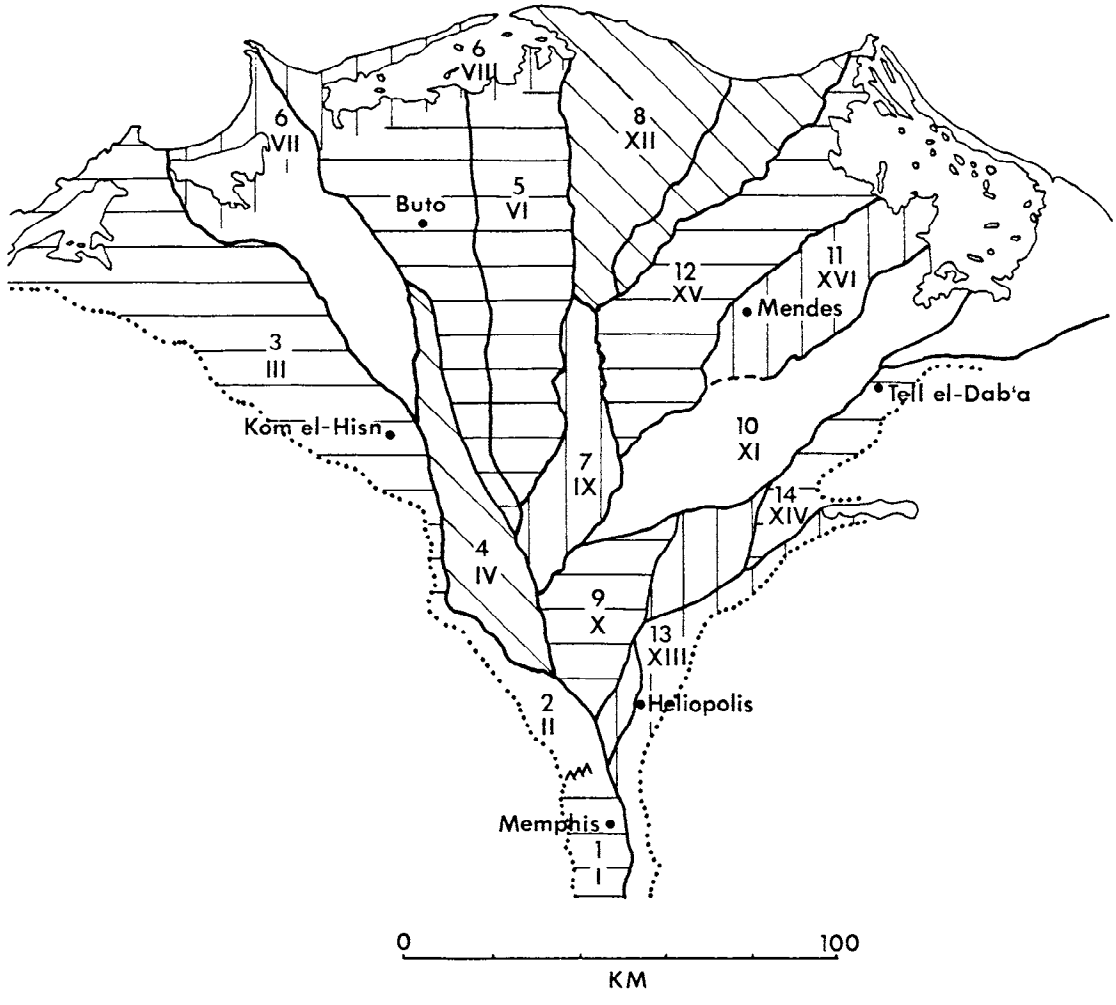

Fig. 1. Kom el-Hisn. Kom el-Hisn was the capital of the IIIrd Nome *(province) in some periods. In this map, the Ptolemaic nome reconstructions are indicated with Roman numerals, earlier ones with Arabic numerals (after Bietak,* Tell el-Dabᶜa *[1975], figures 36–37).*

a centralized and hierarchically-arranged bureaucracy. Thus our work at Kom el-Hisn is relevant to the study of the *development* of Egypt's economic and administrative institutions, not their earliest appearance.

In analyzing the factors that determined Kom el-Hisn's cultural characteristics and history, we have focused on the following elements:

1. *The power of the pharaoh.* The composition and history of communities like Kom el-Hisn must be assumed to be partly determined by variability in the power of the pharaoh and elites to control rural sectors of the state. Wilson notes that the written language of Old Kingdom Egypt had no words for "government" or "state" as impersonal terms, conceived apart from the pharaoh: the Egyptian " . . . theory of government was that the king was everywhere and did everything. . . . The fiction of direct delegation of duty and of a direct report to the king was impossible to maintain in practice; but in the theory of government it was no fiction, it was a working reality."[10] Particularly in the Old Kingdom and First Intermediate periods, inscriptions

[10] *The Culture of Ancient Egypt* (Chicago, 1951) 79.

suggest, the pharaohs personally directed the settlement of Egypt, and they did so for a variety of secular motives, including the consolidation of royal power, stimulation of economic development, and the defense of the frontiers. Pharaoh Wahkare^{c} Khety III (2070-2040 B.C.), in his instructions to his son, Merykare^{c}, forcefully recommended building towns as a means to counteract political fragmentation and inefficient organization, especially in the eastern Delta, which, he lamented, was being subdivided into rival provinces and cities.[11] Baer's classic study of rank and title in the Old Kingdom began as an attempt to document "disintegration of central authority and the rise of semiautonomous families in the provinces";[12] and though the epigraphic evidence to do this was lacking, his study illustrated the great complexity and change in Old Kingdom bureaucratic hierarchies. Kemp suggests that in Upper Egypt the control of local affairs by the pharaoh's overseer was gradually diluted during the late Old Kingdom, culminating in the appearance of provincial governors, or *nomarchs*.[13] Scholars differ on the extent of fluctuations of royal power during the 4th and 5th Dynastics—when Kom el-Hisn was occupied. Trigger raises the possibility that a slow but continuous expansion and elaboration of society and economy in the Old Kingdom may have been accompanied by growing complexity and power of provincial administrative institutions.[14] The apparent emergence of powerful *nomarchs* in the 6th Dynasty may reflect a reduction of pharaonic power, but the pharaohs of this period were still able to send expeditions to Nubia and Palestine and to exert considerable internal control as well.[15] The presumed weakening of the central Egyptian government in the First Intermediate Period (c. 2134-2040 B.C.) may have arisen out of the growing power of the *nomarchs* under the long rule of Pepi II, in association with declines in Nile flood levels.[16] The few texts and fragmentary archaeological evidence from the First Intermediate Period seem to reflect "a loss of equilibrium between a powerful court and provincial aspirations."[17]

Reconstructing the socio-political changes of the Middle Kingdom (c. 2040-1650 B.C.)—Egypt's first true imperial age—is a complex matter. In this period, successive rulers sought to increase national integration while directing defense and trade along increasingly active frontiers. For example, Ammenemes I (c. 1980 B.C.)—whose throne name appears in a clay seal impression at Kom el-Hisn—seems to have been in a constant struggle for power with provincial governors during a period of Asiatic threat to the east Delta.[18]

2. *Provincial economic systems.* As is discussed below, a central issue in evaluating Kom el-Hisn is to determine if it was simply an agricultural community, largely self-sufficient in most goods and services, and linked to the political centers mainly through taxation and other indirect exploitative relations; or, in contrast, was a specialized element in a functionally interdependent provincial and national economic system, with direct administration by agents of the pharaoh. Unfortunately, except for Kom el-Hisn, only a few small areas of provincial early pharaonic communities have been excavated.[19] These communities seem small by Mesopotamian standards. Some were walled and possessed modest public architecture.[20] Perhaps our best evidence about the correspondence of rural Egyptian communities to one or the other of these stereotypes would be in their regional settlement patterns, but we know little about these. Kemp suggests that, unlike the "primate distribution" of the Predynastic, when Nagada, Hierakonpolis,

[11] A. Badawy, "The Civic Sense of the Pharaoh and Urban Development in Ancient Egypt," *Journal of the American Research Center in Egypt* 6 (1967) 103-9.

[12] *Rank and Title in the Old Kingdom* (Chicago, 1960) 1.

[13] In Trigger, *Ancient Egypt* (1983) 108.

[14] In *Origin and Early Development* (1984) 107.

[15] B. J. Kemp, *Ancient Egypt* (1983); H. Goedicke, *Königiche Dokumente aus dem alten Reich* (Wiesbaden, 1967); N. Kanawati, *The Egyptian Administration in the Old Kingdom. Evidence on its Economic Decline* (London, 1977).

[16] K. W. Butzer, "Pleistocene History of the Nile Valley in Egypt and Lower Nubia," in *The Sahara and The Nile*, eds. M. Williams and H. Faure (Rotterdam, 1980) 278; B. J. Kemp, *Ancient Egypt* (1983) 113.

[17] B. J. Kemp, *Ancient Egypt* (1983) 115.

[18] B. J. Kemp, *Ancient Egypt*, 142-43.

[19] Reviewed in B. J. Kemp, *Ancient Egypt* (1983).

[20] Buhen, for example; D. O'Connor, "The Old Kingdom Town at Buhen," presented at the Annual Meeting of the American Research Center in Egypt, Memphis, Tennessee, 1987; scale drawings are provided by B. J. Kemp, *Ancient Egypt* (1983), fig. 2.8.

and a few other towns were probably by far the largest communities in Upper Egypt, the Old Kingdom settlement distribution was one in which settlements of varying sizes were distributed around several larger towns (e.g., Hierakonpolis), which in turn were spaced fairly evenly down the Nile.[21] In the Delta, Old Kingdom settlements (e.g., Kom el-Hisn, Mendes, Tell Basta, possibly Buto), seem to have been relatively large, but it is difficult to estimate the size of these communities.

Regarding the factors dictating the establishment of communities, epigraphic evidence suggests that many large estates were created in the Delta as "pious donations"—the establishment by an individual of a fund, supported by the donation of property or other income-producing assets, and used to ensure the maintenance of a cult center. Pious donations recorded on monuments in the Giza-Saqqara area committed large estates in the Delta to the support of cult centers,[22] and it is possible that Kom el-Hisn was founded and functioned as such an estate. The government apparently granted exemption from taxes and corvée labor requirements to some estates as an incentive to establish communities in the Delta.[23] A primary economic role of at least some of these Delta estates was in cattle-raising.[24] Moens and Wetterstrom note that cattle occur in the names of four Delta nomes,[25] and there are references to the cow-goddess Hathor's cult at Kom el-Hisn from the Middle Kingdom and earlier.[26]

Another important reflection of provincial integration into the national political and economic system would be the nature of commodity production and distribution. Tomb contents reflect scores of industries in materials whose volumes and standardized forms indicate considerable centralized control. Yet most scholars suggest that well into the pharaonic era rural Egyptian settlements were self-sufficient in most foods and crafts, and that to the limited extent that they produced commodities for export it was on a part-time basis and in a regional exchange system based on barter.[27] Relevant archaeological (as opposed to epigraphic) evidence from rural communities on this point is scarce, however.

International trade in the Old Kingdom was substantial (though perhaps not comparable to that of early Mesopotamia).[28] In the Delta, most international trade may have been overland; there is no evidence of extensive port facilities in the Old Kingdom period.[29] But even the location of the coastline in early pharaonic times is uncertain, and excavations at possible trading entrepots, such as Buto, are in their preliminary stages. It is unclear to what extent a community like Kom el-Hisn would have participated in international exchange—though in later times it seems to have been a part of the system through which cattle and other wealth expropriated from Libya were transferred to the central authorities at Giza.[30]

Kom el-Hisn: Research Design and Objectives

In our research at Kom el-Hisn, we are particularly concerned with the determinants of the size, economic functioning, and sociopolitical organization of rural communities in political systems like that of Old Kingdom Egypt. We assume that if we can determine how provincial Egypt both resembled and differed from other early civilizations in settlement pattern characteristics, the general nature and

[21] B. J. Kemp, *Ancient Egypt* (1983) 103.

[22] H. Jacquet-Gordon, *Les noms des domaines funéraires sous l'ancien empire égyptien*, Institut Français d'Archéologie Orientale (Cairo, 1962); P. Posener-Kriéger, *Les archives du temple funeraire de Néferirkarê-kaki*. 2 Volumes, Institut Français d'Archéologie Oriental (Cairo, 1976).

[23] A. Badawy, *JARCE* 6 (1967) 103-9.

[24] W. Ghoneim, "Die ökonomische Bedeutung des Rindes im alten Ägypten," *Lexikon der Agyptologie* V (1977) 259; W. Helck, *Die Beziehungen Ägyptens zu Vorderasien im 3. und 2. Jahrtausend v. Chr.* 2nd ed. (Wiesbaden, 1971); H. Kees, *Ancient Egypt. A Cultural Topography* (Chicago, 1961); also see E. Cruz-Uribe, *Saite and Persian Demotic Cattle Documents* (Chico, Cal., 1985).

[25] M. Moens and W. Wetterstrom, "The Agricultural Economy of an Old Kingdom Town in Egypt's West Delta: Insights from the Plant Remains," *Journal of Near Eastern Studies*, in press.

[26] O. Perdu, "La déesse Sekhathor à la lumière des données locales et nationales," *L'Égyptologie en 1979* I (Paris, 1982) 255-66; K. Zibelius, *Ägyptische Siedlungen nach Texten des Alten Reiches* (Wiesbaden, 1978) 35-36.

[27] B. G. Trigger in *Origin and Early Development* (1984) 104; K. W. Butzer, *Early Hydraulic Civilization* (1984) 17.

[28] Adequate data for this comparison are not available.

[29] But see W. Helck, *Die Beziehungen* (1971) 5-6.

[30] M. Moens and W. Wetterstrom, in press.

mechanisms of early cultural complexity may be more evident.

Most explanations of early Egyptian settlement patterns are essentially functional in nature: that is, in trying to explain, for example, the apparent combination in Old Kingdom Egypt of extreme political centralization and a largely non-urban settlement pattern with a low level of functional interdependence among communities, we can estimate the costs and benefits of this and different arrangements.

