Hoofprints of History: Equids and Dromedaries as Ancient Egyptian Working Animals at the First Nile Cataract

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Abstract

This study investigates the role of equids and dromedaries as working animals in the region of the first Nile cataract from the beginning of the Pharaonic Kingdom until today. Analysis of faunal remains from Elephantine Island and Aswan reveals insights into considerations of the ancient inhabitants of the settlements for the choice of beasts and the stabling of their working animals. Size comparisons highlight differences between horses, mules, and donkeys, while butchery marks indicate processing for consumption and utilization of skin and hair of both equines and dromedaries. Pathological changes in bones reflect the strains of work activities, emphasizing the roles of these animals in ancient Egyptian society as key elements of trade and transportation.

Keywords: Equidae, *Camelus dromedarius*, working animals, First Nile cataract, Aswan, Elephantine Island, zooarchaeology, pathology
DOI: 10.31526/SEAS.2024.549

تتناول هذه الدراسة دور الخيليات والجمال كحيوانات نقل في منطقة الشلال النيلي الأول منذ نشأة الدولة الفرعونية حتى اليوم. يكشف تحليل البقايا الحيوانية من جزيرة إلفنتين وأسوان عن رؤى حول اعتبارات سكان المستوطنات القدامى فيما يتعلق بإختيار الحيوانات وطرق إيواء حيوانات النقل لديهم. تسلط مقارنات الحجم الضوء على الاختلافات بين الخيول والبغال والحمير، في حين تشير علامات الجزارة إلى التجهيز للاستهلاك واستخدام الجلد والفراء لكل من الخيول والجمال. تعكس التغيرات الباثولوجية في العظام مشاق أنشطة العمل، مما يؤكد دور هذه الحيوانات في المجتمع المصري القديم كمكونات رئيسية للتجارة والنقل.

الكلمات المفتاحية: الخيليات، *Camelus dromedarius*، حيوانات النقل، شلال النيل الأول، أسوان، جزيرة إلفنتين، بقايا حيوانية، باثولوجي

1. Introduction

The utilization of animal strength has been integral to various facets of human civilization, including agricultural development, transportation, and warfare. In Egypt, cattle (*Bos taurus*), donkeys (*Equus asinus*), horses (*Equus caballus*), mules (*Equus asinus x caballus*), and dromedaries (*Camelus dromedarius*) have played crucial roles in shaping the socioeconomic landscape of the region from the early history of the country to the present day.

In this study, we will focus primarily on equids and dromedaries due to their important roles as working animals. Unlike cattle, which served as sources of meat, blood, milk, and fat, and as draught animals, equids and dromedaries were employed primarily for their strength and utility in transportation, labor, and warfare. Equine meat was considered unclean even before the advent of monotheistic religions and was thus avoided or prohibited for believers around the Mediterranean (Benecke 1994: 302–5; Peters 1998: 137–141, 164; Lorenz 2000: 103–109; cf. Leviticus 11.3). Dromedaries provided meat, milk, and blood as well as dung, utilized as fuel for fires, but their low reproduction rate, high juvenile mortality, late maturity, and difficult handling made them too valuable to be used solely for consumption (Köhler-Rollefson 1989: 150-151; Brewer, Redford and Redford 1994: 103; Naumann 1999; Hamilton-Dyer 2001: 266; Staubli 2001: 23).

Donkeys, domesticated in northeastern Africa between 5000 and 4600 BCE, facilitated transportation across arid lands and played a crucial role in trade expansion and territorial conquests of the ancient Egyptians from the early days of the Pharaonic kingdom (Milevski et al. 2019: 98-99). Horses, initially domesticated for meat, gained prominence in warfare, symbolizing status and power for kings, noblemen, and warriors after their introduction into the country around the early or mid-2nd millennium BCE (Boessneck 1988: 78–81; Benecke 1994: 298-299, 312-313). Cross-breeding of donkeys and horses produced mules and hinnies, with mules being the more popular variety due to their ease of breeding and strength. *E. africanus*, the wild ancestor of the domesticated donkey, was used to refresh the blood in breeding and prevent size reduction of *E. asinus* and *E. caballus x asinus* (Boessneck 1988: 81–83; Peters 1998: 136-137; Lorenz 2000: 107). The exact introduction date of the domesticated dromedary (*Camelus dromedarius*) to Egypt remains uncertain, although trade contacts with the Near East and Arabia likely facilitated its presence from the New Kingdom onwards (Peters 1997: 561; Peters 2001: 332-333, 338). Assyrian and Persian conquerors of the 7th and 6th centuries BCE may have brought dromedaries to Egypt, but archaeological evidence of their presence remains scarce until the Greco-Roman Period (c. 332 BCE–642 CE; GRP) when both donkeys and dromedaries were frequently used as working animals in the Egyptian eastern desert (cf. Leguilloux 2020).

Our study utilizes faunal material from Aswan and Elephantine Island, to provide insights into the history of equids and dromedaries in the region of the first Nile cataract from the Pharaonic Period (PhP) to the Islamic Middle Ages (MA; for definitions and abbreviations of time periods, see Table 1; Sigl 2017: 11–13 with notes and references).

TABLE 1: Chronological terms and their abbreviations used (cf. Sigl 2017: 11–13).

Period	Abb.	Dynasties	Dates
Pharaonic Period	**PhP**		**c. 2900–332 BCE**
Early Dynastic Period	EDP	Dyn. 1–3	c. 2900–2545 BCE
Old Kingdom	OK	Dyn. 4–8	c. 2543–2120 BCE
1st Intermediate Period	1st IP	Dyn. 9-10	c. 2118–1980 BCE
Middle Kingdom	MK	Dyn. 11-12	c. 1980–1760 BCE
2nd Intermediate Period	2nd IP	Dyn. 13–17	c. 1759–1539 BCE
New Kingdom	NK	Dyn. 18–20	c. 1539–1077 BCE
3rd Intermediate Period	3rd IP	Dyn. 21–24	c. 1076–723 BCE
Late Period	LP	Dyn. 25–(31)	c. 722–332 BCE
Ptolemaic Period	**PtP**		**332–30 BCE**
Roman Period	**RP**		**30 BCE–642 CE**
Imperial Period	IP		c. 30 BCE–395 CE
Late Roman Period	LRP		c. 395–642 CE
Islamic Middle Ages	**MA**		**642–1517 CE**
Early Islamic Period	EIP		642–969 CE
Fatimid Period	FaP		969–1171 CE
Ayyubid Period	AyP		1171–1252 CE
Mameluk Period	MaP		1252–1517 CE

2. Excavation Summary

The Elephantine research project, conducted by the German Archaeological Institute Cairo (DAI) in collaboration with the Swiss Institute for Archaeology and Archaeological Research in Cairo (SIC) and various other institutions, has been ongoing since 1969 (Sählhof 2023). The archaeological site occupies the southern end of the island, consisting of settlement remains including temples and a necropolis of the townspeople dating from around 3300 BCE to the 10th or 11th century CE. Archaeological work focuses on the settlement, particularly the residential quarters from the EDP to the LRP. As part of the subproject Realities of Life (RoL), a small part of the northwestern settlement mound was excavated between 2013 and 2018, exploring how daily life was experienced on the island during the MK (c. 2000–1650 BCE; for preliminary publications of the project, see Sigl 2023). Animal remains from the Elephantine excavation project have been studied by researchers from Ludwig-Maximilians-University Munich (LMU) for many years, as well as by the authors. They indicate the presence of both wild asses and domesticated donkeys from the EDP onwards (e.g., Boessneck and von den Driesch 1982: 22 and 91; Hollmann 1990: 70–75; Sigl et al. 2018: 30–41; Sigl in Sählhof et al. 2020: 35–39). The mentioned publications provide faunal records from Elephantine Island until the MK, and accordingly, no dromedary remains were found. The utilization of both equines and dromedary is until today limited on the island due to the small available space for keeping, feeding, and working these beasts. Only future studies of the so far unpublished faunal material, which includes features of younger date, could correct the current picture of the equines being the only utilized animal in the ancient settlement.

Since the autumn of 2000, the SIC, together with the Supreme Council of Antiquities Aswan, has been conducting rescue excavations in the town of Aswan (Swiss Institute 2022). The joint Swiss-Egyptian mission aims to investigate the settlement history of the east bank of the Nile in this area, focusing on the core of the ancient town Syene (ancient Egyptian *Swnw*). The continuous settlement history of Syene begins in the LP, with the town serving as a trade and military hub. The mainland town was slowly replacing the settlement on Elephantine Island in its role as the commercial and religious center around the 1st millennium CE. While most settlements in Upper Egypt were predominantly Christian at this time, Syene stood out due to its Muslim majority. This resulted in internal conflicts and warfare, added on by conflict with Egypt's central government because of the sheltering of Arab rebels in the 11th century. Consequently, the administrative center and trade route hub was relocated north to Qus in the mid-11th century, marking the beginning of the Syene's slow decline. From the remains of the town, modern Aswan began to expand to its present extent in the 19th century (cf. in detail Sigl 2017: 37–61 and the current information on the project's website: Swiss Institute 2022). Animal remains from the Swiss-Egyptian excavations dating predominantly from the LP to MaP were studied by Angela von den Driesch, Johanna Sigl (Sigl 2017), Joris Peters and Ursula Mutze (Mutze 2021). The combined datasets of Elephantine and Syene excavations provide the possibility of studying the history of utilization of animals in the region from the EDP until the present day.

3. Methods

Animal remains from both excavations were manually collected at the trenches. The material was examined at the storage areas on Elephantine Island using reference literature and the small reference collection held by the DAI on-site, which since 2018 includes a nearly complete modern donkey skeleton. All fragments were counted (n or NISP = Number of Individual Specimen). Matching fragments of single bones were entered into the OSSOBOOK databases of each project (for Aswan cf. Sigl 2017: 26-27) as 'NISP = n' and 'MNE (Minimum Number of Elements) = 1'. For the Aswan material, all fragments of one species from one find bag or feature were weighed together, while for the RoL material, each fragment was weighed individually (g = gram). In addition to the conventional recording of context and recovery information and of skeletal elements, element parts, age, sex, body side, and pathological and use-related alterations on the bones, taphonomic information and measurements were recorded using standardized vocabulary and measuring points (for mammals and birds cf. Angela von den Driesch 1976). All data was exported from OSSOBOOK to a spreadsheet, and the data for equids and dromedaries from both sites were copied to a single file (see supplementary data sheet), crosschecked, and only then processed statistically following the methods described in Sigl 2017 (pp. 27–36).

