

Rubbish Reuse in Ptolemaic and Roman Egypt

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Abstract

Waste held a significant, but often overlooked, socio-economic role in Ptolemaic and Roman Egypt. What people decided to classify and dispose of as waste – as well as what they decided to keep – provides rich insights into their social structures, perceptions of the environment, and everyday activities.¹ This article draws together papyrological documents, archaeological evidence, and ethnoarchaeological comparisons to explore different kinds of waste and waste management in the Ptolemaic and Roman periods. It highlights how the inhabitants living in Egypt during that time used and continued to reuse, repurpose, and recycle their waste materials for socio-economic reasons. The paper starts with a consideration of the different types of waste that people produced as well as the divergent life cycles waste takes. Then, it considers three specific categories of waste, namely those originating from agricultural activities or products, human liquid and solid waste, and animal and other domestic waste. Throughout, we draw from ethnoarchaeological comparisons in order to enhance our papyrological and archaeological datasets. Finally, it is argued that waste held a significant, but often overlooked, socio-economic role in Ptolemaic and Roman Egypt.

Keywords: Rubbish, Greek papyri, archaeology, Ptolemaic Egypt, Roman Egypt

Understanding Rubbish: Terminology and Life Cycles

While contemporary society uses the terms “garbage”, “trash”, “refuse”, “waste”, and “rubbish” synonymously in casual speech, these terms have different meanings.² “Trash” refers specifically to dry discards such as papyri, textiles, ceramics, and so on. “Garbage” encompasses wet discards and organic remains such as those created by food preparation and agricultural labour. People often reuse this form of waste as fodder or as compost to fertilize crops. Human and animal waste offer a special subset of garbage in most societies. Although people often use animal waste as fertilizer or for fuel or even craft production they often dispose of solid human waste outside of settlement areas because it contains pathogens that can be quite dangerous to human health. “Refuse” includes both wet and dry discards, while “rubbish” includes these discards and even construction and demolition debris. In this paper, the researchers use the terms “rubbish” and “waste” to speak about discard in a general sense and the specific terms, as defined above, when we speak of coherent assemblages of waste.³

The life cycles of these different types of rubbish are varied. Often, people are reluctant to simply discard an item because they wish to extract further economic or

¹ Zimring and Rathje 2012, xxv.

² Rathje and Murphy 2001, 9, footnote. See also Boozer 2024.

³ On various acts of waste disposal, see Schiffer 1976, 1987 and Hodder 2012, 73. Boozer forthcoming elaborates on these disposal behaviors in a Romano-Egyptian context.

social value from it. Instead of discarding rubbish they extend its life course by reusing, recycling, or repurposing it. “Reuse” involves simply using the item again, often in a different way or by reclaiming the item. For example, throughout their history Egyptians often sold old clothing that others reused in a similar manner.⁴ Reuse extends the useful life history of an object without significant additional labour. It also provides individuals with access to an object that they might otherwise be unable to purchase new. Repurposing, like reuse, involves little effort. It puts the material from the original item in its original state to a new use. Here, an individual might repurpose a storage basket used for transporting fruit into one used to store clothing. By contrast, “recycling” adapts an object to a new use. This adaptation involves a form of processing to regain the material of the item and make it usable for creating another item. For example, individuals in Ptolemaic and Roman Egypt often cut down worn clothing to form clothes for children or to create other types of objects such as saddle pads.⁵ This form of processing is a type of recycling. Reuse and repurposing extend the life of an item while recycling reprocesses an item into a new raw material. Finally, garbage often has a unique life cycle that ends with either its decomposition for use as fertilizer or repurposing for fodder. The next section begins with agricultural forms of waste materials and their management.

Using and Repurposing Agricultural Waste

Agricultural activities were one of the main producers of waste in Ptolemaic and Roman Egypt. Yet agricultural products or anything coming out of them were completely used and repurposed. At harvest, the produce of the land was gathered at the threshing-floor or the drying place of agricultural fields. In AD 120 in the Hermopolite nome, Petechon son of Hareos, who leased from Hermias son of Sabourion 3 arourae sown with vegetable seed, stipulates that ‘*I will measure the rent in the month of Epeiph and you shall carry it all from the common threshing-floor by halves, new, pure, unadulterated, sifted, measured by the seven-meira measure of Athena belonging to the estate, you, Hermias, being responsible for the rent of the estate*’.⁶ In AD 127 in the same nome, it is also mentioned in a petition that ‘... *of the public threshing-floor of the aforesaid village Tisichis, having gathered the greater part of the produce of the fields*’.⁷ Wheat, barely, and other sowing plants are measured at the threshing-floor like the wheat measured at the threshing-floor of the farmstead of Asclepiades to the credit of Hermolaus in AD 137, probably in the Hermopolite nome.⁸

At harvest, farmers left little-to-no waste behind at the threshing-floor. The written confirmation of clearing the field after the termination of the rental contract is always stressed in lease agreements, reflecting the insistence of the two parties on removing rubbish and leaving no waste at all. Thus, in 103 BC at Tebtynis, Ptolemaios alias Petesouchos acknowledges the lease of land from Maron, and attests that ‘*after the expiration of the lease I shall hand over the arouras free from rushes, reeds, coarse*

⁴ Kajitani 2006, 104; See also *Stud.Pal.* 22.56 (second to third century AD, Soknopaiou Nesos).

⁵ On the saddle pad, see Thomas 2006, 142.

⁶ *P.Ryl* II.168.

⁷ *P.Ryl* II.122.1-5.

⁸ *P.Ryl* II.201.

grass, and all garbage (allēs deisēs)'.⁹ Similarly, in 101 BC at Ptolemais Euergetis, Maron leased his plot of cleruchic land to Ptolemaios, son of Apollonios, for three years, where he testifies that '*I shall hand over the arouras free from rushes, reeds, coarse grass, and all garbage.*'¹⁰ People made use of these by-products of agricultural labour.

In an application for a lease of grain land at Bacchias, datable to AD 121, Horos, son of Horos, addressed Haryotes, son of Alexas, and confirms that '*I shall deliver in the month Pauni in the village the annual rental in grain, new, clean, without blemish, and free from barley. And after the expiration of the lease I shall hand over the arouras free from rushes, reeds, coarse grass, and all garbage (δε[ίσι]ης πάσης)*'.¹¹ Many agricultural tools were used for collecting and removing the waste left in the threshing-floor. In AD 34, Sotas son of Maron, superintendent of the estates of the children of Tiberius and Livia, wife of Drusus Caesar, petitioned Gaius Arrius Priscus, chief of police, that Orsenouphis, son of Heracleus, and Heracles, son of Ptollis, stole many tools which were kept in the tower (*purgos*), including 5 rakes and 6 hay-sickles, attesting to value of the common tools used for dealing with agricultural products and the removal of their waste.¹²

Reeds, hay, chaff, rushes, and coarse grass were all important for the economy of the inhabitants in Ptolemaic and Roman Egypt. Reeds were sometimes collected and kept in the local storehouse as demonstrated in the lease of an olive yard indicates: *at a rent of a metretae for ... and for ... of 13 metretae of ... oil that is acceptable, new, pure, unadulterated and strained, making a total of 15 metretae, and an extra amount of a cotylae for each metretes, subject to no deduction or risk ; and we will perform the gathering of the olives by divisions (?) and reeds, and will complete the work by the 10th of Tubi and deliver the rent by the 30th of Mecheir of the same year, you supplying the vessels and the storehouse free of rent, on condition that the lease to us be confirmed by the 9th of the present month Hadrianus.*¹³

People used reeds for many different purposes; as fuel for domestic ovens, which archaeology confirms by their presence in the courtyards of many houses at Karanis, Trimithis, and Kellis (among other sites),¹⁴ or in the heating of public baths as the preserved edict of Caracalla confirms: *All Egyptians who are in Alexandria, especially country people who have fled from other districts and can easily be detected, are to be expelled with all thoroughness, with the exception, however, of pig dealers and river boatmen and the men who bring down reeds for heating the baths.*¹⁵

Reeds, particularly papyrus and palm leaves, were also utilized in the creation of furniture and tools. Beds were commonly made from papyrus reeds, while boxes were crafted from palm leaves, both frequently included in marriage contracts as part of

⁹ *P.Teb.* 1.105.27.

