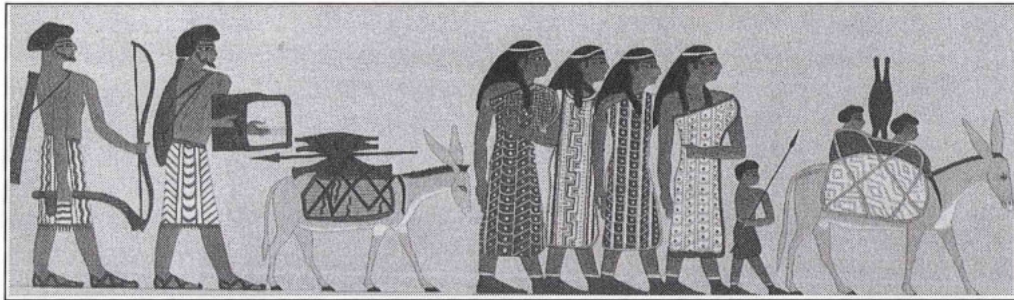


Artistic and Faunal Evidence for the Influence of the Domestication of Donkeys and Camels on the Archaeological History of Jordan and Arabia

One of the most widely debated theories of W. F. Albright was his argument that domesticated donkeys and donkey caravans dominated the Near Eastern landscape from c. 3000 BC into the first millennium BC, and that domesticated dromedary camels and camel caravans from Arabia appeared only after c. 1300 BC (see, e.g., Albright 1960: 204-210; 1963: 1-9; 1968: 70-73, 179;

1970). As evidence for dating the donkey early, in addition to literary (Near Eastern and Biblical) sources, he cited early artistic representations (see FIG. 1, the famous depiction of a c. 1900 BC Asiatic donkey caravan entering into Egypt), and faunal evidence from many sites. As evidence for dating the camel later, he also noted artistic representations (see, e.g., FIG. 2, the c. seventh cen-



1. Asiatics with donkey caravan entering Egypt. Bani Hasan, Egypt, c. 1900 BC. After Pritchard 1969: FIG. 3. Photograph: C. Andrews.



2. The Assyrian forces of Ashurbanipal engaged in conflict with the Arabs, who seek to escape upon their camels. After Pritchard 1969: FIG. 63. Photograph: C. Andrews.

tury BC depiction of the Arabs escaping from the Assyrians), and the absence of faunal remains at most Bronze Age sites. He also argued (1970: 197-198) that some of the wild camel-hunting images from central Arabia, published by Anati (1968-74), were to be dated to the third and early second millennium BC, which supported his view that the domesticated dromedary camel appeared only after that date. In his later career, he became so engrossed with the topic of donkey and camel caravans that many dismissed much of what he wrote on this subject.

But, that has been wrong, because many new projects have been conducted in Arabia, in Jordan, and in Israel, and they support Albright's position on the significance of the introduction of the camel-based trade routes from Arabia. Work by the American Foundation for the Study of Man (AFSM) in Wādī al-Jubah has contributed important faunal evidence in Yemen. It has led me to note the faunal evidence from other nearby sites in Yemen, as well as that from Ḥisbān and the Madaba Plains Project in Jordan.

These and other projects have produced artistic and faunal remains, which are shedding significant new light on how such factors as domestication of animals (especially donkeys and camels as beasts of burden) have influenced the patterns of human settlement and trade in Jordan and Arabia. In their times, changes in the widespread uses of such beasts of burden would have constituted significant technological innovations, and thus this topic is suitable for this International Conference.

The original topic of this paper also included the evidence for the role which climate change played, but since that has already been described by me elsewhere (Sauer 1994a), I will not repeat much of it here.

