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The authors gathered information and evidence of horses on Crete from the Neolithic period up to the present day. They produced two papers, representing a comprehensive overview of the Equus Cabalus history of the island. The first paper covers the period from prehistoric times up to 1895, when the Cretan horse was declared a special breed by the Ottoman administration and protected legally. The research summarizes archaeological, osteological, iconographical, and historical evidence. The second paper describes the state of the breed during the twentieth century, the current position, its further needs and future prospects.

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Keywords
Cretan horse; Cretan pony; Messara horse; Giorgalidiko horse; History of horse breeding; Archaeology of equines.

I. Introduction: objectives and goals

Articles on horses typically begin with a reminder of the historical bond between humans and horses. This is a truism,[7] although much of this relationship remains poorly understood at various economic, ideological, social, biological, or psychological levels. *Equus ferus caballus* became one of the most important domestic animal species, even though it was domesticated relatively late in comparison with other herbivores and ungulates.[8,9]

Some authors place the importance of the horse in civilizational developments (as transport, pack, war, status and prestige animal) on a par with the Neolithic revolution, the invention of the wheel, or metallurgy.[10] The speed of horses allowed humans to move out from the Central Asian steppes into the entirety of Asia and Europe (during the third millennium B.C.E.).[11] Horses became a symbol of strength, prestige, social status, expert knowledge and skills, and speed.[12] Horses not only provide transport for people and commodities but also contributed to the spread of technologies, information, and language systems.[13]

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[7] Ulrich Raulff, *Das Letzte Jahrhundert Der Pferde: Geschichte Einer Trennung* (München: Beck, 2015).

[8] To the horse domestication proces: Marsha A. Levine, "Botai and the Origins of Horse Domestication," *Journal of Anthropological Archaeology* (1999), https://doi.org/10.1006/jaar.1998.0332. Marsha A. Levine, "Domestication and Early History of the Horse," in *The Domestic Horse: The Evolution, Development, and Management of Its Behaviour* (2005). Alan K. Outram, Natalie A Stear, Robin Bendrey, Sandra Olsen, Alexei Kasparov, Victor Zaibert, Nick Thorpe, and Richard P. Evershed, "The Earliest Horse Harnessing and Milking," *Science* 323(5919) (March 6, 2009): 1332 LP – 1335, https://doi.org/10.1126/science.1168594. William T. T. Taylor, and Christina I. Barrón-Ortiz. "Rethinking the Evidence for Early Horse Domestication at Botai," *Scientific Reports* (2021), https://doi.org/10.1038/s41598-021-86832-9.

[9] To the other animals: Greger Larson and Dorian Q. Fuller, "The Evolution of Animal Domestication," *Annual Review of Ecology, Evolution, and Systematics* 45, no. 1 (November 23, 2014): 115–36, https://doi.org/10.1146/annurev-ecolsys-110512-135813.

[10] David W. Anthony, *The Horse, the Wheel, and Language*, *The Horse, the Wheel, and Language*, 2018, https://doi.org/10.2307/j.ctt7sjpn; Věra Klontza-Jaklova, "No Horse, No Sun. The Role of Horse in the Bronze Age Tranformation Processes," *Slovenská Archeológia* Suppl. 1 (2020): 327–36, https://www.sav.sk/journals/uploads/0315170327_klontza-jaklova.pdf;
Vera Warmuth et al., "Reconstructing the Origin and Spread of Horse Domestication in the Eurasian Steppe," *Proceedings of the National Academy of Sciences* 109(21) (May 22, 2012): 8202 LP – 8206, https://doi.org/10.1073/pnas.1111122109.

[11] Pablo Librado et al., "The Origins and Spread of Domestic Horses from the Western Eurasian Steppes," *Nature* (2021), https://doi.org/10.1038/s41586-021-04018-9.

[12] Klontza-Jaklova, "No Horse, No Sun. The Role of Horse in the Bronze Age Tranformation Processes"; Anthony, *Horse, Wheel. Language*; Kristian Kristiansen and Thomas. B. Larsson, *The Rise of Bronze Age Society: Travels, Transmissions and Transformations* (Cambridge: Cambridge University Press, 2005).

[13] Anthony, *Horse, Wheel, Language.*

Horses are consistently a symbol of social prestige across various cultures, and they were a part of the mythological and ideological systems of many past societies (e. g. Indo-Europeans, Upper Palaeolithic hunters, Mongolians, and Native-North Americans). That they (along with some other animals) were held to have roles in some cosmological events is shown by such evidence as their connections to Sun cults of Bronze Age Europe or the occasional equine representations of ancient Greek goddesses and gods.[14] Some clues for the intimate connections between horses and humans appear in Indo-European myths, often in connection with various reproductive acts, e.g., copulation with humans.[15] Pegasus, the winged horse, was the symbol of poets in ancient Greece;[16] likewise, in the early Islamic world the horse symbolized poetic fantasy.[17]

Although the Industrial Revolution led horses to lose their economic and social importance they have not disappeared from our lives; horses remain popular in media, culture, sports, or as pets. The connection between humans and these magnificent animals, and the overwhelmingly positive feelings humans have towards horses are deep-seated and cannot be fully explained.[18] Interest in horses has increased significantly in the last few decades, even among those who are not professional equestrians. In particular, there has been growing concern over their welfare, together with the development of nonviolent methods of communication and training, as well as providing natural habitats for them to thrive.[19]

There are modern horses that have or could have very old lineages. These are mainly groups of horses that live in regions where they have not been cross-bred during modern times due to their isolation (e.g., Albania[20] and Crete[21]).

Crete, with its 8309 km^2 and subtropical climate has occupied an unusual position through the Pleistocene, on the edge of the ice sheets of the Last Glacial Maximum. The island was home to a rich diversity of mammals, some of which were affected by insular dwarfism – for example, the miniature elephants of the island and candiacervus, the pygmy deer. Equids were not native to the island, with no known

[14] Klontza-Jaklova, "No Horse, No Sun. The Role of Horse in the Bronze Age Tranformation Processes."

[15] Kristiansen and Larsson, *The Rise of Bronze Age Society: Travels, Transmissions and Transformations*; Anthony, *Horse, Wheel, Language*.

[16] Stephen J Rojcewicz, "Flights of Pegasus: Literary History of a Symbol and Its Relevance for Poetry Therapy," *Journal of Poetry Therapy* 33(4) (October 1, 2020): 226–35, https://doi.org/10.1080/08893675.2020.1803620.

[17] Jérémie Schiettecatte and Abbès Zouache, "The Horse in Arabia and the Arabian Horse: Origins, Myths and Realities," *The Horse in the Arabian Peninsula / Le Cheval Dans La Péninsule Arabique* (2017), https://doi.org/10.4000/cy.3280.

[18] Raulff, *Das Letzte Jahrhundert Der Pferde: Geschichte Einer Trennung*.

[19] Clémence Lesimple, "Indicators of Horse Welfare: State-of-the-Art," *Animals* (2020), https://doi.org/10.3390/ani10020294.

[20] Věra Klontza-Jaklova and Romilda Tengeriová, "Archeologové (Nejen) Na Cestách I," *Jezdectví: Měsíčník Jezdců, Chovatelů a Milovníků Koní* 8 (2020): 77–80.

[21] Věra Klontza-Jaklova and Romilda Tengeriová, "Archeologové (nejen) na cestách II: Krétsky mimochodník," *Jezdectví: Měsíčník Jezdců, Chovatelů a Milovníků Koní* 9 (2020): 69–73; Věra Klontza-Jaklova, "I na Krétu je nejkrásnější pohled z krétského Klontza-Jaklova and Tengeriová, "Archeologové (Nejen) Na Cestách I."řbetu.," *Jezdectví: Měsíčník Jezdců, Chovatelů a Milovníků Koní* 9 (2021): 76–81.

Pleistocene (or earlier) bone assemblages found to date.[22] Its isolation until the industrial period did not allow for the import of horses in significant numbers. This isolation is also reflected in the specific nature and long continuity of its human genetic pool.[23] A similar situation is observed for horses, although this is based on only a few studies of equine DNA.[24] Despite this, the island (Fig. 1) is home to a unique breed of horses to which different synonym names are given: Cretan horse (Κρητικὸ ἄλογο). It is also known as Messara horse, a reference to the Messara lowlands in southern Crete that provide the most favourable conditions for horses, or Giorgalidiko/Yorgalidiko Alogo (Γιοργαλίδικο ἄλογο), which describes the typical gait of the breed (pacing, ambling). The epithet Georgalidiko (Γεωργαλίδικο), or possibly Cretan pacer, might also occasionally be used. The Cretan horse is listed in some horse encyclopaedias as an independent breed (e.g., in the *Encyclopédie du Cheval*[25] and the European Farm Animal Biodiversity Information System[26]). The Cretan horse is officially deemed a protected breed by the Ministry of Agriculture of Greece. Nevertheless, it has never been systematically registered, documented, studied, or bred. It is bred independently by horse breeders without a central studbook. Its history has never been systematically researched nor are its genetic origins known. The breeding of the Cretan horse, as a common element of local fauna, as part of the local cultural heritage, and as an environment-friendly activity, lacks systematic support from Greek or EU authorities. No systematic and scientifically grounded protection strategy has yet been set up.

The Cretan horse is undoubtedly a "palimpsest" of cultural and environmental information. Through its origin and breeding strategy, its occurrence and uses during history, it preserves significant aspects of the historical processes of the island, for which continuity of habitation, land-use, and culture are typical. F. Braudel describes this phenomenon as Mediterranean *longue durée*.[27] Crete has also been mentioned as an example of a natural permacultural region.[28]

In this article, we summarize the available knowledge on the Cretan horse up to 1895, propose hypotheses for its origin, and list items for future research. It is the authors' desire to the Cretan horse and establish its place in current hippology, by

[22]Oliver Rackham and Jennifer Moody, *The Making of the Cretan Landscape* (Manchester University Press: Manchester University Press, 1996); David S. Reese, *Pleistocene and Holocene Fauna of Crete and Its First Settlers*, Monographs (Madison (WI): Prehistory Press, 1996).

[23] Iosif Lazaridis et al., "Genetic Origins of the Minoans and Mycenaeans," 2017, https://doi.org/10.1038/nature23310; Petros Drineas et al., "Genetic History of the Population of Crete," *Annals of Human Genetics* 83(6) (2019), https://doi.org/10.1111/ahg.12328.

[24] Elisabeth Bömcke, Nicolas Gengler, and E. Gus Cothran, "Genetic Variability in the Skyros Pony and Its Relationship with Other Greek and Foreign Horse Breeds," *Genetics and Molecular Biology* 34(1) (December 22, 2010): 68–76, https://doi.org/10.1590/S1415-47572010005000113.

[25] Luis Noël Marcenac, *Encyclopédie Du Cheval* (Paris: Libraire Maloine, 1974); Bonnie Hendricks, *International Encyclopedia of Horse Breeds* (Oklahoma City: University of Oklahoma Press, 1996); Jasper Nissen, *Enzyklopädie Der Pferderassen* (Stuttgart: Franckh-Kosmos Verlags GmbH & Co, 2003).

[26] "European Farm Animal Biodiversity Information System," (2012)

[27] Fernand Braudel, *La Méditerranée et Le Monde Méditerranéen à l'Epoque de Philippe II. Première Partie*, First (Paris: Armand Colin, 1949).

[28] Adam Geisler et al., "Cretan Landscape as a Natural Permaculture" (Brno, n.d.).

initially assessing the antiquity of the breed. This is urgent given the serious risks of the species' extinction.

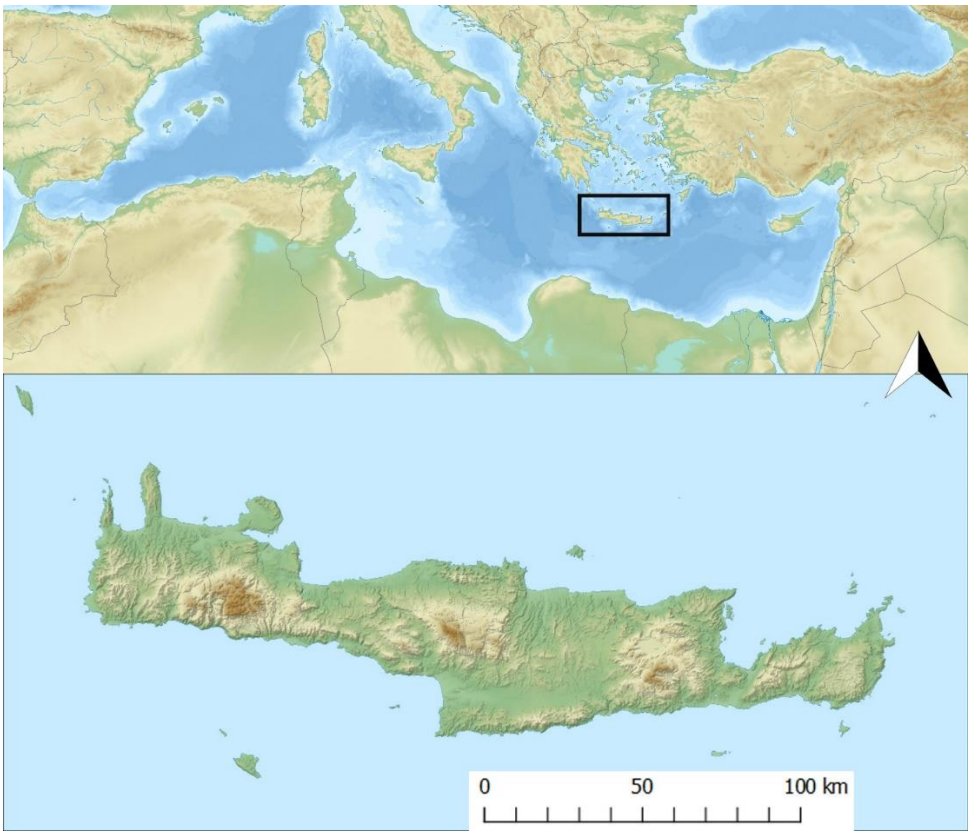

Fig. 1. Crete on a map of the eastern Mediterranean and a topographic map of the island (Illustration by authors).

II. Methods

Based on a study of the modest available literature, the preferences we have gathered from contemporary owners and breeders, and from our own observations, we determined the distinctive characteristics of the Cretan horse (size, morphology, colours, gaits, character). To trace the history of horses on the island of Crete we compiled data from archaeological sources (osteological, iconographical), written documents, artistic representations, and local folklore traditions (narratives, toponyms, equipment). This covered the entirety of the Holocene. We then mapped and reconstructed the equine breeding tradition and the horse's role in the culture and economy of the island across time.

We recorded finds of equid faunal remains and pictorial representations in archaeological artefacts from the early Holocene until 1895. All entries were georeferenced with latitude and longitude values relative to the WGS84 system and

with a chronology defined by a time interval (minimum and maximum values). This data was analysed using a 3-dimensional spatiotemporal kernel density estimator to map the spread of horses on the island of Crete through time.[29] Modelling was done using the software tool "Kernel TimeR" developed within the Pandora & IsoMemo initiative.[30, 31] We also summed the probability ranges of the individual database entries to broadly assess the rise in the presence of equids in Crete. This was done using the function "Sum" within the Bayesian chronological software OxCal v. 4.4 and by treating each individual date range as a uniform distribution.[32]

III. Defining the Cretan horse

Although various names are ascribed to the specific horse breed of Crete (Fig. 2), the Cretan horse or Cretan pony (Κρητικό άλογο) are the most usual designations in the international bibliography. This reference to its geographical distribution also applies to other Greek horse breeds: Andravida, Skyros, Pinias, Thessalia, Zakynthos, and Pindos.[33] Less used is the epithet Messara, after the eponymous lowland in south-central Crete, which, according to contemporary tradition, provides the most favourable environment for horse breeding in Crete.[34,35] The Cretans themselves use the word Giorgalidiko, Yorgalidiko alogo (Γιοργαλίδικο άλογο). The word *yorga* meant duvet in Turkish. While in the Thracian dialect, the world γιοργάνι [yorgani] means blanket.[36] It is possible that the smooth walking and trotting of the Cretan horse was considered particularly comfortable resulting in the analogy of sitting on a cushion or duvet. The Mongols used the word *yurga* when referring to a pacer horse. The Turks adopted the same term during the Middle Ages.[37] From Proto-Turkic the word *yorga* passed into all central-Asian languages, and hence to Turkish.[38] The word phonetically resembles the name of St. George, and therefore some people believe that the horse epithet is related to this saint, also represented as a knight and rider, explaining its misspelling as Georgalidiko (Γεωργαλίδικο).

