

## Animals and the history of ancient and medieval Alexandria

The study of animal bones is crucial for understanding past societies, providing information both on dietary practices and the exploitation of animal remains as raw material. However, archaeozoological analyses of animal remains from domestic deposits are rare in Egypt. The state of the art proposed in the introduction to this volume (table 1, fig. 1, p. 6-13) highlights the regional and chronological disparities between the Late Period and the Middle Ages. Only about forty publications deal with faunal remains, for just over 320,000 bones. Thus, the proposed study of Alexandria marks an important step in research on the relationship between human and animal populations in Egypt.

In order to better understand the archaeozoological approach, it is important to take stock of what is known about the local environment and history of the city (**chapter 1**, p. 15-24). Its establishment *ex nihilo* by Alexander the Great in the 4th century BC is a balance between the imperatives of a Greek city, above all a seaport, and the environmental constraints of Egypt's Mediterranean coastline. Built on a sandstone dune line, the city is bordered to the north by the Mediterranean Sea and to the south by Lake Mariout, a city between two seas as described by Strabo in his *Geography* in the 1st century BC. In the first decades after the creation of the city, a canal was built to bring fresh water from the Nile, closing the access of Lake Mariout to the sea. This lake, now almost extinct, was the river route from Alexandria to the Nile valley. The limits of its boundaries are difficult to calculate because of the variable flood levels. However, major trends are discernible between Antiquity and the Middle Ages (fig. 3-4, p. 18-19). The lake alternated between dry and full water phases. Throughout its history, this geographical position made Alexandria a leading port city, open to the Mediterranean basin and connected to the Nile by its lake port. Its hinterland is located at the interface between the Delta and the Libyan desert.

The city developed rapidly between the early Hellenistic period and the Roman Empire, before gradually declining in the Middle Ages and becoming a port of the Ottoman Empire in the early 16th century. Knowledge about the Greek, Roman and Medieval city is still incomplete.

Nevertheless, textual sources, archaeological excavations in the city and geophysical surveys provide additional information on the history of the political and religious monuments, the layout of the city walls, the organisation of the residential quarters, the ancient necropolises and the medieval cemeteries (fig. 5, p. 22). This short opening synthesis provides a (non-exhaustive) assessment of our knowledge of the city in order to better understand the importance of the archaeozoological approach in the Brouchion district.

The work carried out in Alexandria by the Centre d'Études Alexandrines (CEAlex) was part of an archaeological rescue operation. Of the fourteen sites excavated, seven were selected because of their nature (domestic, artisanal, utilitarian), the quantities of animal bones discovered, and the progress made in the processing of stratigraphic data. The methodological choices are summarised in order to understand the difficulties encountered during the excavations on the one hand, and the selection of faunal samples on the other (**chapter 2**, p. 25-33). The analysis of the archaeological documentation (context sheets, stratigraphic diagrams, ceramic and numismatic studies, etc.) made it possible to establish nine chronological phases between the 4th century BC and the 15th century (table 4, p. 30). The contemporary sites are thus comparable throughout the occupation of this district. The methods used in archaeozoology are then explained, from quantification criteria to biometric studies (p. 34-48). The reference systems used (metrics and masses) are available in Appendix B (p. 337-341).

**Chapter 3** provides an overview of the archaeozoological corpus (32,700 NISP, Number of Identified Specimens) summarising the state of preservation of the material and the diversity of species identified (108 taxa). Notes on the seven selected sites and their respective faunal assemblages are then presented (p. 49-93). The state of archaeological knowledge and the archaeozoological spectra by period are thus brought together.

After presenting the historical, archaeological and methodological overview, several thematic and diachronic chapters present the qualitative and quantitative results of the study of the faunal material. Figures illustrate these data (graphs and photographs), in order to make the data obtained more accessible. For each aspect addressed, short summaries are accompanied by interpretations that shed light on human practices such as animal selection or the choice of meat cuts.

