Apiary-walls and pitfall-traps in Portugal: Archaic constructions for wild animals

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ABSTRACT: The apiary-walls (“muros-apiários”) and the pitfall-traps for wolves (“fojos do lobo”) are two types of rural constructions poorly represented in inventories related to cultural heritage, in spite of their protective function of goods economically important in rural areas. The pitfall-traps are permanent traps built in stone, used in the war against the wolf motivated by livestock depredation. The apiary-walls are stone or stucco-made enclosures, which constitute a strategy for protecting beehives from predators, such as brown bears. These rural buildings are open to multiple approaches covering biological, archaeological and anthropological sciences as they illustrate a strong relation to the environment, both biotic and abiotic, and to rural economy. This study conducts an inventory and characterization of these constructions in Portugal and their context in terms of structural characteristics, distribution and potential for rural development. Methodology was based in a literature review, a research of historical documents and a field prospection of material vestiges.

1 INTRODUCTION

Rural communities in Portugal compose a diversified architectonic heritage associated to their continuous and direct relationship with the surrounding environment, which is unique at the European level (Oliveira et al. 1988, Oliveira & Galhão 2000).

In this work, two types of buildings of rural architecture related to wildlife that have received little attention as Portuguese cultural heritage are highlighted. Structures for beehive protection against predators (“silhas”, “muros” ou “malhadas de colmeias”) and pit-fall traps made of stone for hunting wolves (“fojos do lobo”) are monumental examples of rural architecture which are absent in studies of great importance, particularly those who have been being promoted over the last century in the context of rural ethnology (Oliveira et al. 1988).

The cultural value of these two types of constructions goes beyond their architectural importance. In fact, they are also related to the protection of important rural economic assets, such as honey, wax and livestock, and allow biological and social inferences on the relationship between humans and wild animals, especially brown bears (Ursus arcos) and wolves (Canis lupus). Thus, these rural constructions are open to multiple approaches, and illustrate a strong relation to the environment, both biotic and abiotic, as well as to rural economy. This study aims to highlight these aspects through the inventory and general characterization based on the current knowledge of these constructions in Portugal, and their context in terms of structural characteristics, distribution and potential for rural development.

2 RESEARCH METHODOLOGY

To identify apiary walls and stone-made constructions for hunting wolves, an extensive bibliographic search was conducted based on recent and historical sources, personal interviews and field prospection of material vestiges, covering research approaches from biological, archaeological and anthropological sciences.

Interviewed local informers were preferably selected among rural communities, for their older age and their pastoral or agricultural activity. With this approach it was intended to increase the quantity, quality and credibility of the information on cultural heritage related to wildlife. Informers were accompanied to the building sites to ensure the unequivocal identification of the structures. The identification of these structures was also based on: 1) compilation of unpublished information gathered by other researchers; and 2) historical
documents which could allow not only site identification, but also provide information about the antiquity of the structure.

For each identified structure data was collected concerning the building sites and materials, the functioning, the date of construction and periods of use, and the procedures involved in the construction and use. Considered were only the structures identified with a high confidence level such as direct observation by one of the authors of material remains in the field, or in photographic records on bibliography. The presumed existence of structures, based only on local site names in topographic maps, or oral and bibliographic information, without the observation of material vestiges was not considered. Data on the distribution (building area) and density (construction intensity) of the identified apiary walls and stone-made wolf traps in Portugal is presented and mapped at the Municipality level.

3 APIARY WALLS (“MUROS-APIÁRIOS”)

3.1 Context

The importance of honey and wax to the economy of human communities is ancient. The earliest archaeological evidence of honey manipulation in Europe dates from 5250 years BP, and is documented in a ceramic container from Toledo, Spain (Bueno et al. 2006). In Iberia, the practice of honey collection is also well represented in the rock art of the Eastern Peninsula, dating around the Late Neolithic and Bronze Age (Barandiarán et al. 2007).

The “domestication” or at least the conditioning of bee swarms is documented in more complex cultures, as ancient Egypt, with the use of clay beehives (Naves & Naves, 1988). The increased production of honey and wax, being exposed to predators both wild and human, has originated a second level of conditioning and protection of bee swarms by building defensive and robust structures. Indeed, in many countries of Europe and the Near East, and particularly in the Mediterranean region from the Aegean to the Iberian Peninsula, there are very different architectural solutions for containment and protection of beehives.

