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The Exploitation of Animals in the Roman Praesidia on the Routes to Myos Hormos and to Berenike: on Food, Transport and Craftsmanship

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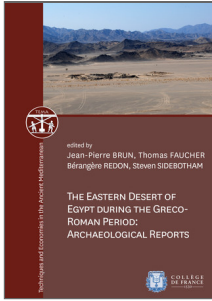
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Jean-Pierre Brun, Thomas Faucher, Bérangère Redon and Steven Sidebotham (dir.)

The Eastern Desert of Egypt during the Greco-Roman Period: Archaeological Reports

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The Exploitation of Animals in the Roman *Praesidia* on the Routes to Myos Hormos and to Berenike: on Food, Transport and Craftsmanship

Martine Leguilloux

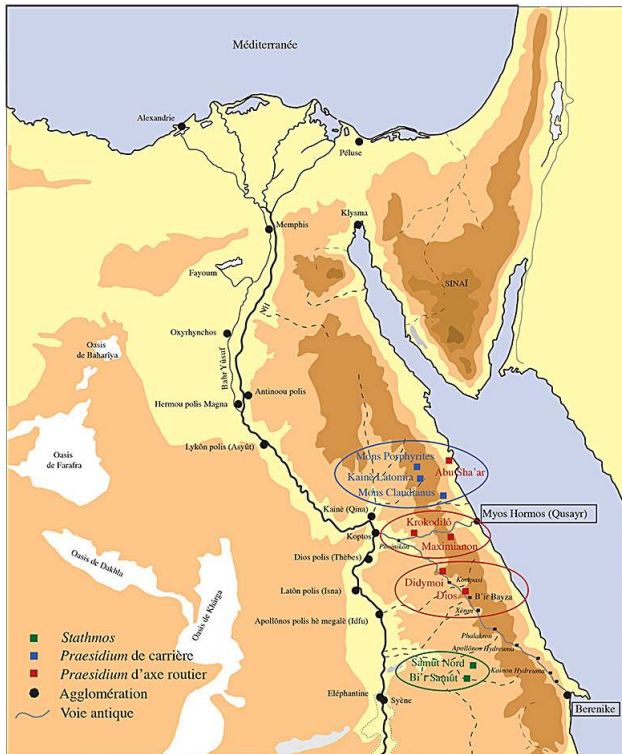
- 1 The conference on “The Eastern Desert of Egypt during the Graeco-Roman period” offers the opportunity to present the main characteristics of the exploitation of animals used as food, as means of transport and as raw materials. These aspects will be addressed through a synthesis of the studies of the faunal assemblages discovered in several Roman praesidia on the routes to Myos Hormos and to Berenike.
- 2 Archaeozoological data are intended to discover the role of animals in all possible activities as soon as they interact with humans. We will observe more specifically how animal resources were used during the occupation of the praesidia. The bones discovered at these sites often reflect the difficulties that the Roman administration faced in supplying the garrisons; they also show alternative methods that praesidia occupants used to ensure a steady supply of food and equipment.
- 3 This study focuses on the period of maximum development of the two trade routes between the 1st and the 3rd century AD. During this period, many distortions are noticeable, due to some chronological gaps and especially to data disparities from site to site. Nevertheless, some trends appear that show recurrent specifics in the exploitation of animal resources according to the type of sites and to changes in food demand.

1. Archaeological contexts

- 4 Many sites located in the Eastern Desert have been explored over the past 30 years by several archaeological missions; the “Mission archéologique française du désert Oriental”¹ explored the fortified way stations providing surveillance of and protection to desert

areas while other archaeological missions developed parallel excavations at quarry and mining sites and at ports on the Red Sea coast (Fig. 1).

Fig. 1



MAP OF THE EASTERN DESERT OF EGYPT WITH LOCATION OF THE SITES MENTIONED IN THIS PAPER.

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- 5 Despite extensive exploration of this region, there are few available archaeozoological data, published or to be published. In our excavations, the majority of the studies were carried out on rubbish dumped outside the forts, usually in front of the entrances. However, not every excavated fort had rubbish dumps; some lacked them, mainly because of meteorological events such as heavy rains and floods that have swept them away. For example, the forts of Qusûr al-Banat, Bi'r al-Hammâmât, Al-Hamrâ' and Bi'r Sayyâla on the route to Myos Hormos had their dumps destroyed by the wâdi flows, reducing the sample studied to two of the seven forts that were excavated or surveyed along this itinerary.
- 6 In other cases, however, the location of the forts in wider wâdis, where floods were less devastating, and where humans seldom visited during the last two millennia, resulted in better site and rubbish dump preservation. We were then able to collect all the bones included in homogeneous and well dated layers. In these primary dumps, discharge of pottery and food waste was rapidly buried under layers of ash and straw. This particular form of sedimentation ensured optimal conservation of organic matter, such as textiles, leather objects, animal bones, food waste, etc.
- 7 In the region covered by the present paper, the Ptolemaic archaeozoological contexts are still limited to two sites located in the gold mining district of Samût² on the route connecting Berenike to (Contra)Apollônopolis Magna (Edfu) (Fig. 1). The study of these contexts provides a glimpse of the living conditions of the inhabitants much before the

stage of the Roman *praesidia*, but in the same environment. This information will serve as a reference for identifying the characteristics of the exploitation of animals in Roman times.

- 8 The gold mining facilities of North Samût³ were used for a short period of time in the late 4th century BC, perhaps around 310-300 BC. The site consists essentially of two large buildings and of facilities devoted to the exploitation of an auriferous quartz vein. Despite the short period of occupation, two small dumps were created outdoors and the abandonment levels of most of the rooms in Building 1 contained not only pottery, but also bones. The site called Bi'r Samût, located about 5 km south of the aforementioned one, was occupied longer than North Samût.⁴ The fort itself was built towards the middle of the 3rd century (circa 260-250 BC) by order of Ptolemy II to serve as a water supply place and as a way station on the route linking the port of Berenike to (Contra) Apollônopolis Magna. The fort was abandoned at the end of the century (about 206 BC). It was built on earlier facilities for the treatment of gold ore dated to the late 4th and to the first half of the 3rd century BC. The plan of the fort is common among military posts in the Eastern Desert: rows of rooms along the northern, eastern and southern ramparts opening onto a central courtyard with a well and a cistern.
- 9 The studies of Roman faunal contexts are more numerous: ten sites can be grouped into three categories according to their function: way stations, quarries or ports (Fig. 1).

1.1. Way stations

- 10 The first set of data comes from forts where a garrison was in charge of monitoring the traffic and the well: the five sites providing archaeozoological data lay along the two main routes between Coptos in the Nile valley and the ports of the Red Sea, Myos Hormos and Berenike.
- 11 The first fort excavated by the French team on the route joining Myos Hormos to Coptos was Maximianon, which was built during the Flavian dynasty and abandoned at the beginning of the 3rd century AD (Fig. 1). The bones come from two distinct deposits. The first context is related to a non-fortified military post founded during the 1st century AD (phase A of the dump). The waste there corresponds to the final phase of its occupation (Max 1: phase A, around AD 50-80). This first settlement was replaced by a fortified *praesidium* during the last quarter of the 1st century (phases B and C of the dump). This second context delivered much more abundant waste, the occupation of the fort having generated a large dump located in front of its northern entrance. This dump was used from the last quarter of the 1st century AD and during the first half of the 2nd century (Max. 2: phase B1 / B2 / B3: AD 80/150) and the second half of the 2nd and the beginning of the 3rd century (Max 3: phases B4 / B5 / C: AD 150/210). During every phase of occupation, discarded bones were abundant, providing evidence about the nature of the meat supply and on the activities of the fort.⁵
- 12 The *praesidium* of Krokodilô, excavated in 1996-1997, was also founded during the Flavian period and abandoned during the second quarter of the 2nd century. A rubbish dump originally existed on the northern side of the site, but had been totally washed away by a flood. Another dump on the southern side revealed layers dating back to the reign of Trajan and the early years of Hadrian (AD 06/125). The bone assemblage of that deposit is, therefore, completely homogeneous.⁶

