

# Ancient use of the knuckle-bone for rituals and gaming piece

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## ABSTRACT

The knuckle-bone has always had both a ritual function linked to the practice of divination and a profane use as a gaming piece for infants and adults. Knuckle bones from different animal species can be used, but sheep and goat (*Ovis* and *Capra*) and pig (*Sus domesticus*) generally prevail. These bones are small and can easily be handled together. Groups of worked and non-modified knuckle-bones have been discovered in several archaeological contexts in Italy. The most important evidence for the funerary use of these bones in Italy is undoubtedly represented by the thousands of knuckle-bones discovered in the cemetery of Locri Epizefiri, dated to the Hellenistic period. In recent times, large amounts of worked and non-modified knuckle-bones have been brought to light in the cemeteries of Le Grotte near Populonia (4<sup>th</sup>-3<sup>rd</sup> c. BC) and Poggio Picenze in Abruzzi (3<sup>rd</sup>-2<sup>nd</sup> c. BC). The zooarchaeological analysis of these samples and their comparison with other evidence can contribute to our understanding of several aspects of the ancient use of the knuckle-bone, such as the choice of the animal, different kinds of modifications, the modalities and significance of types of depositional features.

## KEY WORDS

Knuckle bones,  
funerary custom,  
Iron Age,  
Roman Period,  
Italy.

## RÉSUMÉ

*L'emploi des astragales dans l'Antiquité : entre jeu et divination.*

Depuis longtemps, dans l'ancien monde jusqu'à nos jours, l'astragale a revêtu un rôle particulier avec une double fonction: sacrée dans la pratique des consultations oraculaires et profane dans le jeu des jeunes et des adultes. Les astragales utilisés à cette fin peuvent appartenir à différentes espèces animales. S'ils proviennent de moutons (*Ovis aries*), de chèvres (*Capra hircus*) ou de cochons (*Sus domesticus*), les dimensions modestes de ces éléments permettent facilement la manipulation de pièces multiples. Des ensembles d'astragales, parfois modifiés, ont été retrouvés dans plusieurs sites de la péninsule italique. Les ensembles les plus nombreux proviennent de contextes funéraires et religieux. Une des découvertes

## MOTS CLÉS

Astragales,  
offrandes funéraires,  
Âge du fer,  
période romaine,  
Italie

les plus remarquables est celle de la nécropole hellénistique de Locri Epizefiri, dans laquelle sont documentées plusieurs tombes avec des ensembles d'astragales de plus de 1000 exemplaires. Des découvertes-récents sont également attestées à l'intérieur de la nécropole de Le Grotte à Populonia (IV-III a.C.) et, dans les Abruzzes, dans celle de Poggio Picenze (III-II a.C.). Une analyse détaillée des échantillons cités, en relation avec une riche base documentaire de comparaison, permet de clarifier différents aspects liés à l'emploi de cet os, comme le choix de l'espèce animale, les différents types de modifications, les modalités et le sens des dépositions.

## INTRODUCTION

The use of knuckle bones as infant and adult gaming pieces or as tools for the practice of divination (*astragalomanteia*) was widespread in antiquity (Rohlf 1965; Amandry 1984: 377). Archaeological evidence seems to point to the primacy of the Anatolian and Syro-Palestinian regions in the Mediterranean area (Gilmour 1997). Knuckle bones interpreted as gaming pieces are documented in private buildings and tombs from the Early Bronze Age onwards (Bartosiewicz 1997-98; Goldman 1951: 311, 318, fig. 440: 115-118), whereas the development of the symbolic meaning of the knuckle bone seems to start during the Middle Bronze Age (Minniti 2006).

Knuckle bones were issued from different animal species: cattle (*Bos taurus*), red deer (*Cervus elaphus*), sheep (*Ovis aries*) and goat (*Capra hircus*), pig (*Sus domesticus*), wild boar (*Sus scrofa*), in the Near East area also fallow deer (*Dama dama*) and gazelle (*Gazella* sp.) and the choice of the animal seemed to depend on specific animal exploitation. Due to its particular shape, small ruminant and pig knuckle bones are particularly well suited to handling a large number of pieces.

The analysis of assemblages from the Near East and Europe also documents the custom of modifying knuckle bones in different ways (Minniti & Peyronel 2005).

