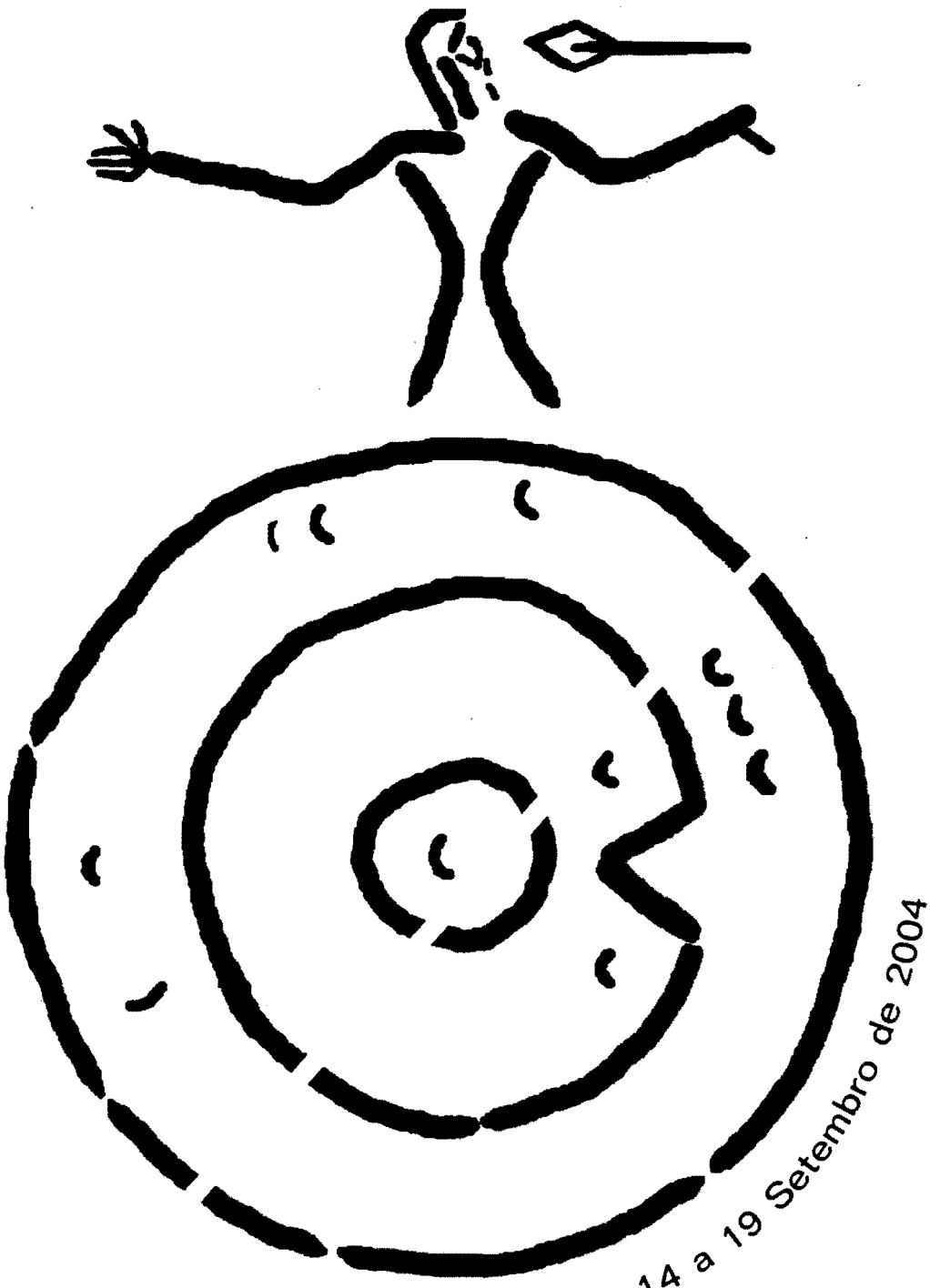

Animais na Pré-história e Arqueologia da Península Ibérica

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Climate, dietary choice, and the Paleolithic hunting of rabbits in Portugal