- 13 The zoological study was completed with the excavation of two forts located on the route to Berenike. The northern-most is the *praesidium* of Didymoi. Founded in AD 76/77, it remained in operation until the third quarter of the 3rd century, thus longer than the ones situated on the route to Myos Hormos.⁷ Several phases of construction and development occurred during this period.⁸ A large rubbish dump formed mainly during the late 1st to the mid-2nd century and then during the end of the 2nd and the 3rd century. During 3rd century, the waste mostly accumulated inside the barracks until their abandonment. The bone deposits found inside the fort are not large enough for reliable studies; however, the long use of the outdoor rubbish dump and the abundance of taxa are sufficient for characterizing the consumption.
- 14 Another site informs us about the last decades of monitoring the Coptos-Berenike route: the *praesidium* of Dios (called Iovis in the *Antonine Itinerary*). Located farther south, it was founded in 115/116 and abandoned in the third quarter of the 3rd century, towards AD 270. This site seems to have enjoyed superior facilities: a bath with glass windows, an oracular chapel with a podium supporting statues decorated with stone marquetry, apartments for the commander adorned with mosaics. As elsewhere, during the 2nd century, waste was thrown on the dumpsite in front of the entrance of the fort, while those of the 3rd century were accumulated inside the fort.
- 15 The fort of Abû Sha'ar may be included in the category of way stations, being situated at the intersection of the route linking Kainè to the Red Sea and the Via Nova Hadriana, the road that ran along the seashore, joining the port of Berenike with Antinoopolis on the Nile in Middle Egypt. This fort is much larger than the others. It is also later, founded in 309-310 and located about 1 km from a well and ca 4.5-5 km from a *praesidium* of the Early Empire near Bi'r Abu al-Sha'ar Qibly.⁹ The military occupation seems to have been short and the army withdrew during the second half of the 4th century. After a period of abandonment, a Christian community reoccupied the fort toward the late 4th or early 5th century. These contexts¹⁰ provide an overview of the evolution of meat consumption when most of the way stations in the desert had already been abandoned.

1.2. Quarries sites

- 16 Some *praesidia* built in order to control and secure the imperial quarries also provided archaeozoological data. Though less numerous, these sites revealed dumps containing diversified rubbish because they were occupied by both civilian and military populations, who produced abundant waste of all sorts.
- 17 The largest of these deposits, that of the Mons Claudianus quarry, have been widely explored and the studies focused on material discovered in inner and outer dumps, which are dated between the middle of the 1st century and the beginning of the 3rd century.¹¹
- 18 The contexts from the Porphyrites quarries are similar although the taxa are less abundant. They provide useful comparisons for other assemblages dated from the middle of the 2nd century to the middle of the 3rd century AD.¹²
- 19 More modestly, the *praesidium* of the Domitianè/Kaine Latomia imperial quarry (today Umm Balad) provides a homogeneous context. The fort controlled granodiorite quarries opened on the south-western slopes of Porphyrites. Due to the uneven quality of the local granodiorite, this quarry was only exploited during two short periods, under the reigns of Domitian and Trajan, when a first quarry was opened, and under Antoninus Pius, towards

AD 150, when a second quarry was planned. During these two periods, the occupants of the fort, soldiers and quarrymen, deposited their rubbish in a dump located in front of the entrance of the *praesidium*.

1.3. Ports

- 20 The specificity of the provisioning of the Roman forts is highlighted by comparison with the faunal assemblages found on coastal sites, in particular the ports of Myos Hormos and Berenike.
- 21 Myos Hormos offers an interesting indicator of the dietary practices of a port town during the 1st and 2nd centuries.¹³ The bone assemblages found in the rubbish dumps allow a comparison between the lifestyles of inhabitants regularly supplied notably by sea food and those of the occupants of the desert forts mainly recipients of the official deliveries.
- 22 The port of Berenike provides data especially on late antiquity, although the city experienced development and decline phases from the Ptolemaic period (3rd century BC) after the creation of the route from (Contra) Apollônopolis Magna and a network of stathmoi, until the Roman occupation (from the 1st century to the third quarter of the 3rd century AD) when the route to Coptos was equipped with a network of wells and *praesidia*.¹⁴ Indeed, the abundant bone contexts dated between the second half of the 4th and the beginning of the 6th century show that changes occurred after the abandonment of the *praesidia* network in the Eastern Desert.

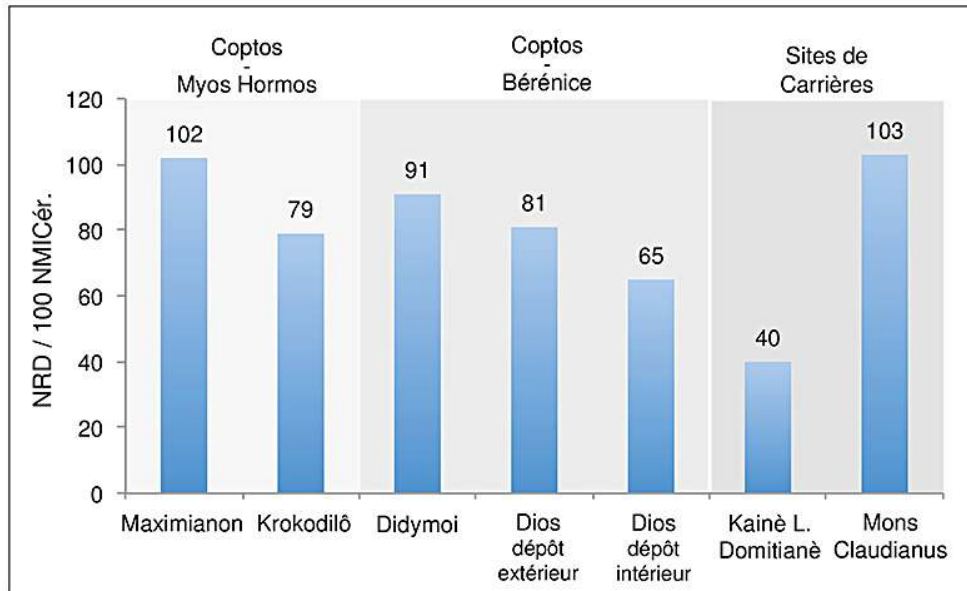
2. Provisioning the Eastern Desert

2.1. Meat in the diet

- 23 Before describing the nature of the supply of meat to the Eastern Desert *praesidia*, we must recall that the staple diet of ancient civilian or military populations consisted of cereals (wheat, barley, oats or sorghum) supplemented with legumes (lentils, vetches, peas, cabbage).¹⁵ Thanks to information provided by ancient sources, an average soldier's consumption can be estimated at one artabe (38.78 litres) per month thus 1 kg to 1.3 kg of wheat per day, during the 2nd century.¹⁶ Oil and wine distributed by the curator of each *praesidium* complemented this monthly ration. From the second half of the 2nd century AD, these two products were also provided by military authorities.¹⁷ The soldiers occasionally supplemented their rations with fresh meat, which explains some aspects of the meat supply in the desert to which we will return.
- 24 Meat waste is rare in the *praesidia* when we take into account the duration of occupation of the sites, from one to two centuries and the optimal taphonomic conditions, the homogeneity of the deposits and the quick burial of the remains.
- 25 A first point should be emphasized: we know, by the type of bones discovered, that the supply of meat was well organized despite the difficulties of transport. However, did every site have easy access to an efficient supply? To estimate the place of meat in the diet of each site necessitates a fixed basis of comparison. I selected the minimum number of discarded table wares and kitchen wares, another abundant type of waste; thus the number of determined bone fragments (NRD) will be calibrated on a 100 vases basis (NMI,

excluding amphorae). Using this calibration, we observe that the frequency rate of bone fragments varies little from one site to another (Fig. 2): a general trend gives a frequency of 80 to 100 bone fragments per 100 vases, suggesting that meat was consumed in the same proportions at most of the Eastern Desert sites.

Fig. 2



NUMBER OF IDENTIFIED FAUNAL REMAINS (NIR) PER 100 VASES (MNI: MINIMUM NUMBER OF INDIVIDUALS, TABLE AND COOKING WARES, EXCLUDING AMPHORA).

