Camel Caravans and Camel Pastoralists at Tell Jemmeh

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Introduction

Camels are a familiar feature of the modern Middle Eastern landscape. Nevertheless, their early history in the region is poorly documented in artistic and written sources prior to the classical periods. Also, until recently no substantial collections of camel bones from archaeological contexts had been recovered. Therefore, the discovery of a large pre-Hellenistic sample of camel bones, excavated from Tell Jemmeh in southern Israel, is particularly significant. This bone sample permits the interdigitation of textual, artistic, and archaeological data in a way not possible before. The result is a better understanding of camel exploitation in the ancient eastern Mediterranean.

This report deals with the problem from two perspectives. Four general models drawn from ethnographic studies are presented that could account for the presence of camel bones in historic Levantine sites. Historical data is next considered to determine which mechanisms were acting alone, or in concert, at Tell Jemmeh in the first and second millennia B.C.E.[1]

The Setting and the Sample

The site of Tell Jemmeh is located about 10 km south of Gaza on the southern bank of the Nahal Besor.[2] Its position at the 200 mm isohyet places it at the border of arid and semi-arid land. This region of Israel's southern coastal plain can be characterized as a marginal agricultural area for both past and present.

Sir Flinders Petrie conducted the first large-scale excavation of the mound in 1928,

1 I wish to express my gratitude to the Memorial Foundation for Jewish Culture and to the National Geographic Society for providing support for the study of the faunal collection from Tell Jemmeh. I am most grateful to Dr. Gus W. van Beek, Smithsonian Institution, for the opportunity to analyze this material.

2 R. Amiran and G. W. van Beek in *Encyclopedia of Excavations in the Holy Land* (English ed.; Jerusalem, 1976) 2:545–48.

identifying it, incorrectly, as the Gerar of the Hebrew Bible (Gen. 20:1; 26:1–12; etc.). From 1970 to 1978, the Smithsonian Institution sponsored archaeological investigations at the site under the direction of Gus W. Van Beek. These excavations produced a large quantity of animal bones of which a total of 472 camel bones has been identified (see Table 1). Of these, 105 have not yet been assigned to a stratigraphic context and are not included in the frequency comparisons of this report, although they were used in the osteomorphological investigations. Given their find locations, none of these unassigned bone fragments pre-date 1100 B.C.E. Also not included are fourteen bones from modern contexts, mostly pits dug into the ancient stratified deposits; twenty-five bone fragments are classified as unstratified because their contexts—from baulk trimmings, mixed pits, wash layers, etc.—were considered too uncertain for a positive assignment.

Camel bones derive from all excavated areas of the site but do not occur in all the occupational levels. None were found in the small Chalcolithic deposit, ca. 3200 B.C.E., or in the Middle Bronze II B deposit, ca. 1800–1540 B.C.E. Five bones derive from the 14th to 13th centuries B.C.E., Late Bronze Age, and two from the 11th and 10th centuries B.C.E., Iron Age I, when Tell Jemmeh was a Philistine settlement. Beginning in the 9th century B.C.E. there are signs of an Assyrian presence at the site. The debris from the occupation of 800 to 700 B.C.E. yielded eight camel bones. The sample dated from 675 to 600 B.C.E. produced the earliest sizable collection with the recovery of 40 bone fragments. These bones coincide with the inception of a large-scale Assyrian occupation. Totalling 188 fragments, the largest sample was recovered from the neo-Babylonian and Persian periods, ca. 600 to 332 B.C.E. The ensuing Hellenistic occupation lasted until about 200 B.C.E., and was the final settlement on the tell.[3] Eighty-five camel bones date to this period. Two camel bones were recovered in a collection of 1110 bone fragments (452 identifiable) from areas excavated by Dr. J. Schaefer to the south of the tell.[4] These areas date from the Iron Age to post-Mamluk periods, but most of the sample is concentrated in the Byzantine and Mamluk periods. Both camel bones date to the Mamluk deposit (14th century C.E.).[5]

Table I shows the distribution of the camel sample at Tell Jemmeh by bone type and period. A better idea of the distribution is obtained from relative frequencies that compare camel bone counts to the bone frequencies of other commonly recovered species, not, however, including sheep and goat which are still being tablulated. Compared with cattle, equids, gazelles, pigs and birds, camels constitute about 25% of the Assyrian faunal sample, between 35 and 47% of the Neo-Babylonian/Persian sample, and 14% of the Hellenistic sample.

All parts of the skeleton are represented except the third phalanx, a bone which is deeply embedded in the foot pad and in butchering usually is removed with the skin. Since camel remains were regularly recovered with other faunal debris no locational depositional bias appears to exist. About 18% of the bones in the sample bear cut marks. These occur at all major joints in the skeleton. This dismemberment pattern is

3 G. W. van Beek, pers. comm.

4 G. W. van Beek, "Notes and News: Tel Gamma," *Israel Exploration Journal* 27 (1977), 171–76.

5 B. Hesse and P. Wapnish, "The Faunal Remains from Byzantine Jemmeh" (ms on file, Anthropology Department, Smithsonian Institution).

Table 1. *Camelus* sp. bone fragments in the Tell Jemmeh sample.

Years BCE	Teeth	Mandible	Maxilla	Vertebra	Scapula	Humerus	Radius Ulna	Carpals	Innominate
1400-1300									
1300-1200								1	
1200-1100									
1100-1000							1		
1000-900									
900-800									
800-700								.5	.5
700-600	2	5	2	1	3	.5	2	2.5	.5
600-500	8.5	5.25	1.5	3.5	1.75	2	3	4	1
500-400	9.5	6.25	1.5	5	2.25	.5	3	4	2
400-300	3	2.25	1	5.5	.75	4	11	15	2
300-200	12	3.25	4	9	2.25		9	10	2
Other	8	2	7	12	5	3	12	17	2
Total	43	24	17	36	15	10	41	54	10

Note: Fractional quantities indicate fragments distributed over different date ranges in areas where the stratigraphy is uncertain.

Years BCE	Femur	Patella	Tibia	Fibula	Calcaneus	Astragalus	Scaphoid	Cuboid	Grand Cuneiform
1400-1300				1					
1300-1200									
1200-1100									
1100-1000			1						
1000-900									
900-800									
800-700					1	.5			
700-600	1	1	.5	.5	5	1.5	1		
600-500	1	.5	1	2	1	1.75	.5	1	
500-400	1	.5	.5	1.5	1	1.75	.5	2	
400-300	2	1	3	1	5	6.25	1		
300-200	2		5		4	6.25	1	2	
Other	7	1	2	4	4	4	2	3	2
Total	14	4	13	10	21	22	6	8	2

Years BCE	Metapodial	P-I	P-II	Sesamoid	TOTAL
1400-1300	1				*2*
1300-1200	1		1		*3*
1200-1100					
1100-1000					*2*
1000-900					
900-800					
800-700	1	3.5	.5		*7.5*
700-600	6	2.5	2.5		*40*
600-500	4.5	3.5	1	.75	*49*
500-400	3	2.5	1	3.75	*53*
400-300	9.5	8	3	2.25	*86.5*
300-200	9	2	2	.25	*85*
Other	18	19	9	1	*144*
Total	53	41	20	8	*472*

typical for large food animals, and the marks parallel those on the cattle bones in the sample. About 20% of the camel subsample is burned and, again, all parts of the skeleton were affected. The substantial fraction of cut and burned material indicates that camels were a meat source for Tell Jemmeh's inhabitants.

