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Historical dynamics of the human-environment interactions in Cyprus during the 12th-10th millennia cal. BP: the last 30 years contributions of the Amathous area (Limassol district)

Jean-Denis Vigne¹, Thomas Cucchi¹, Maria Rousou^{1,2}, Salvador Bailon¹, Isabelle Carrère³, Benoît Devillers⁴, Carolyne Douché¹, Lionel Gourichon⁵, Angelos Hadjikoumis^{1,6}, Pantelitsa Mylona^{1,2}, Katerina Papayianni^{1,7}, Andréa Parès^{1,8}, Margareta Tengberg¹, Antoine Zazzo¹, Jean Guilaine⁹, François Briois³

Corresponding author: J.-D. Vigne, vigne@mnhn.fr

Abstract

The interdisciplinary approach and analytical tools applied in the last 30 years in the Amathous region, especially at the sites of Shillourokambos and Klimonas, generated a huge quantity of archaeological, geoarchaeological and bioarchaeological data. They significantly contributed to document the interactions between the early Neolithic human societies and their environment and natural resources, during this pivotal period when both the climate and the human subsistence strategies went through radical changes. This paper briefly reviews these changes through several insights: hydrological changes and their impact on the establishment and preservation of Neolithic sites; plant and vertebrate faunal evolution, especially as a consequence of the introduction of new wild and domestic species; birth and evolution of the commensal fauna (e.g. mice, cats, crows); local domestication of wild boar and goats; adaptation and intensification of cultivation and breeding to the local environments. Altogether, these insights can provide a heuristic model at a regional scale to further understand the incipient human niche construction of the Eastern Mediterranean area.

Keywords: Neolithic transition, Environment change, Species introduction, Domestication, Insularity, Cyprus.

1. Introduction

Since they are spatially restricted and ecologically simpler, islands provide greater conditions for studying environmental and cultural evolutions compared to the continent, especially in terms of connectivity (McArthur and Wilson 1967, Blondel 1986, Finlayson 2004). The Late Glacial and early Holocene history of Cyprus, the only large island in the Eastern Mediterranean, deserves special attention because it is located near the Levant and Southeast Anatolia, where took place one of the earliest and well-known Neolithic transition. This process began with the Late Glacial Natufian sedentarization (14,500-11,500 cal. BP), followed by plant and animal domestication and by the birth of farming along the Pre-Pottery Neolithic (PPN, 11,500-9000 cal. BP; Cauvin 1998, Goring-Morris & Belfer-Cohen 2011, Enzel & Bar-Yosef 2017). How this 80km offshore island was affected by these deep and massive socio-environmental changes and, if these at least partly reached it, what it can tell us original about them, especially about their diffusion modalities?

At the beginning of the 1990s, the oldest attestation of human beings on Cyprus was restricted to a small Epipaleolithic temporary campsite dated ca. 12,200 cal. BP (Simmons 1999), and to the 3500 years later Khirokitia culture villages which suggested that the Cypriot Neolithic began with three

¹ CNRS – MNHN, Paris, France

² University of Cyprus, Nicosia, Cyprus

³ EHESS – CNRS – U. J. Jaurès, Toulouse, France

⁴ U. Montpellier – CNRS, Lattes, France

⁵ CNRS – U. Côte d'Azur, Nice, France

⁶ Cyprus Institute, Nicosia, Cyprus

⁷ Wiener Laboratory, ASCSA, Athens, Greece

⁸ Muséum d'Histoire naturelle de Toulon, France

⁹ Collège de France, Paris, France

millennia of delay compared to the continent and that it was marked right at the beginning by strong insular specificities (round buildings, absence of pottery, cattle and dog; Le Brun et al. 1987). During the 1990s, excavations brought to light several Neolithic villages dating to the late 11th and to the 10th millennia BP and showing a lot of similarities with the Levantine PPNB (Guilaine & Le Brun 2003, Peltenburg & Wasse 2004,). They completely changed the story: *“The island [of Cyprus] should no longer be viewed as an isolated backwater with no impact on the development of civilization in the Near East, but instead it now emerges as a dynamic partner in the process”* (Swiny 2001, p. XI). More recently, two new excavations evidenced that this was also true for the late PPNA, at the beginning of the 11th millennium (Vigne et al. 2017, 2019b).

These excavations also generated extensive geo- and bioarchaeological researches. Those allow to address more refined questions about the dynamics of site formation and preservation, about the influence of the insular endemism on plants and animal availability, about the impact of the neolithization process on the local biodiversity, about interregional exchanges of lithic, plant and animal resources, or about the local contributions versus external influxes in the Neolithisation process. This is especially true in the area of Amathous, east of Limassol, where we excavated two major sites, *Ayios Tychonas-Klimonas* and *Parekklisha-Shillourokambos*, occupied over the 11th and 10th millennium. This paper aims providing a summary of how these advances significantly improved our knowledge regarding the historical dynamics of the human-environment interactions on this large island, during the Neolithic transition.

2. Geomorphological contexts, sites and chrono-cultural framework

Cyprus rose up from the deep floor of the sea starting from the Miocene (see ref. in Vigne et al. 2014). It was never bridged to the mainland during the last five million years, even during the maximal glacial regression. The continental shelf around Cyprus is very narrow and rapidly gives way to more than 2000m deep seabed. During the end of the Flandrian marine transgression, i.e. the end of the Late Glacial and the Early Holocene, the seashore was therefore not more than 1km offshore than today.

The Epipaleolithic period is documented on the island by a very small number of sites of restricted size dated to the 13th millennium cal. BP (Akrotiri-Aetokremnos, Simmons 1999, Zazzo et al. 2015; Agios Ioannos-Vretsia Roudias, Tsakalos et al. 2021; see also Ammerman 2013). There are only two Cypro-PPNA settlements, both of them occupied c. 10,800 cal. BP (*Ayios-Tychonas-Klimonas*, Vigne et al. 2017a, 2023a; *Ayia Varvara-Asprokremnos*, McCartney 2017, Manning et al. 2010), and five Cypro-PPNB sites covering the 10,500-9000 cal. BP period (*Parekklisha-Shillourokambos*, Guilaine et al. 2011, 2021; *Kissonerga-Mylouthkhia*, Peltenburg et al. 2000, Peltenburg 2003; *Akanthou-Akrosyko*, Şevtekoğlu and Hanson 2015; *Kritou-Marottou-Ais Yorkis*, Simmons 2012, *Kalavassos-Tenta*, Todd 2003) (Fig. 1). Several other sites document the later Neolithic phases during the 9th millennium BP (*Khirokitia* culture, Le Brun et al. 1987).