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- 26 Sites with relatively abundant bones are rare (Maximianon and Mons Claudianus); this rate does not seem to be related to the duration of occupation. The Krokodilô dump, despite its short duration of use, yielded remarkable quantities of bones. Transportation difficulties and the distance from the valley do not seem to have directly influenced supply. In the rubbish dumps of Dios, occupied during one and a half centuries (from AD 115 to AD 270), the rate of faunal remains is identical to that observed in the Krokodilô dump. Only the later contexts (inner dumps of the fort of Dios), during the 3rd century, show a lower rate (Fig. 2).
- 27 The faunal assemblage from Domitianè/Kainè Latomia is the only one that presents an index of meat supply much lower than the other places. This deposit brings together waste from a mixed population, a part of which had low economic status –e.g. unskilled workers of the *familia* and possibly Jewish prisoners of war; this index seems to reflect a more limited access to meat.
- 28 The populations living in these sites were heterogeneous. The way station (*praesidia*) were guarded by ten to fifteen soldiers and some cavalrymen responsible for transporting written communications, but they also housed some civilians whose numbers varied depending on the site, location and period. The proportion of the civilian population was much higher on quarry sites because of the enormous need for labour required to extract and transport the blocks. The presence of civilians was, however, significantly reduced in the way stations which were mostly frequented by providers and prostitutes.¹⁸

- 29 Therefore, supply sources were multiple, private and official, exploiting local natural resources and taking advantage of passing caravans or even couriers. The official supplies delivered food rations every month for the soldiers (mainly grain and oil), but privately acquired supplies complemented the meals with wine and meat.¹⁹
- 30 In general, the ostraka do not specify the nature or origin of the meat, in particular the species selected by officials. The meat was obviously cured because it had to remain edible for several weeks in hot weather. In fact, faunal studies show that meat supply could take several forms (salted meat, but also fresh meat) and that it could have various origins (purchases, local breeding, hunting, slaughtering of old animals).

2.2 Species and pieces consumed

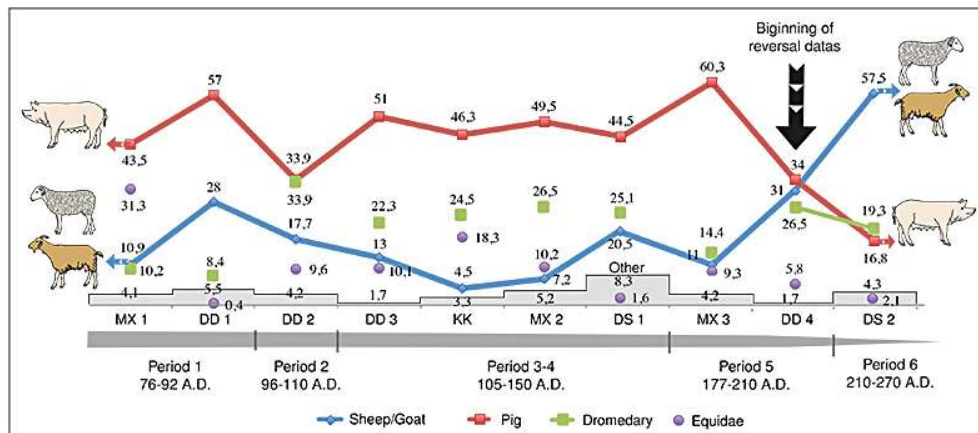
2.2.1. Way stations

- 31 The first set of data comes from forts that controlled the caravan routes and water points in the desert. The faunal assemblages allow an accurate reconstruction of the meat supply and illustrate the difficulties encountered to assure regular supplies, obliging the soldiers to diversify their food.

The consumed species

- 32 The categories of animals at the *praesidia* along the routes include pastoral species, pack (camels, donkeys) or commensal animals (domestic dogs, rodents). Faunal assemblages are characterized by a lack of variety: the number of species is limited to 8 to 12. They are mainly domestic animals (90% to 98% of the identified bones: Table 1), most of which were eaten except for dogs. The dog bones never preserve cut marks and their remains enjoyed special treatment: many were buried in “tombs” and some of them were wrapped in fabrics.²⁰
- 33 The most frequent species in terms of number of bones is swine. Pork bones are abundant in all the rubbish dumps and represent more than half of the faunal assemblages in the *praesidia* between the end of the 1st century and the beginning of the 3rd century AD. This massive proportion characterizes all the road stations on the Coptos/Myos Hormos (Maximianon and Krokodilô) and Coptos /Berenike (Dios and Didymoi) routes (Fig. 3).

Fig. 3



Faunal remains from Eastern Desert sites: *praesidia* of the route to Myos Hormos and to Berenike (% of the number of determined bones per species).

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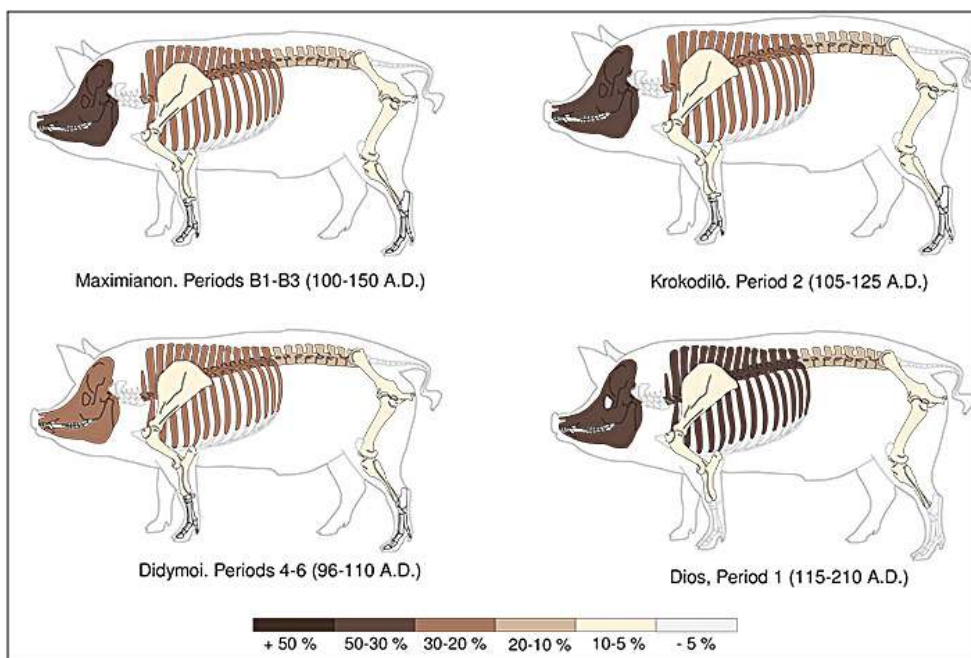
- 34 In 4th century Abu Sha'ar, mammalian bones represent only a small proportion of the contexts. However, swine is the predominant mammalian species (15% of the context). This site being located on the coastline, occupants intensively exploited the marine environment; fishing activities massively supplied the inhabitants, introducing, consequently, an imbalance in the composition of the supply in comparison with other *praesidia*.²¹
- 35 Although their bones are predominant among mammals, pigs were not the only source of meat: bones of pack animals (dromedaries and donkeys) are relatively numerous and these bigger animals provided larger quantities of fresh meat when they were slaughtered. Dromedary meat was the second most commonly eaten if we take into account the frequency of rejection of their bones, ahead of the meat of donkeys and of sheep and goats, the bones of which are rare during the Early Roman period (Fig. 3).
- 36 Adult sheep, frequently mentioned in tax returns dealing with herds, are rarely mentioned in the ostraka that reference the consumption and supply of meat in the *praesidia*.²² This silence can be explained by the poor quality of the meat provided by adult sheep. It was reserved for less demanding consumers than the soldiers and these people hardly appear in written sources.
- 37 Poultry bones are the most fragile remains; due to taphonomic reasons they are underrepresented compared to bones of mammals: from 3% to 5% of the remains identified. The later levels of the Didymoi dump register rates even lower: 1.3%. In any case, other tenuous traces of poultry are systematically recorded in the dumps: numerous egg shells and feathers ensure the existence of chickens, hens and cocks the local breeding of which provided meat and eggs for daily consumption. Hens and cocks were small, very graceful, usually white, according to the white feathers discovered in several dumps (Maximianon, Krokodilô, Didymoi). Apart from these remains, some bones attest the consumption of ducks and geese (Krokodilô and Dios).²³ Despite the scarcity of their remains, domestic poultry was probably a significant food resource. During the Roman period, they were popular for religious reasons or private festivals.²⁴ Geese, pigeons, ducks, but also quails and other small birds are also preserved following a long Pharaonic tradition, which continued during the Ptolemaic era: "They used to eat any kind of fish

raw, either salted or dried in the sun. Quails also, and ducks and small birds, they eat uncooked, merely first salting them.” (Herodotus II, 77). During the Roman Empire, dealers specialized in selling these products.²⁵

Meat selection

- 38 The particular supply conditions of these sites directly influenced the nature of the available meat: the study of pork bones from these dumps shows a clear selection of animals aged from one to two years and of pieces of meat attached to skeletal segments. There is an over-representation of some anatomical elements such as skulls, ribs and vertebrae which represent 60 to 80% of the bones and correspond to pieces of meat that were frequently consumed (Fig. 4).