These topics do have roots in the preceding geological (for Jordan and the Near East see, e.g., Bender 1968; Horowitz 1979; Al-Sayari and Zotl, eds. 1978; Jado and Zotl, eds. 1984; Bowen and Jux 1987) and Palaeolithic (see, e.g., Garrard and Gebel, eds. 1988; Perrot 1968; Horowitz 1979; Cauvin and Sanlaville, eds. 1981; Henry 1989) periods. And they continue into the modern evidence in these regions (see, e.g., Baly 1987; Orni and Efrat 1971; Adler *et al.*, eds. 1985; Zohary 1973).

Domestication of Beasts of Burden

The domestication of beasts of burden, especially donkeys and then camels, followed the technological Neolithic revolutions of the domestication of sheep and goats (and cattle), as well as wheat and barley (see, e.g., Ucko and Dimbleby, eds. 1969; Clutton-Brock 1987: 52-70; Stager 1992). Domesticated sheep, goats, and cattle were not very useful for long-distance transport, but cattle were used for draught purposes. The multi-phased transportation revolution being described here was important for the impact which it had on trade routes

through time, and on settlement patterns in various regions of the Near East.

Donkeys (Wild Equus africanus and Domesticated Equus asinus)

Wild donkeys (*Equus africanus*) are usually assigned a North African origin, but they also did exist in the Levant and Arabia (Clutton-Brock 1987: 92-93, 196; 1992: 33-36; 62-66; Uerpmann 1987: 25-32; Meadow and Uerpmann, eds. 1986; 1991). The evidence for the domesticated donkey (*Equus asinus*) is that it also was present in Africa, Egypt, and the fertile crescent. It was widespread from c. 3500 BC on, but first appeared in the preceding Chalcolithic period (see, e.g., Stager 1992: 27).

Domesticated *Equus asinus* bones have also been found recently in southwestern Arabia, as part of the modest (radiocarbon-dated) third millennium BC Bronze Age villages excavated by de Maigret (1990: 145-185 — see TABLE 1). It should be noted that no camel bones were attested at these Bronze Age sites in Yemen, and the sites themselves were modest in size. They may have been associated with a paleosol which indicated that the climate was slightly wetter at that time (see also Overstreet *et al.* 1988; Sauer 1994a).

Albright (1970) had argued for Bronze Age Midianite donkey caravans in western Arabia, and that remains a likely possibility based on this new evidence from Yemen. The modest nature of the sites in Yemen would not imply major trade routes at this time, but the presence of the donkeys could support some modest trade with the fertile crescent to the north, including Jordan.

When the 14th century BC Kas shipwreck was discovered in the Mediterranean, at first it was suggested that resins contained on the wreck had originated in Arabia or Ethiopia. Now it has been noted that the resins were local to the Mediterranean basin, and nothing on the wreck originated in Arabia (see, e.g., Bass 1987; Haldane 1991). Thus, it is unlikely that widespread trade with Arabia was present in the Late Bronze Age, although in the Late Bronze there could have been some modest trade (Albright 1970).

During the third-first millennia BC, the highly complex urban cultures of the fertile crescent reached their peaks, from Egypt, to Syria-Palestine (including Jordan), to Mesopotamia, to Persia, to India, and beyond; and that was due in part to the existence of these donkey caravans on land, and ship-based trade on the major bodies of water (e.g., Arabian Gulf, Mediterranean).

In Jordan, during the Bronze Age, we do find significant Early Bronze Age sites throughout most of the country (see, e.g., the surveys of Ibrahim *et al.* 1976; Yassine *et al.* 1988; Ibach, Jr. 1987; Miller, ed. 1991; MacDonald 1988; 1992). However, the absence of major

Table 1. Bronze Age of the North Yemen Highlands: fauna identified from the collections of 1983-87. Number of identified specimens to the right. After de Maigret 1990: TABLE E. Computer-generated image by C. Andrews.