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ABSTRACT

One of the common themes in almost all of the Paleolithic faunal assemblages from Portugal regardless of age is the presence of abundant rabbit bones. From a broad perspective, the ubiquity of rabbit bone assemblages in Portuguese cave and rockshelter assemblages may mask differences in bone frequencies between different time periods at individual sites. A broad perspective, however, is required to determine the human preference for rabbit hunting through time. This paper discusses the Paleolithic hunting of rabbits in Portugal by comparing and contrasting two cave assemblages: the oldest well-dated Paleolithic assemblage in Portugal, the Galeria Pesada, and the latter Magdalenian assemblage from Picareiro Cave. Despite the abundance of rabbits available to human hunters during the Middle Pleistocene of central Portugal, there is little evidence that the occupants of the Galeria Pesada actively hunted and consumed these animals. In contrast, at Picareiro Cave the vast majority of bones were deposited by humans during the latter Upper Paleolithic. The Paleolithic hunting of small game such as rabbits in Portugal shows discontinuous patterns across both time and space. In some cases, such as the case of Picareiro Cave, differences in leporid hunting frequencies through time may be largely explained by topography and shifts in climate, while at the Galeria Pesada a pattern suggesting that small game was ignored seems to have been primarily influenced by human dietary choice.

KEY WORDS

Paleolithic diet; rabbit hunting; Portugal

INTRODUCTION

The European rabbit (*Oryctolagus cuniculus*) has been a part of the Iberian ecosystem for the past two million years. There are at least 20 known predators in Iberia that rely on the rabbit for sustenance. These include canids such as the wolf and fox, felids such as the lynx and wildcat, mustelids such as the badger, and a variety of raptors such as the eagle owl (reviewed in Hockett and Haws, 2002). Although the human occupation of modern day Portugal may have begun half a million years ago or longer, the oldest securely dated occupation occurs about 250,000 years ago at the Galeria Pesada located northeast of Lisbon (Marks *et al.*, 2002a, b). The Galeria Pesada contains abundant lithic artifacts and thousands of faunal remains, including almost 13,000 specimens of rabbit.

Between 200,000 and about 60,000 BP, there is scant information on the human occupation of Portugal. After ca. 60,000 BP, a host of Paleolithic sites such as Oliveira Cave, Caldeirão Cave, Figueira Brava, Pego do Diabo, Val Boi, Lapa dos Coelhos, Lapa do Suão, and Picareiro Cave provide numerous dated assemblages containing late Middle Paleolithic and Upper Paleolithic occupations (e.g., Almeida *et al.*, 2004; Antunes, 2000; Bicho *et al.*, 2000; Bicho *et al.*, 2003a, b; Davis, 2002; Haws, 2003, 2004; Hockett and Bicho, 2000; Valente, 2004; Zilhão, 1995). One of the common themes in almost all of the Paleolithic faunal assemblages from Portugal regardless of age is the presence of abundant rabbit bones. Thus, central and southern Portugal seem uniquely suited to the study of human hunting of small terrestrial game across deep time.

From a broad perspective, the ubiquity of rabbit bone assemblages in Portuguese cave and rockshelter assemblages may mask differences in recovered bone frequencies between different time periods at individual sites. A broad perspective, however, is required to determine the human preference for rabbit hunting through time. For example, it has been previously noted in both Portugal and Spain *that most* of the rabbit bones recovered from Middle Paleolithic cave and rockshelter sites occupied by Neandertals, or those assemblages dating prior to about 28,000 BP in Portugal and 30,000 BP in Spain, seem to have been primarily deposited

by small carnivores and raptors despite the fact that Neandertals frequented these same sites. Valente (2004) noted this pattern in Pego do Diabo Cave located in central Portugal, and Blasco Sancho (1995) had earlier noted this pattern in Gabasa Cave in northeastern Spain. Spanish researchers (e.g., Villaverde *et al.*, 1996; Morales *et al.*, 1998) have suggested that Neandertals may not have actively hunted small game such as rabbit because they had very high residential mobility geared toward the procurement of large-to-medium-sized herbivores such as horse and red deer. They think that such high mobility patterns all but precluded the Neandertals from staying put in one place long enough to pursue and capture small game on a consistent basis. In contrast, Upper Paleolithic peoples in Spain as a general rule had more restricted geographic ranges, and this fostered the kind of intimate knowledge of the landscape necessary to procure small game such as rabbit. Without question, beginning in the earliest Upper Paleolithic of Spain, foragers had added rabbit to the menu on a consistent basis (Aura Tortosa *et al.*, 2002). Similarly, foragers in eastern Europe increasingly focused their hunting efforts on small terrestrial game such as the mountain hare beginning in the early Upper Paleolithic (e.g., Musil, 1994).