**Chapter 4** on livestock begins with the domestic triad: beef (*Bos taurus*), pigs (*Sus domesticus*) and goats (sheep [*Ovis aries*] and goats [*Capra hircus*]). These three taxa are in the majority with 12,000 bones distributed in the samples from the Hellenistic period to the Middle Ages. The comparison of the proportions of the triad (NISP and mass) by type of context (pits, dumps, wall foundation trenches, backfills) and by spatial entities (streets, dwelling units, plots) highlights differences at varying scales: from sites to sectors and from one phase to another (fig. 28-39, p. 95-108). The triad is not consumed in the same way over the centuries (fig. 40, p. 108). Analyses of the ages of slaughter and the sex of the animals are important steps in proposing hypotheses on the selection of specimens (p. 109-121). This research is amplified by studies of cutting and cooking marks (p. 122-133), and then on the anatomical distribution (p. 133-144). A detailed descriptive and interpretative reading of the anthropic marks and the choice of pieces is proposed. The ancient and medieval food preparations are thus outlined. The section on the domestic triad concludes with a morphological analysis of the specimens (p. 145-152) based on the height at the withers and the LSI (*Log Size Index*). These two methods describe the stature of the farm animals consumed by the Alexandrians. Cattle have a stable morphology over time

while that of pigs evolves, the specimens being taller, from 77 cm at the withers in the Hellenistic period to 80 cm in the Early Roman Empire. Caprins (sheep/goat), on the other hand, were larger from Antiquity to the Middle Ages (average of 75 cm) compared to other livestock in the Mediterranean basin (between 65 and 70 cm).

Bones of equids (horses, donkeys, mules, hinnies) are rare in the samples, less than 5% of the NISP (p. 152-156). Distinguishing between species remains difficult, and only DNA analysis is fully effective for their determination. The metric data nevertheless allow us to observe the presence of large specimens (horses?) and smaller ones (donkeys?). Some data on the ages and traces of cutting on the bones are the basis for a reflection on the place of equids in the meat diet in Alexandria and the rest of Ptolemaic Egypt.

Finally, the study of domestic poultry closes this chapter (p. 156-166). The proportions of cock (*Gallus gallus*), a bird probably introduced to Egypt in the Hellenistic period, and the greylag goose (*Anser anser*), the only species to have been domesticated in the Pharaonic period, raise questions about their place in the economy of the city. From the first centuries of the Hellenistic period, the chicken is more common than the goose and wild birds (fig. 82, p. 158). Hens are in the majority according to the study of calcareous deposits in the bones, the presence of dewclaws and the analysis of sexual dimorphism. Meat and eggs were therefore valued. The measurements of the few goose bones illustrate their large size, an Egyptian peculiarity (fig. 86, p. 163).

**Chapter 5** is devoted to the exploitation of the ancient and medieval biodiversity of a territory located between the Nile delta, the Libyan desert and the Mediterranean Sea (p. 167-194). Among the avifauna, about thirty taxa have been identified. The most represented are the anatines, which include ducks and scaups. These birds were certainly captured on Lake Mariout or in the vicinity of the lake region. Other species are more occasional, such as flamingos (*Phoenicopterus roseus*), cranes (*Grus grus*) and pelicans (*Pelecanus* sp.). The lack of sediment sieving certainly under-represents the avifauna in the faunal samples. Diachronic analysis of the proportions might indicate an increase in anatines and anserines throughout Antiquity (fig. 94, p. 177). In the Middle Ages, the rooster was the most consumed bird, judging by the number of remains, more than 90%.

The hunting of wild and dangerous animals is attested by the presence of hippopotamus (*Hippopotamus amphibius*) and crocodiles (*Crocodylus niloticus*). The bones of these animals are rare, but provide some information on their exploitation in Graeco-Roman antiquity. For example, a hippopotamus humerus was sawn off during the cutting of the carcass (fig. 95, p. 180). Traces of cutting on a crocodile skin plate reveal skin processing activity in the Late Roman period (fig. 96, p. 182). For desert animals, first of all come the wild bovids (gazelles, hartebeests) certainly hunted in the semi-desert part of the Alexandrian countryside: the Mareotid of the wells. The ostrich (*Struthio camelus*) is also attested by eggshells in the Hellenistic period and by bones in the late Roman period. In this period, direct evidence of the consumption of this large African bird is found in Alexandria (fig. 99, p. 187). Finally, non-native animals such as deer (fallow deer [*Dama dama*] and red deer [*Cervus elaphus*]) reveal trade in the Hellenistic period with the Aegean world and Asia Minor.

