



Forbidden to Sacrifice Humans or Eat Dogs: Revisiting the Tophet Debate through a Demographic Lens

Nathan L. PILKINGTON

University of North Carolina - Wilmington, USA
mail: pilkingtonn@uncw.edu

In the late 9th- 7th centuries BCE, Near Eastern colonists established new foundations throughout the Mediterranean. At certain locations in the central Mediterranean, the settlers, termed Phoenicians by the Greeks, constructed a burial ground for cremated infants and children shortly after the start of their new colonies, generally in the 8th or 7th century BCE.¹ The most well studied of these archaic burial grounds, known as tophets from biblical analogies, have been recovered at Carthage, Sulcis (Sardinia), Tharros (Sardinia), and Mozia (Sicily).² Immediately after the discovery of the first tophets, scholars inscribed the archaeological data with information derived from Greco-Roman sources, a practice common in the early 20th century, when archaeological evidence was sought to confirm or reject textual narratives.³

One of the most persistent claims of Greco-Roman sources is that Phoenicians and Carthaginians regularly practiced child sacrifice. As a result, reconstructions of Phoenician or Carthaginian religion often reproduce these claims. In the following, I reconsider these narratives with reference to recent osteoarchaeological studies at various tophets. I illustrate that the practices recovered archaeologically at tophets bear little resemblance to the narratives of Greco-Roman sources, a position argued before but deserving restatement in light of recent historiographical developments.⁴ Next, I ask whether any Phoenician colonial population

¹ Quinn (2018) for a full discussion of the ethnonym.

² For recent interpretations of archaic tophets, Orsingher (2015) and D'Andrea, Giardino (2011). For the excavation history of all tophets in North Africa, D'Andrea (2014). For excavations at specific tophets, Harden (1937); Hurst, Stager (1978); Stager, Wolf (1984); Ennabli (1987); Ben Jerbania et al. (2020); Melchiorri (2009); Moscati (1987a); Ciasca (1971), Ciasca (1973), and Ciasca (1992).

³ For a complete historiography, D'Andrea (2018), 59-98. For recent interpretations of the tophet phenomenon, Quinn (2012-2013) and Bonnet (2011).

⁴ Simonetti (1983); Moscati (1987b); Ribichini (1987); Ribichini (1990). More recently, Bonnet (2011) and Ribichini (2020). Other scholars, however, remain convinced that the archaeology of tophets and Greco-Roman texts cohere sufficiently to continue to use the Greco-Roman sources as evidence, Xella (2009).

would be able to sustain a regular practice of infanticide. To answer this question, I build a series of parametric models that allow for the estimation of relative population growth in the context of archaic Phoenician colonies of the 9/8th-7/6th centuries BCE. Through these models, I demonstrate that even in the healthiest possible pre-modern geography, limited infant sacrifice has significant effects on population growth over fifteen generations of mothers. I argue that the weight of these demographic models suggests that even a few sacrifices per year should have resulted in significantly reduced population growth at Phoenician colonies. To conclude, I employ archaeological evidence related to population and urban growth at Mozia and build two population models for the colony. These models indicate that a relatively healthy population, augmented by regular immigration, could have sustained a single infant sacrifice per year. However, population growth at Mozia would have slowed substantially, failing below current archaeological estimates of population growth at the site.

1. The Tophet: A Brief Historiography

Before the archaeological discovery of the first tophet, child sacrifice was long an accusation hurled at Phoenician populations in the Greco-Roman textual record, though Carthage is often the specific target of these attacks. The earliest sources on child sacrifice are not preserved as original texts. Rather, scholars possess fragments of these narratives as reported by later writers.⁵ The only continuous texts containing ‘historical’ narratives come from the Roman imperial period: Diodorus and Justin.

In the early 20th century, the archaeological discovery of cemeteries containing only cremated infants, children and animals appeared to provide the necessary physical confirmation of child sacrifice as documented in the Greco-Roman sources. Above the urns with cremated remains, excavators discovered numerous burial stelae with inscriptions. As was customary in the first half of the 20th century, scholars interpreted the inscriptions on tophet burial stelae with reference to the practices recorded in Greco-Roman sources and the *Bible*.⁶ These studies identified the presence of a specific term in inscriptions for sacrifice at the tophet: MLK.⁷ One of the earliest examples of this formula from Carthage dates to the 7th or 6th century BCE. The inscription reads: a pillar of offering (MLK) for Baal which Magon, the son of Hanno, gave to Baal Hammon.⁸ That MLK represents a specific type of sacrifice associated with the tophet appears to be supported by an inscription from Malta.⁹ In this inscription, the formula is: a stele of offering (MLK) of a lamb which Arash placed [here] to Baal Hammon, the Lord.

Given these synergies among the textual, archaeological, and epigraphic evidence, many scholars had concluded by the end of the 20th century that Phoenician populations in the central Mediterranean regularly sacrificed their children, though there was dissent from this position.¹⁰ Vance summed up the debate with the following statement:

⁵ A fragment of Cleitarchus is the most debated (Jacoby (1929), fr.9). Ribichini (2020) for a full discussion.

⁶ D’Andrea (2018), 131-138 for a selection of Greco-Roman and Biblical sources.

⁷ Though not all scholars agreed to this reading. Initially, the letters were interpreted as the name of a god, Moloch/Molech, a position challenged by Eissfeldt, who turned the debate towards a sacrificial interpretation. For these early 20th century studies, Cooke (1903), 104; R.E.S. 307; Eissfeldt (1935); Dussaud (1946); Alt (1950); Février (1953); Amadasi Guzzo (1967), 20-21; Weinfeld (1972). Amadasi Guzzo, Zamora Lopéz (2012-13) for a recent reappraisal of inscriptional formula from tophets. D’Andrea (2018), 59-98 contains a complete historiography.

⁸ CIS I. 5685; See also, CIS I. 123a=KAI 61A; CIS I. 147; CIS I. 194; CIS. I.195; CIS I. 380; KAI 98; KAI 99. CIS= *Corpus Inscriptionum Semiticarum*; KAI=*Kanaanäische und Aramäische Inschriften*.

⁹ CIS I. 123b= KAI 61 B= Amadasi Guzzo (1967), Malta #5

¹⁰ Stager, Wolf (1984); Heider (1985); Moscati (1987b); Bénichou-Safar (1988); Lipiński (1988); Day

Some, mostly American and British, scholars are convinced that child sacrifice was actually practiced. There is textual evidence from several areas and the remains of burned children have been found. Other scholars, particularly French and Italian, are equally convinced that the practice was only the means of handling the corpses of children who died very young or who were stillborn. For these scholars, the legends of child sacrifice are the product of xenophobic imaginations of those outside Phenicio-Punic culture. The prudent position would seem to be to wait until the publication of Stager's osteological evidence from Carthage and see if it supports his conviction that children were indeed the victims of an insidious rite.¹¹

In reality, such hope for the clarity brought by science was misplaced. Rather, multiple teams of scholars have reached different conclusions concerning tophet skeletons.¹² In 2010, Schwartz et al. published an osteological examination of tophet skeletons from Carthage. Their findings can be stated simply: a large portion of the skeletons recovered at the tophet were prenatal or neonatal.¹³ Consequently, these particular infants were not candidates for live sacrifice, as they were either still births/miscarriages or infants who died during or shortly after birth.¹⁴

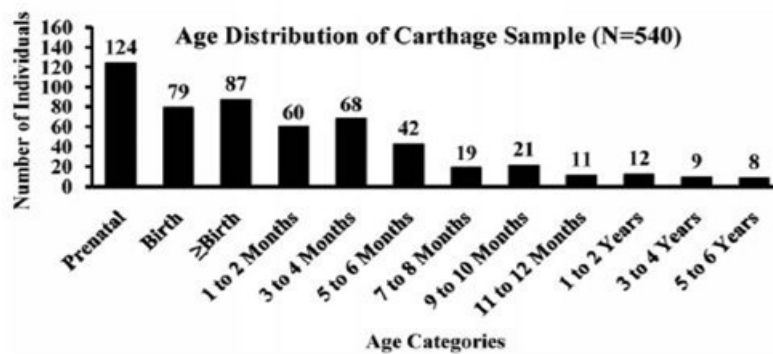


Figure 1. Age Distribution of Carthaginian Skeletons¹⁵

They also found that the distribution of ages matched known, natural infant mortality profiles from antiquity, supporting previous arguments that the tophet was a burial ground

(1989); Brown (1991); Xella (1991); Bénichou-Safar (1993).

¹¹ Vance (1994), 118.

¹² Schwartz et al. (2010); Smith et al. (2011); Schwartz et al. (2012); Smith et al. (2013); Stager (2014); Schwartz et al. (2017). D'Andrea (2018), 17: "In generale, bisogna considerare il fatto che questi studi sono stati effettuati in periodi diversi e utilizzando metodologie diverse. Essi sono oggettivamente complicati da una serie di elementi derivanti perlopiù dalla difficoltà di esaminare e determinare con precisione resti cremati di individui immaturi, umani e animali, talvolta mescolati e spesso frammentari per quanto riguarda sia lo stato di conservazione sia le parti scheletriche rappresentate. Talvolta i risultati di queste analisi appaiono influenzati dalle tesi interpretative degli autori (o, comunque, dei « committenti » delle stesse) e dall'epoca in cui esse sono state effettuate. Spesso, inoltre, questi studi non hanno tenuto conto del contesto archeologico e della stratigrafia dei cinerari restituendo pertanto una visione appiattita che non consente una lettura sincronica o diacronica. È dunque necessaria una grande cautela nell'uso, nella comparazione e nelle generalizzazione di questi dati."

¹³ Richard (1961).

¹⁴ Schwartz et al. (2010).

¹⁵ Schwartz et al. (2010).

for naturally deceased infants.¹⁶ Importantly, Schwartz et al. noted that bodies were burnt on an open funeral pyre with varying degrees of temperature.

A separate group of scholars published a rebuttal to Schwartz et al. in 2011. The primary method by which Smith et al. age tophet skeletons is a new method of identifying tooth age, based on estimates of tooth shrinking as part of a cremation. Smith et al. establish an estimate of tooth shrinking through examples from modern studies in which cremation is conducted in ovens and not on open funeral pyres. Even under oven cremation conditions, shrinkage rates vary. To deal with this variation, Smith et al. employ an average of 6mm of shrinking due to cremation. They then argue that this shrinking represents about four to six weeks of growth using an average of 0.015mm for daily tooth development. Smith et al. comment, “These findings suggest that a minimum of four weeks should be added to age estimates of the cremated teeth from Carthage to compensate for shrinking due to cremation.”¹⁷ Smith et al. use this shrinkage rate to age to post-natal skeletons that would have been identified as pre-natal using the methods of Schwartz et al. In their reconstruction, the largest percentage of burials were infants 1-2 months in age, constituting 62% of their total sample. Further, they note that their mortality profile of infants from the Carthaginian tophet does not follow natural mortality patterns, which spike in the immediate post natal period. Therefore, Smith et al. conclude that the Carthaginians were actively sacrificing these infants.¹⁸

In 2012, Schwartz et al. published a response to the Smith et al. study.¹⁹ In this publication, Schwartz and his coauthors mostly restate their initial findings, but also take the opportunity to assess Smith et al. They conclude:

In the light of an extensive metrical analysis of deciduous tooth crowns, we cannot accept their premise because, if deciduous tooth crowns did shrink 6mm, most (upper and lower deciduous incisors and canines in particular) would not have survived incineration. We also do not know if the incinerated teeth Soleil et al. measured were initially shorter than the unincinerated teeth Deutsch et al. measured. A 6mm adjustment for shrinkage is not compatible with Smith et al.’s statement that crown length increases at a rate of 0.015mm/day. At 0.015mm/day, shrinkage should be 0.42mm. More importantly, crown-size increase cannot be uniform in all dimensions because recruitment rates of new ameloblasts vary along the enamel-dentine juncture, from 20-30/ μ m/day at the cusp tip to 3-6/ μ m/day near the cervix. Furthermore, while uniform shrinkage might be achieved in a closed oven, it is unlikely in small-branch, open-air pyres.²⁰

In addition to publications concerning the Carthaginian tophet, recent excavations have occurred in the tophet at Sulcis. At Sulcis, excavations revealed 110 new burials. Of these, 72 were examined to determine the contents. Melchiorri comments, “Sur un total de 72 cinéraires examinés, des restes humains seuls ont été diagnostiqués pour 50 d’entre eux; plus précisément, il s’agit de 52 individus d’un âge compris entre la phase périnatale et 4-5 ans de vie; 30 au moins étaient des nouveau-nés, dont 9 entre 0 et six mois; 6 individus avaient entre six et neuf mois; 4 avaient environ 18 mois. Deux individus étaient plus âgés, respectivement 3-4 ans et 4-5 ans”.²¹ At Sulcis, 88% of the individuals are under one year of age with the

¹⁶ Benichou-Safar (1981), 5-9.

