

Modern deciduous human teeth: the *Ratón Pérez* Collection.

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INTRODUCTION

Personal identification of an unknown deceased individual is crucial in our society for both legal and humanitarian reasons. Thus, **human skeletal collections are an important source of information for physical anthropologists** to establish and develop rigorous methods to obtain reliable data from the individual under study. There are some dental and osteological reference samples (Dayal et al., 2009; Voisin et al., 2012), but due to the currently low early mortality rate, none of these contain large number of infants and young children from the 21st century.

Due to their hardness, teeth are commonly the best-preserved skeletal remains in natural conditions (burials) as well as in fatalities (accidents, armed conflicts, violent crimes) or natural disasters (earth quakes, floods). **Each individual possesses unique dental characteristics** that may be used to recover useful information for both anthropological and paleoanthropological fields (e.g., age, sex, stress events, diet) relevant for individual identification (Krishan et al., 2015; Martín-Francés et al., 2014).

Since most of the time the deciduous teeth are disregarded, the main purpose of this project was to create a large reference collection that could be used by scientists from several disciplines such as archaeology, forensic anthropology, dental and oral medicine and paleoanthropological studies among others, to obtain relevant information (Martínez de Pinillos et al., 2021). This communication aims to make the research community aware of the **existence and availability of this deciduous dental collection housed at the Centro Nacional de Investigación sobre la Evolución Humana** (National Research Center on Human Evolution, CENIEH) in Burgos, Spain, of identified children that were born during the 21st century.

HISTORY OF THE COLLECTION

Attending to the need of complete our knowledge about immature dentition, the Dental Anthropology Group (GAD) of CENIEH talked with the head of the Scientific Culture and Innovation Department of this institution to organize a campaign to collect deciduous teeth. Our main goal was not only to **gather an important reference collection of deciduous teeth** for comparative studies that could be used by scientists from different fields, but also **involve the community in this project**. Thus, the first collection campaign took place in 2014 at the CENIEH installations during the European Researchers' Night, where 498 teeth were collected in three hours. Between 2015 and 2017, another 745 teeth were added to the dental collection. Then, in 2018 and 2019 eight Spanish Regional Communities (Andalucía, Asturias, Baleares, Cantabria, Cataluña, Extremadura, Galicia and Madrid) joined the project, thus further enlarging the collection with teeth from other origins. Despite the current situation of the pandemic, we have continued with the campaign with all security measurements.

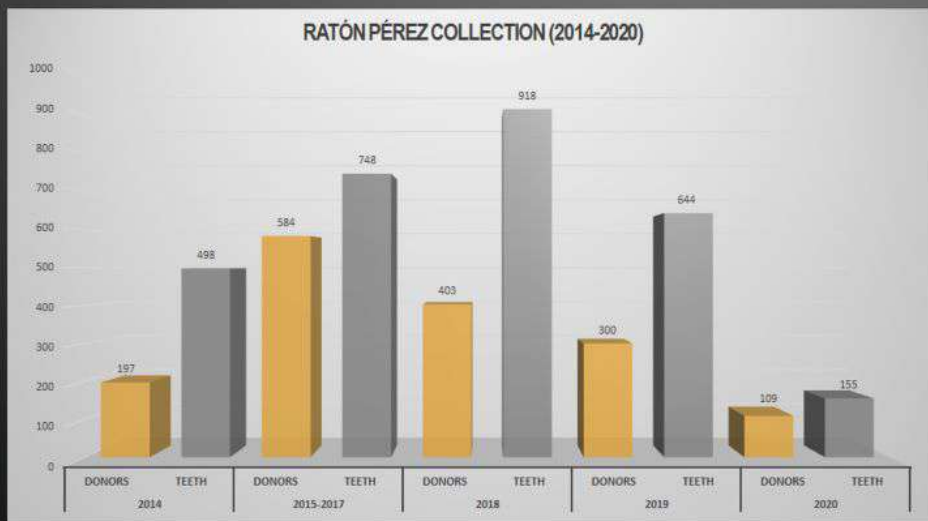
GATHERING, CLEANING AND PROCESING THE TEETH

Yearly, members of the GAD are in charge of **collecting the teeth and registering all the relevant information** from the donors at the time of collection. When the donor give the tooth/teeth, they fill out a Donor Information Form. At the same time, another person completes the data label for the zip lock bags where the tooth is temporarily stored.