Identification of Camelus dromedarius

Of the two Old World camelids, *Camelus dromedarius* (the one-humped dromedary or Arabian camel) and *Camelus bactrianus* (the Bactrian camel),[6] the first is the form most likely to be present in archaeological fauna from historic Levantine sites. Remains of the dromedary or a closely related species have been identified in Upper Pleistocene contexts from several Levantine sites. Prehistoric rock engravings depicting camels as game or riding animals suggest that the original habitat of the dromedary was Arabia, but its distribution on the peninsula prior to 2000 B.C.E. is imperfectly known.[7] Opinions on the region where domestication occurred vary. Some scholars believe the process occurred in Central Arabia around Nejd,[8] while others argue for a location in the southern portions of the peninsula.[9] Bulliet, in particular, notes that the central desert is too hot and dry for pastoral habitation without the use of camels.[10]

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6 Continued use of the Linnaean binomials to indicate two separate species has been challenged recently by I. L. Mason, "Origin, History and Distribution of Domestic Camels," *International Foundation for Science*, Provisional Report No. 6 (1979), 21–32. He maintains that since the two types cross without difficulty and produce fertile offspring of both sexes, the retention of specific separation is incorrect. While Mason himself notes in the discussion that authorities are not unanimous in recognizing hybrid fertility, he leaves the question open by not addressing the objections, despite his resolve to consider them one species. In addition, he questions the application of a Linnaean binomial to a domestic species (the one-humped camel is known only as a domesticate while the two-humped variety nearly always so). Finally, Mason raises linguistic objections to the English usage of "dromedary" and "Bactrian camel." "Dromedary," from the Greek *dromos* = road/*dromas* = running, is an adjective, meaning that the only proper expression can be "dromedary camel." This designation should be used only when referring to the riding or racing camel, and not to the pack animal. When the notion was current that the two-humped variety was native to Baktria, the Oxus River Valley in northern Afghanistan, the term "Bactrian camel" came into use. Since this is now known to be incorrect, the name should be dropped. Mason simply calls the forms one-humped camel and two-humped camel. While his points are well-taken, I prefer to follow F. E. Zeuner, *A History of Domesticated Animals* (London, 1963), 339, who notes that "infertility is not always accepted as decisive evidence for co-specific status." The conventionalizations "dromedary" and "Bactrian," though technically incorrect, are well established expressions now and designate two morphologically and geographically distinct types of Old World camel; they will be used in this article to name the two camel forms.

7 H. G. Epstein, *The Origin of the Domestic Animals of Africa* (New York, 1971), 2:575; E. P. Walker, *Mammals of the World*, 3rd ed. (Baltimore, 1975), 2:1374; J. Zarins, "The Camel in Ancient Arabia: A Further Note," *Antiquity* 52 (1978), 44.

8 Zeuner, *A History of Domesticated Animals*, 364; R. Walz, "Neue Untersuchungen zum Domestikationsproblem der altweltlichen Cameliden. Beiträge zur Geschichte des zweihöckrigen Kamels," *Zeitschrift des Deutches Morgenländischen Gesellschaft* 104 (1945), 45-87; "Beiträge zur ältesten Geschichte der alweltlichen Cameliden unter besonderer Berücksichtigung des Problems der Domestikationszeitpunktes," *Proceedings of the IVth International Congress of Anthropological and Ethnological Sciences* 3 (1956), 190-204; Epstein, *The Origin of Domestic Animals*, 574-75.

9 M. K. Mikesell, "Notes on the Dispersal of the Dromedary," *Southwest Journal of Anthropology* 2 (1955), 244; Mason, *Origin, History and Distribution of Domestic Camels*, 23.

10 R. Bulliet, *The Camel and The Wheel* (Cambridge, Mass., 1975), 47.

Authorities also differ widely on the date of domestication, which is predictable in light of the paucity of evidence. The earliest dates place domestication sometime in the 4th millennium B.C.E.[11] Bulliet, however, believes that the "domestication process" began somewhat later, between 3000 and 2500 B.C.,[12] while Zeuner suggests a date spanning 2900–1900 B.C.E.[13] Though there has been much speculation about the time and place of domestication, actually the earliest archaeological evidence comes from Umm an-Nar, a site located on a small island off the coast of Trucial Oman in the Persian Gulf. Here, the cultural context from which 200 camel bones and teeth were recovered suggests that the dromedary may have been domesticated in the eastern part of the peninsula during the 3rd millennium B.C.E., perhaps as early as 2700 B.C.E.[14] However, the animal's diffusion as a domesticate from the eastern part of the peninsula, in particular its spread to the south, is still to be documented. No sites in South Arabia have yet produced samples of pre-first millennium B.C.E. camel bones that may be interpreted as deriving from domestic animals.[15]

Despite the lack of firm evidence for early domestication, most commentators note that the spread of dromedary use and its importance on the international trade routes did not much precede the 12th century B.C.E. Albright was a strong proponent of this view, arguing as well that domestication could not have preceded this date by many years.[16] Albright contended that the mention of camels in the Genesis narrative was anachronistic, the result of later tradition which imposed on the text institutions current at the time of redaction, but not accurate for the times described. Elat, in a review of

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11 B. Brentjes, "Das Kamel im alten Orient," *Klio* 38 (1960), 23-52; Epstein, *The Origin of Domestic Animals*, 574; M. M. Ripinsky, "The Camel in Ancient Arabia," *Antiquity* 54 (1975), 297; Mason, *Origin, History and Distribution of Domestic Camels*, 23.

12 *The Camel and The Wheel*, 56.

13 *A History of Domesticated Animals*, 344.

14 E. Hoch, "Reflections of Prehistoric Life at Umm an-Nar (Trucial Oman) Based on Faunal Remains from the Third Millennium B. C.," in M. Taddei, ed., *South Asian Archaelogy 1977 Vol. 1* (Naples, 1979), 589-638.

15 J. Zarins, pers. comm. It should be stressed that establishing criteria for distinguising wild from domestic dromedaries on osteological material is difficult. The camel's ability to withstand harsh environments made it desirable to domesticate, and man tampered little with these characters of the wild form; cf. J. Clutton-Brock, *Domesticated Animals From Early Times* (Austin, Texas, 1981), 126. Domestication must be inferred from evidence of the dromedary occurring outside its natural range, and from profiles of "unnatural" morality rates for the animal that suggest human control and selection; cf. B. Hesse, *Evidence for Husbandry From the Early Neolithic Site of Ganj Dareh in Western Iran* (Ph.D. Dissertation, Columbia University; available from University Microfilms: Ann Arbor, 1978). The later may be suggested for the Umm an-Nar material.

16 W. F. Albright discussed and modified his theory many times over the years; cf. S. Z. Leiman, "The Camel in the Patriarchal Narrative," *The Yavneh Review* (1967), 16-26, for a partial bibliography. The last full analysis is found in "Midianite Donkey Caravans," H. T. Frank and W. L. Reed, eds., *Translating and Understanding the Old Testament* (Nashville, 1970), 197-205. Articles published posthumously also support the basic position; cf. "The Historical framework of Palestinian Archaeology Between 2100 and 1600 B.C. (E. B. IV, M. B. I, M. B. II A-B)," *BASOR* 209 (1973), 12-18; "From the Patriarchs to Moses I. From Abraham to Joseph," *BA* 36 (1973), 5-33, and "II. Moses Out of Egypt," *BA* 36 (1973), 48-76.

the domestication of the camel and its impact on commercial trade routes, argues for its diffusion from the Arabian peninsula after the 1st millennium B.C.E.[17]

Given the long history of contact between the Levant and the Arabian peninsula through the commercial spice trade, the dromedary rather than the Bactrian camel would be expected at Tell Jemmeh. Recently, however, some scholars have suggested an early date for the Bactrian camel as a pack animal in the Syria-Palestine region. The Bactrian is native to the steppe country of Chinese Turkestan and Mongolia.[18] However, it appears that it was not domesticated first in this area.[19] The earliest evidence of domestication comes from the site of Shahr-i-Sokhta on the eastern Iranian plateau. Here the recovery of a clay jar filled with camel dung, fragments of camel's hair fabric, and several camel bones suggest the presence of domestic two-humped camels about 2600–2500 B.C.E.[20] Linguistic and artistic evidence documents the spread of the domestic Bactrian camel from the Iranian plateau westward. Of particular importance is its representation on a Syrian cylinder seal of the early second millennium B.C.E.[21] This seal and other works of art depicting Bactrian camels prompted Collon and Porada to note that "the appearance of this animal at a time of intensive commercial activity in Western Asia suggests that the Bactrian camel assumed the role of a pack animal on the international routes at an earlier date than is usually assumed."[22]

Mention of the Bactrian camel in cuneiform sources increases in the records of the Neo-Assyrian kings of the 11th century B.C.E. The term *udru*, used to specify the Bactrian camel for the first time, appears to be an Iranian loanword in Akkadian. The inscriptions imply that the animal was introduced to Mesopotamia from the north and northeast.[23]

Since the possibility exists that Bactrian camels were present in the Levant, particularly after 1100 B.C.E., it was necessary to demonstrate which camel is represented at Tell Jemmeh. In the past, no osteological criteria have been consistently successful in separating the two species, since the available comparative skeletons of

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17 M. Elat, *Economic Relations in the Lands of the Bible (c. 1100–539, B.C.E.)* (Jerusalem, 1977), 98-99.

