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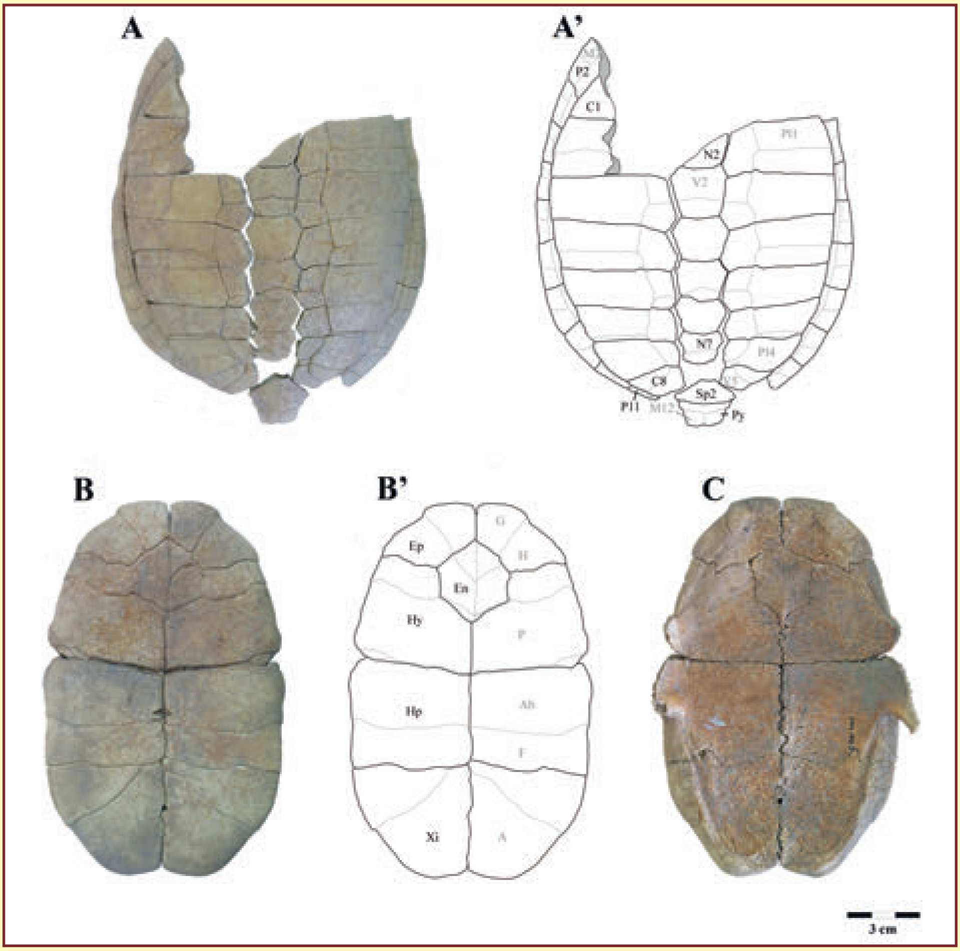

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Archaeozoological studies: new database and method based on alphanumeric codes

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ABSTRACT: The database is an important tool to collect all the necessary information by any archaeozoologist. However, the specialists do not use a recurring methodology to describe the bone remains, and that complicates the possibility to compare the results from different sites. For these reasons, first, it is necessary to provide a complete and versatile database structure and secondly, employ a fast and objective methodology. In this case, we propose simplified method based on alphanumeric codes.

We have designed four databases in FileMaker©, all of them interrelated and focused on a part of an archaeozoological study: 1) site data, taxonomy; 2) taphonomy modifications; 3) osteometry; 4) teeth analysis. Besides, for taphonomic modifications we have created a compilation of alphanumeric codes that simplified and sum up the description of bone morphology, the origin and morphotypes of fractures and the localization of the taphonomic modifications. This new methodology has been applied to different samples. Some of them have an anthropic origin, others are natural accumulations, and even mixed ones. In all cases we have aimed to contrast the results in an objective way, leaving the interpretation to the final step of the analysis. In order to achieve this objective, we should use the same methodology, one that facilitates the way we compile the data and the way we can share the information and compare it within different sites.