Thus, we might suppose, for example, that the similarity of microenvironments in the Nile Valley and Delta would offer relatively few economic inducements to voluminous interregional exchange or cooperation. Agricultural potential is quite similar along the length of the Nile, and the desert borders offer some protection from invasion. Even though transport of goods and information *via* the Nile is cheap and reliable, and Egypt's ancient documents describe regular transport of foodstuffs among communities,[31] in the early periods such state-directed redistribution may have been relatively minor. Water control seems to have been local until late in the last century. One great centrifugal force in Egyptian history seems to have been the recurrent fragmentation of the country into largely self-sufficient, functionally redundant units based on the natural flood basins of the Nile.[32] Thus, generally, there seem to have been few stimuli to elaborate functional interdependence among communities, and as a result, perhaps, few of the urban centers that often seem to result from such interdependence.

Yet early Egypt's non-urban character and low level of functional interdependence cannot be understood entirely as results of simple ecological determinants. Large cities and a differentiated settlement size hierarchy appear to be cost-effective in pre-industrial economies because they offer advantages in organization of economic production, social control, military security, etc. In Mesopotamia and elsewhere, cities apparently offered effective environments for organization and the transmission of techniques of craft-production, administrative and military training, and other activities on which complex societies depend.[33] In Egypt these same activities may have been carried out in ritual centers that were not as functionally interdependent with their rural populations as was apparently the case in Mesopotamia. In fact, Trigger[34] suggests that Egypt may even have been less urbanized in the Early Dynastic era than in the Predynastic, because the emerging state suppressed conflicts between the major towns. Similarly, Service argues that in Egypt the absence of cities promoted stability: by dispersing most administrators except the priests and those with a vested interest in the continuation of the system, the Egyptian state avoided the class-divisiveness that seems to develop out of urbanism.[35] This contrasts with the Mesopotamian model, where the rapid and extreme urbanization may have been a political strategy by rulers trying to defend and extend their territories.[36]

Various scholars have interpreted settlement pattern variability, functional interdependence, and related concepts in *evolutionary*, as opposed to functionalist, terms. Dunnell, for example, suggests that functional interdependence in the mechanisms required to reproduce the society's means of production is the defining criterion of cultural complexity, in that a change in the level of cultural selection occurs when societies of functionally independent communities became functionally interdependent;[37] Wenke presents a

[31] The exchange of grain was partially in the form of a barter system in which prices varied sharply; see, for example, D. O'Connor, "New Kingdom and Third Intermediate Period, 1552–664 B.C.," in B. G. Trigger, et al., *Ancient Egypt* (1983) 226–32, 248–49.

[32] K. W. Butzer, "Perspectives on Irrigation Civilization in Egypt and Lower Nubia," in *Immortal Egypt*, ed. D. Schmandt-Besserat (Malibu, 1978) 17–18.

[33] This sense of urbanism has been discussed at length by R. McC. Adams (for example, *Heartland of Cities* [Chicago, 1981]) and G. A. Johnson "Aspects of Regional Analysis in Archaeology," *Annual Review of Anthropology*, 6 (1977) 479–508.

[34] *Melanges offerts à Jean Vercoutter* (1985).

[35] *Origin of The State and Civilization* (New York, 1975) 225–37.

[36] This hypothesis is argued in detail by R. McC. Adams, *Heartland of Cities* (1981).

[37] "Evolutionary theory and Archaeology," in *Advances in Archaeological Method and Theory*, Vol. 3, ed. M. B. Schiffer, (New York, 1980) 35–99.

somewhat similar argument.[38] Urbanized settlement patterns have even been explained in terms of their efficiencies with regard to the laws of thermodynamics.[39]

These varied attempts at archaeological explanation are prone to many problems,[40] and in any case, they are largely untested archaeologically in Egypt. The stereotype of Old Kingdom Egypt as a non-urban society may be accurate, but it is largely an inference based on very little data: even the supposed largest Old Kingdom community—Memphis—is known only from texts and from fragmentary finds amidst the later occupations that are presumed to cover it.[41]

It is in this context of various explanations of settlement composition and arrangement, and the scarcity of relevant data from Egypt, that we have designed our work at Kom el-Hisn. To link these larger issues to Kom el-Hisn, we have sought evidence about: (1) the local environment, so that we can estimate the agricultural potential of this and other areas of the Delta and such conditions, for example, as the extent of deforestation and agricultural clearing; (2) the size of the community, so that we can estimate the scale of commodity production and occupational specialization; (3) architectural differentiation, so that we can make inferences about socio-economic and political hierarchies in the community; (4) the volume of imported materials in the settlement, so that we can estimate Kom el-Hisn's links to regional, national, and international exchange systems; (5) the nature of the agricultural system, to determine if Kom el-Hisn was mainly a self-sufficient community engaged in subsistence agriculture, or, possibly, a government-directed, specialized producer of cattle or other exportable commodities; and (6) the depositional history of the community, so that we can extend our regional survey and use remote-sensing data to reconstruct Kom el-Hisn's regional settlement pattern.

We have summarized these various aspects of our research objectives by constructing two alternative models of what the community at Kom el-Hisn was like at a given time in the Old Kingdom.

Model I. Kom el-Hisn was established as a pious foundation and to provide cattle and orchard products to the central government. As a regional center it imported some products from central government workshops, but it was largely self-sufficient, and most of its external supplies came from regional markets. Its populace consisted mainly of agriculturalists, who were administered by a resident agent of the pharaoh. Except for this agent and, perhaps, a few elite families, most people lived in simple mudbrick houses that differed little in construction or contents. Because of the heavy centralization of economic and political power at Memphis and perhaps a few other centers, Kom el-Hisn was a tiny community, compared to these centers, and supplied them and nearby communities with only a few goods and services.

Model II. Like provincial Mesopotamian settlements, Kom el-Hisn's initial settlement was in response to both local and national socio-economic factors, and the community served a large hinterland with goods and services. Although participating in the national economy, it was itself functionally quite complex, producing a wide range of agricultural and craft products for internal consumption and export. Its inhabitants were mainly farmers but included specialists and administrators, so that there was significant social stratification and preferential access to the community's wealth, power, and prestige. Interactions between the people of Kom el-Hisn and the rest of Egypt were sufficiently frequent that its artifact styles reflect regional and national influences. Its internal functional complexity and external relations were such that Kom el-Hisn was in the middle of a roughly linear rank-size distribution of Old Kingdom settlements.

We recognize that many plausible alternative models could be constructed, that few of these

[38] R. J. Wenke in *Advances in Archaeological Method* (1981) 115.

[39] R. N. Adams, "Natural selection, energetics, and 'cultural materialism,'" *Current Anthropology* 22 (1981) 603–24.

[40] M. Salmon, *Philosophy and Archaeology* (New York, 1982).

[41] Excellent mapping and surface surveys of this crucial site offer hope of eventual excavations of early occupations; see D. Jeffreys, *The Survey of Memphis* (London, 1985).

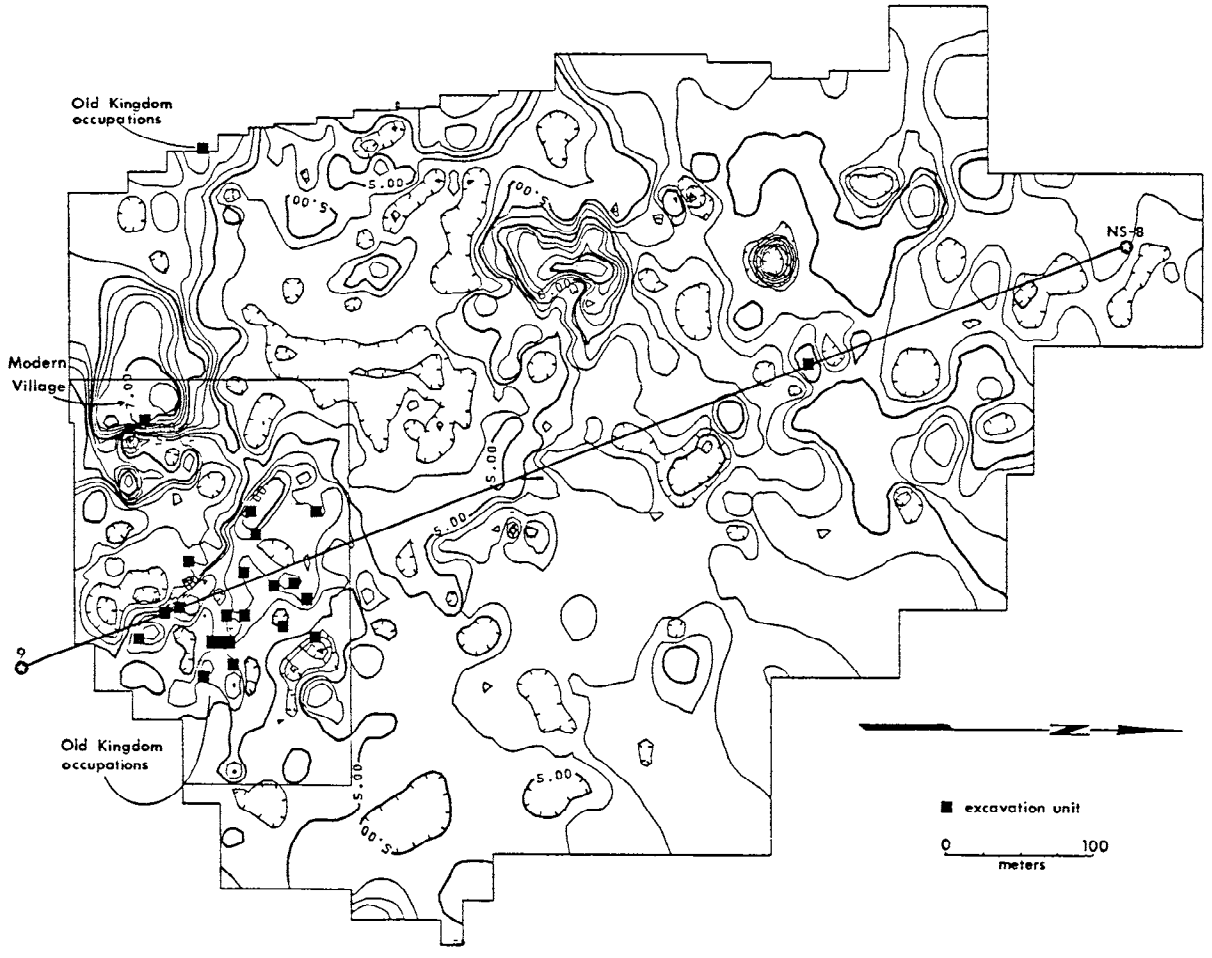

Fig. 2. Central Area of Kom el-Hisn. The line marks the series of auger samples described in fig. 3. The various black rectangles and squares in the bottom left represent our excavation units (correct in orientation and relative size but not drawn to scale). The black square to the west indicates the location of Old Kingdom occupations discovered and partially excavated in 1986. There is a substantial Old Kingdom wall and settlement under the modern village, and we suspect that Old Kingdom occupations extend far beyond the two areas of excavation. The single black square on the auger-line represents one of our geological test-trenches.

imagined characteristics are mutually exclusive, and that these characteristics are not likely to have unique reflections in the archaeological record. The accuracy of any such models could never be conclusively "proven," and we use them mainly as a basis to specify the variable interactions of potential importance to our analyses.

The Archaeological Evidence from Kom el-Hisn

In two previous seasons of excavation, we have attempted to evaluate these models and other hypotheses about Kom el-Hisn. Although the inscribed statuary and other epigraphic materials at Kom el-Hisn have been studied for more than a century,[42] and the rich cemeteries of the (mainly) First Intermediate Period and New Kingdom Periods have been excavated,[43] our own

[42] Reviewed by P. Brodie, W. Coulson, A. Leonard, Jr., and D. Silverman in W. Coulson and A. Leonard, Jr., eds., 81-85.

[43] For example, A. Hamada and M. el-Amir, "Excavations at Kom el-Hisn 1943," *Annales du Service des Antiquités de l'Égypte* 46 (1947) 101-41; A. Hamada, and S. Farid, "Excavations at Kom el-Hisn 1945," *Annalés du Service des Antiquités de l'Égypte* 46 (1947) 195-235, "Excavations at Kom el-Hisn

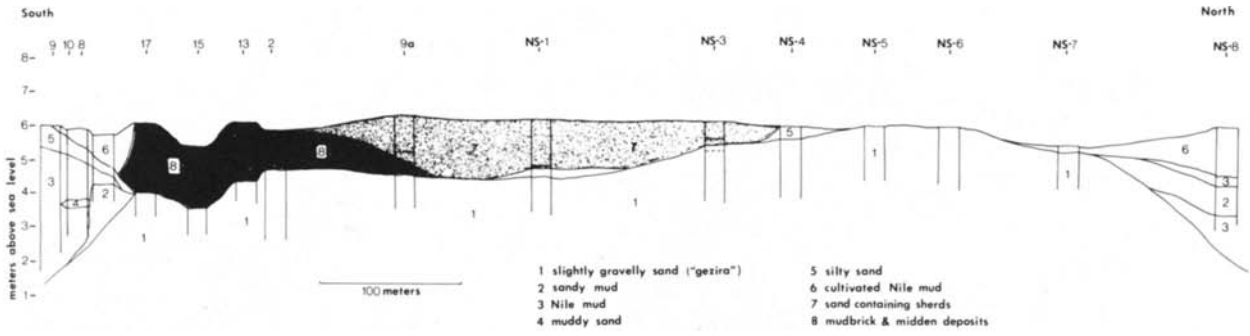

Fig. 3. An estimate, based on auger samples of the relationship of the gezira *(Pleistocene sand-gravel mound) and occupational areas at Kom el-Hisn. Numbers refer to auger-holes along the line indicated in fig. 2. We do not yet have sufficient samples to estimate with precision the geomorphological relationships indicated.*

work represents the only systematic excavations of the site.[44]

1. *Methods.* The locations of our 1984 and 1986 excavations are illustrated in figs. 2-4. We excavated by cultural stratigraphy to varying depths (maximum depth = 1.9 m), mainly in 2 × 1 and 2 × 2 m areas selected according to a stratified random sampling design. We also excavated: (1) two step trenches to determine if a depression between the main area of our excavations and a modern village (fig. 2) was formed by previous excavation or, perhaps, marked an ancient water-course; (2) about 72 square meters of a complex of mudbrick buildings (fig. 5); (3) a 2 × 4 m area to the west of the main settlement mound, in an area of newly discovered Old Kingdom occupations (fig. 2); and (4) a step trench in the east side of the mound underlying the village (fig. 3).