¹⁷ Smith et al. (2011), 863.

¹⁸ Schwartz et al. (2010).

¹⁹ Schwartz et al. (2012).

²⁰ Schwartz et al. (2012), 742.

²¹ Melchiorri (2009), 517.

majority falling in the neonatal period. Melchiorri also reported highly variable cremation temperatures, “D’après l’évaluation chromatique des os et des fissurations qui ont été mis en évidence, il a été possible d’établir que 70 % des échantillons avaient atteint des températures entre 400 et 600° C, tandis que 17 % des crémations avaient atteint des températures plus élevées, comprises entre 600 et 900°. 12 % des cas correspondent à des températures variables, entre 100 et 300° C.”²²

Given the contradictory interpretations of recent osteoarchaeological studies, in 2013, Xella et al. published their assessment of the evidence as a capstone to the debate in *Antiquity*.²³ In their work, the authors deliberately broaden the evidence under consideration in order to escape the constraints of the skeletal evidence. They argue that the totality of epigraphic, literary, biblical, and archaeological evidence proves sacrifice occurred. While the authors do not directly address the rate of sacrifice, they do note that quantitative studies of recovered urns from Mozia indicate a sacrifice rate of 1 to 2 victims per year.²⁴ Further, using the evidence of animal bones recovered in tophet burials, the authors argue that sacrifices were highly seasonal and thus only occurred once or twice per year.²⁵

Xella et al. also discount the possibility of textual bias in Greco-Roman sources and dismiss extant studies from this perspective. They comment, “There is no prima facie reason to doubt the universal verdict of Greek and Roman authors on the matter, selective infanticide being unremarkable in the ancient Mediterranean or elsewhere.”²⁶ It is with this final point that I want to begin. All of the osteologists in the tophet debate agree that the vast majority of skeletons are under one year of age with the heaviest concentration in the pre/neo-natal period (Schwartz) or 1-2 months of age (Smith).²⁷ In sum, do the Greco-Roman sources actually describe the sacrifice of this population?

2. Diodorus, Justin, Plutarch

In the 1980s, Simonetti, Ribichini, and Moscati challenged the received belief that the evidence of the Greco-Roman sources and the archaeological records of tophets cohere, a position deserving of restatement in light of recent osteoarchaeological finds.²⁸ Here, I primarily focus on Diodorus, Justin, and Plutarch due to the fact that scholars possess continuous and lengthy narratives or multiple preserved texts that allow for intra-textual study of age categories. Through this analysis, I illustrate the degree to which the practices recorded, at the most basic level of the age of the victim, do not converge with the evidence of more than fifty years of osteoarchaeological research.²⁹ For the historian, such disjunction matters. In the present state of the tophet debate, the Greco-Roman sources remain the falsifiable variable and the

²² Melchiorri (2009), 517; Aounallah et al. (2020) for the results of a recent excavation in the chronologically later tophet at Dougga. They excavators note, “Les individus dont les restes brûlés ont été déposés dans le sanctuaire sont des périnataux entre sept mois in utero et deux mois après la naissance. Aucune trace pouvant être liée à un geste ayant donné la mort n’a été observée sur les ossements.”

²³ Xella et al. (2013); Xella also edited a volume in which multiple scholars argue for sacrifices at tophets, Xella (2012-13).

²⁴ Orsingher (2018) for a summation of the evidence of infant and child burials at Mozia,

²⁵ A position contested strongly by Ribichini (2020).

²⁶ Xella et al. (2013), 1203.

²⁷ Schwartz et al. (2010); Smith et al. (2011).

²⁸ D’Andrea (2018), 68-76 for a full discussion of all challenges to the standard interpretation of the tophet in the 1980s and 90s. Simonetti (1983); Moscati (1987); Ribichini (1987); Ribichini (1990). For a more recent restatement, Ribichini (2020).

²⁹ Xella (2009) reads this evidence differently.

structuring evidence against which other evidence is weighed.³⁰ However, as Simonetti, Ribichini, and Moscati long ago demonstrated, the Greco-Roman narratives are in fact falsified by comparison of their contents to archaeological finds.

Diodorus records two instances of sacrifice in his narratives:

13.86: Ἱμίλκας δὲ θεωρῶν τὰ πλήθη δεισιδαιμονοῦντα πρῶτον μὲν ἐπαύσατο καθαιρῶν τὰ μνημεῖα, μετὰ δὲ ταῦτα ἰκέτευε τοὺς θεοὺς κατὰ τὸ πάτριον ἔθος τῶ μὲν Κρόνῳ παῖδα σφαγιάσας³¹

20.14: ἦτιῶντο δὲ καὶ τὸν Κρόνον αὐτοῖς ἐναντιοῦσθαι, καθ' ὅσον ἐν τοῖς ἔμπροσθεν χρόνοις θύοντες τούτῳ τῷ θεῷ τῶν υἱῶν τοὺς κρατίστους ὕστερον ὠνούμενοι λάθρᾳ παῖδας καὶ θρέψαντες ἔπεμπον ἐπὶ τὴν θυσίαν: καὶ ζητήσεως γενομένης εὐρέθησάν τινες τῶν καθιερουργημένων ὑποβολιμαῖοι γεγονότες. τούτων δὲ λαβόντες ἔννοιαν καὶ τοὺς πολεμίους πρὸς τοῖς τείχεσιν ὄρωντες στρατοπεδεύοντας ἐδεισιδαιμόνουν ὡς καταλελυκότες τὰς πατρῖους τῶν θεῶν τιμάς. διορθώσασθαι δὲ τὰς ἀγνοίας σπεύδοντες διακοσίους μὲν τῶν ἐπιφανεστάτων παίδων προκρίναντες ἔθυσαν δημοσίᾳ: ἄλλοι δ' ἐν διαβολαῖς ὄντες ἐκουσίως ἑαυτοὺς ἔδοσαν, οὐκ ἐλάττους ὄντες τριακοσίων. ἦν δὲ παρ' αὐτοῖς ἀνδριάς Κρόνου χαλκοῦς, ἐκτετακῶς τὰς χεῖρας ὑπτίας ἐγκεκλιμένης ἐπὶ τὴν γῆν, ὥστε τὸν ἐπιτεθέντα τῶν παίδων ἀποκυλίεσθαι καὶ πίπτειν εἰς τι χάσμα πλήρες πυρός³²

Though these passages seem to confirm the impression that the Carthaginians sacrificed children, they have very little to do with the archaeology of recovered tophets. Both the Schwartz and Smith teams, irrespective of exact aging would agree that tophet skeletons are predominately infants under one year of age and not children, generically, as noted earlier. But, Diodorus has nothing to say about infants and sacrifice. Rather, he clearly states that victims are children, which for him is an older age category. He does mark the presence of infants in multiple other places in his narrative, indicating that he possesses a concept of infancy.

13.57: εἰς δὲ τὴν ἀγορὰν συνδραμόντων τῶν Σελινουντίων, οὗτοι μὲν ἐνταῦθα μαχόμενοι πάντες ἀνηρέθησαν: οἱ δὲ βάρβαροι σκεδασθέντες καθ' ὅλην τὴν πόλιν τὴν μὲν ἐν ταῖς οἰκίαις εὐδαιμονίαν συνήρπασαν, τῶν δὲ ἐγκαταληφθέντων σωμάτων ἃ μὲν ταῖς οἰκίαις συγκατέκαιον, τῶν δ' εἰς τὰς ὁδοὺς βιαζομένων οὐ

³⁰ Mura (2022).

³¹ Himilcar, on seeing how the throng was beset with superstitious fear, first of all put a stop to the destruction of the monuments, and then he supplicated the gods after the custom of his people by sacrificing a boy. Oldfather (1950).

³² They [the Carthaginians] also alleged that Cronus had turned against them inasmuch as in former times they had been accustomed to sacrifice to this god the noblest of their sons, but more recently, secretly buying and nurturing children, they had sent these to the sacrifice; and when an investigation was made, some of those who had been sacrificed were discovered to have been supposititious. When they had given thought to these things and saw their enemy encamped before their walls, they were filled with superstitious dread, for they believed that they had neglected the honours of the gods that had been established by their fathers. In their zeal to make amends for their omission, they selected two hundred of the noblest children and sacrificed them publicly; and others who were under suspicion sacrificed themselves voluntarily, in number not less than three hundred. There was in their city a bronze image of Cronus, extending its hands, palms up and sloping toward the ground, so that each of the children when placed thereon rolled down and fell into a sort of gaping pit filled with fire. Geer (1954).

διακρίνοντες οὔτε φύσιν οὔθ' ἡλικίαν, ἀλλ' ὁμοίως παῖδας νηπίους, γυναῖκας, πρεσβύτας ἐφόνευον, οὐδεμίαν συμπάθειαν λαμβάνοντες.³³

13.111: Διονύσιος δὲ παραγενόμενος εἰς τὴν Καμάριναν, ἠνάγκασε καὶ τοὺς ἐκεῖ μετὰ τέκνων καὶ γυναικῶν εἰς Συρακούσας ἀπιέναι. τοῦ φόβου δ' οὐδεμίαν ἀναβολὴν διδόντος τινὲς μὲν ἀργύριον καὶ χρυσίον καὶ τὰ ῥαδίως φέρεσθαι δυνάμενα συνεσκευάζοντο, τινὲς δὲ γονεῖς καὶ τέκνα τὰ νήπια λαβόντες ἔφευγον, οὐδεμίαν ἐπιστροφὴν χρημάτων ποιούμενοι: ἔνιοι δὲ γεγηρακότες ἢ νόσῳ βαρυνόμενοι δι' ἔρημίαν συγγενῶν ἢ φίλων ὑπελείποντο, προσδοκωμένων ὅσον οὔπω παρέσεσθαι τῶν Καρχηδονίων³⁴

14.52: οἱ δὲ Μοτυηνοὶ τὸ μέγεθος τοῦ κινδύνου λογιζόμενοι, καὶ τῶν γυναικῶν καὶ τῶν τέκνων ἐν ὀφθαλμοῖς ὄντων, τῷ περὶ τούτων φόβῳ προθυμότερον ἠγωνίζοντο. οἱ μὲν γὰρ γονέων παρεστώτων καὶ δεομένων μὴ περιδεῖν αὐτοὺς τῇ τούτων ὕβρει παραδιδομένους ἐπηγείροντο ταῖς ψυχαῖς, οὐδεμίαν φειδῶ τοῦ ζῆν ποιούμενοι, οἱ δὲ γυναικῶν καὶ νηπίων τέκνων θρῆνον ἀκούοντες ἔσπευδον εὐγενῶς ἀποθανεῖν, πρὶν ἐπιδεῖν τὴν τῶν τέκνων αἰχμαλωσίαν³⁵

In these examples, παῖδα (13.86), παῖδας/παίδων (20.14/13.111) and τέκνων (14.52) are children at an age when they can walk and talk (or children, generally, of any age). They can be distinguished against infants, παῖδας νηπίους (13.57), τέκνα τὰ νήπια (13.111), νηπίων τέκνων (14.52), who lack these abilities.

Diodorus reinforces this distinction outside of battle narratives at 17.91:

διόπερ ἐκ νηπίου παρ' αὐτοῖς τὰ βρέφη διακρίνεται καὶ τὰ μὲν ἄρτια καὶ τὴν φύσιν ἔχοντα πρὸς εὐπρέπειαν καὶ ἰσχὺν εὐθέτον τρέφεται, τὰ δὲ καταδεῖ τοῖς σώμασιν ἀνάξια τροφῆς ἠγούμενοι διαφθείρουσιν. ἀκολούθως δὲ τούτοις καὶ τοὺς γάμους ποιοῦνται προικὸς μὲν καὶ τῆς ἄλλης πολυτελείας ἀφροντιστοῦντες, κάλλους δὲ καὶ τῆς τοῦ σώματος ὑπεροχῆς μόνον φροντίζοντες.³⁶

³³ The Selinuntians gathered into the market-place and all who reached it died fighting there; and the barbarians, scattering throughout the entire city, plundered whatever of value was to be found in the dwellings, while of the inhabitants they found in them some they burned together with their homes and when others struggled into the streets, without distinction of sex or age but whether infant children or women or old men, they put them to the sword, showing no sign of compassion. Oldfather (1950).