[29] M. P. Wand and Chris Jones, "Multivariate Plug-in Bandwidth Selection," *Computational Statistics* 9(2) (199AD): 97–116.
[30] https://github.com/Pandora-IsoMemo/iso-app.
[31] Carlo Cocozza et al., "Presenting the Compendium Isotoporum Medii Aevi, a Multi-Isotope Database for Medieval Europe," *Scientific Data* 9(1) (2022): 354, https://doi.org/10.1038/s41597-022-01462-8.
[32] Christopher Bronk Ramsey, "Bayesian Analysis of Radiocarbon Dates," *Radiocarbon* 51(1) (2009): 337–60.
[33] Bömcke, Gengler, and Cothran, "Genetic Variability in the Skyros Pony and Its Relationship with Other Greek and Foreign Horse Breeds."
[34] Jennifer A. Moody, "Hinterlands and Hinterseas: Resources and Production Zones in Bronze Age and Iron Age Crete," in *Parallel Lives: Ancient Island Societies in Crete and Cyprus*, ed. G. Cadogan *et al.* (London: British School at Athens, 2012), 233–71.
[35] Wikipedia (https://en.wikipedia.org/wiki/Messara_horse), for instance, uses this name.
[36] Demetres Tompaides, *Ελληνικά Επώνυμα Τουρκικής Προέλευσης* (Athens: Epikairotita, 1990).
[37] Charles Gladitz, *Horse Breeding in the Medieval World* (Portland: Four Courts Press, 1997).
[38] Mahire Huseynova, "Integration of Equestrian Terms into Dialects of Turkish Languages," *Turkic Studies Journal* 3(2) (2020): 27–34, https://doi.org/https://doi.org/10.32523/2664-5157-2020-2-3-27.

Fig. 2. Typical Cretan horse (Hera, female, 10 years old, Kentri, dist. Ierapetra, owner: Michalis Genniatakis, photo Vera Klontza-Jaklova)

Across the Internet, a number of name variations can be found: Cretan pacer (Κρητικός πλαγιοτραχαστής). Aravani (Αραβάνι), Aravani Atis (Αραβάνι άτης) – again a word having a Turkish origin: from *rahvan* meaning a pacer or pacing horse.

The Cretan horse (Fig. 3) is small (withers height 130 – 147 cm, 12,8 – 14,5 hands), with an average height of 140 cm (13,78 hands) for males, and 134cm (13,2 hands) for females. These dimensions may differ slightly, but it seems clear that the Cretan horse falls within the official range for ponies: height up to 148cm. The animal has a relatively small, rough, "wild-horse-like" head, which is rather heavy and wedge-shaped, a vestige of the Przewalski horse. Small ears, lively eyes, narrow shoulders, and chests are typical. The back is shallow (straight) too and has an inverted "V" shape in section. The overall body shape is rather rectangular, with long and slim legs. The hoofs are hard but small, usually black or dark grey. The body shape is similar to that of Arabic breeds. The mane is typically thick, while the high-rooted tail is thin. In our opinion, this is a result of local environmental conditions. Horses living in regions with low and sharp bushes (like Cretan phrygana) have poor tails (so-called rat tail) and raise them while running, so that they do not become entangled in the undergrowth (e.g., Appaloosa and some other American pacers).[39] The raised tail when running may also be associated with a lower number of lumbar vertebrae, but even Arab horses, for which this is common, do not always have five instead of six lumbar vertebrae. This number (five lumbar vertebrae) is more common, for

[39] Schiettecatte and Zouache, "The Horse in Arabia and the Arabian Horse: Origins, Myths and Realities"; Bill Richardson and Dona Richardson, *The Appaloosa* (New York: A. S. Barnes, 1968).

example, for Przewalski horses.[40] We were unable to determine how many lumbar vertebrae the Cretan horse usually has.[41]

The hindquarters are rounded and strong. The coat colours range widely: dark bay to smoky black, or black, is very common. Grey to blue roan horses can also be seen. There are some chestnut tones, too, but we are not aware of any dun, palomino, or tobiano examples. Some have a dark dorsal stripe. The horse is sure-footed and has plenty of stamina, able to pace steadily over long distances in rugged and extreme terrains.

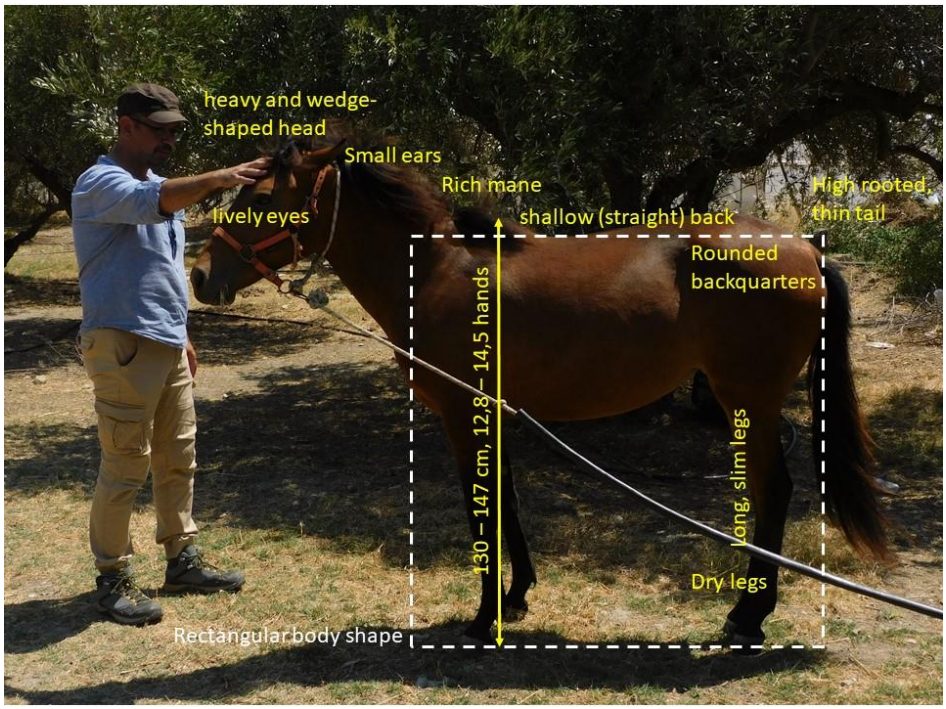

Fig. 3. The main characteristics of the Cretan horse (Vaya, 2-year-old female, Kentri, dist. Ierapetra, owner M. Genniatakis, photo Vera Klontza-Jaklova)

Cretan horses are natural pacers (Fig. 4) when walking or trotting. They may also gallop, but this is not their preferred gait. This is used for speed although they can also reach high speeds during trotting. They are raised to avoid cantering. In the Cretan Greek dialect, the terms used to describe the horse's typical walk and light trot are ραχβάν [rakhvan], meaning pacing. The word has a Turkish origin. The gait reaching up to about 20 km/h is called ταχτάνι [takhtani]. Again, this is a Turkish

[40] Robert M Stecher, "Anatomical Variations of the Spine in the Horse," *Journal of Mammalogy* 43(2) (January 7, 1962): 205–19, https://doi.org/10.2307/1377092.

[41] The local vets do not know this, and we have not had the proper X-ray equipment available at the time of the study.

word meaning a wooden board, probably describing a smooth movement, which is comfortable for the rider. The fastest gait – δυνατά ζάλα [dynata zala] meaning strong steps – is a flying amble with a speed of about 30 km/h or higher.

Fig. 4. Four-months-old foal naturally pacing (Maya, female, Kentri, dist. Ierapetra, owner M, Genniatakis, photo Vera Klontza-Jaklova)

Cretan horses do not require pacing training since they are natural pacers, and pacing ability is one of the criteria used by local owners to identify purebreds. This gait is determined by the DMRT3 gene. It is a permissive gene: an individual must be homozygous to be the pacer like some other natural homozygous pacers, e.g., the Standardbreds, or Icelandic horses.[42] There are no genetic studies of the DMRT3 gene in the Cretan horse, but long-term breeding, with efforts to eliminate the individuals who are not pacers or do not produce pacers, suggests that the Cretan horse would be homozygous.

Such gaits (pacing, ambling) are comfortable for riders, and the horse can endure these for long periods. They seem to be suitable for rough and difficult stony terrains, but they can also be used for carriage drawing. A pacing horse, however, is less flexible in lateral manoeuvres.

[42] Lisa S. Andersson et al., "Mutations in DMRT3 Affect Locomotion in Horses and Spinal Circuit Function in Mice," *Nature* 488(7413) (August 30, 2012): 642–46, https://doi.org/10.1038/NATURE11399.

IV. History of horses and other equines in Crete

In archaeological contexts across the island (Table 1; Fig. 5), a very small number of bones of horses and other equines have been identified and studied. The absence of skeletal horse remains dated to the Palaeolithic period suggests that horses were not present on the island during this period. This is consistent with hypotheses on the spread of horses in Eurasia taking place during the end of the Ice Age.[43] Furthermore, there are many Pleistocene paleontological finds in Crete, including pygmy elephants, pygmy hippos, and endemic deer, but no equids.[44]

Table 1 Crete's chronology[45]

Period	Phase	Abbreviation	Alternative term	Absolute Chronology
Palaeolithic Period		Paleo		>10.300 B.C.E.
Mesolithic Period		Meso		>7000
Neolithic Period		NP		>3300
Early Bronze Age	Early Minoan I	EM I	Prepalatial Period	>2700
	Early Minoan II	EM II		>2450
	Early Minoan III	EMI III		>2200
Middle Bronze Age	Middle Minoan I	MM I	Protopalatial Period	>2050
	Middle Minoan II	MM II		>1950
	Middle Minoan III	MM III	Neopalatial Period	>1750
Late Bronze Age	Late Minoan I	LM I		>1470
	Late Minoan II	LM II	Final- and Postpalatial Period	>1430
	Late Minoan III	LM III		>1150

[43] Warmuth et al., "Reconstructing the Origin and Spread of Horse Domestication in the Eurasian Steppe."

[44] Alexandra Van der Geer, Michael Dermitzakis, and John De Vos, "Crete before the Cretans: The Reign of Dwarfs," *Pharos* 13 (2006): 121–32; Liora Kolska Horowitz, "The Earliest Settlement on Crete: An Archeozoological Perspective," in *The Neolithic Settlement of Knossos in Crete. New Evidence for the Early Occupation of Crete and the Aegean IslandsChapter: The Earliest Settlement on Crete: An Archeozoological Perspective*, ed. Nikos Efstratiou, Alexandra Karetsou, and Maria Ntinou (Philadelphia: INSTAP Academic Press, 2013), 171–92, https://doi.org/https://doi.org/10.2307/j.ctt5vj96p.16.

[45] After: Cynthia Shelmerdine, *The Cambridge Companion to the Aegean Bronze Age*, Cambridge (Cambridge: Cambridge University Press, 2008), https://doi.org/https://doi.org/10.1017/CCOL9780521814447. John Bintliff, "The Complete Archaeology of Greece From Hunter-Gatherers to the 20th Century AD," 2012, www.wiley.com/wiley-blackwell. Jeremy B. Rutter, "Aegean Prehistoric Archaeology," n.d., https://sites.dartmouth.edu/aegean-prehistory/chronology/).

Early Iron Age	Subminoan	SM	Subminoan	>1000
	Protogeomentric Period	PG		>900
Geometric Period		GP		>650
Orientalizing Period		OP		>600
Archaic Period		AP		>479
Classical Period		CP		>323
Hellenistic Period		HP		>66 B.C.E
Roman Period		RP		>324 C.E.
Early Byzantine Period		EByz	First Byzantine Period	>824
Arabic Period		ArabP		>961
Late Byzantine Period		LByz	Second Byzantine Period	>1204
Venetian Period		VP		>1669
Ottoman Period		Ottoman		>1895
Modern times		Modern		> today

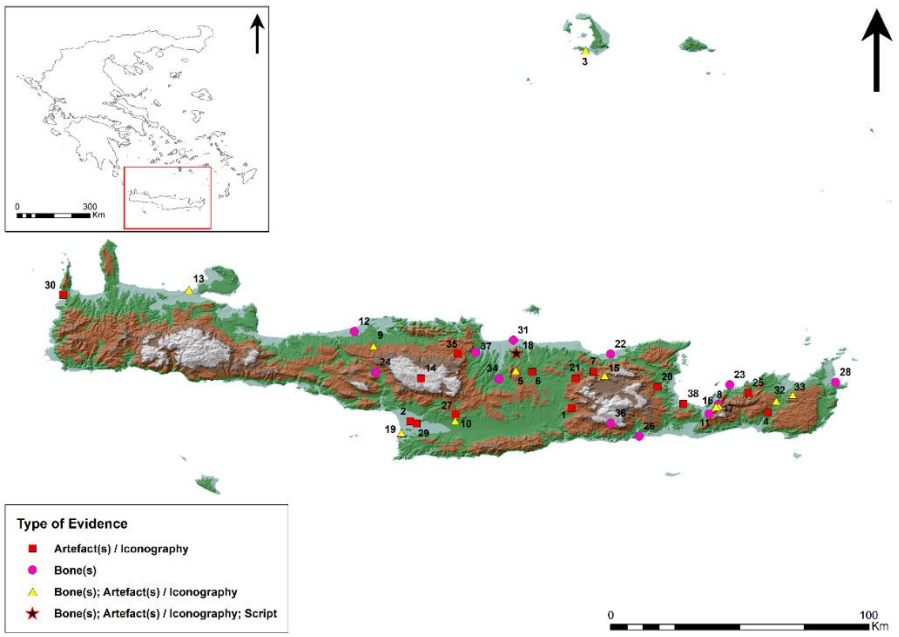

Fig. 5. Sites where equid bones, horse depictions and other artifacts related to horses were found: 1) Afrati, 2) Agia Triada, 3) Akrotiri, 4) Andromyloi, 5) Archanes-Fournoi, 6) Astrakous, 7) Avdou, 8) Azorias, 9) Eleutherna, 10) Gortyn, 11) Chalasmenos, 12) Chamalevri, 13) Chania, 14) Idaion Andron, 15) Karphi, 16) Kavousi Kastro, 17) Kavousi Vronda, 18) Knossos, 19) Kommos, 20) Lato Etera, 21) Lyttos, 22) Malia, 23) Mochlos, 24) Monastiraki, 25) Mouliana, 26) Myrtos Pyrgos, 27) Orthi Petra, 28) Palaikastro, 29) Phaistos, 30) Phalasarna, 31) Poros, 32) Praisos, 33) Prinias, 34) Profitis Ilias, 35) Sklvavokampos, 36) Syme, 37) Tylisssos, 38) Vrokastro. (Illustration Michal Smíšek and Vera Klontza-Jaklova)

A. Neolithic to Bronze Age (c. 3300 B.C.E. *up to about 1000 B.C.)*

Domesticated horses (*Equus ferus caballus*) might appear on Crete during the Pre- and Protopalatial periods in connection with the spread of horses around the turn of the 3rd and 2nd millennium B.C.; they became more common in the Neopalatial Period around 1500 BC.[46] Such chronological and cultural observations are found in recent genetic research resolving longstanding debates about the origins and spread of domestic horses and their ancestors.[47]

Equine faunal remains were found in the palace of Knossos and Kavoussi Vronda and dated to the Late Neolithic. However, their chronology remains uncertain, and

[46] Anthony, *Horse, Wheel, Language.*
[47] Librado et al., "The Origins and Spread of Domestic Horses from the Western Eurasian Steppes."

it is possible that the bones intruded into older strata.[48] The fragmentary state of the bones did not permit their identification as belonging to horses, asses, or hybrids[49] and they are just classified as Equidae.[50] We certainly cannot exclude the possibility – and it is more than likely - that these are the bones of donkeys. In the Near East, donkeys pre-date horses,[51] and this may also apply to Crete (see the chart on https://pandoradata.earth/dataset/vera-klontza-jaklova; Fig. 38).