18 Epstein, *The Origin of Domestic Animals*, 583; Walker, *Mammals of the World*, 1374.

19 Bulliet, *The Camel and the Wheel*, 141-75; Mason, *Origin, History and Distribution of Domestic Camels*, 25–26.

20 B. Compagnoni and M. Tosi, "The Camel: Its Distribution and State of Domestication in the Middle East During the Third Millennium B.C. in Light of the Finds from Shahr-i-Sokhta," in R. Meadow and M. Zeder, eds, *Approaches to Faunal Analysis in the Middle East* (Cambridge, Mass., 1978), 91-103.

21 In the Walters Art Gallery, Baltimore. For illustration see Brentjes, *Das Kamel im Alten Orient*, 30, No. 2. Additional discussion of artistic renderings of two-humped camels are found in Brentjes, loc. cit.; Compagnani and Tosi, *The Camel*, 95; Epstein, *The Origin of Domestic Animals*, 581; Leiman, *The Camel in the Patriarchal Narrative*, 20–21; E. D. Van Buren, "The Fauna of Ancient Mesopotamia as Represented in Art," *An. Or.* 18 (1939), 36-37.

22 D. Collon and E. Porada, "23rd Rencontre Assyriologique Internationale," *Archaeology* 30 (1977), 343–45.

23 A. Salonen, *Hippologica Accadia* (Helsinki, 1956), 85-87. Additional discussion of the Bactrian camel in the Levantine area and in Egypt is found in P. Wapnish, "Dromedaries and Bactrians in the Levant: The Evidence from Tell Jemmeh" (paper presented at the Fourth International Conference on Archaeozoology, London, 1982.)

modern camels exhibit wide individual variation. However, present-day Bactrian camels are shorter and stockier than dromedaries, a feature that has been used to assign specimens to one or the other form. Lesbre's observations developed this feature and established criteria for separation of the taxa that take the form of length/breadth ratios calculated from measurements of complete limb bones.[24] However, archaeological bone material is rarely recovered intact, which makes these ratios rarely applicable.

Using modern comparative skeletons in the Smithsonian collections and the Tell Jemmeh specimens, I was able to observe several other features that distinguish the two camel forms. Morphological details on the atlas, axis, proximal humerus, proximal tibia, and astragalus as well as a criterion based on measurements of the distal metapodia were observed to be diagnostic for separation.[25] These criteria could be applied to 55 camel specimens from Tell Jemmeh. With one exception, all were closer to the dromedary morphology, supporting the expectation that dromedaries dominate the archaeological sample.

Ethnographic Models of the Interactions of Camels and Towns

Why are there any camel bones at all in the Tell Jemmeh sample? Some investigators treat the animal as an "extra-urban" species, one that would be rare in the debris of any village or town, a hypothesis seemingly supported by the rarity of camel bones in most Middle Eastern archaeological sites. Such a notion clearly does not apply to the ancient town of Tell Jemmeh. What is required here are models that can help explain the presence rather than the absence of camel bones in ancient urban garbage.

Faunal remains recovered from archaeological deposits represent the end product of the effects of human activity and the conditions of deposition.[26] Potentially, they measure the proportions of the kinds of animals killed at different times in the past and the way the carcasses were utilized.[27] Unfortunately, of the processes involved with animal use—breeding, nurturing, working, killing, consuming, and discarding—only the last is directly reflected in the archaeological record. Information about the other activities must be generated through analogy. Ethnographic data are an important source of information for the construction of reasonable models that can be tested against the material evidence.[28]

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24 M. F. X. Lesbre, "Recherches Anatomiques sur les Camélidès," *Archives du Muséum d'Historie Naturelle de Lyon* 8 (1903), 1–195.

25 For details see Wapnish, *Dromedaries and Bactrains in the Levant.*

26 J. Clark and K. K. Kietzke, "Paleoecology of the Lower Nodular Zone, Brule Formation, in the Big Badlands of South Dakota," *Fieldiana Geology Memoirs* 5 (1967), 111–37; G. Isaac, "The Diet of Early Man: Aspects of Archaeological Evidence from Lower and Middle Pleistocene Sites in Africa," *World Archaeology* 2 (1971), fig. 8; B. Hesse, "Bias in the Zooarchaeological Record: Some Suggestions for the Interpretations of Bone Counts in the Plains," *Smithsonian Contributions to Anthropology* (1982, forthcoming).

27 A. S. Gilbert, "Bone Utiliztion in the Early Urban Fauna of Iran" (paper presented at the 77th meeting of the American Anthropological Association, Los Angeles, 1978).

28 S. E. Smith, "The Environmental Adaptation of Nomads in the Western African Sahel: A Key to Understanding Prehistoric Pastoralists," in W. Weissleder, ed., *The Nomadic Alternative. Modes and Models of Interaction in the African-Asian Desert and Steppes* (Chicago, 1978), 95–96.

It has long been recognized that camel herding makes possible the exploitation of regions too desolate for pastoralism based on sheep, goats, and cattle.[29] Camel herders use a variety of management strategies determined by availability of water and pasturage, accessibility to markets, and presence of competitors. However, comparison of a number of ethnographies describing geographically disparate cultures produced some general observations about camel herd management that crosscut cultural boundaries. These observations were used to construct several behavioral models capable of explaining the Tell Jemmeh camel sample.[30] They are archaeologically distinct because each implies a different pattern of camel mortality.

Four general patterns are suggested. 1) Camel herders could have been resident at the site, in which case the skeletal remains would reflect the mortality distribution characteristic of camel herds managed by pastoralists. 2) Camel meat could have been supplied to Tell Jemmeh butchers and consumers from independent pastoralists not resident at the site, in which case the skeletal remains would reflect the age categories sold at markets. 3) Camels and camel meat could have been provided by non-resident pastoralists as part of a low intensity trade rather than the specialized conditions that would prevail in a meat market exchange (No. 2) in which case the animals found at the site would be those age categories of little use to pastoralists. 4) Camels could have been sold off by the operators of large commercial caravans that passed through the town.

Using the bones and teeth, the camel mortality patterns in the sample can be determined. Two kinds of information are used: the sequence of epiphyseal fusion of the long bones,[31] and tooth eruption and wear.[32] All individual teeth in the collection are worn and no deciduous teeth are present. None of the teeth or long bones came from animals that were diseased or of great age. Only twenty bone elements are unfused, and none of the non-fusing skeletal elements (carpals, tarsals) appear to have come from juvenile animals. Since camels reach sexual maturity at around four to five years of age,[33] the fused specimens could not have been much less than five years old at death, and, in view of the dental evidence were probably older. The overall impression is of a mortality pattern dominated by mature animals, those older than about seven years of age and younger than twenty years at death.

Comparing the faunal evidence to the ethnographic models we find that the Tell Jemmeh sample does not contain numerous young camels in any period, or remains

29 Camel physiology has been extensively studied by K. Schmidt-Nielsen; see, for example, "The Physiology of the Camel," *Scientific American* 201 (1959), 140–51; *Desert Animals: Physiological Problems of Heat and Water* (Oxford, 1965). The latest publication on camels, a comprehensive treatment of the animal's physiology and relationship to man, contains an excellent bibliography: H. Gauthier-Pilters and A. I. Dagg, *The Camel* (Chicago, 1981).

30 A more detailed discussion is found in Wapnish, *Dromedaries and Bactrians in the Levant.*

31 I. A. Silver, "The Ageing of Domestic Animals," in D. Brothwell and E. Higgs, eds., *Science in Archaeology* (New York, 1970), 283–302.

32 D. S. Rabagliati, *The Dentition of the Camel* (Cairo, 1924); Silver, *The Ageing of Domestic Animals*, 301.

33 Walker, *Mammals of the World*, 1374; Gauthier-Pilters and Dagg, *The Camel*, 93, report that male camels become sexually mature at four or five years of age, female camels at three or four years of age, although they are often not bred until they are older.

indicating disease or great age. These categories would be better represented in the sample had the occupants been raising camels at the site. Absence of young would also rule out an intensive market-based meat supply system, since modern camel meat markets trade in very young animals. The low intensity sale of camels by pastoralists living outside the settlement could account for some portion of the remains since they would have a higher proportion of older animals available for sale. But this model does not explain the large representation of prime adults or the sudden sharp increase in later periods. This is the age of the animals used by camel caravans, a fact which makes these trade systems a likely source for the prime adults in the sample not explained by interaction with pastoralist groups. This conclusion is supported by the historical record relating to Tell Jemmeh.