¹⁰ *P.Teb.* 1.106.26.

¹¹ *P.Mich.* 3.184.

¹² *P.Ryl.* 2.138.

¹³ *P.Ryl.* 2.97.

¹⁴ Gazda 1983, 28, fig. 49 = Abdelwahed 2015, 82, fig. 90 = Abdelwahed 2016, 6, figure 6. Boozer 2015; see Depraetere 2002 for a comprehensive comparative study of domestic bread ovens.

¹⁵ *P.Giss.* 1.40. 16-29 = *Sel.Pap.* 2.215.

dowries.¹⁶ Household hand brooms are similarly made of palm leaves or fibres, and are archaeologically confirmed in many houses and courtyards at Karanis and other, more recently excavated sites such as Trimithis and Kellis (figure 1).¹⁷ Some modern Egyptians still use hand brooms made of palm leaves or bundles of palm fibres woven together with ropes (figure 2). Palm-gardens are attested in Greek papyri from the Ptolemaic and Roman periods. In AD 208, '[...] and Heries his brother expressed their desire to lease from Flavia Petronilla also called Titanias with her guardian her husband Gaius Valerius Pansa, ex-gymnasiarch, the palm-garden called that of Herennius belonging to them in the area of the village of Hephaestias in the Arsinoite at a total rental of 1,000 silver drachmae and as special items 2 artabae of dates on single stems measured by the dromos date-measure of the village'.¹⁸

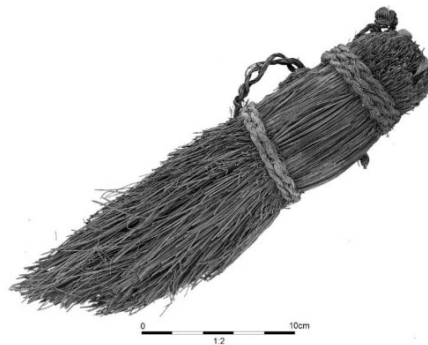


Figure 1: Palm fibre broom (Roman, Karanis). KM inv. no. 3508. Courtesy of the Kelsey Museum (after: Anna Lucille Boozer 2021, 106, figure 5.3)



Figure 2: A modern hand broom constructed from three bundles of palm fibres woven together with a rope (authors)

Hay similarly had an important economic value in the Ptolemaic and Roman periods. It could be delivered as public revenue, rent of agricultural lands, or be used as animal fodder. Hay was left in fields or the drying place for some time before being moved on by the state as revenues or being transported to be stored at the storehouse or the

¹⁶ *P.Eleph.* B28. Translation: Porten 1969, 179.

¹⁷ Gazda 1989. Boozer 2013; Kellis citation.

¹⁸ *P.Ryl* 2.172.

barn of private houses. Whether left in agricultural fields or drying floors or kept in storehouses or domestic barns, hay was subject to robbery, apparently due to its economic value. Thus, in AD 34, Artemidorus son of Irenaeus of Euhemeria petitioned Lysanias, strategos of the Arsinoite nome, that ‘*some individuals made a thievish incursion into the land which I cultivate belonging to Marcus Apollonius Saturninus in the area of Euhemeria in the division of Themistes and carried off on donkeys thirty bundles of hay from two arourae.*’¹⁹

In AD 37, Heracleus son of Pnepheros, farmer of revenue-land, of Euhemeria similarly petitioned Athenodorus, chief of police, that ‘*certain individuals made a thievish inroad on the hay which I have on the revenue-fields cultivated by me in the first plot, stored to the account of the nomarch, sown by myself and belonging to the State, and they carried off by means of donkeys a matter of six hundred bundles.*’²⁰ In AD 30 at Euhemeria, Psosnaus son of Kesthorus, a farmer, wrote ‘*to Dionysodorus, strategos of the Arsinoite nome: On the night before the 16th of Phamenoth of the 16th year of Tiberius Caesar Augustus certain individuals made a thievish attack on the house belonging to me at Euhemeria, and having gained an entrance into the barn carried off five hundred bundles of my hay.*’²¹

People used hay as fodder for both state and privately-owned animals. In 152 BC at Tebtynis, Lysis, keeper of horses and antigrapheus received from Petosiris son of ... ‘*for the royal horses kept by me at Krokodilon polis in the Arsinoite nome, in the month of Tybi of the 29th year, 2000 two-minai bundles of hay.*’²² In the same year, Lysis received from Semtheus son of Phthaus “*for the royal horses kept by me at Krokodilon polis in the Arsinoite nome, in the month of Tybi of the 29th year, one thousand five hundred two-minai bundles of hay, total 1500.*”²³

In AD 16, Ptolemaeus son of Leonides, superintendent of the donkeys of Apollonius son of Alexander at Euhemeria, wrote to Aphrodisius and Petermouthion, both sons of Asclepiades, that “*I have received from you on account of the purchase of hay from the harvest of the 2nd year of Tiberius Caesar Augustus one thousand bundles of hay, total 1000 bundles of hay.*”²⁴ In AD 38 in the Arsinoite, Ammonius wrote a letter to his dearest Aphrodisius: “*As to the pigs’ fodder and the rest of the price for the hay make provision until I come... Urge your wife from me to look after the pigs and do you also take care of the calf. Be sure, Aphrodisius, to send me the loaves and the relish; and if you will, write me to whom I shall pay a further 20 drachams for hay and fodder.*”²⁵ In AD 253 or 256 in the Arsinoite, Syrus asked Heroninus to “*send another team of four donkeys to the city in place of Akes to carry fodder for the riding donkeys and horses coming up.*”²⁶

¹⁹ P.Ryl 2.135.

²⁰ P.Ryl 2.142.

²¹ P.Ryl 2.129.

²² P.Tebt. 3.2.843.

²³ P.Tebt. 3.2.843.

²⁴ P.Ryl. 2.183a.

²⁵ P.Ryl. 2.229.

²⁶ P.Ryl. 2.236.