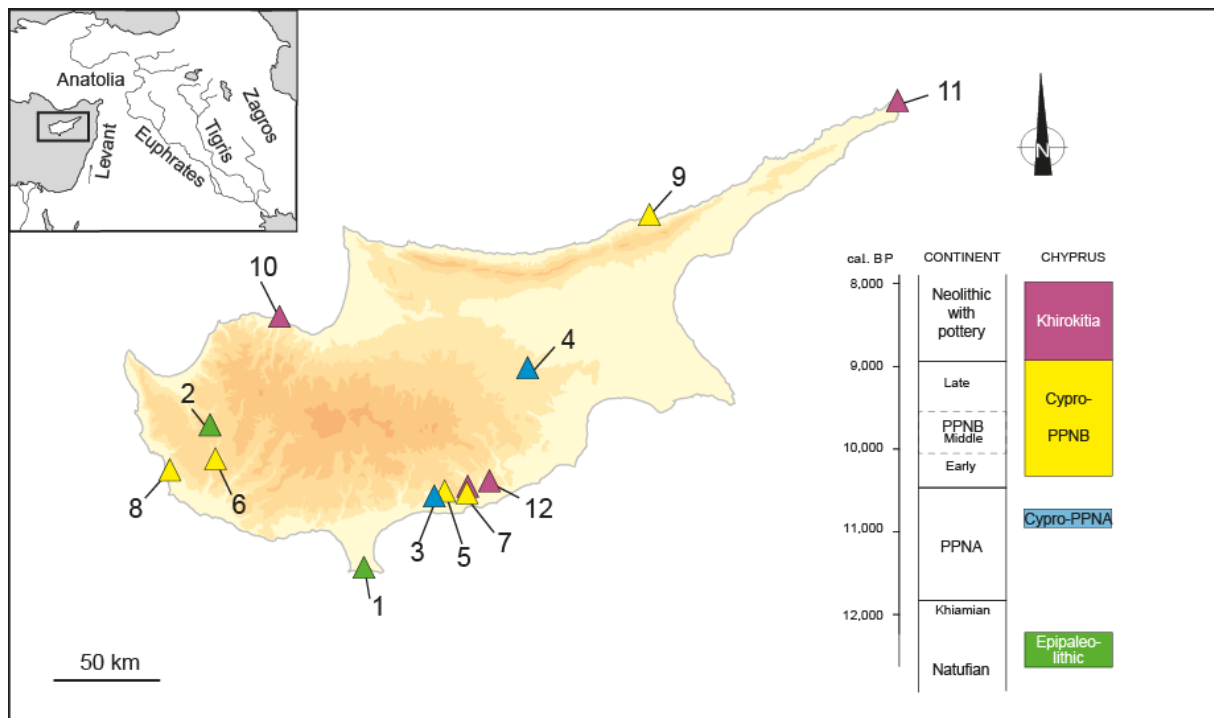


Fig. 1. Main pre-pottery sites in Cyprus. 1, Aetokremnos, 2, Roudias, 3, Klimonas, 4, Asprokremnos, 5, Shillourokambos, 6, Ais-Yorkis, 7, Tenta, 8, Mylouthkia, 9, Akanthou, 10, Petra Tou Limni, 11, Cap Andreas, 12, Khirkitia. CAD P. Gérard, EHESS.

The Amathous area is located at the eastern end of the Limassol Basin. This is the hinterland of the Ancient city of Amathous, founded ca. 1050 BCE and excavated in the past 70 years with collaborations of the French School at Athens. The two major Early Neolithic villages, Shillourokambos (Guilaine et al. 2011, 2021) and Klimonas (Vigne et al. 2023), are located within 2 km of each other and benefited from the high-quality flint accessible in the nearby Athiaki valley (Briois et al. 2005). The first one was settled on a gentle interfluvial slope in the Pyrgos-Pareklisia plain and was excavated in 1991-2004. Excavated in 2009-2016, the second extends on three natural terraces overlooking the small coastal stream Athiaki. Since 2021, new excavations are carried out at a third nearby site at, Armenokhori-Pakhtomena, occupied during the Epipaleolithic period. We conducted several geomorphological surveys in the Amathous region in order to reconstruct the climate evolution, the paleoenvironment of the sites and the site formation and erosion dynamics. In the Athiaki Valley, close to Klimonas, we evidenced several fluvial interlocking terraces, scattered by numerous palaeosoils (Mylona et al. 2017, Mylona and Devillers 2023). Mapping these terraces and the dating and analysing of the palaeosoils allowed to reconstruct a more or less continuous record of the fluctuations of the fluvial activity from the Last Glacial Maximum, around 30 thousand years ago, to the middle Holocene. This is the first paleoclimatic record in Cyprus for the Late Glacial Maximum. It shows several successive cooler episodes. Those correspond to the Late Glacial and Holocene cool episodes identified in the speleothems at Soreq cave in Israel (Bar Matthews et al. 1999). In addition, the Athiaki records point out a strong climatic effect of the 8.2 cooling event, confirming the observations already made in the Gialias and Maroni streams in Cyprus (Devillers 2008, Hourani 2008). This explains that the Epipaleolithic and PPN sites in Cyprus are very eroded and suggests that most of them completely disappeared either during the early Holocene or 8.2 ky erosive episodes.

3. Plant and animal composition and change during the Early 11th millennium

Klimonas was a half hectare Late PPNA village presenting many similarities with the contemporaneous villages of the Levant. It was organized around a ten-meters large semi-buried

earthen Communal building. Twenty-five residential smaller earthen buildings were excavated (Vigne et al. 2012, 2017a, 2023a). Fifty-two radiocarbon dates and their Bayesian processing allowed to date the occupation around 10,800 cal. BP (Zazzo et al. 2023).

Micromorphological analyses of the building earth revealed high densities of cereal phytoliths and plant debris, a well-known characteristic of building earth starting from the PPNA (Mylona et al. 2021). It suggests the cereal cultivation. This is confirmed by archaeobotanical observations (Vigne et al. 2012, Tengberg et al. 2023), that pointed out the presence of both einkorn (*Triticum monococcum* spp. *aegilopoides/monococcum*) and emmer (*Triticum dicoccoides/dicoccon*), two non-indigenous taxa introduced from the Continent. These were cultivated together with wild barley (*Hordeum* cf. *spontaneum*), which was indigenous, as also evidenced by numerous sickles, handstones and grind stones (Briois and Astruc 2019, Robitaille 2017). These are the earliest evidence for cereal cultivation in Cyprus. Mineralized or charred seeds and fruits also testify the presence and exploitation of many other annual plants and fruit-trees, such as *Malva* sp., *Rapistrum rugosum*, *Pistacia terebinthus*, *P. atlantica*, *Celtis tournefortii*, *Ficus carica* and *Olea europaea* (Tengberg et al. 2023). Charcoal analyses evidenced the presence of *Prunus*, which is considered as a non-indigenous plant, that also implicates an early introduction to Cyprus from the Continent (Rousou 2022).

A number of wood charcoal remains from Klimonas also reveal the first evidence for the palaeoenvironment of Cyprus during the PPNA. The anthracological spectrum is composed of indigenous taxa, such as *Pistacia* sp., olive (*Olea europaea*), deciduous oak (*Quercus*), that are attested in the Epipaleolithic (Rousou in Briois & Vigne 2022), but also buckthorn (cf. *Rhamnus*), and members of the apple subfamily (cf. Maloideae) which are also considered to be indigenous in Cyprus (Meikle 1977, 1985, Hadjikyriakou 2017). This data indicates the presence around the site and the exploitation of a broad variety of typical plant taxa of the Mediterranean maquis by the inhabitants of Klimonas (Rousou 2022, Tengberg et al. 2023).

Out of 6600 identified specimens, the wild boar represented 93 % (Vigne et al. 2017a, Vigne and Carrère 2023). It was the only ungulate on the island since its anthropogenic introduction to Cyprus during the Epipaleolithic (Vigne et al. 2009). The unselective age profiles and sex ratio provide evidence that the wild boar was hunted (Vigne et al. 2023b). Many arrow heads, often broken, were brought back to the village in the animal carcasses (Briois 2023). This wild boar was 15% smaller than the continental one, and presented clear allometric reductions of the limb extremities, two marks of insular endemism (Vigne et al. 2023c). Geometric morphometrics provided evidence that the Cypriot small wild boar was an endemic subspecies named *Sus scrofa circeus*, clearly distinct from the early Holocene continental wild boar, and showing some convergences with the Corso-Sardinian wild boar (Cucchi et al. 2021).

The other species of mammals were dog, mice and cat (Vigne et al. 2017a). Dogs (NISP= 35) are morphometrically distinct from the continental Natufian dogs, and more similar to the PPNA dogs. The species was thus introduced to Cyprus from the Levant during the PPNA.

Geometric morphometrics allowed to detect among the 41 mouse teeth and bones, the presence of the commensal house mouse (*Mus musculus domesticus*), clearly distinct from the endemic Cypriot mouse (*Mus cypriacus*; Cucchi et al. 2006) and therefore also introduced from the Continent (Cucchi et al. 2020). The only bone of cat (*Felis s. lybica*) was of very large size, not indigenous from Cyprus and also introduced as a commensal, like mice, within the Neolithic package brought by the PPNA people.