Geographical Setting

Undoubtedly, no one camel management pattern operated exclusively at Tell Jemmeh. In fact, the geographic setting of the site supports several possibilities. Biblical evidence suggests that from the tenth century B.C.E. on, mixed pastoralist groups were occupying regions to the south of Tell Jemmeh in the northern Negev, west towards the Sinai, and east across the ʿArava.[34] They could have interacted with townspeople using camels for either informal local or long distance trading or simple subsistence. This is supported by Rowton's extensive studies of interaction between tribal and urban society in past and present southwest Asia. Wherever the "desert and the sown" meet there is a close symbiosis between nomads and sedentary groups, a "dimorphic structure" in the social and political dimensions of society. Rowton calls the kind of nomadism involved "enclosed nomadism" to distinguish it from the more endemic nomadism of the bedouin. ". . . the dichotomous enmeshment of nomad and sedentary which pervades enclosed nomadism was . . . typical of Palestine and Transjordan."[35] It is not likely that the mixed pastoralists of Palestine and Transjordan would be involved with large scale camel raising for commercial purposes. This would be expected of groups inhabiting the more desertic regions of the Syrian desert and northwest Arabia.

The proximity of Tell Jemmeh to the city of Gaza (ancient Tell el ʿAjjul), a major commercial center throughout much of antiquity insured its interaction in a broad sphere. Tell Jemmeh is located about eight km southeast of the trunk route ("The Way of the Land of the Philistines," Exod. 13:17) that connected Palestine and Egypt (Fig. 1). Crossing northern Sinai, the route followed the coast to Gaza, branching to points further north. A section of the route diverged at Khan Yunis, passed to Tell Jemmeh

34 For citations see J. A. Thompson, in *The Interpreter's Dictionary of the Bible* (New York, 1965), 1:490–92.

35 M. B. Rowton, "Dimorphic Structure and the Parasocial Element," *JNES* 36 (1977), 196, citing DeGeus. A bibliography of Rowton's investigations of dimorphic social structure is found in *Or. An.* 15 (1976), 17, n. 4. For Mesopotamia, see Rowton, "Pastoralism and the Periphery in Evolutionary Perspective," *Colloques internationaux du C.N.R.S.* 580 (1980), 291–301; H. J. Nissen, "The Mobility Between Settled and Non-settled in Early Babylonia: Theory and Evidence," *Colloques internationaux du C.N.R.S.* 580 (1980), 285–90; K. A. Kamp and N. Yoffee, "Ethnicity in Ancient Western Asia During the Early Second Millennium B.C.: Archaeological Assessments and Ethnoarcheological Perspectives," *BASOR* 237 (1980), 85–104.

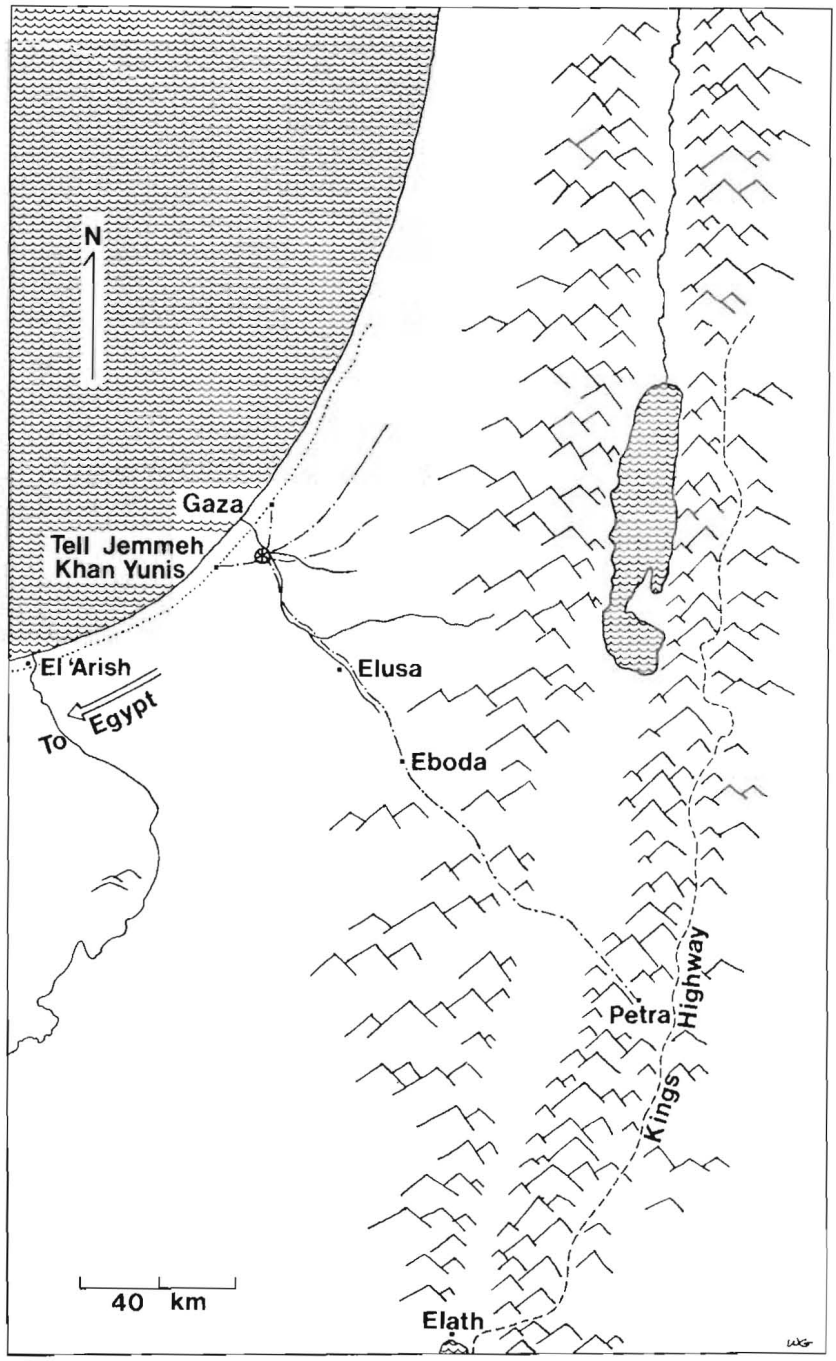

Fig. 1. Suggested route from Petra to Gaza through Tell Jemmeh, based on roads of the Nabataean period.
(Illustration by Wade Gilbreath.)

and continued to Beersheba, the central hill country, and the Dead Sea area.[36] These roads provided connections north, south, and west. Connections to the east concerned, most notably, the international spice routes.

Frankincense and myrrh are gum resins extracted from trees native only to south Arabia, northern Somalia, and parts of Ethiopia.[37] In processed form they provided the incense that burned upon the altars of many cultures in antiquity. They were used as perfumes and medicinal qualities imputed to them added to their commercial value. However, the long distance between source and markets put the resins in the class of luxury items.

One of the earliest, and certainly the most well-known, reference to incense was found in upper Egypt at Deir al-Bahari, the mortuary complex of Queen Hatshepsut (ca. 1490–1469 B.C.E.).[38] There, the temple porticos are decorated with reliefs, including scenes of a trade expedition to Punt commissioned by the queen. Incense and incense trees are among the exotic treasures brought back to Egypt by the expedition. The exact location of Punt remains unknown, although there is no debate that it was somewhere to the south of Egypt. The locations suggested most recently, the northern Somali coast,[39] or southern Ethiopia,[40] exclude south Arabia entirely. Indeed, Groom notes that no evidence exists for a regular trade between south Arabia and Egypt at this early date.[41] He reaches the same conclusion for contacts between Arabia and the Levant or Mesopotamia upon reviewing the evidence of incense use during the 2nd millennium B.C.E. He maintains that locally grown plants probably filled the demand for resins for ritual and medicinal purposes. However, for the history of Tell Jemmeh the most significant result of his analysis, that "there is no reason to suppose that this trade was of any significance before the first millennium B.C.E.,"[42] is the late spread of the dromedary as a pack animal, since camels are needed to cross from south to north Arabia.

The Biblical story of Solomon and the Queen of Sheba is dated to the beginning of the first millennium B.C.E. Its reference to camels has colored history's view of the caravan traffic. The verse tells: "And she came to Jerusalem with a very great train, with camels that bore spices and gold very much, and precious stones" (1 Kgs. 10:2a). It has generally been assumed that the Queen's domain was Saba in South Arabia,[43] which, if true, would have made her a valuable trading partner. Although the story purports to explain the journey as a means of satisfying her curiosity about Solomon's

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36 W. J. Phythian-Adams, "Report on Soundings at Tell Jemmeh," *PEFQST* (1923), 140–46.