Equid species and their hybrids as well as skeletal elements were differentiated based on morphological variations in bones and in the enamel folds of molars following references such as Schneider 1966, Armitage and Chapman 1979, Eisenmann 1986, Peters 1998 (pp. 161–163 and 409–412: figs. 53–56), and von den Driesch and Peters 2001 (pp. 305–308). Skeletal fragments from equids, which could not be identified to species level, were recorded as 'Equidae indet.' in the Aswan material. *E. asinus* was the only equid species confidently identified in the RoL material following the above-mentioned references, even though other equids could potentially have been present as well (i.e., the material is dating to the early 2nd millennium BC, the estimated time of horse introduction to Egypt; see above). As part of the RoL project, extensive dry sieving of all excavated soil with a mesh width of approximately 4 mm, plus sample sieving of several liters per feature down to 0.025 mm introduced very small fragments to the assemblage. These fragments were often unidentifiable at the species level. They were recorded as 'Mammalia size of cattle' in the project's database. This category is potentially a mix of bovid, equid, and other large mammal remains. These records were not included in the data summary presented in this paper (cf. supplementary data sheet).

Dromedary remains are distinctively different from other large mammal remains, which make them generally easy to recognize even in fragmentary state, but in cases of uncertainty, we used Steiger 1990 to aid the identification. On Elephantine Island, no dromedary remains are recorded, which is not surprising, because the excavated strata mentioned in this article date long before the introduction of the species to Egypt (see above).

Estimates of age, sex, and size based on epiphyseal fusion, dental status, and bone completeness posed challenges for both equines and dromedaries. Few bone ends or teeth suitable for aging were found, and canine and pelvic bones, optimal for sexing, were rare.

Equid age and sex determination followed conventional methods and values as they are summarized in Silver 1969, Habermehl 1975 (pp. 22–57), Levine 1982, Manhart 1998 (pp. 62–65), Possmann Dias 2005 (pp. 40–47, 52, 67–73, 89–91), Schmid 2007 (pp. 26–34), Ruscillo 2014, and Sigl 2017 (pp. 20–24).

Aging (and sexing) dromedary remains were more challenging due to the fact that there is not sufficient reference literature for these animals. Age estimates followed other studies in the comparison of the age indicators with values taken, among others, from cattle and horses (cf. von den Driesch and Obermaier 2007: 144; Studer and Schneider 2008: 570; Pigière and Henrotay 2012: 1533; Hamilton-Dyer 2001: 264).

Measuring suitably preserved skeletal remains (i.e., recommended points for measuring are well preserved) of adult equid and dromedary (i.e., epiphyses must be fused, and dentation must be permanent with the exception of loose or jaw-embedded primary teeth) followed Angela von den Driesch's guide book published in 1976. While various measurements were taken from equine remains, especially those from the Aswan excavations, the temporal separation of records significantly reduced comparable data. Measurements from dromedaries were also limited due to bone preservation issues, compounded by the scarcity of comparable material from other publications in Egypt. Thus, only a few statistical values could be obtained, none based on age or sex (cf. supplementary data sheet).

For metric comparison beyond the area of the first cataract, the same individuals and populations that were used in Sigl 2017 (pp. 35, 99-100, 195–199) were utilized for the present contribution. Unfortunately, the new material from the RoL excavations brought scarcely any measurements that could be used to support previously conducted comparative statistics or, for example, the Logarithmic Size Index (LSI) calculations. LSI is used to compare the size of populations and individuals through time and between different sites in and outside of Egypt (cf. Sigl 2017: 34–36). The here presented material was categorized decisively in an attempt to allow detailed insight into size changes during the PhP and the MA. The western donkey from the equid burial in Abusir served as a standard individual for creating LSI graphs for equines (Figure 2; Boessneck et al. 1992: 5–8: Tab. 1). LSI values calculated for medieval and modern dromedary populations were compared with the values of a male individual from Tell Abraq in Arabia (Figure 3; cf. dromedary IUAZ CA04/(01) in Uerpmann and Uerpmann 2002: 242, table 1).

Interestingly, equine species differentiation based on measurements was formerly reported to be challenging due to an expected size similarity between horses and large donkeys in Egypt (Boessneck 1988: 322-323; Peters 1998: 149 and 161–163; von den Driesch and Peters 2001: fig. 6). Consequently, in several cases during work on the material in Aswan, a definitive identification was refrained from and the remains were classified as 'Equidae indet.'. However, a comparison of metric data from the Aswan material with published measurements of equid remains from Egypt (Boessneck 1970: 46-47: Tab. 2; Hollmann 1990: 75: Tab. 29; Boessneck et al. 1992: 3–8: Tab. 1; Bökönyi 1993: 312–315; von den Driesch and Peters 2001: 306-307: Tab. 1), both in direct juxtaposition and through the graphical display of LSI, and backed by morphological features, shows that donkeys and horses through all times were of different sizes, with the mule mostly falling between the species (see below with Figure 2).

TABLE 2: Summary of the basic data of the presented faunal material (I = Individual plus number, e.g., I285—if all listed fragments of the context are matched by morphological features, then MNI is 1(I139); if MNI only refers to some of the present fragments, then the individual number is given as, e.g., (I285); if no morphological match was possible, but only age, gender, size were used, then MNI is given as, e.g., 1 or 2-3; if *is added, then fragments of two contexts belong together; sources: 1 = Hollmann 1990; 2 = Boessneck and von den Driesch 1982; 3 = Realities of Life project; 4 = Sigl 2017).

Site	Area/feature	Context	Family	Species	n	MNI (I)	g	Period	Phase	Source
Elephantine Island	Satet temple	temple	Equidae	*E. africanus*	3	(IX002)	n/a	PhP	EDP	1
Elephantine Island	7940a	temple	Equidae	*E. africanus*	13	.	n/a	PhP	OK	2
Elephantine Island	8926b/c	settlement	Equidae	*E. africanus*	6	.	n/a	PhP	OK	2
Elephantine Island	south-eastern town	settlement	Equidae	*E. africanus*	1	.	n/a	PhP	OK	1
Elephantine Island	Satet temple	temple	Equidae	*E. asinus*	5	.	n/a	PhP	EDP	1
Elephantine Island	Satet temple	temple	Equidae	*E. asinus*	18	.	n/a	PhP	OK	1
Elephantine Island	Satet temple	temple	Equidae	*E. asinus*	4	.	n/a	PhP	MK	1
Elephantine Island	south-western area	necropolis	Equidae	*E. asinus*	1	.	n/a	PhP	OK	1
Elephantine Island	8429H	necropolis	Equidae	*E. asinus*	2	.	n/a	PhP	OK	2
Elephantine Island	necropolis	necropolis	Equidae	*E. asinus*	7	.	n/a	PhP	OK-1st IP	1
Elephantine Island	8448	necropolis	Equidae	*E. asinus*	6	(IX001)	n/a	PhP	MK	2
Elephantine Island	necropolis	necropolis	Equidae	*E. asinus*	9	.	n/a	PhP	MK-2nd IP	1
Elephantine Island	south-eastern town	settlement	Equidae	*E. asinus*	3	.	n/a	PhP	OK	1
Elephantine Island	southern town	settlement	Equidae	*E. asinus*	2	.	n/a	PhP	OK	1
Elephantine Island	V	settlement	Equidae	*E. asinus*	84	.	399.7	PhP	MK	3
Elephantine Island	V	settlement	Equidae	*E. asinus*	2	1 (I425)	10.1	PhP	MK	3
Elephantine Island	southern group of houses	settlement	Equidae	*E. asinus*	3	.	n/a	PhP	MK-2nd IP	1
Elephantine Island	V	settlement	Equidae	*E. asinus*	2	.	5.1	PhP	MK-2nd IP	3
Elephantine Island	south-western area	sebbakh	Equidae	*E. asinus*	1	.	n/a	recent?	recent?	1
Aswan	1	settlement	Camelidae	*C. dromedarius*	2	.	49.2	RP	RP	4
Aswan	1	settlement	Camelidae	*C. dromedarius*	7	.	268.6	RP - MA	LRP-EIP	4
Aswan	1	settlement	Camelidae	*C. dromedarius*	2	.	0.0	MA	MA	4
Aswan	3	settlement	Camelidae	*C. dromedarius*	21	(I38)	1621.6	MA	MaP	4
Aswan	3	settlement	Camelidae	*C. dromedarius*	11	11*	557.2	MA	MA	4
Aswan	3	excluded	Camelidae	*C. dromedarius*	4	1(I39)	198.1	indet.	indet.	4
Aswan	3	excluded	Camelidae	*C. dromedarius*	1	1*	11.0	indet.	indet.	4
Aswan	3	excluded	Camelidae	*C. dromedarius*	2	.	36.2	indet.	indet.	4
Aswan	13	settlement	Camelidae	*C. dromedarius*	1	.	23.2	PtP	PtP	4
Aswan	13	settlement	Camelidae	*C. dromedarius*	1	.	5.2	RP	EP	4
Aswan	13	excluded	Camelidae	*C. dromedarius*	2	.	76.7	indet.	indet.	4
Aswan	14	excluded	Camelidae	*C. dromedarius*	16	.	1363.3	indet.	indet.	4