KEYWORDS: METHODOLOGY, DATABASE, ALPHANUMERIC CODES, BONE REMAINS, ARCHAEOZOOLOGY

RESUMEN: La base de datos es una herramienta importante para recopilar toda la información necesaria por parte de cualquier aespecialista en Arqueozoología. Sin embargo, estos no utilizan una metodología común para describir los restos óseos, y eso complica la posibilidad de comparar los resultados de diferentes yacimientos. Por estas razones, en primer lugar, es necesario proporcionar una base de datos completa y versátil y, en segundo lugar, emplear una metodología rápida y objetiva. En este caso, proponemos un método simplificado basado en códigos alfanuméricos.

Hemos diseñado cuatro bases de datos en FileMaker©, todas ellas interrelacionadas y centradas en una parte del análisis arqueozoológico: 1) datos del yacimiento, taxonomía; 2) modificaciones

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tafonómicas; 3) osteometría; 4) análisis de dientes. Además, para las modificaciones tafonómicas hemos creado una compilación de códigos alfanuméricos que simplifican y resumen la descripción de la morfología ósea, el origen y los morfotipos de las fracturas y la localización de las modificaciones tafonómicas. Esta nueva metodología se ha aplicado a diferentes muestras. Algunas de ellas tienen un origen antrópico, otras son acumulaciones naturales, e incluso mixtas. En todos los casos hemos pretendido contrastar los resultados de forma objetiva, dejando la interpretación para el análisis final. Para lograr este objetivo, debemos utilizar una metodología común, que facilite la forma de recopilar los datos y la manera de compartir y comparar la información entre los diferentes yacimientos.

PALABRAS CLAVE: METODOLOGÍA, BASE DE DATOS, CÓDIGOS ALFANUMÉRICOS, RESTOS ÓSEOS, ARQUEOZOOLOGÍA

INTRODUCTION

Archaeozoologists generally study bone assemblages that contain a large number of remains, to which we apply taxonomy, osteometry, taphonomy and other type of analyses. There also tend to be great differences in these assemblages depending on the type of site and/or chronologies in question. For this reason, the most convenient and effective way of storing all the information is to use a standardized database.

Nowadays it would be impossible to conduct any archaeological research project without creating a database. However, they are generally developed by the research team and are rarely shared with other teams. Thus, the main problem comes when we need to compare assemblages from different sites or different types, where the amount of information based on primary data (taxonomic and anatomical determination, age, sex, presence/absence of elements, modifications, etc.) is recorded in very different ways, despite sharing the same methodological basis. At this point, our greatest concern is how to make all these data homogeneous and how to record the information without it being influenced by subjective opinions. Our intention here is to propose a change aimed at creating a common platform for recording such data that enables the subsequent comparison of the results.

Attempts to create a shared database package and recording methods to facilitate the storage and comparison of information, have already been proposed by other authors. In the 1970s a whole series of alphanumeric codes for studying several skeletal elements were published, providing the first homogeneous classification system for all archaeozoologists (Gifford & Crader, 1977). A few years later, the book by Klein & Cruz-Uribe (1984) covered a whole series of methodologies linked to the treatment and description of archaeozoological assemblages, which were subsequently expanded on by Münzel (1988) for the case of anatomical elements and Lyman (1994) for a more general study of vertebrate taphonomy, which was revisited by Reitz & Wing (2008) and Gifford-Gonzalez (2018) in their most recent compendia. The publication of methodologies currently constitutes a vast corpus with which archaeozoologists have to work, systematizing it in our respective databases. However, there has recently been some concern about how data should be treated and how best to store them. Some researchers have suggested creating a database incorporating new technologies such as barcodes, touch-screen, speech-recognition and GIS, which would speed up the data collection process (Dibble, 2015). Others have proposed the use of relational databases, which should be taught to students in the early stages of the syllabus (Jones & Hurley, 2011). However, these approaches do not consider the need to generate a series of common codes and homogeneous means of recording data for the scientific community that go beyond implementing the technological side of the old methods of recording information. Nevertheless, recently other authors are also concerned about this methodological problem and have made another proposal (Discamps, 2020).