Fig. 4



Selection of pieces of pork meat (*Sus domesticus*) in the main *praesidia* of the routes to Myos Hormos and to Berenike.

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- 39 The perfect preservation of the organic material and the favourable stratigraphic conditions suggest that these disproportionate figures result from a selection of meat pieces, cut and packaged before being delivered to the settlements. We also observe a very high fragmentation of the bones: not a single suet bone is complete and the number of butcher marks is very high (82 slaughtering or butcher marks for 100 bones). Even pork snouts were consumed after being cut into small pieces. These two observations about animal selection and bone fragmentation suggest the frequent consumption of salted meat with bones.²⁶ Often Roman cured meat included bones and was cooked following recipes of boiled or stewed meat. These preparations formed a part of the meat supply of the isolated sites, which could hardly rely on regular supplies. Although they were not traded on a large scale such as salted fish, cured meat from the Nile valley was as commonly consumed as fresh meat, as evidenced both by consumption waste and by occurrences in the papyrological corpus. At Didymoi, an ostrakon announces that a mina

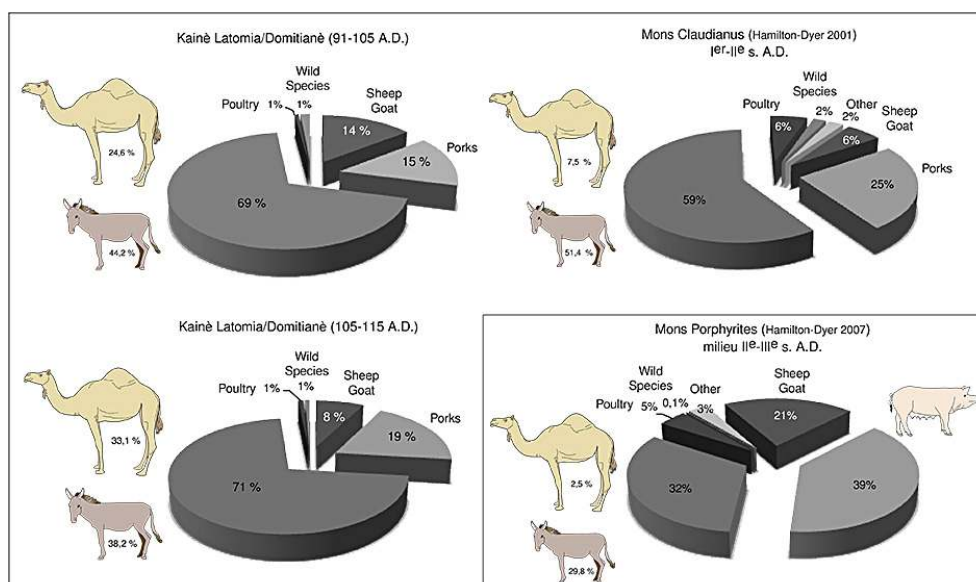
(350 g) of salted pork has been sent (O.Did 452; end 2nd-3rd century) and a *titulus pictus* indicates that a certain amphora contained 27 pieces of salted meat (*kopadia*: O.Did 15; c. AD 76/77).²⁷

- 40 Much of the cured meat came from food rations granted by the army. In the papyrological corpus, the terms mentioning meat are usually generic and rarely specify the names of the meat pieces packaged for transport and storage. All parts of an animal could be salted and the faunal assemblages show that the best pieces, such as hams or shoulders, were not commonly imported to desert sites. The discarded bones comprised mainly heads, specifically snouts, and ribs. Orders recorded on papyri or ostraka mention meat pieces such as pork feet cured in pots. Another order records the sending of a bull's head, which is probably a butcher's preparation using muzzle cuts, pressed for transport and storage.²⁸
- 41 Only pork seems to have been salted. The faunal distribution indicates that the flesh of large (dromedaries and donkeys) and small animals (sheep and goats) slaughtered on the site was eaten fresh.
- 42 The daily average meat consumption is unknown. During the Early Empire, official food distributions to soldiers did not involve meat: the rations consisted mainly of grain for bread (about 1.3 kg per day). The meat would have been included in the rations only during the Later Roman Empire;²⁹ for this period, some texts detail the quantities of meat distributed to the soldiers,³⁰ which was one Egyptian pound per day (roughly equivalent to a Roman pound³¹ or 327 g); this weight remained the same until the 6th century.³² It is possible that these daily quantities were already the norm during the Early Empire although this supply was mostly private.³³ Several letters discovered in the dumps of Krokodilô, Maximianon and Mons Claudianus³⁴ pointed out that there were orders for pork, sometimes also orders for live pigs to be fattened on site.
- 43 Unlike pig bones, sheep and goat bones are often complete; their distribution shows no obvious disproportion between the different anatomical segments. These characteristics suggest that the meat was eaten fresh after slaughtering the animals on site. Similar observations were made at most of the excavated sites (Krokodilô, Maximianon, Didymoi, Mons Claudianus, Porphyrites). It seems that local livestock on a small scale was common: among these animals, most adults were slaughtered after being used for the production of wool or milk for several years.

2.2.2. The quarries

- 44 Studies of faunal assemblages from quarry dumps are fewer. On the three excavated sites (Mons Claudianus, Porphyrites and Domitianè / Kainé Latomia), proportions of bones of different species are structurally different from those of the road stations. The proportion of pack animal bones, particularly donkeys, is higher whereas pork bones are relatively less abundant (Fig. 5).

Fig. 5

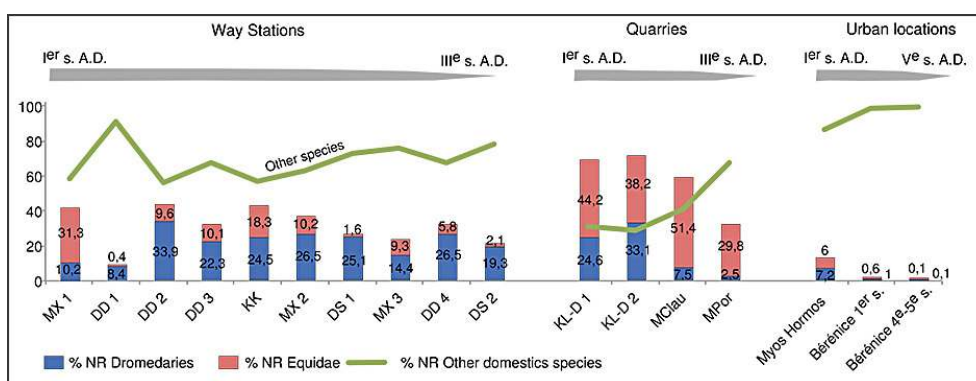


FAUNAL REMAINS FROM THE QUARRY SITES.

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- 45 The predominance of pack animals on these sites is due to the essential role they played in quarrying operations, handling loads in a very different context from the lowland sites. Only the faunal assemblage from the Porphyrites exhibits equal proportions of pack animals and of pork bones.
- 46 If pack animal bones are more common in the quarries, their prevailing attribution to donkeys instead of camels reveals another characteristic of these sites compared to the way stations where camels were the most frequently used animals for transport (Fig. 6).