Isolated bones from equines were found at Protopalatial Malia, in the Quartier Mu.[52] Two equine bones were found in Monastiraki, but it is not possible to identify whether these are donkeys or horses.[53] Other Protopalatial equine bones were recovered at Myrtos Pyrgos, Tylissos,[54] and Symi.[55] Bone finds dating to LMI-IIIA:1, were found at Chania, Tylissos, Archanes Fourni, Knossos, Palaikastro, Kommos, and Halasmenos.[56] It remains uncertain if horses (*Equus ferus caballus*) were already being bred on Crete during the Neopalatial period (MMIII-LMIB).

[48] M. R. Jarman, "Human Influence in the Developments of the Cretan Mammalian Fauna," in *Pleistocene and Holocene Fauna of Crete and Its First Settlers.*, ed. S. Reese, David (Madison: Prehistory Press, 1996), 211–30.

[49] Pauline Hanot and Corentin Bochaton, "New Osteological Criteria for the Identification of Domestic Horses, Donkeys and Their Hybrids in Archaeological Contexts," *Journal of Archaeological Science* 94 (June 1, 2018): 12–20. https://doi.org/10.1016/J.JAS.2018.03.012;
Paulline Hanot, C. Guintard, S. Lepetz, and R. Cornette, "Identifying Domestic Horses, Donkeys and Hybrids from Archaeological Deposits: A 3D Morphological Investigation on Skeletons," *Journal of Archaeological Science* 78 (2017): 88–98.

[50] Moody, "Hinterlands and Hinterseas: Resources and Production Zones in Bronze Age and Iron Age Crete."

[51] Joachim Marzahn, "Equids in Mesopotamia-A Short Ride through Selected Textual Source," in *Equids and Wheeled Vehicles in the Ancient World Essays in Memory of Mary A. Littauer*, ed. Peter Raulwing, Katheryn M. Linduff, and Joost H. Crouwel (London: British Archaeological Report S2923, 2019), 71–84; Peter Mitchell, *The Donkey in Human History: An Archaeological Perspective* (Oxford: Oxford University Press, 2018), https://doi.org/10.1093/oso/9780198749233.001.0001.

[52] E. Vila and D. Helmer, "Les Vestiges de Mammifères Du Quartier MU et MALIA," in *Vie Quotidienne et Techniques Au Minoen Moyen II, Fouilles Exécutées à Malia, Le Quartier MU V*, ed. J. C. Poursat, Etudes Cré (De Boccard, 2013), 136–76; Armelle Gardeisen, "Les Assemblages Archéozoologiques de Mammifères," *Bulletin de Correspondance Hellénique* 141(2) (2017), https://journals.openedition.org/bch/560 .

[53] Moody, "Hinterlands and Hinterseas: Resources and Production Zones in Bronze Age and Iron Age Crete"; Dimitra Mylona, "The Animal Bones from the Archive Building Area at Monastiraki," in *Monastiraki IIA: The Archive Building and Associated Finds*, ed. Aikaterini Kanta (Heraklion, 2012), 200–206.

[54] C. Gamble, "Surplus and Self-Sufficiency in the Cycladic Subsistence Economy," in *Papers in Cycladic Prehistory*, ed. J. L. Davis and J. F. Cherry (Los Angeles, 1979), 122–34. Joseph Hatzidakis, *Tylissos a l'epoque Minoen.* (Paris, 1921).

[55] Gűnter Nobis, "Haus- Und Wildtiere Aus Bergheiligtum Kato Syme/SO Kreta - Grabungen 1972-1984," *Tier Und Museum* 1 (1994): 42–47.

[56] E. Hallager and B. P. Hallager, *The Greek Swedish Excavations at the Agia Aikaterini Square, Kastelli, Khania 1970-1987 and 2001 III. The Late Minoan IIIB:2 Settlement*, Skrifter U (Stockholm, 2003).
J. Hatzidakis, "Τύλισος Μινωική," *ArchEph*, 1912, 197–223.
J. A. Sakellarakis and E. Sapouna-Sakellaraki, *Archanes* (Athens, 1991).
O. Bedwin, "The Animal Bones," in *The Minoan Unexplored Mansion at Knossos*, ed. M. R. Popham, BSA Suppl. (London: British School at Athens, 1984), 307–8.

A large assemblage of horse bones was found at the "Pillar Hall" in the Unexplored Mansion at Knossos. Three sets of articulated elements and a complete skull, each set probably from one animal, were recovered and dated to the LMII.[57]

The only horse bone remains that suggest an intentionally ritualized burial practice were recovered from Archanes Fourni in Tholos Tomb A.[58] Next to the burial of a dismembered horse, a *bucranium* (cattle skull) was embedded in an LM IIIA wall blocking a side chamber doorway into the tomb (with human remains). The horse skeleton is not complete, and there are traces of cutting and butchering on the bones.

A significant number of equine bones, relative to those from other animals, was found at Chania. They are present in all excavated contexts, but mainly date to the end of the Mycenaean period (LM IIIC). The bones, mostly fragmentary, are found in rubbish deposits, belong to adult animals, and are mostly females. Their heights fall within the pony range: wither's height = 1.11 – 1.31m.[59] A horse skeleton, almost fully articulated, was found at Chania in an LM IIIA context (Pit M, Daskaloyannis/Khaniamou corner). However, some butchery marks and the presence of bones from other animals do not suggest an intentional horse burial. In total, 90 equine bones were found, 81 from one individual.[60] Other sites with equine bones are Tylissos, Palaikastro, and Kommos.

An archaeological question to consider is how horse bones became part of archaeological contexts. The equines were not a standard part of the Minoan diet (there are only exceptional examples of butchery marks) nor a preferred sacrificial animal, otherwise their cadavers would have been removed from the spaces where people lived and from which they are typically excavated. It should also be noted that human burial remains dating to the heyday of Minoan Crete (Neopalatial period) have yet to be found.[61] Therefore, we must consider some alternative way of disposing of human bodies or large animal carcasses. Only a few decades ago

S. Wall-Crowther, "The Animal Bones," in *Palaikastro. Two Late Minoan Wells*, ed. Joseph A. MacGillivray, L. H. Sackett, and Jan Driessen, BSA Suppl. (London: British School at Athens, 2007), 181–210.

D. S. Reese, M. J. Rose, and S. Payne, "The Minoan Fauna," in *Kommos I. The Kommos Region and Houses of the Minoan Town I. The Kommos Region, Ecology, and Minoan Industries*, ed. J. W. Shaw and M. C. Shaw (Princeton, 1995), 163–291. Lynn Snyder and W. E. Klippel, "The Vertebrate Faunal Material," *Aegean Archaeology* I (1994): 92–93.

[57] Bedwin, "The Animal Bones."

[58] Johannes Sakellarakis, "Das Kuppelgrab A von Archanes Und Das Kretisch Mykenische Tieropferritual," *Prehistorische Zeitschrift* 45(2) (1970): 135–219

Joannis A. Sakellarakis and E. Sapouna-Sakellaraki, *Archanes. Minoan Crete in a New Light* (Athens: Ammos Publications, 1997).

[59] Kerry Michelle Harris, "The Social Role of Hunting and Wild Animals in Late Bronze Age Crete: A Social Zooarchaeological Analysis" (University of Southampton, 2014), https://eprints.soton.ac.uk/374395/1/__userfiles.soton.ac.uk_Users_slb1_mydesktop_THESIS%2520-%2520final%2520version-signed.pdf.

[60] Harris, "The Social Role of Hunting and Wild Animals in Late Bronze Age Crete: A Social Zooarchaeological Analysis."

[61] Eleni Hatzaki and Priscilla Schuster Keswani, "Mortuary practices and ideology in Bronze Age and Early Iron Age Crete," *British School at Athens Studies* 20 (2012): 307–13, https://doi.org/http://www.jstor.org/stable/23541215.

donkeys, mules, and even horses were still being dropped into caves, when they got old, sick, and could work no more.[62] Vultures, common in Crete (Griffon Vulture - *Gyps fulvus*, Bearded vulture - *Gypaetus barbatus*), completed decarnation. Given such taphonomic issues, we must expect that the number of horses in Crete could be considerably larger than suggested by the archaeological record.

An additional source of information on the past presence of horses in Crete comes from Minoan pictorial and written sources. The earliest horse representations predate those of bone remains. Horses are shown on a Protopalatial bone seal with 14 faces found in Archanes Fourni (Fig. 6). On three of the faces equine bodies are depicted.[63,64] D. Ruscillo notes that, during this period, horses could have been present in Crete but at the same time states that the seal bearing the horse depictions could be an import and does not necessarily reflect the situation on the island.[65] This seal is considered one of the earliest examples of Cretan hieroglyph, a Minoan writing system that is yet to be deciphered.[66]

Neo- and Final Palatial equine depictions are limited to a few seals, one fresco, a painting on a limestone funeral larnax, and several clay figurines. No Bronze Age harness or chariot gear has been found so far on Crete.

A few seals with horse depictions are from Late Minoan contexts. One seal imprint shows a large horse covering a boat with three rowers (CMS II8.133) (Fig. 7). The horse's head and the lower parts of the legs are missing. An LM IB context at a Minoan villa in Sklavokambos contained a sealing with a chariot, two horses, and a rider (CMS II.6 260) (Fig. 8). The same motif, possibly from the same seal, was found imprinted on a clay seal at Ayia Triada in Crete and Akrotiri in Santorini (CMS VS3 391).[67] A horse/horses pulling a chariot was/were probably shown in the so-called Palanquin fresco from Knossos (Fig. 9). The reconstruction is based on a few small fragments,[68] however, the multiple reins do suggest that it might be a chariot scene. It dates to the Final Palatial Period.

[62] Own ethnographic research: we are currently working on mapping places around the village of Kritsa (Eastern Crete), where old and sick animals have been driven.
[63] Sakellarakis, "Das Kuppelgrab A von Archanes Und Das Kretisch Mykenische Tieropferritual."
[64] D. Ruscillo, "Faunal Remains and Murex Dye Production," in *Kommos V: The Monumental Minoan Building at Kommos*, ed. J. W. Shaw and M. C. Shaw (Oxford, 2006), 776–844.
[65] Ibidem
[66] Roeland P.-J. E. Decorte, "The First 'European' Writing: Redefining the Archanes Script," *Oxford Journal of Archaeology* 37
(4) (2018): 341–72.
[67] Ingo et al. Pini, *Kleinere Griechische Sammlungen. Supplementum 3. Neufunde Aus Griechenland Und Der Westlichen Türkei*, CMS V (Mainz: Philipp von Zabern, 2004).
[68] Mark A.S. Cameron, "Unpublished Fresco Fragments of a Chariot Composition from Knossos," *Archäologischer Anzeiger* 82(3) (1967): 330–44.

Fig. 6. Three horses on the bone seal from Archanes Fourni (CMS II.1 391).[69]

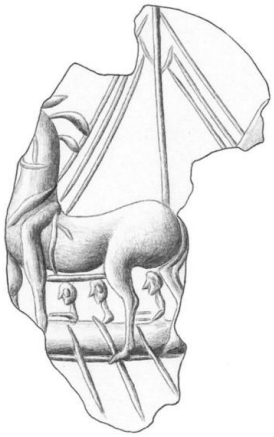

Fig. 7. Seal imprint in a clay with a large horse covering a boat with three rowers, size 2,8 x 2,2cm (CMS II.8. 133).[70]

[69] After: Nikolaos Platon, *Iraklion, Archäologisches Museum: Die Siegel Der Vorpalastzeit*, ed. Friedrich Matz und Ingo Pini, Corpus der (Heidelberg: Propylaeum, 2016), https://doi.org/10.11588/propylaeum.74.67).

[70] Platon, *Iraklion, Archäologisches Museum: Die Siegel Der Vorpalastzeit*.

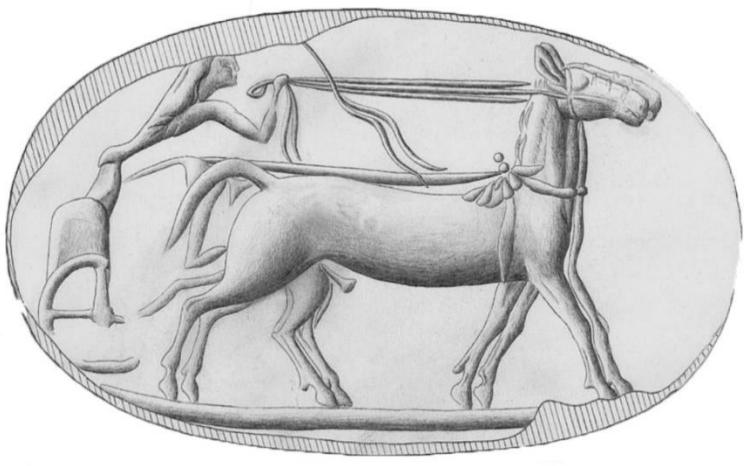

Fig. 8. Sklavokampos: Drawing of a sealing ring imprint in clay, size: 3x1,85cm (CMS II.6 260).[71]

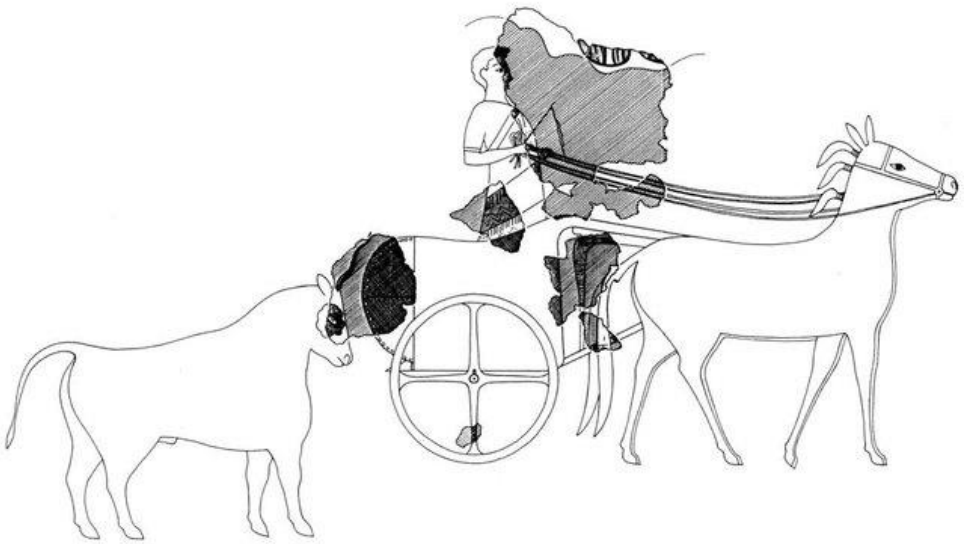

Fig. 9. Knossos, Palanquine fresco. Reconstruction.[72]

A scene showing chariot horses is found on a limestone funeral larnax (Tomb 4) from Ayia Triada,[73] which also dates to the Final Palatial period, 1370-1325 B.C.E. (Fig. 10). The scenes painted on the long sides of the larnax show different stages of

[71] Ibidem.
[72] After: Cameron, "Unpublished Fresco Fragments of a Chariot Composition from Knossos."
[73] Roberto Paribeni, "Il Sarcofago Dipinto Di Haghia Triada," *Monumenti Del Lincei* XVIII (1908): 5–87.

a funeral ceremony for a high-status individual. A chariot pulled by a pair of horses, transporting a dead person, is shown on one of the larnax's sides. On the opposite side, a chariot pulled by griffons transfers the individual to the underworld. A horse and a gryphon pulling a chariot were also depicted on a seal found in Astrakous (Fig 11), near Knossos,[74] and horses pulling a chariot were on a seal from Lyttos (Fig. 12). Evans identified these animals as goats, but we believe they are more likely to represent horses with a crest. Goats are much smaller. However, we cannot completely exclude the possibility that the depicted animals are goats, especially in Crete, where there is a large number of them. Goat-drawn carts occur in various mythological systems (e.g., the Norse myths). Even in the recent past, goat-drawn carts could occasionally be seen.[75]