Site	Area/feature	Context	Family	Species	n	MNI (I)	g	Period	Phase	Source
Aswan	21	settlement	Camelidae	*C. dromedarius*	4	.	86.8	MA	MA	4
Aswan	23	indet.	Camelidae	*C. dromedarius*	47	2-3	2574.0	MA	MaP	4
Aswan	24	settlement/ production	Camelidae	*C. dromedarius*	19	1	1107.3	MA	AyP-MaP	4
Aswan	25	excluded	Camelidae	*C. dromedarius*	25	.	1310.4	indet.	indet.	4
Aswan	30	settlement	Camelidae	*C. dromedarius*	23	(I285)	2534.7	RP	RP	4
Aswan	31	settlement	Camelidae	*C. dromedarius*	10	.	396.1	MA	EIP	4
Aswan	31	necropolis	Camelidae	*C. dromedarius*	24	2-3	2020.1	MA	MaP	4
Aswan	31	necropolis/ waste heap	Camelidae	*C. dromedarius*	11	.	648.0	MA	MA	4
Aswan	31	excluded	Camelidae	*C. dromedarius*	2	.	30.8	indet.	indet.	4
Aswan	32	fortress	Camelidae	*C. dromedarius*	2	.	233.0	RP	LRP	4
Aswan	32	stable	Camelidae	*C. dromedarius*	3	.	144.5	MA	FiP	4
Aswan	34	excluded	Camelidae	*C. dromedarius*	2	.	127.6	indet.	indet.	4
Aswan	35	excluded	Camelidae	*C. dromedarius*	4	.	383.9	indet.	indet.	4
Aswan	37	settlement/ production	Camelidae	*C. dromedarius*	5	.	142.5	MA	FaP-AyP	4
Aswan	37	settlement/ production	Camelidae	*C. dromedarius*	16	.	421.4	MA	AyP	4
Aswan	40	settlement	Camelidae	*C. dromedarius*	11	1	653.7	MA	AyP	4
Aswan	40	settlement/ production	Camelidae	*C. dromedarius*	2	.	90.4	MA	AyP-MaP	4
Aswan	40	settlement	Camelidae	*C. dromedarius*	4	.	186.8	MA	MA	4
Aswan	40	excluded	Camelidae	*C. dromedarius*	7	.	469.1	indet.	indet.	4
Aswan	42	settlement	Camelidae	*C. dromedarius*	1	.	17.0	MA	FaP-AyP	4
Aswan	42	settlement	Camelidae	*C. dromedarius*	42	3	1644.9	MA	AyP	4
Aswan	42	settlement	Camelidae	*C. dromedarius*	2	.	13.6	MA	AyP-MaP	4
Aswan	45	necropolis	Camelidae	*C. dromedarius*	3	.	342.5	RP	LRP	4
Aswan	45	settlement/ production	Camelidae	*C. dromedarius*	3	.	125.3	MA	AyP	4
Aswan	45	settlement/ production	Camelidae	*C. dromedarius*	8	.	295.7	MA	MaP	4
Aswan	45	excluded	Camelidae	*C. dromedarius*	7	.	648.9	indet.	indet.	4
Aswan	1	settlement	Equidae	*E. asinus*	9	(I10)	269.4	PtP - RP	PtP-RP	4
Aswan	1	settlement	Equidae	*E. asinus*	1	.	12.4	RP	LRP	4
Aswan	1	settlement	Equidae	*E. asinus*	19	.	418.9	RP	RP	4
Aswan	1	settlement	Equidae	*E. asinus*	1	.	28.2	RP - MA	LRP-EIP	4
Aswan	1	settlement	Equidae	*E. asinus*	1	.	33.8	MA	MA	4
Aswan	1	excluded	Equidae	*E. asinus*	1	.	20.9	indet.	indet.	4
Aswan	3	settlement	Equidae	*E. asinus*	5	(I51)	47.1	MA	MaP	4
Aswan	3	settlement	Equidae	*E. asinus*	2	.	39.5	MA	MA	4
Aswan	6	indet.	Equidae	*E. asinus*	1	.	53.9	MA	EIP-MaP	4
Aswan	13	fortress	Equidae	*E. asinus*	4	(I139)	64.3	PhP - PtP	LP-PtP	4
Aswan	13	settlement	Equidae	*E. asinus*	56	(I254/I278/I162/ I163/I242/I239)	1546.8	PtP	PtP	4
Aswan	13	settlement	Equidae	*E. asinus*	17	(I141)	448.3	PtP - RP	PtP-RP	4
Aswan	13	settlement	Equidae	*E. asinus*	7	.	149.3	RP	EP	4
Aswan	13	settlement	Equidae	*E. asinus*	1	.	111.7	RP	RP	4

Site	Area/feature	Context	Family	Species	n	MNI (I)	g	Period	Phase	Source
Aswan	13	indet.	Equidae	*E. asinus*	1	.	20.7	MA	MA	4
Aswan	13	excluded	Equidae	*E. asinus*	5	.	76.8	indet.	indet.	4
Aswan	14	excluded	Equidae	*E. asinus*	4	.	122.5	indet.	indet.	4
Aswan	15	production/ fortress	Equidae	*E. asinus*	4	(I271)	210.7	PhP	LP	4
Aswan	15	production/ fortress	Equidae	*E. asinus*	2	.	81.3	PhP - PtP	LP-PtP	4
Aswan	15	camp	Equidae	*E. asinus*	9	(I173)	64.7	PtP	PtP	4
Aswan	15	settlement	Equidae	*E. asinus*	10	(I174/I168)	216.5	PtP	PtP	4
Aswan	15	production/ fortress	Equidae	*E. asinus*	3	(I177)	122.0	PtP	PtP	4
Aswan	15	settlement	Equidae	*E. asinus*	4	(I198)	84.1	PtP - RP	PtP-RP	4
Aswan	15	settlement	Equidae	*E. asinus*	1	.	5.6	RP	EP	4
Aswan	15	settlement/ representa-tive	Equidae	*E. asinus*	1	.	124.0	RP	LRP	4
Aswan	15	settlement/ representa-tive	Equidae	*E. asinus*	2	.	17.2	RP	RP	4
Aswan	23	indet.	Equidae	*E. asinus*	24	(I230/I231/I232/ I233/I235)	279.5	MA	MaP	4
Aswan	24	indet.	Equidae	*E. asinus*	1	.	58.2	MA	AyP-MaP	4
Aswan	30	excluded	Equidae	*E. asinus*	1	.	44.8	indet.	indet.	4
Aswan	36	excluded	Equidae	*E. asinus*	2	.	23.8	indet.	indet.	4
Aswan	40	settlement/ production	Equidae	*E. asinus*	1	.	17.7	MA	AyP-MaP	4
Aswan	42	settlement	Equidae	*E. asinus*	3	(I370)	563.3	MA	AyP	4
Aswan	43	settlement	Equidae	*E. asinus*	1	.	0.0	PtP	PtP	4
Aswan	46	settlement	Equidae	*E. asinus*	1	.	10.4	PtP	PtP	4
Aswan	1	settlement	Equidae	*E. asinus?*	1	.	27.7	PtP - RP	PtP-RP	4
Aswan	1	settlement	Equidae	*E. asinus?*	1	.	2.3	RP	RP	4
Aswan	6	excluded	Equidae	*E. asinus?*	1	.	11.9	indet.	indet.	4
Aswan	13	indet.	Equidae	*E. asinus?*	1	.	71.0	PhP - PtP	LP-PtP	4
Aswan	13	settlement	Equidae	*E. asinus?*	3	(I276)	129.1	PtP	PtP	4
Aswan	15	indet.	Equidae	*E. asinus?*	1	.	12.7	PtP	PtP	4
Aswan	15	settlement	Equidae	*E. asinus?*	1	.	27.1	PtP - RP	PtP-RP	4
Aswan	15	excluded	Equidae	*E. asinus?*	1	.	11.7	indet.	indet.	4
Aswan	25	excluded	Equidae	*E. asinus?*	1	.	16.0	indet.	indet.	4
Aswan	32	excluded	Equidae	*E. asinus?*	1	.	0.0	indet.	indet.	4
Aswan	13	settlement	Equidae	*E. caballus*	19	(I259/152/I86)	1634.8	PtP	PtP	4
Aswan	13	indet.	Equidae	*E. caballus*	2	.	61.7	PtP	PtP	4
Aswan	15	indet.	Equidae	*E. caballus*	2	.	68.3	PhP	LP	4
Aswan	15	production/ fortress	Equidae	*E. caballus*	1	.	71.8	PhP	LP	4
Aswan	15	production/ fortress	Equidae	*E. caballus*	2	.	69.0	PhP - PtP	LP-PtP	4
Aswan	15	excluded	Equidae	*E. caballus*	1	.	29.0	indet.	indet.	4
Aswan	24	settlement/ production	Equidae	*E. caballus*	1	.	31.2	MA	AyP-MaP	4
Aswan	25	excluded	Equidae	*E. caballus*	2	.	239.0	indet.	indet.	4