The remainder of this paper discusses the Paleolithic hunting of rabbits in Portugal by comparing and contrasting two cave assemblages that I have been analyzing for a number of years: the oldest well-dated Paleolithic assemblage in Portugal, the Galeria Pesada, and the latter Magdalenian assemblage from Picareiro Cave. Tony Marks is the Principal Investigator at the Galeria Pesada, and Nuno Bicho led the excavations at Picareiro Cave. Both of these caves are located in central Portugal northeast of Lisbon (Figure 1), and they are spaced only about 5 km from one another. However, Picareiro Cave is located in the upland zone at 550 m asl, and represents the highest altitude Paleolithic cave excavated to date in either central or southern Portugal. In contrast, the Galeria Pesada is located in the low-to-mid zone at about 110 m asl.

Approximately equal numbers of rabbit bones were recovered from both caves: 13,000 specimens each. A total of 12,612 leporid bones were recovered from the Galeria Pesada, while 13,051 were recovered from Picareiro Cave through the year 2004. The 12,612 bones from the Galeria Pesada represent at least 234 rabbits and hares, while the 13,051 bones from Picareiro Cave represent at least 271 rabbits. Each of these assemblages, however, displays a unique and complex depositional history that requires intensive taphonomic and paleoecological analyses in order to tease out who or what deposited the rabbit bones into these caves, and in the case of Picareiro Cave, ascertain why we see fluctuations in specimen numbers through time. And that is my main theme of this paper: if we are to increase our understanding of Paleolithic subsistence practices in Portugal then each faunal assemblage analyzed must be scrutinized through taphonomic and paleoecological filters, otherwise we will make little progress in our understanding of behavioral and demographic change through time, which is a topic that I explore in greater detail in a different paper published in these conference proceedings (Hockett, 2005; also Hockett and Haws, 2005).

DIETARY CHOICE AT GALERIA PESADA AND PICAREIRO CAVE

Galeria Pesada seems to have been occupied primarily during MIS 8 and perhaps MIS 6, sometime roughly between 250,000 and 200,000 years ago (T. Marks, personal communication). Tony Marks describes the lithic assemblage from the Galeria Pesada as unique in southwestern Iberia, exhibiting a mixture of large and small bifaces that include hand axes and other tools such as backed knives and side scrapers (Marks *et al.*, 2002a). Approximately 20,000 bone specimens were recovered from the Galeria Pesada (Marks *et al.*, 2002b). As mentioned, almost 13,000 were from rabbits and hares, with 99% of these from rabbits. The number of individual elements represented by these bones and bone fragments are shown in Table 1.

Despite the abundance of rabbits available to human hunters during the Middle Pleistocene of central Portugal, there is little evidence that the occupants of the Galeria Pesada actively hunted and consumed these animals. Because of their small size, human hunters generally bring entire rabbit carcasses into caves and rockshelters for processing. This tends to produce faunal assemblages with relatively even distributions of the major limb bones. In contrast, in addition to cut-marked bones, rabbit bone assemblages from the earliest Upper Paleolithic of Iberia tend to contain large numbers of long bone cylinders created by the extraction of marrow from the femur, tibia, and humerus (reviewed in Hockett and Haws, 2002). However, at the Galeria Pesada there were many more hind limb bones recovered than front limb bones (Table 2); this is characteristic of both raptor and small carnivore-accumulated assemblages. For examples, as shown in Table 2, at the Galeria Pesada the bones of the hind limb region returned relative frequency values that ranged between .63 and 1.0, while those of the front limb region ranged between .29 and .52. This discrepancy in relative frequency values between hind limb and front limb bones is similar to both eagle nest and small carnivore assemblages. In contrast, at Picareiro Cave, where the vast majority of bones were deposited by humans during the latter Upper Paleolithic, the hind limb and front limb bones display more even relative frequency values. In the case of Picareiro Cave, the relative frequency

values of the hind limb bones ranged between .63 and 1.0 (similar to Galeria Pesada), but the front limb bone values ranged between .59 and .85 (Table 2).