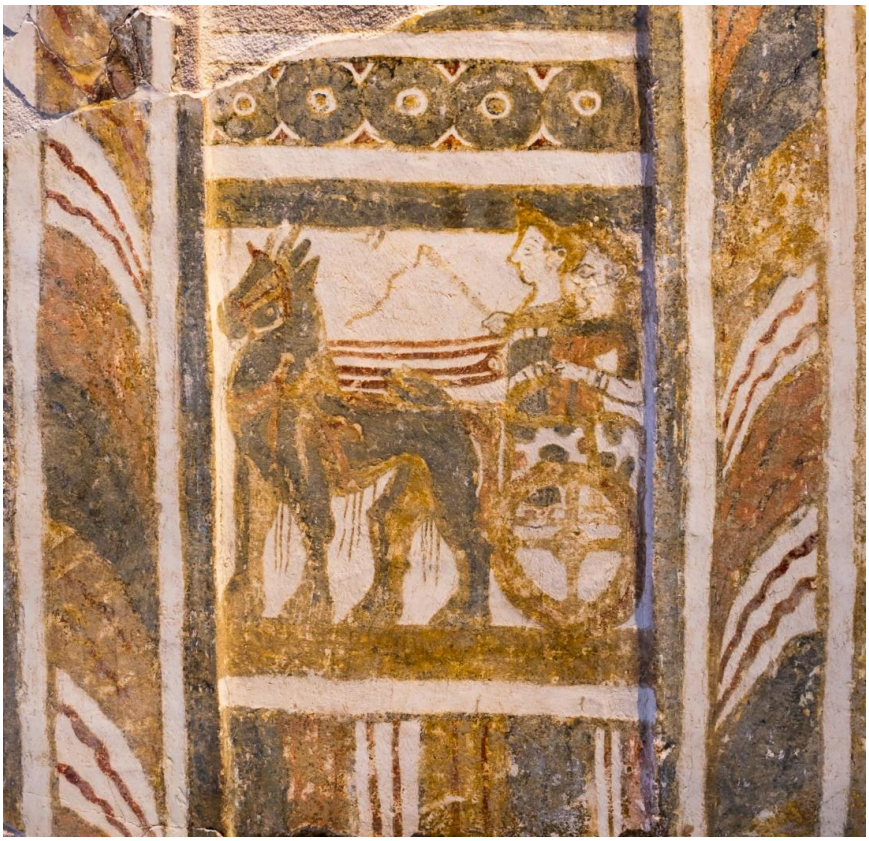

Fig. 10. Ayia Triada sarcophagus/larnax: detail of the short side (after https://commons.wikimedia.org/wiki/File:Painting_on_limestone_sarcophagus_of_religious_rituals_from_Hagia_Triada_-_Heraklion_AM_-_10.jpg)

[74] Arthur J. Evans, *The Palace of Minos: A Comparative Account of the Successive Stages of the Early Cretan Civilization as Illustred by the Discoveries at Knossos (Band 4,2): Camp-Stool Fresco, Long-Robed Priests and Beneficent Genii* (London, 1935), https://doi.org/https://doi.org/10.11588/diglit.1118.
[75] https://harnessgoats.co.uk/harness-goat-society-history/.

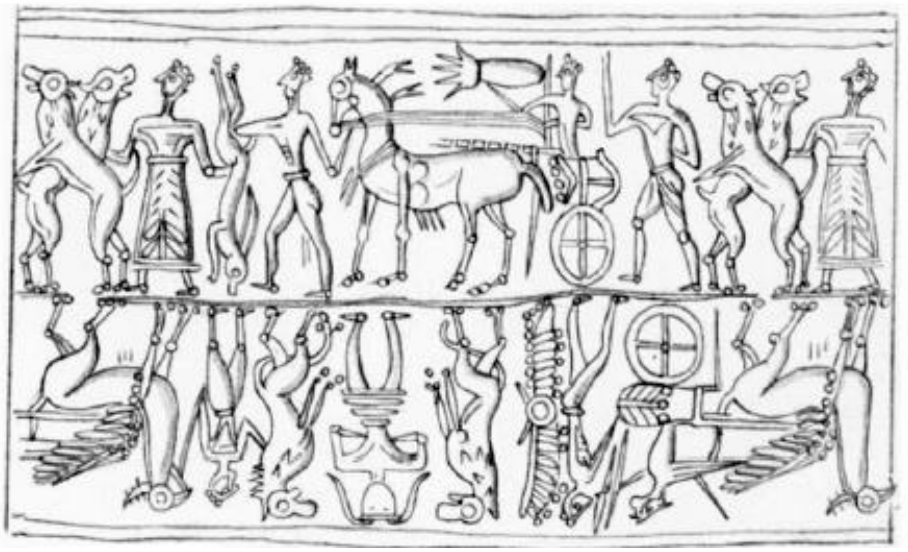

Fig. 11. Astrakous: Haematid cylindrical seal[76]

Fig. 12. Avdou: Sardonite seal.[77]

[76] V. E. G. Kenna, *Cretan Seals: With a Catalogue of the Minoan Gems in the Ashmolean Museum* (Oxford: Clarendon Express, 1960).

[77] Evans, *The Palace of Minos: A Comparative Account of the Successive Stages of the Early Cretan Civilization as Illustred by the Discoveries at Knossos (Band 4,2): Camp-Stool Fresco, Long-Robed Priests and Beneficent Genii.*

A single horse painted on a crater was found in Chania during the Mycenaean period.[78] This contrasts with the Mycenaean mainland and Cyprus, where horse depictions on funeral urns in the shape of craters are abundant.[79]

Equine clay figurines are known for the post-Minoan period. Especially interesting is a clay equine figure from Archanes, on which a human individual is sitting sideways. Although this type of sitting was favoured by Near Eastern deities (e.g., Pirvu, Astarte), or Celtic Epona,[80] it is also the riding position traditionally adopted by Cretan farmers, men and women, since it is more comfortable for travelling long distances. The saddle, called *somari*, has also been adapted for a comfortable side seat (Fig. 13). Furthermore, the pacing gait is much more convenient for riding this way. The figurine from Archanes has no morphological features of an ass. However, it is not possible to establish if the figurine represented a horse or donkey.

Fig. 13. Somari, wooden saddle used by Cretan villagers for longer journeys and cargo (photo Vera Klontza-Jaklova)

[78] E. Hallager and B. P. Hallager, *The Greek-Swedish Excavations at the Agia Aikaterini Square, Kastelli, Khania 1970-1987. Volume II. The Late Minoan IIIC Settlement* (Stockholm: Paul Åströms Förlag, 2000).

[79] Laerke Recht and Christine E. Morris, "Chariot kraters and horse–human relations in Late Bronze Age Greece and Cyprus," *The Annual of the British School at Athens* (April 26, 2021): 1–38, https://doi.org/10.1017/S0068245421000022.

[80] Mary Voyatzis, "Votive Riders Seated Side-Saddle at Early Greek Sanctuaries," *The Annual of the British School at Athens* 87 (1992): 259–79, https://doi.org/doi:10.1017/S0068245400015173.

Several dozens of equine figurines were found in the LM IIIC settlement at Kavoussi Vronda (Fig. 14). They were handmade from local clay and placed in contexts together with other animal figurines. Some of them have a painted harness, coloured mane, or other decorative motifs on their bodies. Their height is less than 20 cm. The excavators interpreted the figurines from small settlement shrines as *ex-votos,* a tradition that continued into the Iron Age.[81]

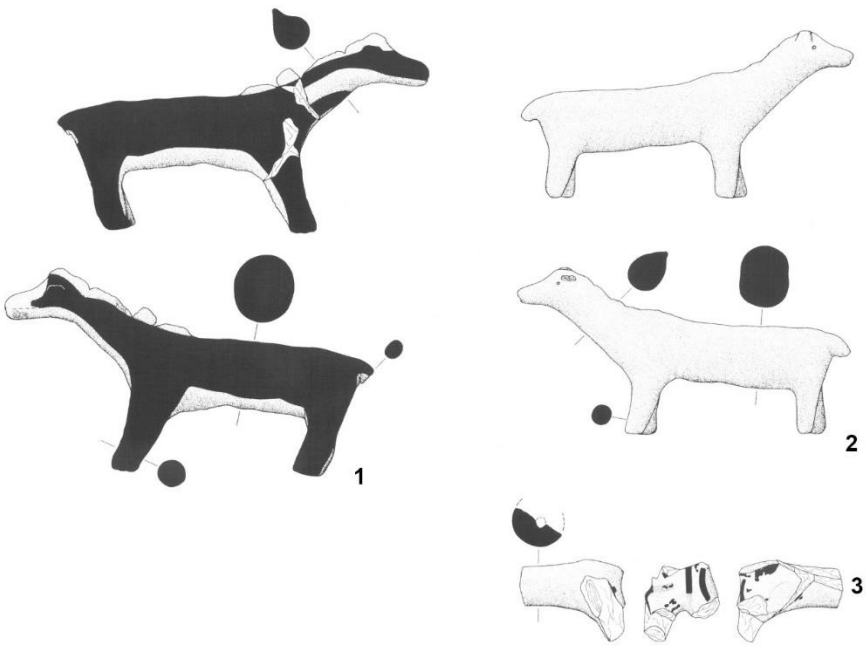

Fig. 14. Kavousi Vronda: **1:** Painted horse figurine, length ca 11cm, **2:** Plain horse figurine, length ca 8cm, **3:** Fragment of painted horse figurine (head), length ca 2,5cm.[82]

Written documents also provide information on the past presence of horses in Crete. The Knossos archive, the most extensive collection of Linear B script documents, preserves texts written on clay tablets in Linear B script (Mycenaean Greek). There is some controversy relative to the chronology of the collection, but it is clear that these were produced around 1400 B.C.E. and date no later than 1350 B.C.E. These are not narrative texts but lists of items related to the economy of an administrative centre.[83] Represented are different types of pictograms meaning horse:

[81] Geraldine C. Gesell, "No Title," in *Kavousi IIC: The Late Minoan IIIC Settlement at Vronda Specialist Reports and Analyses*, ed. Leslie Preston Day et al. (Philadelphia: INSTAP Academic Press, 2016), 117–3,6.
[82] Ibidem, Fig. 64, 65.
[83] Michael Ventris and John Chadwick, *Documents in Mycenaean Greek*, 2nd ed. (Cambridge: Cambridge University Press, 1973).

po-ro/po-lo (foal), mare, stallion, and *i-qo* (horse in general).[84] A special sign was used for *o-no* (donkey).[85,86] Horses in ideograms have a distinctive mane while donkeys lack this[87] (Fig. 15). Horses are usually connected with signs of chariots and numbers.[88] This suggests that their number was worth documenting, with a certain number of horses certainly controlled by the palatial elite. The vocabulary related to chariot construction was very rich and detailed.[89] The same role for horses can be expected as in the Mycenaean mainland, in the Hittite empire, the Near East, or Egypt, where horses and chariots were part of an elite package.[90] Horses are mentioned in Mesopotamian written sources from 2100 B.C.E., and references become more frequent around 1500 B.C., when elite men had even to be trained in chariot driving. This was likely part of a broader military education in which the elite would serve as cavalrymen or officers. During this period, the horse chariot was considered an effective weapon.

In summary, horses in Bronze Age Crete likely served similar roles to those in other palatial civilizations. Horses were prestigious animals connected to palatial and military elites. Horses were also part of cosmological myths symbolizing the transition between the human- and the nether worlds. However, a few bones (*Equus sp.*) bear traces of butchery. Their dating is insecure (probably Final Neolithic), but it is possible that, in rare circumstances, equids were consumed or sacrificed.[91]

84 i-go *ἵκκϝοι* horses

85 o-no *ὦνοι* donkeys

86 John Chadwick, "THE KNOSSOS HORSE AND FOAL TABLET (Ca895)," *Bulletin of the Institute of Classical Studies* 2(1) (1955), https://doi.org/10.1111/j.2041-5370.1955.tb00320.x.

87 Michael Ventriss and John Chadwick, *Documents in Mycenaean Greek*, Second (Cambridge: Cambridge University Press, 1973).

88 D. M. Jones, "The Linear B Tablets from Knossos - The Knossos Tablets. A Transliteration by Emmett L. Bennett, John Chadwick, Michael Ventris. Second Edition with Corrections and Additions by John Chadwick with the Assistance of Fred W. Householder" (University of London Institute of Classical Studies, Bulletin Supplement No. 7.) Pp. Vi+137. London: Institute of Classical Studies, 1959. Paper, 15 s . Net," *The Classical Review* 11(3) (1961), https://doi.org/10.1017/s0009840x00211918.

89 Richard Vallance Janke and Spyros Bakas, "Linear B Lexicon for the Construction of Mycenaean Chariots," *Epohi (Epochs). Department of History of "St. Cyril and St. Methodius" University of Veliko Tarnovo* 25(2) (2017).

90 J. Argent, "Do the Clothes Make the Horse? Relationality, Roles and Statuses in Iron Age Inner Asia," *World Archaeology* 42(2) (2010): 157–74; Anthony, *Horse, Wheel, Language.*

91 Amy K. Styring et al., "Refining Human Palaeodietary Reconstruction Using Amino Acid Δ15N Values of Plants, Animals and Humans," *Journal of Archaeological Science* 53 (January 2015): 504–15, https://doi.org/10.1016/j.jas.2014.11.009. Peter Tomkins, "Domesticity by Default. Ritual, Ritualization and Cave-Use in the Neolithic Aegean," *Oxford Journal of Archaeology* 28(2) (2009): 125–53. Valasia Isaakidou, "Farming, Feasting and Crafts at the Palace of Knossos: A View from Faunal Remains," *Bulletin of the Institute of Classical Studies of the University of London* 48 (2005): 204.

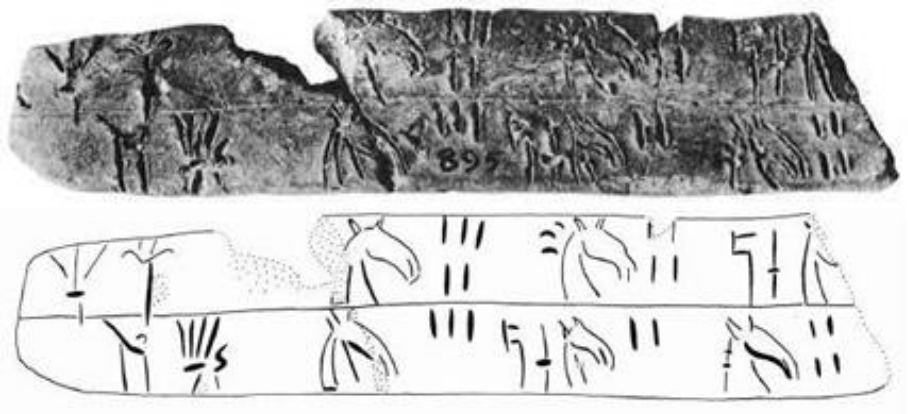

Fig. 15. Knossos, horse and foal tablet (Ca895). First Line: Horses; five mares, four (full-grown) horses, x foals. Second line: Asses: three she-asses, two foals, four he-asses.[92]

It also seems that the Bronze Age horse population in Crete was not large, although they would have been present in central Crete (mainly around Knossos palace) to meet the needs of local elites. Some authors believe that it is challenging to keep horses in Crete compared with other livestock, because they imagine the ideal conditions for horses to be those standard in the temperate climate zone where these authors usually come from, which would justify a small population.[93] However, Crete, mainly in its central part, has a favourable landscape for horses, where they can easily find and graze on fresh green plants during winter and on dry vegetation during summer. There is also a sufficient quantity of open space and accessible water sources. Horses are known to thrive in more adverse regions;[94] they are steppe animals with a peptic system specialized for dry vegetation poor in proteins and rich in fibres. Climatic and environmental conditions were neither stable nor the same as they are today. There were multiple changes in paleoclimatic conditions.[95] However, even Cretan climate extremes would not preclude the comfortable survival of Equids. Horses can travel long distances to reach water sources and quickly learn how to move easily in rocky terrain. When pasture of low nutritional value is available, they can consume the harder parts of plants rich in cellulose and poor in protein. Although there are no luxuriant Alpine-like pastures, there is sufficient space for horses to

[92] Ventriss and Chadwick, *Documents in Mycenaean Greek*. Chadwick, "The Knossoshorse and foal tablet (Ca895)."