During the classic period, there were a number of knuckle bone game variations. Knuckle bones could be used in the *Tropa* or in the *Penthelita* or in the *Omilla* games (De Nardi 1991). For this game, players tossed the bones on the ground and recorded their point value. The Romans had a complex scoring system for

knuckle bone games, with the highest score going to the *Venus*, where four bones were tossed and displayed four different sides. Other scores were calculated on the basis of the point value of the sides displayed. With four knuckle bones, different scores and up to 35 variations were possible (Becc de Fouquières 1873: 325-356; Lovett 1901; Schädler 1996; Fasnacht 1997). In ancient literature: Martial, *Apophoreta*, XIV, 14; Cicero, *De divinatione*, I, XIII; Svetonius, *Augustus*, LXXI; Horatius, *Carmina*, II, 7, 26).

As an example of important evidence for the ritual use of knuckle bones during Classic times, the famous case of Korykeion Cave on Parnassus near Delphi in Crete bears mentioning, where thousands of knuckle bones have been discovered. The knuckle bones may have been thrown inside the cave as offerings to the deities or as amulets originally used in gaming activities (Amandry 1984; Poplin 1984). Šebesta (1993) suggests that the priest could have collected the knuckle bones from sacrificed animals and thrown them in front of the simulacrum of the deity to interpret the various combinations and predict the future, which is probably why a large number of these bones are found in temples or in sacred areas.

A different hypothesis links the knuckle bone to ancient metrology, as suggested by the similarity between the terms *talus* and *talent* and by the discovery of metal-handled weights in the shape of the knuckle bone (Alinei 1960-61; Šebesta 1999). An engraved specimen from the Apollo sanctuary at Didyma, exhibited in the Louvre Museum, weighs as much as 220 obols of Miletus and may have been used for controlling weight in the market (Hitzl 1996).

TABLE 1. – Number of knuckle bones (NISP) from the cemeteries of Populonia-Le Grotte and Varranone by species.

Site	Chronology	Sheep NISP	Goat NISP	Pig NISP	Sheep/goat NISP	Wild boar NISP
Populonia – Le Grotte	4 <sup>th</sup> -3 <sup>rd</sup> c. BC	52	4	41		2
Varranone	3 <sup>rd</sup> -2 <sup>nd</sup> c. BC	70	23		17	

The interpretation of knuckle bones placed in graves appears more complex, due to all the possible meanings and functions that they could have had. The recent discovery and study of knuckle bones from graves located in the two cemeteries of Le Grotte near Populonia (LI) and Varranone near Poggio Picenze (AQ) thus contributes to enhancing our understanding of the ancient use and meaning of these animal bones.

#### CEMETERY OF GROTTA (POPULONIA-LI)

99 knuckle bones were found at the cemetery of Grotte, Populonia (Fig. 1), in the pit burial (tomb “zeta”) dated between the end of the 4<sup>th</sup> and the beginning of the 3<sup>rd</sup> cent. BC and belonging to a 8-9 year-old boy (De Grossi Mazzorin & Minniti 2009). The knuckle bones were above the feet of the dead. 52 of them are sheep knuckle bones (25 left and 27 right) and 4 are from goats (3 left and 1 right); 41 from pigs (24 left and 19 right) and the other 2 could derive from wild boar given their large size (Table 1). 10 sheep, 1 goat and 9 pig knuckle bones were smoothed - 9 were slightly modified - on medial, lateral or both sides (Fig. 2), while cut marks, which may have been produced during the separation of the bone from the rest of carcass, have been observed on another 5 sheep and 7 pig knuckle bones.

#### VARRANONE CEMETERY (POGGIO PICENZE – AQ)

A large quantity of knuckle bones was collected in 2007, at the Varranone cemetery, Poggio Picenze (Fig. 1), in tomb 101 by V. D’Ercole. The tomb is an *arcosolium* building and is dated to the 3<sup>rd</sup>-2<sup>nd</sup> c. BC. The grave had been already used and the bones from