37 A new, comprehensive study deals with all aspects of the trade: N. Groom, *Frankincense and Myrrh: A Study of the Arabian Incense Trade* (London, 1981).

38 Groom (ibid., 23) mentions early ritual texts that show incense was used centuries before Hatshepsut, brought overland to Upper Egypt by traders. The earliest royal interest was an expedition sent to Punt by King Sahure ca. 2800 B.C.E.

39 L. Casson, "Maritime Trade in Antiquity," *Archaeology* 34 (1981), 37. Casson gives an account of the Red Sea trade in Ptolemaic Egypt.

40 Groom, *Frankincense and Myrrh*, 24ff.

41 *Ibid.*

42 Groom, *Frankincense and Myrrh*, 37.

43 But see Groom, *ibid.*, who proposes that the Queen of Sheba ruled a Sabaean merchant colony in north Arabia.

legendary wisdom, the expanded context of the verse makes it clear that this unprecedented trip was also to secure commercial relations between the two rulers. However, no other evidence of a regular traffic in incense in this period exists. In fact, no archaeological evidence for camel caravans has been found, except for the Tell Jemmeh bones that date from 600 B.C.E., or 350 years after 950 B.C.E., the putative date of the Solomon and Sheba story. The Queen of Sheba's trip is best seen as a singular event; whatever trade arrangements were effected did not require the institution of overland transport of goods by camel caravans.

Several land and sea routes were used for distribution during the centuries of the trade to cover the north-south distance of the peninsula, and the stretch from north Arabia to Levantine markets (Fig. 2). "The principal overland route to the north began at Shabwa and included stops at Timnaʾ, Marib, Naʾin, Yathrib (Medina), Dedan (El-ʾOla) and Gaza."[44] At the northern end of the route, presumably north of Dedan, the road continued in several directions, notably to el-ʾArish[45] and Elat, where South Arabian inscriptions of the sixth and fifth centuries B.C.E. have been recovered. Two main branches of the road crossed southern Transjordan. One branch led north to Damascus, probably following the King's Highway.[46] The other ran northwest through the ʿArava and the Negev to port cities on the Mediterranean coast.[47]

The Zenon Papyri (mid-second century B.C.E.) name Gaza as the most important mercantile city in Palestine because of its central role in the distribution of incense and spices.[48] Pliny (mid-first century C.E.) also calls Gaza the principal port for Arabian aromatics.[49] His description of the overland shipment of frankincense from South Arabia reveals a relay trade, passing through different middlemen at political borders. Groom speculates that this would have involved reloading cargoes to fresh camels that were locally owned and handled.[50]

During classical periods, the Arabian trade was controlled by the Nabataeans, and related peoples, from their capital at Petra.[51] Although their rise to power and prominence post-date the last major occupation at Tell Jemmeh, there is evidence that their predecessors, or some other Arab people, came to dominate the incense trade earlier, sometime prior to the fourth century B.C.E. In his *Geography*, compiled mid-second century C.E., Ptolemy of Alexandria lists the names of cities that apparently were way-stations on two separate roads through the Negev. The first road ran west to east from Eboda through Maliatha and Kalguia. Meshel and Tsafrir have shown that Ptolemy's list of cities does not reflect the Negev of the mid-second century C.E., when

44 G. W. van Beek, "Frankincense and Myrrh," *BA* 23 (1960), 76. Groom, *Frankincense and Myrrh*, presents a detailed itinerary of the entire journey. In his review of Groom's study, D. F. Graf, *BA* 45 (1982), 63, notes some additional points about the caravan routes through north Arabia.

45 Rhinocolura, in classical times.

46 Van Beek, *Frankincense and Myrrh*, 76; Z. Meshel and Y. Tsafrir, "The Nabataean Road from 'Avdat to Sha'ar-Ramon," *PEQ* 106 (1974), 103.

47 Meshel and Tsafrir, *The Nabataean Road*, 103.

48 M. Hengel, *Judaism and Hellenism* (London, 1974), 37.

49 Pliny, *Natural History* XIII, 32, 63.

50 Groom, *Frankincense and Myrrh*, 198.

51 Hengel, *Hellenism and Judaism*, 37.

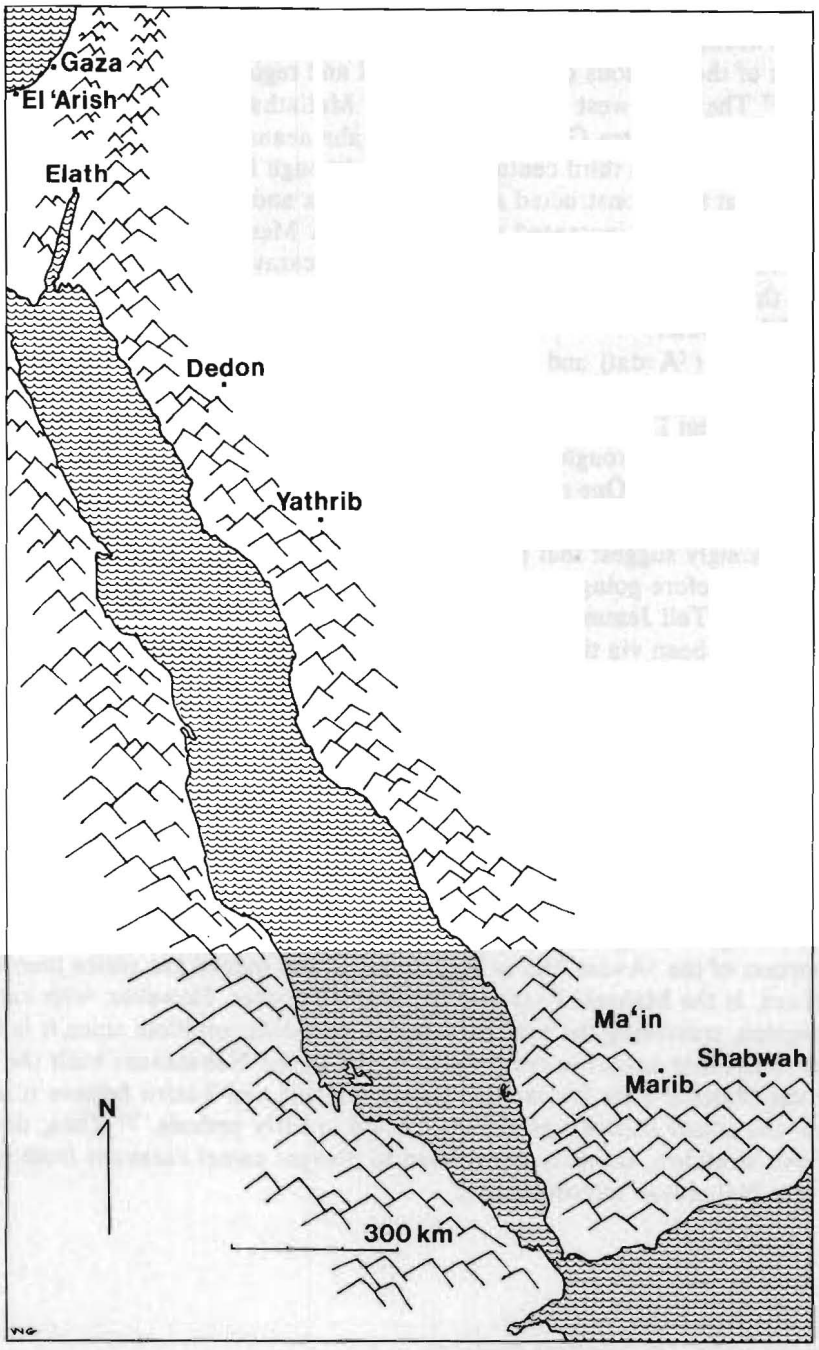

Fig. 2. Stops along the spice route from South Arabia.
(Illustration by Wade Gilbreath.)

it was almost desolate and, as a result, sparsely populated.[52] Rather, it is mainly based on conditions of the previous century when road and region thrived under the Nabataeans.[53] The route west to Eboda through Maliatha and Kalguia would thus be the first section of the Petra-Gaza Road. The Nabataeans probably began to use this route during the fourth to third centuries B.C.E., although it was not until the mid-first century B.C.E. that they constructed a number of forts and way-stations with water reservoirs to facilitate an increased volume of travel. Meshel and Tsafrir also state, "The actual route was undoubtedly used by nomad caravans in very early times. It is conceivable that as far back as the eighth century B.C.E. Arab tribes dealing in perfumes made use of this route."[54]

Leaving Eboda (ʿAvdat) and travelling northwest, the next major halt in the road was at Elusa, another Nabataean settlement founded in the late fourth or early third century B.C.E.[55] From Elusa, located on the Nahal Besor, to Gaza the terrain steadily decreases in altitude and roughness. Consequently it would have been possible to follow a number of paths north. One may have run from Elusa directly to Gaza, somewhat north and east of the Besor. However, the camel bones from Tell Jemmeh's later occupations strongly suggest that part of the incense traffic followed the Nahal Besor north to the site, before going on to Gaza.