³⁴ When Dionysius arrived at Camarina, he compelled the residents of that city also to depart with their children and wives to Syracuse. And since their fear admitted of no delay, some gathered together silver and gold and whatever could be easily carried, while others fled with only their parents and infant children, paying no attention to valuables; and some, who were aged or suffering from illness, were left behind because they had no relatives or friends, since the Carthaginians were expected to arrive almost immediately. Oldfather (1950).

³⁵ The Motyans, as they took account of the magnitude of the peril, and with their wives and children before their eyes, fought the more fiercely out of fear for their fate. There were some whose parents stood by entreating them not to let them be surrendered to the lawless will of victors, who were thus wrought to a pitch where they set no value on life; others, as they heard the laments of their wives and infant children, sought to die like men rather than to see their children led into captivity. Oldfather (1954).

³⁶ From birth, their babies are subjected to a process of selection. Those who are well formed and designed by nature to have a fine appearance and bodily strength are reared, while those who are bodily deficient are destroyed as not worth bringing up. Welles (1963).

Here, Diodorus denotes birth, *νηπίου*, and babies, *βρέφη*, reinforcing the idea that Diodorus has very specific concepts of the stages of development for children.

To return to the narratives of sacrifice, when contextualized, Diodorus is clearly referencing older children, who rarely figure in the archaeological record of tophets. In 13.86, he uses *παῖδα*, child, with no accompanying adjective to denote a sacrifice victim. This usage is continued in 20.14. First, we have children or sons, *υἱῶν*, followed by *παῖδας*, who he qualifies as *θρέψαντες*, reared or nurtured. Reared suggests much more time than the first few days or weeks of life.

The same aging problem present in Diodorus is also visible in the narrative of Justin. Justin describes sacrifice but not infant sacrifice. Justin 18.6:

Cum inter cetera mala etiam peste laborarent, cruenta sacrorum religione et scelere pro remedio usi sunt ; quippe homines ut victimas immolabant et inpuberes, quae aetas etiam hostium misericordiam provocat, aris admovebant.³⁷

In(m)pubes does not normally denote infants in Latin. Rather, the term is generally applied to a youth who is nearing physical maturity. It is also a technical legal term to denote minority in age. Justin often uses it in this sense. At 1.1, Justin utilizes “inpubere filio Ninya” to denote a boy too young to assume the kingship when his father dies, a meaning he again employs at 29.1, “in Asia interfecto Seleuco inpubes adhuc rex Antiochus constitutus est”. At 5.6, he writes “inpuberes pueri” to denote boys enrolled in the military who are too young to fight. Justin also provides a second narrative of sacrifice at 19.1:

Dum haec aguntur, legati a Dario, Persarum rege, Karthaginem venerunt adferentes edictum, quo Poeni humanas hostias immolare et canina vesci prohibebantur. mortuorumque corpora cremare potius quam terra obruere a rege iubebantur petentes simul auxilia adversus Graeciam, cui inlaturus bellum Darius erat. Sed Karthaginienses auxilia negantes propter adsidua finitimorum bella ceteris, ne per omnia contumaces viderentur, cupide parvere.³⁸

In this example, Justin does not even note the presence of children, just humans. He also claims that Darius prohibits the Carthaginians from eating dogs, an assertion that has received comparatively less attention than claims of human sacrifice. Additionally, Justin implies that the Carthaginians agree to stop human sacrifice, again complicating scholarly reconstructions that seek to use his narrative to read archaeological evidence from the tophet.³⁹ If true, the Carthaginian tophet should have ceased to contain infant burials by 490 BCE. In reality, infant burials continue until the destruction of the city.⁴⁰

³⁷ Being afflicted, among other calamities, with a pestilence, they adopted a cruel religious ceremony, an execrable abomination, as a remedy for it; for they immolated human beings as victims, and brought children (whose age excites pity even in enemies) to the altars. Watson (1853).

³⁸ During the course of these transactions, ambassadors came to Carthage from Darius king of Persia, bringing an edict, by which the Carthaginians were forbidden to offer human sacrifices, and to eat dog's flesh, and were commanded to burn the bodies of the dead rather than bury them in the earth; and requesting, at the same time, assistance against Greece, on which Darius was about to make war. The Carthaginians declined giving him aid, on account of their continual wars with their neighbors, but, that they might not appear uncompliant in everything, willingly submitted to the decree. Watson (1853).

³⁹ Xella (2009) for a discussion of attempts by outsiders to stop Carthaginian child sacrifice.

⁴⁰ Ben Jerbania et al. (2022), 1151-1153; D'Andrea (2014), 44-46. D'Andrea (2021) for an analysis of the spread of tophets from the 4th-1st centuries BCE.

Finally, in Plutarch's narrative of child sacrifice, he cites the source, Empedocles, from which he forms his opinion. Plutarch, *De Superstitione*, 13:

τί δέ; Καρχηδονίοις οὐκ ἔλυσιτέλει Κριτίαν λαβοῦσιν ἢ Διαγόραν νομοθέτην ἀπ' ἀρχῆς μήτε τινὰ δαιμόνων μήτε θεῶν νομίζειν ἢ τοιαῦτα θύειν οἷα τῷ Κρόνῳ ἔθουον; οὐχ ὡσπερ Ἐμπεδοκλῆς φησι τῶν τὰ ζῶα θυόντων καθαπτόμενος

μορφήν δ' ἀλλάξαντα πατήρ φίλον υἷον ἀείρας
σφάζει ἐπευχόμενος μέγα νήπιος,

ἀλλ' εἰδότες καὶ γινώσκοντες αὐτοὶ τὰ αὐτῶν τέκνα καθιέρουν, οἱ δ' ἄτεκνοι παρὰ τῶν πενήτων ὠνούμενοι παιδία κατέσφαζον καθάπερ ἄρνας ἢ νεοσσοὺς, παρειστήκει δ' ἡ μήτηρ ἄτεγκτος καὶ ἀστένακτος. εἰ δὲ στενάξειεν ἢ δακρῦσειεν, ἔδει τῆς τιμῆς στέρεσθαι, τὸ δὲ παιδίον οὐδὲν ἦττον ἐθύετο, κρότου τε κατεπίμπατο πάντα πρὸ τοῦ ἀγάλματος ἐπαυλούντων καὶ τυμπανιζόντων ἕνεκα τοῦ μὴ γίγνεσθαι τὴν βοήν τῶν θρήνων ἐξάκουστον.⁴¹

Empedocles lived in the 5th century BCE in Sicily, in a town the Carthaginians conquered after his death. As cited, Empedocles employs the word νήπιος but not to describe the sacrificial victim. Rather, he deploys it in a possible word play, μέγα νήπιος, “how infantile”, being one possible translation. Plutarch obviously does not recognize the potential double entendre, as he uses τέκνα, παιδία and παιδίον to describe the sacrificial victims.

Xella has argued that παιδίον, in this passage, refers specifically to “bambini molto piccolo.”⁴² However, the word is merely a diminutive of child and not specific to very small children or babies. In the *Eumenes* (13), Plutarch refers to a 3-4 year old Alexander IV as παιδίον. Similarly, in the *Brutus* (13), he refers to the child of Porcia, at the time of her marriage to Brutus, as παιδίον...μικρόν. Porcia's first husband had died in 48 BCE. Her marriage to Brutus occurred in 45 BCE. The child, therefore, was three or more years old.

In sum, in these three sources, often cited, there is but one potential description of infant sacrifice and that in a word play. Moreover, these source narratives appear to describe a practice that has very little to do with archaeology of the tophet as recovered. Therefore, while infanticide may have been “unremarkable”, these three often cited Greco-Roman sources are not describing infanticide. Instead, they record child sacrifice, the killing of older, healthy children, a practice that was remarkable in the Greco-Roman world.⁴³

⁴¹ Again, would it not have been far better for the Carthaginians to have taken Critias or Diagoras to draw up their law-code at the very beginning, and so not to believe in any divine power or god, rather than to offer such sacrifices as they used to offer to Cronos? These were not in the manner that Empedocles describes in his attack on those who sacrifice living creatures:

Changed in form is the son beloved of his father so pious,
Who on the altar lays him and slays him. What Folly!

No, but with full knowledge and understanding they themselves offered up their own children, and those who had no children would buy little ones from poor people and cut their throats as if they were so many lambs or young birds; meanwhile the mother stood by without a tear or moan; but should she utter a single moan or let fall a single tear, she had to forfeit the money, and her child was sacrificed nevertheless; and the whole area before the statue was filled with a loud noise of flutes and drums so that the cries of wailing should not reach the ears of the people. Babbitt (1928).

⁴² Xella (2009), 90.

⁴³ Shaw (2001).

While fragmentary sources on sacrifice, by their very nature, do not allow for the study of an author's use of age-related language, the most commonly cited fragments produced in the last four centuries BCE contain generic words for children or small children.⁴⁴ Further, the diction is similar to that of Diodorus, Justin, and Plutarch. For example, Cleitarchus uses ἐνὸς τῶν παίδων and παιδίον, children and small child, to describe sacrificial victims. A fragment of Ennius identifies the victims as puellos, little boys.⁴⁵

A change occurs in Latin narratives from the 1st century CE, most notably in the *Punica* of Silius Italicus. In *Punica* 4.467, Silius describes the victims of sacrifice as “parvos...natos”. While natos can mean children of any age, Silius in other instances uses the term to refer specifically to infants. At 4.377, he narrates a woman breastfeeding children in the following manner, “suspendit ab ubere natos.” From this point, several Latin authors identify the sacrificial victims as infans, infants. Tertullian records two usages of the term. Minucius Felix has one usage.⁴⁶

By contrast, Greek authors do not follow the same convention from the 1st century CE. Instead, the language is the same as that used by earlier authors. Origen denotes the victims of sacrifice as τέκνα. Eusebius, citing Philo of Byblos, employs τέκνων and υἱόν.⁴⁷

In sum, the vast majority of sources use the generic word for child or small child and not specifically infant. Based on the evidence of Diodorus, Justin, and Plutarch, child and small child in these contexts denotes individuals at an age when they can walk and talk, i.e. 1-2 years old or older. By contrast, the archaeology of the tophet at Carthage reveals very few individuals in this age category. Of 540 individuals, Schwartz et al. aged 11 sets of remains to 1-2 years old and 29 to older age categories. Smith et al. in their sample of 390 individuals identified 13 1-2 year olds and 15 in older age categories. Respectively, individuals one year and older constitute 7.4% and 7.1% of burials in the Carthaginian tophet. The remainder are infants, predominately younger than three months, a group nearly absent from the Greco-Roman source tradition.

To conclude, it should be noted that the same problems evident in the Greco-Roman sources characterize the epigraphic record of tophets. No mention is made of infants or children by any inscription during the 8th-2nd centuries BCE. Additionally, the use of MLK as a sacrificial term appears to have predominated in the archaic period only.⁴⁸ From the 5th century, after the goddess TNT had been added to the cult, the standard formula of tophet inscriptions, of which well more than 1000 examples exist, is: ‘To the Great One, to TNT, the Face of Baal, and to the Lord, to Baal Hammon, that which (Name) vowed.’⁴⁹ Only occasionally does the term MLK appear at the very end of the text in these later inscriptions.⁵⁰ Most, however, make no reference to sacrifice.

⁴⁴ D’Andrea (2018), 135 ff. for all the commonly cited sources.

⁴⁵ Jacoby (1929), fr. 9; Warmington (1935), fr. 237; Certain narratives of child sacrifice are not fragments but part of larger narratives that should allow for the study of age categories. However, these narratives describe victims in a manner that is too generic for such study. Pseudo Plato (*Minos* 315 b-c) employs υἱεῖς, children or sons. Dionysius of Halicarnassus (*AR* 1.38.2) does not even specify an age of victims. He simply notes sacrifices, θυσίας.

⁴⁶ Tertullian, *Apology*, 9; Minucius Felix, *Octavian*, 30.3; Xella (2009), 79-80 for discussion of Silius’ passage.

⁴⁷ Origen, *Against Celsus*, 5.27; Eusebius, *Praeparatio Evangelica*, 1.10.44.

⁴⁸ D’Andrea (2018), 24-31 for a full discussion.

⁴⁹ CIS I.440 and following for multitudes of examples.