Amphibians and reptiles (NISP= 53) are represented by four ubiquitous species already mentioned in the Epipaleolithic, the green toad (*Bufo viridis*), the Schneider's skink (*Eumeces schneideri*), the black whipsnake (cf. *Dolichophis jugularis*) and the blunt nosed viper (*Macrovipera lebetina*, Bailon 2023). In addition, several remains of an enigmatic terrestrial tortoise (*Testudo* s.s.) were found. Birds (NISP= 74) were the second source of animal food after wild boar. They were mostly composed of waterfowl (*Anser anser/fabalis*, *A. albifrons*, *A. erythropus*, *Anas platyrhynchos*, *A. crecca/Spatula querquedula*, *Fulica atra*...) and the great bustard (*Otis tarda*, Gourichon 2023). Those suggest the presence of wetland in the near vicinity of the site.

Archaeozoological and botanical studies of the Klimonas bioarchaeological record yielded an important contribution to the origin of the animal and plant Cypriot communities, the history of which can be summarized as follows (fig. 2). The two main components of the Late Pleistocene 100% endemic faunas described from Akrotiri (Smmons 1999), i.e. the dwarf hippos (*Hippopotamus minor*; Geer et al. 2018) and elephants (*Elephas cypriotes*), became extinct about 12,500 cal. BP (Zazzo et al. 2015). The third one, an endemic genet (*Genetta plesictoides*) absent from Klimonas (where cat is attested), likely became extinct between 12,000 and 10,800 cal. BP. Only the fourth and last one, the endemic mouse of Cyprus (*Mus cypriacus*), likely present on the island since the Middle Pleistocene (Bate 1903), is extant on Cyprus (Cucchi et al. 2006). Epipaleolithic people introduced the wild boar which quickly decreased in size due to insularity and was still proliferating on the island during the occupation of Klimonas, 1500 years later. Klimonas also provided evidence that PPNA people introduced einkorn and emmer from the Continent, and started cultivating them. In the same time, they introduced dogs, continental mice and cats. Likely, the latter was introduced to control rodent pests (Cucchi et al. 2020, Vigne 2019). Introductions from the Levant of morphologically wild plants or animals such as einkorn, emmer, wild boar or cat, that should necessarily be intentional, are important evidence of human control of this species that contribute to understanding the premises of plant and animal domestication in the Levant (Vigne et al. 2011).

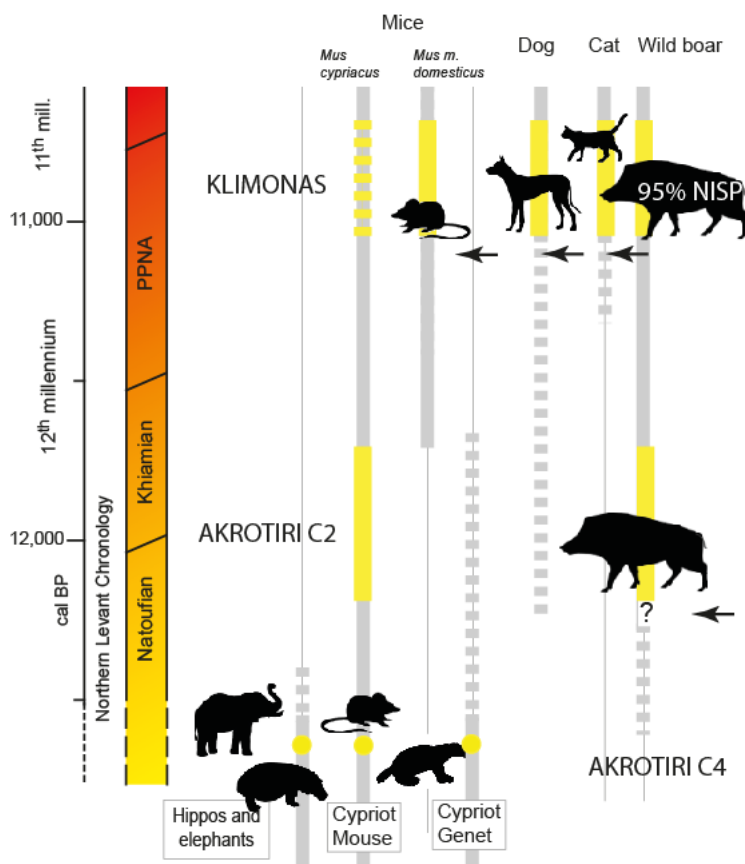


Fig. 2. Replacement of the terrestrial mammals in Cyprus from the Late Glacial and Epipaleolithic period (Akrotiri) to the Early Holocene and PPNA period (Klimonas). Yellow bars indicate the attestation of the species and arrows the anthropogenic introductions. CAD J.-D. V.

4. New introduction, domestication and beginning of farming in the 11th-10th millennium cal. BP

Shillourokambos is a Cypro-PPNB site, occupied over 1500 years, from 10,400 to 9000 cal. BP (Guilaine et al. 2011, 2021). The earliest phases (A and B) were contemporaneous of the Early and Middle Cypro-PPNB. The Middle and Late phases were dated to the Late Cypro-PPNB, second half of the 10th millennium BP. Charcoal analyses indicate a strong domination of *Pistacia* since the earliest occupation phase of the site (Rousou 2022). The anthracological spectrum is also composed by

deciduous and evergreen oak (*Quercus*), olive trees (*Olea europaea*), Greek strawberry tree (*Arbutus* sp.) and members of the legume family (Fabaceae; Thiébaud 2003, 2011, 2021, Rousou 2022). Charred and mineralized fruit remains evidence the presence of two wild indigenous *Pistacia* species (*P. atlantica* and *P. terebinthus*), as well as the presence of hackberry (*Celtis* cf. *tournefortii*; Rousou et al. 2021, Rousou 2022). Charred fruits evidence the presence of both *Pistacia atlantica* and *P. terebinthus* species. Emmer and barley were cultivated (Willcox 2003, 2011, 2021). The herpetofauna of Shillourokambos refer to the western Caspian terrapin (*Mauremys* cf. *rivulata*), to the green sea turtle (*Chelonia mydas*) and to the agama lizard (*Stellagama stellio*, Vigne 2011a, 2021). Together with the much more numerous herpetofauna bones from Akrotiri and Mylouthkia (Bailon 1999, Croft et al. 2017), we can reconstruct the biogeographical evolution of 13 taxa. Ten of these remains could belong to Pleistocene species extant until the early Holocene (and today: *Bufotes viridis*, *Testudo graeca/ibera*, *M. rivulata*, *E. schreiberi*, *S. stellio*, Lacertidae, *Coluber jugularis*, *Telescopus fallax*, *Natrix n. cyriacus* et *V. lebetina*). Only the terrestrial tortoise (*Testudo* s.s.) would have gone extinct, and four species might have been introduced during the Early Holocene: the green frog (*Polyphylax* sp.), a gecko, a skink and the Montpellier snake (*Malpolon* sp.). Nearly 30,000 often very well-preserved large mammal specimens were identified at Shillourokambos. They document new introductions of goat and early domestic cattle c. 10,500 cal. BP, and of the fallow deer, domestic sheep and fox at the very beginning of the 10th millennium cal BP (Vigne et al. 2011, 2014, 2016). During the Late Cypro-PPNB, cattle and dog decreased in abundance and finally became extinct.

Archaeozoological investigations conducted during the last 25 years on the more than 30,000 identified large mammal specimens of Shillourokambos focused on the as accurate as possible description of the status of each ungulate taxon and their evolution along the 1500 years of site occupation (Vigne et al. 2003, 2011). For this research, we considered domestication as a process of intensification of the interaction between humans and plants or non-human animals (e.g. Clutton-Brock 1992, Vigne 2011, 2015, Zeder 2012, 2015). The implementation of this process can be detected through the weed composition in the charred seed record for plants (Willcox et al. 2008), or through the taxon frequencies, the age at death profiles or the skeletal part representation for incipient husbandry for animals (e. g. Zeder & Hesse 2000, Vigne 2011b, 2015, Stiner et al. 2014). This human control inflected the evolutionary trajectory of the non-human populations involved in the domestication process, provoking delayed physiological or morphological change that became archaeologically visible only after a certain time following the initiation of the domestication process (Zohary et al. 1998, Vigne 2011b, Zeder 2012, Arbuckle 2016). This time depends on the intensity and modalities of the human control (Hendry et al. 2008). The archaeologically visible delayed consequences of the domestication process are the size increase of cereal seeds or the [abundance of indehiscent wheat ears](#) (Tano & Willcox 2006) for plants. For animals those are the sexual dimorphism decrease (Arbuckle 2005, Helmer et al. 2005, Vigne et al. 2011, 2017b), the general body size decrease (e.g. Peters et al. 2005) or any other morphological change (Turcotte et al. 2017). We considered using the term of domestic plant or animal if and only if one of these features was detected. Consequently, the process of domestication precedes the appearance of the domestic form of sometimes several centuries (Vigne 2011, 2015).