To summarize Tell Jemmeh's interaction with international trade: contact with Egypt would have been via the coastal trunk route; contact with the incense trade from South Arabia would have been through the Petra-Gaza Road through the north-central Negev. Although the actual roadway was not constructed by the Nabataeans until the mid-first century B.C.E., the route was probably in use several centuries earlier by nomadic peoples.

There does not seem to be any point along the Petra-Eboda-Elusa-Gaza route that would have been impassable to camel caravans. In their detailed study of the road from ʿAvdat to Shaʿar Ramon, Meshel and Tsafrir indicate that the "narrow and steep portions preclude the possibility that transport could have been by means of carts; goods were transported by beasts of burden, usually camels."[56] The steepest and most difficult portion of the ʿAvdat-Shaʿar Ramon road, and indeed the entire journey from Petra to Gaza, is the Maḥmal Pass over the Ramon Crater. However, with careful course selection, traversing the pass presents no particular problem since it is less formidable than other defiles in the Negev. Although the Nabataeans built the present road over the Maḥmal Pass for caravan traffic, Meshel and Tsafrir believe it is "almost certain that the actual course was already known in early periods."[57] Thus, despite some difficult stretches, no obstacles existed to prevent camel caravans from using this route prior to Nabataean improvements.

52 Meshel and Tsafrir, *The Nabataean Road*, 103.
53 "The Nabataean Road, Part II," *PEQ* 107 (1975), 3–21.
54 Ibid., 14.
55 A. Negev, ed., *Archaeological Encyclopedia of the Holy Land* (New York, 1972), 100.
56 Meshel and Tsafrir, *The Nabataean Road*, 106.
57 Ibid., 114.

Historical Setting

The Assyrian Occupation (ca. 680–630 B.C.E.)

Tell Jemmeh functioned in a military capacity during the Neo-Assyrian period, possibly as an advanced forward position for Assyrian invasions of Egypt[58] by Esarhaddon (674, 671 and 669 B.C.E.) and his son and successor Ashurbanipal (669–668 and 664–663 B.C.E.).[59] When the Assyrian king Esarhaddon marched down the Philistine coast to Egypt in 671 B.C.E., he tells of receiving camels from the Arabs to be used as water carriers for his army.[60] The inscription of Ashurbanipal's two Egyptian campaigns does not mention the use of pack camels by the army.[61] But dromedaries do appear in the accounts of his wars against the Arabs of the Syrian desert (ca. 640 B.C.E.). In one relief, Arab warriors mounted on dromedaries flee from Assyrian forces.[62] The accompanying inscription tells of the many camels seized as booty and transported back to Assyria for distribution to the local populace.[63] Unfortunately, neither source gives explicit evidence that the Assyrian army used camels on these campaigns, but on other occasions they were involved in Ashurbanipal's military activities. One relief, for example, which shows an army camp with two dromedaries outside a tent, is attributed to Ashurbanipal's campaign against the Elamites, 655–639 B.C.E.[64] Assyrian kings before and after Esarhaddon tell of receiving camels from the Arabs as tribute or booty. From about 750 B.C.E. on, Assyrian texts use the terms *Aribi, Arabu, Arbaya*, etc., to identify nomadic groups and confederations inhabiting the Syro-Arabian Desert and northern Sinai.[65] The tenor of these texts makes it clear that Assyrian kings had to rely on the cooperation of Arab leaders, who wielded considerable power in the desert expanse, to insure the flow of goods between Egypt and Phoenicia via Palestine.[66] For much of this period the overland routes to the east between the Mediterranean and Dedan included the territory of Philistia on the coast, Judah in the central Negev, Edom east of the ʿArava, and increasingly powerful desert peoples in Syria and northwest Arabia, all under varying degrees of Assyrian control. Each of these powers benefited from the transit nature of the trade in aromatics, turning

58 G. W. van Beek, pers. comm. For the identification of Tell Jemmeh as Azra, "The City of the Brook of Egypt" mentioned in Assyrian texts, see N. Na'aman, "The Brook of Egypt and Assyrian Policy on the Border of Egypt," *Tel Aviv* 6 (1979), 68–90; "The Shihor of Egypt and Shur that is Before Egypt," *Tel Aviv* 7 (1980), 95–109. Contrast K. A. Kitchen, *The Third Intermediate Period in Egypt (1100-600 B.C.)* (Warminster, 1973), 300, 441; and now A. F. Rainey, "The Administrative Division of the Shephelah," *Tel Aviv* 7 (1980), 197.

59 A. Spalinger, "Esarhaddon and Egypt: An Analysis of the First Invasion of Egypt," *Orientalia* 43 (1974), 295. Kitchen, *The Third Intermediate Period in Egypt*, 392, dates the 'first' invasion of Ashurbanipal to 667/666 B.C.E.

60 R. Borger, *Die Inschriften Asarhaddons Königs von Assyrien*, *AfO* Beiheft 9 (Graz, 1956), 111–13.

61 *ANET*[3], 294–95.

62 *ANEP*[3], 20.

63 *ANET*[3], 299.

64 *ANEP*[3], 269, citing Gadd.

65 Bulliet, *The Camel and the Wheel*, 78

66 I. Eph'al, "'Ishmael' and 'Arabs': A Tranformation of Ethnological Terms," *JNES* 35 (1976), 228.

a profit at points of re-export. Assyria extracted her share by establishing a customs at Gaza, a Philistine city, to collect harbor duties.[67]

The first substantial increase in the Tell Jemmeh camel bone sample occurs during the Assyrian occupation when several lines of evidence support Tell Jemmeh's role in Assyrian military expeditions to Egypt. The two dromedary figurines recovered by the Smithsonian excavations date to the period of an Assyrian presence in the region; one from the eighth or ninth century, the other, mid-seventh century B.C.E.[68] Tell Jemmeh's position near two major routes terminating at Gaza, in a sensitive military area, recommends the suggestion that the Assyrians could have used the site as a garrison town. It is difficult to demonstrate that a large number of Assyrian troops would have been in residence, but a provisional interpretation of faunal data showed that a different economy was in effect during the Assyrian occupation. A preliminary comparison of the Assyrian faunal sample with the combined Late Bronze and Philistine material revealed different subsistence strategies in each period. The earlier sample reflects a locally focused pastoral economy. The sheep/goat to cattle ratio was 4:1, sheep outnumbering goats 3:1. Further, the harvest profile for the sheep/goat flock indicates heavy culling of young, probably male animals. No more than 25% of the individuals were older than four years at death, and most were slaughtered between the ages of six and eighteen months. In the Assyrian period, sheep and goats outnumber cattle nine to one and sheep increased with respect to goats to a four to one ratio. Most sheep and goats were slaughtered at ages greater than four years,[69] and more than 25% were older than six years at death. This Assyrian pattern, containing an excess of mature animals and an absence of young males, reflects an economy that was consuming potential breeding stock or animals likely to have been producers of secondary products (milk, wool, etc.). The Assyrian presence at Tell Jemmeh must have put considerable stress on local food resources, resulting in the importation of these older animals for slaughter.[70]

Also present in the faunal assemblage are more than twenty-five species of marine and two species of fresh water molluscs.[71] Of the marine molusca, fifteen species live (or lived) in the Mediterranean and ten in the Red Sea; one fresh water species lives in the Nile system, and the other is local to the site area. The proportion of Red Sea and Nile specimens from the Assyrian levels is larger than from earlier periods, implying increased contact with Egypt. Further, Stern describes a variety of cosmetic receptacles fashioned from a *Tridacna* shell (from the Red Sea and Indian Ocean) that was typical only during the seventh century B.C.E.[72] A *Tridacna maxima* shell, fairly intact, is

67 P. Rost, *Die Keilschriftexte Tiglath-pilesers III* (Leipzig, 1893), 80, 1:14; D. J. Wiseman, "Two Historical Inscriptions from Nimrud," *Iraq* 13 (1950), 23, 1:18; "A Fragmentary Inscription of Tiglath-pileser III from Nimrud," *Iraq* 18 (1956), 126, 1:16.