All sediments were screened, all artifacts (including body sherds) were saved and analyzed, and sediment samples for floral and other analyses were taken from every excavation unit and level. The volume of all depositional units was measured precisely. In addition, we used an auger to take hundreds of sediment samples from the site and its environs.

2. *Chronology.* Radiocarbon dates (table 1) as well as artifact styles and epigraphic finds (discussed below) indicate that most of the area we excavated was a large community in the 5th and 6th Dynasties (c. 2500-2290 B.C.) and that some areas of the site were occupied into at least the early Middle Kingdom (c. 1890 B.C.)—specifically, the contiguous excavation units 1261S-1074E and 1263S-1074E, and unit 1159S-1040E contained Middle Kingdom materials. We found stamp sealings and stamps that probably date to the 5th and 6th Dynasties near the surface in areas where augering has revealed from two to three meters of underlying cultural deposits—suggesting occupation at least back to the 4th Dynasty and probably earlier. Variability in mudbrick construction is considerable,[45] and we hope to use this evidence in combination with

1946," *Annales du Service des Antiquités de l'Égypte* 48 (1948) 299-325; other Old Kingdom occupations have been reported in the Delta that seem similar to the Kom el-Hisn materials, for example, S. Adam, "Report on the excavations of the Antiquities Department at Ezbet Rushdi," *Annales du Service des Antiquités de l'Égypte* 56 (1959) 207-26, and S. Farid, "Preliminary Report on the Excavations at Kom Abu Billo," *Annales du Service des Antiquités de l'Égypte* 61 (1973) 21-26.

[44] R. J. Wenke, "Old Kingdom Community Organization in the Western Egyptian Delta," *Norwegian Archaeological Review* 19 (1986) 15-33; R. J. Wenke and R. Redding, "Excavations at Kom el-Hisn, 1984," *Newsletter of the American Research Center in Egypt* 129 (1985) 1-11, "Excavations at Kom el-Hisn, 1986," *Newsletter of the American Research Center in Egypt* 135 (1986) 11-17; R. J. Wenke, ed., *Excavations at Kom el-Hisn, an Old Kingdom Egyptian Community*, unpublished manuscript; P. E. Buck, S. C. Willis, and M. O. Smith, "A Mixture Modeling Approach to Remote Sensing of Archaeological Sites in Egypt Using Landsat Imagery," presented at the 98th Annual Meeting of the Geological Society of America, San Antonio, Texas, 1986.

[45] M. King, "Research Design for Mudbrick Study," unpublished paper.

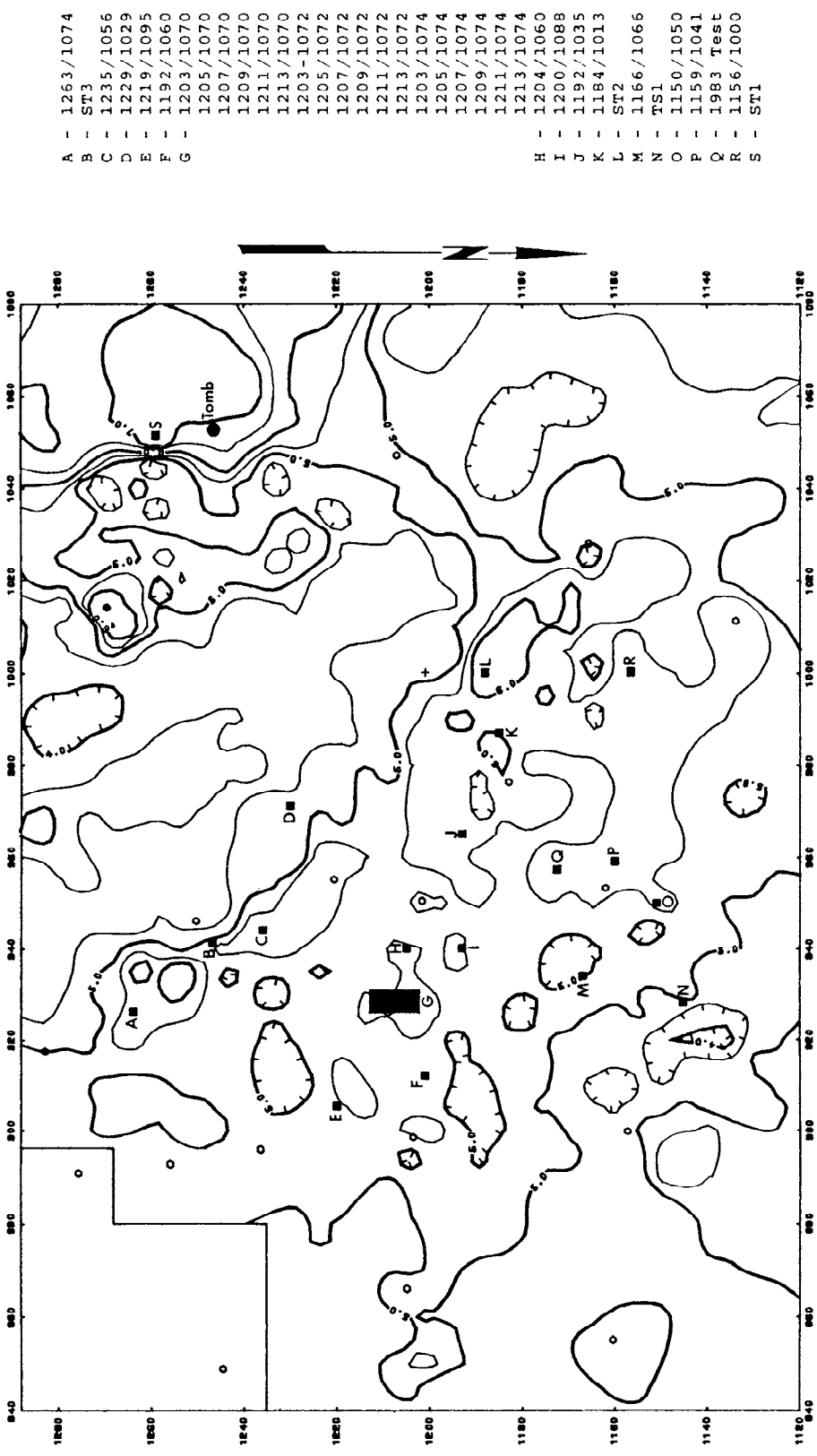

Fig. 4. Locations of excavation units in 1984 and 1986 seasons. Units drawn to approximate scale. Hexagons indicate locations of auger samples. Vertical axis is magnetic north. Scales are in meters. Hatchured areas indicate depressions, contour intervals are A.S.L. ("Above Sea Level").

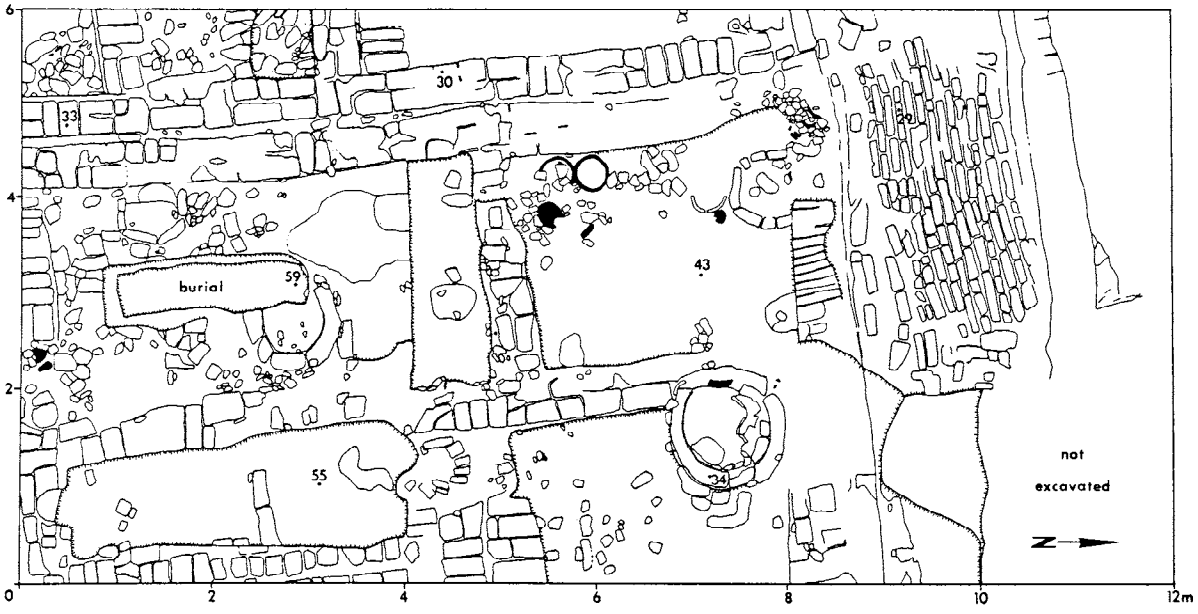

Fig. 5. Typical Old Kingdom architecture at Kom el-Hisn. Walls are formed by mudbricks. Numbers indicate depths from surface at datum point in upper right hand corner. Black areas are relatively complete ceramic vessels or features in situ *on the floor underlying the walls. Plant and animal remains and artifacts within the walls and on the floor suggest food preparation and domestic activities.*

artifact styles to improve our inferred chronological seriations. Given the problems of estimating accumulation and erosion rates in mound sites,[46] it is difficult to translate the depth of deposits into calendar years of occupation.

3. *Ecological context.* Our faunal and floral samples (see below) suggest an Old Kingdom environment much like that around Kom el-Hisn today, although there is some evidence in our auger samples (fig. 3) and other data that it was somewhat more "patchy," with large sandy regions interspersed among vegetated areas of Nile alluvium. Moens and Wetterstrom have raised the possibility that the absence of wood charcoal in our flotation samples reflects deforestation or, alternatively, that Kom el-Hisn's populace was prohibited from using trees for fuel.[47] Given the low apparent population densities of the Delta in Old Kingdom times, it seems improbable that the environs of the site would have been deforested. We suspect that the absence of wood charcoal results from the concentration of our excavations in domestic areas of the settlement, where manure may have been the preferred fuel.

Regarding the sand/gravel deposits on which Kom el-Hisn rests, our heavy mineral analysis and other studies are still in progress, and thus we have not been able to identify the source or age of these formations. The diluvial sediments at Kom el-Hisn are richer in amphiboles and epidotes, but poorer in pyroxenes than the Darau Member of the Gebel Silsila Formation (which dates to about 15,000–10,000 BP) so it is probably not related to this formation.[48] Some of the sand formations at and around Kom el-Hisn may be stabilized dunes of pre-Neolithic age,[49] or, alternatively, alluvial or fluvial sands of Mousterian age.[50] We have considered the possibility that the

[46] A. M. Rosen, *Cities of Clay* (Chicago, 1986).

[47] In press.

[48] H. Hamroush, "Geoarchaeology of Kom el-Hisn," in R. J. Wenke, ed., unpublished manuscript.

[49] R. Said, *The Geological Evolution of the River Nile* (New York, 1981).

[50] M. Attia, *Deposits in the Nile Valley and the Delta* (Cairo, 1954); V. Coutellier and D. J. Stanley, "Late Quaternary Stratigraphy and Paleogeography of the Eastern Nile Delta, Egypt," unpublished paper.

TABLE 1

Sample No. (Provenience)	Material	Radiocarbon Years (BP)	Estimated Date B.C. (Centroid)
SMU 1438 (St-1, SU37, 22)	shell	4173 ± 59	3043
SMU 1440 (1156S-1000E, SU28)	shell	3882 ± 200	2683
SMU 1882 (1261S-1074E, SU17)	shell	4030 ± 60	2606
SMU 1627 (1184S-1013E, SU13)	carbon	3790 ± 90	2230
SMU 1569 (1200S-1088E, SU17)	carbon	3680 ± 340	2084
SMU 1552 (ST1, SU37)	carbon	11344 ± 241	9770
Teledyne I-13,318 (1983 Test, SU3)	carbon	3970 ± 130	2481

Radiocarbon dates from Kom el-Hisn. Dates are based on the 5730 half-life, except the Teledyne date, which is based on the 5568 half-life. All dates corrected for fractionation. Dates are calibrated on the basis of recent research by G. W. Pearson and M. V. Stuiver (see their "High-Precision Calibration of the Radiocarbon Time Scale, 500-2500 B.C., "*Radiocarbon* 28 (1986), 839-862. The shells are all from Pelecypods, and SMU 1440 is from shells intentionally placed under the corner of a mudbrick wall. SMU 1552 was from various fragments of carbon collected in deposits near the base of the Old Kingdom wall in ST-1 and may include noncultural materials in the sand-gravel formation on which the settlement was constructed.

settlement areas of Kom el-Hisn rest on a point bar deposit that accreted laterally to the north. Point bar deposits often have graded bedding, with coarser channel lag deposits at the bottom and a fining upward sequence above;[51] we found little evidence of this in our initial augering program, but we will examine this possibility more thoroughly in future seasons by means of geological sections and trenches along areas we suspect may be ancient watercourses.

Even if Kom el-Hisn was not formed as a point bar, it might still have been close to a distributary of the Nile. Ball reconstructed the Canopic branch as within six km of the site;[52] Hamroush also suggests that the river might have been quite close to Kom el-Hisn.[53] We used the Landsat 5 Tm image of the western Delta and a specially-constructed mathematical model[54] to try to identify ancient distributaries, as well as archaeological sites and other geological deposits. We conducted laboratory calibrations of the reflectance properties of pottery, mudbrick, Nile silt, and other common materials of Kom el-Hisn's environment and then used the model (which has a unique method of correcting for shade) to analyze the reflectance properties of a large area of the western Delta. In examining the "fit" of this model with regard to the midden deposits of the surface exposures of Old Kingdom occupa-

[51] H. Reineck and I. Singh, *Depositional Sedimentary Environments, with Reference to Terrigenous Clastics* (New York, 1980).