Site	Area/feature	Context	Family	Species	n	MNI (I)	g	Period	Phase	Source
Aswan	31	excluded	Equidae	*E. caballus*	2	.	96.0	indet.	indet.	4
Aswan	36	excluded	Equidae	*E. caballus*	1	.	0.0	indet.	indet.	4
Aswan	46	settlement	Equidae	*E. caballus*	6	(I315)	210.3	PtP	PtP	4
Aswan	13	settlement	Equidae	*E. caballus?*	1	.	37.1	PtP	PtP	4
Aswan	40	settlement	Equidae	*E. caballus?*	1	.	29.6	MA	AyP	4
Aswan	42	settlement	Equidae	*E. caballus?*	1	.	15.6	MA	AyP	4
Aswan	13	settlement	Equidae	*E. asinus x caballus*	1	.	342.0	PtP	PtP	4
Aswan	15	indet.	Equidae	*E. asinus x caballus*	9	1(I200)	266.0	PtP	PtP	4
Aswan	3	settlement	Equidae	*E. caballus/ asinus x caballus*	2	.	445.7	MA	MaP	4
Aswan	6	excluded	Equidae	*E. caballus/ asinus x caballus*	1	.	44.0	indet.	indet.	4
Aswan	13	fortress	Equidae	*E. caballus/ asinus x caballus*	1	.	723.5	PhP - PtP	LP-PtP	4
Aswan	13	settlement	Equidae	*E. caballus/ asinus x caballus*	2	.	48.0	PtP	PtP	4
Aswan	13	settlement	Equidae	*E. caballus/ asinus x caballus*	1	.	0.0	PtP - RP	PtP-RP	4
Aswan	15	production/ fortress	Equidae	*E. caballus/ asinus x caballus*	1	.	0.0	PhP	LP	4
Aswan	15	production	Equidae	*E. caballus/ asinus x caballus*	1	.	16.7	PhP	LP	4
Aswan	15	camp	Equidae	*E. caballus/ asinus x caballus*	1	.	35.6	PtP	PtP	4
Aswan	15	settlement	Equidae	*E. caballus/ asinus x caballus*	1	.	32.5	RP	EP	4
Aswan	42	settlement	Equidae	*E. caballus/ asinus x caballus*	1	.	154.6	MA	AyP	4
Aswan	3	settlement	Equidae	Equidae indet.	1	.	0.0	MA	MaP	4
Aswan	3	settlement	Equidae	Equidae indet.	1	.	15.3	MA	MA	4
Aswan	13	indet.	Equidae	Equidae indet.	1	.	5.6	PhP - PtP	LP-PtP	4
Aswan	13	settlement	Equidae	Equidae indet.	31	(I253)	436.5	PtP	PtP	4
Aswan	13	settlement	Equidae	Equidae indet.	1	.	13.9	PtP - RP	PtP-RP	4
Aswan	13	settlement	Equidae	Equidae indet.	1	.	11.3	RP	EP	4
Aswan	15	production/ fortress	Equidae	Equidae indet.	12	(I191/I273)	444.8	PhP	LP	4
Aswan	15	production/ fortress	Equidae	Equidae indet.	1	.	53.0	PtP	PtP	4
Aswan	15	settlement	Equidae	Equidae indet.	1	.	111.5	PtP	PtP	4
Aswan	15	indet.	Equidae	Equidae indet.	1	.	6.3	PtP	PtP	4
Aswan	23	indet.	Equidae	Equidae indet.	3	.	47.8	MA	MaP	4
Aswan	24	settlement/ production	Equidae	Equidae indet.	1	.	11.3	MA	AyP-MaP	4
Aswan	25	excluded	Equidae	Equidae indet.	1	.	5.6	indet.	indet.	4
Aswan	26	excluded	Equidae	Equidae indet.	1	.	2.4	indet.	indet.	4
Aswan	31	necropolis	Equidae	Equidae indet.	1	.	40.2	MA	MaP	4
Aswan	32	quarry	Equidae	Equidae indet.	1	.	31.8	PhP	2nd IP	4
Aswan	32	fortress	Equidae	Equidae indet.	1	.	12.6	RP	LRP	4
Aswan	32	indet.	Equidae	Equidae indet.	1	.	8.6	MA	EIP	4
Aswan	34	excluded	Equidae	Equidae indet.	1	.	18.6	indet.	indet.	4
Aswan	35	excluded	Equidae	Equidae indet.	1	.	26.4	indet.	indet.	4

Site	Area/feature	Context	Family	Species	n	MNI (I)	g	Period	Phase	Source
Aswan	36	excluded	Equidae	Equidae indet.	8	2(I331/I332)	401.1	indet.	indet.	4
Aswan	37	production/ fortress	Equidae	Equidae indet.	1	.	28.2	MA	AyP	4
Aswan	37	excluded	Equidae	Equidae indet.	1	.	4.8	indet.	indet.	4
Aswan	40	settlement	Equidae	Equidae indet.	1	.	9.4	MA	FaP-AyP	4
Aswan	40	settlement	Equidae	Equidae indet.	3	.	60.7	MA	AyP	4
Aswan	40	settlement/ production	Equidae	Equidae indet.	2	.	14.8	MA	AyP-MaP	4
Aswan	40	settlement	Equidae	Equidae indet.	2	.	79.8	MA	MA	4
Aswan	42	settlement	Equidae	Equidae indet.	10	(I371)	14.6	MA	AyP	4
Aswan	42	settlement	Equidae	Equidae indet.	1	.	16.9	MA	AyP-MaP	4
Aswan	43	settlement	Equidae	Equidae indet.	4	(I348)	27.0	PtP	PtP	4
Aswan	44	excluded	Equidae	Equidae indet.	1	.	176.4	indet.	indet.	4
Aswan	46	fortress	Equidae	Equidae indet.	3	.	44.9	PhP	LP	4
Aswan	46	settlement	Equidae	Equidae indet.	1	.	7.5	PtP	PtP	4
	Elephantine Island		**Camelidae**		**0**		**0**			
			Equidae		**172**		**414.9**			
	Aswan		**Camelidae**		**357**		**20859.3**			
			Equidae		**382**		**12589.4**			
	sum				**911**		**33863.6**			

4. Temporal, Spatial, and Skeletal Distribution

A total of 382 equid (E) fragments weighing 12.9 kg were identified, along with 357 fragments weighing 20.9 kg attributed to *C. dromedarius* (C) in the Syene/Aswan material. Some fragments (E: n = 38, g = 1.4 kg; C: n = 72, g = 4.7 kg) were excluded from statistical examination due to missing dates or their status as modern intrusions into the material (Table 2: marked gray). An additional 88 fragments (414.9 g) of *E. asinus* were documented from the MK material of the RoL project. Earlier faunal examinations from Elephantine Island were recorded by species and fragment count, but not with weight (Boessneck and von den Driesch 1982: 22 and 91; Hollmann 1990: 70–75). A total of 83 fragments were documented from various contexts of the EDP to the MK, with 60 identified as *E. asinus* and 23 as *E. africanus*. One additional fragment came from a *sebbakh* mixed context, indicating a possible modern intrusion.

Several equid and dromedary fragments can be attributed to single individuals through the matching of joints within contexts or through age, gender, and size evaluation (Table 2: Minimum Individual Numbers = MNI and Individual-nummer = I+number; on the method of calculating MNI see Sigl 2017: 29-30). The MNI calculation was only possible in a few instances due to the rarity of similar bones of each species. Morphologically matched equine material consists mostly of tooth rows, skull sections, and extremity parts. These groups were recorded as I (= individual) plus number. The individual number was tracked and automatically assigned by OSSOBOOK. Theoretically, several I-numbers could belong to one individual; however, if no additional MNI can be calculated on these bones or no direct matches between groups are possible, then there is no proof for them belonging to one animal. In the more recently studied material from the RoL excavations, mainly feces of equines were identified (see supplementary data sheet). Equine bone finds were generally few, suggesting that horses, donkeys, and mules were primarily kept as livestock rather than for food production during their lifetime, and thus, their carcasses were disposed of outside of the settlements and hence outside of the excavated area.

TABLE 3: Summary of the distribution of species through main temporal phases and across the region at the northern end of the first Nile cataract.

Location	Period	n/g	*Camelus dromedarius*	*Equus africanus*	*Equus asinus*	*Equus caballus*	*Equus asinus x caballus*	*Equus caballus/ asinus x caballus*	Equidae indet.	Sum Equidae
Elephantine Island	**PhP**	**n**	0	23	148	0	0	0	0	**171**
		g	0	0	414.9	0	0	0	0	**414.9**
Aswan South	**PhP**	**n**	0	0	4	3	0	2	16	**25**
		g	0	0	210.7	140.1	0	16.7	521.5	**889.0**
	PtP	**n**	1	0	80	27	10	3	39	**159**
		g	23.2	0	1960.4	1906.8	608	83.6	641.8	**5200.6**
	RP	**n**	5	0	32	0	0	1	2	**35**
		g	287.4	0	839.1	0	0	32.5	23.9	**895.5**
	MA	**n**	37	0	10	0	0	2	3	**15**
		g	2323.3	0	195.0	0	0	445.7	23.9	**664.6**
Aswan North	**RP**	**n**	26	0	0	0	0	0	0	**0**
		g	2877.2	0	0	0	0	0	0	**0.0**
	MA	**n**	209	0	29	1	0	1	25	**56**
		g	10423.6	0	918.7	31.2	0	154.6	323.7	**1428.2**

Skeletal remains of *C. dromedarius* from Aswan were generally in poor condition, with phalanges being the most numerous identified and best-preserved elements. Matches of skeletal parts were less frequent compared to equines. An exception is a more or less complete skeleton discovered in area 30 (I285). The interpretation of this find remains problematic, as it is uncertain if it was buried with a certain intention or if the carcass was just disposed of in an old grave (Sigl 2017: 95).

In terms of distribution, during the PhP, donkey remains were the majority, with some early strata also containing wild ass remains (EDP: n = 23). With the introduction of the horse, a few fragments during each period can be attributed to this species (PhP: n = 3, g = 140.1 g; PtP: n = 27, g = 1906.8 g; MA: n = 1, g = 31.2 g) or the mule (PtP: n = 10, g = 608.0 g) or horse/mule (PhP: n = 2, g = 16.7 g; PtP: n = 3, g = 83.6 g; RP: n = 1, g = 32.5 g; MA = 3, g = 600.3 g), but at no times do they show up in larger quantities. During the PtP, the found weight of donkeys and horses in the area of Aswan is very similar, even though NISP counts clearly state the predominance of donkeys (Table 3; Figure 2; *E. asinus*: 80 fragments at 1960.4 g; *E. caballus*: 27 fragments at 1906.8 g). The bone weight in the animal body equals about 7–8.5% of its body weight. Thus, the weight of bone fragments from archaeological sites theoretically allows an estimation of the body weight of all animals once present, from which the number of animals can be calculated (cf. for a discussion of the method with references Sigl 2017: 30). The above given similar total weights of fragments from donkey and horse from the PtP may therefore point toward a similar number of individual animals once present. The discrepancy in fragment counts can be explained by a predominance of the carpals, tarsals, phalanges, and teeth identified as *E. caballus* (cf. supplementary data sheet). These elements are often preserved entirely due to their compact shape. In contrast, *E. asinus* is represented by a wide variety of elements, of which especially the long bones mostly survive in a fragmented state, thus producing a higher number of NISP. Unfortunately, an MNI count cannot be used to support the above equality in numbers of donkey and horse individuals (see above and cf. the method in Sigl 2017: 29-30). The number of recorded 'individuals' in Table 1 (*E. asinus*: I162, I163, I168, I173, I174, I177, I239, I242, I254, I278 = 10; *E. caballus*: I86, I152, I259, I315 = 4) is misleading because the I-numbers were used in the database to identify physically related skeletal elements from each feature: several I-numbered element groups could theoretically come from the same individual, but there is no proof that they actually do. The bone weight remains therefore the only reliable argument for the above-stated equality in the numbers of donkeys and horses during the PtP. The mule is generally only rarely documented. The 10 bones from the PtP belong to one individual (I200). Most other finds cannot be identified with certainty as either horse or mule (cf. supplementary data sheet and Table 2: *E. caballus/asinus x caballus*). If they were all mules, then this crossbreed would be documented until the MA. This again would run in line with the Islamic religious opinion on the breed, which regarded the mule as one of the animals that God had created specifically for the benefit of man (Khoury 2004: 361: Sura 16.8; Foltz 2006: 16).