68 G. W. van Beek, pers. comm.

69 Only 4% of the animals culled were slaughtered at less than 12 months of age.

70 P. Wapnish and B. Hesse, "The Zooarchaeology of Empires: Evidence for an Assyrian Military Occupation," paper presented at the 1978 Society for American Archaeology, Tuscon.

71 I am most grateful to Dr. H. Mienis, The Hebrew University, for identifying this material.

72 E. Stern, "Israel at the Close of the Period of the Monarchy: An Archaeological Survey," *BA* 38 (1975), 26–54.

present in the Assyrian collection. Although it bears none of the modeling or incising described by Stern, it could have been intended for such use.

I believe that the best explanation for the presence of camel bones in the Assyrian levels at Tell Jemmeh was the use of the animal in Esarhaddon's, and possibly Ashurbanipal's, armies. The camels could have been obtained as booty, or tribute, or possibly by the utilization of an existing low intensity market in camels purchased from local groups of pastoralists.

Neo-Babylonian and Persian Periods (599–332 B.C.E.)

The frequency of camel bones increases greatly in the levels dated to the sixth and fifth centuries B.C.E., during the Neo-Babylonian and the beginning of the Persian periods. At present, stratigraphic and artifact contexts have not been worked out in sufficient detail to make finer temporal assignments. The total sample for these combined periods is 188 camel bone fragments.

The disintegration of the Assyrian empire at the death of Ashurbanipal in 627 B.C.E. left Babylon heir to Assyrian dominions and eager for a share in the trade. Babylon's military activities in the western provinces weakened the Transjordan states and precipitated a decline in settled conditions. The subjugation of Edom was probably effected by Nabonidus in his campaigns in southern Transjordan and northwest Arabia in 552 B.C.E. The end of centralized authority so weakened Edom that Arab groups were able to penetrate its borders,[73] changing the political conditions of the Arabian trade. A good deal of mystery surrounds Nabonidus' Arabian expedition, especially his six-year residence in Tema'. It seems that a major objective of the campaign was the control of Arabian commerce. The Harran inscription relates that Nabonidus established a number of military colonies stretching from Tema' to Medina, a distance of some 250 miles.[74] By establishing control far into the desert, Nabonidus changed the nature of the relay trade. Increased control over the final stretch of the route between northwest Arabia and the Mediterranean would concentrate a greater share in Babylonian hands. An important link was now established in territory where large scale camel raising for commercial purposes was likely to occur.

Babylon's empire disintegrated when the Persians under Cyrus took over the city in 539 B.C.E. The Persians continued Babylon's policy of maintaining an administrative link in Arabia through a governor in Dedan.[75] But Babylon's fall allowed a resurgence of Arab power in the former Edomite territory. The Persians probably never exerted more than nominal control over the Arabs in the area that had been Edom. Arab political power was a force to be reckoned with, a fact which the Persians realized immediately. When Cambyses planned his attack on Egypt in 525 B.C.E., he was

73 J. R. Bartlett, "The Rise and Fall of the Kingdom of Edom," *PEQ* 104 (1972), 26–37; *idem*, "From Edomites to Nabataeans: A Study in Continuity," *PEQ* 111 (1979), 53–66; J. Lindsay, "The Babylonian Kings and Edom, 605–550 B.C.," *PEQ* 108 (1976), 23–39.

74 Lindsay, *The Babylonian Kings*, 39.

75 Bartlett, *From Edomites to Nabataeans*, 58–59; F. W. Winnett and W. L. Reed, *Ancient Records from North Arabia* (Toronto, 1970), 115ff.

advised to ask the king of the Arabs for safe conduct across the Palestinian desert.[76] Having done this, the cooperation of the Arab king set the stage for future Persian/Arab relations. The annexation of Egypt by Persia "increased the importance of the coastal road, making it mandatory to cooperate with the Arabs, who controlled both the road and other means of transportation."[77] Herodotus[78] mentions that the Persian administrative unit of Syria-Palestine excluded a district which belonged to the Arabs who, incidentally, paid no taxes. He writes further: "the Arabians were never subject as slaves to the Persians, but had a league of friendship with them from the time when they brought Cambyses on his way as he went to Egypt."[79] This does not mean that the Arabs were not subject to Persia; rather, their position was one of clients.[80] Most important, the accommodation of Persian and Arab interests in the spice trade is evident in this passage from Herodotus: "from Gaza . . . the marts upon the coast till you reach Ienysos are the Arabian kings."[81] (See Fig. 3.)

The Persian occupation at Tell Jemmeh is dominated by two very large structures, originally excavated by Petrie, which feature a building plan known in Assyrian and Persian architecture. They date to the late seventh and sixth centuries B.C.E.[82] The monumentality of the buildings[83] has prompted the suggestion that a Persian garrison may have been stationed here.[84] The Persian royal fortress at Gaza was apparently placed to prevent Egyptian encroachment across the border in the fifth century B.C.E.[85]

A corridor between northwest Arabia and Mediterranean ports controlled by Arabs and secured by Persian imperial forces would favor an increase in traffic of the Arabian trade and the use of camel caravans as the transport system on this stretch of the route.

Hellenistic Period (332 to ca. 200 B.C.E.)

Gaza was the only city in Palestine to oppose Alexander in 332 B.C.E., as he swiftly brought the entire Near East under his control. By 286 B.C.E., the Ptolemaic kingdom in Egypt was well established, and unlike Persian administration, it exercised firm military and fiscal control over the province of Syria and Phoenicia.[86] Despite this, no major changes in trade or industry occurred. Rather, there seems to have been an intensification of established practices.

Tell Jemmeh's continued interaction with the Arabian trade is evidenced not only by the 85 camel bones from this period, but also by a South Arabian inscription. "A

76 Herodotus, BK III. 4,5.

77 N. Na'aman, *The Brook of Egypt and Assyrian Policy*, 79; cf. Herodotus, BK III. 7-9.

78 BK III, 91.

79 Herodotus, BK III, 88.

80 S. Smith, *Isaiah LI-LV* (London, 1944), 148.

81 BK III. 5.

82 Amiran and van Beek, *Encyclopedia of Excavations in the Holy Land*, 547.

83 W. M. F. Petrie, *Gerar* (London, 1928), pl. XI.

84 G. Widengren, "The Persian Period," in J. H. Hayes and J. M. Miller, eds., *Israelite and Judaean History* (Philadelphia, 1977), 502.