In addition, several bones from the Galeria Pesada display puncture marks caused by raptor beaks or talons or by carnivore teeth. Because most of these bones display a single puncture only, this suggests they were damaged by raptors rather than by carnivores because carnivore mastication often leaves multiple puncture marks on rabbit bones. The vast majority of the rabbit bones from Galeria Pesada, therefore, appears to have been deposited by raptors and small carnivores rather than by humans. The only caveat to this interpretation is the fact that less than one-half of one percent of all the rabbit bones recovered from the Galeria Pesada displayed a puncture mark, whereas every modern raptor and carnivore-accumulated assemblage I have analyzed shows between 2-25% of rabbit bones punctured (Table 2). Thus, this taphonomic pattern remains unexplained at the Galeria Pesada. It also may be noted that Jean-Philip Brugal has found good evidence through the presence of stone tool cut marks and hammer percussion marks that large game such as horse and red deer were consumed inside the cave (Marks *et al.*, 2002b). Thus, the Neandertal or late *H. heidelbergensis* that occupied the Galeria Pesada chose not to eat rabbit on a consistent basis despite the fact that rabbits were numerous in the region. Whether the mobility patterns of these early human populations contributed to this dietary choice is uncertain, but it may have played a role.

The rabbit bone assemblage from Picareiro Cave is taphonomically different in almost every respect to that of the Galeria Pesada, as suggested above. As a whole, the rabbit bones from the cave show a more even distribution of body parts (Table 2), hundreds of long bone cylinders were recovered (572 humeri, femora, and tibiae cylinders in the levels dating between 12,300 and 11,800 BP), and many foot bones were burned from the roasting of whole carcasses (see also Hockett and Bicho, 2000). In addition, many of them were found in context with a large hearth-like feature full of charcoal (Bicho *et al.*, 2003b: Figure 5). During the Magdalenian occupations, not a single bone displays a puncture mark caused by a raptor or a small carnivore. Clearly, human hunters actively targeted rabbits near Picareiro Cave during the latter Magdalenian and processed hundreds of carcasses inside the site.

Such broad-based interpretations, however, may mask diachronic differences in hunting strategies and land use near Picareiro Cave that may have been influenced by changes in climatic patterns, the latter of which impacted faunal and vegetation distributions in the uplands of Estremadura. Picareiro Cave is the highest elevation Paleolithic site excavated to date in central Portugal. If we compare the number of rabbit bones deposited in the cave across the Upper Paleolithic, we see that most of these bones come from climatic phases that were relatively warm (Table 3). Before ca. 12,300 BP, during the cooler phases of ca. 12,500-14,500 BP and during Late Glacial Maximum (depending on the precise dating of stratum I in the cave), Picareiro Cave does not appear to have been utilized much by human hunters, nor even by nonhuman predators. Between 12,300 BP and just prior to the Dryas III cold event at about 11,500 BP, thousands of rabbit bones were deposited inside the cave. Then, during the Dryas III cold event, human use of the Estremadura uplands seems to have diminished considerably. Human use of the cave, including rabbit hunting nearby, appears to have increased again when conditions became warmer after ca. 10,500 BP.

My colleague Jonathan Haws and I (Hockett and Haws, 2002) think that these fluctuations in the intensity of rabbit hunting near Picareiro Cave were likely influenced primarily by climatic conditions that negatively impacted local rabbit populations during colder phases and positively impacted their numbers during warmer phases in the Estremadura uplands. In contrast, lower elevation sites nearby, such as Caldeirão Cave, did not see significant decreases in human use even during colder climatic phases associated with cultural periods such as the Solutrean. Put another way, rabbit populations do not appear to have been as negatively impacted in the lowland and mid-elevation zones as they were in the uplands, because rabbit bones are as common in the colder phases as they are in the warmer phases in the lower elevation settings.