We also considered that, during the PPN period, whatever wild or modified were the morphotype, the plant or animal population exploitation strategy can rapidly shift from cultivation/husbandry to gathering/hunting (i.e. feralization) or reverse (i.e. re-domestication of feral animals or sub-spontaneous plants; Vigne et al. 2003). Morphologically domestic animals acquired by hunting were considered as feral. We also restricted the use of the word “farming” to subsistence systems predominantly based on plant cultivation and animal husbandry. In the Levant, farming emerged preeminent during the middle or late PPNB, depending on the site or region (Connelly et al. 2011, Arbuckle 2016). Before that, either animal husbandry did not exist (PPNA) or game meat dominated over farmed meat (PPNB; Vigne & Helmer 2007, Vigne 2008).

The very large morphometric and dental age datasets from Shillourokambos (Vigne and Carrère 2021) allowed describing the rather wild or rather domestic status of each of the nine mammal

species along the different chronological phases of the site occupation (Vigne et al. 2011). We will briefly deal with the example of goat, suids and cat. Some discrete osteological evidence, namely a slight size reduction with reference to the continental aegagrus measurements, suggested that goats attested at the very beginning of the site occupation, ca. 10,500 cal. BP were already domesticated. However, no further size decrease was observed over the next 1000 years, a period for which age profiles also suggest hunting rather than herding (Vigne et al. 2003, 2017b). We concluded that goats were introduced to Cyprus short after their domestication on the continent, then rapidly released to the wild and hunted along the Early and Middle PPNB. The high degree of sexual dimorphism of goats (*Capra aegagrus/hircus*) allowed to study separately the size of males and females using well statistically supported mixture analyses. The females were not subjected to any significant modification along the chronological sequence, except a decrease in size after the Middle A phase. The males' size also decreased at the very end of the sequence, in such an extent that the sexual dimorphism also decreased, considered as a strong clue for a local domestication process (Vigne et al. 2017b). Local goat breeding is clearer attested in the later phases, with the emergence of a new type of horncore, closer to the domestic morphology than from the aegagrus type, as well as by a shift of adult sex-ratio from 50/50 to a strong domination of females, considered as an evidence of selective demographic management. As a consequence, we should consider that feral goats introduced to the island ca 10,500 were re-domesticated ca. 9,500 and gave birth to the Cyprus Neolithic domestic goat described e.g. at Khirokitia (8800-7800 cal. BP).

As for the pigs, the dental geometric morphometric analyses made it clear that the Shillourokambos and Khirokitia suids were offspring of the small endemic wild boar described at Klimonas and previously introduced to the island during the Late Glacial (Cucchi et al. 2021, Vigne et al. 2023c). In the present state of knowledge, there is no evidence of any introduction of domestic suids during the PPNB. Dental age profiles evidenced clear differences between the unselective slaughtering strategy of Klimonas and the selective slaughtering of the early phases of Shillourokambos. This evidences incipient husbandry as early as the early PPNB (Vigne 2021b). During the middle and late PPNB, the strategy was sharply focused towards seasonal slaughtering of young domestic suids, with very little or no contribution of hunting. The pig scenario is thus somewhat similar to the goat one, with however a different timing: Epipaleolithic introduction of wild boars ca. 12,500 cal. BP, rapid decrease in size due to insularity over the 12th millennium BP, hunting of this Cypriot new subspecies *S. s. circeus* during the Cypro-PPNA and Early PPNB (11th millennium), domestication then breeding of this island lineage during the 10th millennium (Late Cypro-PPNB and Khirokitia culture (Vigne et al. 2023c).

Small quantities of a large size cat bones were found in nearly all the sites between 10,800 and 9000 cal. BP (Cypro-PPNA and PPNB; Croft et al. 2017, Vigne in Guilaine et al. 2021). We also found a burial tightly associating a human and a large cat skeletons at Shillourokambos, dating to the end of this long period (9600-9100 cal. BP; Vigne et al. 2004). These observations evidenced that morphologically wild *Felis s. lybica* were intentionally introduced to Cyprus about the same time as cereal cultivations and commensal mice, that they lived in the PPN villages over this long period and that some of them get closer to some humans (Vigne 2019). According to our above-mentioned criteria, this figures the initiation of a domestic process. Smaller cat specimens were also found in Khirokitia (9th millennium BP; Davis 2003). Recently, a revision of the morphometric dataset of the cat found in the Shillourokambos human burial have shown that, despite its young age (only 7 months), this animal was significantly bigger than the other cats of the site (Vigne 2019). This suggests that it was already displaying domestication syndrome. Commensal cats introduced to Cyprus two millennia earlier to control house mice pests were therefore probably domesticated locally in Cyprus, like feral goats and wild boars.

5. Evolution of the Cypriot terrestrial mammals contributes to understand the Neolithic transition

Based on the huge faunal assemblages of the two sites of Klimonas and Shillourokambos, we can summarize the complex sequence of interactions between humans and mammals during the Cypro-PPN as follows (fig. 3).

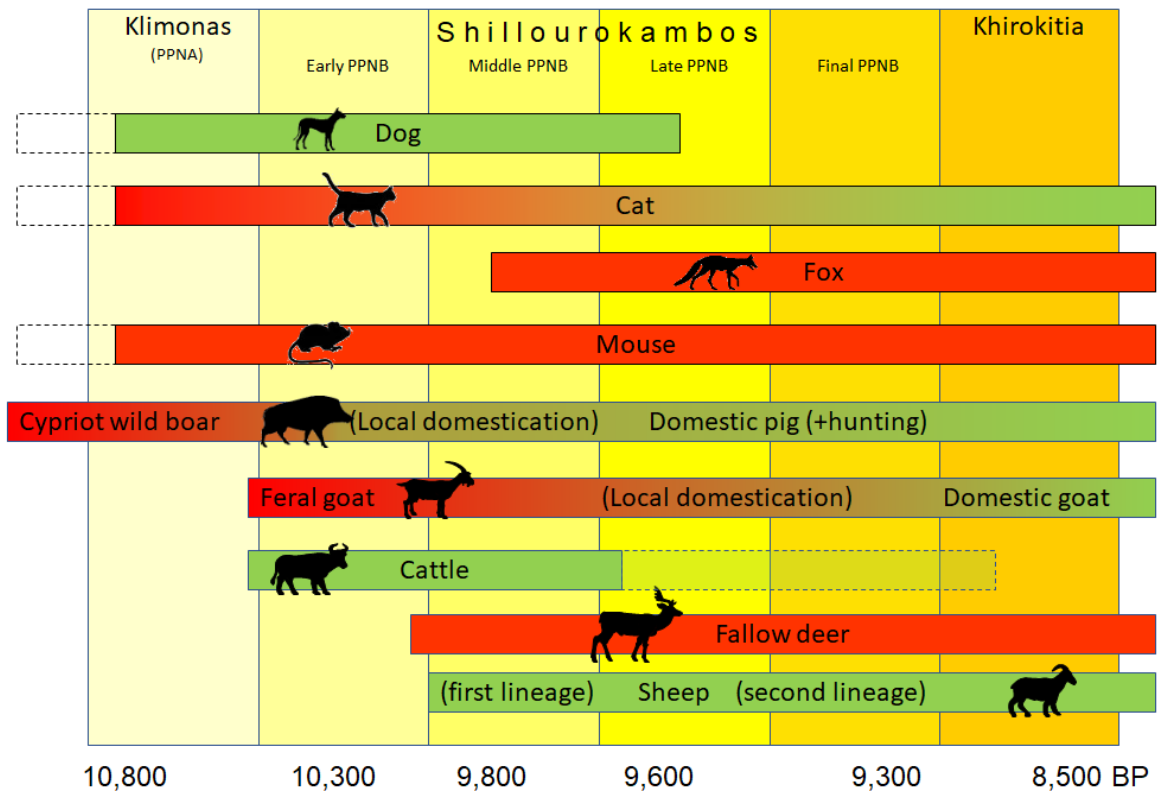


Fig. 3. Summary of the history of terrestrial mammals in Cyprus along the chrono-stratigraphic sequence of Shillourokambos. Red and green colours respectively refer to wild and domestic morphotypes, according to the above-mentioned criteria.