Fig. 6



VARIATION OF THE NUMBER OF DETERMINED BONES OF THE MAIN SPECIES IN THE VARIOUS CATEGORIES OF RUBBISH DUMPS (NR: NUMBER OF BONES).

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- 47 Conversely, the high rate of equine bones in the quarry sites indicates that these animals were the most common. Their bones are identified almost exclusively as donkeys'. Horse bones are virtually absent, as they are at way stations. At Didymoi, where we find the largest quantity of identified bones, horse bones account for only 3% of the total of the

identified equine bones. In other sites on the routes to Myos Hormos and Berenike, horse bones represent only 1 or 2% of the identified equine bones. All identified horses were adults aged more than 10 years with the exception of an 8 year old from the site of Maximianon. Note that no faunal remains from hybrid species were identified at any desert sites although mules were known from the Ptolemaic period³⁵ and were later greatly appreciated by the Roman army.

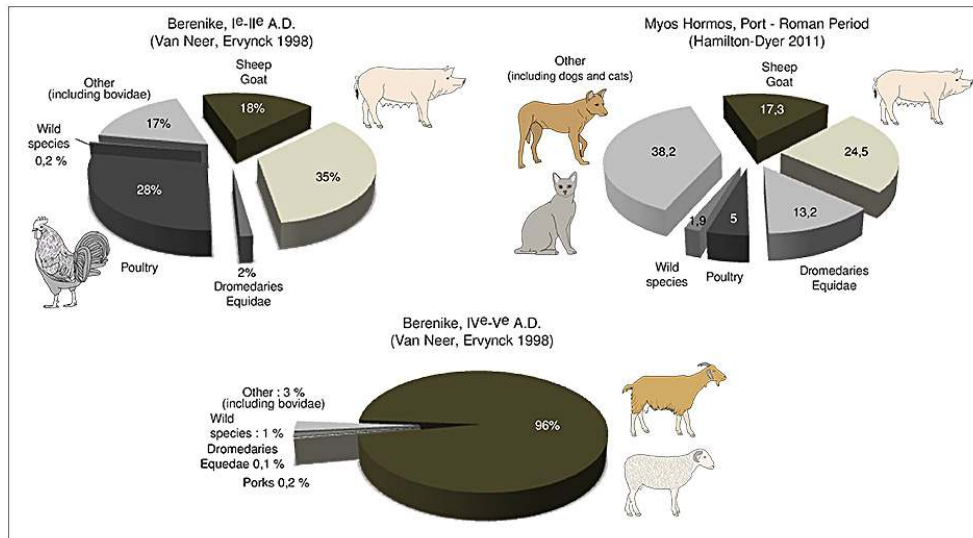
- 48 The significant presence of equine bones in these dumps is obviously linked to the activities of supplying the workers and for the extraction and transport of granite blocks over uneven and rocky terrain, impassable for camels. Camels, indeed, are only suitable for flat and sandy terrain, but they could replace the donkeys once the blocks descended from the mountain quarries to the wâdi bottoms.
- 49 Quarry sites are, therefore, characterized by the presence of large equine herds. These animals were almost always consumed when too old or injured, as evidenced by the numerous cut marks on their bones, precisely noted at Mons Claudianus.³⁶ On this site that housed a mixed population of civilians and soldiers, donkey and pork meat represented the bulk of meat consumption.³⁷ Generally speaking, consumption of donkey meat is common on all the examined desert sites; equine bones discovered in way stations show cut marks and kitchen traces. At Berenike and Myos Hormos, there are no data proving that equine meat was eaten. Donkey and camel meat was not prized,³⁸ but in the Eastern Desert, slaughtering donkeys or camels provided large quantities of meat to eat quickly and the inhabitants could not disdain these proteins.
- 50 Unlike pigs consumed in most cases between one and two years, donkeys and camels were adults at the time of slaughtering. These animals were injured, sick or too old for their workload. Outside the Eastern Desert, the use of equines as a food and as raw materials was limited. For example, while the hides of many species were tanned to make leather, horses were not while written sources even mention dogs or camels.³⁹ Equine meat consumption seems to be characteristic of the desert sites that suffered irregular supply. The cured meat supplied by purchases and meat from animals raised and slaughtered on site were insufficient to meet demand. Even if, in terms of number of bones, those of the pack animals are less numerous than those of pigs, the quantities of meat their carcasses provided were greater. Sporadic supply and frequent shortages, compelled workers and soldiers to exploit any food resources, including equines, which were not regularly eaten.
- 51 Poultry bones were also discovered at quarry sites: the frequency of domestic birds remains similar to that observed in way stations: Mons Claudianus: 5.9% Porphyrites: 4.5%. At Kaine Latomia, the proportion is lower: 0.6% (phase 1: late 1st early 2nd century) and 0.9% (phase 2: mid 2nd century); these lower rates can be explained by the short duration of occupation of this *praesidium*⁴⁰ and by the few bones collected from the dump, perhaps due to taphonomic conditions worse than those at Mons Claudianus.

2.2.3. The ports

- 52 The specificity of the Eastern Desert forts is clear when comparing the faunal assemblages to those of urban contexts at Myos Hormos and Berenike.
- 53 During the 1st and 2nd centuries AD, the populations living in these ports consumed a lower proportion of pork (Fig. 7). At Berenike, we observe an interesting evolution of the proportion of pork bones: absent from the Ptolemaic levels, they become frequent in the contexts of the Early Roman Empire (35% of the faunal assemblages during the 1st century

AD),⁴¹ and then, after the 3rd century they tend to decrease and become rare again in 5th-6th century layers (0.2% of the identified bones).⁴²

Fig. 7



FAUNAL REMAINS FROM SOME URBAN COASTAL SITES (% OF IDENTIFIED BONES).

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- 54 The proportion of sheep and goat bones found in the two ports is similar to percentages observed at the desert forts during the Early Roman period. However, a clear distinction can be observed between these two categories of sites through the distribution of other species, especially poultry and, to a lesser extent, cattle and game. The faunal assemblages indicate that more regular consumption of these species occurred at the expense of pork (Fig. 7).
- 55 This diversity disappears in contexts of the 4th to 6th centuries at Berenike. The composition of rubbish dumps contemporaneous with those of Abu Sha'ar is marked by a high proportion of sea food, which represents almost one third (31.6%) of the overall faunal material and by the quasi-exclusive consumption of small ruminants the bones of which represent 96% of the mammal bones (Fig. 7). Sheep and goats became the main source of meat in terms of frequency and during late Roman times their bones⁴³ have a proportion similar to that found in the Ptolemaic period.⁴⁴
- 56 At Myos Hormos, a first study reveals similar trends although it takes into account only a small sample (300 identifiable fragments) from 1st/2nd centuries contexts. As expected, sea food represents the bulk of the material (71% of the taxa), but the proportion of pork bones is higher than that of sheep and goat (Fig. 7).⁴⁵
- 57 In brief, the Early Roman faunal assemblages of these two ports present a large variety of animal species. The proportion of pork bones and of sheep and goats are roughly equivalent: respectively 35% and 18% at Berenike and 24.5% and 17.3% at Myos Hormos. The supply of meat was supplemented by cattle and especially by poultry, at least at Berenike (Fig. 7). At Myos Hormos, we observe a high proportion of pet bones, from dogs and cats, but the sample is too small to be reliable and this could partly explain this fairly high percentage.

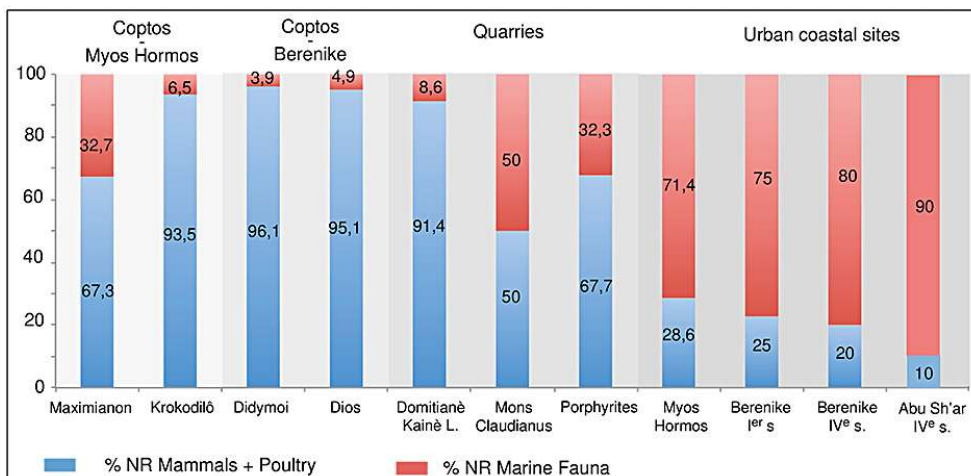
3. Managing shortages: self supply (hunting and fishing) and local livestock

58 Provisioning the *praesidia* depended on caravans. However, some irregularities of official supply together with permanent or occasional shortages often forced occupants to diversify their food sources, exploiting their environment by fishing or hunting and by raising sheep, goats, domestic fowl (chicken) and pigs.