The Galeria Pesada is similar to lowland cave sites such as Caldeirão in this regard. The faunal bearing sediments in the Galeria Pesada were deposited during the glacial cycles of MIS 8 or MIS 6. Yet the deposits are full of thousands of rabbit bones. Thus, the data at hand suggest that rabbit populations remained strong during both glacial and interglacial cycles in the lowland zones of central Portugal. The differences between the taphonomic patterns of the rabbit bones deposited during cooler phases at the Galeria Pesada during the Middle Pleistocene and at sites such as Caldeirão during the latter Pleistocene lie in the agents of rabbit bone deposition. At the Galeria Pesada, raptors and small carnivores were the primary depositors of rabbit bones to the site, both because these predators rely on rabbit for sustenance but also because the Middle Pleistocene humans chose not to capture and consume rabbits inside the cave. At many of the latter Pleistocene sites, humans were the primary or sole agents of rabbit bone deposition.

Picareiro Cave, on the other hand, is interesting because the site records much greater variation in numbers of rabbit bones within relatively short spans of time compared to sites such as Caldeirão. These fluctuations are directly correlated with warmer and colder climatic phases in which human use

of the upland zones appears to have increased in frequency and/or duration during the warmer periods, and dropped rather dramatically during the colder phases. We interpret this as a loss in productivity of animal populations in the upland zones during colder climatic phases, perhaps coupled with the intensification of resource use in lowland habitats and the opening of new resource opportunities in coastal areas during these cool climatic periods.

CONCLUDING REMARKS

We must continue to recover faunal assemblages from as many different ecological settings as possible in order to fully understand Paleolithic land use in southwest Iberia (e.g., Aura *et al.*, 1998; Aura Tortosa *et al.*, 2002; Morales *et al.*, 1998; Villaverde *et al.*, 1996). The hunting of small game such as rabbits shows discontinuous patterns across both time and space. During the Middle Pleistocene, early human populations represented by Neandertals or *Homo heidelbergensis* showed little interest in pursuing small game of any kind, despite the fact that rabbits, birds, and tortoises were abundant in specific localities near occupation sites. In contrast, early Upper Paleolithic foragers represented by *Homo sapiens* actively pursued small game, including rabbits. However, within the Upper Paleolithic specific sites may suggest little to no hunting of rabbits while others nearby suggest active rabbit hunting. In some cases, such as the case of Picareiro Cave, these differences may be largely explained by topography and climate rather than by human dietary choice.

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TABLE 1. Minimum Number of Leporid Elements (MNE) of the major bones from the Middle Pleistocene site Galeria Pesada and the Late Pleistocene site Picareiro Cave, central Portugal.

Element	Galeria Pesada (MNE)	Picareiro Cave (MNE)
mandible	187	285
maxilla	114	220
sacrum	58	8
innominate	468	425
femur	297	274
tibia	425	271
patella	26	150
calcaneus	443	430
astragalus	190	327
scapula	181	306
humerus	244	253
radius	137	364
ulna	174	349
carpal/tarsal	220	260
metapodial	2,040	1,158
phalange	2,744	2,374
vertebra	980	218

TABLE 2. Comparison of relative frequency values of leporid head, hind limb, and front limb portions between Galeria Pesada, eagle nests, small carnivore accumulations, and Upper Paleolithic foragers.

	Leporid Bone Assemblage			
	Galeria Pesada	Eagle Nests	Small Carnivores	Picareiro Cave
Head				
mandible	.40	.23	.48	.66
maxilla	.24	.14	.58	.51
Hind Limb				
innominate	1.0	.60	.73	.99
femur	.63	.51	.67	.64
tibia	.91	1.0	1.0	.63
calcaneus	.95	.95	.60	1.0
Front Limb				
scapula	.39	.06	.19	.71
humerus	.52	.18	.33	.59
radius	.29	.22	.25	.85
ulna	.37	.19	.31	.81
Vertebra NISP/MAU	4.2	2.3	5.7	0.8
% punctured	.001	.02	.24	.00

TABLE 3. Number of Identified Specimens (NISP) and Minimum Number of Elements (MNE) of the leporid bones recovered from strata D – I at Picareiro Cave.