In this paper, we propose a new database for studying faunal material in an archaeological and neo-taphonomic contexts, with a user-friendly interface in which the methods commonly used by archaeozoologists are adapted to a new series of alphanumeric codes, offering a more effective way of recording and processing data.

METHODS

When designing the database, the main objective was to create a platform that could contain all kinds of bone assemblages, regardless of their origin and formation, with a simple, intuitive interface that was easy to fill in. This was done by standardizing the descriptions that had been made to date, but in a more objective, descriptive manner without resorting to individual interpretations. A series of alphanumeric codes was also developed, meaning that data could be entered more quickly and facilitating the subsequent extraction and comparison of data. After a long process of trial and error, where we considered which fields and codes actually needed to be recorded and which should be expanded, deleted or changed (Real, 2012, 2021), the new database started to take shape. Once it had been created and after a long test period during which some teething problems were solved, it was possible to improve the codes in order to cover most specimens. Since then, the database has been applied to anthropogenic assemblages of different chronologies, assemblages generated by carnivores and birds of prey, and even neo-taphonomic samples (e.g. Gordón-Baeza, 2016; Morales, 2015; Machado & Pérez, 2016; Pérez, 2019; Real, 2012, 2021; Sanchis *et al*., 2014, 2016, 2019).

THE DATABASE

A database (DB) was designed using *FileMaker*© software. Our DB consists of a primary database and three secondary ones, all of which are independent but automatically interrelated with one another. This relationship is based on a number of basic fields such as record number, site information, genus and anatomical element. All of them have a simple interface that is quick to use. Separate databases are used according to the type of information compiled in each: general, dental, osteometry and modifications.

In terms of how it works, each specimen is recorded with a unique number (Record number) in the "Main DB". Then if we wish to add specific information related to the other databases, a new record is generated in the secondary database using the same record number as in the Main DB. Thanks to this dependent field, the other corresponding basic fields are filled in automatically. Moreover, when the specimen is recorded in the secondary databases, a specific correlative Record number is created in each of them.

Main database

The main database is divided into four separate columns depending on the type of data being recorded (Suppl. Figure 1A). The first column, in white, includes the (record and inventory) reference numbers and the buttons that allow records to be created. Information related to the site and the stratigraphic location of the items is also shown. The second column can be used for recording taxonomic and anatomical data and information about age and sex.

The next section (column 3) contains the fields related to the taphonomic study in terms of fractures, thermal and anthropogenic alterations and those caused by other predators. The list of modifications only includes fields that indicate their presence and if we wish to describe each of these in more detail, it is necessary to go to the "Modifications DB". Lastly, column 4 includes miscellaneous information such as diagenetic modifications, measurements, notes and comments.

Teeth database

This database was created in order to record the specific features of teeth that are identified (Suppl. Figure 1B). The remains are recorded in the main database and their description is then added to the Teeth DB, so it is normally used for complete teeth or those which are sufficiently well preserved to be used to study age and/or seasonality. The specific information that is recorded is divided into four blocks. The first two columns include information linked to the Main DB and the description of the tooth: name, location and state of preservation. The third column is used to record the measurements and state of wear of teeth belonging to different taxa of ungulates, such as caprines, cervids and carnivores. The last block refers to measurements and wear of equid teeth. Lastly, it should be noted that a presentation called "Measurement" has been included, which specifies with the aid of drawings how each of the measurements should be taken (Suppl. Figure 1C).