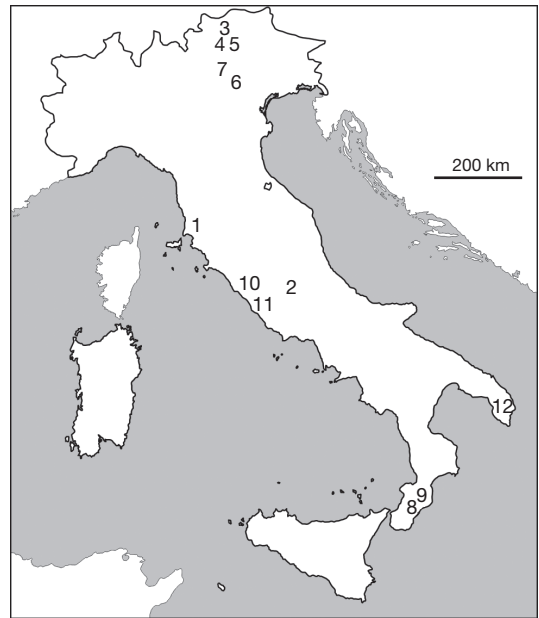


FIG. 1. – Location of the Italian sites mentioned in the text: 1, Populonia; 2, Varranone; 3, Tires; 4, Vadena; 5, Laives; 6, Gazzo Veronese; 7, Colombara; 8, Locri Epizefiri; 9, Caulonia; 10, Pyrgi; 11, Roma; 12, Vaste.

the previous grave had been moved in order to make room for the next deceased, an adult female. The grave goods included a black-slipped plate, three fine ware *balsamaria*, a bronze ring, another ring with two iron strigils, a lamp and over one hundred knuckle bones. These were arranged between the body of the dead and the entrance of the tomb, mixed with groups of iron nails (fig. 3). Another small group of knuckle bones lay to the right of the head.

23 knuckle bones belonged to 14 goats, 70 knuckle bones belonged to at least 46 sheep, while 18 juvenile knuckle bones have been generically identified as caprine (Table 1). None of the knuckle bones have been modified.



FIG. 2. — Smoothed knuckle bones on lateral and medial sides from the tomb “zeta” of Populonia.

TABLE 2. — Number of knuckle bones (NISP) from the *Lapis Niger* by type of modification according to the analysis of B. Caré.

Type of modification	NISP
Perforated by one hole directed plantar-dorsally	13
Perforated by two holes directed plantar-dorsally	1
Gently smoothed on both plantar and dorsal sides	23
Heavily smoothed on both plantar and dorsal sides	10
Smoothed on plantar side	1
Smoothed on dorsal side	23
Heavily smoothed and perforated	4
Smoothed and perforated on plantar side	1
Smoothed and perforated on dorsal side	3
Smoothed on lateral side	2
Smoothed on medial side	1
Smoothed on both lateral and medial sides	1

## COMPARISON

The practice of placing knuckle bones in tombs as grave goods in Italy is well documented and seems to have been used for a long time (Fig. 1). The most ancient finding of knuckle bones is currently represented by groups with cultic features and graves from the Alpine region, dated to the Final Bronze

/ Iron Age transition (Šebesta 1993; 1999). Several caprine knuckle bones, which may have been used with an apotropaic significance, have been discovered at Tires, northeast of Bolzano, under the first stone line at the base of an Iron age hut (Lorenz 2003; Marconi & Tecchiati 2006).

Another group of 46 knuckle bones, belonging to sheep, goats, cattle and red deer, comes from the *ustrinum* of Vadena (Pfatten) near Bolzano and consists mostly of modified or perforated bones (Riedel & Tecchiati 2005). At Laives, near Vadena, 18 knuckle bones have been found in a funerary area (Riedel & Tecchiati 2005: 124-125). Others have been found in burial A in the Ponte Nuovo cemetery at Gazzo Veronese, where some knuckle bones (two cattle, one red deer, two pig and one sheep) formed a circle with a perforated second cattle phalanx around the funerary urn (Tecchiati 2005). Nearby, several knuckle bones were found in four tombs at the necropolis of Colombara (Riedel & Tecchiati 2001).<sup>1</sup>

1. Two sheep and one pig knuckle bones come from tomb 33; two red deer and two sheep knuckle bones come from tomb 94; three cattle, two pig and one red deer knuckle bones come from tomb 183; finally, two cattle, three caprine, one goat, and five red deer knuckle bones come from tomb 41.

