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Forensic Anthropology Population Data

A new forensic collection housed at the University of Coimbra, Portugal: The 21st century identified skeletal collection

Maria Teresa Ferreira [a,b,c], Ricardo Vicente [a,b], David Navega [a,b], David Gonçalves [a,b,c,d], Francisco Curate [a,b,c], Eugénia Cunha [a,b,*]

[a] Forensic Sciences Centre (CENCIFOR), Coimbra, Portugal
[b] Laboratory of Forensic Anthropology, Department of Life Sciences, University of Coimbra, Coimbra, Portugal
[c] Research Centre for Anthropology and Health (CIAS), University of Coimbra, Coimbra, Portugal
[d] Laboratório de Arqueociências, Direcção Geral do Património Cultural and LARC/CIBIO/InBIO, Lisboa, Portugal

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ABSTRACT

The purpose of this study is to characterize and contextualize the new collection of identified skeletons housed in the Department of Life Sciences at the University of Coimbra, Portugal. The 21st Century Identified Skeletal Collection, which is still being enlarged, is currently composed of 159 complete adult skeletons (age at death range: 29–99 years) of both sexes. The skeletons consist almost exclusively of Portuguese nationals who died between 1995 and 2008. The state of preservation is good and more detailed antemortem information is presently being collected.

This collection constitutes a fundamental tool for forensic anthropology research, including development and validation studies of skeletal aging and sexing methods that target elderly adults. Moreover, this collection can also be used in conjunction with the other reference collections housed in the University of Coimbra to investigate secular trends in skeletal development and aging, among others.

1. Introduction

The first human skeletal collections were amassed in Europe and in the United States of America, prompted by influential individuals, such as the surgeon John Hunter, the anthropologist and physician Pierre Paul Broca or the professor William Turner [1–4]. The methodical assemblage and study of human skeletal remains have a longstanding scientific tradition in physical anthropology. Reference collections represent the primary foundation for the development of basic techniques in both forensic anthropology and bioarchaeology, which among others, include sex, age and stature estimation (e.g., [5–12]).

Reference skeletal collections are therefore recognized as an exceptionally valuable research asset but those with a significant number of human skeletons of recent origin are scarce. Also, it must be taken into account that the age range of a forensic case is considerably different from country to country, therefore many older collections are not entirely useful for the development of methods that can be reliably applied to more recent populations. To start with, documented skeletons are limited to a few assemblages (Table 1) [13–27], thus further decreasing the amount of forensically adequate collections.

Although reference skeletal collections are major resources for the physical anthropologist, there is a growing awareness about the empirical constraints in the application of universal standards to the identification of individuals in forensic settings and the construction of paleodemographic and paleoepidemiological profiles in bioarchaeology [17,24,28]. Physiological age indicators, growth patterns or sexually dimorphic traits vary across populations, demanding population-specific methodologies for the assessment of basic biological profiles of skeletonized individuals [29]. Most of the cited documented skeletal assemblages comprise individuals that died before 1950 and are biased samples of the populations from which they derive [25]. Also, the reliability of individual documentation in these collections is heterogeneous, occasionally conveying inaccurate information. For example, some collections, including the well-known Terry Collection, include some or all individuals with self-reported ages [29]. As such, the

* Corresponding author at: Departamento de Ciências da Vida, Universidade de Coimbra, Calçada Martim de Freitas, 3000-456 Coimbra, Portugal.
Tel.: +351 239854111; fax: +351 239854129.
E-mail addresses: cunhae@ci.uc.pt, genac62@gmail.com (E. Cunha).

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Table 1
Some of the existing identified skeletal collections in Europe.

Collection	Country	Individuals (*N*)	Chronology	Reference
Coimbra Identified Skeletal Collection	Portugal (Coimbra)	505	1904–1938	[13]
Bocage Museum (NMNH) Identified Skeletal Collection	Portugal (Lisbon)	1692	1880–1975	[14]
UAB Identified Skeletal Collection	Spain (Barcelona)	35	1977–1991	[15]
UCM Identified Skeletal Collection	Spain (Madrid)	119	1975–1985	[16]
Granada Osteological Collection of Identified Infants and Young Children	Spain (Granada)	230	1870–2009	[19]
Sassari Collection	Italy (Bologna)	606	First half of the twentieth century	[18]
Athens Human Skeletal Reference Collection	Greece (Athens)	225	1960–1996	[17]
Crete Human Skeletal Reference Collection	Greece (Crete)	178	1968–1998	[27]
St. Bride's Church Documented Collection	UK (London)	244	18th–19th century	[20]
Christ Church Spitafields Collection	UK (London)	968	1729–1859	[21]

methodologies applied to forensic cases should be developed on the basis of recent reference series. Having this in mind, we strove to amass a forensic identified skeletal collection.