- The wild boar introduced during the Epipaleolithic rapidly decreased in size. It was the only large game during the Cypro-PPNA and was locally domesticated during the Cypro-PPNB (Cucchi et al. 2021). This reveals that, 2000 years before domestication, Levantine Epipaleolithic hunters were already managing wild animals at the point of transferring them overseas to populate new territories with game (Vigne et al. 2009). This also indicates that Cypro-PPNA people were able to adapt their broad-spectrum subsistence model to very low diversity.
- Domestic dogs and commensal mice and cats were introduced with the Neolithic way of life that created a niche for these species. Some cats were subsequently and probably locally domesticated. Dog became extinct from Cyprus with the transition from hunting to herding. If we consider that mice were introduced as stowaways (Cucchi et al. 2020), this means that voyaging was much more intense than we suspected before, and that PPNA people already mastered navigation techniques and boat making (Vigne et al. 2014). This also reveals that cats were already part of the commensal or even domestic environment in at least some PPNA villages in the Levant (Cucchi et al. 2020) and confirms that dogs were more important in the lifestyle of PPNA hunters than in that of the first farmers.
- The early PPNB brought a third wave of introduction, with early domesticated cattle and goat. The latter was immediately released to the wild and hunted during one millennium before being locally domesticated. Conversely, cattle were bred all along the early and middle PPNB, then decreased and went extinct from Cyprus during the next five millennia, until the Bronze Age. This indicates that during the period between the early ungulate domestications, c. 10,500 cal. BP, and the time when farming emerged as above defined, c. 9,500 cal. BP (Vigne et al. 2017c), the status of domestic animals could be subject to important changes, including feralization or re-domestication of feral populations (Vigne 2015).

- Three new species were introduced at the beginning of the Middle PPNB, the Mesopotamian fallow deer, sheep and the fox. They were respectively released to the wild and hunted (Vigne et al. 2016), herded with two successive different lineages (Vigne et al. 2017b), and tolerated in the villages as commensals (Vigne 2021a). This also strengthens the idea that early Neolithic people were experimenting a lot of different systems of relationships with animals (Vigne 2015).

In conclusion, Cyprus, and more specifically the Amathus area brought a fantastic set of environmental and biogeographical new data, which have provided evidence that the Neolithic transition in Cyprus was very similar to any other Levantine region, except differences due to insular idiosyncrasies (Vigne et al. 2019).

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References

- Ammerman A. J. 2013 – Racing the steps in the fieldwork at the sites of Aspros and Nissi Beach on Cyprus, in Ammerman A. J., Davis T. (eds.), *Island Archaeology and the Origins of Seafaring in the Eastern Mediterranean, Proceedings Wener Gren workshop, Reggio de Calbre, 2012, Eurasian Prehistory*, 10 (1-2), p. 117-138.
- Arbuckle B. S. 2005. — Experimental animal domestication and its application to the study of animal exploitation in Prehistory, in Vigne J.-D., Helmer D. & Peters J. (eds), *New Methods for the First Steps of the Domestication*. Oxbow Books, Oxford: 18-33.
- Arbuckle B. S. 2016 – Early history of animal domestication in Southwest Asia, in *Oxford Research Encyclopedia of Environmental Science*, Oxford University Press USA [DOI: 10.1093/acrefore/9780199389414.013.548].
- Bailon S. 1999 – Toad and snakes, in Simons A.H. (dir.), *Faunal extinction in a island society. Pygmy hippopotamus hunter of Cyprus*, New York, Kluwer academic/Plenum pub., p. 182-186.
- Bailon S. 2023 – Amphibians and reptiles (chap. 25), in Vigne J.-D., Briois F., Guilaine J. (eds.), *Klimonas, a Prepottery Neolithic A (PPNA) village in Cyprus (excavations 2009-2016) - Klimonas, un village néolithique précéramique A (PPNA) à Chypre (fouilles 2009-2016)*, Paris, CNRS Editions (*Gallia Préhistoire International – Paléorient*), in press.
- Bate D. M. A. 1903 – The mammals of Cyprus, *Proceedings of the Zoological Society of London*, 2, p. 341–348.
- Bar-Matthews M., Ayalon A., Kaufman A., Wassenburg G. J. 1999 – The Eastern Mediterranean paleoclimate as a reflection of regional events: Soreq Cave, Israel, *Earth and Planetary Science Letters*, 166, p. 85-95
- Blondel J. 1986 – *Biogéographie évolutive*, Paris, Masson, 221 p.
- Briois F. 2023 – Les industries de pierre taillée (chap. 14), in Vigne J.-D., Briois F., Guilaine J. (eds.), *Klimonas, a Prepottery Neolithic A (PPNA) village in Cyprus (excavations 2009-2016) - Klimonas, un village néolithique précéramique A (PPNA) à Chypre (fouilles 2009-2016)*, Paris, CNRS Editions (*Gallia Préhistoire International – Paléorient*), in press.
- Briois F., Astruc L., 2019 – Introduction, adaptation and development of the first Pre-Pottery Neolithic communities in Cyprus: the contribution of lithic industries in the Amathus area, in Astruc L.,