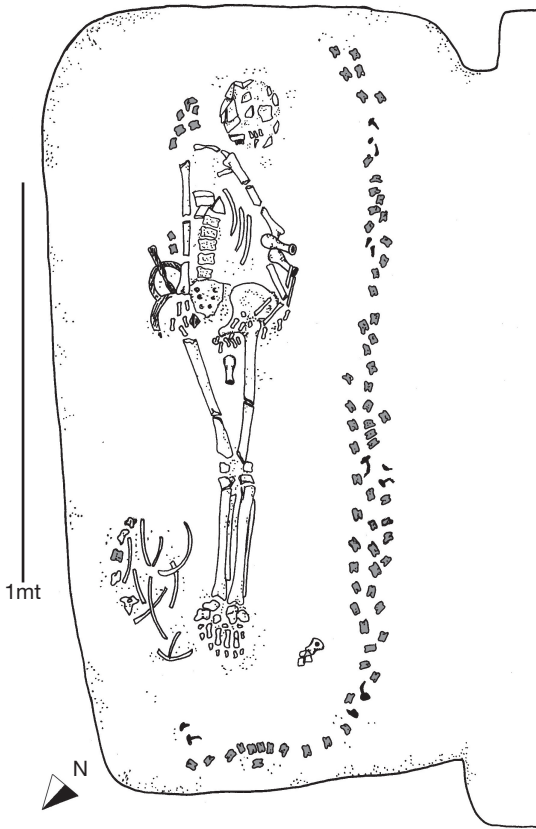


FIG. 3. — Plan of the tomb 101 in the cemetery of Varranone (Poggio Picenze – AQ).

Several tombs with hundreds of sometimes modified knuckle bones were found in the cemeteries of Locri Epizefiri and Caulonia, dated to the Hellenistic period (Elia & Carè 2004: 85; Carè 2006; 2010).<sup>2</sup> In the first context, the use of knuckle bones as grave goods was traditionally linked to infants, due to its function as a toy. However, many tombs with knuckle bones in the Contrada Lucifero necropolis at Locri Epizefiri belonged to adults (53%), whereas infant and mostly juvenile graves represent respectively 30% and 17% (Elia & Carè 2004: 79-80; 2010: 460-461). On the other hand, in the Caulonia necropolis, knuckle bones were only

2. Due to the large quantity of knuckle bones in the Locri necropolis, Hampe (1951) coined the term “astragalomania”.

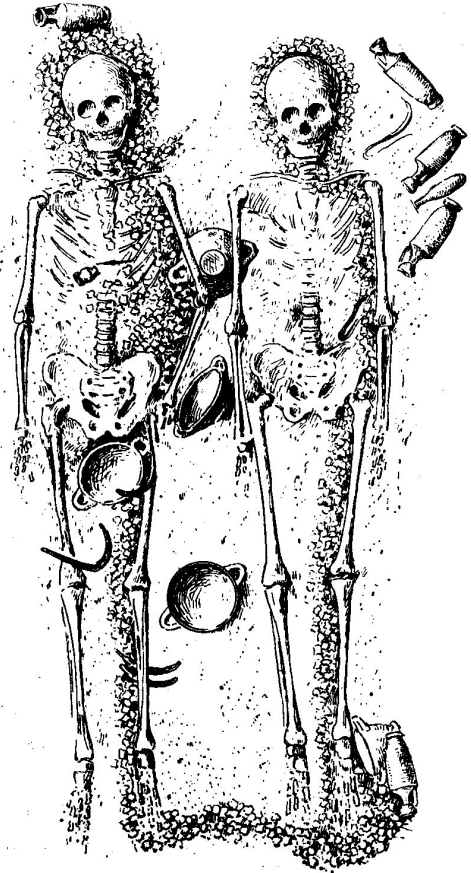


FIG. 4. — The tomb 348 in the cemetery of Contrada Lucifero at Locri Epizefiri.

found in infant and juvenile graves (Carè 2010: 462). At Locri Epizefiri, several tombs contained hundreds of knuckle bones arranged in particular patterns. Large quantities of knuckle bones were found around the bodies in several tombs (Elia & Carè 2004: 78). The arrangement can vary, sometimes in little groups, sometimes on the chest of the dead, sometimes around the grave goods or in vases (Elia & Carè 2004: 79). Tomb 348, belonging to two people, and in which 1400 knuckle bones were laid out around the bodies, from the head to the foot along the left side, is very famous (Fig. 4). Grave 709 contained rows of 936 knuckle bones, running from the right foot up to the right hand,