85 A. Ovadiah, *Encyclopedia of Excavations in the Holy Land*, 408-9; Widengren, *The Persian Period*, 502, 524.

86 Hengel, *Judaism and Hellenism*, 7.

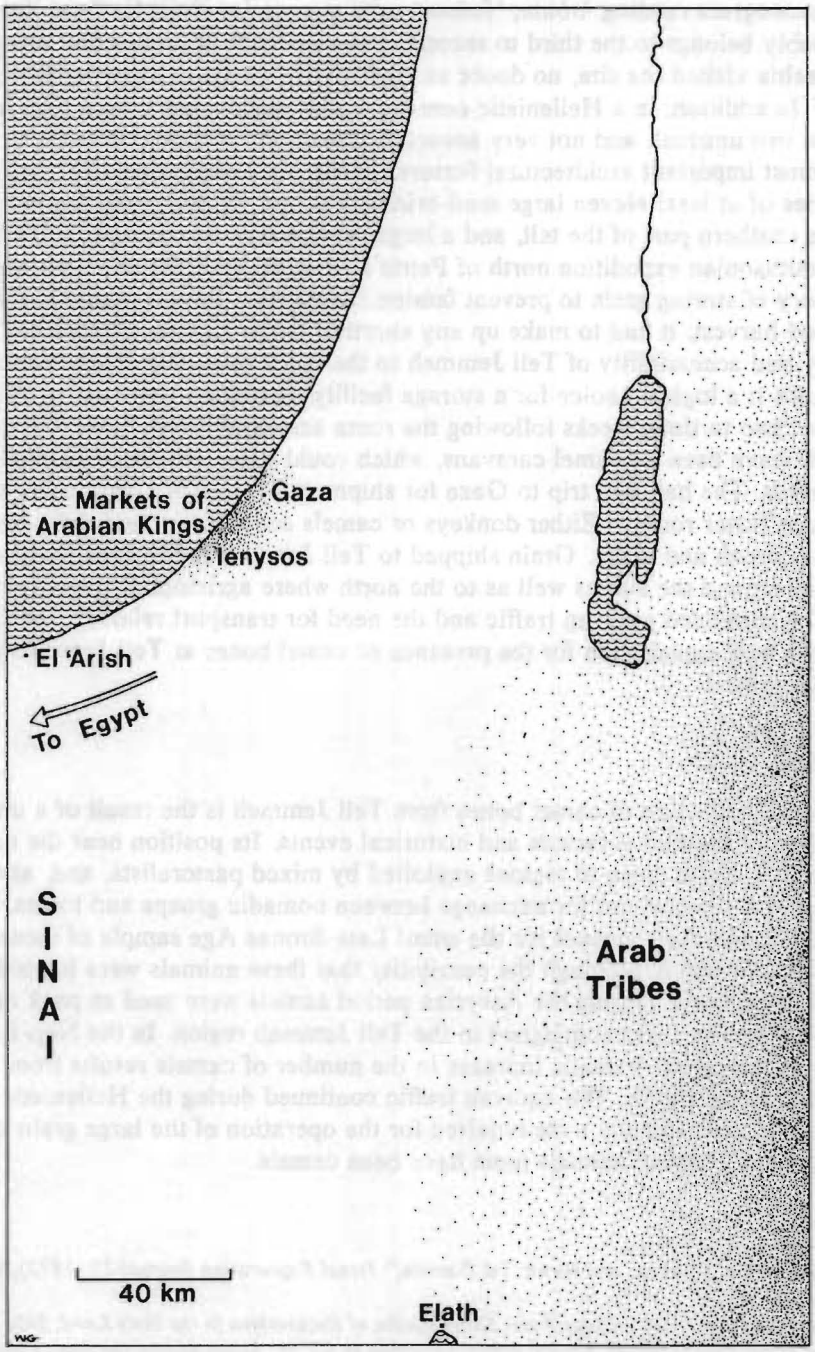

Fig. 3. Areas dominated by Arab tribes in the desert and on the Mediterranean coast, following Herodotus (III.5). Since exact boundaries cannot be determined for these peoples, stippling is used to delimit their approximate territories. (Illustration by Wade Gilbreath.)

painted monogram reading *ʾabum*, 'father,' on a storage jar shoulder from the granary fill, probably belongs to the third to second centuries B.C.E. It proves that people from South Arabia visited the site, no doubt as members of caravans carrying incense to Gaza."[87] In addition, in a Hellenistic context, Petrie discovered a limestone incense altar with two unusual, and not very accurate, depictions of dromedaries.[88]

The most important architectural features of the Hellenistic Period at Tell Jemmeh are a series of at least eleven large mud-brick granaries. Several were found by Petrie along the southern part of the tell, and a large, well preserved example was excavated by the Smithsonian expedition north of Petrie's excavations.[89] By this time, Egypt had a long history of storing grain to prevent famine. The Zenon Papyri relate that if Palestine had a good harvest, it had to make up any shortfall in the Egyptian harvest. The proximity and accessibility of Tell Jemmeh to the coast road near Khan Yunis, and to Gaza, made it a logical choice for a storage facility. Overland shipment to Pelusium took about two to three weeks following the route across northern Sinai.[90] Presumably this would have been by camel caravans, which could have left directly after loading at Tell Jemmeh. The half day trip to Gaza for shipment by sea (two days to Pelusium) was a much faster route.[91] Either donkeys or camels could have carried the grain between Jemmeh and Gaza. Grain shipped to Tell Jemmeh for storage probably came from areas around the site as well as to the north where agricultural potential was even better. The continued caravan traffic and the need for transport related to the granaries provide the best explanation for the presence of camel bones at Tell Jemmeh in the Hellenistic period.

Conclusions

The large collection of camel bones from Tell Jemmeh is the result of a unique combination of locational factors and historical events. Its position near the margin of arable land placed it close to regions exploited by mixed pastoralists, and, as noted, several factors can account for exchange between nomadic groups and towns. Some form of this trade may account for the small Late Bronze Age sample of camel bones found at Tell Jemmeh, although the possibility that these animals were hunted cannot totally be eliminated. During the Assyrian period camels were used as pack animals by the imperial armies that campaigned in the Tell Jemmeh region. In the Neo-Babylonian and Persian periods a dramatic increase in the number of camels results from the increased caravan traffic. The caravan traffic continued during the Hellenistic Period. Additionally, pack animals were required for the operation of the large grain storage facilities; many of these animals must have been camels.

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87 G. W. van Beek, "Notes and News: Tel Gamma," *Israel Exploration Journal* 22 (1972), 246.

88 *Gerar*, pl. XL.

89 *Gerar*, pl. XIII; Amiran and van Beek, *Encyclopedia of Excavations in the Holy Land*, 548. Petrie dated the granaries to the Persian period. Several scholars continue to use this dating despite van Beek's questioning of a Persian assignment in published site reports. The complex of granaries belongs to the Hellenistic period.

90 A. Tscherikower, "Palestine under the Ptolemies (A Contribution to the Study of the Zenon Papyri)," *Mizraim* IV-V (1937), 28. Reports of one week for the trip indicate a hurried pace.

91 Hengel, *Judaism and Hellenism*, 43; Tscherikower, *Palestine under the Ptolemies*, 28.

If technological innovation was the spur to the increased use of camel caravans,[92] we would expect it to spread beyond political boundaries. Camel bones should appear at other sites when they appear at Tell Jemmeh. In fact they don't.[93] If we view the establishment of camel caravans as an economic and political event, where the elaboration of an existing technology (camel transport) was based on the need to cover long, difficult distances, the general absence of camel bones from other historic sites in the Levant is instructive. Faunal collections from sites located on trade routes and at the boundary of desert zones do not contain camel bones in significant numbers.[94] The one exception is Beer-Sheba, where less than twenty-five camel bones occur in a very large faunal sample dated prior to ca. 701 B.C.E.[95] Camels were not a major means of transport before 600 B.C.E., and after that date only appear in any numbers in the Tell Jemmeh region. Not until the Arab period does another significant sample of camel bones appear in the Levant associated with caravan traffic, at Pella in the Jordan Valley.[96] Clearly, the establishment of a single political unit linking northwest Arabia and the Mediterranean coast was the major impetus to the rise of camel caravans along the northern spice route during the Persian period. This trade which followed the Petra-Eboda-Gaza road passed Tell Jemmeh, where caravan animals were sold in the local market.[97]

92 As claimed by Bulliet, *The Camel and the Wheel.*

93 Tell Esh> Sha>aria, located on the Nahal Gerar, a tributary of the Besor River and in the trade corridor under Arab control, produced a modest camel sample (S. Davis, pers. comm.). Animal bones from Lachish, located north of the corridor, appear to include only one camel bone in the Persian period. D. M. A. Bate reported that remains of domestic *Camelus* sp. from Lachish Level III included an incomplete skull, mandible fragments with teeth, and a number of sizable limb bones ("The Animal Bones," in O. Tufnell, ed., *Lachish III* [London, 1953], 410–11). Level III was destroyed by Sennacherib in 701 B.C.E. (D. Ussishkin, "Excavations at Tel Lachish—1973–1977, Preliminary Report," *Tel Aviv* 5 [1978], 93). No camel bones are reported by H. Lernau, "Animal Remains," in Y. Aharoni, ed., *Investigations at Lachish. The Sanctuary and the Residency* (Tel Aviv, 1975), 86–103. The one camel specimen from the Persian period is unpublished; I examined it in the laboratory of the Institute of Archaeology, Tel-Aviv University. (I am grateful to Dr. Eitan Tchernov for making the collections available to me, and to Ms. Mira Homsky for her help.)

94 See D. Hakker-Orion, "Hunting and Stock-breeding in Israel," in A. T. Clason, ed., *Archaeozoological Studies* (New York, 1975), 295–301. Lernau suggests that the two camel bones from Early Bronze Arad derive from wild animals; "Faunal Remains, Strata III-I," in R. Amiran, ed., *Early Arad. The Chalcolithic Settlement and Early Bronze City* (Jerusalem, 1978), 83–117.

95 Examined by the author, Institute of Archaeology, Tel Aviv University.

96 R. H. Smith, "Pella of the Decapolis," *Archaeology* 34 (1981), 46–53.

97 Since camel caravans are a high risk business, sick or injured animals are sold at termini to recoup some of the capital investment. Rambunctious camels, or those turned vicious, will be disposed of to rid the caravan of the potential for dangerous disruptions.