- McCartney C., Briois F., Kassianidou V. (eds.), *Near Eastern lithic technologies on the move. Interactions and contexts in Neolithic traditions (Proceedings of the 8th International Conference on PPN Chipped and Ground Stone Industries of the Near East, Nicosia, 23-27 November 2016)*, Uppsala, Astrom Editions (*Studies of Mediterranean Archaeology*), p. 45-52.
- Briois F., Petit-Aupert C., Pechoux P.-Y. 2005 – *Histoire des campagnes d'Amathonte. L'occupation du sol au Néolithique*, Athènes, Ecole française d'Athènes (*Etudes Chypriotes* 16), 259 p.
- Cauvin J. 1998 *Naissance des divinités, naissance de l'agriculture*, CNRS éditions, Paris.
- Conolly J., Colledge S., Dobney K., Vigne J.-D., Peters J., Stopp B., Manning K. & Shennan S., 2011 - Meta-analysis of zooarchaeological data from SW Asia and SE Europe provides insight into the origins and spread of animal husbandry. *J. Archaeol. Sci.*, 38 : 538-545.
- Croft P., Ceron-Carrasco R., Peltenburg E., Bailon S., Cucchi T., Mano L., Colledge S., Deckers K., Lorentz K.O., Ridout-Sharpe J. 2017 – Neolithic Kisonerga-Myroudia, 2000-2006: the bioarcheology, *Report of the Departement of antiquities*, Cyprus, 2011-12, p. 189-217.
- Cucchi T., Orth A., Auffray J.-C., Renaud S., Fabre L., Catalan J., Hadjisterkotis E., Bonhomme F., Vigne J.-D. 2006 – A new endemic species of the subgenus *Mus* (Rodentia, Mammalia) on the Island of Cyprus, *Zootaxa*, 261, p. 1-36.
- Cucchi T., Papayianni K., Cersoy S., Aznar-Cormano L., Zazzo A., Debruyne R., Berthon R., Bălăşescu A., Simmons A., Valla F., Hamilakis Y., Mavridis F., Mashkour M., Darvish J., Siahsarvi R., Biglari F., Petrie C. A., Weeks L., Sardari A., Maziar S., Denys C., Orton D., Jenkins E., Zeder M., Searle J.B., Larson G., Bonhomme F., Auffray J.-C., Vigne J.-D. 2020 – Tracking the Near Eastern origins and European dispersal of the western house mouse and its relevance to cat domestication, *Scientific Report*, 10 : 8276 | <https://doi.org/10.1038/s41598-020-64939-9> .
- Cucchi T., Domont A., Harbers H., Leduc C., Guidez A., Bridault A., Hongo H., Price M., Peters J., Briois F., Guilaine J., Vigne J.-D. 2021 – Bones geometric morphometrics illustrate 10th millennium cal. BP domestication of autochthonous Cypriot wild boar (*Sus scrofa circeus* nov. ssp), *Scientific Reports*, 11: 11435. [URL: <https://doi.org/10.1038/s41598-021-90933-w>].
- Davis S. J. M. 2003 – The zooarchaeology of Khirokitia (Neolithic Cyprus), including a view from the mainland, in Guilaine J., Le Brun A. (eds.), *Le Néolithique de Chypre*, Athènes/Paris, École française d'Athènes, (*Bulletin de correspondance hellénique* Supplément 43), p. 254-268.
- Devillers B. 2008 – *Holocene morphogenesis and anthropisation of a semi-arid watershed, Gialias River, Cyprus*, Oxford, Archaeopress, 216 p.
- Enzel Y., Bar-Yosef O. (eds.) 2017 - *Quaternary of Levant. Environments, climate change and humans*. Cambridge : Cambridge University Press.
- Finlayson B. 2004 – Island colonization, insularity or mainstream?, in Peltenburg E., Wasse A. (eds.) *Neolithic Revolution. New Perspectives on Southwest Asia in Light of Recent Discoveries on Cyprus*, Oxford, Oxbow (*Levant Supplementary Series*), p. 11–22.
- Geer A.A. Van der, Lyras G.A, Mitteroecker P., MacPhee R.D.E. 2018 – From Jumbo to Dumbo: cranial shape changes in elephants and hippos during phyletic dwarfing. *Evolutionary Biology* 45 (3), 1–15).
- Goring-Morris A. N., Belfer-Cohen A. 2011 Neolithization processes in the Levant. The outer envelop. *Current Anthropology*, Vol. 52, No. S4, The Origins of Agriculture: New Data, New Ideas (October 2011), pp. S209-S220.
- Gourichon L. 2023 – The avifauna: General observations (chap. 26), in Vigne J.-D., Briois F., Guilaine J. (eds.), *Klimonas, a Prepottery Neolithic A (PPNA) village in Cyprus (excavations 2009-2016) - Klimonas, un village néolithique précéramique A (PPNA) à Chypre (fouilles 2009-2016)*, Paris, CNRS Editions (*Gallia Préhistoire International – Paléorient*), in press.
- Guilaine J., Briois F., Vigne J.-D. (éds.) 2011 – *Shillourokambos. Un établissement néolithique pré-céramique à Chypre. Les fouilles du Secteur 1*, Paris, Editions Errance/ Ecole Française d'Athènes, 1248 p.
- Guilaine J., Briois F., Vigne J.-D. (éds.) 2021 – *Shillourokambos. Un établissement néolithique pré-céramique à Chypre. Les fouilles du secteur 3*, Paris, CNRS Editions, 776 pages.

- Guilaine J., Le Brun A. (eds) 2003 - *Le Néolithique de Chypre, Actes du colloque international organisés par le Département des Antiquités de Chypre et l'Ecole Française d'Athènes, Nicosie 17-19 mai 2001*, Athènes, Ecole Française d'Athènes (*Bulletin de Correspondances Helléniques* suppl.).
- Hadjikyriakou G.N. 2017. Ιστορία των δασών της Κύπρου. Από αρχαιοτάτων χρόνων μέχρι το τέλος της Τουρκοκρατίας [History of the Cyprus' forests]. Φιλοδασικός Σύνδεσμος Κύπρου, Nicosia.
- Helmer D., Gourichon L., Monchot H., Peters J. & Sana Segui M. 2005. — Identifying early domestic cattle from Pre- Pottery Neolithic sites on the Euphrates using sexual dimorphism, in Vigne J.-D., Peters J. & Helmer D. (eds), *The First Steps of Animal Domestication*. Oxbow Books, Oxford: 86-95.
- Hendry AP, Farrugia TJ, Kinnison MT. 2008 Human influences on rates of phenotypic change in wild animal populations. *Molecular Ecology* 17, 20–29. (doi:10.1111/j.1365- 294X.2007.03428.x)
- Hourani F. 2008 – Khirokitia (Chypre), un village néolithique les pieds dans l'eau, in Guimier-Sorbets A-M., *L'eau. enjeux, usages et représentations, Actes du quatrième colloque de la Maison René-Ginouvès*, Paris : De Boccard, p. 159–169.
- Le Brun A., Cluzan S., Davis S., Hansen J., Renault-Miskovsky J. 1987 – Le Néolithique précéramique de Chypre, *L'Anthropologie*, 91 (1), p. 283-316.
- MacArthur R. H., Wilson E. O. 1967 – *The theory of island biogeography*, Princeton, N. J, Princeton University Press, 224 p.
- McCartney C. 2017 – Ayia Varvara Asprokremnos. A late PPNA specialized site on Cyprus, in Vigne J.-D., Briois F., Tengberg M. (éds.), *Nouvelles données sur les débuts du Néolithique à Chypre/New data on the beginning of Neolithic Cyprus. Actes de la séance de la Société Préhistorique Française 18-19 mars 2015*, Paris, Société Préhistorique française (*Séances en ligne* 9), p. 47-58.
- Manning S. W., McCartney C., Kromer B., Stewart S. T. 2010 – The earlier Neolithic in Cyprus: Recognition and dating of a Pre-Pottery Neolithic A occupation, *Antiquity*, 84, p. 693–706.
- Meikle R.D. 1985. Flora of Cyprus. The Bertham-Moxon Trust Royal Botanic Gardens, Kew, London.
- Mylona P., Devillers 2023 – Geomorphological evolution of the site and of adjacent slopes and stream (chap. 3), in Vigne J.-D., Briois F., Guilaine J. (eds.), *Klimonas, a Prepottery Neolithic A (PPNA) village in Cyprus (excavations 2009-2016) - Klimonas, un village néolithique précéramique A (PPNA) à Chypre (fouilles 2009-2016)*, Paris, CNRS Editions (*Gallia Préhistoire International – Paléorient*), in press.
- Mylona P., Devillers B., Vigne J.-D., 2017 – De la fin du Pléniglaciaire au début de l'Holocène à Chypre : premières analyses des terrasses fluviatiles proches du site Néolithique pré-céramique de Klimonas (Ayios Tychonas, Limassol), in Vigne J.-D., Briois F., Tengberg M. (éds.), *Nouvelles données sur les débuts du Néolithique à Chypre/New data on the beginning of Neolithic Cyprus. Actes de la séance de la Société Préhistorique Française 18-19 mars 2015*, Paris, Société Préhistorique française (*Séances en ligne* 9), p. 95-104.
- Mylona P., Vigne J.-D., Wattez J. 2021 – Exploring a new spatial analysis method for earthen Buildings: a combination of statistical analysis and soil micromorphology, in Amadio M (ed.) *Archaeology in the smallest realm. Micro analyses and methods for the reconstruction of Cyprus early societies*, ARTEMIDE, Roma, p. XX.
- Peltenburg E., Wasse A. (eds..) 2004 - *Neolithic Revolution. New Perspectives on Southwest Asia in Light of Recent Discoveries on Cyprus*, Oxford, Oxbow (*Levant Supplementary Series*).
- Peters J., Driesch A. von den, Helmer D. 2005 - The upper Euphrates-Tigris basin: cradle of agropastoralism? In: J.-D. Vigne, J. Peters and D. Helmer (Eds.). *First Steps of Animal Domestication, New archaeozoological approaches*. Oxbow Books, Oxford, p. 96–124.
- Robitaille J. 2017 – Le macro-outillage d'un site PPNA chypriote, Ayios-Tychonas Klimonas, in Vigne J.-D., Briois F., Tengberg M. (éds.), *Nouvelles données sur les débuts du Néolithique à Chypre/New data on the beginning of Neolithic Cyprus. Actes de la séance de la Société Préhistorique Française 18-19 mars 2015*, Paris, Société Préhistorique française (*Séances en ligne* 9), p. 135-166.