[52] *Egypt in the Classical Geographers* (Cairo, 1942).

[53] Also see H. Hamroush, n. 48.

[54] J. Adams, M. O. Smith, and P. E. Johnson, "Spectral Mixture Modeling: A New Analysis of Rock and Soil Types at the Viking Lander I Site," *Journal of Geophysical Research* 91 (1986) 8098-8112.

tions and other areas, it seems highly probable that, when we institute a full regional survey, we will be able to locate efficiently some kinds of ancient occupations and also the watercourses along which these settlements may have been distributed.

4. *Architecture.* Our excavations have revealed that a substantial portion of the main site area is composed of mudbrick buildings, most of them apparently domestic in nature. We found no architectural use of stone—probably because limestone was unavailable locally. Figure 5 illustrates 72 square meters of architecture that we found just below the surface of the site. Preservation even this close (c. 10-60 cm) to the surface is good. The topography of adjacent areas suggests that this building complex extends over at least an additional 900 square meters, and perhaps over most of the area illustrated in fig. 3. Nearly all of our other excavations elsewhere on the site revealed mudbrick architecture at levels that seem to correspond to that of the complex in fig. 5. Within this complex we found numerous butchered animal bones, smoke-blackened pottery, burned organic materials, and many other traces of domestic activities.

Elsewhere, a thick mudbrick wall (fig. 8) of Old Kingdom age seems to ring part of the site underlying the modern village in fig. 2. This wall, and the extensive Old Kingdom architecture we found far to the west of most of our excavations (fig. 2), raise the possibility that the contemporary village near our step-trench may cover a small, walled segment of the Old Kingdom settlement, with the rest of the community extending for many hundreds of meters to the southeast and northwest.

An obvious implication of this partial reconstruction of the community plan is that Kom el-Hisn may have been spatially arranged such that some activities or groups were east of what is now the modern village, while other activities, groups, etc., were west of it. In future work we hope to define the limits of the Old Kingdom settlement and determine if the spatial distribution of the occupations has to do with functional and/or chronological differences.

Figure 6 illustrates a typical excavation profile at Kom el-Hisn. In some excavations, two or three superimposed levels of architecture were found, usually separated by well-defined floors; but in some units only stratified layers of residential debris were found. We suspect most of these non-architectural areas were open places within the Kom el-Hisn community, perhaps cattle-pens, garbage dumps, threshing floors, etc. The slope of some of these levels, however, suggests that buildings at Kom el-Hisn may have been situated on the highest elevations of the *gezira*, with the lower areas between them used for garbage disposal, cattle-pens, and so forth. Most of our excavations have been small in scale and were intended to give us diverse samples of artifacts and stratigraphic information, not architectural exposures. In future seasons we hope to expand these test excavations to reveal fully their architectural components.

Our analyses of Kom el-Hisn's architecture are in progress. We are trying to estimate with various statistical means the patterns of association between architecture, ceramics, floral and faunal remains, etc., as well as changes over time in these associations—with time here, of course, being represented by the stratigraphic sequence.

5. *Faunal and floral remains.* Animal remains from Kom al-Hisn reflect the ancient Egyptian combination of mammals, birds, and fish (table 2 and fig. 7). Most of the fish were of varieties common in the immediate environs—though there seems to have been little use of the large varieties of *Lates* usually found in the main Nile. One species, *Sparus auratus*, is a marine fish that can survive brackish water. Its presence in the Kom el-Hisn assemblage may indicate import from the coast or from estuaries close to Kom el-Hisn. At the Predynastic site of Merimde, 23% of the *Synodontis* remains were neurocranial fragments, but at Kom el-Hisn these amounted to less than 5% of the remains of this genus; this may indicate that these fish were brought to Kom el-Hisn primarily as dried, decapitated fish (a form well-represented in tomb paintings.[55] We are presently trying to assess the significance of the difference between Kom el-Hisn's fish remains and those found at other sites (table 2).

Many of the bird bones are from teal (*Anas crecca*), a seasonal migrant to the area. None of

[55] A. Von den Dreisch, "Fische in Alten Ägypten—eine osteoarchäologische Untersuchung, *Documente Naturae* 34 (1986) 1-33.

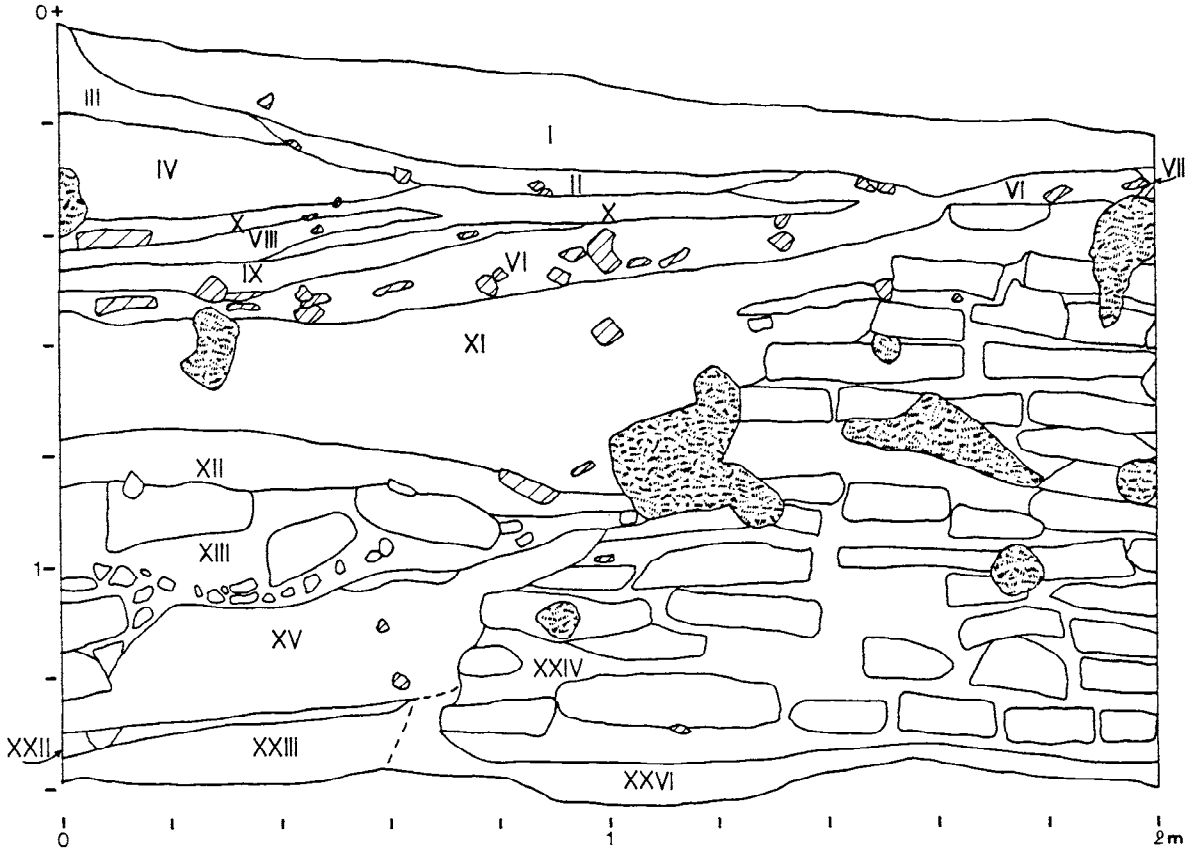

Fig. 6. Excavations in Unit 1235S-1056E. Mud bricks are shown in outline, mudbrick fragments are cross-hatched. The mottled areas are rodent burrows and other disturbances. Strata are composed of varying mixtures of sherds, decomposed mudbrick, and other cultural debris. A complete stratigraphic description and interpretation will be published in our forthcoming report.

the identifiable bird bones comes from the domestic geese and ducks so common in Egyptian villages of all periods—all are wild waterfowl.

Our statistical analyses of the patterns of spatial association of animal taxa are in their preliminary stages, but bird bones and fish bones seem to be found in many of the same deposits. This may reflect the traditional ancient Egyptian practice of combining fishing and duck hunting during certain periods of the year.[56]

Domesticated sheep, goats, and pigs were the principal mammals represented in our samples. The ratio of pigs to sheep/goats is about 1:1.3 (pigs yield on the average 1.5 times as much meat as the average sheep/goat). We have only small samples of bones useful in constructing age and sex distributions, but these samples do suggest that most of the pigs were eaten before maturity, and that the sheep/goats have a sharply bimodal age distribution, with most of the mortality within the first year or in late maturity. Payne has demonstrated the reliability of age estimates of sheep/goats based on teeth measurements,[57] and with a greater sample we hope to reconstruct with precision the age-distribution of sheep/goats at Kom el-Hisn. Our current estimate of sheep/goat and pig survivorship curves are pre-

[56] Douglas Brewer, personal communication.

[57] "Kill-off Patterns in Sheep and Goats; The Mandibles from Asvan Kale," *Anatolian Studies* 23 (1973) 281-304.

TABLE 2

TAXA	(NISP) Number of Identified Specimens	%
Sus	397	(30.01)
Fish	330	(24.90)
Ovis/Capra	311	(23.35)
Birds	178	(13.45)
Equus	41	(3.10)
Alcelaphus	16	(1.21)
Bos	14	(1.06)
Canis	12	(0.91)
Ostrich egg shell	9	(0.68)
Suncus	2	(0.15)
Felis	1	(0.07)
Lepus	1	(0.07)
Addax	1	(0.07)
Snake	1	(0.07)
Gazella	1	(0.07)
Trionyx	1	(0.07)

Summary of identified animal remains found in excavations at Kom el-Hisn. The distribution of fish by genus was *Tilapia* = 109 (33.30%), *Sparus auratus* = 96 (29.09%), *Synodontis* = 83 (25.15%), *Bagrus* = 23 (6.9%), *Clarias* = 6 (1.82%), *Tetradon* = 4 (1.20%), others = 4 (1.20%). Unidentified fish remains totalled 259.3 g; unidentified mammal remains totalled 14,626.1 g. The birds are all migratory water-fowl, many of them the teal, *Anas crecca*.

sented in fig. 8. The taxa and their proportions in our samples are very much what one would expect from a pharaonic settlement, except in the frequency of cattle bones. Not only are there relatively few cattle bones but they are all from animals of less than two years of age. The significance of this in terms of the possible role of Kom el-Hisn as a cattle-breeding center is a complex issue and must be interpreted in the context of the floral remains (table 3 and fig. 9).

Most of the floral remains are carbonized cereal straw, field weeds, reeds and sedges, and fodder plants. Moens and Wetterstrom conclude that these remains seem to come almost exclusively from the burning of dungcakes in domestic cooking.[58] Many floral remains from Kom el-Hisn are of plants commonly used as fodder, specifically, clover and vetch, as well as the weeds commonly found in fodder crops, such as medick, vetch, dock, and mallow. The emmer seeds and rachises could have come from dungcakes rather than directly from the plants, as wheat straw is commonly used to temper dungcakes. Barley grains far outnumber rachises, suggesting that they came directly from forage rather than winnowed waste. Moens and Wetterstrom suggest that the Kom el-Hisn cattle were fed, perhaps in pens, rather than free-browsing—based on the kinds and proportions of plant remains in their dung. Only a few pieces of sheep/goat dung were found in the Kom el-Hisn samples; and since such pellets are commonly preserved in domestic hearth fires,[59] their absence supports the inference that cattle dung was the primary fuel. Kom el-Hisn's botanical remains are very different from those from Predynastic domestic areas of Nagada[60] in that the Kom el-Hisn samples contain so little charcoal and so few cereals.

Our statistical analyses of the floral remains are also incomplete, but at this point the remains found in both Old Kingdom and Middle Kingdom deposits are similar. In Old Kingdom deposits, emmer rachises constitute 17% of the floral remains, while in Middle Kingdom deposits these rachises represent 37% of the total; but there is great variation between individual excavation units, and the overall pattern is quite similar.

Given this botanical evidence, the low frequency of cattle bones in our samples may, somewhat paradoxically, support the possibility that Kom el-Hisn was a specialized cattle-rearing center. Cattle may have been raised at Kom el-Hisn by people who subsisted primarily on other animals and foodstuffs and were charged with supplying cult centers near Memphis with herds of cattle.

Our quantitative analyses of patterns of co-occurrence of animal remains are in progress. Using cluster analysis, linear regression, and other techniques, we have searched for patterns that may indicate the use of certain kinds of foods

[58] In press.

[59] S. Bottema, "The Composition of Modern Charred Seed Assemblages," in *Plants and Ancient Man*, eds. W. Van Zeist and W. Casparie (Rotterdam, 1984) 207-12; N. Miller, "The Use of Dung as Fuel: an Ethnographic Example and an Archeological Application," *Paleorient* 10/2 (1984) 75.

[60] Moens and Wetterstrom, in press.