MAMMAL, DOMESTIC		
<i>Ovis aries</i> (sheep) and <i>Ovis/Capra</i> indeterminate	+++	353
? <i>Capra hircus</i> (domestic goat)	+	4
<i>Bos taurus</i> (domestic cattle)	+	12
MAMMAL, DOMESTIC OR WILD		
<i>Canis cf. familiaris</i> (dog)	-	1
<i>Sus scrofa</i> (pig or wild boar)	-	1
<i>Equus (Asinus) sp.</i> (ass or donkey)	-	2
<i>Felis cf. silvestris</i> (cat)	-	2
MAMMAL, WILD		
<i>Gazella sp.</i> (gazelle)	-	2
Microrodents, gnawed bones	-	2
MAMMAL, MODERN INTRUSIONS		
<i>Meriones rex</i> (king jird)	+	35

Middle Bronze and Late Bronze sites from the southern part of the country may reflect the availability of only the donkey as a widespread beast of burden. This could have limited the extent to which trade was conducted through Jordan at that time (see also Sauer 1994b: 230-238).

In situ Bronze Age remains were not attested at the site of Ḥisbān, but some Bronze Age sherds may have been present among the UD sherds at the site (see Sauer 1994b). Bronze Age remains have been published somewhat from Tall al-'Umayri (Geraty *et al.*, eds. 1989; Herr *et al.*, eds. 1991), which is part of the same Madaba Plains Project. From Tall al-'Umayri, donkey bones were attested in the Bronze Age and Iron Age loci, and only one camel bone was attested, and it was from the Iron II period (Geraty *et al.*, eds. 1989: 14, 584; Herr *et al.*, eds. 1991: 601-610). This faunal evidence agrees with the positions being described in this paper.

Dromedary Camels (Wild Camelus, Domesticated Camelus dromedarius)

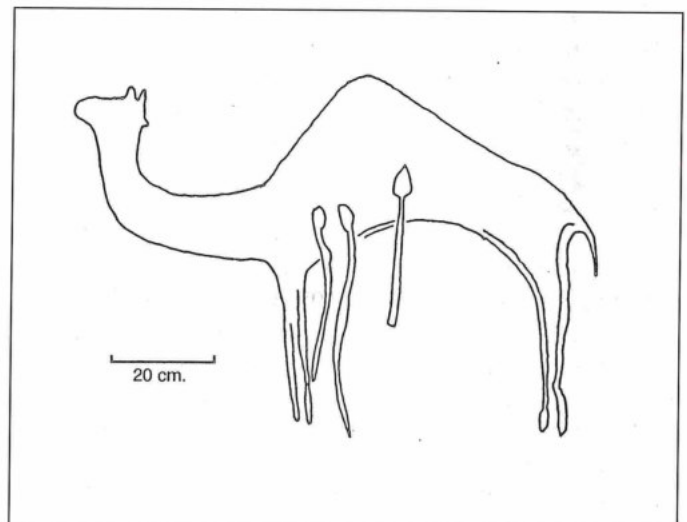
The dromedary camel (*Camelus dromedarius*) is attested in the Near East much later than the donkey, and its wild progenitor is of uncertain species (*Camelus*) and geographical point of origin (Clutton-Brock 1987: 124-129, 197; Uerpmann 1987: 48-52). Many have suggested eastern Arabia as the earliest location to attest domesticated dromedary camels, but Zarins (1989: 144-149) has cited even earlier evidence from Iran and India. For long distance trade in arid conditions, it was a much superior animal to the donkey (see, e.g., Bulliet 1975; Gauthier-Pilters and Dagg 1981; Wilson 1989). With the domestication of the dromedary camel, more extensive trade routes came into fuller use in Arabia especially, and these routes passed through Jordan. After the introduction of the camel, the domesticated donkey continued to play a (declining) role in the trade routes of the fertile

crescent, down into the first millennium BC and perhaps later.

Ripinsky (1975) argued for an early (c. third millennium BC) date for its appearance in parts of the Near East, and some of his viewpoints have been corroborated by recent discoveries, especially in eastern Arabia. However, Albright was still correct to note that the widespread appearance of the camel did not predate c. 1300 BC.