Chaff was similarly used as animal fodder. In 140 BC, a receipt shows that the crown cultivators of Oxyrhyncha had similarly paid their quota of chaff for the year.²⁷ The chaff eaten by the intruding sheep was a cause of conflict and petitions were written for this reason. In 34 BC in the Arsinoite, Harnesis son of Sentheus and his sons Sentheus and Onnophris petitioned an unknown official against Harmiusis son of Psempnoutis, herdsman at Euhemeria, for letting “*his sheep loose on the cneus which we have together with the chaff in the drying-place, grazed away 15 artabae of it*”.²⁸ In response to this petition, another papyrus shows that the petitioners received from Harmiusis son of Psempnoutis, “*the price of the hay from the seventeen sown arourae of revenue-land cultivated by us in the area of Setrempaei which your sheep have grazed down, and we make no further claim against you*”.²⁹

In Greek papyrological evidence from Greco-Roman Egypt, people used a variety of Greek terms to refer to different types of waste materials, whether solid or liquid. The inhabitants used the designation *allēs deisēs* to refer to all forms of organic materials coming out of the agricultural products of their fields.³⁰ Human urine is always called *ouron* in the papyrological record.³¹ It appears that the population did not differentiate between drinking water and waste water coming out of daily activities such as bathing or laundry for they indistinguishably used the word *hydros* in their reference to both waste and clean water.³²

Human Liquid Waste (Water and Urine)

Inhabitants in Ptolemaic and Roman Egypt were concerned with hygiene maintenance. A house lease involves a formula of stipulations specifying that the renters should clean the house from any waste before departure.³³ At the moment of their discoveries, many houses at Karanis, Soknopaiou Nesos, Trimithis, and elsewhere had clean rooms and floors, except for the ashes of ovens and animal waste.³⁴ The recently excavated houses at Trimithis, for example, had clean-swept floors except in one room that people used intensively for food preparation.³⁵ Such cleanliness may attest to concerns about hygiene since food remains attracted all kinds of vermin that could then threaten the health of the inhabitants, and especially vulnerable young children.³⁶ Waste also interfered with important ritual practice. It is certain that many houses had domestic shrines, indicating that people may have viewed at least some parts of the home as an abode of the god,³⁷ where lamps were

²⁷ *P.Tebt.* 3.2.842.

²⁸ *P.Ryl.* 2.69.

²⁹ *P.Ryl.* 2.73.

³⁰ *P.Teb.* I.105.27.

³¹ *P.Enteux* 79.

³² *P.Ryl.* 2.233.

³³ *P.Oxy.* 48.3386 (AD 338).

³⁴ On Soknopaiou Nesos, see Boak 1935. On Karanis, see Husselman 1979. On Trimithis House B2, see Boozer 2015.

³⁵ House B2, room 5, see Boozer 2015.

³⁶ Boozer 2021, Chapters 5, 8.

³⁷ Husselman 1979, 41, 60, plans 20-30, pls. 25, 62b, 65a, 69a, 94b; Boak 1932, 523; Boak 1935, 6-14, figs 4-7; Davoli 1998, 46-7, fig. 11; Abdelwahed 2015, 46.

lightened up and cushions were spread and prayers were performed in the presence of a statue of a deity.³⁸

Many facilities were built to serve hygiene purposes such as public and private toilets, which are confirmed in papyrological and archaeological evidence. Public baths are attested at poleis and metropoleis like Antinoopolis,³⁹ Hermopolis Magna,⁴⁰ and Oxyrhynchus.⁴¹ Public baths of Greek tradition with different tholoi⁴² for men and women are confirmed in the Arsinoite nome, not only in written sources but also archaeologically.⁴³ Interestingly, robbery and different forms of violent behaviour were committed in public baths.⁴⁴ The bath tax (βαλαν(είων)/ βαλ(ανευτικοῦ) in Greek), which was a regular impost on public baths in both the Ptolemaic and Roman periods, is estimated at four obols⁴⁵ and half-obol in Thebes in AD 34⁴⁶ and 5 obols at Euhemeria in AD 36.⁴⁷

The house occupants were keen to buy utensils and bathing towels,⁴⁸ and some houses had water wells⁴⁹ and private toilets.⁵⁰ In AD 66, Chaeremon son of Apollonius, a Persian of the Epigone, acknowledges to Sisois son of Peteesis that he received from him as dowry upon his daughter Thaisarion, who formerly lived with Chaeremon as his wife, a hundred drachmae of silver coin, and as parapherna a pair of gold ear-rings weighing four quarters, a gold crescent of three quarters, two gold rings of two quarters, a pair of silver armlets to the weight of 44 drachmae of unstamped metal, two bracelets to the weight of 16 drachmae of unstamped metal; in raiment two robes, one white, one narcissus, and five mantles; and bronze utensils and a bath (λουτρίδιον).⁵¹ In the second century AD, Justus sent a letter to Ploution asking him to buy from Bousiris 'two linen tunics, coarse, clean and good, for the amount of up to 40 drachmae, a nice pair of cross-woven cloths from Diospolis, a single bathing towel (βαλανάρην μοναχόν), a good half-cushion, if you find a bigger one, another cheaper one from Sais'.⁵²

³⁸ *P.Athen.* 60.5-8.

³⁹ Kühn 1913: 51-6.

⁴⁰ *P.Brem.* 46.7-8; Roeder 1959, 113; McKenzie 2007, 158.

⁴¹ *P.Oxy.* 6.896.col.ii.7-8; *P.Oxy.* 17.2128.12; *P.Oxy.* 43.308.

⁴² The term tholos is a term used to describe any type of round Greek building, here it refers to rooms with circular walls and domed or conical roof built upon a podium and supported by ring of columns; for more information: Andrews, T. (2019). Greek Tholoi of the Classical and Hellenistic Periods: An Examination.

⁴³ Davoli 2011, 82.

⁴⁴ Theft of a *himation*: *P.Tebt.* 3.1.784. Female violence: *P.Tebt.* 3.1.798; *P.Ryl* 2.124. On domestic violence, see Abdelwahed (forthcoming).

⁴⁵ Obol is an ancient Greek coin. It was used in Ptolemaic and Roman Egypt. It is equal to 1/6 drachma

⁴⁶ *P.Bagnall* 60.

⁴⁷ *P.Fay* 46.

⁴⁸ *P.Oslo* 2.56.

⁴⁹ *P.Oxy.* 3.502.17-18.

⁵⁰ *P.Ryl.* 2.154. Most houses with toilets date to the Ptolemaic Period. There are no obvious toilets dating to the Roman Period (Boozer 2021, Chapter 6).

⁵¹ *P.Ryl.* 2.154.

⁵² *P.Oslo* 2.56.