3.1. Marine fauna

59 Marine faunal remains (fish and shellfish) are always present in the rubbish dumps regardless of the remoteness of a site from the coastline. This distance, however, plays an essential role in seafood delivery: at Maximianon, located 60 km from the sea, the proportion of marine remains reach 21.4% but at Krokodilô, 111 km from the coast, seafood represents only 6.5% of the remains. Along the route to Berenike, at Didymoi and Dios, even more isolated, marine animals do not exceed 5% of all faunal remains (Fig. 8).

Fig. 8



MARINE FAUNAL REMAINS COMPARED TO BIRDS AND MAMMALS REMAINS (NR: NUMBER OF IDENTIFIED REMAINS).

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60 On the contrary, coastal sites where securing food from the sea was easier, seafood occupied a central place in the diet. At Abu Sha'ar,⁴⁶ fish bones and shellfish constitute the overwhelming majority of the remains (90%); they are associated with numerous fishing tools: hooks, nets and net weights.⁴⁷

61 At Domitianè/Kaine Latomia, seafood represents only a small part of the faunal remains (8%), but this site was occupied for only short periods. At Mons Claudianus and Mons Porphyrites, seafood waste appears in higher proportions (50% and 32%). These statistics can be explained by larger civilian and military populations, but also by a greater purchasing power among some categories of manpower, especially skilled workers and administrative officials. Seafood was well appreciated and frequently requested: several private letters discovered at Mons Claudianus deal with fresh fish orders; the customers

were willing to pay the price required for purchase and delivery (O. Claud. II 241 and 242). The faunal assemblages at Mons Claudianus are characterized by the abundance of bones and a large variety of species. The structure of faunal assemblages shows that some residents enjoyed substantial buying power and could purchase luxury goods.⁴⁸ Parrot fish was one of the most popular and, consequently, its remains are common in the rubbish dumps.

- 62 Fish was consumed by the privileged classes, from the time of Zeno at least⁴⁹ and in several forms: fresh, salted or dried. Herodotus reports dried (2, 92-93) or salted fish (2, 77) consumption by the Egyptians. Fresh fish was generally prized according to Athenaeus (8, 355-357). During the 2nd and 3rd centuries AD, salted fish was often prepared in specialized workshops (P. Oxy. XLIX 3495 and P. Tebt. III.1, 701: c. AD 235), but there were also domestic productions (P. Oxy. VI 928: 2nd century AD). Under these two forms, fish was affordable for the soldiers stationed in remote desert forts and was available even in way stations located far from the coast. It is difficult to determine whether the fish remains found there are from fresh, dried or salted fish, but it seems sensible to think that the last two categories were the most common because of delivery times.
- 63 The other food source provided by fishing, shellfish, sometimes contributed significantly to human consumption: they are regularly present at all sites and in all levels of occupation of the Eastern Desert, but unlike fish,⁵⁰ the ostraka do not mention them.

3.2. Game

- 64 Hunting was another potential source of meat. However, the proportion of bones collected in the dumps indicates that hunting was rarely practiced. We observe some bones from wild animals living in the Eastern Desert: gazelles, ibex, mountain sheep and hyenas. These remains rarely exceed 1% of the total. This form of self-supply is particularly rare at Maximianon and Krokodilô, likely because they were regularly supplied thanks to their location on the busy route joining Coptos with Myos Hormos.
- 65 Hunting wild animals was not seen as a subsistence activity. Obtaining fresh meat by hunting was difficult in desert areas. However, there are three sites where the remains of wild animals, mainly gazelles, reach 2% of the faunal assemblages: Didymoi during its first phase of occupation (circa AD 76-92), Mons Claudianus during the 3rd century and Myos Hormos during the 1st and 2nd centuries when the movement of people and goods could have encouraged the consumption of game.

3.3. Attempts at local farming: pig sties

- 66 To overcome the supply problems and to compensate for any dearth in the official supply, the soldiers occasionally raised poultry, as we have seen, but also pigs and goats.
- 67 Not only did the garrisons consume cured pork, but also occasionally live animals were slaughtered. Climatic conditions and supply problems are certainly not favourable factors for raising pigs in the desert; nevertheless, certain sites have facilities for housing and fattening young pigs that were slaughtered probably for festivals.
- 68 This practice is known from ostraka mentioning barley food for pigs and by shelters built on the rubbish dumps (pigsties). The pigsties used to protect the animals are small-sized

structures, isolated and sometimes equipped with troughs; they have been documented at Krokodilô, Didymoi, Dios and Xeron Pelagos. They are aligned at Krokodilô (Fig. 9) and Dios (Fig. 10) or opening onto a yard as Didymoi (Fig. 11); but some isolated pigsties exist at Dios and at Didymoi. These facilities experienced short periods of use: they were abandoned fairly quickly, then returned to service or they were rebuilt several times. Indeed raising pigs was sporadic because it required a regular supply of grain. The number of animals fattened in this way was limited: at Krokodilô and Dios, three sties were successively built, at Didymoi and Xeron, two to three in different periods. These sties, whose surfaces vary from 1 to 2 m², have walls of at most one meter high; they could accommodate a single animal; a maximum of two or three pigs could be fed simultaneously. It was not breeder farming, but rather fattening animals born elsewhere; we did not find very young animals. This intermittent practice is consistent with the climatic conditions and with supply difficulties that would have prevented permanent pig raising.

Fig. 9



PIGSTIES IN THE EXTERNAL DUMP OF KROKODILÔ.

© J.-P. BRUN, MAFDO 1996

Fig. 10



PIGSTIES IN THE EXTERNAL DUMP OF DIOS.

© J.-P. BRUN, MAFDO 2008

Fig. 11



PIGSTIES IN THE EXTERNAL DUMP OF DIDYMOI.

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3.4. Local crafts and exploitation of animal raw materials

- 69 The supply issue related not only to food, but also equipment and other supplies for men and animals, which had to be maintained to ensure their proper function in these military posts or in the quarries. The resources of the desert were limited and so were imported supplies; consequently, people had to adapt and to reuse raw or used materials found in their environment. Camels and donkeys were not only food resources, they also provided raw material to small workshops using the hides and the bones of slaughtered animals. Recycling products offered the opportunity, when necessary, to manufacture or repair quotidian objects such as clothes, shoes and harnesses. This work was done by individuals, improvised bone craftsmen, cobblers or tanners. The quality of the items was, however, very poor, especially for leather objects.
- 70 The long and complex tanning processes required water, skilled techniques, specific tools and special equipment⁵¹ that were impossible to implement in the environment and with the limited resources of the Eastern Desert. Yet, transportation and military life required many leather objects ranging from shoes to wineskins and coupling components; these had to be maintained and repaired on site by those who knew how to work the skins. Tanning was then replaced by other processes, especially because animals commonly exploited for their hides, such as cattle, were unavailable. Hides and tendons from animals slaughtered for food, camels in particular, were used to make sandals or harness parts found at Didymoi,⁵² Dios and Xeron.⁵³ These dried and coarsely prepared raw hides were primarily used for mending or making sandal-type shoes (Fig. 12) or belts used to attach cargoes on pack animals; these were basic and shoddy items used for many purposes.

Fig. 12



A. RAW SKIN USED FOR MAKING A SANDAL AT XERON (PHOTO M. LEGUILLOUX, MAFDO 2009). B. GRAPHIC RECONSTITUTION OF THIS SANDAL (SANTAL-TYPE DIDYMOI 1B: LEGUILLOUX 2006, PL. 17).