⁵⁰ D’Andrea (2014), 57-58; Amadasi Guzzo, Zamora Lopéz (2012-13).

3. The Demography of Colonial Populations

If we discard the Greco-Roman sources as falsified, it is possible to consider tophet skeletons and their deposition as a demographic problem, an argument scholars first put forward in the 1980s. At that time, however, assumptions were made about the health of ancient populations that proved false.⁵¹ Over the last three decades, scholars have made substantial advances in studies of ancient health and demography, primarily through incorporation of skeletal evidence into demographic reconstructions.⁵² These studies have demonstrated that ancient populations were more unhealthy than envisaged by demographic models based on 19th century populations.⁵³ The totality of the evidence suggests that population growth was in fact difficult to achieve in antiquity and likely proceeded slowly if at all (0.05- 0.15% per annum) over the long term.⁵⁴ Thus demographic studies that consider infant sacrifice as a form of population control err in the most basic premise. In the following, I put forward a series of models that account for updated understandings of ancient population dynamics.⁵⁵

Based on current understandings of health in antiquity, it is possible to model a generation of reproductive adults and the number of offspring produced in an ancient colonial context. Infant sacrifice can then be introduced into the models to understand its effects. The point of this section is therefore simple. Models allow for the estimation of probability. One can determine at what rate a reproductive population needs to grow endogenously in a colonial context to support any regular practice of infant sacrifice. In turn, probable population models can be read into current archaeological records at various sites. Thus one can test various scenarios against physical evidence. In this process of comparison, demography and archaeology create their own falsifiable variables independent of the ancient source tradition.

I develop three different model populations, designed specifically to capture a range of demographic possibilities for archaic Phoenician colonies of the central Mediterranean. Each of the population models focuses on reproductive adults only rather than total population. Therefore, to achieve a total population metric, the reproductive populations studied in these models may be multiplied by 3, 4, or 5, as comparative evidence indicates reproductive adults constitute 20-33% of the total population in pre-modern contexts. Further, I build the models with large starting populations in order to test both low and high rates of sacrifice. In reality, Phoenician colonies were smaller when founded. I, therefore, conclude this section by adapting the model populations to currently known archaeological evidence about population growth at Mozia.

Population #1 is designed to be a maximum bound, representing an undocumented and likely impossible endogenous rate of growth for an ancient population. Population #2, by contrast, is within the very upper limits of conjectured endogenous population growth. Finally, Population #3 is designed to be average, which for antiquity is unhealthy, and represents a lower bound for this study. Any population with health below that of population #3

⁵¹ Stager and Wolff (1984); Suder (1991); González Wagner (1991), 411-416; Ruiz Cabrero (2007), 618 ff..

⁵² Pilkington (2013); Hin (2013).

⁵³ Scheidel (2007) and Scheidel (2001) for discussion of the problems related to Coale-Demeny models and their general inapplicability to the conditions of the ancient Mediterranean.

⁵⁴ Scheidel (2007); Scheidel (2001); For an argument that ancient populations could achieve 2-3 % growth, Sallares (1991), 85-88.

⁵⁵ Garnand et al. (2012-2013) for a recent attempt to model the demography of tophets, though no mathematical models are presented. Further, their verbal models assume far too high rates of infant mortality, “infant children would have been only marginally viable in their first year (ca. 50-60% mortality) (209).” No population in antiquity is known to have been this unhealthy.

would have been unable to sustain a regular practice of infanticide as the models make clear. Immigration rates are absent from these initial models.

Table 1 (below) shows the setup of the model for the first generation of reproductive adults in Population #1, an improbably healthy population with low infant and childhood mortality rates. For modelling purposes, I have started with an initial population of 2000 reproductive adults, who form the basis for the hypothetical colony. All are aged 20, and thus fully fertile.⁵⁶ None have had any prior children. All fertile adults are paired in each year of the model. The adults experience a dropout rate of 1% per annum. Dropouts are caused by death, infertility, disease, etc. Every year, therefore, fewer adults remain in our reproductive population. One quarter of all reproductive pairs have a child every year. These children are then subjected to a 20% infant mortality rate (birth-1) and a decreasing childhood mortality rate, beginning at 10% in the second year and decreasing to 2% in the fifth year. No juvenile mortality rate affects this population as it ages from 5-20.

Year	Adult	Newborn	One	Two	Three	Four	Five
1	2000	0	0	0	0	0	0
2	1980	250	0	0	0	0	0
3	1960	248	200	0	0	0	0
4	1940	245	198	180	0	0	0
5	1921	243	196	178	166	0	0
6	1902	240	194	176	164	158	0
7	1883	238	192	175	162	156	155
8	1864	235	190	173	161	154	153
9	1845	233	188	171	159	153	151
10	1827	231	186	169	157	151	150
11	1809	228	185	167	155	149	148
12	1791	226	1802	167	154	147	146
13	1773	224	181	164	154	146	144
14	1755	222	179	163	151	146	143
15	1737	219	178	161	150	143	143
		217	175	160	148	143	140
			174	158	147	141	140
				157	145	140	138
					144	138	137
						137	135
							134

Table 1. Reproductive Model of Population #1, Generation #1

Because of low infant and childhood mortality rates, Population #1 is successful at growth. In the first generation alone, the population produced 2157 surviving adult children. Using the same model, I iterate the next generations of reproductive adults and establish a population growth rate for this colony over 15 generations. For Carthage, or other colonies, this will generally cover the period 800-575 or 750- 525 BCE. Over 225 years, Population #1 achieves

⁵⁶ Pilkington (2013) for the age of girls at menarche.

212% growth. Annually, it nearly achieves nearly a 1% growth rate, beyond the known endogenous growth rates of ancient populations over this long of a term.

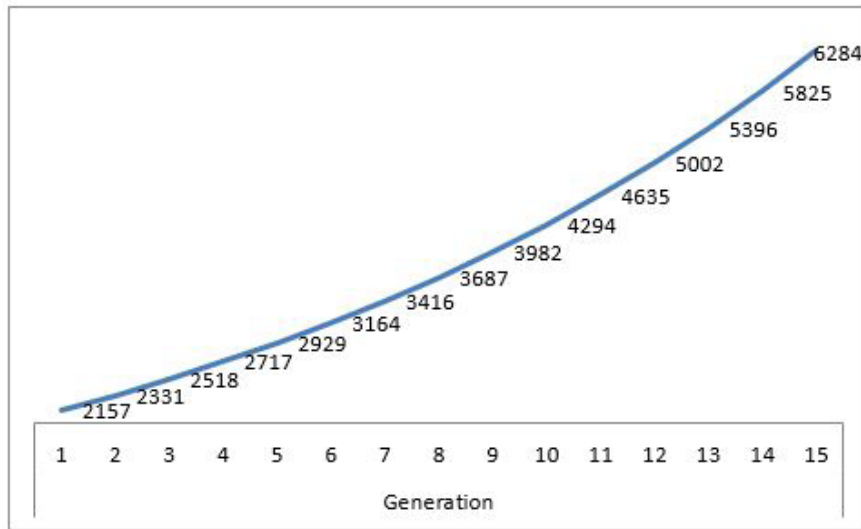


Fig. 2. Population #1, Reproductive Population Growth over 15 Generations

Now, I subject population #1 to infant sacrifice. Rates of burials in tophets vary by time and place. At Mozia, studies indicate an average of one to two burials per year. By contrast, Stager and Wolff estimated that the Carthaginian tophet received up to 20,000 urns from 400-200 BCE, a deposition rate of 100 urns per year, potentially indicating a tophet sacrifice on one out of every three days, though not all urns contain human remains. Complicating matters further, recent excavations at Carthage indicate that it is difficult to establish a minimum number of individuals in urns with more than individual, due to the fact that bones appear to have been collected with a shovel like tool and dumped into the urn at the same time. Ben Jerbania et al. comment, “il apparait que ce nombre d’individus présents réellement dans les urnes constitue un problème plus complexe que l’on croyait et mérite ainsi d’être étudié.”⁵⁷

For the purposes of demographic modelling, I set the minimum number of infants sacrificed at five and then increase to ten and fifteen per year for Population #1, simply to illustrate the effects on our upper bound. Additionally, I have placed the sacrifices within the first year of life (from birth to 1).

Year	Adults	Newborn	Remaining	One	Two	Three	Four	Five
1	2000	0		0	0	0	0	0
2	1980	250	245	0	0	0	0	0
3	1960	248	243	196	0	0	0	0
4	1940	245	240	194	176	0	0	0
5	1921	243	238	192	175	162	0	0
6	1902	240	235	190	173	161	154	0
7	1883	238	233	188	171	159	153	151

⁵⁷ Ben Jerbania et al. (2022), 1154; Stager and Wolff (1984).

Year	Adults	Newborn	Remaining	One	Two	Three	Four	Five
8	1864	235	230	186	169	157	151	150
9	1845	233	228	184	167	155	149	148
10	1827	231	226	182	166	154	147	146
11	1809	228	223	181	164	153	146	144
12	1791	226	221	178	163	151	145	143
13	1773	224	219	177	160	150	143	142
14	1755	222	217	175	159	147	143	140
15	1737	219	214	174	158	146	140	140
		217	212	171	157	145	139	137
				170	154	144	138	136
					153	142	137	135
						141	135	134
							134	132
								131

Tab. 2. Population #1, Reproductive Population with Infant Sacrifice

Over fifteen generations of reproductive adults, infant sacrifice would have important effects on population growth when compared to the population without sacrifice. Five sacrifices per year results in a loss of more than 1200 reproductive adults. Ten sacrifices per year creates a difference of more than 2500. At fifteen sacrifices per year, the population grows at a rate that would be expected of the average, though unhealthy, population in the ancient Mediterranean (as seen in Population #3 below).

In the first year of the first cohort of generation one, five, ten and fifteen sacrifices per year represent 2%, 4%, and 6% sacrifice rates of infants brought to term. Though some scholars have tried to suggest that infanticide rates in antiquity were quite high, this model illustrates that the healthiest ancient population could only sustain annual infanticide rates of 6.8%. At any higher percentage, the population would begin to contract.⁵⁸

The above population, however, is unlikely to be representative of colonial spaces in the Iron Age Mediterranean or any other space or time period in the ancient world. It is presented here solely to represent the effects that even limited infanticide would have on an absolute upper bound population. In reality, populations in antiquity would have experienced much higher subadult mortality rates.

In Population #2, I model increased infant (30%) and childhood (28%) mortality rates compared to Population #1. To compensate, couples have increased their fertility from Population #1. In addition, I have added a juvenile mortality rate for ages 5-20 of 8%.⁵⁹

⁵⁸ Garnand et al. have argued that “premodern societies with high rates of infant mortality nevertheless could have tolerated a relatively high rate of selective female infanticide, up to 33%.” (2012-2013), 214. For this debate in Roman history, Engels (1980) and Harris (1982).

⁵⁹ 8% juvenile mortality is a rounded average taken from the countries with the lowest life expectancies at birth in the WHO Life Tables from 1999. Lopez et al. (2009).

Forbidden to Sacrifice Humans or Eat Dogs

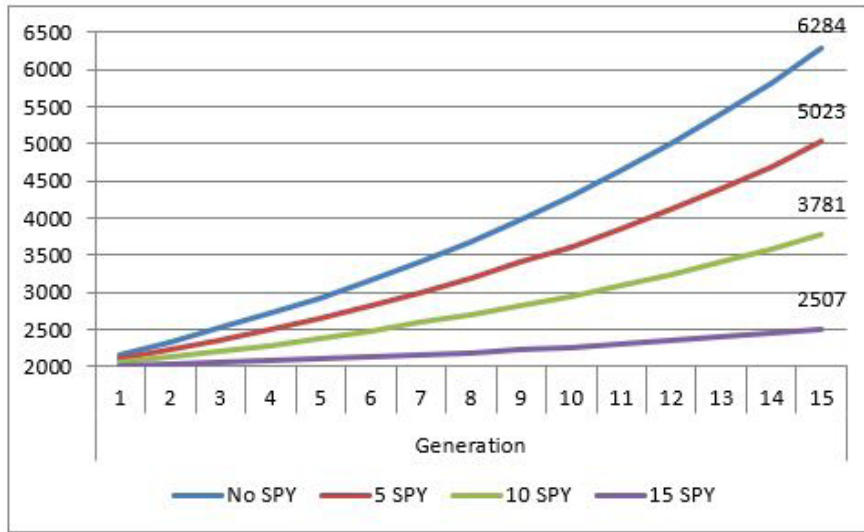


Fig. 3. Population #1, Effects of Infant Sacrifice on Population Growth

Year	Adults	Newborn	One	Two	Three	Four	Five	Twenty
1	2000							
2	1980	320						
3	1960	317	224					
4	1940	314	222	190				
5	1921	310	220	189	171			
6	1902	307	217	187	170	166		
7	1883	304	215	184	168	165	163	
8	1864	301	213	183	166	163	162	150
9	1845	298	211	181	165	161	160	149
10	1827	295	209	179	163	160	158	147
11	1809	292	207	178	161	158	157	145
12	1791	289	204	176	160	156	155	144
13	1773	287	202	173	158	155	153	143
14	1755	284	201	172	156	153	152	141
15	1737	281	199	171	155	151	150	140
		278	197	169	154	150	148	138
			195	167	152	149	147	136
				166	150	147	146	135
					149	146	144	134
						145	143	132
							142	132
								131

Tab. 3. Reproductive Model of Population #2, Generation #1.