There is archaeological evidence for bath-houses in the well-excavated sites of the Arsinoite area, though it seems that bath-houses were closely associated with urban centres.⁵³ Some, however, can be found at remote sites, including at Trimithis in the Dakhleh Oasis as well as in fortresses in the Eastern Desert.⁵⁴ The majority of the baths known in the Arsinoite nome are of the tholos type, but one with a hypocaust system was built in Karanis in the fourth century AD.⁵⁵ In addition to the ruins of a great temenos of the temple of Sobek, statues of Ramses II, and fasciculate columns of Amenemhat III, the remains of four bathhouses have come to light from the ancient metropolis of Krokodilopolis.⁵⁶ A Roman period-dated house from Kom Medinet Ghoran, House A in Kom A, is square in plan and consists of 9 rooms, two of which, according to the interpretation of Jouguet, were open; a flight of stairs leads to a terrace or maybe to a second floor (fig. 3). A room (G) has been recognized as a kitchen for the presence of a domestic oven in one of the corners and ashes on the floor, while another (B) was used for bathing since it has a bath carved in stone. Two interior doors and windows, in Egyptian style, were made of stone and decorated with a cavetto cornice and a torus moulding.⁵⁷ The heating system of public and private baths must have generated a significant amount of smoke and waste. While smoke problems were often solved by the use of chimney flutes,⁵⁸ hips or thick layers of ashes and glazed materials used in heating are often piled nearby.⁵⁹

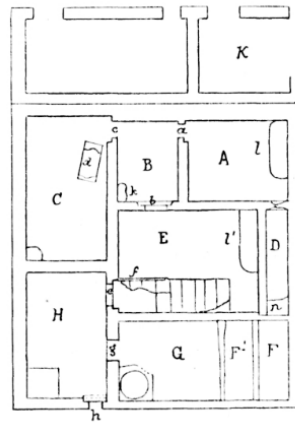


Fig 3: Plan of house from Kom Medinet Ghoran, House A in Kom A ((after: Jouguet 1901, fig. 5, 391)

Drinking water for the house occupants was often secured by water carriers,⁶⁰ who played an important role in supplying water to people and quarries; they often used water skins and donkeys and camels for carrying water.⁶¹ Household drinking water

⁵³ Fournet and Redon 2017, 182-3.

⁵⁴ Davoli 2015, 2017. On the Eastern Desert, see Sidebotham 2011, 117; Bagnall et al 2001.

⁵⁵ Castel 2009.

⁵⁶ Davoli and Mohammed 2006.

⁵⁷ Jouguet 1901, 380-411; Davoli 1998, 218, fig. 100.

⁵⁸ Fournet and Redon 2017, 132, fig. 8.

⁵⁹ Davoli 2011.

⁶⁰ P. Enteux 78.

⁶¹ Shehata 2019.

was kept in amphorae, jars, or, as papyri confirm, in roofed water-coolers (ὕδρ[ο] | ψυχεῖον).⁶² Although no domestic water-cooler has been discovered so far, water pot stands survive from sites such as Karanis. Some of these examples were elaborate, which attest to the significance that the inhabitants placed upon their water supply (figure 4).⁶³ Water jars (in Arabic *Zier*) for cooling water (figure 5), which are often carried upon tripod metal stands, are still used in modern Egypt, especially in villages. A “roofer water-cooler”, called in Arabic *Sabil*, served as a public water dispensary in Islamic architecture of mediaeval Cairo.⁶⁴ Modern Egyptians rarely use the *Sabil*, which may be architecturally interpreted as the “roofed water-coolers” of Greek papyri, in public streets and near cemeteries. As a public water dispenser, the *Sabil* has a roofed water basin from which passers-by can drink (figure 6).



Figure 4: Limestone waterpot stand from Karanis House C451 (Roman, Karanis).
Courtesy of the Kelsey Museum (after: Husselman 1979, Pl 94b)

⁶² *P.Ryl.* 2.233.

⁶³ Boozer 2021, Chapter 5.

⁶⁴ El Shakhs and Ezzat 2018.



Figure 5: *Zier* (water jar) for cooling water in a modern Egyptian village house (authors).

Figure 6: *Sabil* (roofed-water cooler) in a modern Egyptian town (authors).

Although there is papyrological reference to dikes and water conduits in the Arsinoite area and elsewhere,⁶⁵ the archaeological evidence for sewage system in houses, particularly rural housing, is poor.⁶⁶ Water wells (φρέαρ) are papyrologically confirmed in the courtyards of some houses, particularly in Oxyrhynchus.⁶⁷ Archaeologically remains of water cisterns and water-wells have come to light in area L just southeast of the bath complex at Kom el Dikka, Alexandria. The water reservoir and pressure tower are relatively well preserved and would have provided water for the baths and possibly other houses in the area.⁶⁸ Waste water and urine discharge were occasionally flushed away by a series of small channels as part of a system for collecting rain water, as in the houses uncovered from Marina el-Alamein. These houses had a system for collecting rain water filled underground cisterns and a series of small channels connecting to a latrine allowed waste water to be flushed away.⁶⁹ The Romans sometimes reused water for progressively less clean purposes. For instance, they reused waste water from baths for flushing latrines or driving watermills.⁷⁰ In the chora,⁷¹ however, it seems likely, though not confirmed, that waste water was thrown out of the home, as modern Egyptian villagers still do.

Urine occasionally appears in Greek magical formulas. For example, the method of the scarab of the cup of wine to make a woman love a man, it is prescribed that a man should drown a fish-faced scarab in the milk of a black cow and pound it with ‘nine

⁶⁵ *P. Bagnall* 9.

⁶⁶ *Husselman* 1979; *Gazda* 1989.

⁶⁷ *P. Oxy.* 3.502. “at oxyrhynchos in the Temgenouthis quarter, with the court and two yards in one of which is a well”

⁶⁸ *Kordas* 2021, 238, n. 11; *Majcherek* 2015, 54, 57.

⁶⁹ *Daszewski* 1995, 20-4.

⁷⁰ *Duckworth and Wilson* 2020.

⁷¹ Chora is a word in Ancient Attic Greek means “place” in different senses. There are different meanings for the chora in The Greek-English Lexicon provides six such as place or space is defined as the residence, the place where we live, land, town, territory, partly occupied space, the habitation, *GÜNEY* 2018, 19-29.

apple pips together with your urine or your sweat free from oil of the bath; you make it into a ball and put it in the wine, and speak over it seven times, and you make the woman drink it'.⁷² Urine discharge was surprisingly thrown on the body and clothing of bystanders, with whom the house occupants had struggle. Thus, in 218 BC at Krokodilopolis, Herakleides, of those from Alexandrou Nesos, petitioned King Ptolemy against Psenobastis, an Egyptian woman who lives in Psya:

I am wronged by Psenobastis, who ... leaned over and poured urine (ouron) down upon my clothing, with the result that they were dripping (with urine). I was vexed and upbraided her, and she abused me.... She was upbraided by some of those present for the things which she had done to me, and as a result, she left me behind there and went inside [her house], from where she had poured the urine on me. I need you, king, if it seems best to you, to not overlook me, having been treated with hybris so outrageously by an Egyptian woman- I, being a Greek and a foreigner.⁷³

This outlandish behaviour was referred to in the papyrus as an act of shame (*hybris*), against which a petition was written to the official authority. In Pharaonic and post-Pharaonic Egypt, urine was used in pregnancy tests and for determining fetal gender.⁷⁴ In the first century AD, Apollonios Mys, a doctor who worked in Alexandria, listed camel urine as a remedy for dandruff and hot donkey urine for a sore throat.⁷⁵ In Egyptian funerary literature, however, urine appears as an awful, disgusting substance, which is drunk only by the unjustified or impure dead.⁷⁶ Normally, human urine was kept in chamber pots, which were perhaps taken out of the home by the house occupants or by urine collectors, probably to be used by fullers or dyers. Hundreds of chamber pots have come to light from different sites elsewhere in the Graeco-Roman world, but none have been identified in Ptolemaic and Roman Egypt.⁷⁷

In the first century AD, the Roman emperor Vespasian levied what was known as the *vectigal urinae*, which means the urine tax.⁷⁸ This tax was placed on the collection of urine at public urinals, since the lower classes of society had to relieve themselves in small pots which were then emptied into cesspools. Urine was also collected from the public toilets of the upper classes. The buyer of the urine paid the tax, then it was then collected from the cesspools and recycled as a valuable raw material for a number of chemical processes.⁷⁹ Collectors-officers are confirmed in Greek papyri, such as the collectors of the meat-tax and the guard-tax in Samareia⁸⁰ and public clothing for the

⁷² Griffith and Thompson 1904, 137.