The exploitation of marine resources is an important component of the diet (**Chapter 6**). The malacofaunal spectrum is very diverse with about sixty taxa (p. 194-211). Oysters (*Ostrea* sp.) were largely dominant during the Hellenistic and Roman periods, but the range of species was enriched by spiny (*Bolinus brandaris*) and tuberous (*Hexaplex trunculus*) murexes, bean (or wedge) clams (*Donax trunculus*) or grooved carpet shell (*Ruditapes decussatus*) and cockles (*Cerastoderma*

*glaucum*). These marine (or brackish) shellfish thrive in very different biotopes, from rocky to silted substrates, suggesting that the Alexandrian coast was rich in a diverse coastline. Today, the coast has changed significantly due to subsidence and tectonic movements. The freshwater or terrestrial malacofauna is very rare, underlining the preference of the populations of the Brouchion district for products of marine origin. In the Middle Ages, bean (or wedge) clams (*Donax trunculus*) were particularly appreciated, if we are to believe the quantities of shells found in the backfills of the el-Nabih cistern. This consumption is reflected in Medieval textual sources.

The section of the book on the exploitation of aquatic resources ends with fishing (p. 212-225). The collection bias most certainly under-represents small specimens; the analysis of standard lengths highlights this. In the Hellenistic period, Nile perch, the largest specimens over one metre in length, are in the majority. Some particular deposits from the Late Roman period seem to indicate the presence of tilapia, cyprinid and mugilid preparations in the artisanal area of the Diana Theatre site. In the Middle Ages, freshwater and brackish water taxa are still favoured. Finally, the shell remains of sea turtles (Cheloniidae) are also recontextualised in the food history of the city.

**Chapter 7** deals with the exploitation of hard materials of animal origin. Several sites in the corpus yielded a few or several hundred worked bones (p. 227-265). This material, which is often little exploited in archaeozoology, is examined here in order to document the sourcing and processing strategies of the Alexandrian craftsmen. Equid, bovid and cervid bones are the most commonly used taxa. Fragments of sawn dromedary have also been found in Hellenistic levels (fig. 126, p. 231). A few fragments of African elephant (*Loxodonta africana*) and Indian rhinoceros (*Rhinoceros unicornis*) ivory are also present in very small quantities. Two particular batches of worked bones were highlighted, the first from the Hellenistic period at the Fouad Street site (p. 233-236) and the second from the Late Roman period at the Diana Theatre site (p. 250-255). To study these workshop rejects, a classification grid by species, by bone and by treatment of the bone pieces was used. This analysis has made it possible to highlight the different strategies of supply, selection of pieces and treatment of materials in the production areas. In addition to bone work, mollusc shells were also used for craft and decorative purposes (p. 237-248). Chemical composition analyses have identified remains of iron and lead pigments or gold leaf, materials that were certainly used in wall plastering. Shells were used as cosmetic containers and mother-of-pearl was sometimes used as raw material (p. 246 and p. 255). Large quantities of red coral (*Corallium rubrum*) found in the late Roman craft district invite a discussion on the trade of this material from the western Mediterranean. The samples from Antiquity are richer, but some remains from the medieval period are also described (p. 260-261). This chapter on worked hard materials closes with jacks, game pieces that have survived the centuries. Several examples have been found in the contexts of Hellenistic settlements in the city of Alexandria. This game was very popular in the eastern Mediterranean and was certainly introduced into Egypt by the Greeks. On one of them an upsilon (Υ) and a sigma (Σ) are inscribed (fig. 148, p. 264). This is certainly the abbreviation of the name of a deity bringing good luck in games. A few jacks were also found in the fill of the medieval cistern construction. This game was probably played by the builders.

In the city, some animals are neither consumed nor exploited in craft activities (**chapter 8**, p. 267-274). Auxiliary and commensal species lived close to human populations: cats, dogs and rodents. Their bones are frequent in the assemblages of the Late Roman period, during which

the Brouchion district was no longer a residential area, but a craftsman's area. Rats are particularly numerous in these contexts.

The **last chapter** of the book offers a synthesis of various aspects of life in Alexandria based on archaeozoological data. These unpublished results provide a better understanding of the strategies for the supply of meat and craft products during the three main periods of the city's history. Historical knowledge and archaeological data enrich the study of animal exploitation in an urban context.