Date (BP)	Associated Strata	Cultural Period	Associated Climate	Number of leporid bones NISP (MNE)
10,500-8,500 BP	E (U.), D	Epipaleolithic	relatively warm	767 (421)
11,500-10,500 BP	none	Magdalenian	relatively cool	0 (0)
12,500-11,500 BP	E (M.), E (L.), F, G	Magdalenian	relatively warm	11,214 (6,889)
< 12,500 BP	I	Magdalenian? Solutrean?	relatively cool	348 (254)

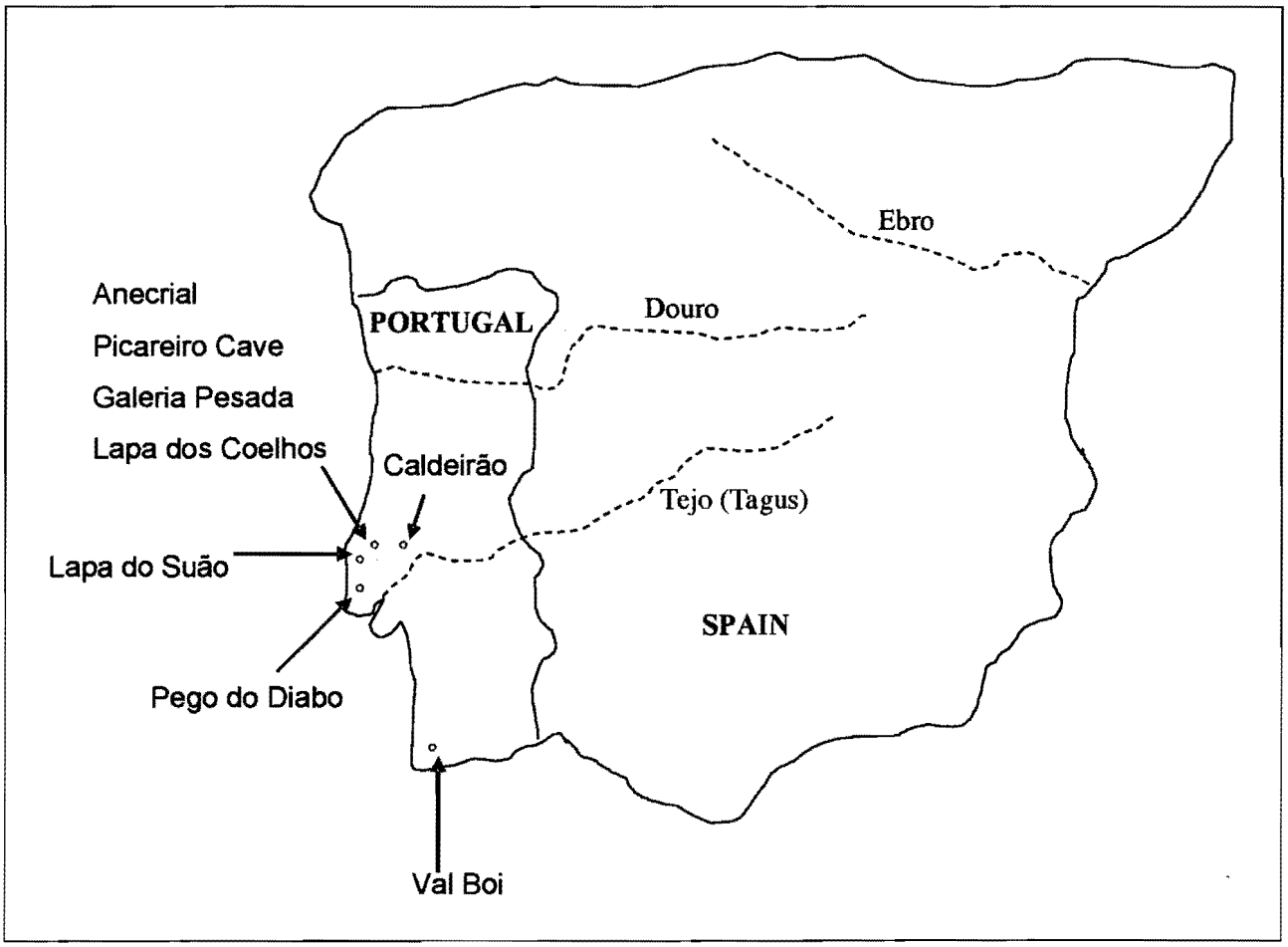

FIGURE 1. General location of the Galeria Pesada, Picareiro Cave, and other nearby sites.