⁷³ *P. Enteux* 79.

⁷⁴ In Pharaonic Egypt: Ziskind and Halioua 2007; Ghalioungui, Khalil, and Ammar 1963. In Greco-Roman Egypt: Frankfurter 2006.

⁷⁵ Lang 2012, 166.

⁷⁶ Allen 1974, 91, 187 (Spells 116, 178)

⁷⁷ E.g. at Viminacium: Savić and Bogdanović 2017. For generally summaries in the Roman World, see Petznek 2018, Wilson et al 2011.

⁷⁸ Suetonius, *Vesp.* 23.3, 19.2.

⁷⁹ Hughes 1996; Havlíček and Morcinek 2016, 40.

⁸⁰ *P. Tebt.* 3.2.873.

guards from the weavers of the village of Soknopaiou Nesos and for the needs of the soldiers serving in Judaea in AD 128.⁸¹

Waste collectors operated in Ptolemaic and Roman Egypt,⁸² where police agents (ἀστυνόμοι) forbid the waste collector to deposit any waste within (10 *stadia*) from the city walls.⁸³ Yet, heaps of dung and waste materials are reported within the residential area.⁸⁴ As far as we know, there is no papyrological evidence of urine collectors in Ptolemaic and Roman Egypt. The presence of fullers and dyers is confirmed in Greek papyri, however. In the second century AD, Ptollos Pasiwnos submitted an application for lease of a dyer's workshop (β[α]φειῶν) at Ptolemais Euergetis.⁸⁵ In AD 161-9 at Tebtynis, the fullers and dyers from the Arsinoite nome appealed Severianus, possibly the prefect, against Maximus, the inspector, who allegedly exacted an undue amount for the tax upon their respective trades. According to tariff and custom, the fullers used to pay 1092 drachmas yearly for the tax on trades, while the dyers yearly paid 1088 drachmas.⁸⁶

In AD 172, Heron son of Herodes son of Theogiton, of the quarter of the temple of Sekneptunis submitted an application to the superintendents of the lease of the dyeing (βαφικῆς) monopoly to take control of the weaving in the village of Archelais at a total yearly rent of 300 silver drachmae.⁸⁷ Serenus the fuller is mentioned in a private letter from Hatres to his brother Heras in the second/third century AD at Oxyrhynchus.⁸⁸ In AD 323, Hierax, son of Pesouris, former archon and councillor of Oxyrhynchus, leased to Horion son of Theodoros, from the same city, for three more years, part of the house and the atrium and the courtyard, belonging to him in the Cretan quarter, from his own dyer's workshop, a room on the ground floor, with all its appurtenances.⁸⁹

Dyeing was a state monopoly that could be leased to merchants and inhabitants. Thus in AD 172 at Ptolemais Euergetis, Heron son of Herodes son of Theogiton, of the quarter of the temple of Sekneptunis, addressed Ision and the other nine superintendents of the lease of the dyeing monopoly that 'I wish to be granted by you the control of the weaving in the village of Archelais for the present 13th year only of Aurelius Antoninus Caesar the lord at a total yearly rent of 300 silver drachmas which I will pay in equal monthly instalments'.⁹⁰ Having considered the discharge and reuse of liquid human waste (water and urine), let us now turn into the disposal of human solid waste (*feces*).

With regard to the sanitation and drainage system in baths in Ptolemaic and Roman Egypt, the ancient city of Alexandria, for example, was known as the city of cisterns.

⁸¹ *P.Ryl.* 2.189.

⁸² Yassin and El-desokey 2023, 192-193.

⁸³ *P.Lond.* 1.131.

⁸⁴ *P.Ryl.* 2.162.

⁸⁵ *P.Oslo* 3.139.

⁸⁶ *P.Tebt.* 2.287.

⁸⁷ *P.Ryl.* 2.98.

⁸⁸ *P.Oxy.* 3.527.

⁸⁹ *P.Oslo* 3.138.

⁹⁰ *P.Ryl.* 2.298.

The entire city was fundamentally built over a level of infrastructure, sewerage, and underground aqueducts, running below the city and out to the sea. Ancient Alexandria was founded over a network of water channels running under the city streets that were angled so as to exploit the sea breezes to cool the city naturally and keep the residents healthy.⁹¹ Reservoirs have been used to store both rainwater and spring and river water to meet the needs of seasonal variations.⁹² A similar water management system was used in Hellenistic Berenike, a key port on Egypt's Red Sea coast, where a rock-cut well is located inside a rebuilt early-Hellenistic gate and a nearby cistern with an associated rainwater-collection system.⁹³

As for the remaining water of irrigation, it seems that it was redirected into the water streams of the surrounding canals to be used again for irrigation. The silt coming out of the irrigating water which might have blocked the water stream over time was cleared out annually prior to and during the flood season. In other words, the water coming out of the irrigation of the fields was repurposed into the water sources.⁹⁴

Human Solid Waste

No clear reference is made in Greek papyri to the disposal of human solid waste. Human solid waste was probably collected in a private chamber pot before being carried away from the house. The above-mentioned chamber pot confirmed as part of the dowry of Thaisarion, the wife of Chaeremon son of Apollonius, was supposedly used for both solid and liquid human waste.⁹⁵

For thousands of years, humans have been repurposing their feces. Human excreta and urine were used for medical purposes and were utilized in the agriculture as a fertilizer. From ancient Egypt until at least the sixth century AD, human feces and urine were used as a remedy. Galen and other physicians expressed their abhorrence of using human effluvia such as urine, excrement, sweat, or menstrual blood as remedies, indicating that human solid and liquid waste was used for some medical purposes.⁹⁶ Although its use in *fullonicae* may be overestimated, urine had some use for cloth production and maintenance.⁹⁷

Human excreta and urine may have ended up in farms and agricultural fields as the treated, human-feces-based fertilizer known as biosolids.⁹⁸ Human excrement, urine, and household wastewater were used for centuries as fertilizers in an attempt to close

⁹¹ Solieman 2016.

⁹² Spanoudi, S., Goufopoulos, A. and Kalavrouziotis, I. 2021. 'Water Management in Ancient Alexandria, Egypt. Comparison with Constantinople Hydraulic System.' *Water Supply* 21/7, 3427-36.

⁹³ Woźniak 2022.

⁹⁴ Thomson, D. J. 1999. 'Irrigation and Drainage in the Early Ptolemaic Fayyum.' In A. K. Bowman and E. Rogan (eds.), *Agriculture in Egypt from Pharaonic to Modern Times*, Proceedings of the British Academy 96, Oxford University Press, Oxford, 107-122.