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- 71 If hide working was systematic, bone carving was less common; camel bones were used to make objects for daily use (pins and spoons). This craft requires some basic techniques involving the selection of the bone material, its preparation by cutting and sawing and finally polishing. For these reasons, waste from cutting and sawing is rare and attested only in 2nd century levels at some sites. At Didymoi, waste concentrated in layers of the second quarter of the 2nd century (Phase 10, c. AD 125-140) when a craftsman was present; at Dios, several artefacts illustrating the entire operating chain were found in levels of the first half of 2nd century.⁵⁴

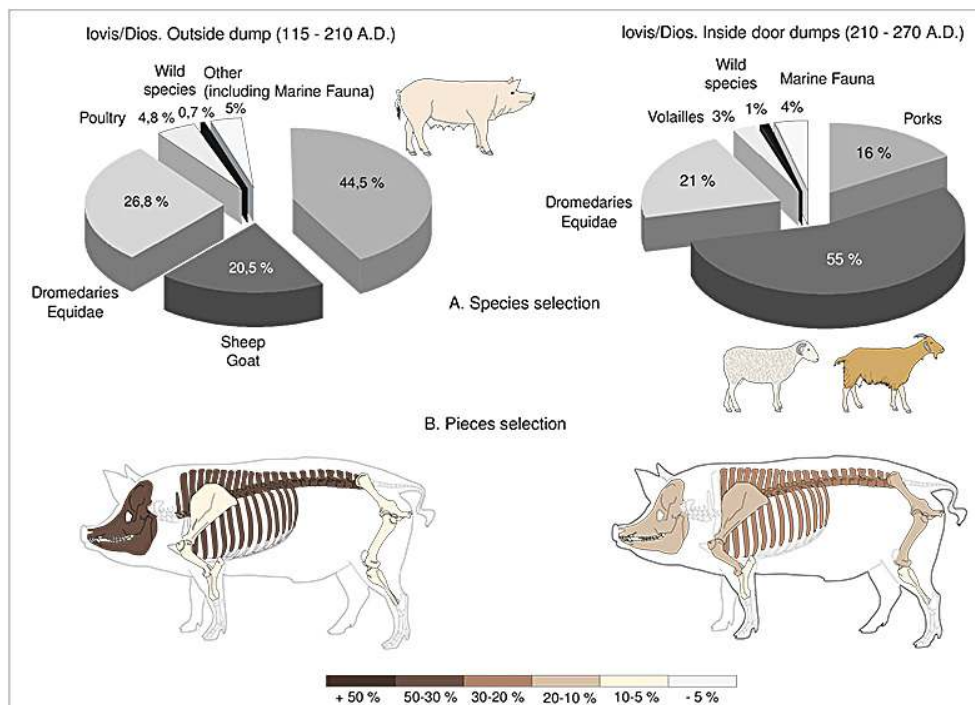
4. Food as a cultural marker

- 72 Archaeozoological studies highlight the living conditions in the Eastern Desert, but they also reveal food choices depending on the period and the origin of soldiers and workers. These choices are reflected by the selection of the species that were consumed. The bones of the main species, except cattle, are always present in the dumps; eventual fluctuation of their respective proportions is an indication of change.
- 73 These proportions are particularly stable during the first two centuries AD indicating that people living in the Early Roman *praesidia* experienced more or less the same diet (Fig. 3). But signs of change appeared during the 3rd century: pig taxa, abundant in 1st and 2nd century levels, became relatively less common with an increase in sheep and goat taxa. This change in the meat diet is noticeable in the late levels of Didymoi (Fig. 3, DD4). This trend is confirmed in the later levels of the *praesidium* of Dios towards the middle of the 3

rd century. Dietary changes are reflected by the selection of species (percentages of identified bones) and the nature of the meat consumed (selection of meat pieces).

- 74 From the reign of Caracalla, the forts on the route to Berenike were occupied by detachments of Palmyrene archers whose installation was followed by significant changes in the architecture of barracks and in waste management. Thereafter, external dumps at the *praesidia* of Didymoi, Dios and Xeron were no longer regularly used and waste was left inside the barracks, which had previously been kept clean. These later soldiers did not regularly clean the living areas and the accumulation of waste on the ground caused a rapid stratification.
- 75 Meanwhile, the composition of the meat diet changed: there was a reversal of the curves of pork versus sheep and goat bones, indicating that the latter species became the main meat sources in the last period of occupation (Fig. 13A). The origin of the meat resources also changed: the occupants of the forts more frequently used local supply, which is proven by the slaughtering of the animals on site. These came from grazing in the desert and they probably belonged to nomadic tribes whose presence may be reflected by sherds of indigenous made ceramics (Eastern Desert Ware) in the layers of this period.
- 76 These changes in supply conditions in the 3rd century are accompanied by a change in the nature of the species of meat that was consumed; pigs were slaughtered providing fresh meat; salted meat rations were no longer the basis of prepared meals as indicated by the uniform distribution of consumable pieces (Fig. 13B).

Fig. 13



Faunal remains from the external rubbish dump and the internal ones in the *praesidium* of Dios (% of identified bones).

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- 77 The specific conditions of life in the isolated way stations, but also the ethnicities of soldiers determined food choices from the first settlements to the final phases of

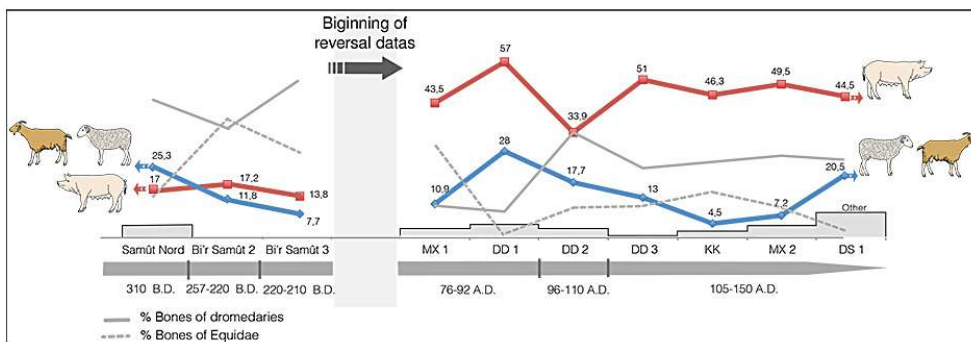
occupation of the sites. We can link these dietary changes and the arrival of detachments of Palmyrene archers⁵⁵ because the ostraka mention Palmyrenes in the Eastern Desert in that same period.⁵⁶ The arrival of an eastern population changed the supply based on new dietary needs and perhaps due to increasing difficulties of supply.

- 78 It is interesting to note that changes also affected the ports and that these were accentuated during the following centuries: sheep and goats dominate in the dumps of 4th and 5th century Berenike indicating that these two species provided most of the supply of meat (Fig. 7). At Abu Sha'ar during the 4th century, pork consumption is also reduced, their bones representing only 15% of the assemblage. The main source of food supply was seafood, which represented 80% of the faunal remains collected.⁵⁷

Food Evolution from the Ptolemaic period to the Late Roman period

- 79 The history of diet of the inhabitants of the Eastern Desert sites is, thus, marked by a series of changes. The changes in the meat supply, which began during the 3rd century AD, are probably due to cultural reasons; they find some parallels in more ancient periods. Indeed, the transition from the Ptolemaic to the Roman period was also a time of change in the selection of species; there had already been an inversion of the curves of the meat diet. In the contexts of Samût from the end of the 4th century (North Samût) to the end of 3rd century BC (Bi'r Samût) previously mentioned, camel meat was the most commonly eaten: their bones are more abundant than those of small ungulates, pigs, sheep and goats (Fig. 14). In the category of small ungulates, sheep and goats seem to have primacy over pigs at the end of the 4th century. During the 3rd century, the proportion of bones from these species is roughly balanced.

Fig. 14



VARIATION OF FAUNAL REMAINS IN PTOLEMAIC AND ROMAN SITES OF THE EASTERN DESERT OF EGYPT.