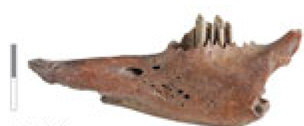
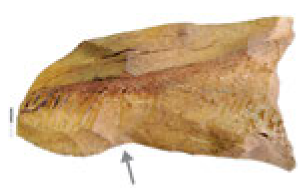
OLD DESCRIPTIONS	NEW DESCRIPTIONS	REMAINS
Complete distal epiphysis of humerus with part of the diaphysis and complete circumference. Ossified.	H, 150, 5, X2	
With fresh fracture on the diaphysis	II.2.4	Cova de les Cendres (Upper Palaeolithic). *Oryctolagus cuniculus*
Fragmented distal epiphysis of second phalange with a few part of the diaphysis and incomplete circumference.	Fa2, 055, 3, X2	
Longitudinal fresh fracture on the diaphysis and distal epiphysis	II.1.3	
Cut-marks on the dorsal part of the distal zone of the diaphysis	cut-marks on 2dtd	Cova de les Cendres (Upper Palaeolithic). *Cervus elaphus*
Almost complete mandible with the incisive part and the body	Hem, 555, 5	
With dry fracture on the body/ramus	III.3.4	El Salt (MiddlePalaeolithic). *Oryctolagus cuniculus*
Fragment of diaphysis of humerus, with uncomplete circumference	H, 050, 2, 2	
Fresh fracture on the diaphysis	II.4.2	
Percussion mark on the lateral/dorsal distal part of the diaphysis	percussion on 2dtdl	El Salt (MiddlePalaeolithic). *Equus ferus*

FIGURE 1
Comparative table between old descriptions and new descriptions based on the same bone fragment.

Modifications database

This database can be used to describe the modifications identified on the bone surfaces, including anthropogenic modifications (cut marks, tooth marks and fractures) and those caused by other predators (resulting from dental action and digestion) (Suppl. Figure 2A). It is designed for recording each of the modifications, even if they are on the same surface or overlapping, as they are given their own Mark Record number, which is always linked to the Record number in the Main DB. It is arranged in columns, like the other databases, where the first two columns contain the fields linked to the Main DB. The third offers fields related to the origin and morphology of the alteration: type of mark, origin, agent, location, morphology, distribution, direction, intensity and quantity. The last column includes fields for recording the length and width of unilateral or bilateral modifications, and a "Notes" and "Comments" section.

Osteometry database

This database was created to allow a specific osteometric study. The first and second columns include information dependent on the Main DB (Suppl.Figure 2B). The next column shows a list of specific measurements referred to as "Osteo" plus a correlative number, corresponding to the measurements defined by Driesch (1976). To make the measuring procedure easier, the last column includes a drawing of a skeleton with buttons to access pictures of each anatomical element and a description of how each measurement should be taken (Suppl.Figure 2C).

Other features

In terms of how the Database works, buttons have been added to facilitate repetitive tasks such as recording identical fragments, for which the information can be copied as many times as needed. Some basic calculations have also been added, such as the size range, based on length, or the calculation of dental indices in the case of equids. Lastly, there are also buttons to facilitate tasks such as those related to taxonomy, e.g. by specifying the genus, the remaining information is automatically filled in. A DB has also been added to offer an explanation and illustrations of all the new codes that are used. Abbreviations have been used to record the bone type and the anatomical group to which it belongs. This is also the case for the colour of thermal alterations. All of them are intuitive, representing the first letter or the first two letters in the case of repetitions.

ALPHANUMERIC CODES

Bone fragment morphology

Codes in this section specify what percentage has been preserved in each specimen and whether each of its anatomical parts are fragmented or complete, using a combination of three digits (Suppl. Figure 3). The first digit refers to the proximal part, the second to the diaphysis or middle part, and the third to the distal part. The preservation of each of these three digits is expressed in numbers and letters, where 1 means it is complete, 5 corresponds to fragmented, 0 is used when it is missing and "X" when it is not ossified.