Equines generally provide the majority of material from those areas, which are part of the core of ancient Aswan (PhP: n = 25, g = 889.0 g; PtP: n = 159, g = 5200.6 g; RP: n = 35, g = 895.5 g; MA: n = 15, g = 664.6 g). However, with the progression of the MA, equids stagnate in numbers, and donkey remains are the most numerous of the family of Equidae. At the same time, the dromedary becomes the more frequently identified species in general (Table 3; Figure 1; PtP: n = 1, g = 23.2 g; RP: n = 31, g = 3164.6 g; MA: n = 246, g = 12746.9 g). It is the dominantly identified species in the younger settlement areas of Syene in the north (Table 3; Figure 1; RP: n = 26, g = 2877.2 g; MA: n = 209, g = 10423.6 g). Both equines and dromedaries are in ancient Aswan present in larger numbers in areas which are closer to the outskirts of the town in the respective phases (e.g., areas 13, 15, 23, 42; cf. Figure 1, Tables 1 and 2).

Due to the scarce evidence from Elephantine Island, no similar spatial observations were possible. However, similar to today's practice, it may be assumed that large domesticated animals were kept at the outskirts of the town or in small agricultural areas rather than within the houses or the rare open spaces in the densely built settlement. On Elephantine Island, this would mean the small agricultural land to the north of the modern village of Koti (cf. Sigl 2022: 91 and Figure 1), or the eastern (and western) shore of the Nile or one of the largely uninhabited islands of the cataract. Thus, again the faunal remains of these beasts cannot be expected to show up in the archaeological material in larger quantities.

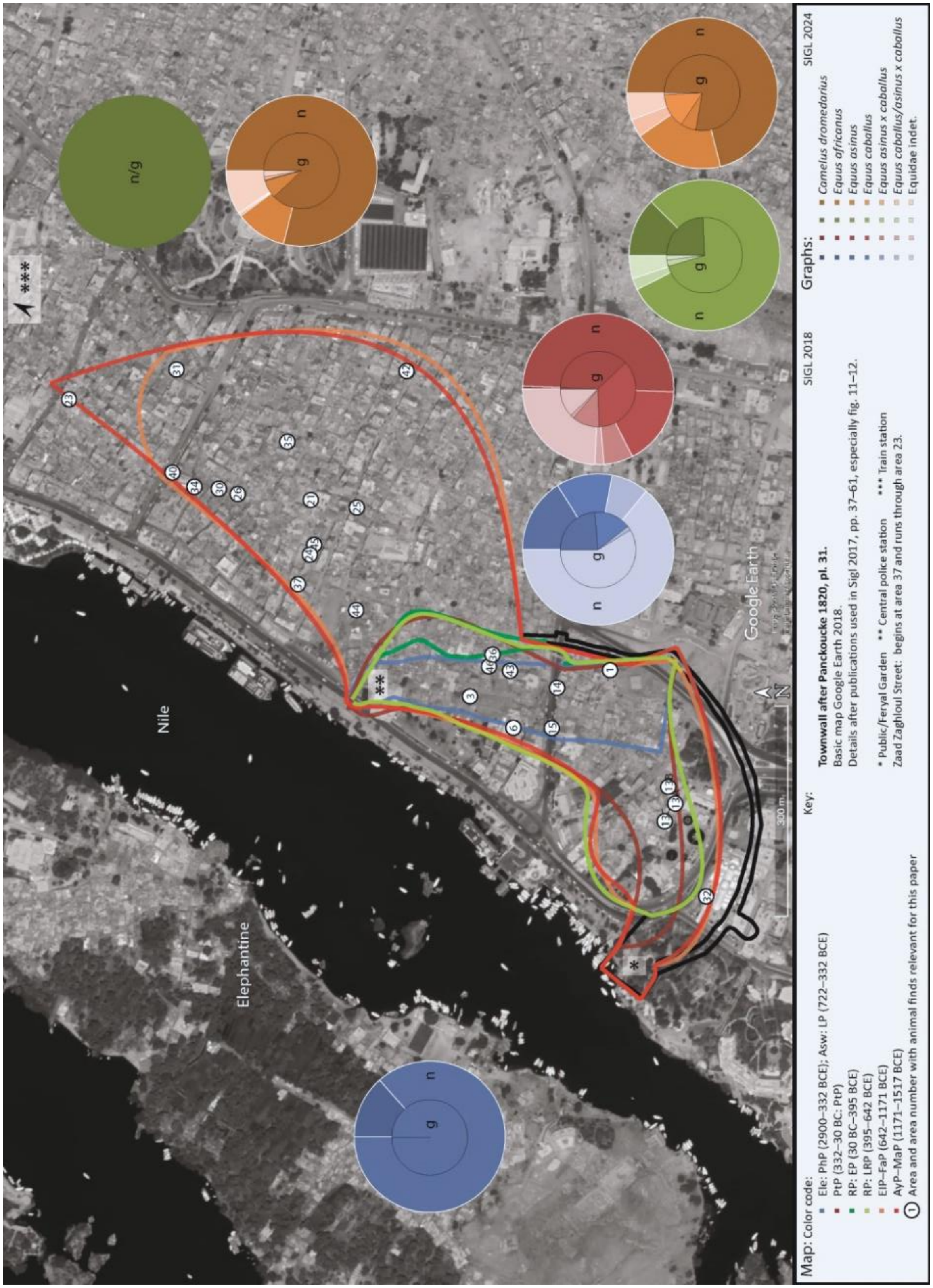

FIGURE 1: Study area with marked extents of the towns of Syene and Elephantine during various periods and with graphs of fragment counts (n) and weight (g) of equid and dromedary remains following Table 3 (Map © Google Earth 2018 with details after Sigl 2017; graphs © Sigl 2024).

5. Age and Sex

The overall impression of the material from both Elephantine Island and Aswan suggests a predominance of adult equines (cf. Tables 4 and 5; reference see Chapter 3 and Sigl 2017: 20-21). However, some bones and teeth indicate the presence of foals and young animals, particularly in material from mainly PtP but also in other strata. Among the younger individuals are a proximal donkey radius from the LP (see supplementary data sheet; I271: 06-015-250-10/01), a distal humerus (06-015-079-04/01), and a metatarsus III (06-013-003-09) dating from the PhP to PtP. These animals were at least 15–18 months old, although the synostosis of other epiphyses in the donkey skeleton suggests a later actual age. Among the wild asses found on Elephantine Island, a few were younger than 15 months, but most could not be aged and likely were adult animals (cf. supplementary data sheet and Tables 4 and 5; Boessneck and von den Driesch 1982: 13, 22, 61, 63, 91; Hollmann 1990:72-73).

For dromedaries, the skeletal material was mostly classified as subadult or young-adult (Tables 4 and 5). Some animals could have reached an older age. Remains of a dromedary fetus in area 23 (06-023-003-05) dating to the MaP indicate the presence of a pregnant female of the species (see supplementary data sheet).

In terms of sexes, both male and female equines must have been present throughout all periods. The record of foals indirectly suggests the presence of mares, while sexable bone material is predominantly male (Table 6; Boessneck and von den Driesch 1982: 13, 22, 61, 63, 91; Hollmann 1990: 73; Sigl 2017: 194). A similar situation exists for dromedary remains, with those determinable only coming from strata dating to the MA (Sigl 2017: 96-97).

TABLE 4: Summary of the estimated relative age of bone material without visible epiphyses based on bone structure and size.

Relative age	Phase	Infantil-juvenile	Juvenile	Subadult	Adult
Camelus dromedarius	EP			1	
	EIP		1		
	AyP				4
	AyP-MaP		1		2
	MA		1		1
Equus africanus	OK				1
Equus asinus	OK		1		1
	OK - 1st IP				1
	MK				4
	LP	1			
	LP-PtP			1	
Equidae indet.	LP				1
	MaP				1
sums		**1**	**4**	**2**	**16**

6. Size Comparison through LSI Values

LSI comparisons of donkey, horse, and mule populations, as well as specimens from the Aswan region and other sites in Egypt (Figure 2; Hamilton-Dyer 2001: 261, table 9.7, and 255; Van Neer and Sidebotham 2002: 186-187, Tab. 6; Leguilloux 2003: 561 and 579-580, tableaux 10-11), revealed significant size differences between the species, with mules mostly falling between horses and donkeys. Moreover, material from the OK on Elephantine Island allows for differentiation between wild asses and domestic donkeys (cf. Hollmann 1990: 75: Tab. 29).