Unparalleled with other European regions, the type of defensive structure for beehives used in Portugal is the apiary-wall, a construction aimed to confine beehives inside a stone wall corral (AAVV 2010). The apiary-walls are circular or quadrangular structures made of robust and high stone walls (more than 2 m high), aimed at protecting the beehives from being destroyed by large predators, such as brown bears (Mendez de Torres 1586, Torrente 1999, Boza 2002, Álvares & Domingues 2010).

3.2 General description

In Portugal, the current knowledge of structural characteristics of apiary-walls is based mainly on four regional inventories (Dinis & Dinis 2010, Correia, 2010, Henriques et al., 2010, Rodrigues & Neves, 2010). An apiary-wall can be defined as a closed wall structure, built in stone or earthen materials (the latter only in southern Portugal), enclosing an area not covered, inside which the beehives are placed, usually in rows and arranged in a staircase terraced, when the terrain is more inclined (Fig. 1 A). The entrance to this structure is usually done by a small opening in the wall, which is closed by a door. Two other structural elements are common in many apiary-walls: 1) the “beirado”, which consists in a wall top layer of overhanging, large, flat stones that formed an outer edge, to prevent an overtopping entrance, and 2) a small storeroom made of stone, adjacent to the interior or exterior surface of the wall.

In Portugal apiary-walls have two main configurations: 1) circular (Fig. 1B), including variants with sub-circular, elongated, elliptical or ovoid shapes, and 2) four-sided polygonal shape (Fig. 1C), including quadrangular, rectangular or trapezoidal variants. Mixed forms are less represented, combining arched and straight sides as a semicircle (Figure 1D) or horseshoe shape (Fig. 1 A). The geographical distribution of these types of configurations and their relative dominance in a particular region vary throughout the country, and sometimes between nearby areas (Henriques et al. 2010, Rodrigues & Neves 2010).

The size of the enclosed area is related to the number of beehives capable of being supported in the area, which depends on the floristic potential and the competition from other apiaries in the surrounding region. In central Portugal (Tejo river valley), the apiary-walls have areas ranging from 26 m² to 2704 m² (Henriques et al. 2010, Rodrigues & Neves 2010).

![Figure 1. General view of structural types of apiary-walls, in Lobios (A), Idanha-a-Nova (B), Nisa (C), Idanha-a-Nova (D). (Credits: J.C. Caninas et al).](image-url)
The topographic placement of apiary-walls is conditioned by bee biology, climatic factors and the optimization of apiary productivity (Henriques et al. 2010). Some parameters that reflect this constraint are sun exposure, nearest water source and biotic factors, such as the existence of floristic resources with potential for honey production. In central Portugal (Tejo river valley), most apiary-walls are oriented to the Southeast, South and Southwest (120 degrees to 220 degrees), being dominant the South direction (about 40%).

The construction of apiary-walls involves a huge effort since they are often located in remote places of difficult access. The main reason for building apiary-walls was for defense, by preventing the onslaught of humans and wild predators of different sizes, mainly brown bears, but also badgers (Meles meles), mangoses (Herpestes ichneumon) and wildboars (Sus scrofa). Additionally, these constructions also function as protection against fire and winds.

3.3 Chronology and building areas

The use of these defensive constructions is documented since the 16th century in beekeeping manuals (Mendez de Torres 1586) and other historical documents (Álvares & Domingues 2010, Henriques et al. 2010). However, it is believed that the use of these structures must be older, taking into account the extent and economic importance of honey and wax production during the Middle Age (Henriques et al. 2010).

In the last few centuries, with the human population growth, expansion of cultivated areas and the decline of large predators, as brown bears; the construction of massive apiary-walls has also decreased with a trend to gradually reduce the height of the walls of new buildings, efficient enough to avoid smaller predators.

During the 20th century, written references to apiary-walls in Portugal are scarce and mainly related to occasional references in beekeeping manuals. Only recently, some attention has been given to these examples of rural architecture with several regional inventories specifically dedicated to these structures (Dinis & Dinis 2010, Correia 2010, Henriques et al. 2010, Rodrigues & Neves 2010). Until now, the presence of apiary-walls has been identified in a total of 43 municipalities, comprising 14% of all these administrative units in the country.