In the case of fragments of diaphysis, this is also combined with the amount of circumference, their length and the bone area they belong to (Suppl. Figure 4). The code for the area or the location of modifications (of the same type) also consists of two parts: the first indicates only the area –proximal (1), diaphysis or middle part (2) and distal (3)– whereas the second indicates the specific surface by means of a letter or combination of letters (dorsal, medial, lateral and plantar).

Fracture morphology

The second broad group of codes refers to fracture morphotypes (Suppl.Figure 5-10). Each of the codes consists of two major blocks. The first relates to the origin of the fragment, which is identified with Roman numerals: dry (I), fresh (II), mixed (III) and indeterminate (IV). The second is shown with numbers 1 to 6 and contains up to three digits, each combination specifying a particular morphology that has been observed repeatedly. Its use depends on the anatomical element.

Joint ossification

In the database, the determination of the state of joint ossification has been coded in order to facilitate its further study. The code that has been created consists of two parts: the first refers to the proximal epiphysis and the second to the distal (Suppl. Table 1). There are four options for both of these: fused (2), partially fused (1), unfused (0). For fragments where the joint is not present and it is therefore impossible to know whether or not they are fused, X is used.

RESULTS AND DISCUSSION

In this section we want to show, on the one hand, the improvement that the use of these new codes would represent with respect to the previous data recording methods. For the other hand, how much more effective the use of this common methodology is for different assemblages and their subsequent comparison.

Old and new descriptions

Before this methodological compendium was created, archaeozoological and taphonomic studies were generally based on a detailed description of the features of each fragment. In this regard, as shown in Figure 1, the old descriptions are long-winded, they vary according to the researcher and it is difficult to make comparisons. In contrast, by applying the new codes it is possible to simplify the information that is recorded without losing any data or quality in the record.

Moreover, apart from simplifying the data recording process, the codes can be easily combined in tables to provide more information. In our case, we use dynamic tables in *Excel*© to compare and contrast different data (Table 1). In this regard, by using alphanumeric codes rather than longer, variable descriptions, it is possible to create tables combining quite a large number of fields. Thus, a greater quantity of information can be obtained by combining different data. In the example in Table 1, relating to European rabbit (*Oryctolagus cuniculus*) remains (humerus) from level XII (Upper Palaeolithic) of Cova de les Cendres (Moraira-Teulada, Alicante), the data regarding fragmentation (codes on the left) and ossification and laterality (codes at the top) are combined in order to obtain the MNI. It can be seen that there are 16 individuals aged over 3 months (showing ossification of the distal joint), at least three individuals younger than 10 months (without ossification of the proximal joint) and one individu-

	Right						**Left**				**Indeterminate**			**Total**
	00	**0X**	**1X**	**2X**	**X2**	**In**	**00**	**2X**	**X2**	**In**	**0X**	**2X**	**In**	
Complete														1
Proximal complete														
100				1										1
150								1						1
1XX	1						1							2
Proximal fragmented														
500						1		1		1		1	2	7
550		1	2								1			4
5XX		1					1							1
Diaphysis														
050						6				4			11	21
Distal complete														
001					3				1					4
011									1					1
051					12				11					22
Distal fragmented														
005					1				2	1			1	5
055									1					1
	1	**2**	**2**	**1**	**16**	**7**	**2**	**2**	**16**	**6**	**1**	**1**	**14**	**71**

TABLE 1

Example of a dynamic table combining different items: Bone fragment (Complete, Proximal complete, Proximal fragmented, Distal complete, Distal fragmented, Diaphysis), laterality and the ossification code. Rabbit (*Oryctolagus cuniculus*) humerus remains from Cova de les Cendres level XII (Upper Palaeolithic) (Real, 2021).

al aged approximately 9-10 months (showing partial ossification of the proximal joint).