⁹⁵ *P.Ryl.* 2.154.

⁹⁶ "But drinking sweat and urine and a woman's menstrual blood is outrageous and disgusting, and so are feces, no less than these..." (Galen, *The Temperaments and Powers of Simple Drugs* 10.1 = Lang 2012, 165) (translation).

⁹⁷ Plin. *H.N.* XXVIII.18.26; Mart. *Epigrams* 6.93.1-2. Scholars may have overestimated the use of urine (Flohr 2017, 45-46).

⁹⁸ Nagy, Zseni, and Tóth 2019.

the nutrient cycle in agricultural fields. Human excreta and urine are a rich organic fertilizer for the excreta and urine contain all the macroelements which are important for the soil, for example nitrogen, phosphorus and potassium.⁹⁹ For centuries, the vehicles responsible for carrying household sewage waste, which is a mixture of human excrement, urine, and household wastewater, used to pour it into certain agricultural lands upon the request of the land owners to serve as “night soil”, especially for what people call in Egypt the green crops like lettuce, rockets, and green onions. This is now forbidden by law in Egypt because it can spread human pathogens, but some people may illegally continue to do this in villages.¹⁰⁰

Animal Waste

It was customary for the Egyptians to keep animals in their houses, a practice that held to be unique by ancient classical authors: “*The Egyptians are the only people who keep their animals with them in the house*”.¹⁰¹ The house was not only a residential place for humans, but also a home for animals in the Ptolemaic and Roman period.¹⁰² In AD 100 at Euhemeria, Gemellos possessed an animal farm.¹⁰³ Animals of burden are often used for wagons;¹⁰⁴ donkeys and other transport animals are confirmed in Greek papyri.¹⁰⁵ There is evidence of the theft of three pairs of oxen and two beasts of burden in a domestic context.¹⁰⁶ The donkeys of Papos were once stabled in the courtyard (*aule*) belonging to Klesis in his house.¹⁰⁷ There is evidence of the theft of sheep from an *aule* of a house, and of a black donkey from the house of a donkey-driver.¹⁰⁸ In AD 31, Mysthes and Pelopion sons of Pelops, of Euhemeria petitioned Dionysodorus, strategos of the Arsinoite nome, that the young wheat and the barley which they had on the farm had been grazed down by the sheep of Harmiusis son of Heras, a herdsman.¹⁰⁹ Animals such as geese and birds were owned by the state and privately.¹¹⁰ The inhabitants of Samareia in the Arsinoite nome owned a list of sheep and goats,¹¹¹ and the inhabitants of Phanesios Akra, presumably identical with Phanseos kome, similarly possessed a list of swine.¹¹² The plant remains recovered in the excavations at Kom el-Hisn are primarily derived from burnt animal dung that was used for fuel.¹¹³

⁹⁹ Abdel-Shafy and Mohamed-Mansour 2013, 458-9.

¹⁰⁰ See also, Farooq and Mallah 1966.

¹⁰¹ Hdt. 2.36.

¹⁰² Abdelwahed 2016, 67.

¹⁰³ *P.Bagnall* 4.

¹⁰⁴ *P.Tebt.* 3.1.748.

¹⁰⁵ *P.Tebt.* 3.1.749; *P.Tebt.* 3.1.750; *P.Tebt.* 3.1.753; *P.Tebt.* 3.1.759; *P.Tebt.* 3.1.764; *P.Tebt.* 3.1.768.

¹⁰⁶ *P.Tebt.* 3.1.791.

¹⁰⁷ *P.Mich.* 2.121.

¹⁰⁸ *P.Tebt.* 3.1.791

¹⁰⁹ *P.Ryl* 2.131.

¹¹⁰ *P.Tebt.* 3.2.875.

¹¹¹ *P.Tebt.* 3.2.882.

¹¹² *P.Tebt.* 3.2.883.

¹¹³ Moens and Wetterstrom 1988.

Ethnographic studies suggest that domestic animals are usually given unlimited access to different interior parts of the house in many cultures.¹¹⁴ Yet it is unlikely that they were allowed into domestic shrines. According to Diodoros, “*the Egyptians venerate certain animals exceedingly, not only during their lifetime, but also even after their death, such as cats, ichneumons and dogs, and, again, hawks and the birds which they call ibis*”.¹¹⁵ Animals played a central religious role in the life of the inhabitants. Animal cult was a widespread practice in Egyptian religion of the Greco-Roman period. Thus, sacred animals associated with traditional deities were not used in sacrifice.¹¹⁶

Pigs, for example, were among the most common domesticated animals in Graeco-Roman Egypt.¹¹⁷ They were also great for consuming household waste. In AD 34, Anchorimphis son of Anchorimphis, of Euhemeria in the division of Themistes, farmer on the Germanician estate of Tiberius Caesar Augustus petitioned Gaius Arrius Priscus, chief of police, about the robbery of a brood-sow about to litter, tawny-coloured, worth 12 drachmae, in the village by certain individuals.¹¹⁸ In his recount on Isis and Osiris, Plutarch narrates that “*In the same way they [the Egyptians] consider the pig to be an unclean animal; when they sacrifice a pig once every year in full moon and eat it, they narrate a story that Typhon, as he was pursuing a pig in full moon, found the wooden coffin, in which the body of Osiris lay, and tore it up*”.¹¹⁹ Based on Manetho of Sebennyte, Aelian, who lived in the late second and early third century, refers to this festival when he states that: “*The Egyptians believe that swine are particularly abhorrent to the sun and moon: they sacrifice these animals once a year when they held the annual lunar festival, but on no other occasion do they offer them either to the moon or to any other gods*”.¹²⁰

Throughout the successive periods of ancient Egyptian history, pigs were among the most common domesticated animals.¹²¹ In Ptolemaic and Roman Egypt, pig-breeding continued to be a relatively important economic activity. Pigs were reared alongside other domesticated animals in the courtyards of houses in both towns and villages and surely contributed to the health and hygiene of settlements due to their consumption of organic waste.¹²² Pigs played a significant role in the consumption of organic waste for they are nature’s ultimate recycling heroes. Most household organic materials are a scrumptious meal for pigs.¹²³

¹¹⁴ Chickens and pigeons in particular often reside together with people in modern Egyptian mud-brick houses; see Correas-Amador 2013, 125, and Appendix, document 9. Compare to the Berber House: Bourdieu 1973.

¹¹⁵ Dio. Sic. 1.83.1.

¹¹⁶ Bell 1948, 82-97.

¹¹⁷ *P.Tebt.* 3.1.883; *P.Mich.* 1.69; *P.Mich.* 1.108.

¹¹⁸ *P.Ryl.* 2.134.

¹¹⁹ Plut. *De Is. et Os.* 8.

¹²⁰ Ael. *NA* 10.16.

¹²¹ On textual, pictorial and zooarchaeological evidence for pigs in ancient Egypt: Hdt. 2.14; Newberry 1928: 211; Houlihan 1996, 25-8.

¹²² Bowman 1986, 102. Miller 1990.

¹²³ Redding 1991.