TABLE 5: Summary of the status of epiphyseal fusion and derived age.

skeletal element		**Radius**	**Humerus, Phal. 2 ant./post.**	**Radius**	**Phal. 2 ant./post., Phal. 2 ant., Phal. 2 post.**	**Phal. 1 ant./post.**	**Phal. 1 ant./post., Phal. 1 ant., Phal. 1 post.**	**Calcaneus**	**Calcaneus**	**Humerus, Ulna, Femur, Tibia**	**Femur**	**Tibia**	**V. thoracalis, V. lumbalis, V. indet., V. cervicalis**	**Radius, Ulna, Femur, Tibia**	**V. thoracalis**	**V. cervicalis, V. thoracalis, V. lumbalis, V. indet.**
status of epiphysis		**prox.- dist.?**	**prox.- dist.-**	**prox.+ dist.?**	**prox.+ dist.?**	**prox.- dist.?**	**prox.+ dist.?**	**prox.- dist.?**	**prox.+ dist.?**	**prox.- dist.?**	**prox.+ dist.?**	**prox.+ dist.?**	**cran.- caud.-**	**prox.+ dist.+ / prox.? dist. +**	**cran.+ caud.-**	**cran.+ caud.+**
	age	**< 12 months**	**< 15 months**	**> 15 months**	**> 18 months**	**< 20 months**	**> 24 months**	**< 3 years**	**> 3 years**	**< 3.5 years**	**> 3.5 years**	**> 3.5-4 years**	**< 4 years**	**> 4 years**	**c. 4-5 years**	**> 5 years**
Camelus dromedarius	***phase***															
	LRP						1								1	
	EP				1											
	EP-LRP				2	1	2			1			3			
	EIP									1						
	FaP-AyP						1									
	AyP			1	3		8	1	1	1	1	1	3			1
	AyP-MaP		1		2		1									
	MaP	1				1	1			5	2		3	2		
	MA			1			1			1			1			
Equus africanus		**< 15 months**	**< 15 months**	**> 18 months**	**> 15 months**	**< 12 months**	**> 15 months**	**< 3 years**	**> 3 years**	**< 3.5 years**	**> 3.5 years**	**> 3.5 years**	**< 4 years**	**> 3.5 years**	**c. 4-5 years**	**> 5 years**
	OK	1								2						
Equus asinus	MK				1									1		
	PtP			1	3		4			1	1			1		
	PtP-RP			1												
	AyP													2		
	AyP-MaP				1											
	OK		1							1	1					
	OK - 1st IP													1		
	LP			1												
	MaP			1	1		1							1		
Equus asinus?	LP-PtP										1					
Equus caballus	AyP-MaP									1						
	LP										1					

Equus caballus?	AyP													1		
Equus caballus/ asinus x caballus	MaP										1					
Equidae indet.	LP-PtP															
	PtP			1					1	2				1		
	FaP-AyP													1		
	AyP			1										1		
	AyP-MaP						1									
	LP													1		
	MaP															
	MA													1		

TABLE 6: Summary of identified male and female skeletal remains of the species discussed through time.

Sex	Phase	Female	Male	Male?
Camelus dromedarius	AyP			1
	MaP	1	1	2
	MA		1	
Equus africanus	OK		1	
Equus asinus	MK	1		
	MK - 2nd IP	1	1	
	PtP		1	
	AyP-MaP		1	
Equus caballus	PtP		1	
Equidae indet.	MaP		1	
sums		**3**	**8**	**3**

The study also shows that E. asinus in the Aswan region decreased in size until the RP (cf. Figure 2: especially the mean values in the graph boxes). In contrast to that, during the RP, the animals were generally sizable, resembling wild asses, while mules remained small. In the following centuries, the size of E. asinus again decreased back to levels observed in early domestic donkeys in Egypt, such as those from Abusir (Boessneck et al. 1992). Horses remained relatively unchanged, with a peak in material from PtP-Syene and a reduction in size observed in modern Arabian horses from TT32 in Luxor (cf. Fóthi et al. 2010: 63-64 and 132–140: table 17).

Despite the challenges in obtaining age, sex, and measurement data from *C. dromedarius* remains, LSI values calculated for medieval and modern dromedary populations from four sites, including the Aswan region, indicate variations in size (Figure 3). Medieval dromedaries from Syene seem to be slightly larger on average than recent ones. However, differences in size may reflect the sexual composition of populations and breeding practices, with animals from certain regions being smaller due to specific breeding purposes. Thus, the population from Tell Abraq in Arabia (Uerpmann and Uerpmann 2002: 246: table 6) could have been composed mainly of female dromedaries, as this would have been the heartland of breeding at this time. In comparison, the populations from Syene and modern Aswan, as well as Luxor (Fóthi et al. 2010: 65 and 133: table 17), would consist of more male animals, thus the ones used for labor and slaughter but less likely for breeding. Centers for breeding *C. dromedarius* are, according to personal information from owners in the Aswan region (obtained 2009–2011), indeed nowadays situated mostly in northern Sudan and not in Egypt. However, the interpretation of LSI calculations for both dromedaries and equids is limited by the low availability of measured values, especially for the Aswan material, necessitating further research to confirm these interpretations.

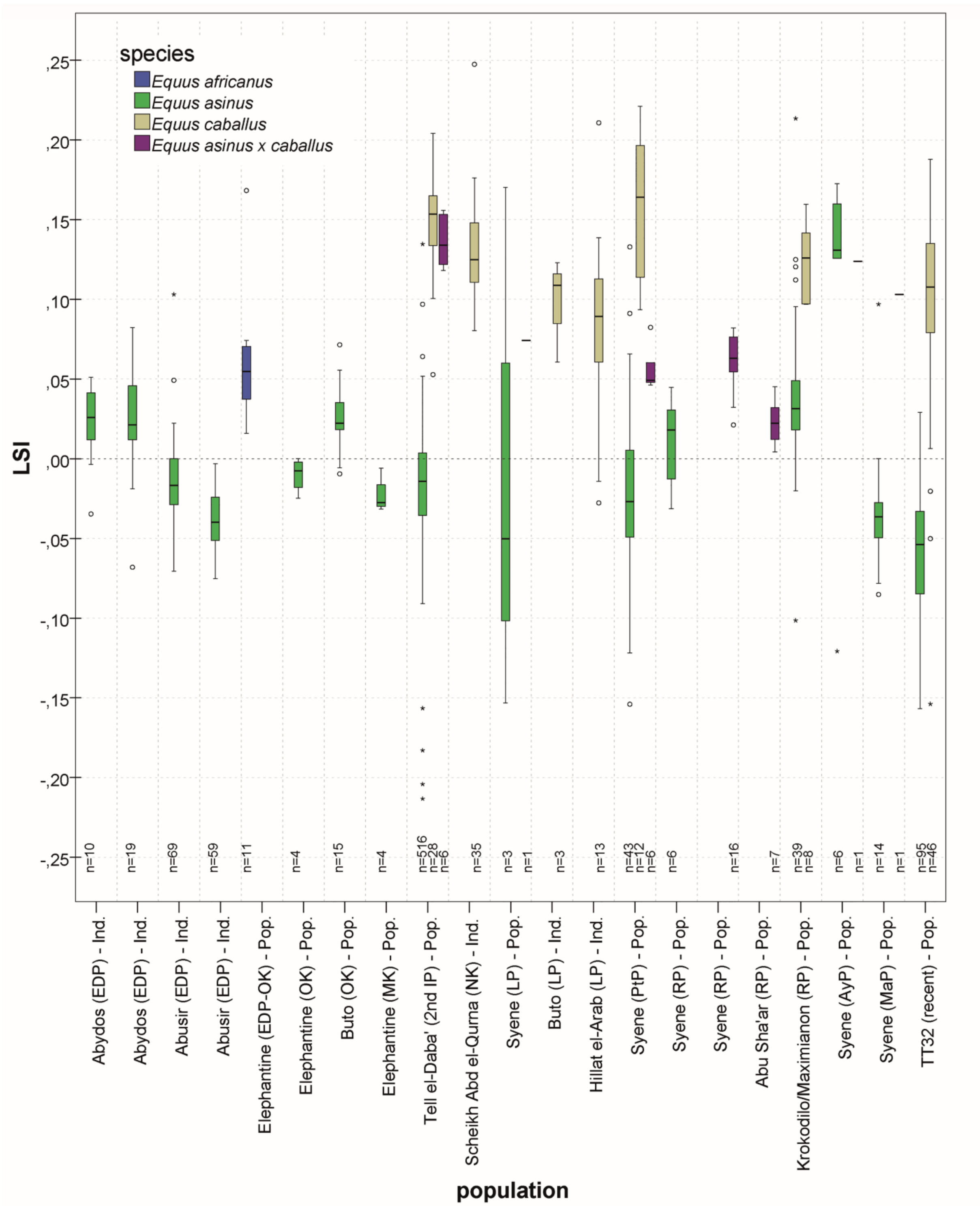

FIGURE 2: LSI calculations for equids from the Aswan area and various other sites in Egypt (Data from Boessneck and von den Driesch 1982, Hollmann 1990, Boessneck et al. 1992, Hamilton-Dyer 2001, Van Neer and Sidebotham 2002, Leguilloux 2003, Fóthi et al. 2010, Sigl 2017, RoL Project 2024; graph © Sigl 2024).

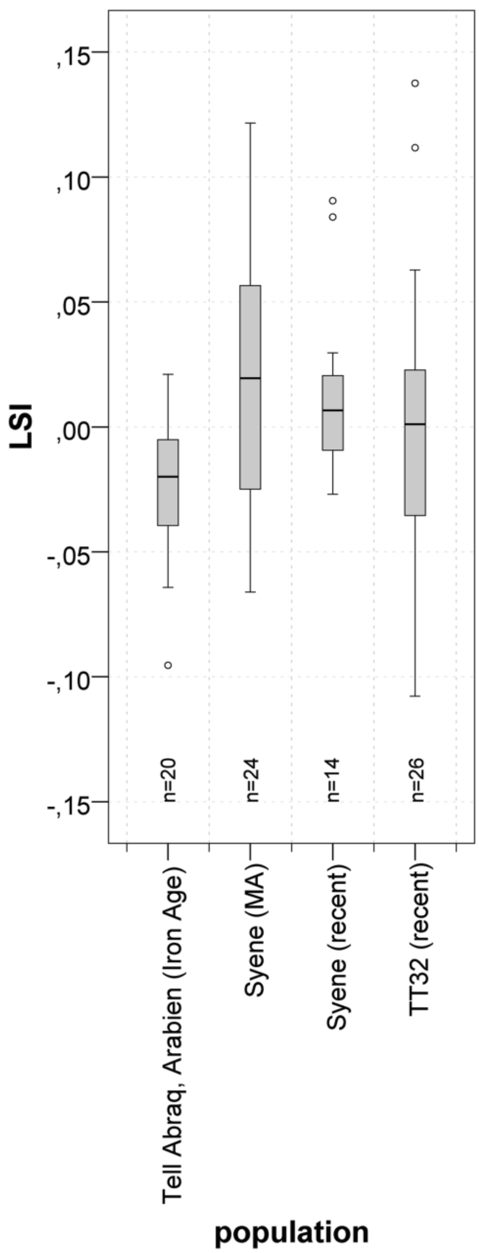

FIGURE 3: LSI calculations for dromedaries from the Aswan area, Tell Abraq in Arabia, and TT32 in Luxor (Data from Uerpmann and Uerpmann 2002, Fóthi et al. 2010, Sigl 2017; graph © Sigl 2024).