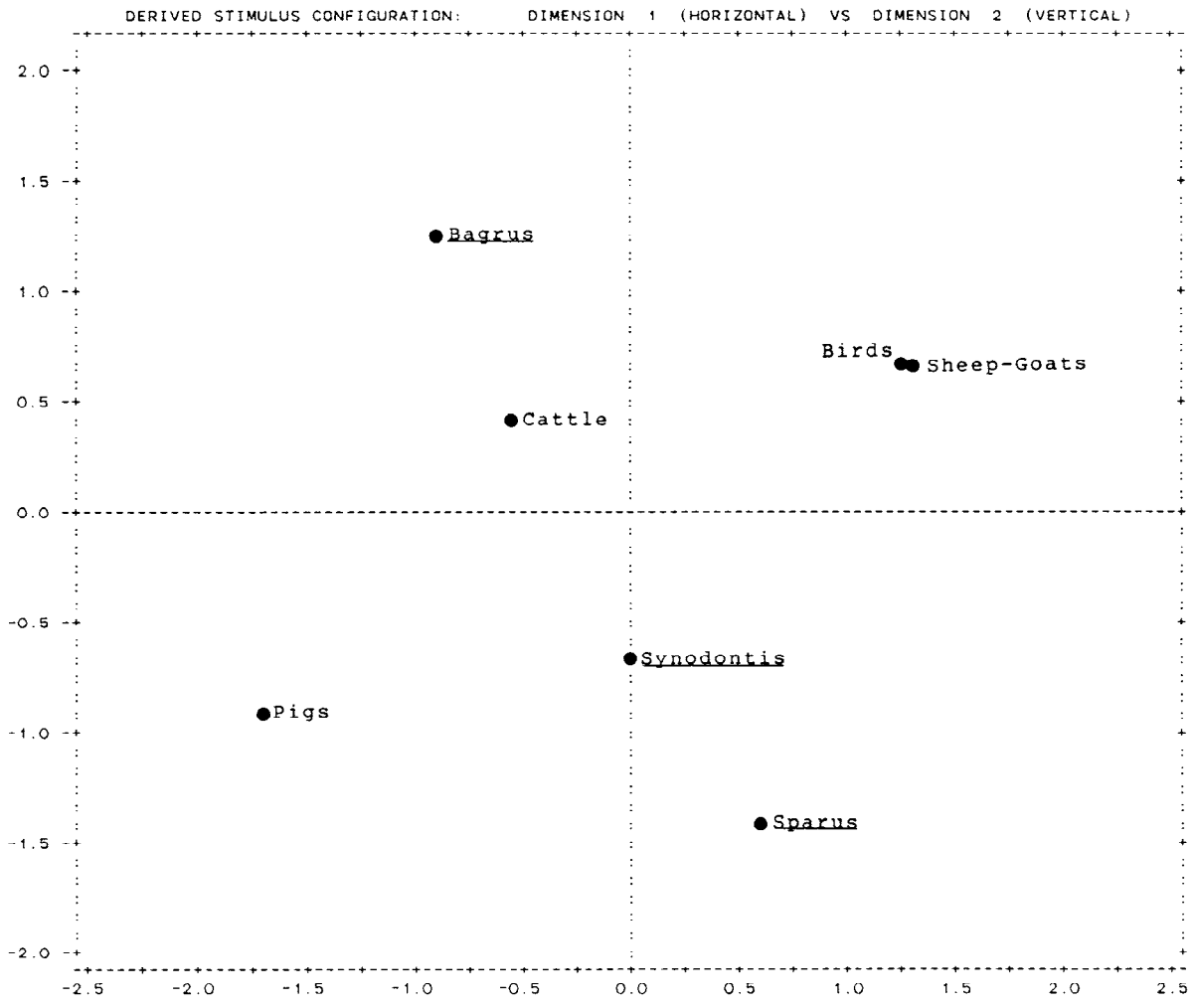

Fig. 7. A multidimensional scaling of the most common animal remains from Kom el-Hisn. An important question in our analyses is the co-occurrence of animal remains, plant remains, and other categories of evidence. Various forms of cluster analysis have been applied to archaeological data to identify groups of artifacts or plant and animal remains that tend to be found together, in the same depositional strata. Non-metric multidimensional scaling has been used here as a form of cluster analysis because it is based on few assumptions about the data. The relative proximity of the points representing the different taxa reflect how commonly they are found in the same deposits. Bird bones and those of sheep and goats, for example, are often found together but are usually not found in association with pig bones. The two dimensions forming the space in which these points are plotted may indicate seasonal differences, social class differences, preservation biases—or any of many other possible factors that determined the distribution of animal bones through the strata at Kom el-Hisn. With additional data and other analyses, we hope to make these patterns of co-occurrence more precise and then link them to some of these and other factors (in this analysis, the similarity measure used was "Phi-squared," the normalized square root of the combined frequencies of the elements being compared; stress in two dimensions was 0.216) (for an introduction to multidimensional scaling, see J. B. Kruskal and M. Wish, Multidimensional Scaling *[Beverly Hills, 1978]).*

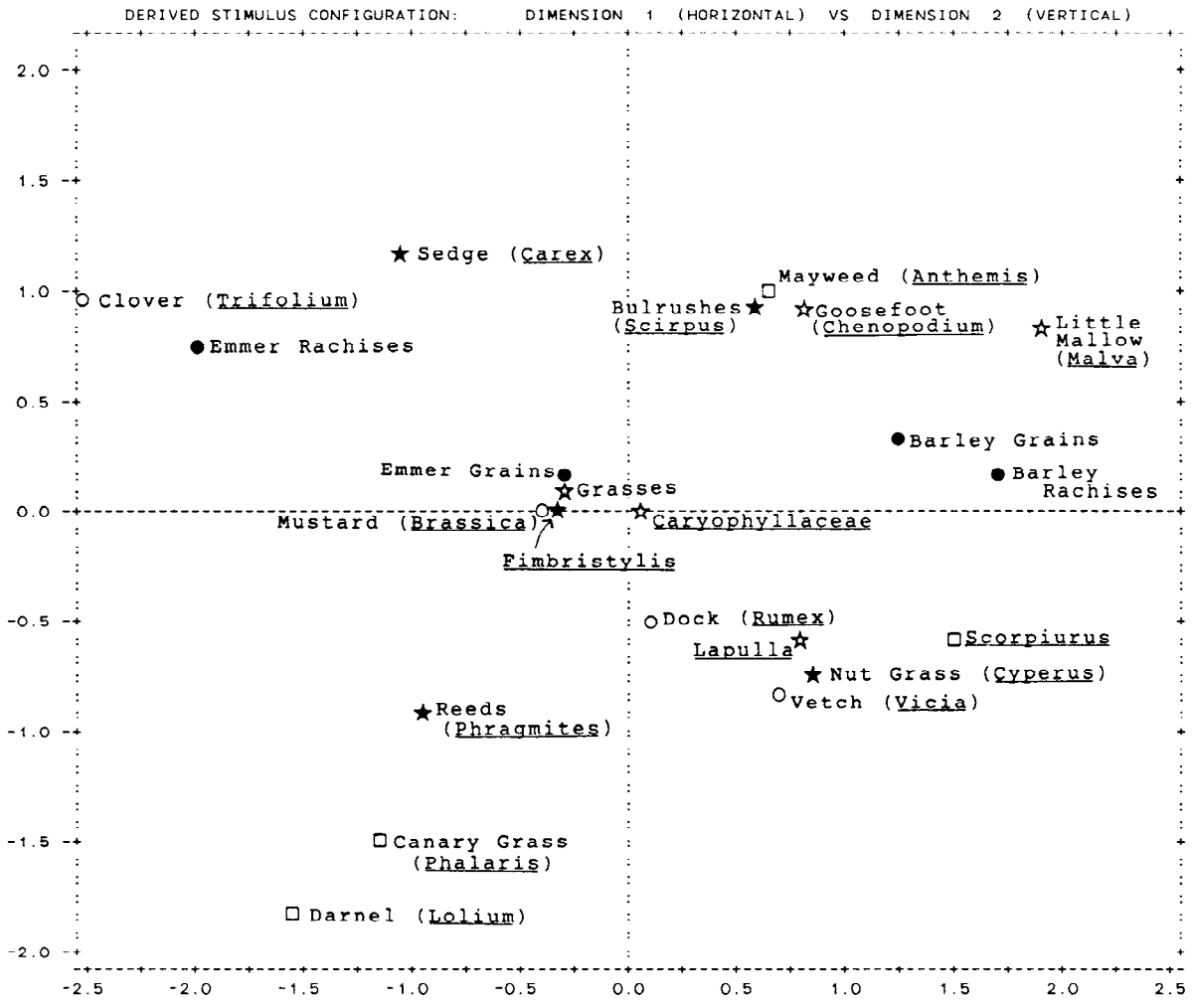

Fig. 8. Multidimensional scaling of plant taxa in excavated samples. See fig. 6 for explanation of multidimensional scaling. The proximity of the taxa in this plot is a reflection of how commonly these taxa are found in the same deposits. Thus darnel and canary grass were often found in the same excavated sediments, but clover and barley remains usually are not found together. The two dimensions in this figure may reflect seasonal differences in the diet of cattle, differential preservation of botanical remains in different areas of the site, or other factors. Cereal grains are indicated with a black dot; fodder plants are indicated with a circle; reeds and sedges are indicated with a black star; field weeds are indicated with a square; other plants are represented by a star with a white center; not all taxa are plotted. Additional data will be required to interpret these plots (Phi-squared similarity coefficient used in this analysis, stress in two dimension = 0.630).

TABLE 3

PLANT TAXA (Common & Latin names)	Number	Percent of Total	Class Total	Class Percent of Total
CEREAL GRAINS			251	02.18
barley (*Hordeum vulgare*)	175	01.52		
emmer (*Triticum dicoccum*)	76	00.66		
CEREAL RACHISES			2600	22.59
barley (*Hordeum vulgare*)	93	00.80		
emmer (*Triticum dicoccum*)	2507	21.78		
FIELD WEEDS			2728	23.70
canary grass (*Phalaris paradoxa*)	1325	11.51		
darnel (*Lolium temulentum*)	1168	10.15		
mayweed (*Anthemis* sp.)	161	01.40		
(none) (*Scorpirus muricata*)	71	00.62		
vetchling (*Lathyrus* sp.)	3	00.03		
REEDS AND SEDGES			2450	21.29
reed (*Phragmites australis*)	1316	11.43		
sedge (*Carex* sp.)	835	07.25		
bulrush (*Scirpus* spp.)	133	01.16		
fimbristylis (*Fimbristylis* spp.)	113	00.98		
Nutgrass (*Cyperus* spp.)	47	00.41		
Spikerush (*Eleocharis*)	6	00.05		
FODDER PLANTS			3171	27.55
clover (*Trifolium* sp.)	2393	20.79		
mustard (*Brassica* sp.)	383	03.33		
dock (*Rumex* sp.)	213	01.85		
vetch (*Vicia* spp.)	168	01.46		
midick (*Medicago* sp.)	14	00.12		
OTHER PLANTS			310	02.69
(none) (*Lapulla* sp.)	144	01.25		
grass (*Bromus* sp. et al.)	83	00.72		
goosefoot (*Chenopodium* sp.)	50	00.43		
grape (*vitis vinifera*)	3	00.03		
pink family (*Caryophyllaceae*)	11	00.10		
carpet weed (*Aizoaceae*)	1	00.01		
carpet weed (*Glinus* sp.)	1	00.01		
little mallow (*Malva parviflora*)	11	00.10		
purslane (*Portulaca oleracea*)	6	00.05		
TOTAL	11,510			100%

Summary of identified floral remains from Kom el-Hisn. Fewer than 5% of our samples have been analyzed, so these data may not be good estimators of the total assemblage at Kom el-Hisn. Most of these plant remains may be from cattle dung that was burned in the Old Kingdom community. Darnel, one of the most common weeds in our samples, grows almost exclusively in cultivated fields, and *Scorpirus* and canary grass are common invaders of grain fields. Mayweed and vetchling also commonly grow in grain fields. Seeds of all these plants were found in grain offerings in tombs at Saqqara—probably as contaminants. Reeds and sedges are common in wet marshy areas and may have been eaten by cattle or used as temper for dung cakes.

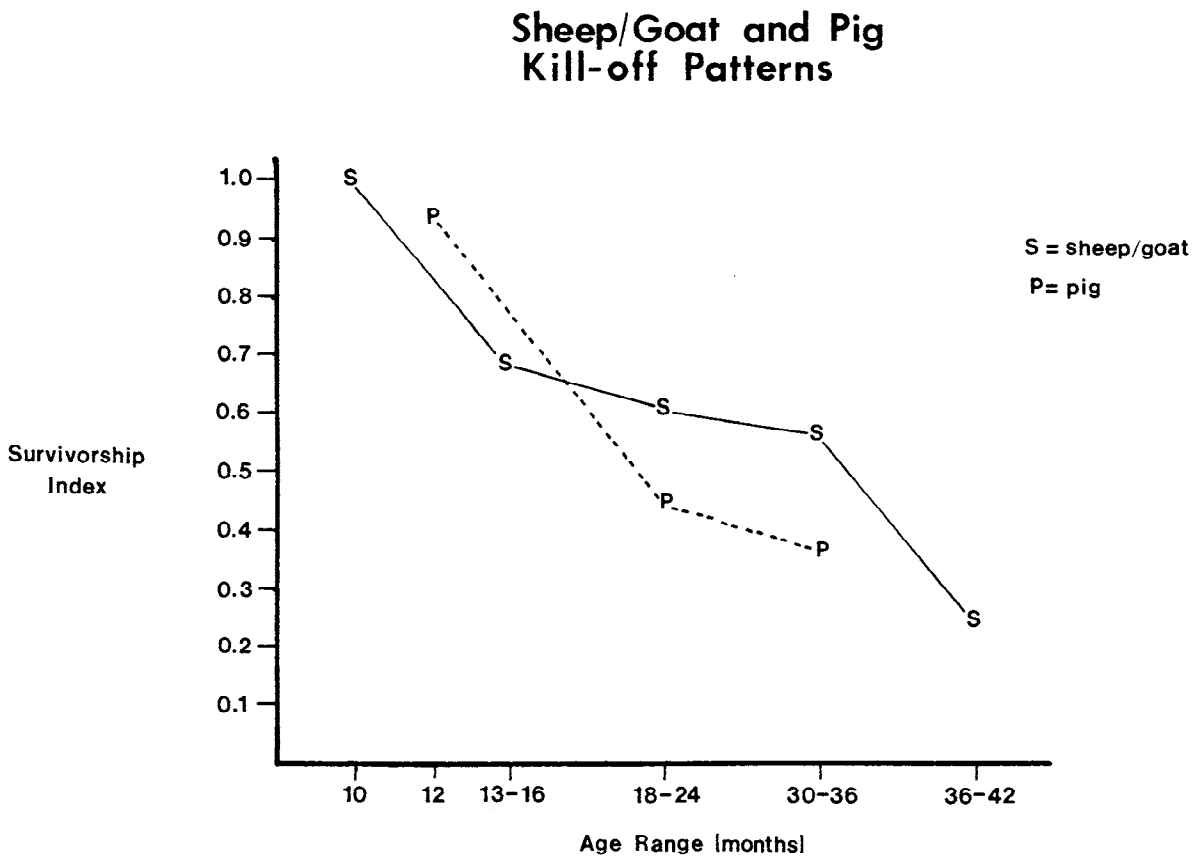

Fig. 9. Sheep/goat and Pig kill-off patterns. This graph indicates the relative proportion of these taxa that were alive at different ages, reflecting butchering practices.

together, and for associations of animal foods with different varieties of plants, artifacts, architectural contexts, stratigraphic levels, etc. The animal remains seem to show some patterns of co-occurrence (fig. 7). Pigs far outnumber sheep/goats in the architectural unit illustrated in fig. 5, and other significant spatial differences in frequencies are tentatively indicated in our stratigraphic sequence, but our analyses are incomplete. The floral remains show some patterns of co-occurrence (fig. 9), but here, too, we are still in the process of analysis. Finally, the only grape seeds recovered from Kom el-Hisn come from Middle Kingdom deposits. Artistic representations and inscriptions suggest that the Delta was an important area of viticulture from Early Dynastic times onward, but we have no evidence of this in Old Kingdom times at Kom el-Hisn.