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- 80 During the Roman times, we observe a difference in Berenike where the study of faunal assemblages found in the Hellenistic levels shows the essential role played by sheep and goats in the diet: their bones represent 89% of the assemblages while pork bones are totally absent.⁵⁸ At Bi'r Samût, it is striking that, although scarce, pork bones are present despite the *delphakophobia* of Egyptian people recorded by Herodotus (2.47-48) and Plutarch (De Iside, 8354): Egyptians regarded pig as a Sethian and evil animal. But pigs and piglets were commonly eaten by the Greeks as suggested by the recurring mentions of this meat in Zeno's archives.⁵⁹ For the Greek communities settled in Egypt, pigs had a special place in their sacrifices.⁶⁰

- 81 2nd and 1st centuries BC faunal assemblages have not yet been documented in the Eastern Desert. We must wait until the first Roman forts, during the 1st century AD, to observe the relative role of each species in the diet. At that time, there is an increase in pork bones that corresponds to the preponderance of pork in the diet of the soldiers occupying the first *praesidia*.⁶¹ The archaeozoology also indicates the preponderance of pork even where alternatives were possible. At Karanis, for example, the dumps contain a large proportion of pork bones, which outnumbered goat and sheep bones and especially cattle bones despite the breeding facilities available in the Fayoum.⁶²
- 82 This overview of the archaeozoological data, therefore, shows the specificity of the various categories of sites according to their function and location (way stations, quarry sites or ports), but also according to the period of occupation because each category and period experienced different methods of supply. Some changes in the composition of the faunal assemblages suggest that institutional and cultural aspects influenced meat consumption. The consumption of pork at Roman military sites of the Early Empire and its regression during the 3rd century are probably due to an evolution of the recruitment of the soldiers, which are also evident from changes in the architecture of the forts and in the clothing.⁶³

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NOTES

1. The Mission française du désert Oriental was led from 1993 to 2013 by H. Cuvigny (CNRS-IRHT) and since 2013 by B. Redon (HiSoMA, UMR 5189 CNRS).
2. Mission archéologique française du désert Oriental/IFAO. B. Redon (Directrice, HiSoMA, UMR 5189 du CNRS), Th. Faucher (Directeur adjoint, CNRS-IRAMAT Orléans).
3. Redon, Faucher 2016, pp. 27-29.
4. Brun et alii 2013; Redon, Faucher 2016, pp. 25-27.
5. Leguilloux 2001.
6. Leguilloux 2001.
7. Brun 2017.
8. Leguilloux 2011.
9. Sidebotham 1994.
10. Wendrich, Van Neer 1994; Van Neer, Sidebotham 2002.
11. Hamilton-Dyer 2001.
12. Hamilton-Dyer 2007.
13. Hamilton-Dyer 2011.
14. Van Neer, Lentacker 1996; Van Neer, Eryvynck 1998; Van Neer, Eryvynck 1999.
15. We refer to the specialized bibliography concerning cereal consumption by the soldiers (Junkelmann 1997 Groenman Van Waateringe 1997) and the civilians (Andre 1981) as well as to the studies of plant remains discovered in the Eastern Desert of Egypt, including Mons Claudianus (Van der Veen 2003) and Didymoi (Tendberg 2011). On these issues, see the paper by Van der Veen, Bouchaud and Newton 2017.
16. Cuvigny 2014.
17. During the Roman Republic and the Early Empire, the legionaries were receiving rations of wheat the price of which was detracted from their salary: Speidel, 1992, p. 98 and n. 79.
18. Cuvigny 2014, p. 71.
19. The olive oil was freely granted to the soldiers from the 2nd century. The wine was detracted from the salary during the Early Empire then granted from Aurelian: Tchernia 1986, p. 17.
20. Didymoi: Brun 2011, Fig. 223, Fig. 238; Leguilloux 2011, p. 172. At Maximianon: Leguilloux 2006, p. 567.

21. Wendrich, Van Neer 1994, p. 183.
22. Cuvigny 2003.
23. Leguilloux 2011, p. 172.
24. Perpillou-Thomas 1993, pp. 201-202.
25. *P. Oxy.* XLII 3055 and 3056, dated AD 285.
26. Small pieces of meat were alternately arranged with layers of salt in a wide mouthed jar or in recycled amphorae reused for transportation and storage (Cato, *Agr* 162; Columella XII, 55, 4).
27. Cuvigny 2012, pp. 14 and 183.
28. Cheap muzzles were used for cured meats: a butcher dump discovered during the excavations of craftsmen discharges at *Aqua Sextiae* (Aix-en-Provence) contained bones from hundreds of cattle and pigs heads, mainly muzzles (mandible and maxilla), cut in small pieces. A special knife was used for the preparation of “heads pressed” or snouts “salad”: Leguilloux 1997.
29. In a letter written in AD 311, the *strategos* of the Oxyrhynchite region acknowledges the reception of 4850 pounds of meat (1,586 kg) for the soldiers of Memphis (*P. Oxy.* XXXIII 2668).
30. Jones 1964, pp. 628-629.
31. Duncan-Jones 1976, pp. 43-52.
32. *P. Oxy.* XVI 1903, dated from AD 561 is a receipt issued by a butcher involved in the distribution of 960 pounds of beef (314 kg) to 30 soldiers, each soldier receiving 30 pounds for a month (9.8 kg). *P. Oxy.* XVI 1920 and *P. Oxy.* XVI 2013 (551 AD) are receipts for meat distributions.
33. Occasionally troops were given free food, in particular during celebrations or religious festivals taking place regularly: Davies 1971, p. 125; King 1984, pp. 187-218.
34. For Mons Claudianus: *O. Claud.* II 271, pp. 102-103.
35. Rostovtzeff 1922, pp. 107-114
36. Van Der Veen 1998, p. 104.
37. Van der Veen 1998, p. 103.
38. This type of meat remained long discredited: in 14th century texts, the poorest people, who could not even get mutton, consumed horse meat, donkey and camel with a gradation in quality from the sheep (or goat), pork, cattle, fish, horse, donkey and, finally, the dromedary: Ashtor 1968, pp. 1034-1035.
39. Dercy 2015, p. 17.
40. Short stays probably limited the possibilities of raising hens and cocks.
41. Van Neer, Lentacker 1996, p. 349; Van Neer 1997, pp. 141-143.
42. Van Neer, Yrvynck 1998, Figs 17-23.
43. Van Neer, Lentacker 1996, p. 347
44. Van Neer, Eryvynck 1997, Figs 17-23
45. Wattenmaker 1979, pp. 250-252 and 1982, pp. 347-353.
46. Van Neer, Sidebotham 2002.
47. Wendrich, Van Neer 1994.
48. Van Der Veen, Hamilton-Dyer 1998.
49. Reekmans 1996, p. 27.
50. Orders for fresh fish and salted fish are regularly mentioned in the *ostraka* of the *praesidia* of the two routes: Cuvigny 2006, pp. 273-254; Cuvigny, 2012, p. 32.
51. Hide treatment and leather production were perfectly mastered by Roman craftsmen and their techniques hardly changed during Antiquity and Middle-Ages and actually the modern era until the advent of chemical agents. On the technical products and the quality of tanning in Greek times: Dercy 2015; in Roman times: Leguilloux 2004; Van Driel-Murray, 2008.
52. About the use of raw skin by the inhabitants of the *praesidium* of Didymoi: Leguilloux 2006b, Figs 6, 7.
53. About the use of raw skin on the *praesidia* of Dios and Xèron: Leguilloux forthcoming b.

54. Leguilloux forthcoming, d.
 55. Palmyrene archers are known at Koptos from AD 183-185, but their deployment along the route to Berenike does not appear prior to the start of the 3rd century.
 56. Cuvigny 2012, p. 1315.
 57. Wendrich, Van Neer 1994, p. 183.
 58. Van Neer, Ervynck 1998, figs 17-23.
 59. Reekmans 1996, p. 23.
 60. Perpillou-Thomas 1993, p. 207.
 61. Roman papyri indicate that numerous animals were consumed during religious festivals: Perpillou Thomas 1993, pp. 206-207.
 62. Boak 1933, pp. 88-92.
 63. According to D. Cardon's presentation at the conference: <http://www.college-de-france.fr/site/jean-pierre-brun/symposium-2016-03-31-09h30.htm>.
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