Zarins (1989) has published a good recent article on the topic of its domestication, and I am in general agreement with it (see TABLE 2). First there was a phase (c. 6000-2200 BC) of hunting the wild camel, which is depicted in artistic representations from Saudi Arabia (Anati 1968-74; Zarins 1989 — see FIGS. 3, 4). Then (probably only in eastern Arabia), Zarins shows that camels were domesticated but not used for trade, in c. 2200-1500 BC. Then came full trade, with various changes in saddles and associated structures, from c. 1500 BC on. With calibrated radiocarbon dates, this date would be in the Late Bronze Age, which is the earliest period that Albright would have allowed.

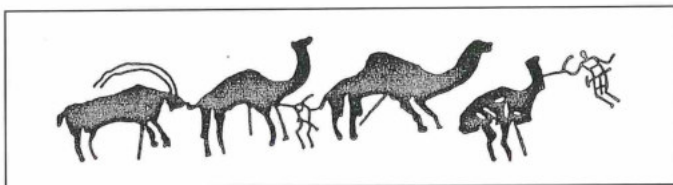
Supporting this reconstruction is the evidence from the AFSM Wādī al-Jubah Project in Yemen (see, e.g., Blakely and Sauer 1985; Blakely *et al.* 1985; Sauer and Blakely 1988). The stratigraphic probe at Ḥajār at-Tamrah was excavated by J. A. Blakely and W. Glanzman. It attested camel bones which were identified by M. R. Toplyn (Blakely *et al.* 1985: 127-128), as well as radiocarbon dates which started at least as early as c. 1300 BC (Blakely *et al.* 1985: 87-90). On the basis of this evidence, we observed that the high level of cultural development attested in Yemen after about c. 1300 BC could not have occurred without the domestication of the camel as a beast of burden (Blakely and Sauer 1985;



3. Spheared camel of Phase I or II from Bir Hima, site 217-35C, Saudi Arabia. After Zarins 1989: FIG. 14.7. Computer-generated image by C. Andrews.

Table 2. Suggested developmental model for camel bedouin. After Zarins 1989: TABLE 14.2. Computer-generated image by C. Andrews.

Phase	Camel utilization	Date	Cultural evolution
V	North Arabian saddle (Shadad); Thamudic/South Arabic	500 BC	rectangular goat hair tent; minimal use of stone
IV	cushion saddle	1000 BC	rectangular stone outline; tapered structures
III	South Arabic saddle (Hawlani/Hadaja) pack camels; overland incense trade; change in camel status	1500 BC	troughs; horse-shoe shape
II	non-riding; herds for milk; little group movement	2200-1500 BC	Umm-an-Nar, Subr, Sihi; Phase II rock art in southwest Arabia
I	the wild camel	6000-2200 BC	Phase I rock art in southwest Arabia



4. Phase II camel hunting scene in the Bir Hima region, Saudi Arabia. After Zarins 1989: FIG. 14.8, and Anati 1968b: 54, FIG. 4. Computer-generated image by C. Andrews.

Blakely *et al.* 1985: 151-155; Sauer and Blakely 1988). We also argued that the major trade route from Yemen to the Levant would also have begun to be used more extensively at about that same time.

In eastern Arabia, Potts is now finding domesticated camel bones in the upper strata at Tall Abraq in the United Arab Emirates, from c. 1500 BC on (see, e.g., Potts 1991).