- Rousou M. 2022 – *Exploitation des ressources végétales et impact environnemental des premiers peuplements à Chypre : approches anthracologique et carpologique*, thèse de doctorat, Muséum national d'Histoire naturelle et Université de Chypre, inédit.
- Rousou M., Parés A., Douché C., Ergun M., Tengberg M. 2021 – Identification of archaeobotanical *Pistacia* L. fruit remains: implications for our knowledge on past distribution and use in prehistoric Cyprus, *Vegetation History and Archaeobotany*, 30, p. 623-639. <https://doi.org/10.1007/s00334-020-00812-z>
- Simmons A. H. (ed.) 1999 - Faunal extinction in an island society. Pygmy hippopotamus hunters of Cyprus New York-Boston-Dordrecht-London-Moscow, Kluwer Academy–Plenum Publisher.
- Simmons A. H. 2012 – Ais Giorkis: An unusual early Neolithic settlement in Cyprus, *Journal of Field Archaeology*, 37(2), p. 86-103. [URL: <https://www.tandfonline.com/doi/full/10.1179/0093469012Z.0000000009>].
- Stiner M. C., Buitenhuis H., Duru G., Kuhn S. L., Mentzer S. N., Munro N. D., Pöllath N., Quade J., Tsartsidou G., Özbasaran M. 2014 - A forager–herder trade-off, from broad-spectrum hunting to sheep management at Asıklı Höyük, Turkey. *Proc. Natl. Acad. Sci. USA* 111, 23, p. 8404–8409.
- Swiny S. 2001 *The Earliest Prehistory of Cyprus*, American School of Oriental Research, Boston.
- Tano K, Willcox G. 2006 - How fast was wild wheat domesticated? *Science*, 311, p. 1886.
- Tengberg M., Willcox G., Rousou M., Douché C., Parés A., Zazzo A. 2023 – Plant exploitation and vegetation cover (chap. 23), in Vigne J.-D., Briois F., Guilaine J. (eds.), *Klimonas, a Prepottery Neolithic A (PPNA) village in Cyprus (excavations 2009-2016) - Klimonas, un village néolithique précéramique A (PPNA) à Chypre (fouilles 2009-2016)*, Paris, CNRS Editions (*Gallia Préhistoire International – Paléorient*), in press.
- Thiébaud S. 2003 - Les paysages végétaux de Chypre au Néolithique: premières données anthracologiques, in Guilaine J. & Le Brun A. (eds), *Le Néolithique de Chypre : actes du colloque international organisé par le Département des Antiquités de Chypre et l'École Française d'Athènes (Nicosie 17-19 Mai 2001)*, Bulletin de Correspondance Hellénique Supplément 43, p. 221-230.
- Thiébaud S. 2011 – L'analyse anthracologique, in Guilaine J., Briois F., Vigne J.-D. (eds.), *Shillourokambos. Un établissement néolithique pré-céramique à Chypre. Les fouilles du Secteur 1*, Editions Errance/ Ecole Française d'Athènes, Paris, p. 589-898.
- Thiébaud S. 2021 – Les résultats de l'identification des fragments de charbons de bois, in Guilaine J., Briois F., Vigne J.-D. (eds.) 2021 – *Shillourokambos. Un établissement néolithique pré-céramique à Chypre. Les fouilles du secteur 3*, Paris, CNRS Editions, p. 259-263.
- Todd I. 2003 – Kalavassos-Tenta: a reappraisal, in Guilaine J., Le Brun A. (eds.), *Le Néolithique de Chypre. Actes du colloque international organisé par le Département des Antiquités de Chypre et l'École Française d'Athènes, Nicosie 17-19 Mai 2001*, Athènes, École Française d'Athènes, (*Bulletin de Correspondance Hellénique suppl. 43*), p. 35-44.
- Tsakalos E., Efstratiou N., Bassiakos Y., Kazantzaki M., Filippaki E. 2021 - Early Cypriot Prehistory. On the traces of the last hunters and gatherers on the island—preliminary results of luminescence dating, *Current Anthropology*, 62 (4). [DOI: 10.1086/716100].
- Turcotte M. M., Araki H., Karp D. S., Poveda K., Whitehead S. R. 2017 - The eco-evolutionary impacts of domestication and agricultural practices on wild species. *Philosophical Transactions of the Royal Society B: Biological Sciences* 372, 20160033 (doi:10.1098/rstb.2016.0033)
- Vigne J.-D., 2008.- Zooarchaeological aspects of the Neolithic diet transition in the Near East and Europe, and their putative relationships with the Neolithic Demographic Transition. In : Bocquet Appel J-P and O Bar-Yosef (eds) *The Neolithic Demographic Transition and its Consequences/*. New York: Springer Verlag, p. 179-205.
- Vigne J.-D. 2011a – Les petits et microvertébrés terrestres (chéloniens, squamates, oiseaux, rongeurs et carnivores) : contribution à l'histoire du peuplement reptilien et mammalien de Chypre, in Guilaine J., Briois F., Vigne J.-D. (eds.), *Shillourokambos. Un établissement néolithique pré-céramique à Chypre. Les fouilles du Secteur 1*, Editions Errance/ Ecole Française d'Athènes, Paris, p. 847-870.