The new reference collection presented here results from the sampling of recent individuals from Portuguese nationality and south European ancestry. The "Colecção de Esqueletos Identificados do Século XXI (herein CEI/XXI)" (21st Century Identified Skeletal Collection – ISC/XXI) housed at the Laboratory of Forensic Anthropology of the Life Sciences Department at the University of Coimbra, Portugal, currently comprises 159 documented adult skeletons from both sexes. This paper aims to depict the fundamental anthropological and demographic features of the new collection, as well as its organization history.

2. Building a reference sample

A protocol of collaboration between the former Department of Anthropology of the University of Coimbra (UC), now integrated in the Life Sciences Department and the City Council of Santarém (responsible for the *Capuchos* cemetery) was established in 2009 for the bestowal of non-claimed skeletal remains. Since then, identified skeletons from individuals who died after the year 2000 have thus been received and curated at the UC.

In Portugal, according to ordinance n° 411/98 of December the 30th, it is possible to perform non-judiciary exhumations three years after the inhumation (provided that the body is fully skeletonized) thus allowing the reuse of burial ground [30]. The skeletons that are not claimed by relatives stay under the tutelage of the cemetery. Therefore, the CEI/XXI collection is composed of corpses that were unclaimed or abandoned beyond the legal period. The Santarém City Council provided copies of the inhumation and exhumation registrations as well as the death certificates of each individual. Information about the name, age at death, sex, nationality, date of death, date of inhumation, date of exhumation and the burial slot at the cemetery is therefore available for each individual.

Currently, the skeletons are submitted to a preliminary cleaning process at the cemetery and transported to the UC packed in black plastic bags. However, the first 70 skeletons were not subjected to that process and still presented body hair, adipocere, soft tissues and clothes when received at the UC. In these cases, complete cleaning and maceration took place at the laboratory. After the cleaning process, the skeletons were stored individually inside plastic containers tagged with the correspondent serial number. The information linking the serial number to the name of each individual is kept in an Excel database with access restricted to researchers, in order to preserve the confidentiality of personal data.

Currently, 70 skeletons are available for study while the remaining 89 are still undergoing the cleaning and tagging processes. In order to process and keep the skeletons in good conditions, the Laboratory of Forensic Anthropology was renewed. It is worthwhile to briefly describe it since it was partially planned in function of this new collection. The laboratory includes a reception room where new skeletons are kept while the cleaning and maceration takes place. These procedures are done in accordance with standard hygienic conditions. Once cleaned, the skeletons are moved into a separate room where they are placed in individualized plastic boxes in a specific closet – both specifically designed to house them. It is in this latter room, equipped with modern technology (e.g., 3D scanner; digital X-ray), that all the exhaustive analyses of the skeletons are accomplished. The existence of two separate rooms is designed to avoid any kind of organic contamination between newly arrived and already cleaned and stored skeletons. With the renewed facilities, it is possible to enlarge the collection at a planned rate of 20 skeletons per year, which was something impossible to do previously.

3. Description of the collection

3.1. Demographic composition

At the moment, the collection is composed of 159 skeletons from Portuguese of both sexes with ages at death between 29 and 99 years (Table 2). All the individuals died between 1995 and 2008 and have been exhumed between 1999 and 2013. The female sample represents 53.5% ($n = 85$) of the collection and the age at death ranges from 50 to 99 years old ($\bar{x} = 81.84$; *s.d.* = 10.99; median = 85). The male sample has 74 individuals (46.5%) with a larger age at death distribution since the younger individual is 25 years old and the oldest is 95 years old ($\bar{x} = 71.11$, *s.d.* = 18.23; median = 75).

The majority of the individuals is quite old thus leading to the correlated "inconvenience" of severe ante mortem tooth loss. This is a research handicap for testing dental methods. Moreover, until now the series does not include a single subadult skeleton. In other words, whereas this series is an excellent opportunity to test and develop aging methods in older adults, no testing can be accomplished for subadults.

Table 2
Distribution by age group and sex.

Sex	Age group					Totals
	[20; 29]	[30; 49]	[50; 69]	[70; 89]	[90; *i*]	
Male	3	8	13	43	6	73
Female	0	1	12	53	19	85
Global	3	9	25	96	25	158