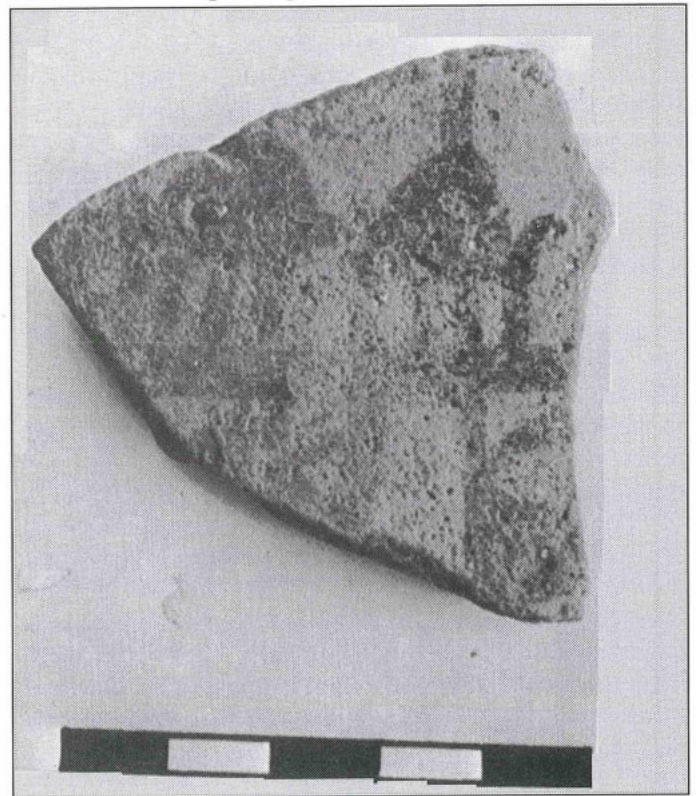
In Jordan, it is important to note that camel bones were attested in the Iron I up to Mamluk layers at Ḥisbān (see LaBianca 1990: TABLE 5.1 — see TABLE 3). For this paper, their appearance in the Iron I layers is particularly significant. That evidence also argues for the existence of the Arabian camel caravan route at that time, and it may even suggest that the site was first occupied in a major way for that reason.

Also in Jordan, there is the artistic representation of camels from Tall Dayr ‘Allā (Ibrahim and van der Kooij 1983: 581 — see FIG. 5), which seems to be a camel caravan. The sherd came from an Iron II locus, but it seems to be Late Bronze in character. If it is a Late Bronze sherd, it could reflect some camel caravan activities in Jordan at that early date.

From Palestine, Wapnish published an excellent discussion of the camel bones from Tall Jammah (1981 — see TABLE 4). A few fragments were attested in the Late Bronze Age and Iron I, and most came from Iron II and later contexts.

In Yemen, major “states” and their urban centers started to flourish at this time (c. 1300 BC or earlier), and they included Sheba, Qataban, and later, Himyar (see, e.g., Van Beek 1952; 1960; 1969; Doe 1983). These Early Pre-Islamic cultures attested very complex water management systems and agricultural installations, such as the famous dam and associated silt fields at Ma’rib. Early Pre-Islamic sites attested impressive public architecture, abundant South Arabic inscriptions, and industrial activities including hand-made red-burnished pottery, bronze smelting, and working in such lithics as obsidian, alabaster, and steatite. The camel caravans originated as far south as the Arabian coast, where goods were brought by ship from India and beyond, and could be trans-shipped with local products, such as incense, to reach the large markets to the north, including Jordan.

That is why Iron Age sites are found throughout Jordan, as well as later ones (see, e.g., the surveys of Ibrahim *et al.* 1976; Yassine *et al.* 1988; Ibach, Jr. 1987; Miller, ed. 1991; MacDonald 1988; 1992). Sites from the Iron Age are much better distributed throughout most of Jordan than are those of the Late Bronze Age. It was in the Iron Age (or Late Bronze Age) that Ammon, Moab and Edom, had apparently formed as kingdoms in Jordan, and the fact that these kingdoms in Transjordan tended to breakup along the lines of the deep rivers and



5. Tall Dayr ‘Allā, Jordan. Sherd of jar, reg. nr. 2776, phase V/VI, showing camels. After Ibrahim and van der Kooij 1983: PL. 127, 2. Photograph: C. Andrews.

Table 3. Number of identified specimens of principal domestic animals from Hisbān, Jordan. After LaBianca 1990: TABLE 5.1. Computer-generated image by C. Andrews.