The geographical location of these constructions, at a municipality level, shows asymmetries in the distribution and density across Portugal (Figure 2). Apiary-walls are distributed in mountainous areas, along the main river valleys inland, and also in the lowland plains of southern Portugal. The largest number of identified structures per municipality reflects a bigger research effort conducted in these areas under inventory projects of architectural heritage.

Based on the present compilation from Portugal, and several other studies from Spain, it is possible to identify four main areas with apiary-walls in the Iberian Peninsula: 1) Northwest Iberian (northern Portugal and Spanish regions of Galicia, Asturias and Castilla León); 2) the Ebro river valley (Spanish regions of Aragon, Navarre, Catalonia, and Castilla León); 3) Tejo river valley (Portuguese regions of Beira Interior and Alto Alentejo and Spanish regions of Cáceres), 4) Guadiana river valley (Portuguese region of Alentejo).

4 PITFALL-TRAPS FOR WOLVES (“FOJOS DO LOBO”)

4.1 Context

Throughout the centuries wolves were the main predators of livestock, causing important economic...
losses on the weak rural economy (Boitani 1995). As a response, pastoral communities have developed several devices for capturing and killing wolves, as a means for controlling wolf numbers and reduce livestock losses (Álvares et al. 2000, Boza 2002, Pérez López 2010). The most remarkable were the traps or pits constructed in stone for capturing wolves, denominated “fojo do lobo” in Portugal (Grande del Brio 1984, Álvares et al. 2000, Boza 2002, Pérez López 2010). These wolf-traps were constructed along the paths frequently used by wolves, usually near villages or livestock grazing areas, and had as a common feature the capturing of the animal inside a pit, through either active or passive means (Álvares et al. 2011). The use of these examples of rural architecture was also important in an anthropological and social context. In fact, capturing a wolf in one of these traps was a cause of great satisfaction and joy for all the villagers in the region, and a way of expressing all the repressed fear and hatred towards this carnivore (Álvares et al. 2011, Pérez López 2010). This architectural legacy related to wolf-traps makes part of an extensive list of cultural and ethnographic manifestations related to wolves, still present in the collective memory and daily practices of rural villagers in Portugal (Álvares et al. 2011).

Three main types of wolf-trap constructions can be recognised in Portugal according to their functioning and structural features: 1) the “simple wolf-trap”; 2) the “goat wolf-trap” and, 3) the “convergent walls wolf-trap” (Álvares et al. 2000, 2011, Boza 2002, Pérez López 2010). The designations adopted in English follow a direct translation of how each type of these traps is referred to among rural people in Portugal.

The “simple wolf-trap” consisted in a single pit dug in the ground, frequently supported with stone walls, where the wolves would fall after being pursued by a hunting party, or attracted with dead or living bait (Figure 3 A). The mouth of the pit was normally camouflaged with vegetation, but in some cases it had a rotating trap-door that would turn when the animal stepped on it. Due to the lack of conspicuous architectural elements and the intentional or natural sand-barring, this type of wolf-trap is very difficult to detect, and its technical characteristics are known mainly through oral or written sources.

The “goat wolf-trap” was a 15–30 meters in diameter circular stone wall corral, inside which a living bait—most frequently a goat but, also a dog or a sheep—was placed to attract the wolf (Figure 3 B). Each time, the animal used as bait was supplied by a different livestock-owner from the village to which the wolf-trap belonged. This trap was conceived to allow wolves an easy entrance, because the exterior wall height was lower. However, once the wolf got inside, it was very difficult to get out since from the interior the wall was 2 meters high, slightly slant inwards and included a top layer of overhanging, large, flat stones that formed an inner edge (Fig. 3D). The “convergent walls wolf-trap” was a funnel-shaped structure comprising two long stone walls, up to 1 km long and 2 meters high each, which converged into a deep pit (Fig. 3C). Wolves were driven to the pit by a hunting party made up of large numbers of local people, from one or more villages. There are at least two known variants of the “convergent walls wolf-trap”, such as a W-shaped structure, with two pits; or an X-shaped structure, with four walls converging to a single pit (Pérez López 2010). Similarly to the “goat wolf-trap”, the effort required for the construction, use and maintenance of this kind of trap was dependant on a communal social system.