7. Butchery

Evidence of butchery is present in moderate numbers on equid and dromedary bones from Elephantine and Aswan, indicating processing for consumption and utilization of their skin and coat (Table 7). Equid remains, including those from donkeys, horses, and mules, display cut, chopping, or saw marks, particularly on extremity bones down to the proximal phalanges (= Phalanx 1). For instance, phalanges (e.g., 04-013-090-04), epistropheus (09-046-208-02/02), and lower jaws (05-015-378-04/02) show cut marks likely from skinning or head removal (cf. von den Driesch and Boessneck 1975: 19-20). The dissection of animal bodies is indicated by hack marks along joint areas, suggesting utilization for meat production (e.g., 46501D/a-36 or 44501 H/d-2). However, as the animals mostly seem to have been butchered at an older age and due to the initially stated restrictions on equid consumption through all times, it remains questionable if it was for human consumption. Some equid bones exhibit rough butchery (e.g., 06-013-050-02 and 09-046-126-04/03) which would be executed when chopping up meat for domestic carnivores (cf. examples in Sigl 2017: fig. 79). Additionally, evidence of bone extraction for tools or decorative objects is observable through carved or sawn long bones (e.g., 05-015-366-02/01 and 05-015-001-04).

Traces of butchery for possible human consumption are more evident on dromedary bones, with chopping and cutting marks present across various skeletal elements (e.g., nine pieces from the RP feature 08-045-002-15, a vertebra from the MA feature 07-031-004-01/01, etc.). Large postcranial bones seem to have been chopped up from various directions (e.g., 04-014-020-01 and 04-014-023-01, cf. Sigl 2017: figs 35-36). Traces of burning are recognizable on a total of six fragments (e.g., two pieces each from 03-001-020-08 and 03-001-037-01), four of which can be dated to the RP–MA, while the others are from the MA. These traces might have been created during the preparation of the meat including bones, thus indicating food preparation. Chopped metapodial, carpal, and tarsal bones again indicate skin or coat removal, possibly to use the material for bags, tents, or other items.

TABLE 7: Summary of butchery marks observed on the skeletal elements.

butchery mark		chops																							cuts													cuts and chops					fine cutmark(s)
skeletal element		**Mandibula**	**V. thoracalis**	**Costa**	**V. lumbalis**	**Sacrum**	**V. indet.**	**Scapula**	**Humerus**	**Radius**	**Ulna**	**Metacarpus III**	**Metacarpus III+IV**	**Coxa**	**Femur**	**Patella**	**Tibia**	**Talus (Astragalus)**	**Calcaneus**	**Tarsalia: Os tarsale III**	**Metatarsus III+IV**	**Phalanx 1 post.**	**Metapodium indet.**	**Phalanx 1 ant./post.**	**Mandibula**	**Costa**	**Scapula**	**Metacarpus III**	**Metacarpus III+IV**	**Metacarpus lateral indet.**	**Phalanx 1 ant.**	**Femur**	**Calcaneus**	**Tarsalia: Os tarsale IV**	**Metatarsus II**	**Metatarsus III**	**Phalanx 1 post.**	**V. thoracalis**	**Scapula**	**Metacarpus III+IV**	**Talus (Astragalus)**	**Calcaneus**	**Costa**
species	**period**																																										
Camelus dromedarius	**LRP**		1		1																																						
	EIP								1																												1						
	FaP-AyP							1						1	1									1																			
	AyP	1		1			1		1				2	1	2		1		1				1	3	1				1									1					
	AyP-MaP	1																1						2																1			
	MaP	1	1	1		1		1	2		2							1			1					1			1			1											
	MA			1	1			1					1	1		1	1							1								1										1	
Equus asinus	**MK**									1	1	1																															1
	LP-PtP								1																											1							
	PtP	1															1										1	1		1	1		1		1				1		1		
	EP-LRP									1					1							1		1																			
	MaP																					1																					
	MA											1																															
Equus asinus?	**LP-PtP**																															1											
Equus caballus	**PtP**																		1																								
	AyP-MaP														1																												
Equus asinus x caballus	**PtP**																																	1		1							
Equus caballus/asinus x caballus	**PtP**								1																																		
Equidae indet.	**PtP**					1				2								1	1	1												1											
	EP								1																																		
	AyP									1																																	
	AyP-MaP																	1																									

8. Pathological-Anatomical Changes

Some of the most important factors for identifying the use of animals are the pathological-anatomical changes observed on bones (and teeth) in the faunal material. However, in the equid and dromedary remains presented here, such alterations are found only rarely. Several of these again were unspecific, which is why the injury or disease that might have caused them could not be determined. In some cases such as a fragmentary donkey cranium from Elephantine Island (43501C/x-2), the question remains open, whether the bone surface has been altered by any kind of stress during the lifetime of the animal or if certain kinds of taphonomic processes led to the roughening of the outer layers of the bone. Nevertheless, in all observed instances of true pathologies on bones, the changes detected suggest overloading of joints and stressed tendons, which resulted from extensive use of the animals (Table 8; cf. von den Driesch 1975: 415-16).

TABLE 8: Summary of the pathological-anatomical alterations observed.

	skeletal element	Cranium	Dens superior	Vertebra thoracalis	Vertebra lumbalis	Phal. 1 ant.	Calcaneus	Tarsalia: Os tarsale III	Metatarsus III	Phal. 1 post.	Phal. 1 ant./post.	Phal. 2 ant./post.	
	pathology	slight spongeous cover of exterior surface (taphonomy?)	indet. (dental calculus? hypercementosis?)	Spondylosis deformans	traces of stress	(Spondylitis ankylosans)	Exostosis	Periostitis ossificans	(Spat exostosis)	Spat exostosis	Exostosis	Osteosclerosis	Exostosis
Species	**period**												
Camelus dromedarius	**EP-LRP**												2
	AyP												1
	MaP			2			1						
	MA				1								
	indet.					1		1					
Equus asinus	**MK**	1											
	EP-LRP											1	
Equus caballus	**PtP**		1						1	1	1		

Among the equid remains, the most severe pathology was found on a phalanx proximalis (= Phal. 1 ant./post.) of a donkey from an RP house in area 1. It shows strongly developed osteophytes in the dorsomedial area and cauliflower-like swellings as well as signs of arthrosis in the joint area (04-013-090-04: Figure 4). A PtP-dated horse metatarsus III from area 13 has slight dorsal exostoses spreading to the os tarsale tertium (05-013-514-03: I259). If this animal had grown older, it would certainly have suffered from spavin.

A rather large horse from the same area displayed the beginning of similar alterations on its proximal phalanx (= Phalanx 1 posterior; 05-013-195-04: Figure 4). Last but not least, the roots and lower part of the crown of a loose second premolar from the upper jaw of a horse (09-046-118-02/02: Figure 4) from area 46 dating to PtP is covered in rough, grayish deposits that chip off easily. Underneath, the cementum of the tooth seems to be only slightly altered. The occlusal surface of the tooth is a little inverted and has a small mesial step. In the case of the first-mentioned pathology, Angela von den Driesch suggested in 2007 that inflammation in the periosteum around the tooth was the cause (private conversation with J. Sigl). Alternatively, abnormal cementation or dental calculus could have led to the deposit observed on the tooth, but especially the first disease would probably not as easily chip off. The occlusal alterations on the other hand would either be caused by the use of a bit while working the horse (cf. Brown and Anthony 1998; Levine 2005: 9–11; Greenfield et al. 2018) or by a simple misalignment of the teeth.

On dromedary bones, pathological-anatomical changes of varying degrees were found in seven cases. They range from barely noticeable stress marks to severe exostoses causing permanent immobility of the joint. Added bone material at the insertion area of muscular tendons and slight abrasions of the articulation surfaces on a lumbar vertebra from area 3 (03-003-058-01) dating to the MA and on the proximal end of a MaP anterior phalanx proximalis (= Phalanx 1 anterior) from the same area (03-003-151-02: Figure 4) were probably caused by stress through extensive tension or working of the attached muscles. Similar slight alterations would most likely be recorded during a second assessment of the faunal material especially on phalanges of dromedary (but also on several phalange or spine segments of equids and bovids). They were not recorded during the first assessment reported here due to their frequency, which made them appear like a natural phenomenon rather than an observable pathology. Much more clearly visible is the extreme ossification of the periosteum on the palmar side of a calcaneus from area 35 (07-035-002-04/01: Figure 4), which usually develops due to severe muscle stress or inflammation of the periosteum or an external injury of the tarsal joint. The same applies to severe exostoses on the intermediate phalanges of individual I285 (Phalanx 2 anterior/posterior; 07-030-026-01: Figure 4) dating to the RP and of an AyP animal from area 42 (08-042-012-04/01). An advanced spondylosis deformans on the fourth and fifth thoracic vertebrae of a MaP dromedary from area 23 (06-023-003-05: Figure 4 left) must have been particularly painful while still active but would in the present state have stabilized the spine in this area through immobilization of the joint: due to the thick layer of additional bone material on this bone, it was only possible to identify the species after comparison with a skeleton from the Bavarian State Collection for Paleoanatomy in Munich (SPM: Figure 4 right). On and around the extremitas articularis caudalis of a lumbar vertebra from area 25 (06-025-019-03/01), bony deposits forming fine bars and bridges may be interpreted as incipient ankylopoietic spondylarthrosis, which would also have led to a fusion of the vertebrae in due course. All of these changes are attributed to the animals' role in transportation and labor activities (Curasson 1947: 340; von den Driesch 1975: 415–420; Köhler-Rollefson 1989: 143), possibly emphasized by the local topography which today consists of loose sand dunes (predominantly on the western river bank) as well as rough rocky terrain (especially on the eastern bank of the Nile).