[93] Paul Halstead and Valasia Isaakidou, "Revolutionary Secondary Products: The Development and Significance of Milking, Animal-Traction and Wool-Gathering in Later Prehistoric Europe and the Near East," in *Interweaving Worlds: Systemic Interactions in Eurasia, 7th to the 1st Millennia BC*, ed. T. C. Wilkinson, S. Sheratt, and John Bennet (Oxford: Oxbow Books, 2011), 61–76.

[94] Don A. Driscoll et al., "Impacts of Feral Horses in the Australian Alps and Evidence-Based Solutions," *Ecological Management and Restoration* 20(1) (2019): 63–72, https://doi.org/10.1111/emr.12357.

[95] Rackham and Moody, *The Making of the Cretan Landscape.*
Jennifer A. Moody, "The Roman Climate in the Southwest Aegean: Was It Really Different?," in *Roman Crete. New Perspectives.*, ed. Jane E. Francis and Anna Kouremenos (Oxford: Oxbow Books, 2016), 59–82.

graze. Horses adapt well to difficult conditions if necessary[96] and have thrived on rugged terrains across the world. If the landscape is rough and poor, they need accessible water sources (it does not matter if they are distant) and the freedom to move across a wider region in the search for suitable food. The island is generally dry, but water springs from limestone karst formations are common, and rivers in the past had a larger flow than in recent decades.[97] The mountain slopes during the rainy period are covered with juicy grasses and wild cereals. In summer, they are rich in dry stalks (similar to natural hay) and fruits like figs and pears. Tree leaves and a plethora of wild herbs with medical properties can make for a healthy and nutritious diet. Herds can be left free to roam or driven across different areas, as observed in other similar regions (e. g., mountainous southern Albania), so that they could have access to more nutritious winter diets. This remains common practice for sheep and goats.

B. Iron Age

Following the collapse of the palatial civilization (c. 1250 – 1150 B.C.E.),[98] there were major political and demographic changes: economic and power structures controlled from the palace centers disappeared, many palaces were destroyed by attacks, the originators of which have not yet been clearly determined. In the Helladic world, there was a period that was previously referred to as the Dark Age, during which the foundations of ancient civilization, societies characterized by Greek city-states, crystallized.[99]

Populations abandoned coastal zones and moved into the mountains, where new settlements were established. These endured during the Early Iron Age and some of them were still inhabited during the Hellenistic period.[100] Osteological remains from excavated sites of this transitional period are rare. Until now we only have information on equids from the site of Prinias.[101] A few graves, each containing a horse and a dog accompanying human burials, have been located.[102] They were

[96] Based on our observations, the current Cretan horse has the hooves typical of horses living in dry, rocky regions (narrow, taller, and hard).

[97] Rackham and Moody, *The Making of the Cretan Landscape*; Moody, "Hinterlands and Hinterseas: Resources and Production Zones in Bronze Age and Iron Age Crete."

[98] Eric H Cline, *1177 B.C.*, REV-Revi (Princeton University Press, 2014), https://doi.org/10.2307/j.ctvc77576.

[99] *V. R. d'A Desborough, The Greek Dark Ages (London: Benn, 1972).*

[100] K. Nowicki, *Deffensible Sites in Crete, C.1200 - 800 B.C.: LM IIIb*, Aegeaum (Liege: Universite de Liege, Histoire de l'art et archeologie de la Grece antique, 2000), https://books.google.gr/books?id=pLT3tAEACAAJ. Saro Wallace, *From Successful Collapse to Democracy's Alternatives, Twelfth–Fifth Centuries BC* (Cambridge: Cambridge University Press, 2010).

[101] Barbara Wilkens, "Faunal Remains from Italian Excavations on Crete," in *Pleistocene and Holocene Fauna of Crete and Its First Settlers*, ed. D. S. Reese, Monographs (Madison: Prehistory Press, 1996), 241–61.

[102] Wilkens; Barbara Wilkens, "Zooarchaeology in Greece: Recent Advances," in *British School at Athens Studies*, ed. E. Kotjabopoulou et al., vol. 9 (London, 2003), 85–90.

interpreted as the graves of elite hunters.[103] An intentional animal burial is a significant phenomenon. This indicates that the animal, a horse or a dog, was viewed as having a close bond with the human. In Crete, this ritual is matched with a period when horse riders were increasing in prestige and from this, a class of *hippeis,* characteristic of classical Greek poleis, emerged. Horses and their value were often mentioned, e.g., by Homer, although in the Mycenaean mainland horse burials appeared much earlier than in Crete; e.g., in the Dendra cemetery,[104] where they are dated between 1431 and 1132 B.C.E. (LH IIIA – C).[105] During the early Iron Age, the role of horses as a feature of elite membership was fully developed. A hero, a leader, or a king must be a skilled and successful hunter and warrior.

From the whole first millennium BC, we only know of a few horses depicted on pottery, relief pithoi, a few collections of clay figurines, small bronze cast horses, horses on a temple relief, seals, armour, and other bronze items. A hunting scene containing a running horse and a dog, on a decoration panel of a pithos with a lid, was made in the so-called Horse workshop between 790–750 B.C.E. (Fig. 16). On another vessel, a pyxis serving as a cremation urn, a horse and a dog are again depicted. The vessel also includes representation of other animals such as deer, sheep, and panthers. This vessel is dated to the second half of the seventh century. Both artefacts were found in Knossos.[106]

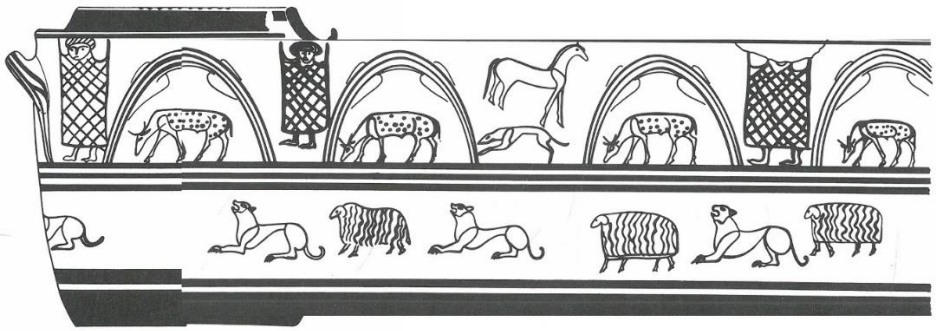

Fig. 16. Knossos: painted pyxis with a horse (high 21,8cm)[107]

Horses are also possibly depicted on a Late Geometric krater from the Kavousi Kastro slope and decorated in a local geometric style. In the horizontal band under the vessel's rim quadrupeds are shown; one of them is possibly a horse (Fig. 17).[108]

[103] Wilkens, "Faunal Remains from Italian Excavations on Crete"; Wilkens, "Zooarchaeology in Greece: Recent Advances"; Harris, "The Social Role of Hunting and Wild Animals in Late Bronze Age Crete: A Social Zooarchaeological Analysis."

[104] Mycenaean cemetery in Argolis (NE Peloponnese).

[105] Harris, "The Social Role of Hunting and Wild Animals in Late Bronze Age Crete: A Social Zooarchaeological Analysis."

[106] J N Coldstream, L J Eiring, and G Forster, "Knossos Pottery Handbook: Greek and Roman," *British School at Athens Studies* 7 (September 24, 2001): 1–178, http://www.jstor.org/stable/40960536.

[107] Ibidem, Fig. 1.8.j-k.

[108] Metaxia Tsipopoulou, *I Anatoliki Kriti Stin Proimi Epochi Tou Sidirou* (Iraklion: Arch. Inst., 2005).

Three conical lids with handles in the shape of a horse head and neck, dated into the Late Geometric Period, belong to a group of lids with zoomorphic handles (Fig. 18).[109] A hydria from Kavousi shows a scene of a charioteer pressing his horse to run faster while three mourning women are pulling their hair on the other side of the vessel, which was found in a grave dated to the Late Geometric – Early Orientalizing period (Fig. 19).[110] There are only 6 such vessels from the Geometric period found on Crete, while 313 have been found across Greece.[111]

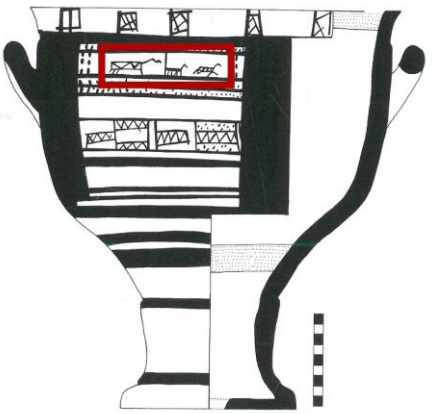

Fig. 17. Kavousi Kastro: Krater with three quadrupeds resembling horses[112]

Fig. 18. Painted conical lid[113]

[109] Ibidem.
[110] Ibidem.
[111] Romilda Tengeriová, "Kůň v Ikonografii Antického Řecka (Horse in the Ancient Greek Iconography)" (Masaryk University, 2021), https://is.muni.cz/auth/th/p5dr9/.
[112] Tsipopoulou, *I Anatoliki Kriti Stin Proimi Epochi Tou Sidirou*.
[113] Ibidem.

Fig. 19. Orthi Petra: Hydria[114]

One of the most impressive depictions of grazing horses appears on an amphora from the necropolis of Orthi Petra at Eleutherna dated 700-675 B.C.E. (Fig. 20). It was possibly imported from one of the Cycladic islands.[115]

[114] Ibidem.

[115] Nikolaos Stampolidis, *Eleutherna; Polis – Acropolis – Necropolis* (Athens: Museum of Cycladic Art, 2004). Antonis Kotsonas, *The Archaeology of Tomb A1K1 of Orthi Petra in Eleutherna: The Early Iron Age Pottery* (Athens: Scripta, 2008).

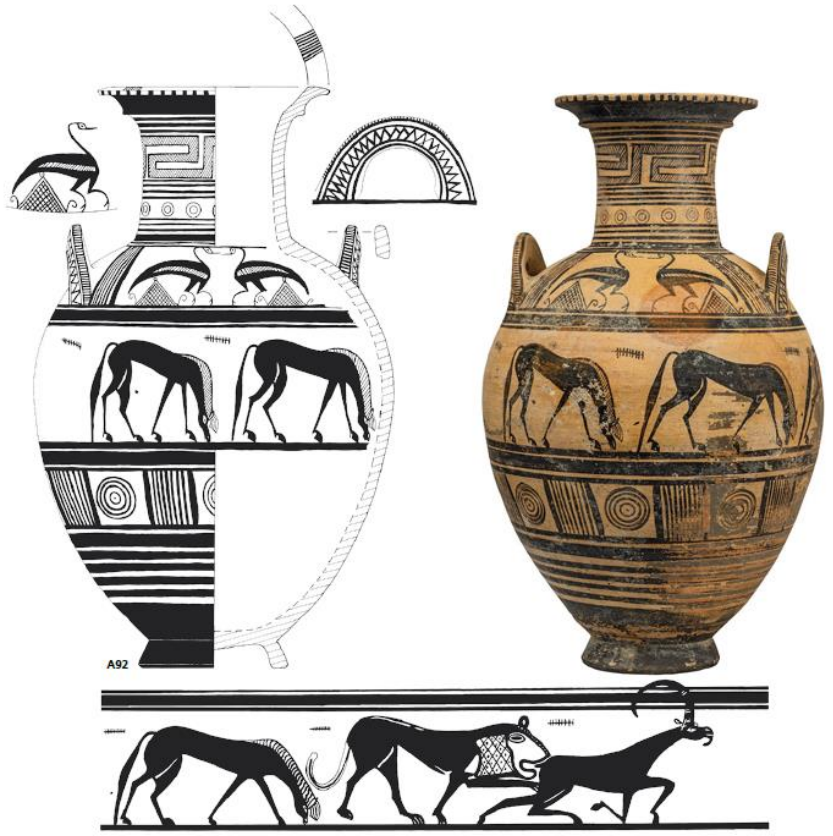

Fig. 20. Orthi Petra, Eleutherna: Amphora (A92)[116]

In general, figurative decoration is relatively rare on Cretan pottery during the Iron Age compared to other Greek regions, where the figurative style gained significant popularity, mainly during and after the eighth century.

Horse ceramic figurines made from local clays were found in Vrokastro.[117] Some of them were entirely handmade, while the bodies for some were partially made on a potter's wheel. In some cases, these had painted harnesses. A clay model of a chariot, including the charioteer, was also found (Fig. 21). B. Hayden dated them to the Subminoan period, Early Iron Age, and Geometric period. The artefacts were found together with other animal idols in rooms, interpreted as settlement shrines. There were similar clay figures at Kavoussi Vronda.[118]

[116] Afeter: Kotsonas, *The Archaeology of Tomb A1K1 of Orthi Petra in Eleutherna: The Early Iron Age Pottery*, Figure 71.
Nikolaos Stampolidis, *Eleutherna* (Athens: Lambda Development, n.d.), 169.
[117] Barbara J. Hayden, "Terracotta Figures, Figurines, and Vase Attachments from Vrokastro, Crete," *Hesperia* 60(1) (1991): 103–44, https://doi.org/https://doi.org/10.2307/148229.
[118] Gesell, "The terracotta figurines."

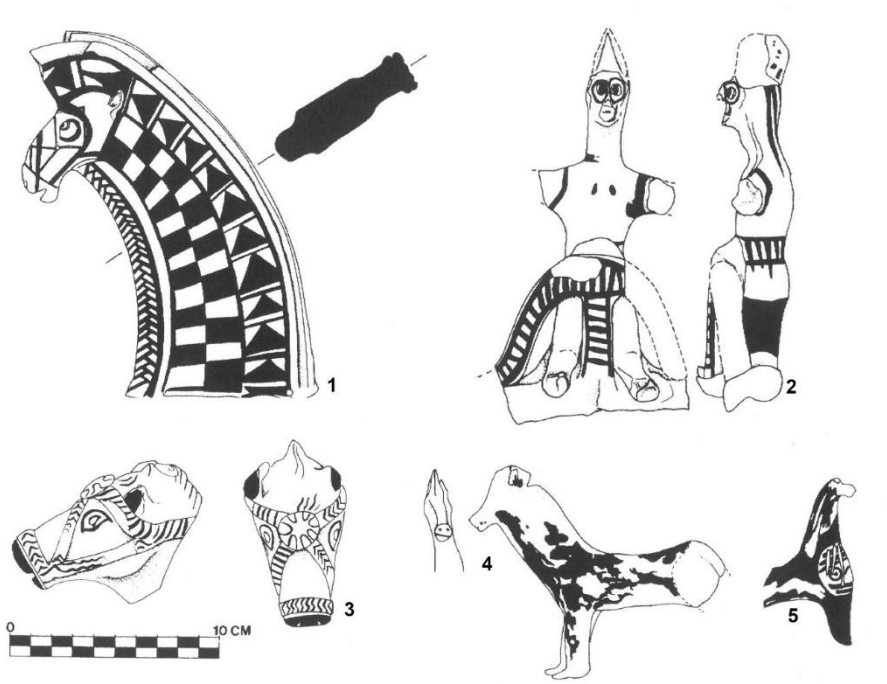

Fig. 21 Vrokastro: ceramic horses. **1:** Painted lid handle, **2:** Painted figure of a charioteer, **3:** Horse head, **4:** Painted horse torso, **5:** Painted horse torso[119]

An equine clay figurine was also found in Phaistos (LM IIIC).[120] It is carrying two large vases and, given the local ethnographic context, this indicates that it was more likely a donkey or a mule, as is also suggested by its long ears.