The first point summarises the dietary practices of the foreign and well-to-do population of the Brouchion district near the royal palaces (p. 275-284). The proportions of small livestock in the diet (sheep and pigs) change significantly between the Early Hellenistic and Early Roman periods. The large quantities of sheep at a site from the late 4th and early 3rd centuries BC opens a discussion on the origin and activities of the city's first inhabitants. Then, the pig takes a prominent place to reach 80% of the NR<sub>3</sub> (number of remains of domestic triad) during Antiquity (phases 1 to 4). This overwhelming place in the diet is to be compared with Roman dietary customs; ceramic studies also converge in this sense. The place of the cockerel is also interesting in Egypt's relationship with the ancient world. This bird took an important place in the economy of the city from the Hellenistic period, a phenomenon observed in several regions of the eastern Mediterranean. The exploitation of local wildlife by the Greek (or Hellenised) elites shows the acculturation of these foreign populations with the Egyptian world and its emblematic animals: hippopotamuses, crocodiles, ostriches and wild bovids (hartebeest, gazelle). These animals were integrated into the meat diet in a sustainable way. Finally, the consumption of marine molluscs, from oysters to murex, highlights the introduction of new dietary practices in Egypt. Prior to the Hellenistic period, Mediterranean marine shellfish were not, or only rarely, consumed by Egyptians.

Hellenistic sites are windows to the environment where spaces for craft production have been revealed by archaeozoological material through spatial approaches (p. 285-287). The finds of sawn dromedary and equine bones are evidence of the recovery of animal bones – from animals previously used for the transport of goods or people – for the production of objects. Craftsmen probably obtained their supplies from the outskirts of the city, where the animal corpses were usually disposed of.

For the Late Roman period, we follow the evolution of the Brouchion district and especially the artisanal area uncovered on the site of the Diana Theatre (p. 289-294). Butchery activities were highlighted by the faunal discards with specific characteristics: very high proportions of beef, a particular cut and a characteristic anatomical distribution. Although the architectural elements were recovered in the Medieval period, the archaeological material and the spatial distribution of the remains reveal areas for the processing of cattle carcasses on the one hand, and areas for the working of semi-precious stones, red coral and Red Sea pearl oysters on the other (fig. 156, p. 291). The craftsmen coexisted with butchery activities, certainly in order to obtain raw materials. Cattle bones were indeed recovered for the production of objects. Some of them (scapulas, humeri, metapods) were specifically used to make pins, game pieces and decorative elements.

The cross-referencing of historical and archaeological data facilitates a global analysis of the area, which was certainly extramural during this period, with all the necessary caution in the interpretations made. The end of Antiquity was marked by the Justinian plague. This pandemic struck Alexandria in the middle of the 6th century according to the textual sources, before affecting other territories of the Mediterranean basin (fig. 158, p. 295). Three sites from this

period yielded numerous remains of black rats, one of the main propagators of the flea infected with the bacterium *Yersinia pestis*. This discovery allows us to return to the other archaeological evidence of the pandemic in Alexandria.

The last part of the chapter deals with the medieval period using a case study: the el-Nabih cistern (p. 297-300). Although it is a small sample, the backfill associated with its construction and repair has yielded large quantities of bones. Trends common to the whole Muslim world are apparent, such as the significant consumption of goats and the very low place of pork. Young sheep, dromedaries and marine molluscs open a discussion on social and regional particularities. The cross-referenced study with Medieval texts providing information on the food choices of different social categories in Egyptian society indicates that the cistern waste reflects the diet of the builders, but also of a larger part of the inhabitants living in the vicinity, given the diversity of the taxa identified.

The conclusion takes stock of the archaeozoological knowledge on the food choices and artisanal activities of this district of Alexandria (p. 301-303). Parallels are observed both in Mediterranean societies and in Egyptian traditions of the Pharaonic period, illustrating the multiple influences in Alexandrian society, at the crossroads of the ancient worlds. Research must continue in order to support these results, notably by multiplying collaborations. However, archaeological excavations of the settlement areas in Egypt are still rare and the excavation protocols are not generally adapted to bioarchaeological studies (archaeozoology, archaeobotany). On the other hand, a recent dynamism allows the creation of new multidisciplinary teams. Prospects are opening up, particularly on the scale of the Nile delta, a region that is still poorly documented on breeding, hunting and fishing practices between the first millennium BC and the Middle Ages.

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