All teeth are then transferred to the CENIEH Restoration lab, where the specialists apply the same protocol as for the fossil remains. First, for **preliminary cleaning**, the teeth are carefully washed with a mixture of purified water and ethanol (1:1), removing any organic material adhered to them. Once the tooth is dry, it is consolidated with diluted resin (3% Acryloid B72 in acetone) to solidify and ensure their conservation. Each tooth is **assigned an inventory number and stored individually** inside a zip lock bag with the corresponding label. This label contains the inventory number of the tooth as well as an identification number of the donor, the tooth class, the sex, age of tooth loss, the box number where it is stored and a checkbox to indicate if the tooth has been scanned or not. Between 50 and 75 teeth inside their own plastic bags are kept in polystyrene transparent boxes, which are then placed in polypropylene containers. Finally, these containers are put inside compact cabinets at the **CENIEH storage room**, where the environmental parameters are fit for preservation at 50 % relative humidity and 20 °C.

At the moment, **798 teeth have been scanned** with a microtomographic Phoenix v/tome/xs of GE, housed at the CENIEH, using the following parameters: 100-120 kV, 110-140 µA, 0.2 mm Cu filter and isometric voxel size of 14-18 µm.

Figure 1. Total number of donors and teeth per year collected between 2014 and 2020.



ACKNOWLEDGMENTS

We acknowledge all donors for their altruistic collaboration for helping us to obtain this collection. The authors would like to thank the sponsorship of Fundación La Caixa, Fundación Caja de Burgos, the European Researchers' Night and the Spanish Ministerio de Economía y Competitividad (MINECO) (Projet CGL2015-65387-C3-3-P) for the important support to this project. We are also grateful to the Casita Museo de Ratón Pérez of Madrid for joining us on this collection campaign since 2014, as well as the collaboration of institutions from the different Spanish Autonomous Regions.

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Table 1. Ratón Pérez sample separated by sex and tooth class.

TOOTH CLASS	Male		Female		Indeterminate		Total	
	N	%	N	%	N	%	N	%
Upper first incisor (i ¹)	173	8.02%	141	6.54%	18	0.83%	332	15.39%
Upper second incisor (i ²)	137	6.35%	106	4.91%	22	1.02%	265	12.29%
Upper canine (c)	65	3.01%	58	2.69%	14	0.65%	137	6.35%
Upper first molar (m ¹)	69	3.20%	71	3.29%	22	1.02%	162	7.51%
Upper second molar (m ²)	61	2.83%	69	3.20%	26	1.21%	156	7.23%
Lower first incisor (l ₁)	140	6.49%	127	5.89%	25	1.16%	292	13.54%
Lower second incisor (l ₂)	166	7.70%	148	6.86%	16	0.74%	330	15.30%
Lower canine (c)	70	3.25%	91	4.22%	27	1.25%	188	8.72%
Lower first molar (m ₁)	65	3.01%	77	3.57%	24	1.11%	166	7.70%
Lower second molar (m ₂)	54	2.50%	52	2.41%	23	1.07%	129	5.98%
Total (n, %)	1000	46.36%	940	43.58%	217	10.06%	2157	100.00%

RESULTS

Although the sample is still growing, from the first collection campaign in 2014 to date it comprises **2977 teeth of children whose ages of tooth loss are between 2 and 15 years** (Figure 1). Each tooth is associated with basic information of the individuals and their parents and grandparents (sex, date and place of birth, ancestry, country of residence), as well as important data about early life history (pregnancy duration, breast-feeding, bottle-feeding) and other relevant information provided by the donors (such as if they are twins, dental loss or dental extraction).

At present, from the overall collection we have processed **2157 deciduous teeth** (Table 1) from 1160 Spanish children and 9 children from France, India, China, Russia, Dominican Republic, Netherlands, Australia and Mexico. The individuals are of both sexes: the male sample is represented by a 46.36% (n=1000) and the female by a 43.58% (n=940), with 10.06% (n=217) indeterminate which correspond to donors that did not provide such information as teeth belonging to different individuals were mixed in the same bag.

CONCLUSIONS

Due to the scarcity of deciduous teeth, most of these studies were performed with permanent ones. Therefore, this collection will expand the scope of the studies as it represents an unprecedented source of information. In particular, the **Ratón Pérez collection represents a highly valuable sample for a wide range of disciplines** such as forensic, dental and anthropological fields among others.