6. *Ceramics, lithics, and commodity production.* The Kom el-Hisn ceramics represent one of only a few large, systematically collected samples from an Old Kingdom community. There are comparative materials from other Old Kingdom Delta sites, such as Tell Basta, Mendes, Kom Abu Billou, el-Quatta, Tell el-Kibir, and Buto, but these have either not been collected through systematic excavation or have not been published in sufficient detail to allow detailed comparison with the Kom el-Hisn ceramics.

A sample of the Kom el-Hisn ceramics is illustrated in figs. 10–12. In our research at Kom el-Hisn we are using ceramics to study various aspects of site chronology and functional differentiation, and we are experimenting with various typological and classificatory approaches. Our description of these ceramics in the present paper is based on simple divisions according to clay

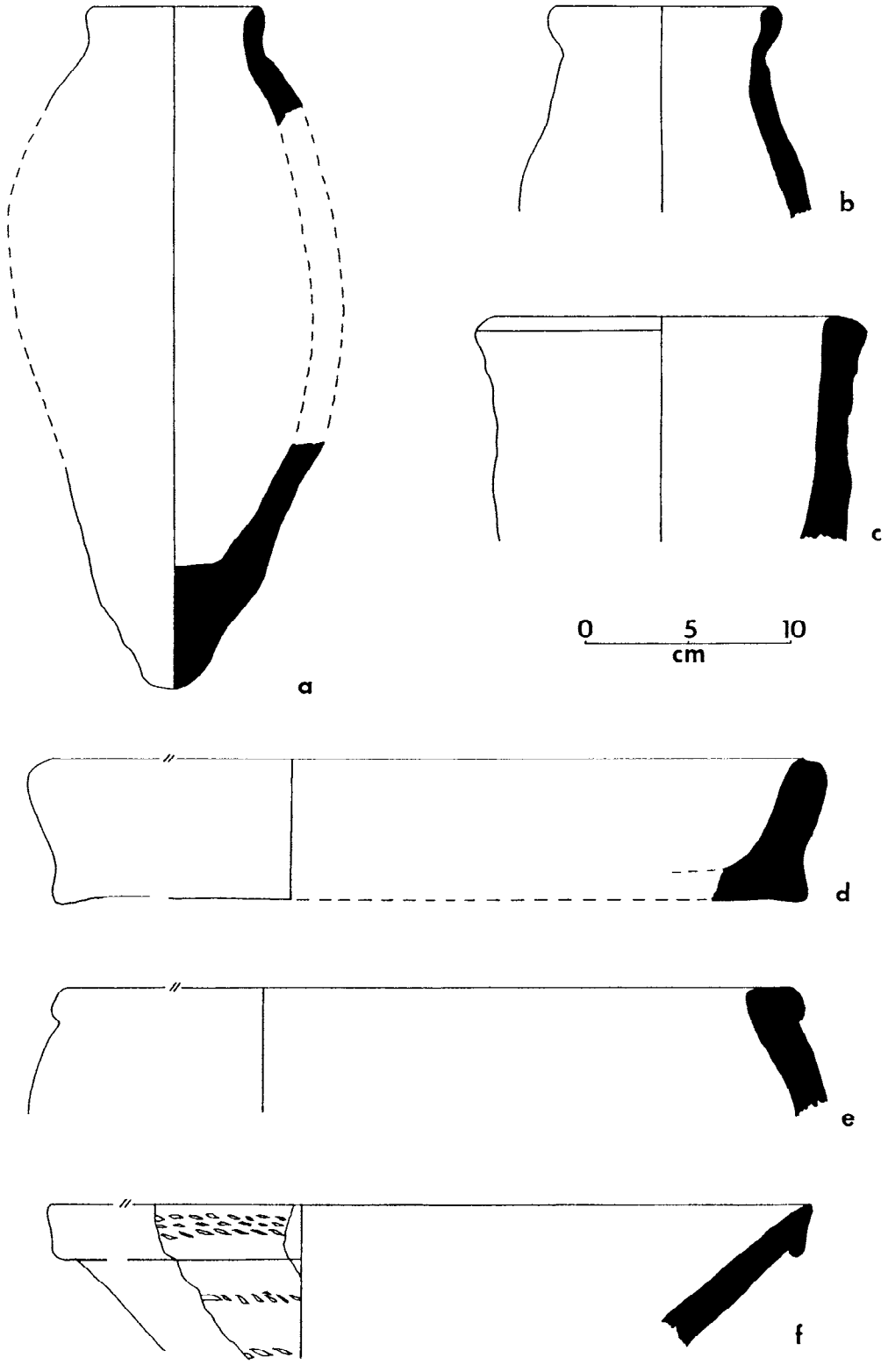

Fig. 10. Old Kingdom ceramics from Kom el-Hisn. See text for discussion.

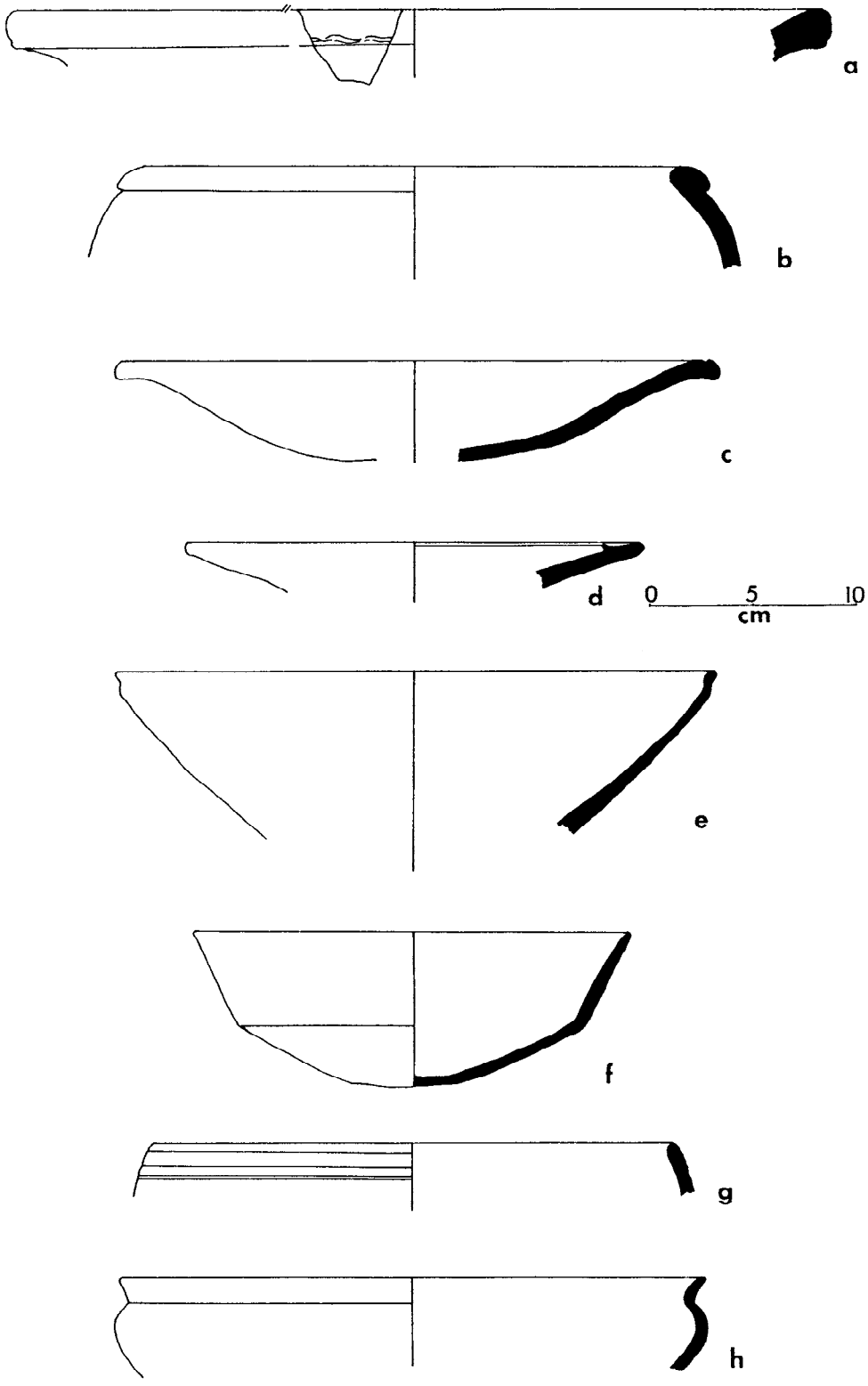

Fig. 11. Old Kingdom ceramics from Kom el-Hisn. See text for discussion.

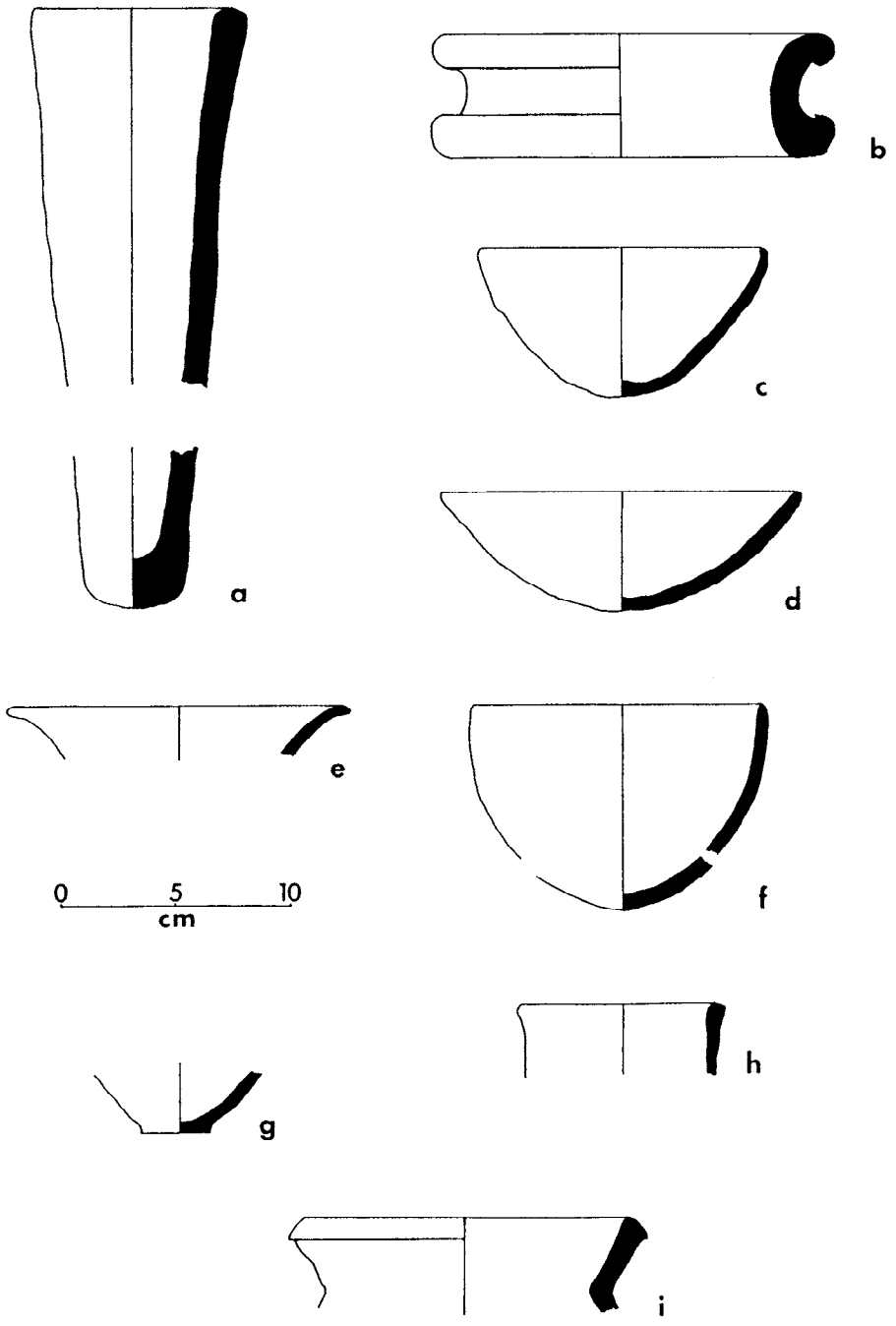

Fig. 12. First Intermediate Period/Middle Kingdom ceramics from Kom el-Hisn. See text for discussion.

types, manufacturing methods, surface treatment, and form.