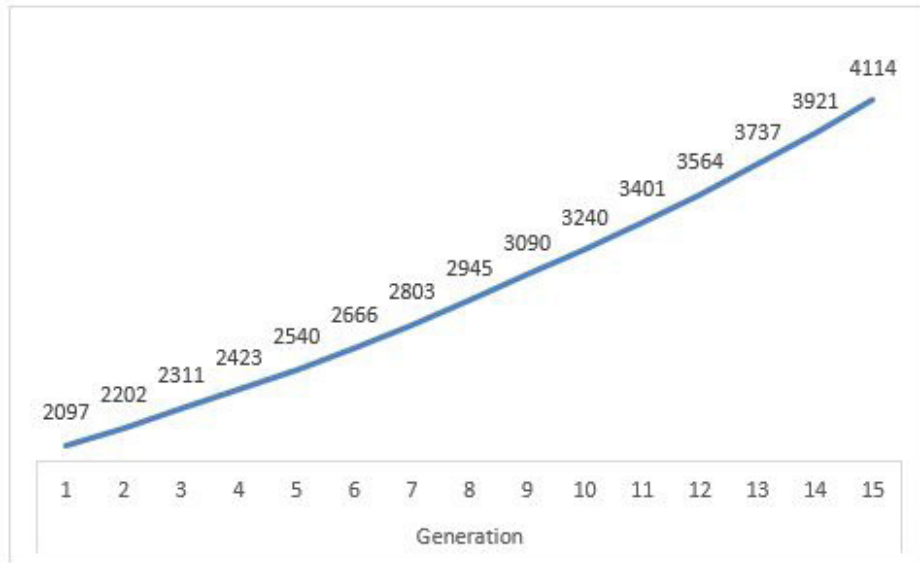


Fig. 4. Population #2, Reproductive Population Growth

Population #2 may be thought of as a possible demographic picture. The population averages better than 0.45% annual growth, high for antiquity. Ober has recently argued that Greece in this period achieved annual growth rates slightly higher than Population #2, as part of a general efflorescence. I would agree that such growth rates, if ever achieved in antiquity, were most likely to have occurred during the 8th- 6th centuries BCE. Colonization movements, of the scale achieved by the Greeks and Phoenicians, should result in lower population densities for both the parent city and its new foundation. Lower density tends to result in lighter disease loads as well as increased land and decreased labor supply, all parts of the recipe for sustained population growth.⁶⁰

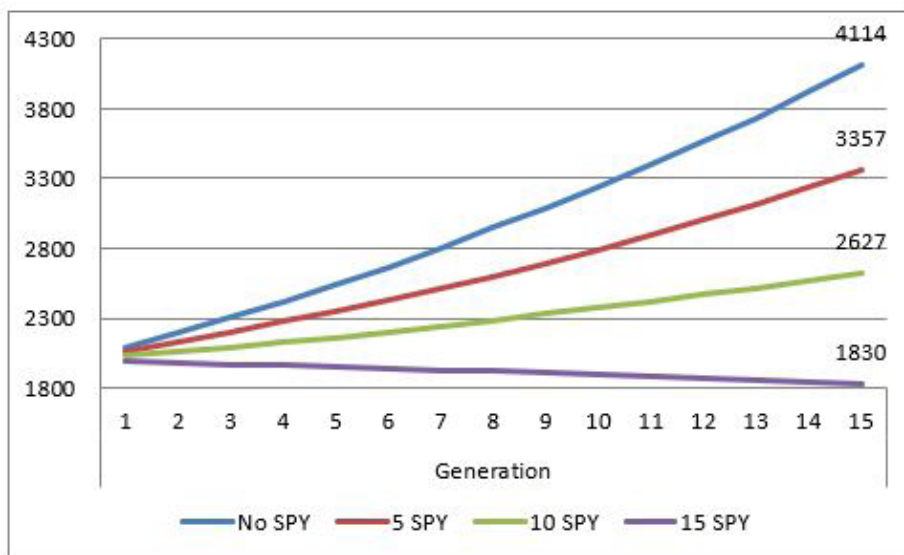


Fig. 5. Population #2, Effects of Infant Sacrifice on Population Growth.

⁶⁰ Ober (2015), 2: “Efflorescence is characterized by more people (demographic growth) living at higher levels of welfare (per capita growth) and by cultural production at a higher level”

Forbidden to Sacrifice Humans or Eat Dogs

Now, I add infant sacrifice to Population #2. The population without infant sacrifice achieves 105% population growth. Five sacrifices per year reduce growth to only 67%. Ten sacrifices per year result in only 31% growth. At fifteen sacrifices per year, the colony begins to contract. In the first cohort of births in generation one, five, ten and fifteen sacrifices represent 1.56%, 3.12%, and 4.68% sacrifice rates of infants brought to term. In sum, even for a population in efflorescence, a condition achieved in only a few centuries of ancient history, if ever, a limited amount of infanticide would significantly alter the demographic growth of Phoenician colonies.

Finally, I model a population in the most likely ancient context possible. Population #3 has elevated adult dropout rates of 2% compared to 1% in the earlier populations. In addition, I have elevated infant mortality rates to 35% and childhood mortality rates in year four (from 3% to 5%) to create a more realistic disease environment. I have also increased fertility. The juvenile mortality rate is the same.

Year	Adults	Newborn	One	Two	Three	Four	Five	Twenty
1	2000							
2	1960	365						
3	1921	358	237					
4	1883	351	233	201				
5	1845	344	228	198	181			
6	1808	337	224	194	178	172		
7	1772	330	219	190	175	169	169	
8	1737	323	215	186	171	166	166	155
9	1702	317	210	183	167	162	163	153
10	1668	311	206	179	165	159	159	150
11	1635	304	202	175	161	157	156	146
12	1602	298	198	172	158	153	154	144
13	1570	292	194	168	155	150	150	142
14	1539	287	190	165	151	147	147	138
15	1508	281	187	162	149	143	144	135
		275	183	159	146	142	140	132
			179	156	143	139	139	129
				152	140	136	136	128
					137	133	133	125
						130	130	122
							127	120
								117

Tab. 4. Reproductive Model of Population #3, Generation #1

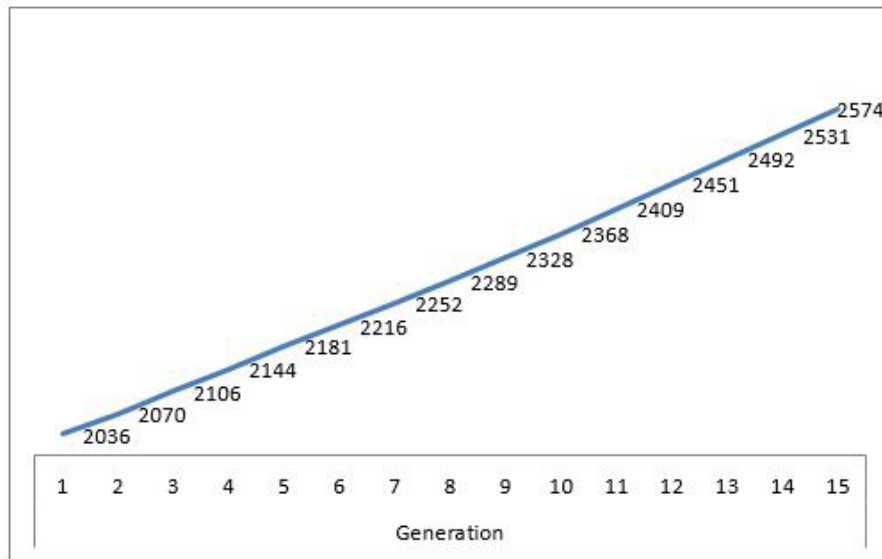


Fig. 6. Population #3, Reproductive Population Growth

Population #3 illustrates the much slower growth predicted by recent studies of ancient demography, 0.127% annually. In this environment, the population is too unhealthy to sacrifice ten or more infants per year. Therefore, I have reduced the number of sacrifices to two, four or six per year. For this population, a small increase in infant mortality, even as few as two sacrifices per year, begins to hamper population growth. Without infant sacrifice, the population achieves 28% growth. Two and four sacrifices per year reduce growth to 17% and 8%, respectively. The population contracts at six sacrifices per year, shrinking by 4.7%. Two sacrifices in the first year of the first birth cohort represents a 0.54% sacrifice rate, whereas four and six sacrifices constitute 1.09% and 1.64% sacrifice rates.

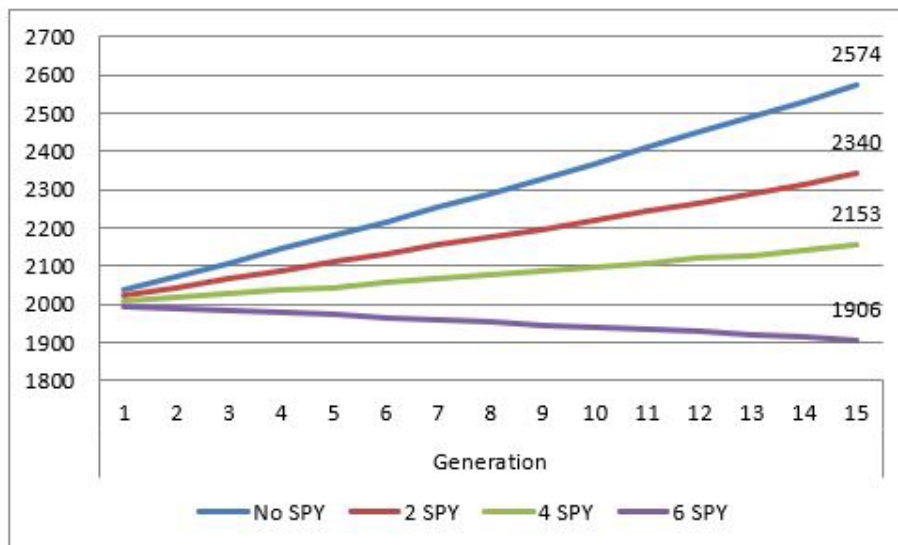


Fig. 7. Population #3, Effects of Infant Sacrifice on Population Growth

The foregoing models illustrate a simple point. Whether a population is improbably healthy, in efflorescence, or average, even limited infant sacrifice has significant long-term consequences on population growth. Further, the models indicate that unhealthy populations begin to contract at much lower annual rates of infant sacrifice than healthy populations. Population #1 is able to sustain rates of infant sacrifice of 6.8% per annum. By contrast, Population #3 begins to shrink at an infant sacrifice rate of 1.64%. Under the assumption that most Phoenician colonial populations inhabited the range between Populations #2 and #3, one should expect to find a limited amount of growth at Phoenician colonies practicing infant sacrifice absent regular immigration.

Immigration, however, only creates long-term growth in Phoenician colonies when the new adults are reproductive age or if not already have three or more children. Reproductive age adults die in these colonies every year. As such, the first wave of immigrants in any year does not increase the population immediately. If Phoenician colonies began with 2000 inhabitants under the demographic regime of model Population #3, the first 40 adult immigrants every year are merely making up for reproductive aged mortality within the colony.