This activity led to the emergence of a 'pig tax' levied from those breeding and trading on pigs¹²⁴ and even from those sacrificing pigs.¹²⁵ Pig-tax is estimated at one drachma and four obols in Hermopolis Magna in AD 132-5.¹²⁶ Pigs played a role in the diet of the inhabitants,¹²⁷ and were consumed at least by the lower classes.¹²⁸ Pigs were closely associated in ancient Egyptian religion and mythology with the god Seth, lord of chaos.¹²⁹ Together with hippopotami and donkeys, pigs were considered the evil animals of the god Seth.¹³⁰ No Egyptian god took the form of a pig, however.¹³¹ Due to their connection with Seth, pigs had an ambiguous status in ancient Egyptian religion and culture.¹³² Pork was never used in traditional temple offerings. However, pigs were included in lists of temple properties.¹³³ The association of pigs with dirt and filth may explain their lowly status in ancient Egyptian culture.¹³⁴ However, the taboo on pigs was reinforced due to the connection of pigs with Seth.¹³⁵

But how did the Egyptian population during the Ptolemaic and Roman eras get rid of their dead animals? It is certain that many animals were honoured during their lifetimes and likewise after death. When one of these animals dies, the Egyptians mourn for it deeply as do those who have lost a beloved child, and bury it in a manner not in keeping with their ability but going far beyond the value of their estates.¹³⁶ Presumably, only the wealthy inhabitants could wrap it in fine linen and then, wailing and beating their breasts, carry it off to be embalmed.¹³⁷ Dwellers in a house where a cat had died of a natural death shave their eyebrows and no more; where a dog has so died, the head and the whole body are shaven. Cats which died were taken to Bubastis, where they were embalmed and buried in sacred receptacles; dogs were buried also in sacred burial places in the towns where they belonged.¹³⁸

Upon the death of certain animals, the Egyptians used to perform particular rituals of lamentation in their houses: Whenever a dog is found dead in any house, every resident of it shaves his entire body and goes into mourning. What is more astonishing than this, if any wine or grain or any other thing necessary to life happens to be stored in the building where one of these animals has expired, they would never think of using it thereafter for any purpose.¹³⁹ During this period of mourning, which presumably ended with the burial of the dead animal, it was expected that relatives and neighbours would come to the house to console its residents. Great grief was

¹²⁴ *P. Oxy.* 4.733.

¹²⁵ *P. Giss. Bibl.* 1.2.

¹²⁶ *P. Ryl.* 2.193.

¹²⁷ Pedding 1991, 25.

¹²⁸ Hecker 1982, 62.

¹²⁹ Bonnet 1952, 112.

¹³⁰ Dieleman 2005, 130-8.

¹³¹ Houlihan 1996, 26.

¹³² Helck 1984, 764.

¹³³ Newberry 1928, 211.

¹³⁴ Houlihan 2001, 47.

¹³⁵ Lloyd 2007, 271.

¹³⁶ Dio. Sic. 1.84.7.

¹³⁷ Dio. Sic. 1.83.5.

¹³⁸ Hdt. 2.66-7.

¹³⁹ Dio. Sic. 1.84.2.

displayed over the death of a family dog and the family would shave their body as a sign of sorrow. Dogs were highly valued in Egypt as part of the family and, when a dog died, the family, if they could afford to, would have the dog mummified with as much care as they would pay for a human member of the family.¹⁴⁰

The standard period for the mummification process of all animals was seventy days, like humans. When one of these animals died, they wrapped it in fine linen and then, wailing and beating their breasts, carried it off to be embalmed. After the body was treated with cedar oil and such spices as have the quality of imparting a pleasant odour and of preserving the body for a long time, they lay it away in a consecrated tomb.¹⁴¹

At home, the animal was first wrapped with linen cloth, before it was sent off to the embalming place. Generally, dogs were not well embalmed for they were merely desiccated with natron or salt, before being wrapped in white linen. In ancient Egypt, mummified dogs guided human spirits into the next world. Thus, Abuwtiyuw (*'bwtjw*), the royal dog of Khufu, was given a coffin from the royal treasury, fine linen in great quantity, incense, and ointment that he might be honoured before the great god Anubis.¹⁴² In Ptolemaic and Roman Egypt, canid species were continuously mummified as guides (*psychopompos*) for the deceased.¹⁴³

Together, literature evidence by Diodoros and archaeological remains confirm that sacred, votive, and household animals were buried in private tombs or with their owners.¹⁴⁴ The *theagoi* (bearers of the sacred crocodiles of Souchos) were responsible for carrying the sacred animals to their tombs.¹⁴⁵ Dead cats were taken away into sacred buildings, where they were embalmed and buried in Bubastis. Shrewmice and hawks were taken away to Buto, while the ibises were buried at Tuna el-Gebel¹⁴⁶ and Oxyrhynchus.¹⁴⁷ Dogs were also buried in several sacred burials.¹⁴⁸ Gebel Asyut el-Gharbi was a necropolis for mummified dogs.¹⁴⁹ Remains of dog mummies with wrappings have also been found in two cemeteries associated with the temple of El-Deir in the Kharga Oasis, probably offered by the inhabitants or the travellers to the god Anubis.¹⁵⁰ The first/second century AD temple of Ain Dabashiya at the Kharga Oasis was also associated with the cult of the canine-headed god Anubis, where the remains of several hundred dogs, ranging from few-week-old puppies to adults, were found near the temple.¹⁵¹ Oxyrhynchus also contained mummified remains of dogs.¹⁵² Nearly 8 million mummies of puppies and old dogs were ceremonially buried in the

¹⁴⁰ Abdelwahed 2016, 57-69.

¹⁴¹ Dio. Sic. 1.83.5.

¹⁴² Reisner 1938, 8.

¹⁴³ Gauthier 2007; Abdelwahed 2017.

¹⁴⁴ On literature: Dio. Sic. 1.83.5-6. On archaeology: Vos 1993.

¹⁴⁵ Dils 1995.

¹⁴⁶ Hdt. 2.66.

¹⁴⁷ *P.Oxy.* 9.1188.4.

¹⁴⁸ Hdt. 2.66-7.

¹⁴⁹ Kahl et al 2009.

¹⁵⁰ Dunand and Lichtenberg 2005.

¹⁵¹ Ikram 2008, 39.

¹⁵² Bunson 2002, 292.

Anubieion of Saqqara for Anubis,¹⁵³ the god responsible for taking the deceased from this world to the next.¹⁵⁴

Archaeological evidence confirms that some people used animal waste for making bread plates.¹⁵⁵ People used bread plates as platforms for their dough to rise before baking it. Ethnoarchaeological examples confirm that many people continue to use animal manure to form bread plates (figure 7). Waste from food production and consumption and other domestic activities would be disposed of in streets and alleys and on communal rubbish heaps and dung-hills, which could then be reused.¹⁵⁶ In AD 159 at Soknoapiou Nesos, a dung-hill (kopria) once formed the northern boundary of the house and court of Thases daughter of Panephrumis son of Herieuson, which she sold to Taharpagathes daughter of Harpagathes son of Harpagathes.¹⁵⁷ Animals like sheep could feed on waste of food consumption, hay, sheaves and other plant rubbish as thus served as “herbivore” or “plant eater” in a similar way to dogs which acted as “carnivore” or “meat scavengers” in ancient Egypt.¹⁵⁸ In AD 32, Theonus son of Theon, estate-agent of Evander son of Ptolemaeus and priest of Tiberius Caesar Augustus petitioned Athenodorus, chief of police, that while he was making an inspection of the land belonging to Evander in the area of Euhemeria, he found that the shepherds of ... son of Eunomius had caused the sheep which they tend to feed on 26 sheaves.¹⁵⁹



Figure 7: Modern bread plates made from animal manure with dough to rise before baking (authors)

¹⁵³ Ikram et al 2013, 51.