Many of the Kom el-Hisn ceramics are made from *Nile Silt C*, which contains relatively coarse clay particles and coarse straw. A common vessel in this category is a form of crude, hand-made medium-size jar with constricted neck and pointed bottom (fig. 10, a-b). Long associated with beer offerings, these vessels have been found in or near offering chapels at Giza and Abu

Gurob, but rarely in the burial chambers themselves.[61] Some of these from Giza and Abu Gurob contained plaster, perhaps indicating reuse.[62] Another common Nile Silt C form is the "bread mold" (fig. 10c), a crude vessel in which, according to inscriptions and illustrations, bread was baked by first heating the vessel over coals, then filling it with dough, and then covering it with a second mold.[63] These vessels have been found in many Old Kingdom sites, in shapes varying from bowls to cups and with rounded or flat bottoms—but always with a rough exterior and a smooth interior. Also common in Nile Silt C wares are trays and plates (e.g., Figure 10d), both handmade and wheelmade, and a considerable variety of bowls (figs. 10e–10f, 11a).

Nile Silt B wares comprise clay particles that range from coarse to relatively fine, and some vessels are also made with relatively fine straw tempering. These occur in a diversity of forms and with varied surface treatments (figs. 10b–10g). Most of these are wheel-made, many with a red exterior slip. In fact, one of the most common types of pottery at Kom el-Hisn is a round-bottom carinated bowl in a relatively fine clay. This form (fig. 11h) seems to be a good chronological marker and is known at many different Old Kingdom sites. We are currently doing statistical analyses that we hope will allow us to use relatively subtle variations in rim and neck attributes of this vessel form to seriate excavation units that we cannot connect stratigraphically. These bowls are sometimes burned and seem to be associated with faunal remains and features indicative of domestic food-preparation and consumption.

We found only a few pieces of *Nile Silt A* pottery (fine clay with no or very little organic tempering), all of them small fragments of the "Maidum" bowls well known at Maidum and other Old Kingdom sites.[64]

From one excavation unit, 1261–1071 (fig. 4), we recovered a large collection of ceramics dating to the Middle Kingdom, mainly to the 11th and 12th Dynasties (c. 2080–1850 B.C.). Many of these are in the form of bread molds (fig. 12a) made of Nile Silt C; various cups and bowls in Nile Silt B were associated with these bread molds, as were numerous rim sherds of a form of grayish-brown cups with very thin walls (fig. 12f).

We found only a few diagnostic ceramics in marl clays—all of them in 12th Dynasty areas of the site. Those from Old Kingdom areas are body sherds. One of these was shaped and worn as if it had been used as a tool.

In general, the ceramics from Kom el-Hisn seem to come mainly from the 5th, 6th, and 12th Dynasties, but we strongly suspect that some of the forms we have found and have not been able to match with those from other sites are of First Intermediate Period age. In this regard, the recent discovery of a First Intermediate Period settlement at Tell el-Dabᶜa, in the eastern Delta (fig. 1), offers good comparative possibilities. Most of the Kom el-Hisn ceramics are what one would expect from an Old Kingdom provincial residential community, in that they seem mainly to reflect food storage, preparation, and consumption. None of these ceramics appears to be non-Egyptian in origin, and there is evidence of only minor import of ceramics from other areas (e.g., in the form of a few examples of Qena wares). On the other hand, we have found no evidence in the form of kilns, wasters, slag, or obvious workshops of extensive manufacturing—though here, too, the preliminary nature of our excavations must be stressed. If activities such as casting, smelting, industrial ceramics production, etc., were separated from the main occupational areas, it is likely we would not yet have revealed them.

In our two seasons of excavation we have found 1042 lithic artifacts, about equally divided between flint and ground-stone tools (tables 4–5). We found only six cores, most of them in Egyptian flint (fig. 13a, g) and another a completely exhausted microlithic multiplatform core

[61] G. Reisner and W. Smith, *A History of the Giza Necropolis, Vol II* (Cambridge, 1955) 70; J. Bourriau, *Umm el-Gaᶜab. Pottery from the Nile Valley Before the Arab Conquest* (Cambridge, 1981) 17.

[62] A. Eggebrecht, "Frühe Keramik aus el-Tarif," *Mitteilungen des Deutschen Ärchäologischen Instituts Abteilung Kairo* (1974) 30–32 (1974).

[63] Idem.

[64] Some Kom el-Hisn ceramics are very similar in style, size, and fabric to one illustrated in J. Bourriau, *Umm el-Gaᶜab*, 52–53, No. 87.; also see W. Kaiser, "Die Tongefässe," in *Beiträge zur Ägyptischen Bauforschung und Altertumskunde—Das Sonnenheiligtume des Königs Userkaf II/8*, H. Ricke, (Wiesbaden, 1969) 54.

TABLE 4. Flint Artifacts from Kom el-Hisn, 1984 and 1986 Seasons.

Type	—	%
Cores and core fragments	6	1.18
Débitage	306	60.48
Retouched tools	194	38.34
Total:	506	100.00

of obsidian. The majority of debitage pieces were blades, most of them very straight and broken; a few were burned. All appeared to have been produced by the same technology, from single platform cores; primary flakes (more than 50% of the surface covered by cortex) are relatively rare. The most common retouched tools were "sickle blades" (fig. 14). Many of these appear to have been broken, either through use or intentionally, to fit sickle hafts, and well-developed sheen is visible on many of them. Denticulate retouch is common, as is simple use retouch, and retouch was about equally distributed between right and left hand margins. After sickle blades, the most common retouched tool is a form of bifacial "knife" (fig. 13c-13d). Two burins (e.g., fig. 13b), two scrapers (e.g., fig. 13e-13f), and single examples of various other tool types were also found.

Generally, it seems obvious that sickle blades were the most important stone tools. Production of these requires straight, very regular and thin but strong blades. Blades appear to have been struck from carefully prepared single platform cores. The high frequency of pointed platforms and inconspicuous bulbs in the debitage probably reflects use of soft-hammer and pressure flaking.[65] Because many of the sickle blades were found broken but without apparent use-wear, we suspect that they were fitted and hafted locally. We also have found no evidence, such as the characteristic flakes of superficial flat retouch, of local manufacture of bifacial tools—though it is entirely possible that lithic workshops were concentrated in areas of the site we have not yet excavated. Regarding the source of the raw materials for the lithic artifacts, the Egyptian flint of which most are made is common in the southwestern deserts of Egypt and on the west bank of the Nile near Luxor, but it may also have been available on the desert margins of the Delta, perhaps near Abu Roash.

Of the 536 pieces of worked ground stone tools found (table 4), about 15% are "manos" and "metates"; and many of the chunks and other pieces of ground stone probably resulted from reworking these grinding implements. Some of these implements were stained red, perhaps reflecting the processing of minerals. A few pieces of granite, petrified wood, quartz, and alabaster were also found. In general, the lack of large primary flakes of limestone and granite would seem to suggest that none of the areas we have excavated to date involved the production of ground stone implements—just their use.

The Kom el-Hisn lithic assemblage reflects the considerable importance of stone tools in Old Kingdom agriculture. All of the forms found at Kom el-Hisn are well-known from tombs and other sites,[66] from the Neolithic period into later pharaonic times. If, however, Kom el-Hisn was a specialized cattle-raising center, it would be an interesting reflection of its economic structure if all or most ceramics, flint tools, metal, textiles, etc., were imported to the community. To some extent our results with regard to commodity production contrast with the traditional view of the Old Kingdom rural settlement as relatively self-sufficient: even the by-products of simple stone tool manufacture seem poorly represented in our samples, in that we have found few cores and little debitage; perhaps even the sickle blades that make up most of our lithics collection were manufactured elsewhere.[67] Here, too, however,

[65] J. Tixier, "Le debitage par pression," In *Préhistoire de la pierre taillee (Vol. 2). Economie du debitage laminaire* (Paris, 1984) 50-70.

[66] B. Midant-Reynes, "Le debitage de lames de silex par pression: les lames de foucilles de Ayn-Asil (Oasis de Dakhla)," *Bulletin de l'Institut de'Archéologie Orientale* (1983) 257-62; B. Midant-Reynes, "L'industrie lithique en Égypte: a propos de fouilles de ᶜAyn-Asil (Oasis de Dakhla), *Bulletin de la Societe Française d'Égyptologie* 102 (1985) 27-44; B. Ginter, Kozlowski, J. K., and B. Drobniewicz, "Silexindustrien von El-Tarif," *Archäologische Veröffentlichungen* 26, Deutsches Archäolgische Institut, Abteilung Kairo (Mainz, 1979).

[67] M. Kobusiewicz, "Lithic artifacts from Kom el-Hisn," in Wenke, in press.

TABLE 5. Ground Stone Artifacts from Kom el-Hisn, 1984 and 1986 Seasons.

Type	Sand stone	Quartz. sandstone	Ferrocr. sandstone	Lime stone	Petrified wood	Granite	Alabaster	Chert	Quartz	Ignous rock
Lower grind. stones	26	6	5	1	—	—	—	—	—	—
Upper grind. stone	11	—	2	1	—	—	—	1	—	—
Unidentified frags.	21	2	1	—	—	1	—	—	—	—
Flakes	67	19	15	26	2	1	—	—	1	—
Blades	1	—	—	—	—	—	—	—	—	—
Chips	2	1	2	—	—	—	—	—	—	—
Chunks	68	6	10	218	2	1	3	—	1	1
Other	1	—	—	4	—	—	1	5	—	—
Total:	197	34	35	250	4	3	4	6	2	1
%:	(36.75)	(6.34)	(6.52)	(46.64)	(0.74)	(0.55)	(0.74)	(1.11)	(0.37)	(0.18)

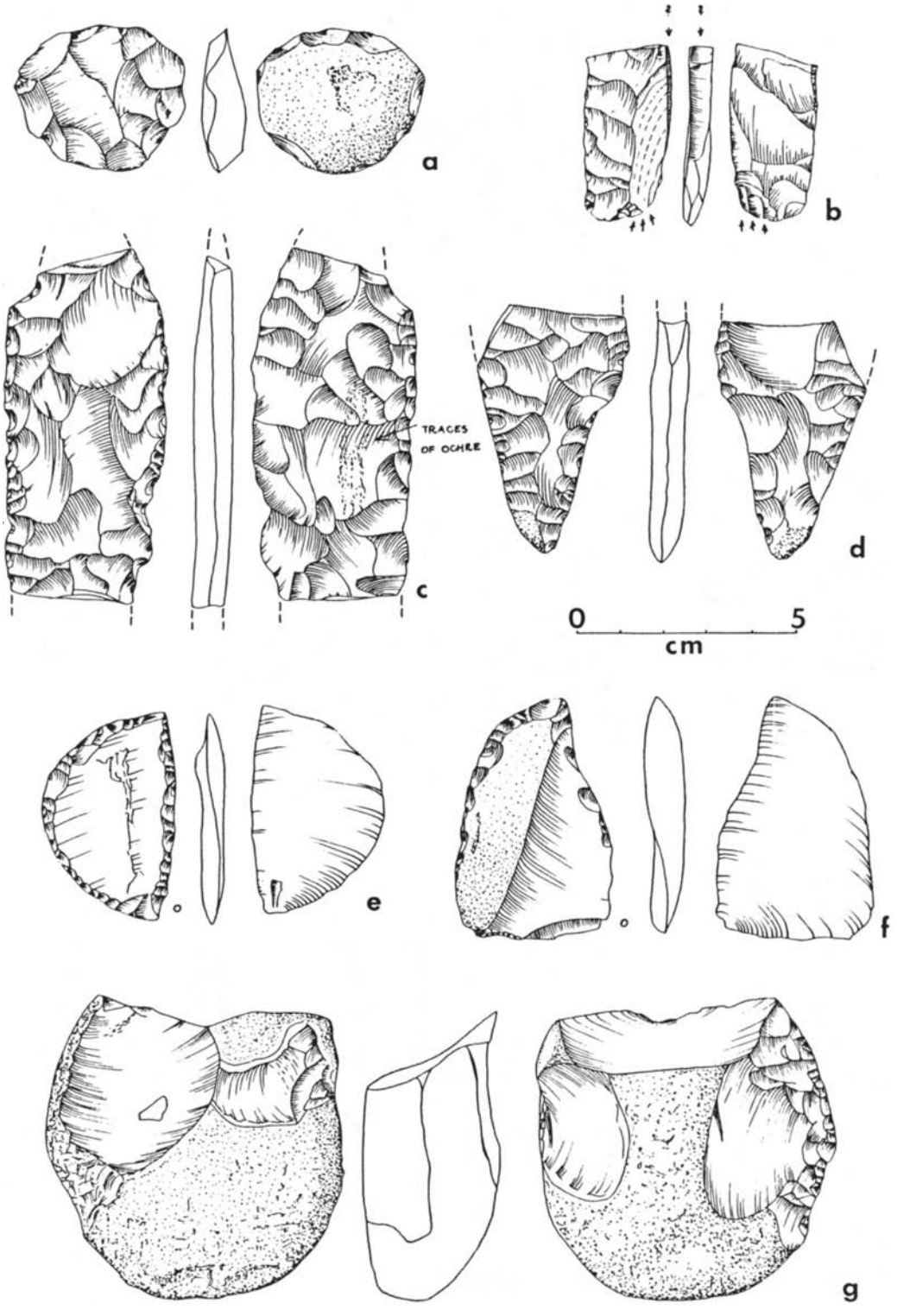

Fig. 13. Lithics from Kom el-Hisn. See text for discussion.