At the Kommos sanctuary, a large set of animal figurines was found. They were in well-stratified contexts, which offered a precise chronology and allowed for a diachronic analysis of ritual practices from the Subminoan to 600 B.C.E. (Temple B) and, following a short temporal hiatus, up to the fourth century B.C.E., when the sanctuary was extended. The ritual site was abandoned in the secondcentury C.E. The majority of the figurines are of quadrupeds, with a significant proportion of horses. The excavators Joseph and Maria Shaw[121] divided these into three typological groups: (1) small handmade terracotta horses, painted (lines, striped with darker clays) and some pulling chariots. Shapes were highly variable and have some similarities to artefacts found in Apulia, Cyprus, and Olympia, but the closest parallels are from Attica, (2) large horses with wheel-made bodies, occasionally painted (thick

[119] After: Hayden, "Terracotta Figures, Figurines, and Vase Attachments from Vrokastro, Crete," FIG.10, 11.

[120] Aitaterini Kanta, *The Late Minoan III Period in Crete. A Survey of Sites, Pottery and Their Distribution* (Göteborg: Paul Åströms Förlag, 1980).

[121] Joseph W. Shaw, "Excavations at Kommos (Crete) during 1979," *Hesperia* 49(3) (1980); Joseph W. Shaw and Maria C. Shaw, *Kommos: An Excavation on the South Coast of Crete Volume IV: The Greek Sanctuary* (Princeton: Princeton University Press, 2000).

lines in patterns), but these are rare, and (3), a bronze figurine of a horse from the early Greek shrine (seventh century B.C.E.) at Kommos (Fig. 22), firmly embedded between two slabs under the altar (Room 2A). Above the horse, there was a faience figure of the Egyptian goddess Sekhmet. In the same context, a terracotta horse head, a ceramic chariot wheel, a bronze bull, a fragment of another faience figure and a small bronze shield were found. This assemblage was interpreted as a votive deposit.[122]

Fig. 22. Bronze horse from Temple "B" at Kommos; length 13,3cm (Provenance and Copyrights holder: Heraklion Archaeological Museum, Hellenic Ministry of Culture and Sports – "Hellenic Organization of Cultural Resources Development – HOCRD," Catalogue number: AMH X4511; Permission number 254670/06-06-2022; Photo Vera Klontza-Jaklova)

[122] Shaw, "Excavations at Kommos (Crete) during 1979"; Shaw and Shaw, *Kommos: An Excavation on the South Coast of Crete Volume IV: The Greek Sanctuary*.

Horses can be identified on votive deposits from the Idaion Cave, one of the putative birthplaces of Zeus. Idaion Cave was a place of worship in continuous use during the Bronze and Iron Age. Horses were depicted on three bronze shields. On one of them, slim horses are grazing and walking together with a deer and lions. They are placed in concentric bands. On another shield, also called the Hunt shield, hunters fight with (and sometimes are overpowered by) boars and lions. Two of the horses are mounted and galloping with the riders holding round shields and lances or bows (Fig. 23a). The shields were initially dated to the mid-seventh century,[123] but, after analogous finds from Eleutherna were recovered in a well-dated burial context, an earlier date between 830 – 730 B.C.E. was suggested.[124]

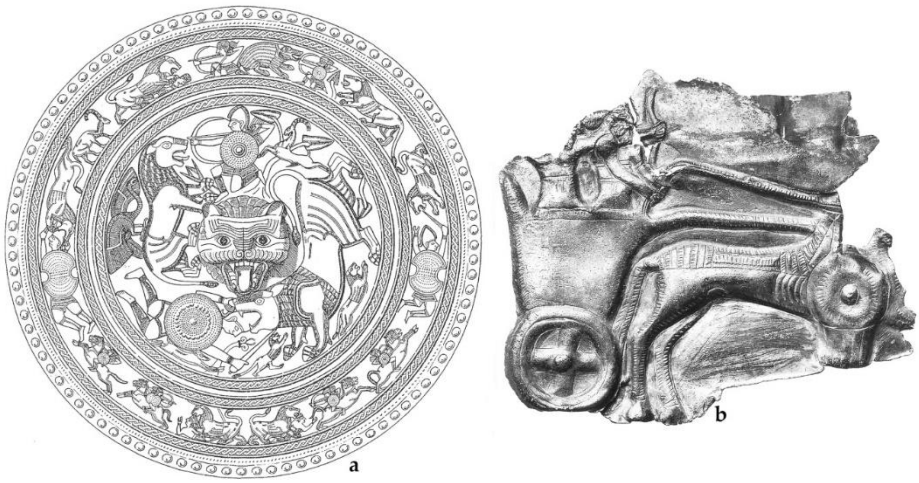

Fig. 23: Idaion Andron Cave shrine: a) reconstruction of the bronze shield, b) fragment of the shield[125]

Within the same context, and also dated to the Geometric period, ivory seals were found with horse depictions (Fig 24). Excavators classified both shields and seals as locally made.[126]

Imported items were also found at the Idaion Andron Cave shrine. These included a North Syrian shield with a chariot, fragments of a Cypriot hypostaton (Fig. 23b), and tripod handles with attached horse figurines all dated to the eighth century B.C.E. (Fig. 25).[127]

[123] Ibidem.
[124] Stampolidis, *Eleutherna; Polis – Acropolis – Necropolis*.
[125] Sakellarakis and Sapouna-Sakellaraki, *To Idaio Antro. Vol. 1-3*.
[126] Ibidem.
[127] Joannis A. Sakellarakis, "The Idaean Cave. Minoan and Greek Worship," *Kernos* 1 (1988): 207–14, https://doi.org/10.4000/kernos.114.
Sakellarakis and Sapouna-Sakellaraki, *To Idaio Antro. Vol. 1-3*.

Fig. 24. Idaion Andron Cave shrine: ivory seals with depictions of horses and riders[128]

[128] Ibidem.

Fig. 25. Idaion Andron Cave shrine: Fragments of bronze stand (top half of the image) and rounded tripod kettle handles (bottom part of the image)[129]

Other artefacts of interest, include some pieces of bronze armour now stored at the Metropolitan Museum in New York and probably found in Afrati. These are two crescent-shaped mitrae (belly guards). On one of them the head and shoulders of two horses standing face to face are depicted together with an inscription identifying its owner: *Synenitos, the son of Euklotas, [took] this* (Fig. 26). On the other the foreparts of two winged horses facing each other are shown. The name of the owner is also inscribed: *Aisonidas, the son of Klonidios took this* (Fig. 27). Synenitos signature is also found in a bronze helmet showing two long-legged horses and small lions (Fig. 28). All artefacts are dated to the late seventh century B.C.E.[130]

[129] Sakellarakis and Sapouna-Sakellaraki, *To Idaio Antro. Vol. 1-3.*

[130] E. J. Milleker, *Ancient Art: Gifts from The Norbert Schimmel Collection: Greek and Roman*, *Bulletin of The Metropolitan Museum of Art*, vol. 49, 1992.

Fig. 26. Afrati: Bronze mitra (belly guard). Dimensions 15,4 x 24,2cm. MET Museum: 1989.281.51 (https://www.metmuseum.org/art/collection/search/255928)

Fig. 27. Afrati: Bronze mitra (belly guard). Dimensions 15,4 x 24,2cm. MET Museum: 1989.281.52 (https://www.metmuseum.org/art/collection/search/255929)

Fig. 28. Afrati: Bronze helm. High 24,5cm. MET Museum: 1989.281.49 (https://www.metmuseum.org/art/collection/search/255926)

Relief decoration on large storage vessels has a long tradition on Crete. Applied relief decoration was common during all of the Bronze Age,[131] while figure representations appeared during the beginning of the Iron Age and continued until 600 B.C.E.[132] Large numbers of the Iron Age Cretan relief pithoi bear various scenes with horse protomes, a couple of horses flanking the Mistress of Animals, winged horses, prancing horses flanking an altar, and horses with riders (Fig. 29).[133]

The decoration of Temple A in Prinias (ancient Rizinia) also dates back to the second half of the seventh century B.C.E. The sculptural decoration consists of sphinxes, seated goddesses likely representing either Rhea or Artemis as "mistress of animals." Their garments are decorated with horses, lions, and sphinxes. The architrave of the temple has a relief of successive riders holding shields and lances (Fig. 30).[134] The horses have unnaturally long legs, which suggests that the relief was placed relatively high on the building.

[131] Kostandinos S Christakis, *Cretan Bronze Age Pithoi: Traditions and Trends in the Production and Consumption of Storage Containers in Bronze Age Crete*, Prehistory (Philadelphia: INSTAP Academic Press, 2005).
[132] David Levi, *Early Hellenic Pottery of Crete* (Princeton: Princeton University Press, 1945); T. J. Dunbabin, "Cretan Relief Pithoi in Dr. Giamalakes' Collection," *The Annual of the British School at Athens* 47 (1952): 153–58.
[133] Dunbabin, "Cretan Relief Pithoi in Dr. Giamalakes' Collection."
[134] L. Vance Watrous, "Crete and Egypt in the Seventh Century BC: Temple A at Prinias," *British School at Athens Studies* 2 (1998): 75–79, http://www.jstor.org/stable/40960146.

Fig. 29. Relief pithos found probably at Lyttos (Provenance and Copyrights holder: Heraklion Archaeological Museum, Hellenic Ministry of Culture and Sports – "Hellenic Organization of Cultural Resources Development – HOCRD," Catalogue number: AMH Π1182; Permission number 254670/06-06-2022;
Photo Vera Klontza-Jaklova)

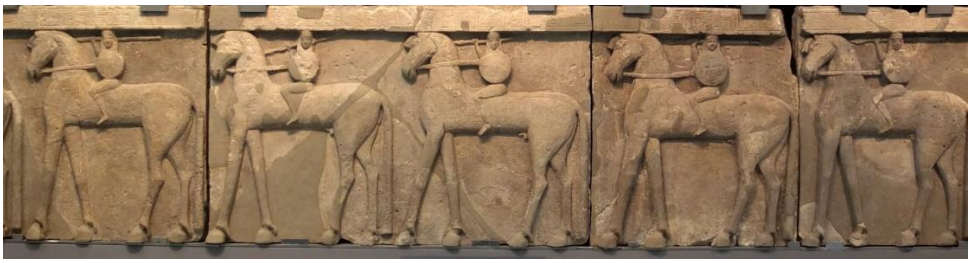

Fig. 30. Prinias, Temple A: Relief freeze with riders (after https://commons.wikimedia.org/wiki/File:Rizinia.jpg)

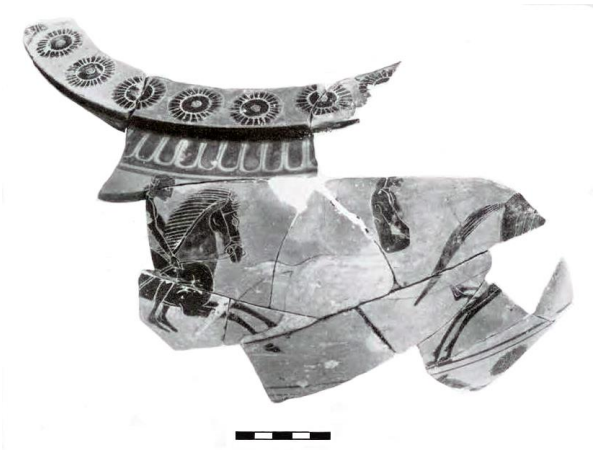

Fig. 31. One of faces of the deinos by Sophilos (Attic potter and painter active about 590-570B.C.E.) depicting a horse race.[135]

Fig. 32. Crete (Chersonisos): Attic black-figure lekythos, height of about 15cm (Provenance and Copyright holder: Heraklion Archaeological Museum, Hellenic Ministry of Culture and Sports – "Hellenic Organization of Cultural Resources Development – HOCRD," Catalogue number: AMH Π4946; Permission number 254670/06-06-2022; Photo Vera Klontza-Jaklova

Painted horses on Cretan Archaic and Classical vessels are extremely rare. A deinos (vessel used for wine mixing), attributed to Sophilos, an Attic painter active c. 590 – 570 B.C.E., found in Gortyn and today stored in Heraklion Archaeological Museum, shows a horse race scene, another horseman, and many other animals (Fig 31). A Black-figure lekythos, displayed in the Archaeological Museum at Heraklion (Display Nr. 227), has its shoulders decorated with running palmettes, while a war

[135] W. Johanowsky, "Frammenti Di Un Dinos Di Sopliilos Da Gortina," *Annuario Della Scuola Archaeologica Di Atene e Delle Missioni Italiene in Oriente* 33-30 (1955-1956): 45–52.

scene covers the body and includes a chariot pulled by four horses (Fig. 32). The lekythos is a typical Attic production dating to c. 570 B.C.E.

Only a few Hellenistic vessels showing horses have been found. An Attic red-figure pelike from the early Hellenistic necropolis at Phalasarna shows a horse and bearded man protome of 330-320 B.C.E.[136] A large vessel (amphora?), made in the West Slope Style, is decorated with a white Pegasus on a glossy black surface. It dates to the second half of the thirrd century B.C.E. and was found at Knossos (Fig 33a). A Hadra vase, also found in Knossos, was decorated with a cantering horse painted on the vessel's shoulders (Fig. 33b). The vessel was attributed to the Pegasus'painter and also dated to the second half of the thirrd century B.C.E.[137] Another Hadra vase was recovered from the Unexplored Villa" in Knossos and shows galloping horses.[138]

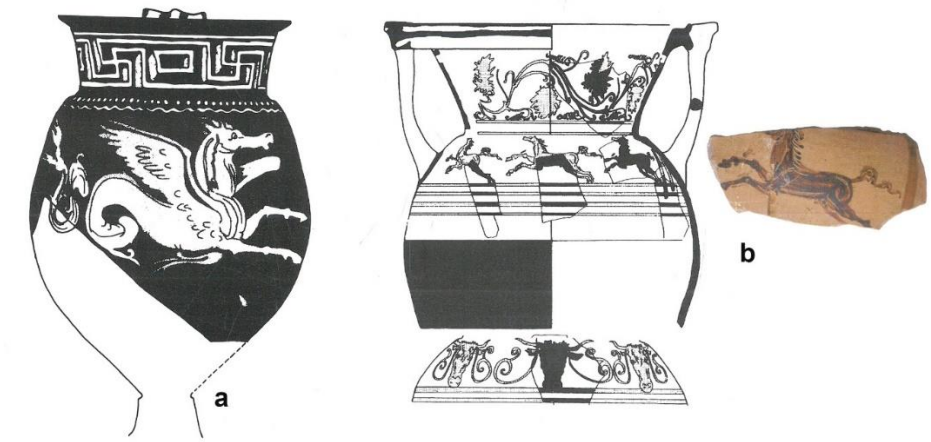

Fig. 33. Knossos: a) Late classical – Hellenistic Amphora of black glazed ware (West slope type), b) Hadra vase:[139] hydriae made in Knossos and Chersonissos, popular in a large region of the Eastern Mediterranean, mainly in Egypt where the Cretan painted hydriae were used as burial urns (necropolis at Hadra, Alexandreia)[140]

In the Hellenistic period, some toponyms that have a connection with horse breeding circulated. In the treaty of alliance between the cities of Lato and Ierapytna (111-110 B.C.E.), two sites are named: Ippagra (Ιππάγρα = the horse pasture), which was located at the present site of Sellakano, and Ippasia (Ιππασία = the place where the horses are bred), the location of which is to be found on the northern coast between the localities of Almyros (Agios Nikolaos) and the village of Kavousi.[141]

[136] Eleni Hadjidaki and H. Iniotakis, "Hellenistic Ceramics from Phalasarna Found from 1986-1990," *Ancient World* 31(1) (2000): 54–73.
[137] Coldstream, Eiring, and Forster, "Knossos Pottery Handbook: Greek and Roman."
[138] M. Eglezou, *Ellinistiki Keramiki Kritis: Kentriki Kriti*, Publicatio (Athens, 2005).
[139] Coldstream, Eiring, and Forster, "Knossos Pottery Handbook: Greek and Roman."
[140] P. J. Callaghan and R. E. Jones, "Hadra Hydriae and Central Crete: A Fabric Analysis," *The Annual of the British School at Athens* 80 (1985): 1–17, http://www.jstor.org/stable/30102817.
[141] Aggelos Chaniotes, Panagiota Vlachaki, and Emmanouil Marinakes, "XVIII. Συνθήκη Συμμαχίας Και Ισοπολιτείας Μεταξύ Ιεραπυτνίων Και Λατίων, 111/110 π. Χ. (Syntheke Symmachias Kai Isopoliteias

C. Archaic to Hellenistic periods: conclusions

It is hard to quantify how many horses were on the island, how popular the animal was, and how it was used, understood, and approached. Archaeological data are unrepresentative compared with the Bronze Age. Crete was considered a politically isolated region during the Archaic and Classical periods. This was due to neglect in foreign policy affairs by key Cretan city-states, although Crete was part of a Greek trade network.[142]

On the Greek mainland, equids were the most popular animal in two-dimensional art (Fig. 34). Figural decoration on Cretan pottery is less common than in Attica and other Greek regions. While there we count the depiction of horses on ceramics by the thousands, on Crete they are individual pieces. The same ratio also applies to ceramic and bronze figures, as well as other archaeological material.