¹⁵⁴ DuQuesne et al 2007.

¹⁵⁵ Tomber 2013. See Amheida B2, Room 5.

¹⁵⁶ See Weir, Wasif, Hassan, Attia, and Kader 1952 for a modern Egyptian comparison of dung reuse.

¹⁵⁷ *P.Ryl* 2.162.

¹⁵⁸ Dixon 1989.

¹⁵⁹ *P.Ryl* 2.132.

Other Domestic Waste (Papyrus Rolls, Mummies, and Old Clothing)

Papyrus was the main writing material in Ptolemaic and Roman Egypt. Official documents, legal proceedings, private letters, and other documents were all written on papyrus rolls,¹⁶⁰ which were often transported on board.¹⁶¹ Papyrus manufacture was always a state monopoly. In 159 BC, Sokonopis, the overseer of distribution of royal papyrus, informs the village officials of Talei (Tebtynis) of the name of the new contractor for the sale of the royal papyrus at Talei through royal shops, asking them to give him the proper assistance.¹⁶² In the second century AD, Apol... wrote to Apollinarius, his brother: “*For I have already used up a papyrus roll in writing to you, and I received barely one letter from you, in which you informed me that I should receive the cloaks and the pig*”.¹⁶³

Temple papyrus chit containing the positive oracular answer was normally taken home by believers, whereas the other negative chit remained in the temple and was eventually thrown away. Hundreds of these chits, often still sealed and unopened, were recently found in a rubbish dump near the temple of Tebtynis.¹⁶⁴ Plain and cartonnage mummies, usually draped down the face, and other obsolete items and objects were thrown into abandoned houses or streets; these later on formed trash mounds and debris as archaeological evidence from Hibeh suggests.¹⁶⁵

Old papyrus rolls containing receipts and other accounts were similarly used and reused as long as possible. The reuse of writing material manufactured from papyrus is widely attested. The blank sides of previously written-upon texts have been used, mostly from the time of Augustus until the fourth century AD. Discarded documents and sometimes literary manuscripts were recycled as raw material for a kind of papier-mâché referred to as cartonnage, which was often reused in human and animal mummy wrappings.¹⁶⁶ An account of the *idioslogos* was uncovered from a human mummy cartonnage at Tebtynis dating back to 179 BC.¹⁶⁷ A list of holders of temple and cleruchic lands at Kerkeosiris has similarly been found in a crocodile mummy cartonnage at Tebtunis 28.10, which dates back to 119/118 BC.¹⁶⁸ A similar papyrus list comes from a crocodile mummy cartonnage at Tebtunis 27.35, dating back to 112/111 BC.¹⁶⁹ There is archaeological evidence that children toys like dolls were commonly made of old clothing or even hay.¹⁷⁰ Old clothes were also used for children and in burials. Equally importantly, a number of votive mummies, such as an ancient Egyptian mummified bird in the Iziko Museums of South Africa in Cape Town, were sometimes complete fake, containing only plant material, mud, linen, and

¹⁶⁰ *P.Mich.* 1.46.

¹⁶¹ *P.Mich.* 1.22.

¹⁶² *P.Tebt.* 3.1.709.

¹⁶³ *P.Mich.* 8.496.

¹⁶⁴ Clarysse 2012, 571.

¹⁶⁵ Grenfell and Hunt 1906, 4.

¹⁶⁶ Salmenkivi 2002.

¹⁶⁷ *P.Tebt.* 3.2.874.

¹⁶⁸ *P.Tebt.* 4.1111.

¹⁶⁹ *P.Tebt.* 4.1114.

¹⁷⁰ E.g. Cloth doll from Roman Karanis excavations, (KM 3648, Field number 25-247-A).

perhaps small stones.¹⁷¹ To sum up, trash items were continuously repurposed for economic or social gains.

Conclusion:

This article focuses on especially upon exposing the hidden economy and social values surrounding the extended lifecycle of three forms of organic waste: agricultural, human, and animal waste. Recycled, reused, and repurposed materials retained significant economic and social values that people exploited. In doing so, they extracted further economic or social value from different types of rubbish. Garbage originating from agricultural labor was often reused as fuel for household oven and public baths, as bird and animal fodder, as compost to fertilize crops, or for making household furniture. It is clear that ancient peoples placed great value upon hygiene and cleanliness, as can be observed by the requirements to clear agricultural lands, the cleanliness of many house floors, and by the offense taken by the dumping of urine on a passer-by. These hygiene values, however, are culturally specific. For example, people reused dung to form bread plates to cook upon and seem to have stored it in close proximity to their dwellings. They also may have used human solid waste as night soil to fertilize crops, which is now realized as a dangerous practice likely to spread human pathogens. These culturally-specific perceptions of hygiene reveal a great deal about social values, suggesting that pragmatic uses of these materials carried particular weight.

We explored only briefly other forms of waste that proliferated in settlements. The inhabitants in Ptolemaic and Roman Egypt repurposed other domestic trash such as papyri and textiles, which were reused in mummies, mummy wrappings, and children toys. Equally, they often cut down worn clothing to form clothes for children or to create other types of objects such as saddle pads. An examination of this domestic waste confirms that the prevalent social attitude towards goods was to extend its life course for as long as possible. Further studies of these and other forms of waste management will help to uncover additional social and economic values in Ptolemaic and Roman Egypt. It will also help to explain the formation and preservation of the archaeological record that preserves these materials for us.

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إعادة تدوير النفايات في مصر البطلمية والرومانية

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الملخص:

كان للنفايات دور اجتماعي واقتصادي هام في مصر البطلمية والرومانية، ولكن غالبًا ما تم تجاهله في الدراسات المختلفة. توفر النفايات في تلك الحقبة التاريخية معلومات ثرية عن السكان وحياتهم الاجتماعية، وتصوراتهم عن البيئة، وأنشطتهم اليومية. يجمع هذا المقال بين الوثائق البردية والأدلة الأثرية للتعرف على أنواع النفايات المختلفة وطرق إدارتها في العصرين البطلمي والروماني. يُلقى المقال الضوء على إعادة استخدام وإعادة تدوير النفايات لأسباب اجتماعية واقتصادية. يبدأ البحث بدراسة الأنواع المختلفة من النفايات التي أنتجها السكان بالإضافة إلى دورة حياة النفايات. ثم يتناول البحث ثلاث أنواع محددة من النفايات، وهي تلك الناتجة عن الأنشطة الزراعية، والنفايات البشرية السائلة والصلبة، والنفايات الحيوانية والمنزلية الأخرى. يؤكد المقال على الدور الاجتماعي والاقتصادي الهام للنفايات في مصر البطلمية والرومانية.

الكلمات المفتاحية: النفايات - البطلمية - الرومانية - تدوير - البرديات اليونانية - الأدلة الأثرية.