Strata	Period	Cattle #	%	Sheep/Goat #	%	Sheep #	%	Goat #	%	Pig #	%	Camel #	%	Equids #	%	Horse #	%	Donkey #	%	Total #	%	Accumulation Rates
1	Modern	60	5.7	908	86.0	36	3.4	52	4.9	25	2.4	9	0.9	54	5.1	5	0.5	19	1.8	1,056	5.7	9.96
2-3	Mamluk	1,117	13.3	6,901	81.9	353	4.2	402	4.8	139	1.6	215	2.6	57	0.7	6	0.1	14	0.2	8,429	45.3	43.00
4	Ayyubid	9	10.7	71	84.5	4	4.8	6	7.1	-	-	2	2.4	2	2.4	-	-	-	-	84	0.5	1.40
5	Abbasid	8	3.9	188	91.7	14	6.8	11	5.4	2	1.0	5	2.4	2	1.0	-	-	-	-	205	1.1	0.73
6	Umayyad	68	10.4	494	75.3	47	7.2	33	5.0	80	12.2	8	1.2	6	0.9	-	-	3	0.4	656	6.5	7.80
7-10	Byzantine	162	12.5	932	71.6	58	4.5	48	3.7	130	10.0	14	1.1	63	4.8	5	0.4	10	0.8	1,301	7.0	4.39
11-13	L. Roman	286	11.7	1,892	77.6	140	5.7	115	4.7	183	7.5	17	0.7	58	2.4	2	0.1	6	0.2	2,436	13.1	10.36
14	E. Roman	131	15.0	682	78.1	67	7.7	36	4.1	43	4.9	7	0.8	10	1.1	-	-	3	0.3	873	4.7	4.12
15	Hellenistic	136	12.0	977	85.9	135	11.9	75	6.6	6	0.5	15	1.3	4	0.4	-	-	1	0.1	1,138	6.1	2.60
16-18	Iron 2	256	14.3	1,406	78.5	137	7.7	83	4.6	94	5.3	5	0.3	29	1.6	-	-	9	0.5	1,790	9.6	3.58
19	Iron 1	145	22.2	460	70.6	38	5.8	29	4.4	31	4.8	3	0.5	13	2.0	-	-	6	0.9	652	3.5	3.26
Sum	All	2,378	12.8	14,911	80.1	1,029	5.5	890	4.8	733	3.9	300	1.6	298	1.6	18	0.1	71	0.4	18,620	100	5.81