This contrasts with the situation on Crete. We have identified just a few items with a horse motif, which indicates that horses were not given special attention by Cretan potters and pottery consumers. How this relates to the popularity of horses on the island is less clear. It can be argued that donkeys were probably intensively used, and they are not depicted either. During the Bronze Age sheep were an abundant animal, yet their appearance in iconography is minimal.

Although occasionally, incorrectly, used as such, the number of bones in household garbage deposits does not equate to a number of animals. Until now, only one osteological collection dated to the Hellenistic period has been published. It is a collection of 260 bone fragments from Gortyn – Profitis Ilias Thesmophorion, wherein only one equine tooth was identified.[143] The author of the study also mentions that it was found together with material from a ritual context dated to the sixth-century B.C.E.,[144] which throws doubt on the validity of the entire study.

The fact remains that, even though there is much less painted pottery than in other Greek regions, the relative popularity of the horse motif on pottery used for communal drinking and feasting in Crete was low.

Our conclusion, that it is very difficult to create an image of the volume of horse population and equines in general based on osteological, archaeological, two- and

Metaxy Ierapytnion Kai Lation 111/110 B.C.)," in *ΤΑ⊥ΙΕ ΣΥΝΕΘΕΝΤΟ ΙΕΡΑΙΤΥΤΝΙΟΙ... (Tade Synethento Ierapytnioi...)* (Ierapetra: Syllogos Anadeixes Archaiotiton, istorias & politismou Ierapetras "Ierapytna - Ierapetra," 2021), 89–97.

142 Brice L. Erickson, *Crete in Transition. Pottery Styles and Island History in the Archaic and Classical Periods.*, Hesperia. (Princeton: American School of Classical Studies at Athens, 2010).

143 Stefano Masala, "I Resti Ossei Rinvenuti Nello Scarico Votivo Del Thesmophorion Di Gortina a Creta," in *Atti Del 6° Convegno Nazionale Di Archeozoologia Centro Visitatori Del Parco Dell'Orecchiella 21-24 Maggio 2009*, ed. J. De Mazzorin, 2012, 377–79; Stefano Masala, "I CAMBIAMENTI DELLE FAUNE OLOCENICHE LEGATI ALL'ATTIVITÀ ANTROPICA Nuove Introduzioni, Evoluzioni Interne, Cambiamenti Climatici: Il Caso Della Sardegna e Di Creta" (Scuola di Dottorato in UNIVERSITÀ DEGLI STUDI DI SASSARI, 2012).

144 Masala, "I CAMBIAMENTI DELLE FAUNE OLOCENICHE LEGATI ALL'ATTIVITÀ ANTROPICA Nuove Introduzioni, Evoluzioni Interne, Cambiamenti Climatici: Il Caso Della Sardegna e Di Creta."

three-dimensional images from the early Iron Age up to the Hellenistic period, was also expressed by B. Wilkens.[145]

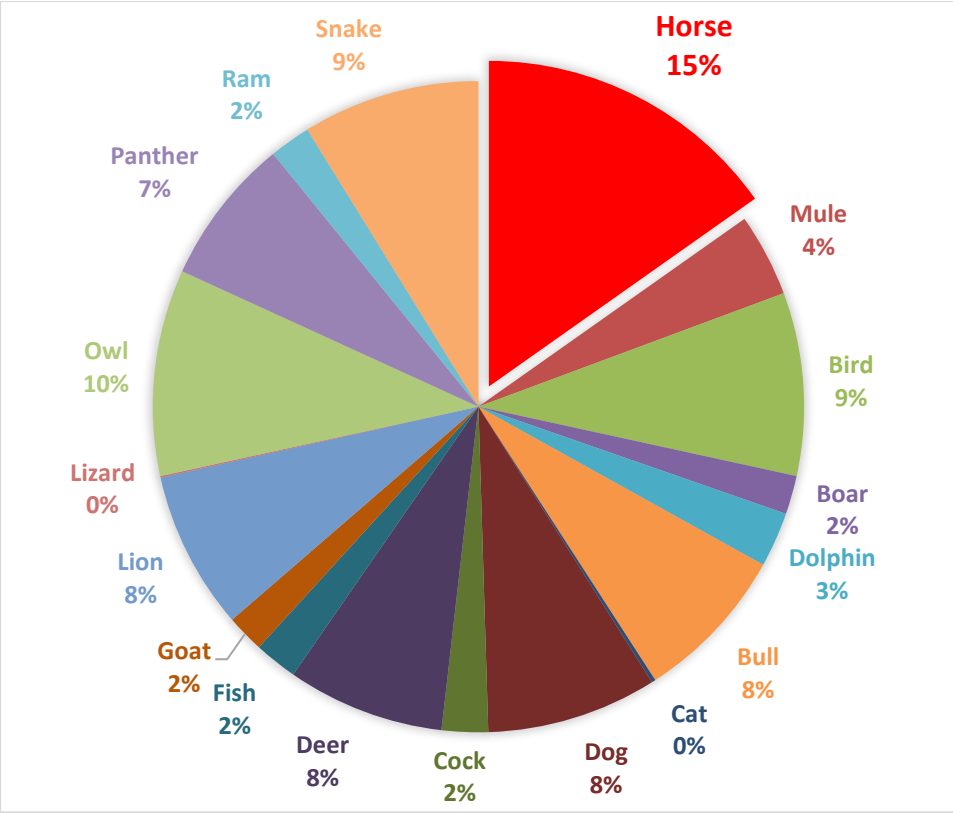

Fig. 34. Ratios of the number of animals displayed on Attic red figure pottery. The horse is the most frequently shown animal. Number of images: 5271)[146]

D. Roman period – Middle Ages

Information is also sparse for the Roman empire period. The exceptions are the excavations in Gortyn, Chania, and Knossos where *Equus caballus* and *Equus Asinus* bones were found and dated between the Late Roman and Early Byzantine period (fourth – ninth century). In Roman Knossos horse bones represent only 0.9 -1.7% of the osteological material.[147] In some areas of the Late Antiquity/Early Christian city of Gortyn, the *Equidae* represent the second most frequent species: in Area Altare

[145] Wilkens, "Faunal Remains from Italian Excavations on Crete."
[146] Tengeriová, "Kůň v Ikonografii Antického Řecka (Horse in the Ancient Greek Iconography)."
[147] Owen Bedwin, "No Title," in *KNOSSOS: FROM GREEK CITY TO ROMAN COLONY. Excavations at the Unexplored Mansion II. TEXT*, ed. L. H. SACKETT et al., Supplement (London: The British School at Athens, 1992), 491–92, https://www.jstor.org/stable/40856014.

(fifth – sixth century) after pig; in Mitropolis (seventh - eighth century) after cattle, and they are third at the Odeion (fifth – sixth century) after sheep/goat and pig.[148] Fragmentary material did not always allow for the differentiation between *E. caballus* and *E. asinus*. However, the number of recognized donkey bones in Gortyn suggests that donkeys were more widespread as sturdy work animals.

As far as we know, the only (published) depictions of horses for the Roman Crete are stamps on the ceramic lamps found at Idaion Andron Cave (Fig. 35).

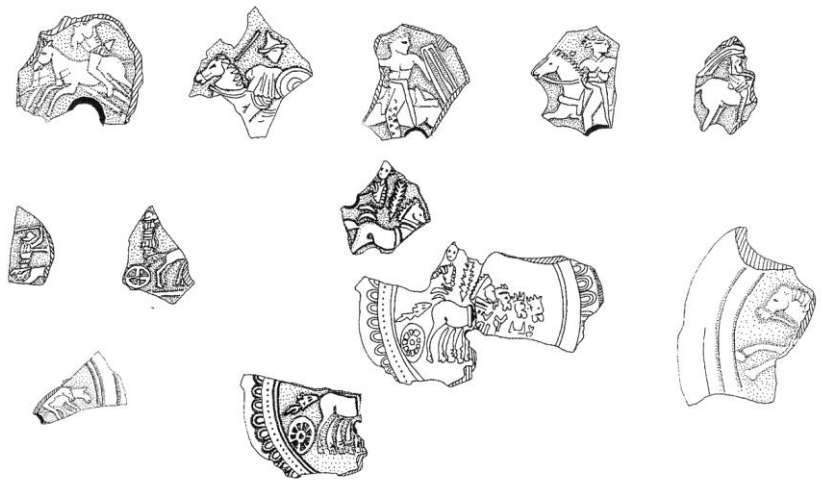

Fig. 35. Idaion Andron Cave: Fragments of Roman lamps with horse depictions[149]

Cavalry was a significant part of the Roman army. Horses were also extremely popular as racing and show animals.[150]

During the Byzantine period, following the Roman age, a horse was certainly an important animal and was treated professionally. The tradition of veterinary studies and handbooks continued from the Late Antiquity, with the most known work *Hippiatrica* dating to the fifth – sixth century.[151] A specialized profession involving horses is known for the Byzantine period: *hippiattros*, i.e., equine physician.

Written sources provide information on the prices of horses, donkeys, and mules. These depended on their use. A draft horse was about eight times cheaper than a war or a parade horse; a donkey was about four times. The value of horses was almost the same from the fourth until the fifteenth century. Horse and slave prices were

[148] Stefano Masala, "I Resti Osteologici Provenienti Dall'Area Dell'Odeion Di Gortina," in *GORTINA AGORÀ SCAVI 1996-1997*, ed. Antonio Di Vita and Maria Antonietta Rizzo, Studi di a (Padova: Aldo Ausilio editore, 2011), 319-330.; Masala, "I CAMBIAMENTI DELLE FAUNE OLOCENICHE LEGATI ALL'ATTIVITÀ ANTROPICA Nuove Introduzioni, Evoluzioni Interne, Cambiamenti Climatici: Il Caso Della Sardegna e Di Creta."

[149] Sakellarakis and Sapouna-Sakellaraki, *To Idaio Antro. Vol. 1-3.*

[150] Ann Hyland, *Equus: The Horse in the Roman World* (New Haven: Yale University Press, 1990).

[151] Anne Elena McCabe, *A Byzantine Encyclopaedia of Horse Medicine: The Sources, Compilation, and Transmission of the Hippiatrica*, Oxford Stu (Oxford: Oxford Studies in Byzantium, 2007).

broadly similar.[152] The opinion has been expressed[153] that Andalusian Arabs, who conquered Crete at the beginning of the ninth century C.E., brought with them a significant number of horses, although this is not mentioned in written documents. It is possible, that, given the size of their campaign, horses arrived as Arab cavalry.

Horses played an important role in Arab society. They were a social status marker, a symbolic animal (the Prophet ascended to heaven on a white-winged horse), and they were employed in military services and as pack animals. The Arabs studied and produced hippological books - so-called *Furussiya* literature – that were based on earlier knowledge from the Byzantines, Romans, and Greeks.[154] Under such a context, the import and breeding of horses by Cretan emirs and other noblemen is plausible. Horses represented a significant part of an international trade network with prominent marketplaces in the Arabic world.[155] An elite horse could easily be 50 times more expensive than a slave.[156]

Some Arab horses may have remained in Crete following the massive campaign against the Cretan Muslims (960-961 C.E.) organized by the future emperor Nikephoros Phocas. This was a major operation comprising 308 boats, 72.000 men, and c. 5.000 horses.[157] Transporting an army of this size over the sea must have been a complex task.[158] This highlights the tactical importance that horses must have had.

During the Middle Ages, the Late Byzantine and Venetian periods, the only information on Cretan equines are the wills and contracts dating to the Venetian period. Horses, donkeys, mules, and other animals are often mentioned in these.[159] There are almost no data from archaeological excavations except the excavation at Chania where, in the Venetian layers, a single 2nd phalanx and, in the Ottoman contexts, a few horse, donkey, and *equus sp.* bones were identified.[160]

The only iconographic sources for horse depiction in the Middle Ages on Crete are icons of saints and church wall paintings and icons. Horses related to biblical and hagiographic stories, such as St. George, are common. However, these sources cannot provide information on Cretan horses, since depictions followed Christian

[152] Cécile Morrisson and Jean-Claude Cheynet, "Prices and Wages in the Byzantine World, in The Economic History of Byzantium," in *The Economic History of Byzantium, Vol. 2*, ed. Angeliki E. Laiou, Dumbarton (Washington DC: Dumbarton Oaks, Trustees for Harvard University, 2002), 799–878.
[153] Ioannis M. Karavalakis, "Η Προστασία Της Ιστορικής Πανίδας Της Κρήτης," *Δημοκράτης*, 1988.
[154] Schiettecatte and Zouache, "The Horse in Arabia and the Arabian Horse: Origins, Myths and Realities."
[155] Gladitz, *Horse Breeding in the Medieval World*.
[156] Morrisson and Cheynet, "Prices and Wages in the Byzantine World, in The Economic History of Byzantium."
[157] Lucas McMahon, "Logistical Modelling of a Sea-Borne Expedition in the Mediterranean: The Case of the Byzantine Invasion of Crete in AD 960," *Mediterranean Historical Review* 36(1)(2021): 63–94, https://doi.org/10.1080/09518967.2021.1900171.
[158] John H. Pryor, "Transportation of Horses by the Sea during the Era of the Crusades: Eighth Century to 1285 A.D.: Part I: To c. 1225.," *The Mariner's Mirror* 68(1) (1982): 9–27.
[159] Sally McKee, *Wills from Late Medieval Venetian Crete, 1312-1420* (Washington DC: Dumbarton Oaks, Research Library and Collections, 1998).
[160] Hallager and Hallager, *The Greek-Swedish Excavations at the Agia Aikaterini Square, Kastelli, Khania 1970-1987. Volume II. The Late Minoan IIIC Settlement*.

canons. St. George is typically painted as a knight riding a white muscular horse.[161] Donkeys are skinny with their heads lowered.

Useful information is available from a Renaissance ballad written by a Venetian Cretan Vitsentzios Kornaros (1553-1613/14), describing a romantic love story between Princess Aretousa and Erotokritos, the son of an advisor to the king, her father. Horses are mentioned frequently in the text. The author uses the word φαρί [faree], a word originating in Arabic where *Faras* means horse and *Faris* means horseback rider, or knight. = Kornaros describes cavalry troops and young aristocrats travelling on horseback, jousting, and taking part in cavalry battles. He describes the noblemen from various regions (who arrived in Athens to joust for the prize of marriage to princess Aretousa) by using the specific characteristics of the typical horses from each region: for Mytilene, he mentions the "fish-like" (gray) horses, for Methone of Messenia tall and red horses, black and dark grey from the region of Coroni, etc. Special attention is given to the governor of Axia, who had a horse "white like a deer with brown and black patches." Kornaros describes how the audience was amazed by such colour and stood in a circle surrounding the knight and his horse, watching the animal with admiration. Kornaros mentions that the Byzantine king (Rigas in Cretan Greek) had an entire army with him, including cavalry, and eight horses in his suite. Three were dark, three red, one grey, and only one black, which was ridden by the king himself. The horse was strong, muscular, and galloped or cantered constantly. The Governor of Patra had a horse "faster than the wind." The Cypriot prince's horses neighed a lot. The Cretan king also had a black horse. He had a black lance and was dressed all in black. Black shirts, trousers, high boots, and black headscarves were typical in many local Cretan dressing costumes. Erotokritos also had a black horse, but with one white leg. He shone like the Sun. On the other side, the Karamanites people (Anatolia), who were enemies of the Cretans, had wild horses, skinny but fast, with poor tails "like a cat's tail" and legs like a buffalo. They were red and black, and they were loud but did not neigh.[162]

Kornaros must have known descriptions of similar scenes. His description is very similar to the description in an anonymous chronicle from 1452 describing how Emperor Frederick III came to Italy to be crowned by Pope Nicholas V and to marry Eleanor of Portugal. The role of horses was prominent during all celebrations and lavish equestrian games were, naturally, organized during such a great feast as this. Two hundred local, Italian horses were present. Another four hundred horses from North Africa, Turkey, Greek speaking regions, and Spain arrived to compete.[163]

It is clear that the author, who lived in Venetian Crete, knew horses well, and had good knowledge of their physical appearance and behaviour. The ballad suggests that horses were common in Crete, or at least that Cretan aristocrats and learned people were well-embedded in the social climate of late medieval Europe, wherein horses

[161] Maria Bormpoudaki, "Figures of Mounted Warrior Saints in Medieval Crete. The Representation of the Equestrian Saint George 'Thalassoperatis' at Diavaide in Heraklion," *Zograf* 41 (2017): 143–56, https://doi.org/10.2298/ZOG1741143B.