- Vigne J.-D. 2011b The origins of animal domestication and husbandry: A major change in the 505 history of humanity and the biosphere. *Comptes Rendus Biologies* 334, p. 171–181.
- Vigne J.-D. 2015 – Early Domestication and Farming: what should we know or do for a better understanding? *Anthropozoologica*, 50 (2), p. 123–150.
- Vigne J.-D., 2019. The beginning of cat domestication in East and West Asia, in Peters J., McGlynn G., Goebel V. (eds.), *Animals: Cultural identifiers in ancient societies? Documenta archaeobiologiae*, Rahden/Westf., Verlag Marie Leidorf GmbH, p. 343–354.
- Vigne J.-D. 2021a – Tortues, agame, oiseaux, renard, chien et chat (Chap. 41), in Guilaine J., Briois F., Vigne J.-D. (eds.), *Shillourokambos : un établissement néolithique pré-céramique à Chypre. Les fouilles du secteur 3*, Paris, CNRS éditions, p. 511–537.
- Vigne J.-D. 2021b – Ostéologie, chasse, élevage et consommation des ongulés (Chap. 42), in Guilaine J., Briois F., Vigne J.-D. (eds.), *Shillourokambos. Un établissement néolithique pré-céramique à Chypre. Les fouilles du secteur 3*, Paris, CNRS Editions, p. 539–631.
- Vigne J.-D., Carrère I. 2021 – L'évolution des spectres de faune et la périodisation des occupations (Chap. 25), in Guilaine J., Briois F., Vigne J.-D. (eds.), *Shillourokambos. Un établissement néolithique pré-céramique à Chypre. Les fouilles du secteur 3*, Paris, CNRS Editions, p. 239–249.
- Vigne J.-D., Carrère I. 2023 – The faunal remains: taxonomy, taphonomy, archaeological contexts and animal resources (chap. 24), in Vigne J.-D., Briois F., Guilaine J. (eds.), *Klimonas, a Prepottery Neolithic A (PPNA) village in Cyprus (excavations 2009-2016) - Klimonas, un village néolithique précéramique A (PPNA) à Chypre (fouilles 2009-2016)*, Paris, CNRS Editions (*Gallia Préhistoire International – Paléorient*), in press.
- Vigne J.-D., Helmer D. 2007 - Was milk a “secondary product” in the Old World Neolithisation process? Its role in the domestication of cattle, sheep and goats. *Anthropozoologica*, 42, 2: 9–40 (2007).
- Vigne J.-D., Carrère I., Guilaine J. 2003 - Unstable status of early domestic ungulates in the Near East : the example of Shillourokambos (Cyprus, IX-VIIIth millennia cal. B.C.). In : J. Guilaine et A. Le Brun éd., *Le Néolithique de Chypre (Actes Coll. Int. Nicosie, 17-19 mai 2001)*. *Bull. Corr. Hélienique*, suppl. 43, p. 239-251.
- Vigne J.-D., Guilaine J., Debue K., Haye L., Gérard P. 2004 – Early taming of the cat in Cyprus, *Science*, 304, p. 259.
- Vigne J.-D., Zazzo A., Saliege J.-F., Poplin F., Guilaine J., Simmons A. 2009 – Pre-Neolithic wild boar management and introduction to Cyprus more than 11,400 years ago, *Proc. Natl. Acad. Sci. USA*, 106 (38), p. 16131-16138.
- Vigne J.-D., Carrère I., Briois F., Guilaine J., 2011 – The early process of the mammal domestication in the Near East: New evidence from the Pre-Neolithic and Pre-Pottery Neolithic in Cyprus, *Current Anthropology*, 52, 4: S255-S271. [<http://www.jstor.org/stable/10.1086/658481>].
- Vigne J.-D., Briois F., Zazzo A., Willcox G., Cucchi T., Thébaud S., Carrère I., Franel Y., Touquet R., Martin C., Moreau C., Comby C., Guilaine J. 2012 – First wave of cultivators spread to Cyprus at least 10,600 y ago, *Proc. Natl. Acad. Sci. USA*, 109 (22), p. 8445–8449.
- Vigne J.-D., Cucchi T., Zazzo A., Carrère I., Briois F., Guilaine J. 2014 – The transportation of mammals to Cyprus sheds light on early voyaging and boats in the Mediterranean Sea, *Eurasian Prehistory*, 10 (1-2), p. 157–178.
- Vigne J.-D., Daujat J., Monchot H. 2016 – First introduction and early exploitation of the Persian fallow deer on Cyprus (8,000–6,000 cal. BC). *International Journal of Osteoarchaeology*, 26, p. 853–866.
- Vigne J.-D., Briois F., Cucchi T., Franel Y., Mylona P., Tengberg M., Touquet R., Wattez J., Willcox G., Zazzo A. et Guilaine J. 2017a – Klimonas, a late PPNA hunter-cultivator village in Cyprus: new results, in Vigne J.-D., Briois F., Tengberg M. (éds.), *Nouvelles données sur les débuts du Néolithique à Chypre/New data on the beginning of Neolithic Cyprus. Actes de la séance de la Société Préhistorique Française 18-19 mars 2015*, Paris, Société Préhistorique française (*Séances en ligne* 9), p. 21-46.

- Vigne J.-D., Carrère I., Guilaine J. 2017b – Instability and co–development of the exploitation of early domestic sheep and goats: the example of Shillourokambos (Cyprus, Pre–Pottery Neolithic, 10,400–9,000 cal BP), in Mashkour M., Beech M. (eds.), *Archaeozoology of the Near East 9, Proceedings of the 9th ASWA Conference, Al Ain, 2008*, Oxford, Oxbow Books, Vol. 1, p. 10–22.
- Vigne J.-D., Gourichon, L., Helmer D., Martin L., Peters J. 2017c – The beginning of animal domestication and husbandry in South West Asia, in Enzel Y., Bar Yosef O. (eds.), *Quaternary in the Levant*, Cambridge Univ. Press., p. 753-760. [URL : doi:10.1017/9781316106754.084].
- Vigne J.-D., Briois F., Guilaine J. 2019b - To what extent insularity has played a role in the Cyprus Neolithic transition?, in Astruc, L., McCartney, C., Briois, F., Kassianidou, V. (Eds.), *Near Eastern lithic technologies on the move, Interactions and contexts in the Neolithic traditions (proceedings of the PPN 8 Conference, Nicosia, 2016)*, *Studies in Mediterranean Archaeology*, vol. 150, Stockholm: Astrom, p. 19-30.
- Vigne J.-D., Briois F., Guilaine J. 2023a – Klimonas, an early Pre-Pottery Neolithic village in Cyprus - Klimonas, un village néolithique précéramique ancien à Chypre, Paris, CNRS Editions (*Gallia Préhistoire, International supplement 1*).
- Vigne J.-., Hadjikoumis A., Balasse M., Cucchi T. 2023 b – Wild boar seasonality, hunting strategies and techno-economic utilizations (chap. 29), in Vigne J.-D., Briois F., Guilaine J. (eds.), *Klimonas, a Prepottery Neolithic A (PPNA) village in Cyprus (excavations 2009-2016) - Klimonas, un village néolithique précéramique A (PPNA) à Chypre (fouilles 2009-2016)*, Paris, CNRS Editions (*Gallia Préhistoire International – Paléorient*), in press.
- Vigne J.-D.,? Cucchi T., Domont A., Harbers H. 2023c – The extinct small Cypriot wild boar (*Sus scrofa circeo*, nov. ssp.): osteological description, origins and insular evolution (chap. 30), in Vigne J.-D., Briois F., Guilaine J. (eds.), *Klimonas, a Prepottery Neolithic A (PPNA) village in Cyprus (excavations 2009-2016) - Klimonas, un village néolithique précéramique A (PPNA) à Chypre (fouilles 2009-2016)*, Paris, CNRS Editions (*Gallia Préhistoire International – Paléorient*), in press.
- Willcox S. 2003 - The origins of Cypriot farming, in Guilaine J. & Le Brun A. (eds), *Le Néolithique de Chypre : actes du colloque international organisé par le Département des Antiquités de Chypre et l'Ecole Française d'Athènes (Nicosie 17-19 Mai 2001)*, *Bulletin de Correspondance Hellénique Supplément 43*, p. 231-238.
- Willcox G. 2011 – Témoignages d'une agriculture précoce à Shillourokambos. Etude du Secteur 1, in Guilaine J., Briois F., Vigne J.-D. (eds.), *Shillourokambos. Un établissement néolithique précéramique à Chypre. Les fouilles du Secteur 1*, Editions Errance/ Ecole Française d'Athènes, Paris, p. 599-605.
- Willcox G. 2021 –Témoignages des plantes cultivées à Shillourokambos secteur 3 (Chap. 29.), in Guilaine J., Briois F., Vigne J.-D. (eds.), *Shillourokambos – un établissement néolithique précéramique à Chypre : les fouilles du secteur 3*, Paris, CNRS Éditions, p. 265-275.
- Willcox G., Fornite S., Herveux L. 2008 – Early Holocene cultivation before domestication in northern Syria. *Veget. Hist. Archaeobot.* 17: 313–325.
- Zazzo A., Lebon M., Quiles A., Reiche I., Vigne J.-D. 2015 – Direct Dating and Physico-Chemical Analyses Cast Doubts on the Coexistence of Humans and Dwarf Hippos in Cyprus, *PLOS ONE*, 10, p. e0134429.
- Zazzo A., Quilès A., Vigne J.-D. 2023 – Radiocarbon chronology: dating and duration of village occupation; rhythm of building renovations (chap. 10), in Vigne J.-D., Briois F., Guilaine J. (eds.), *Klimonas, a Prepottery Neolithic A (PPNA) village in Cyprus (excavations 2009-2016) - Klimonas, un village néolithique précéramique A (PPNA) à Chypre (fouilles 2009-2016)*, Paris, CNRS Editions (*Gallia Préhistoire International – Paléorient*), in press.
- Zeder M. A. 2012 The Domestication of Animals. *Journal of Anthropological Research* 68, p. 161–190.
- Zeder M. A. 2015 – Core questions in domestication research. *Proc. Natl. Acad. Sci. USA*, www.pnas.org/cgi/doi/10.1073/pnas.1501711112
- Zeder M. A. & Hesse B. 2000. — The initial domestication of goats (*Capra hircus*) in the Zagros Mountains 10 000 years ago. *Science* 287: 2254-2257.