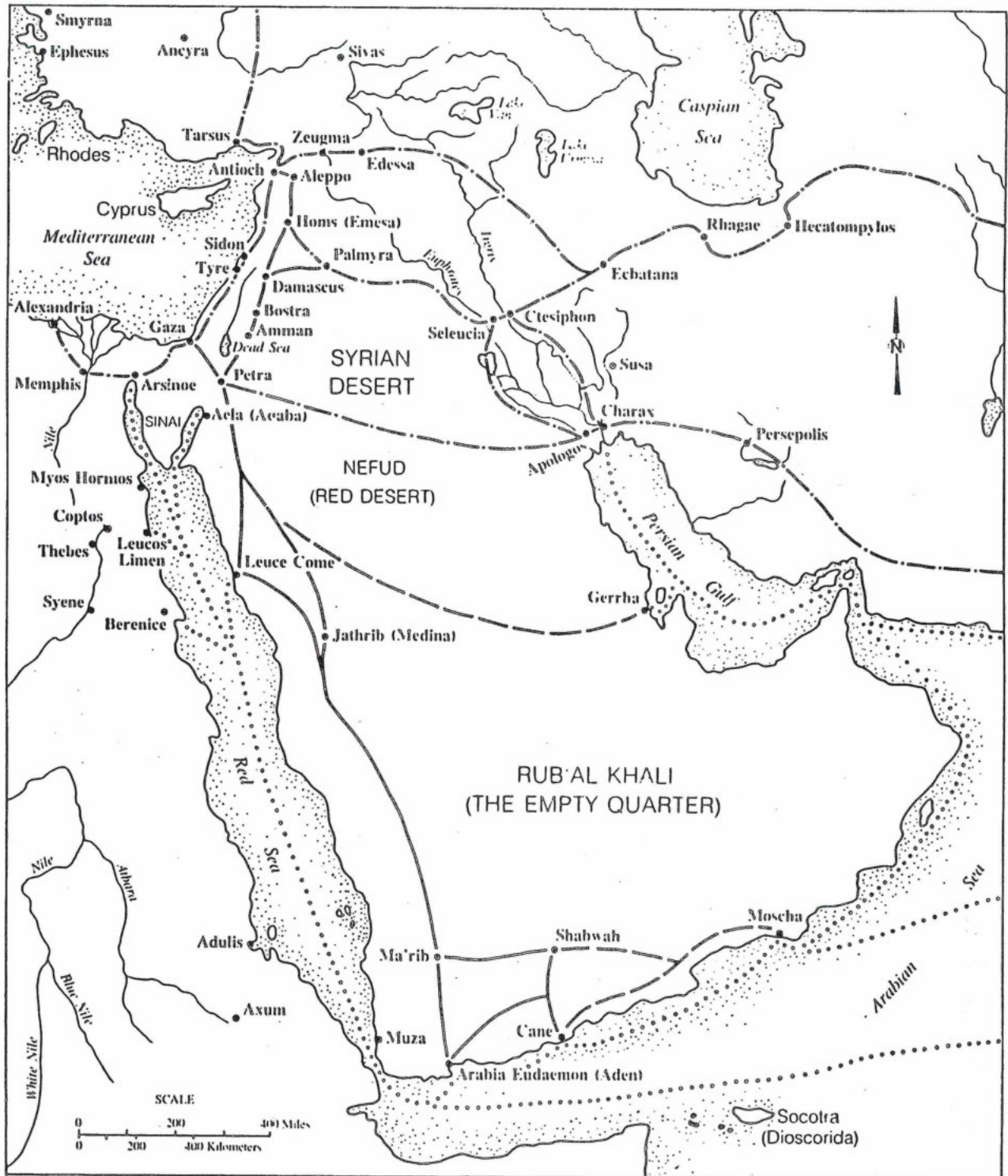
Table 4. *Camelus* sp. bone fragments in the Tall Jammah sample, Palestine. After Wapnish 1981: TABLE 1. Computer-generated image by C. Andrews.

Years BC	Teeth	Mandible	Maxilla	Vertebra	Scapula	Humerus	Radius Ulna	Carpals	Innominate
1400-1300									
1300-1200								1	
1200-1100									
1100-1000							1		
900-800									
800-700								0.5	0.5
700-600	2	5	2	1	3	0.5	2	2.5	0.5
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	0.5	3	4	2
400-300	3	2.25	1	5.5	0.75	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 BC	Femur	Patella	Tibia	Fibula	Calcaneus	Astragalus	Scaphoid	Cuboid	Grand Cuneiform
1400-1300				1					
1300-1200									
1200-1100									
1100-1000			1						
900-800									
800-700					1	0.5			
700-600	1	1	0.5	0.5	5	1.5	1		
600-500	1	0.5	1	2	1	1.75	0.5	1	
500-400	1	0.5	0.5	1.5	1	1.75	0.5	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 BC	Metapodial	P-I	P-II	Sesamoid	TOTAL
1400-1300	1				2
1300-1200	1		1		3
1200-1100					
1100-1000					2
900-800					
800-700	1	3.5	0.5		7.5
700-600	6	2.5	2.5		40
600-500	4.5	3.5	1	0.75	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	0.25	85
Other	18	19	9	1	144
Total	53	41	20	8	472



The Incense Road in Greco-Roman Times

- Main Incense Road
- Main Connecting Land Routes
- - - - - Secondary Incense Roads
- Spice Route

6. The Incense Road in Graeco-Roman Times. After Franck and Brownstone 1984: 168. Computer-generated image by C. Andrews.

wadis was a natural result of the environmental constraints which those natural barriers placed on the country. However, it was also due to the widespread use of the camel as a beast of burden, that those barriers could also be more easily crossed, and that distant arid regions like Yemen could be reached, which accounts for, in part, why these kingdoms may have formed in areas which had not been as extensively settled in the Middle and Late Bronze periods (see also Sauer 1994b: 230-238).