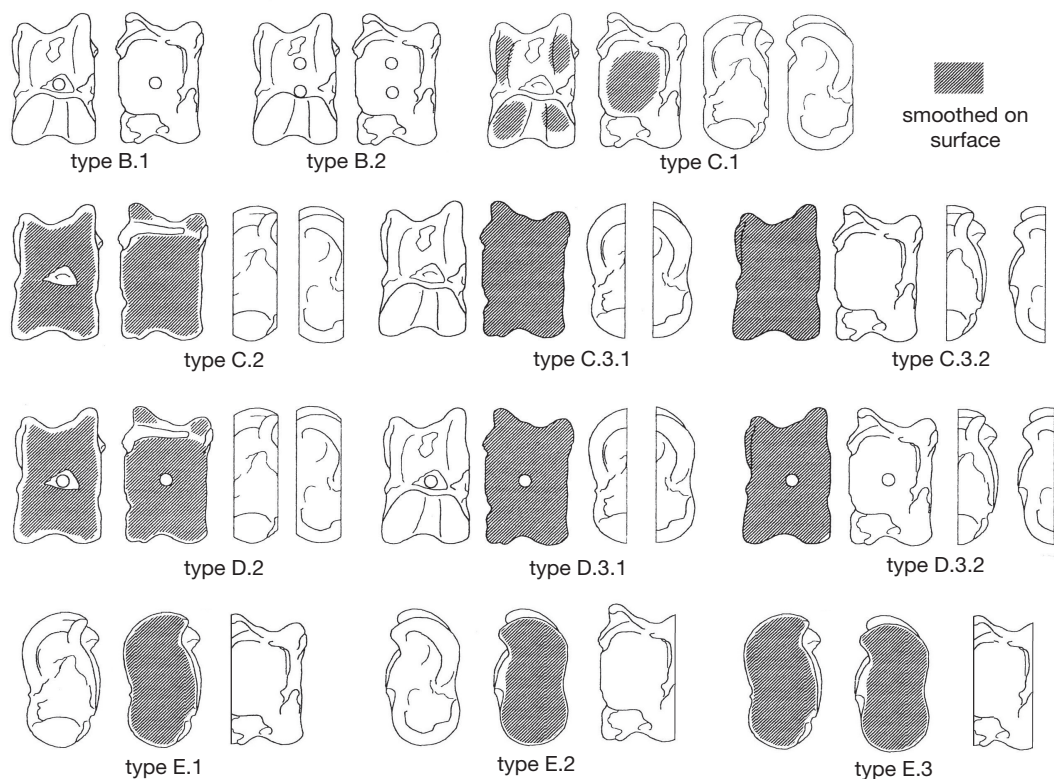


Fig. 5. — Types of modifications observed on the knuckle bones from the Lapis Niger (from Elia & Carè 2004).

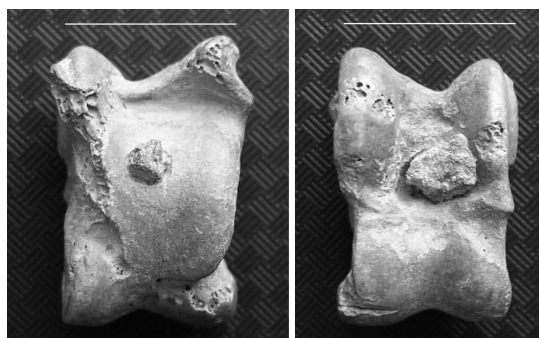


Fig. 6. — Knuckle bone pierced and filled with lead from the Lapis Niger.

creating a sort of drapery (Elia & Carè 2004: 78). In tomb 1108, 56 knuckle bones were arranged from the right foot up to the right hand and other

58 from the left foot up to the left hand (Orsi 1917: 106). Finally, the 479 knuckle bones from tomb 865 were organized from the right hand to the right arm and shoulder and the skull, up to the left shoulder (Orsi 1913: 40).

Groups of knuckle bones linked to ritual function were found in Rome, inside the Archaic Temple of S. Omobono and in the Comitium at the Roman Forum (Gjerstad 1960: 242, fig. 154: 1-9). Some of these have been modified.