[162] Vitsentzos Kornaros, *Ερωτόκριτος*, World class (JiaHu Books, 2014), https://en.calameo.com/read/00309402229a8e356e7fd?authid=8pldf2jKoOe8.

[163] Giovanni Battista Tomassini, *The Italian Tradition of Equestrian Art. A Survey of the Treatises on Horsemanship from the Renaissance and the Centuries Following* (Franktown: Xenophon Press, LLC, 2014).

began to be systematically studied and bred. Modern, systematically built studs emerged across the continent, first in the Italian states, Spain, and the Habsburg Monarchy (e.g., Kladruby nad Labem, Czech Republic today).[164]

Similarly, the painter Georgios Klontzas (1553-1608) was familiar with the horses used by the high aristocracy. Klontzas was one of the most popular iconographers and painters of his time. He was associated with the Italian and Spanish schools of painting, and one of the supporters of El Greco (Domenico Theotokopoulos). Horses frequently appear in his works, such as his illustrated codex, ordered by Veneto-Cretan mathematician and sorcerer Francesco Barossi.[165] 122 of the 409 images in the codex feature a horse or horses, including one Pegasus, one Unicorn and two donkeys. Other animals (e.g., a dog, cattle, lions, panthers, and various birds) are rarer. The horses are depicted in a European knightly manner. They are muscular with high action gaits, high set muscular neck, and their heads on the vertical axis (Fig. 36). They are shown in different situations, positions, and gaits (Fig. 37). It is clear that the talented painter had experience in dealing with horses. He knew their movements and the way they were ridden. His horses, cattle, and dogs are exquisite and entirely realistic, unlike his foreign animals, e.g., a panther or lions, which are anatomically imperfect. Klontzas was a learned and cosmopolitan man who studied painting in Italy and had access to advanced painting techniques and the know-how to apply these. He likely also was familiar with the depiction templates that renaissance painters often used. Klontzas's horses do not reflect the Cretan local breed, at least not as we know it today. They matched the European horse fashion, wherein the Italian and Spanish parade horses epitomized the ideal of horse beauty, strength, and temperament. Italian equestrianism and horse breeding were at their peak in the time of G. Klontzas. The first handbooks of the equestrian art were printed then and these presented equitation as a highly developed and refined discipline, the result of a well-established tradition.[166] G. Klontzas, citizen of Venetian Crete, originally Italian, educated in Italy, must have been aware of it.[167]

During the same period, interest in Byzantine manuscripts, including the hippological literature, was on the rise, mainly among the Italian humanists. A few manuscripts of *Hippiatrica* were copied in Cretan scriptoria. The first was made by professional Greek scribes for French and Italian patrons (manuscript Parisinus gr. 2245, or "P "287 by 202mm, 138 folia) and is signed at the end of the text by Antonios Damilas (Δαμηλάς), a native of Crete, whose family was originally from Milan. He was active as a notary in Candia in the third quarter of the fifteenth century. The paper on which the text is copied has watermarks of the 1430s – 1470s. Another manuscript known as the "P" manuscript was created by the Cretan calligrapher Angelo Vergèce (Ἄγγελος Βεργίκιος). The "b" manuscript, also known as Phillips

[164] E Jurečková, *Výzkumná Stanice pro Chov Koní ve Slatiňanech 1945-1992. Světla a Stíny Regenerace Starokladrubského Koně.* (Kladruby nad Labem: Národní hřebčín Kladruby nad Labem, 2021); Gladitz, *Horse Breeding in the Medieval World.*

[165] Athanasios D. Paliouras and Georgios Klontzas, *Ho Zōgraphos Geōrgios Klontzas, 1540 ca.-1608, Kai Hai Mikrographiai Tou Kōdikos Autou* (Athens: Ekdoseis Grēgorē, 1977).

[166] Tomassini, *The Italian Tradition of Equestrian Art. A Survey of the Treatises on Horsemanship from the Renaissance and the Centuries Following.*

[167] Klontza-Jaklova and Tengeriová, "Archeologové (Nejen) Na Cestách I."

1539, or Berolinensis 135 was copied by Greek émigré Nikolaos Kokolos (Κόκολος) who, along with his brother Georgios, was part of the scriptorium of Guillaume Pellicier. The "O", or Oxford, or Barozzi 164 manuscript was created by Petros Daklozaos (Δακλώζαος) of Rethymnon. The scribe was active in the second half of the sixteenth century. Daklozaos copied five other manuscripts for the same Barozzi, and this particular work was probably copied from the "P" manuscript. All these works were very expensive and valuable items circulating only in libraries of high-ranking noblemen and institutions.[168]

Fig. 36. Typical horse of Georgios Klontzas[169]

Fig. 37. Georgios Klontzas: horse scratching his front leg (or nose)[170]

Horses in Crete during the fifteenth century were very expensive. They could cost more than 90 hyperpyra, slightly more than a male slave, ten times more than cattle, and 100 more than a sheep or goat. For the same price one could, for example, buy

[168] McCabe, *A Byzantine Encyclopaedia of Horse Medicine : The Sources, Compilation, and Transmission of the Hippiatrica*.
[169] After: Paliouras and Klontzas, *Ho Zōgraphos Geōrgios Klontzas, 1540 ca.-1608, Kai Hai Mikrographiai Tou Kōdikos Autou*.
[170] Ibidem

at the time a field with 500 vine trees.[171] Such high prices confirm that horses mainly belonged to the rich, who could afford to buy, look after, and breed them.

V. Conclusions on horses in Crete from the Neolithic until the Venetian period

It is challenging to evaluate what types of horses were present on the island during prehistory and early history, and what precise roles they had in society, economy, and cosmology. It is sometimes assumed from archaeological analyses that the number of osteological remains of an animal and their ratios, or the number of depictions of an animal, can be automatically and by direct proportion transferred to livestock numbers, but material culture (artefacts, ecofacts, topography) is not such a direct reflection of reality and cannot be thus simplified into a simple mirror. Iconography, written, and osteological evidence must be evaluated contextually by considering different aspects that played a role in depicting a horse or placing its remains within a particular context. When evaluating iconography, many factors - such as symbolism, the target group of spectators, etc. - could play a role and must be taken in account. However, the osteological picture is not necessarily better. Archaeologists mainly excavate trash heaps informing on past dietary habits. Here, *Equidae* bones are rare, suggesting that horses, mules, or donkeys were in Crete rarely eaten.

Horse burials may take place in ritual contexts (Archanes Fourni); they could have been buried individually without a clear ritual context or buried together with humans (e.g., Prinias). Such graves give a high status to horses, who likely belonged to an elite group. Iron Age Greece, despite starting with an exceptional trajectory of its history, was an integral part of the Eurasian context, where burials of the elite men together with their horses is a common phenomenon.[172]

Horse depictions suggest also that these had a high status, while donkeys and mules were more accessible to the general population – something that is confirmed by ethnographic examples. Donkeys and mules became part of elite iconography only when they were an integral part of such symbolism, such as donkeys in Dionysus parades, Jesus riding on a donkey, etc.[173]

Something that is missing in Crete, but which is very common on the archaic – classical Greek mainland, are depictions of equestrian sports events. There is also an absence of horse harnesses. However, the absence of archaeological evidence is not always evidence for absence of the phenomenon in the live culture of the past.

Equidae were present on Crete as early as the Late Neolithic; however, it is likely that until the Late Bronze Age these were exclusively donkeys. In comparison to other animals, horse depictions are rare during the Bronze Age as a whole; similarly,

[171] Morrisson and Cheynet, "Prices and Wages in the Byzantine World, in The Economic History of Byzantium."
[172] Petra Kmeťová, "The Spectacle of the Horse: On Early Iron Ageburial Customs in the Eastern-Alpine Hallstattregion," *Archaeological Review from Cambridge* 28(2) (2013): 67–81.
[173] Tengeriová, "Kůň v Ikonografii Antického Řecka (Horse in the Ancient Greek Iconography)."

horse bones represent only a small proportion of animal bones from archaeological contexts.[174]

From the Neopalatial Period onward (i.e., the beginning of the Late Bronze Age), horses begin to appear in elite contexts. During the late Mycenaean period, horse finds became more frequent in both iconographic and osteological records. Horses were physically present on the island and were connected to elite status within Mycenaean culture. As in other regions, horses were an attribute of the Iron Age warrior class.

Data from the periods which followed the Bronze and Iron Age are scattered, and their summarization to create a detailed picture is almost impossible. The evidence that at least the elite and the learned people of the Venetian period were part of the horse culture of then Europe, is eloquent. Unfortunately, the state of archaeological and, with it, osteological research for historical periods is insufficient for the time being, due to the paucity of data.

To trace through time the evidence for equines in the island of Crete we produced a graph showing the sum of probability distributions for the date ranges associated to each find (Fig. 38). This was generated by assuming a uniform probability distribution between the minimum and maximum date point assigned to each find. To sum the individual probabilities, we used the chronological software OxCal v. 4.4.4.[175,176] The resulting graph shows how the evidence for equines starts clearly after c. 2000 B.C.E. with a peak around c. 1500 – 1200 B.C.E., and that there is a following major peak of evidence arising after c. 1000 B.C.E.

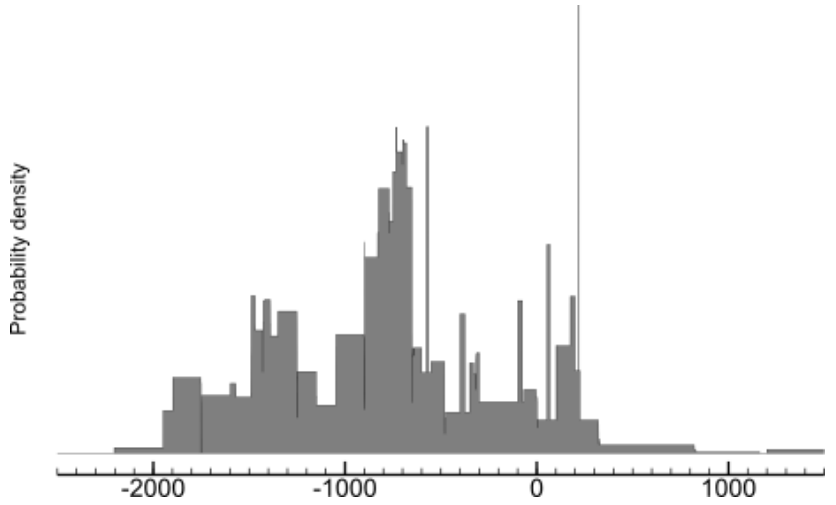

Fig. 38 Summed probabilities of date ranges associated to each equine find

[174] Andrew John Shapland, "Over the Horizon: Human-Animal Relations in Bronze Age Crete" (University College London, 2009), https://discovery.ucl.ac.uk/id/eprint/17579/.
[175] Ramsey, "Bayesian Analysis of Radiocarbon Dates."
[176] Christopher Bronk Ramsey, "METHODS FOR SUMMARIZING RADIOCARBON DATASETS," 2017, https://doi.org/10.1017/RDC.2017.108.

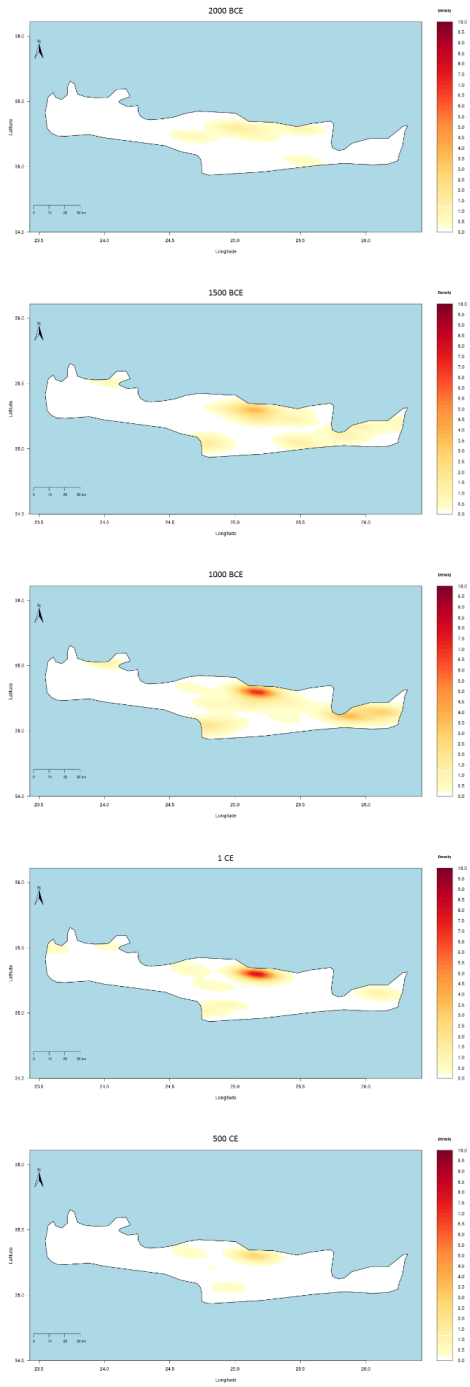

Fig. 39. Kernel density of historical evidence for equines in the island of Crete across five time slices

The spatiotemporal distribution for equine evidence was modelled using the 3-dimensional spatiotemporal kernel density estimator KernelTimeR based on the work by.[177] The KernelTimeR application was developed within the Pandora & IsoMemo initiative and is available online (https://isomemoapp.com/app/iso-memo-app). The modelling results (Fig. 39) show that equine evidence at c. 2000 B.C.E. is concentrated in central northern Crete and that this subsequently spreads, mostly into eastern and southern Crete. For these regions, the presence of equine evidence intensifies after c. 1000 B.C.E and evidence declines after c. 1 C.E. as also observed in Fig. 38.

The appearance of horses on Crete chronologically matches the spread of horses from the eastern steppes into the European continent following the movements of the first Indo-European population.[178] The rise of equine evidence during the Late Bronze Age supports the assumption that horses were an important part of the so-called elite package for palatial aristocracy. After 1000 B.C.E., the significant increase in equine evidence corresponds to a period when horses were increasingly used for hunting and war making. Greek *poleis* were arising during this period, an equestrian class appeared in some of these and the ability to handle horses became part of ruling class knowledge.[179]

Understanding of the history of the appearance, breeding, use of horses, and reconstruction of the development of the relationship between man and horse is essential for understanding the current state. This extensive study aims to be a summary of information on horses and human society in Crete from early prehistory to the Early Modern Period. It is followed by another study that deals with horsemanship in Crete in the twentieth century. The following paper, "The Cretan horse: Still a unique breed? Part II: Equines on Crete from the end of the nineteenth century to the present day," deals with the characteristics of the Cretan horse, the current state of breeding and its prospects.

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[177] M.P. Wand and M.C. Jones, "Multivariate Plug-in Bandwidth Selection," *Computational Statistics* 9 (1994): 97–117.

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[179] Julius A. Saacke, "An Admirer Looks at the Horsemen of Ancient Greece," *The Classical Journal* 37(6) (1942): 323–33.

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