This (now major) trade route (for a discussion of this and other related major trade routes, see Franck and Brownstone 1984: 168-184 — see FIG. 6), based mostly on the camel, almost certainly explains the economic motives of the record in 1 Kings 10 of the visit to King Solomon in Jerusalem of the Queen of Sheba. The Arabs and their camels were often of concern to the later Assyrian, Babylonian, Persian, Greek, and Roman empires, in part because of these economic trade factors.

In the c. 300 BC-AD 640 period, many sites in southern Jordan began to flourish, because of the independent capital city of Petra which was located there. Later, after the annexation of Nabataea, the Romans constructed their linking route, the *via nova*, which followed the line of the old but difficult trade route through Jordan. Himyar dominated Yemen from its mountain capital of Zafar in the Late Pre-Islamic period.

In the Early Islamic period, c. AD 640, the center of gravity in Arabia moved from Yemen to the north (to Makka, al-Madina, etc.), but camel-based trade and cultural connections between Jordan and Arabia continued as before, and increased because of the religious pilgrimages to Makka.

During the Ottoman period, the new "desert highway" was constructed to the east, primarily for pilgrims, and at that time most of Jordan had moved away from village systems to nomadic ways of life.

In Modern times, small villages, farms, and cities started in Jordan again, but gasoline driven cars have mostly replaced the donkey and the camel (see, e.g., Bullet 1975). Trucks are still used for transportation, but the airplane and sea routes through Suez and around Africa have largely replaced the camel-based routes. Because of their religious importance, the land-based pilgrimage routes continue to be used down to the modern day as well (see Franck and Brownstone 1984: 168-184).

Conclusions

Thus it has been argued, following Albright, that the domestication and widespread use of donkeys in the mid-fourth millennium BC opened up Jordan to trade with the rest of the fertile crescent, but only in a limited way with Arabia to the south. Only with the domestication and widespread use of the camel as a beast of burden, by c.

1300 BC or earlier, did the international trade routes through Arabia become more regular, which probably explains in part why the Transjordanian states of Ammon, Moab, and Edom formed at that time. Because of the international character of the trading network in the Late Bronze Age, it would be surprising if Arabia was not somehow connected to that network. On the other hand, the existence of the camel-based trading route in the Iron I period may represent the filling of the Mediterranean-based trade gap which commenced at the end of the Late Bronze Age. After the widespread introduction of the camel as a beast of burden, the donkey continued to play a (declining) trade role on the routes of the fertile crescent, at least into the first millennium BC.

It should be noted that I. Finkelstein (1988; 1992), starting with the evidence from sites in an-Naqab, but extending his work to Edomite sites in southern Jordan as well, came to conclusions which are very similar to those in this paper. I am in agreement with most of his arguments.

This again is a tentative study, and the results which are described here need to be tested by many other sites in Jordan, Arabia, and the rest of the Near East. However, I am reasonably confident that major changes in this paper will not be necessary. It should however be noted that although major sites were not found, modest Middle and Late Bronze remains were attested in southern Jordan. Some of the UD sherds collected from those regions did belong to those periods as well.

This trade route phenomenon could also be studied using today's remote sensing technology (see, e.g., El-Baz, ed. 1984), to locate, among other things, the routes of ancient caravans. When combined with careful work on maps and with work on the ground, these techniques should allow for more detailed analyses of these routes to be accomplished.

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