Knuckle bones were also recovered by G. Boni at the end of the 19<sup>th</sup> century (Boni 1899) in Rome, in the shrine located under the Lapis Niger, southeast of the Roman Forum Comitium. Due to Julius Caesar's and Augustus's rearrangements of the Roman Forum, the shrine was hidden and covered by a superstructure in black marble paving, that overlay an altar, a stone block with one of

the earliest known Latin inscriptions (ca. 570-550 BC) and a *favissa* dated between the second quarter of the 6<sup>th</sup> and the 1<sup>st</sup> c. BC. F. Coarelli (1983) identified the building as the Vulcanal where the first king of Rome, Romulus, was murdered by the senate and possibly buried. Several animal bones, and in particular some from a vulture, an animal closely linked to the myth of the foundation of Rome, were found there (Blanc & Blanc 1958; 1960; De Grossi Mazzorin 1990). In particular, G. Boni (1899) mentions the discovery of 164 caprine knuckle bones in his report edited in the review “Notizie degli Scavi delle Antichità”.

The recent re-analysis of the assemblage from the store of the *Forensis Antiquarium* documents 221 knuckle bones, suggesting that other discoveries followed the first excavation. 16 knuckle bones belonged to goats<sup>3</sup> (6 left and 10 right), 139 to sheep (70 left and 69 right), while we could not distinguish between sheep and goat for other 64 (39 left and 25 right); the last two knuckle bones belonged to pig (1 left and 1 right). Most of them showed signs of modification (Fig. 5): 61 were smoothed on the dorsal, plantar, medial or lateral side, another 13 were perforated plantar-dorsally<sup>4</sup>, 8 bore both these types of modification, another one was perforated and filled with lead (Fig. 6). 138 were not modified. In figure 5, all types of modification can be observed according to the analysis of Carè (Elia & Carè 2004). In table 2, the number of specimens from the Lapis Niger is illustrated by type of modification. Cut marks caused during tendon severing are frequent on the dorsal and medial sides.

Another group of 31 knuckle bones with evidence of modification and perforation, came to light at Pyrgi in the cultic feature located south of the Temple B annexes. They belonged to sheep and goat, except for two belonging to cattle (Baglione 1989-90).

Small quantities of knuckle bones were found in the Archaic *bothros* located in Rome at the northeastern base of Palatinum (area II) and in cavity 3 of Vaste in Apulia, southern Italy (De Grossi Mazzorin in study).

3. The separation of sheep and goat was attempted according to Boessneck *et al.* (1964).

4. One knuckle bone was partially perforated, while two others were perforated twice, both on the plantar and dorsal sides.

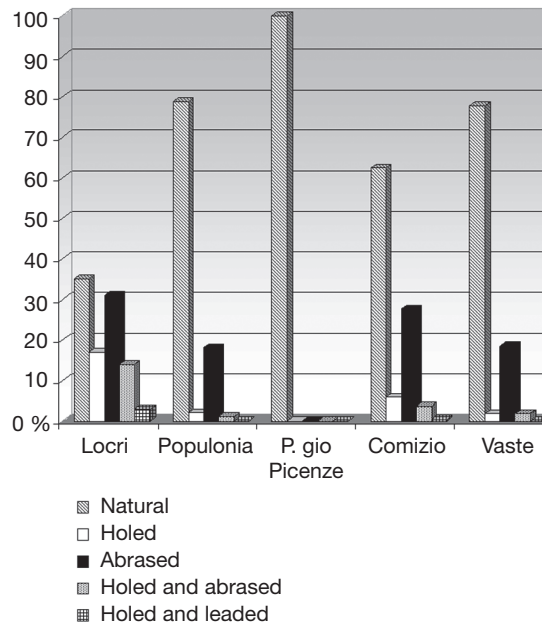


FIG. 7. — Percentages of modified and non-modified knuckle bones from all mentioned contexts.

At Vaste, 53 knuckle bones dated to the Hellenistic period were recorded: 34 belonged to sheep and only one to pig, other eighteen were generically identified as caprine. 11 specimens were smoothed and perforated (De Grossi Mazzorin & Solinas 2010).