If the immigration rate were 40 reproductive adults per year, and thus held the reproductive population stable at 2000 adults, Population #3 would grow from 2000 to 2325 after the first generation. If spread over the well-known tophet colonies of the central Mediterranean (Carthage, Mozia, Sulcis, and Tharros), 160 reproductive age immigrants per year could have contributed to substantial population growth at these colonies without any practice of infant sacrifice. Though 160 adults per year appears small on initial inspection, it would indicate a massive population movement over a 225 year period, 36,000 adult immigrants just to these four colonies.⁶¹

To conclude this section, I, therefore, turn to the evidence of Mozia in order to demonstrate the practical application of the models above. Many scholars have argued that Mozia, from its foundation, experienced a population explosion. In a recent publication, Nigro estimated, using the evidence of settlement contexts and necropoleis, that the colony began with 140 inhabitants in 800 BCE and grew to 1300 inhabitants by 750 BCE, a 16% annual growth rate. As such a rate of population growth is well beyond the reproductive potential of ancient populations, Nigro concludes that this initial, explosive phase of growth at Mozia resulted from very high rates of immigration. From 750-675 BCE, growth slowed as Mozia reached its carrying capacity and rates of immigration decreased. The population of 1300 in 750 BCE only increased to 1500-1600 inhabitants by 675 BCE, a 0.2-0.3% annual growth rate. Over the next three centuries, agricultural land on Mozia was slowly converted to urban occupation. Prior to its destruction in 397 BCE, the archaeology of the site reveals densely packed homes, suggesting high population density. Using the average house and extrapolating for the whole island, Di Mauro et al. calculated that Mozia could have maintained a population of nearly 18,000 inhabitants with two level houses. However, streets and other

⁶¹ Estimating immigration rates is difficult for ancient sites. For example, pottery suggests Carthage was widely connected early in its history, offering regular opportunities for individuals to arrive at the site. Transport amphorae recovered from the 8th and early 7th centuries indicate that its primary external trading partners were in Sardinia (38% of all transport amphora recovered), southern Spain (15%), central Italy (8%), and the Levant (7%). Docter (2008) and Docter (2009); Docter, Bechtold (2010); Amadori et al. (2017). Further, scholars have often argued for periods or waves of Phoenician settlement in the central and western Mediterranean.: pre-colonization, initial colonization, and secondary colonization. Pellicer Catalan (2006) and Van Dommelen (1998). Secondary colonization movements, such as those seen around Phoenician colonies in Sardinia are occasionally ascribed to immigrants from the Near East, fleeing a tumultuous political situation with the rise of Assyrian imperialism in the 8th century. Fletcher (2006).

public spaces limited the area available for housing. Archaeological excavation has revealed several public spaces (sacred pool, tophet, temples, etc...), suggesting that Mozia more likely had a population of 10,000-14,000 with two level homes. Nigro has recently estimated its highest population at 12,000, in line with mathematical extrapolations.⁶²

To model Mozia's growth over fifteen generations of reproductive adults, I begin with the colony in 750 BCE, after its period of rapid growth. Mozia #1 uses a model similar to Population #2 described above. The primary difference is that I have added a low level of annual reproductive age adult immigration into Mozia #1. The model begins with 433 reproductive adults, who make up one-third of the total population of 1300, as indicated by Nigro's estimates. Over the next 225 years, the reproductive population grows to 835, while the total population increases to 2505. Additionally, the population estimates derived from this model agree with Nigro's estimates of population growth at Mozia from 750-675 BCE. In his reconstruction, the population reached 1500-1600 inhabitants by 675 BCE. Here, the model indicates a population of 1551 for that period.

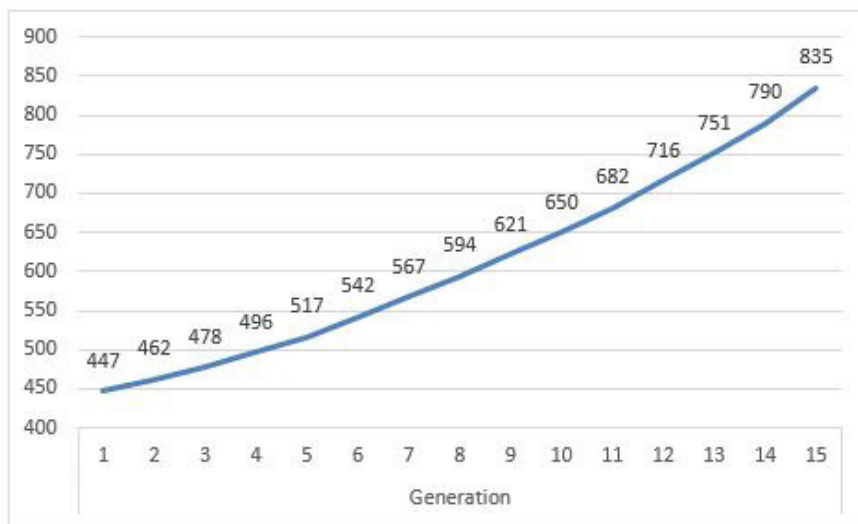


Fig. 8. Mozia #1, Reproductive Population Growth

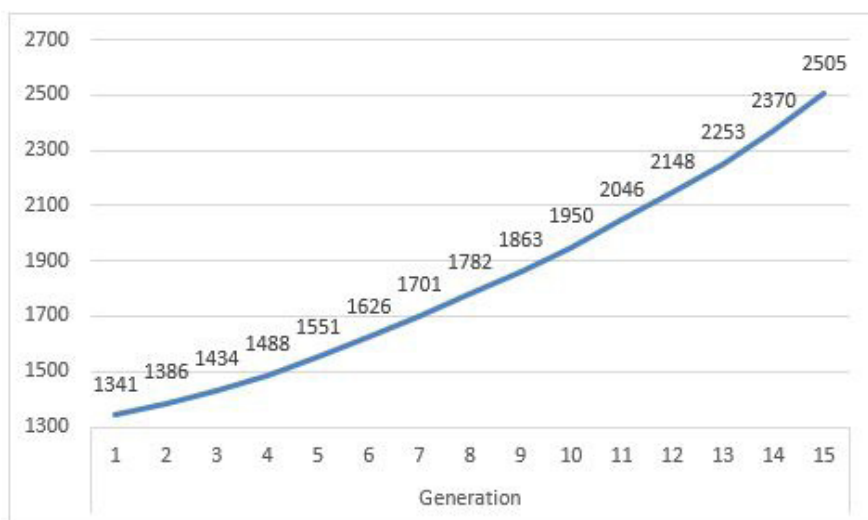


Fig. 9. Mozia #1, Total Population Growth

⁶² Nigro (2022); Di Mauro et al. (2014); Aubet (2001), 232; Famà (1997).

Forbidden to Sacrifice Humans or Eat Dogs

The addition of infant sacrifice into this population has important effects on its growth. As noted previously, quantitative studies of urns at Mozia suggest a sacrifice rate of one or two infants per year. Thus I model both rates for Mozia #1. The total population without sacrifice reaches 2505. One sacrifice per year results in a total population of 1905. At two sacrifices per year, Mozia's total population only increases to 1398. The population without sacrifice achieves nearly 93% growth over the period. By contrast, one sacrifice per year reduces growth to only 47%, whereas two sacrifices per year result in only 8% growth. One sacrifice in the first year of the first birth cohort constitutes a 1.26% sacrifice rate, whereas two sacrifices represent a 2.53% sacrifice rate.

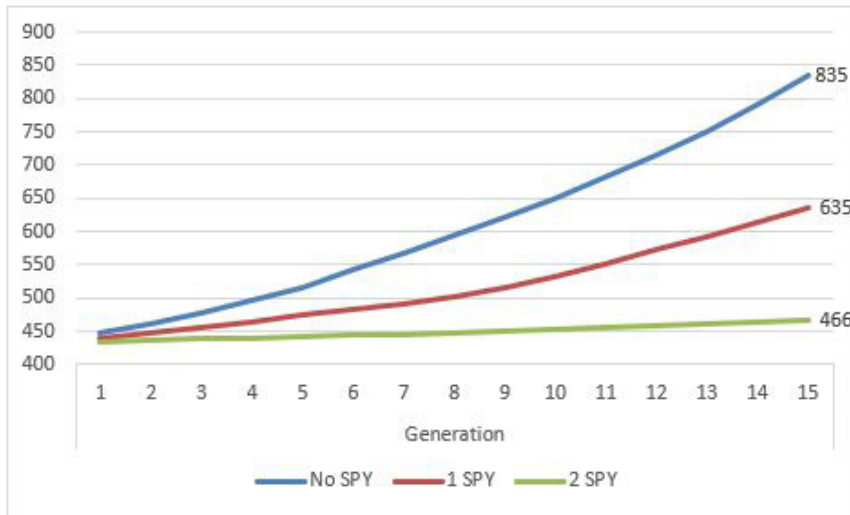


Fig. 10. Mozia #1, Effects of Infant Sacrifice, Reproductive Adults

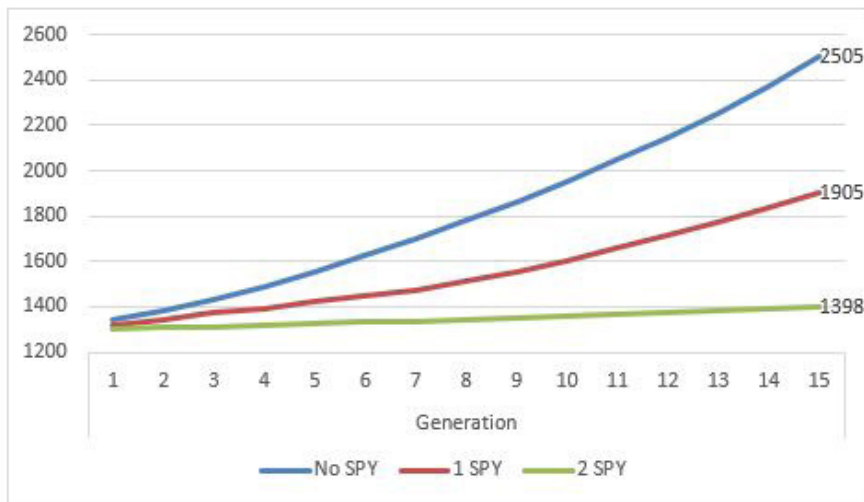


Fig. 11. Mozia #1, Effects of Infant Sacrifice on Total Population

In sum, at Mozia, a relatively healthy population with regular immigration, averaging 0.41% annual growth over a 225 year period without sacrifice, could sustain a single infant sacrifice per year. However, a single sacrifice per year would reduce the population's annual growth rate to 0.20%. Further, at one sacrifice per year, the population at Mozia would have

only grown to 1419 by 675 BCE, a hundred or more inhabitants fewer than estimated by Nigro and the model above without sacrifice.

If Mozia were more unhealthy, even a single sacrifice per year was unsustainable. In Mozia #2, I develop a model similar to Population #3 discussed above. It has elevated infant mortality rates and assumes regular immigration in order to offset adult mortality in the colony. In this second population model, the colony begins with 433 reproductive adults and 1300 total inhabitants. Due to its poorer health, the reproductive population grows to 612 and the total population to 1836, an average annual growth rate of .18%.

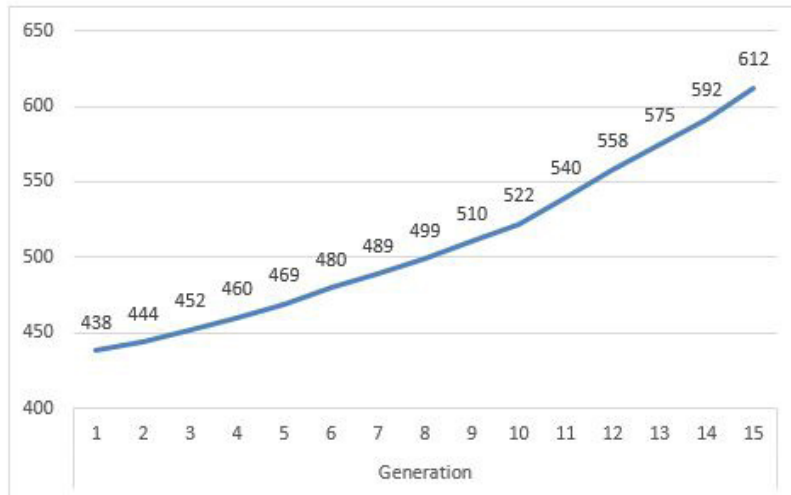


Fig. 12. Mozia #2, Reproductive Population Growth

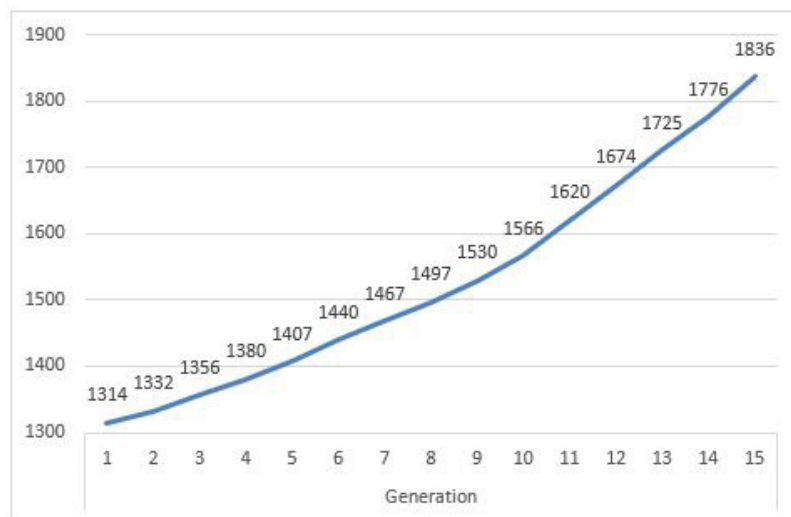


Fig. 13. Mozia #2, Total Population Growth

The introduction of a single infant sacrifice per year in this population causes population growth to cease. The population becomes stable at 1305 inhabitants after the first generation, achieving a 0.0017% growth rate over 225 years. Therefore, if the population at Mozia were growing at an average rate for antiquity, 0.18%, and a single sacrifice per year occurred of a newborn infant, no archaeological evidence would exist for population growth at Mozia, unless immigration rates were much higher than those included in the model.