4.2 General description
4.3 Chronology and building areas

The first references to the use of these stone-built wolf-traps in Portugal are in documents dated from the 10th to the 12th centuries, both in Portugal (Herculano 1868, Gonçalves 2006) and in Spain (Grande del Brio 1984, Boza 2002). For centuries these constructions were regularly used among rural communities as the main system to control wolf numbers. Their use was still widespread until the end of the nineteenth century and the last wolf captures in these traps occurred in the 1970s in Soajo municipality (Álvares et al. 2000, 2011). As a consequence of their abandonment, most of these constructions have fallen into ruin, mainly...
due to intentional sand-barring, stone pillage and negligence in recent rural development actions, such as road network improvement and forest production (Álvares et al. 2000).

The presence of wolf-trap structures was identified in a total of 17 municipalities, comprising only 5% of all these administrative units in Portugal. The distribution of the municipalities in Portugal with identified structures indicates that their presence is mostly associated with the mountainous regions of northwestern Portugal (Fig. 4). Localized areas with higher density of wolf-traps are also identified. In fact, it has been confirmed up to four of these hunting structures located in areas of 100 km², which could be used simultaneously or according to the seasonal grazing movements of the livestock. These areas with high concentration of wolf traps suggest the existence of an intense wolf predation on livestock and coincide with the main core areas of current wolf distribution, where this carnivore still persist mainly due to high availability of domestic prey (Álvares 2004).

The presence of wolf pitfall-traps structurally similar to the Portuguese ones is also known in other regions worldwide. Bibliographic references indicate that “simple wolf-trap” were widespread throughout the whole Iberian Peninsula and across the Palearctic region (Grande del Brio 1984, Boza 2002). On the contrary, the “goat wolf-trap” and the “convergent walls wolf-trap”, technically more elaborate, have much more restricted building areas at the Iberian level, and are located mainly in the Northwest (Álvares et al. 2011).

The “goat wolf-trap” type was mainly built in regions traditionally with high numbers of goats and sheep, whereas “convergent wall” traps were limited to highland pastures with free-ranging horses and cattle. Apart from the Iberian Peninsula, the use of stone-built traps for capturing wolves similar to the “goat wolf-trap” is known from the trans-Himalayan region of northwestern India (Fox & Chundawat 1995); also the use of game traps similar to the “convergent walls wolf-trap” is only known in the deserts of the Near East for capturing herds of wild ungulates (Holzer et al. 2010). Thus, the “fojos”, and in particular these two types, reflect a level of technical and operative specialization in wolf hunting in northern Portugal that does not have comparison with other regions of the world.

5 FINAL CONSIDERATIONS

This study highlights the apiary walls and wolf pitfall-traps as monumental and remarkable examples of rural architecture aimed to protect livelihoods from predators, such as large carnivores. Other Iberian traditional constructions exist, with similar function and impressiveness, such as the stone-made structures for livestock confinement or protection (Álvares et al. 2011). Altogether, this architectural legacy has practical implications in several domains of knowledge. These structures are still well manifested in material remains of high architectural value, and in the memory or practices of local communities, making it unparalleled in other European regions. Moreover, these constructions provide insights on historical distributions of wild species, such as wolves and bears, and their relationship with humans (Álvares & Domingues 2010, Álvares et al. 2011).

The inventory, study and preservation of these structures are important from an archaeological, architectonic, ethnographic and biological point of view and as a potential promoter of rural development through their touristic use. Several actions
aimed at the preservation of apiary-walls and pitfall-traps have already been implemented in Portugal, involving the full structural reconstruction of the structures and their inclusion in touristic routes. Public authorities should confer adequate legal protection and recognition to these structures due to their cultural and environmental interest, in order to ensure their future presence both in Portuguese landscape and culture.

ACKNOWLEDGEMENTS

For providing enlightenment and useful information our thanks to A. Miguel Lima, A. Cerveira Lima, A. Pereira, A. González Cordero, A. Redentor, F. Carvalho, J. Domingues, J. Maria Serra Saraiva, J. J. Mendes Gardete, P. Dias, P. Ramalho, P. Primavera, R. Barbosa, V. Barbosa Pinto and M.M. Ramalho. For financial and logistic support our thanks to the NGO “Grup M Lobo” and EMERITA, Lda. For figure construction our thanks to M. Mascarenhas Monteiro.

This work is dedicated to Luigi Nino Masetti, tireless researcher on apiculture history in Europe, and João Carlos Neves, technician from Serra de São Mamede Natural Park, who promoted the first regional inventories of apiary walls.

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