## DISCUSSION

The knuckle bones found around the dead in tomb 101 at Varannone can be compared with the knuckle bones discovered in the same arrangement or above the tile covering of several tombs at Locri Epizefiri, interpreted as protective items (Elia & Carè 2004: 85). The link between the number of specimens, their arrangement and the funerary context is striking and could suggest that the knuckle bones were used to protect each living being from the dead.<sup>5</sup>

5. A similar case is represented by an older tomb (n. 476) in the Osteria dell’Osa necropolis (Rome), in which some graves and the arrangement of Vulcan lava blocks seem to suggest that the deceased was a sort of witch (Bietti Sestieri 1992, p. 660; 2008, p.154).



FIG. 8. — Heavily smoothed knuckle bones from the Lapis Niger.



FIG. 9. — The kernos coming from the Heraion of Samos (we can observe one knuckle bone under the animal protome).

The protective function of the knuckle bones is also suggested by the graphic representations on many block-anchors discovered in the Mediterranean and in the Black Sea basin (Gianfrotta 1980: 108). The knuckle bones are arranged in different ways but always represented with the highest score going to a *Venus*, with four different sides being displayed. The knuckle bones represented on block-anchors could reflect the hope of a safe docking (Queyrel 1987).

Nails were also considered to be protective items; they are mostly found with coins in Roman cemeteries (Sannazzaro 2001: 110). Even if we cannot completely exclude the hypothesis that the nails derive from a wood coffin, we would tend to consider them as protective items as they have been only found along the left side of the body. This theory is also suggested by tomb 587 in the Contrada Lucifero necropolis at Locri Epizefiri, in which 507 knuckle bones were arranged above the covering, while only one lay inside, close to the head, with an iron nail.

The case of Populonia seems to be different. The presence of knuckle bones in the burial of the child

seems to be linked to the desire to perpetuate his games, even if the knuckle game doesn't necessarily seem to be linked to the infant/child age, as documented by the iconographic and epigraphic evidence from the Classical and Hellenistic periods.<sup>6</sup>

The variety of genera of knuckle bones from the two contexts implies that this was strictly linked to the different meanings. The knuckle bones from Populonia belonged indifferently to sheep, goats (57%) and pigs (43%). On the other hand, no pig knuckle bones are recorded at Varranone, and they are infrequent at Locri Epizefiri.

The type of modification could also be varied (fig. 7). The knuckle bones from Populonia were smoothed on medial and lateral sides. The knuckle bones found at Varranone were not modified. The knuckle bones from Locri Epizefiri mostly display modifications on the plantar and dorsal sides. This difference could be linked to different functions. The heavily smoothed knuckle bones could have been used as piece games in order to reach different variations with no difficulty (fig. 8). A different interpretation from that of the 300 knuckle bones found in the princess' grave (tomb 200) at the Cigarralejo necropolis (Mula, Murcia), dated to ca. 425-375 BC (Cuadrado 1987). Rísquez & García Luque (2007: 162) interprets the grave goods, which also included 56 spindle whorls and a spool, as tools related to weaving activities.<sup>7</sup>

6. See also Carè (2006).

7. Tombs with several knuckle bones from the Iberian Peninsula are documented in the Coimbra del Barranco Ancho necropolis (Jumilla, Murcia), where 230 knuckle bones come from tomb 75 and another 100 from tomb 70; in the Cigarralejo necropolis (Mula, Murcia), where 300 knuckle bones were found in tomb 200; in the necropolis of La Albufereta (Alicante) where 200 knuckle bones come from tomb 28.



The significance of knuckle bones from Varranone e Populonia seems to be very different from that of knuckle bones from the *Lapis Niger* shrine, which can be compared with sacred and polysemic objects discovered in several sacred areas and temples located in the Mediterranean area, from the Near East to the Iberian Peninsula. Their meaning is not yet clear; the knuckle bones could be used as a means to predict the future and provide divinations, but also as *amuleta* to accompany the dead during their journey to the Lower world. The four knuckle bones (originally five or six) that adorn the *kernos* from the bothros in the Heraion of Samos, with other meaningful items such as the pomegranate, the frog, the animal protome, the shell and the monkey, are of particular relevance to this theory (fig. 9) (Bignasca 2000: 145).

## CONCLUSION

The knuckle bone can convey powerful meanings, as Carè (2010: 462) has already suggested, irrespective of age and gender. Although both of the contexts are funerary, the analysed assemblages of knuckle bones seem to have different functions. The knuckle bones from Populonia can be considered as toys of the deceased, whereas the knuckle bones from Varranone were undoubtedly protective items, such as *amuleta*.

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