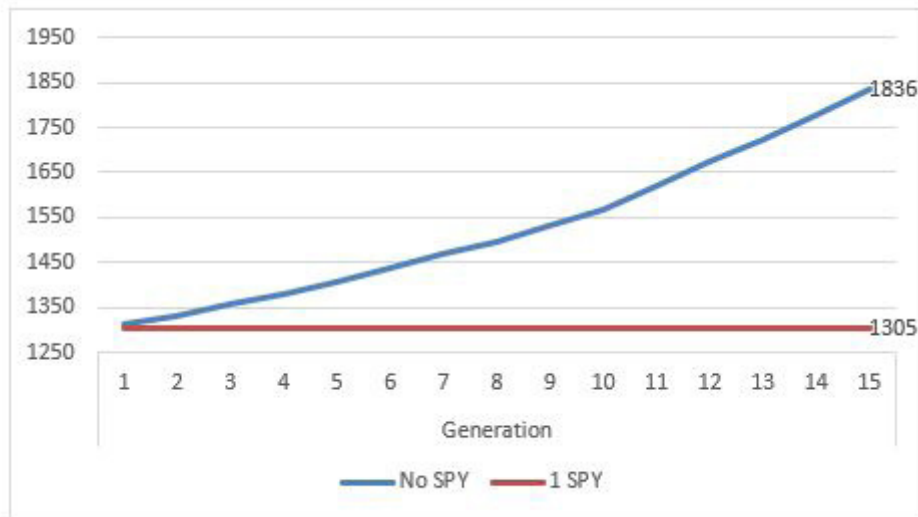


Fig. 14. Mozia #2, Effects of Infant Sacrifice on Total Population

Taken collectively, the demographic models indicate that the rate of urban and population growth suggested by the archaeological evidence at Mozia would require powerful evidence of decreased infant mortality rates and substantial evidence of regular immigration rates in order to sustain a single infant sacrifice, though even under these conditions infant sacrifice still has substantial consequences. More importantly, the same evidence of population growth during this period appears at other sites with tophets: Carthage, Sulcis, and Tharros.⁶³ Thus all of the archaeological evidence for tophet colonies presently indicates sustained population growth coupled with physical expansion.

4. A Path Forward?

As scholars have demonstrated for three decades, little about the practices recorded in the Greco-Roman sources coheres with the archaeological evidence recovered at tophets. Rather than continue that debate, I have tried to move the discussion to new evidence, demography, which offers the potential for a direct interpretation of the archaeological evidence absent source narratives. To conclude, I want to stress that unlike the ancient sources, subadult skeletons from tophet colonies can provide a more definitive answer to the demographic problem of the tophet.⁶⁴

Though uncommon, excavations have uncovered progressively more infant, child, and juvenile burials outside of tophets. Certain skeletons are also not cremated.⁶⁵ As I have shown in an earlier publication, a sufficient number of skeletons, properly measured for length, age, and health status, can allow for the relative estimation of infant, child, and juvenile health through the study of comparative anthropometry. Further, using comparative anthropometry,

⁶³ Kaufman et al. (2016); Niemeyer et al. (2009); Docter (2007); Chelbi et al. (2006); Docter et al. (2006), 39-41; Niemeyer (1989); Guirguis (2005); Van Dommelen (1998) and (1997).

⁶⁴ Steckel (2009), 8: "The most common historical evidence, and indeed much modern data, consists of adult heights. Human growth, however, unfolds over some 20 years, from conception to maturity; there are sensitive periods such as early childhood and adolescence; a multitude of socioeconomic variables potentially operate at each age; and genetic conditions may interact with environmental ones. Adult heights merely summarize the final result, and if this is all that's available (as opposed to longitudinal height on height and socioeconomic conditions at each age), then researchers face a huge identification problem in which there are far more determinants than outcomes."

⁶⁵ Orsingher (2018) for the evidence at Mozia.

I argued that Roman populations appear to most closely match the models for Population #3 and Mozia #2 described above. For infants and children, such a finding means that length-for-age in these populations is -2 to -3 standard deviations removed from modern growth reference populations.⁶⁶ As shown above, these model populations were too unhealthy to artificially increase rates of infant mortality through sacrifice.

Therefore, to achieve the substantiated urban growth at Phoenician colonies and practice infant sacrifice, skeletal evidence should indicate a subadult population that is no more than -1 – 1.5 SD removed from modern growth reference populations, similar to Populations #1 or #2 and Mozia #1 above. These populations would still suffer important reductions in population growth, if infant sacrifice were practiced. However, a healthy subadult population at least makes a limited practice of infant sacrifice possible if not plausible.

⁶⁶ Pilkington (2013).

Forbidden to Sacrifice Humans or Eat Dogs

Bibliography

- Alt A. (1950), Die phönikischen Inschriften von Karatepe, *Die Welt des Orients*, 1, 272-287.
- Amadasi Guzzo M. (1967), *Le Iscrizioni Fenicie e Puniche delle Colonie in Occidente*, Rome.
- Amadasi Guzzo M., Zamora Lopéz J. (2012-13), The epigraphy of the tophet, *Studi Epigrafici e Linguistici sul Vicino Oriente antico*, 29-30, 159-192.
- Amadori M.L., Del Vais C., Fermo P., Pallante P. (2017) Archaeometric researches on the provenance of Mediterranean Archaic Phoenician and Punic pottery, *Environmental Science and Pollution Research* 24, 13921–13949.
- Aounallah S., Brouquier-Reddé V., Abidi H., Romdhane B., Bonifay M., Haddad F., Hafiane Nouri S., de Larminat S., Mukai T., Poupon F., Zech-Matterne V. (2020), L'aire sacrée de Baal Hammon – Saturne à Dougga, *Antiquités Africaines* 56, 245-273.
- Aubert M.E. (2001), *The Phoenicians and the West: Politics, Colonies, and Trade*, Cambridge.
- Babbitt F. (1928) [trans.], Plutarch, *Moralia, Volume II*, Cambridge.
- Ben Jerbania I., Ferjaoui A., Peña V., Redissi T., Jendoubi K., Maddahi N., Khalfalli W. (2020), Nouvelles fouilles dans le sanctuaire de Ba'1 Hamon à Carthage, in *Un Viaje entre el Oriente y el Occidente del Mediterráneo* v.III (MYTRA 5), Celestino Pérez S., Rodríguez González E. [eds.], Merida, 1141-1156.
- Bénichou-Safar H. (1981), A propos des ossements humains du Tophet de Carthage, *Rivista di Studi Fenici*, 9, 5-9.
- Bénichou-Safar H. (1988), Sur l'incinération des enfants aux tophets de Carthage et de Sousse, *Revue de l'Histoire des Religions*, 205, 57-67.
- Bénichou-Safar H. (1993), Le rite d'entrée sous le joug. Des stèles de Carthage à l'Ancien Testament, *Revue de l'Histoire des Religions*, 210, 131-143.
- Bonnet C. (2011), On gods and earth: the tophet and the construction of a new identity in Punic Carthage, in *Cultural Identity in the Ancient Mediterranean*, Gruen E. [ed.], Los Angeles, 373-387.
- Brown S. (1991), *Late Carthaginian Child Sacrifice and Sacrificial Monuments in their Mediterranean Context*, Sheffield.
- Chelbi F., Maraoui Telmini B., Docter R. (2006), Découverte d'une nécropole du huitième siècle av. J.-C. à Carthage Bir Massouda. Rapport préliminaire sur les fouilles de l'Institut National du Patrimoine (Tunis) et l'Université du Gand, *CEDAC Carthage Bulletin*, 22, 13-25.
- Ciasca A. (1971), Sul tofet di Mozia, *Sicilia Archeologica*, 4, 10-15.
- Ciasca A. (1973), Mozia (Sicilia): il tofet. Campagne 1971-1972, *Rivista di Studi Fenici*, 1, 94-98.
- Ciasca A. (1992), Mozia: sguardo d'insieme sul Tofet, *Vicino Oriente*, 8, 113-155.
- Cooke G. (1903), *A Text-Book of North-Semitic Inscriptions*, Oxford.
- CIS, *Corpus Inscriptionum Semiticarum Pars I* (1881-1962), Paris.
- D'Andrea B. (2014), *I tofet del Nord Africa dall'età arcaica all'età romana (VIII sec. a.C. – II sec. d.C.)*, Pisa.
- D'Andrea B. (2018), *Bambini nel "Limbo": Dati e Proposte interpretive sui Tofet Fenici e Punici*, Rome.
- D'Andrea B. (2021), The tophets of North Africa between the 4th and the 1st centuries BC: practices of belonging, phenomena of innovation and strategies of appropriation. in *Transformations and Crisis in the Mediterranean during the 5th-2nd centuries BCE*, Garbati G., Pedrazzi T. [eds.], Rome, 167-188.
- D'Andrea B., Giardino S. (2011), "Il tofet: dove e perché?": alla origini dell'identità fenicia, *Vicino & Medio Oriente*, 15, 133-157.
- Day J. (1989), *Molech: A God of Human Sacrifice in the Old Testament*, Cambridge.