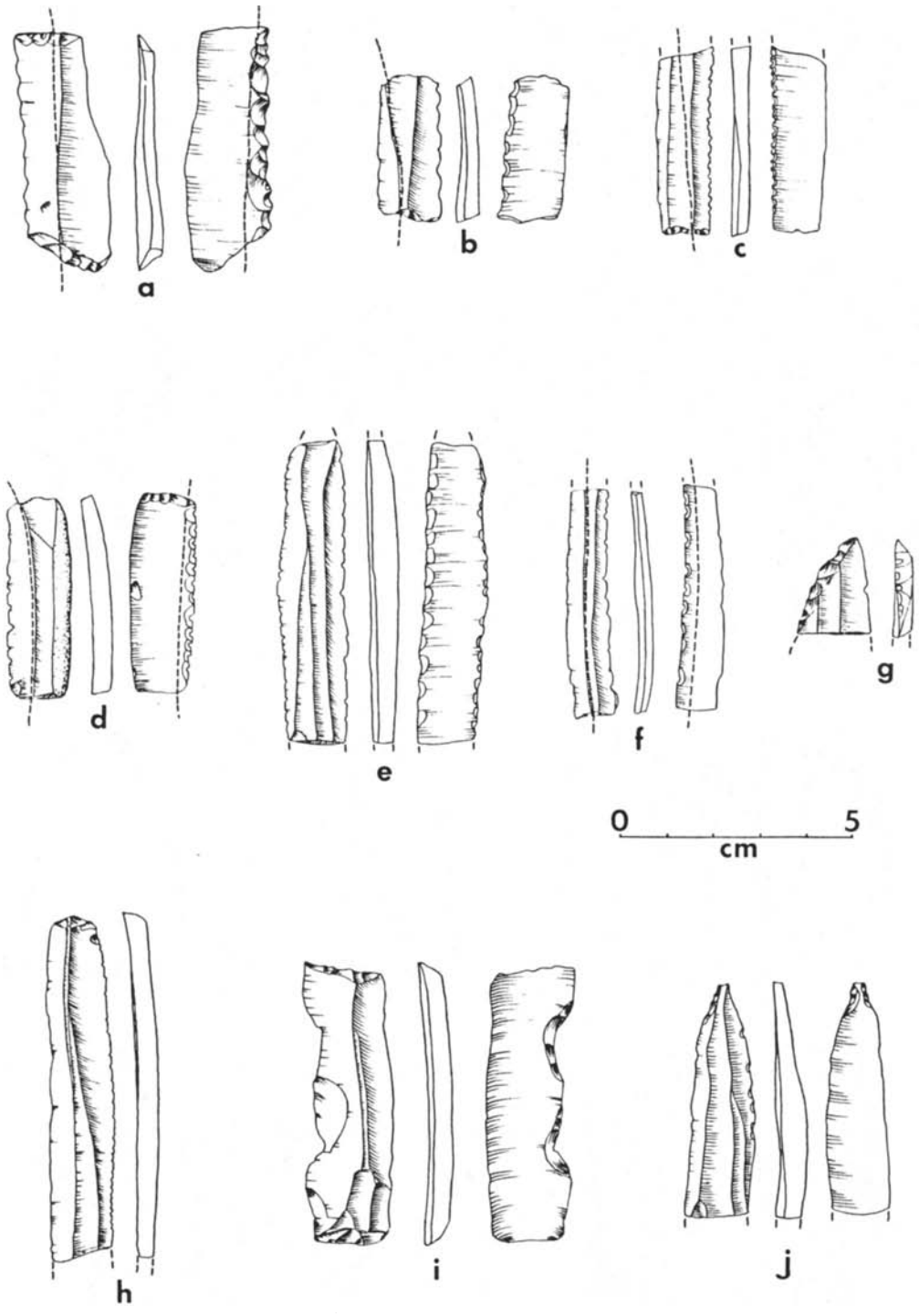

Fig. 14. Lithics from Kom el-Hisn. See text for discussion.

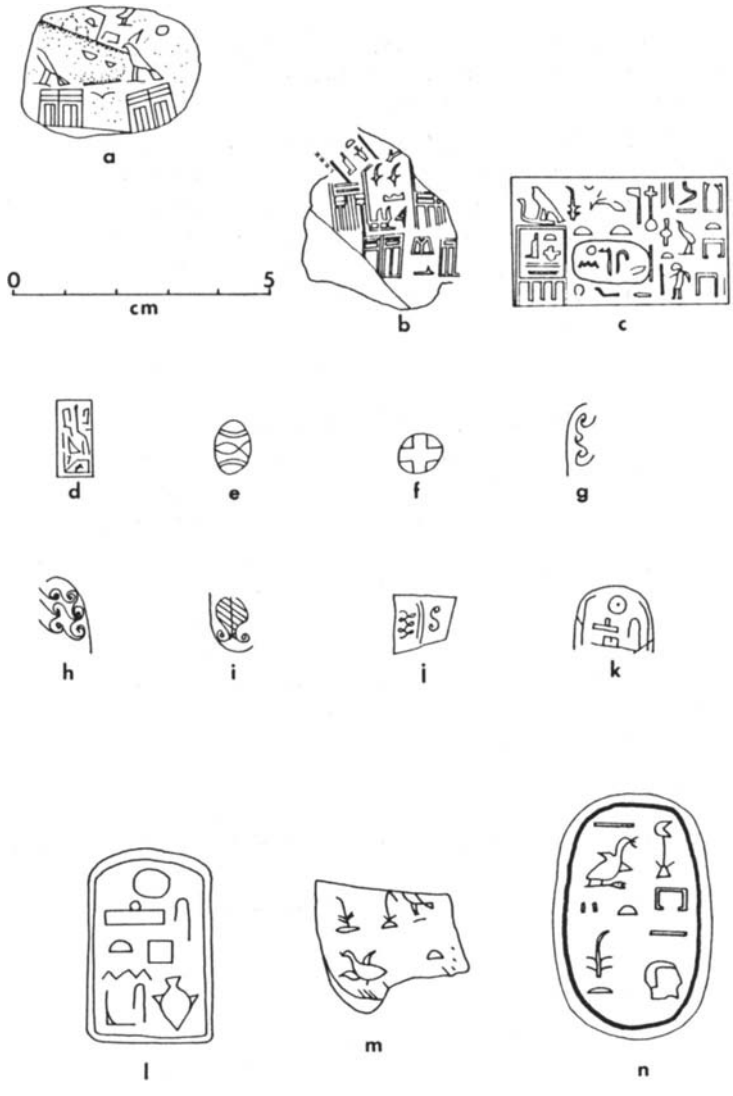

Fig. 15. Epigraphic finds from Kom el-Hisn and Comparative Specimens. See text for discussion.

our samples are too small to come to definitive conclusions.

7. *Epigraphic material.* Although we have found many fragments of clay sealings, only the seals and sealings illustrated in fig. 15 were decipherable. Inscribed mud sealings were used from at least Early Dynastic times and well into the pharaonic era, often as sealings on pottery vessels containing various commodities, but also on documents and small containers and boxes.[68]

Old Kingdom seals were made in both the cylinder and stamp form. Old Kingdom cylinder seals generally bore the Horus and ring names of the king and the titles of the owner of the seal; they are usually small, compared with seals of other periods, and were often applied several times in a criss-cross pattern—as is exemplified in fig. 15a, which was found in Old Kingdom levels of Kom el-Hisn. In this sealing there appear to be three superimposed impressions.

[68] P. Kaplony, *Die Inschriften der ägyptischen Frühzeit* (Wiesbaden, 1963); P. Kaplony, "Die Rollsiegel des Alten Reiches," *Monumenta Aegyptica* (Bruxelles, 1977) 2. 6, "Rollsiegel," *Lexicon der Ägyptologie* V (1984) 294.

The design seems to be one in which there were two palace facades in the bottom row; sealings of similar design found elsewhere and titles interspersed with these facades. The upper part of the *serekh*, which should—according to others of this type—contain the Horus name of the king, is missing. Instead, following directly above the paneling, somewhat to the left, appears the Horus falcon, with the crown in one Horus impression (and possibly in others). Because of the superimposition of the sealings, it is not possible to determine if the falcon figures are part of the same scene as the palace facade impressions. We have found no parallel cases in which the *serekh* appears without the Horus name in Old Kingdom sealings. Possibly the falcons are parts of sealings that partially destroyed previous impressions. The impression above the row of falcons is also partly obscured. Remains of what appears to be the upper part of a *serekh* (?) with, inside, on the right, the sign for a "t" (part of a Horus name) and rounded signs under next to the "t" are also visible. Although we could find no close parallel examples of this sealing, in design and type of rolling it is quite similar to some other Old Kingdom impressions, as is illustrated in fig. 15b.[69]

Stamp seals began to replace cylinder seals toward the end of the Old Kingdom but never did so completely.[70] One type of stamp seal found at Kom el-Hisn is the half-cylinder, steatite piece illustrated in fig. 15c. This seal was pierced longitudinally, doubtless to facilitate stringing it, and the back was rounded. The bottom plate is carved with a simple geometric design representing a person, seated, with upraised arms. Similar seals have been found at Hu, Qau/Badari, and other sites, and have been roughly dated to the 6th through 8th Dynasties.[71]

Another stamp seal, found at Kom el-Hisn is in the common scarab shape (fig. 15d). This seal, which is made of steatite, has a simplified design, with one line dividing the wings, a square profile, and very shallow grooving to indicate the legs. The engraved design on the bottom plate resembles the outline of a fish. The simplified design suggests a late First Intermediate Period/Early Middle Kingdom date;[72] the fish design is rare, with the closest parallels being from Sedment,[73] dating to the 9th and 10th Dynasties, and from Harageh,[74] from an undated context.

The fragments of stamp seal impressions found at Kom el-Hisn are illustrated in figs. 15e–15k. Most of these come from excavations in areas that contained ceramics of 12th Dynasty styles (specifically, excavation unit 1261/1074 [fig. 4]). Seal impressions like that of fig. 15f, with the cross-pattern, which resembles the hieroglyph for city, appeared in Egypt at the end of the Old Kingdom and were used well into the later pharaonic era as a decorative design for scarabs. Based on similar designs found on sealings from other sites, the specimen from Kom el-Hisn probably dates to the 6th–8th Dynasties.[75]

Fragments of sealings exhibiting the linked scroll pattern, like those from Kom el-Hisn illustrated in figs. 15g–15i, are common throughout Egypt, in a great diversity of designs. Some have been dated to pre-Middle Kingdom times,[76] but the specimens from Kom el-Hisn come from areas that contain not only Middle Kingdom pottery but also the two Middle Kingdom seal impressions illustrated in figs. 15k and 15j. Figure 15k, which is impressed on a dark gray clay, reads "Sḫtp-(ib)-r^{c}"—the throne name of Ammenemes I. Seals from other sites similar to the Kom el-Hisn specimen give the private name seals of "Sḫtp-ib-r^{c}-^{c}nḫ" and Sḫtp-ib-r^{c}-snb" (c.g., fig. 151).[77] In the Kom el-Hisn specimen the last part of the name is not preserved, but the scheme is clearly the same.

The Kom el-Hisn seal impression illustrated in fig. 15k was clearly used to seal a document;

[69] Kaplony, "Rollsiegel," 76–77.

[70] Idem.

[71] W. F. Petrie, *Diospolis Parva* (London, 1901) pls. XXV, XLVI, 1–4; G. Brunton, *Qau and Badari I* (Warminster, 1927) pls. XXXIX, 22–28, XLVI, 52–62.

[72] W. Ward, *Studies on Scarab Seals I* (Warminster, 1978) 23f.

[73] W. F. Petrie and G. Brunton, *Sedment I* (London, 1924) pl. XLIII, 31.

[74] R. Engelbach, *Haraqeh* (London, 1923), pl. XX, 69.

[75] For parallels see G. Reisner, *Naqa ed-Der III* (Oxford, 1932) 109f.

[76] W. F. Petrie, *Buttons and Design Scarabs* (London, 1925), pls. VI, 35-3, VII, 71–77; Ward, *Studies on Scarab Seals* (1978) 263–67.

[77] G. Martin, *Egyptian Administrative and Private-Name Seals* (Oxford, 1971), pl. XVI, 3 (see other places in this volume for additional comparative specimens).

the impression of the papyrus sheet is visible on the back. The impression reads "*rsy*(sic)[?] *ḥ3* (*n*) *t3ty*. . . ." Similar sealings from other sites read, "*ʿḥ3 n t3ty n tp rsy*" or "*ḥ3 n t3ty niwt rsyt*"—or "hall of the vizier in the south" and "hall of the vizier in the southern city" (e.g., fig. 15m).

8. *Burials.* We have excavated three burials, two adults and a child—none of whom was buried with any goods whatever. These burials were near the surface and are badly preserved. All were cut into Old Kingdom architecture. Nearly a thousand burials were excavated from the main sand/gravel mound (*gezira*) that borders the Old Kingdom settlement at the site,[78] but most had some grave goods (unlike our examples) and apparently ranged in age from the First Intermediate Period to the Late Period.[79] The largest tomb at Kom el-Hisn (that of Khesu-wer) has been dated on epigraphic and stylistic criteria to the early Middle Kingdom.[80]

Summary and Conclusions

In two seasons of excavation we have demonstrated that the Old and Middle Kingdom settlements of Kom el-Hisn are well-preserved and extensive. Most of our research has been designed to evaluate alternative models of provincial Egypt's socio-economic organization during a period of important cultural change. The absence of evidence of commodity production, the similarity of artifacts to those of the political centers at Giza, and the inscribed sealings may reflect more functional interdependence, and less self-sufficiency, than is commonly attributed to Old Kingdom Egypt. But our present samples are inadequate as a basis for evaluating the research models.[81] Nor can we take Kom el-Hisn as a paradigm for all Old Kingdom settlements, or even all west Delta Old Kingdom communities. In future seasons we hope to expand considerably our excavations of Kom el-Hisn, and using satellite imagery studies, we also hope to continue our preliminary regional survey—which we consider one of the most important parts of our research. If the results of the satellite imagery analyses are promising, we hope to concentrate in future seasons on a full-scale regional settlement survey. It is within this regional framework that many of the questions raised in our work at Kom el-Hisn will ultimately be answered.

[78] A. Hamada and M. el-Amir, *ASAE* 46 (1947) 101–11; A. Hamada, and S. Farid, *ASAE* 46 (1947); 48 (1948), and 56 (1959).

[79] G. Brunton, *Qau and Badari* (1927).

[80] D. Silverman, personal communication.

[81] Demonstrating the co-occurrence and spatial patterning of artifacts and other remains is a notoriously difficult matter, with complex statistical implications (see, for example, C. Carr, *For Concordance in Archaeological Analysis* [Kansas City, 1985]).