9. Discussion and Conclusion

Although the available material is statistically not numerous, the analysis of equid and dromedary remains from the northern first cataract region offers valuable insights into the utilization patterns of these animals in the region. Judging from the number of remains found, the use of horses and mules was limited throughout the periods examined. This is possibly due to the challenges associated with their upkeep and the scarcity of suitable grazing land in the region (cf. the importance of grazing land for horses Donaghy 2012: 303). Horses, in particular, were an animal strongly connected to warfare and prestige in ancient Egypt (Boessneck 1988: 79; Decker 1986: 35 with note 6; Delpeut 2022). For ideal performance, they are noted for their dependence on food rations matching to the type and amount of work they do, which can include high-energy cereals and grains (Helck 1963: 510; Boessneck 1988: 81; Donaghy 2012: 305). They were presumably kept in state-maintained stables or private estates of rich people where adequate feed and exercise could be provided (Newton 1923; Pendlebury 1951: 132–134; Helck 1963: 510; Herold 2001: 7–10; Jarmużek 2013), rather than by the average inhabitants of the settlements around the first cataract. Mules would, due to the necessity to use horses for breeding, probably fall under the same prerequisite. For the average person, therefore, the donkey was the animal of choice, even though it had to be rented, if possession could not be afforded. Donkeys were utilized as beasts of burden as well as working animals (summarized by Boessneck 1988: 78). The dromedary seems to be connected mainly to supraregional transport and trade since its introduction to Egypt (Dijkstra 2007: 190-191; Sigl 2017: 289). In the trade hub of Aswan, it, therefore, rivaled the donkey at some point: most of the here-discussed remains were identified as *E. asinus* and *C. dromedarius*, and the results summarized below are based mainly on these two species.

Assuming that the faunal remains were found close to the area where the animals were kept and these places again were in the vicinity of the locations where their bodies were disposed of, then both species were stabled near the outskirts of the town of Syene (for comparison, cf. Churcher 2002: 106–107), but in the case of those remains found in the southern, older part of Syene, they were still within temporarily existing fortifications of the town. A similar situation may be assumed for the settlement on Elephantine Island, but the available material was not numerous enough to provide a clear picture so far. In the outskirt areas, more space would be available for stabling the animals. At the same time, grazing or feeding grounds for donkeys and horses are closer as is the access to long-distance transport routes where (donkeys and) dromedaries would have had their major area of use.

The smaller donkey is still today a valuable beast of burden in towns, used for transporting, for example, water, building materials, or people through narrow streets such as those that existed in the ancient settlement of Elephantine or the modern island-villages of Koti and Siou. During the Pharaonic Period, donkey remains therefore dominated not only because the dromedary was not yet available but also due to the significance of the small equid in local transportation and labor activities. And, as we know from other studies (Förster et al., 2013; Leguilloux, 2020), being well adapted to the Egyptian Nile valley and desert environment, donkeys were efficient pack animals for short- and long-distance transport as well. Nevertheless, for this species, only a single pathologically altered bone was found: an intermediate phalanx showing signs of osteosclerosis (07-030-026-01: Figure 4). Together with four cases of altered bones from *E. caballus* (Table 8), this find indicates the use of the equines for extensive work on possibly loose sandy or rocky grounds but gives no further hint as to which kind of work—such as transport or warfare—this could have been.

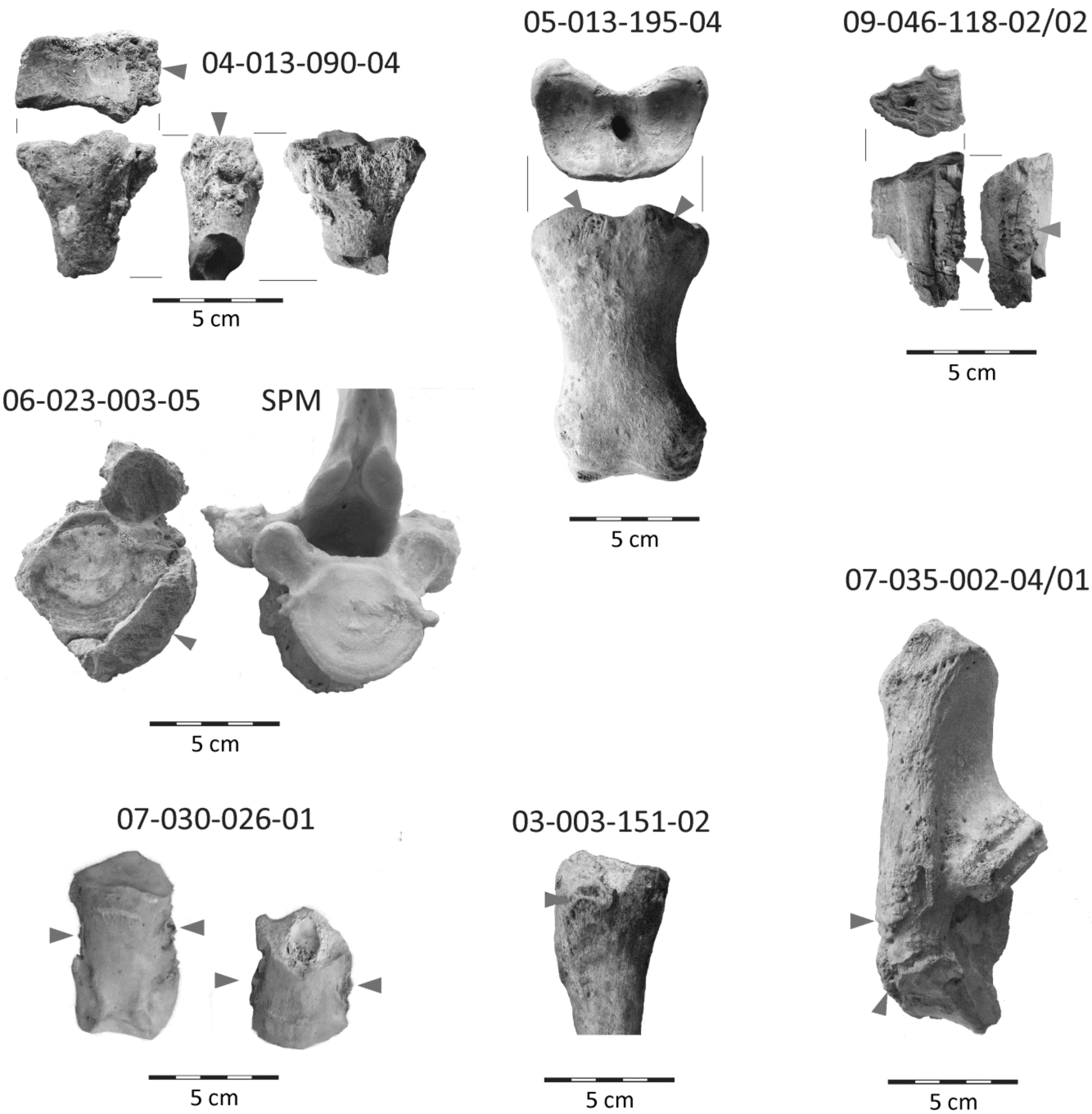

FIGURE 4: Equid and dromedary remains with pathological-anatomical changes (photos and postprocessing © Sigl 2024, with friendly permission from A. von den Driesch and J. Peters, LMU Munich).

Since their introduction in Egypt around the late 1st millennium BCE, dromedaries became increasingly prevalent. Their remains are found especially in the northern settlement areas of Syene. Being bigger and less agile than the donkey, the dromedary is less appropriate for urban transport. However, their suitability for traversing arid landscapes and carrying heavy loads made them indispensable for trans-desert trade routes. A text from the so-called Patermouthis Archive mentions a 'camel station for transports to Philae' in the 6th century CE, which may have been situated somewhere south of the excavation areas considered here (Dijkstra 2007: 190–191; Sigl 2017: 289), and pathological changes on a set of vertebrae thoracales (06-023-003-05: Figure 4) prove the use of the animals as mounts or beasts of burden in ancient Syene. Indeed, in comparison to the total available number of faunal remains of the species dated to one of the defined periods (n = 278), *C. dromedarius* shows more frequently pathological bone alterations (7 out of 278 = 2.5%) than donkeys (*E. asinus*: 1 or 2 out of 303 = 0.3 or 0.6%). *E. caballus* provides the highest frequency of pathologies (4 out of 31 = 12.9%), but this number may be distorted due to the small number of finds in total. The size estimates through LSI seem to suggest that a predominantly male dromedary population was present at the first cataract (Figure 3), which are in general the best suited as working animals and which would have been the first choice for sale to other users such as the newly interested Egyptians from their breeders in Arabia (or today Sudan). However, the presence of fetal remains proves that at least limited breeding took place in the area during the later Islamic Middle Ages as well. Butchery marks on equid and dromedary bones provide evidence of their dissection for meat and leather processing, giving them a secondary value at the end of their lifetime.

In conclusion, the analysis of equid and dromedary remains from Elephantine and Syene/Aswan offers valuable insights into the complex interplay between economic and cultural factors shaping the use of animals from Pharaonic to modern times. The spatial and temporal distribution patterns, coupled with age, sex, and size estimation data, allow suggestions on how these animals were utilized and managed in Egyptian society in the first cataract region. However, further research integrating archaeological, osteological, and historical data may enrich our understanding of the roles of equids and dromedaries in the ancient Egyptian economy and society in the future.

Acknowledgments

We sincerely appreciate the administrative and financial support from the German Archaeological Institute Cairo and the Swiss Institute for our participation in the Elephantine and Aswan projects. Apart from covering travel, accommodation, and providing a modest salary for research and fieldwork, we received no financial assistance for authorship or publication of this paper.

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