- Di Mauro D., Alfonsi L., Sapia V., Urbini S. (2014), A neighborhood revealed by geophysical prospection: an example of urbanization at the Phoenician–Punic settlement of Mozia (western Sicily, Italy), *Journal of Applied Geophysics*, 104, 114–120.
- Docter R. (2007), Published settlement contexts of Punic Carthage, *Carthage Studies*, 1, 37–76.
- Docter R. (2008), New radiocarbon dates from Carthage: bridging the gap between history and archaeology?, in *Beyond the Homeland: Markers in Phoenician Chronology*, Sagona C. [ed.], Leuven, 379–422.
- Docter R. (2009), Carthage and its Hinterland, in *Phönizisches und punisches Städtewesen*, Helas S., Marzoli D. [eds.], Mainz, 179–189.
- Docter R., Chelbi F., Maraoui Telmini B., Bechtold B., Ben Romdhane H., Declercq V., De Schacht T., Deweydt E., De Wulf A., Fersi L., Frey-Kupper S., Garsallah S., Joosten I., Hans Koens, Jalel Mabrouk, Taoufik Redissi, Roudesli Chebbi S., Ryckbosch K., Schmidt K., Taverniers B., Van Kerckhove J., Verdonck L. (2006), Carthage Bir Massouda: second preliminary report on the bilateral excavations of Ghent University and the Institut National du Patrimoine (2003–2004), *BaBesch*, 81, 37–89.
- Docter R., Bechtold B. (2010), Transport amphora from Carthage: an overview, In *Motya and The Phoenician Ceramic Repertoire between the Levant and the West 9th - 6th century BC*, Nigro L. [ed.], Rome, 85–116.
- Donner H., Röllig, W. (1962–64), *Kanaanäische und Aramäische Inschriften*, Wiesbaden.
- Dussaud R. (1946), Précisions épigraphiques sur les sacrifices puniques d'enfants, *Comptes-rendus des séances de l'Académie des Inscriptions et Belles-Lettres*, 90, 371–387.
- Eissfeldt, O. (1935), *Molk als Opferbegriff im Punischen und Hebräischen und das Ende des Gottes Moloch*, Halle.
- Engels D. (1980), The problem of female infanticide in the Greco-Roman world, *Classical Philology*, 75, 112–120.
- Ennabli A. (1987), La campagne internationale de sauvegarde de Carthage. Fouilles et recherches archéologiques 1973–1987. Premiers bilans, *Comptes-rendus des séances de l'Académie des Inscriptions et Belles-Lettres*, 131, 407–438.
- Famà M. (1997), Gli scavi recenti nell'abitato di Mozia: nuove prospettive di indagine alla luce dei primi risultati della ricerca, in *Seconde Giornate Internazionali di Studi sull'area Elima, (Gibellina, 22–26 ottobre 1994)*, *Atti*, Pisa, 643–654.
- Février J.-G. (1953), Molchomor, *Revue de l'histoire des Religions*, 143, 8–18.
- Fletcher R. (2006), The cultural biography of a Phoenician mushroom-lipped jug, *Oxford Journal of Archaeology*, 25, 173–194.
- Garnand B., Stager L., Greene J. (2012–2013), Infants as offerings: palaeodemographic patterns and tophet burial, *Studi Epigrafici e Linguistici sul Vicino Oriente antico*, 29–30, 193–222.
- Geer R. (1954) [trans.], Diodorus Siculus, *Library of History, Volume X: Books 19.66–20*, Cambridge.
- González Wagner C. (1991), El sacrificio del Moloch en Fenicia : una respuesta cultural adaptativa a la presión demográfica, in *Atti del II congresso internazionale di studi fenici e punici*, Roma, 411–416.
- Guirguis M. (2005), Storia degli studi e degli scavi a Sulky e a Monte Sirai, *Rivista di Studi Fenici*, 33, 13–29.
- Harden D. (1937), The pottery from the Precinct of Tanit at Salamambo, Carthage, *Iraq*, 4, 59–90.
- Harris W. (1982), The theoretical possibility of extensive infanticide in the Greco-Roman world, *Classical Quarterly*, 32, 114–116.
- Heider G. (1985), *The Cult of Molek: A Reassessment*, New Haven.
- Hin S. (2013), *The Demography of Roman Italy. Population Dynamics in an Ancient Conquest Society 201 BCE – CE 14*, Cambridge.
- Hurst H., Stager L. (1978), A metropolitan landscape: the late Punic port of Carthage, *World Archaeology*, 9, 334–346.
- Jacoby F. (1929), *Die Fragmente der griechischen Historiker*, Part II B, Berlin.

Forbidden to Sacrifice Humans or Eat Dogs

- Kaufman B., Docter R., Fischer C., Chelbi F., Maraoui Telmini, B. (2016), Ferrous metallurgy from the Bir Massouda metallurgical precinct at Phoenician and Punic Carthage and the beginning of the North African Iron Age, *Journal of Archaeological Science*, 71, 33-50.
- Lipiński E. (1988), Sacrifices d'enfants à Carthage et dans le monde sémitique oriental, in *Studia Phoenicia VI: Carthago*, Lipiński E. [ed.], Leuven, 151-185.
- Lopez A., Salomon J., Ahmad O., Murray C., Mafat D., (2009), *Life Tables for 191 Countries: Data, Methods and Results (=GPE Discussion Paper Series 9)*, Geneva.
- Melchiorri V. (2009), Le tophet de Sulci (S. Antioco, Sardaigne). État des études et perspectives de la recherche, *Ugarit-Forschungen*, 41, 509-524.
- Moscato S. (1987), Découvertes phéniciennes à Tharros, *Comptes-rendus de Séances de l'Académie des Inscriptions et Belles-Lettres*, 131, 483-503.
- Moscato S. (1987b), Il sacrificio punico dei fanciulli: realta or invenzione?, *Rendiconti dell'Accademia dei Lincei*, 261, 3-15
- Mura S. (2022), Ethical considerations in narratives of death: the case of the tophet, *Kleos*, 5, 19-43.
- Niemeyer H. (1989), Los comienzos de Cartago y la expansión fenicia en el área Mediterránea, *Gerión*, 7, 11-40.
- Niemeyer H., Docter R., Schmidt K. (2009) Die Hamburger Grabung unter dem Decumanus Maximus von Karthago, in *Phönizisches und Punisches Städtewesen*, Helas S., Marzoli D. [eds.], Mainz, 171-178.
- Nigro L. (2022), Motya, the rise of a port-city: demography and colonial models in comparison, in *Comparing Greek Colonies*, Colombi C., Parisi V., Dally O., Guggisberg M., Piras G. [eds.], Berlin, 335-356.
- Ober J. (2015), *The Rise and Fall of Classical Greece*, Princeton.
- Oldfather C. (1950) [trans.], Diodorus Siculus, *Library of History, Volume V: Books 12.41-13*, Cambridge.
- Oldfather C. (1954) [trans.], Diodorus Siculus, *Library of History, Volume VI: Books 14-15.19*, Cambridge.
- Orsingher A. (2015), Vessels in tophet Sanctuaries: the archaic evidence and the Levantine connection, *Bulletin d'Archéologie et d'Architecture Libanaises*, 10, 561-590.
- Orsingher A. (2018), Forever young: rethinking infancy and childhood at Motya, in *From Invisible to Visible. New Methods and Data for the Archaeology of Infant and Child Burials in Pre-Roman Italy and Beyond (=Studies in Mediterranean Archaeology, CLIX)*, Tabolli J. [ed.], Nicosia, 197-206.
- Pellicer Catalan M. (2006), Momentos precoloniales y precolonización en Iberia: nuevos datos, *Rivista di Studi Fenici*, 34, 9-37.
- Pilkington N. (2013), Growing up Roman: infant mortality and reproductive development, *Journal of Interdisciplinary History*, 44, 1-36.
- Quinn J. (2012-13), Tophets in the 'Punic World', *Studi Epigrafici e Linguistici sul Vicino Oriente antico*, 29-30, 23-48
- Quinn J. (2018), *In Search of the Phoenicians*, Princeton.
- Répertoire d'épigraphie Sémitique* (1900-), Paris.
- Ribichini S. (1987), *Il Tofet e il Sacrificio dei Fanciulli*, Sassari.
- Ribichini, S. (1990), Il sacrificio di fanciulli nel mondo punico: testimonianze e problemi, in *Riti Funerari e di Olocausto nella Sardegna Fenicia e Punica. Atti dell'incontro di studio*, Cagliari, 45-66.
- Ribichini S. (2020), Saisons du Molk, in *Cartagine, il Mediterraneo Centro-occidentale e la Sardegna. Società, Economia e Cultura Materiale tra Fenici e Autoctoni. Studi in Onore di Piero Bartoloni*, Guirguis M., Muscuso S., Pla Orquín R. [eds.], Sassari, 237-258.
- Richard J. (1961), *Etude Medico-legale des Urnes Sacrificielles Puniqes et de leur Contenu*, PhD Thesis. Université de Lille: France.
- Ruiz Cabrero L. (2007), *El Sacrificio Molk entre los Fenicio-púnicos: Cuestiones Demográficas y Ecológicas*, PhD Thesis. Universidad Complutense de Madrid: Spain.

- Sallares R. (1991), *The Ecology of the Ancient Greek World*, Ithaca.
- Scheidel W. (2001), Roman age structure: evidence and models, *Journal of Roman Studies*, 91, 1-26.
- Scheidel, W. (2007), Demography, in *The Cambridge Economic History of the Greco-Roman World*, Scheidel, W., Morris I., Saller P. [eds.], Cambridge, 38-86.
- Schwartz J., Houghton F., Bondioli L., Macchiarelli R. (2010), Skeletal remains from Punic Carthage do not support the systematic sacrifice of infants, *PLoS ONE*, 5, e9177.
- Schwartz J., Houghton F., Bondioli L., Macchiarelli R. (2012), Bones, teeth and estimating age of perinates: Carthaginian infant sacrifice revisited, *Antiquity*, 86, 738-745.
- Schwartz J., Houghton F., Bondioli L., Macchiarelli R. (2017), Two tales of one city: data, inference, and Carthaginian infant sacrifice, *Antiquity*, 91, 442-454.
- Shaw B. (2001), Raising and killing children: two Roman myths, *Mnemosyne*, 54, 31-77.
- Simonetti A. (1983), Sacrifici umani e uccisioni rituali nel mondo fenicio-punico: Il contributo delle fonti letterarie, *Rivista di Studi Fenici*, 11, 91-111.
- Smith P., Avishai G., Greene J., Stager L. (2011), Aging cremated infants: the problem of sacrifice at the tophet at Carthage, *Antiquity*, 85, 859-874.
- Smith P., Stager L., Greene J., Avishai, G. (2013), Cemetery or sacrifice? Infant burials at the Carthage tophet, *Antiquity*, 87, 1191-1199.
- Stager L. (2014), *Rites of Spring in the Carthaginian Tophet*, Leiden.
- Stager L., Wolf S. (1984), Child sacrifice at Carthage: religious rite or population control, *Biblical Archaeology Review*, 10, 30-51.
- Steckel R. (2009), Heights and human welfare: recent developments and new directions, *Explorations in Economic History*, 46, 1-23.
- Suder W. (1991), Tophet à Carthage. Quelques remarques sur le rite funéraire et les problèmes démographiques, in *Atti del II Congresso Internazionale di Studi Fenici e Punici*, Roma, 407-409.
- Vance D. (1994), Literary sources for the history of Palestine and Syria: the Phoenician inscriptions, *The Biblical Archaeologist*, 57, 110-120.
- Van Dommelen P. (1997), Some reflections on urbanization in a colonial context: West Central Sardinia in the 7th to 5th century BC, in *Urbanization in the Mediterranean in the 9th to 6th Centuries BC (=Acta Hypeborea 7)*, Andersen H., Horsnaes H., Houby-Nielsen S., Rathje A. [eds.], Copenhagen, 243-278.
- Van Dommelen P. (1998), *On Colonial Grounds: A Comparative Study of Colonialism and Rural Settlement in the First Millennium BC West Central Sardinia*, Leiden.
- Warmington E. (1935), *Remains of Old Latin I: Ennius and Caecilius*, Cambridge.
- Watson J. (1853) [trans.], M. Junianus Justinus, *Epitome of the Philippic History of Pompeius Trogus*, London.
- Weinfeld M. (1972), The worship of Molech and of the Queen of Heaven and its background, *Ugarit Forschungen*, 4, 133-154.
- Welles B. (1963) [trans.], Diodorus Siculus, *Library of History, Volume VIII: Books 16.66-17*, Cambridge.
- Xella P. (1991), *Baal Hammon : Recherches sur l'identité et l'histoire d'un Dieu Phénico-punique*, Rome.
- Xella, P. (2009), Sacrifici di bambini nel mondo fenicio e punico nelle testimonianze in lingua greca e Latina, *Studi epigrafici e linguistici sul Vicino Oriente antico*, 26, 59-100.
- Xella P. [ed.] (2012-13), *The Tophet in the Phoenician Mediterranean. (=Studi Epigrafici e Linguistici sul Vicino Oriente Antico 29-30)*.
- Xella P, Quinn J., Melchiorri V., Van Dommelen P. (2013), Phoenician bones of contention, *Antiquity*, 87, 1199-1207.

Riassunto / *Abstract*

Abstract: Abstract: Due to recent osteoarchaeological publications, prominent historians, archaeologists and osteologists have reignited the debate over the practice of infant and child sacrifice at Phoenician sites in the central Mediterranean. In all previous studies, including osteoarchaeological approaches, the debate has been conducted on terms established by the Greco-Roman sources. Here, I move away from those sources and suggest a series of demographic models in order to understand better the effects of infanticide on population growth at Phoenician colonies in the Early Iron Age central Mediterranean.

Parole chiave: Tofet; Sacrificio di neonati e bambini; Colonie fenicie; Cartagine

Keywords: Tophet; Infant and Child Sacrifice; Phoenician Colonies; Carthage

Come citare questo articolo / *How to cite this paper*

Nathan L. Pilkington, *Forbidden to Sacrifice Humans or Eat Dogs: Revisiting the Tophet Debate through a Demographic Lens*, *CaSteR* 8 (2023), DOI: 10.13125/caster/5532, <http://ojs.unica.it/index.php/caster/>