Bone assemblages' comparison

Our research group comprises several specialists who work on faunal bone assemblages from different chronologies and origins: remains accumulated by humans and other predators (carnivores and birds of prey) from the Middle Palaeolithic to the Mesolithic. Hence, we are interested in being able to compare the data for each sample quickly and easily. We shall therefore show the specific application of the fracture codes (morphotypes).

First, it was applied to two rabbit bone assemblages: level XI of Cova de les Cendres (Real, 2021) and level Xa of El Salt (Alcoi, Valencia) (Pérez, 2019). The first pertains to an Upper Magdalenian anthropogenic accumulation in a cave. The second is a mixed accumulation (by anthropic and natural agents) from the Mousterian in a shelter. The results of the studies were organised by anatomic elements and are shown in Table 2. It is easy to compare the two assemblages using the repeated codes.

In the case of the rabbit remains, considerable differences between the assemblages can be observed. At Cendres we recurrently see remains with fractures on fresh, which are characteristic of a deposit that was regularly accumulated by humans, especially if we look at the long bones and metapodials (Real, 2021). At El Salt, on the other hand, the diversity of fresh fracture morphotypes for the different anatomical elements shows the mixed origin of the assemblage, its nature as a shelter and the diverse associated taphonomic damage (Pérez, 2019).

Secondly, the fracture morphotypes were applied with the same criteria to assemblages of medium-sized animals such as red deer (*Cervus elaphus*) and Iberian ibex (*Capra pyrenaica*) from the aforementioned sites. In this regard, it can be seen that the variety of morphotypes at Cendres is some-

	Cova de les Cendres (XI)	**El Salt (Xa)**
RED DEER AND IBERIAN IBEX		
Mandible	II.5.1	II.4, II.4.1, II.5, II.5.1, II.6.1
Vertebra	II.1.2	II.2.1, II.2.2, II.4, II.4.2
Rib	II.4.2, II.2.4	II.1, II.3, II.4, II.4.2
Scapula	-	II.5
Pelvis	II.5.3, II.4.2	II.5.1, II.5.2
Long bone with proximal epiphysis	II.1.1, II.1.2	II.1, II.1.2, II.1.3, II.2.2, II.2.3, II.2.4, II.3.4, II.4.1, II.4.2, II.4.3, II.4.4, II.5.1, II.5.2.2, II.6.1
Long bone with distal epiphysis	II.1.2	II.1, II.1.2, II.1.3, II.2.1, II.2.2, II.2.3, II.2.4, II.3.4, II.4.2, II.4.3, II.4.4, II.5.2.2, II.5.3, II.6.1
Long bone without epiphysis	II.4.2	II.1, II.1.1, II.2, II.2.1, II.3, II.4, II.4.1, II.4.2, II.4.3, II.5, II.5.1, II.5.2
Metapodial	II.4.2, II.2.2, II.1.2	II.1.2, II.1.3, II.2.2, II.4, II.4.1, II.4.2, II.4.3, II.4.4
Phalanx	II.2.2, II.4.2, II.2.4	II.2.1, II.2.2, II.2.4, II.3.4, II.4.2, II.4.4, II.5.2.2
	Cova de les Cendres (XI)	**El Salt (Xa)**
RABBIT		
Mandible	II.6.1, II.1, II.4.1, II.5.1	II.1.2, II.3, II.3.3, II.6.1
Vertebra	II.1.2, II.4.1, II.4.2	II.1.2
Rib	II.1, II.2.4, II.3.4	-
Scapula	II.4.2, II.2, II.1.1	II.2, II.2.1, II.4.1
Pelvis	II.5.2, II.5.1, II.1.1	II.1, II.1.1, II.3.2, II.3.1, II.5.3, II.6.1
Long bone with proximal epiphysis	II.1.1.1, II.1.1, II.1.1.3, II.1.4	II.1, II.1.1, II.1.3, II.2.3, II.3.1, II.3.4, II.4.3, II.4.4, II.5.4.3, II.6.1
Long bone with distal epiphysis	II.2.4, II.1.4, II.1.2	II.1, II.1.2, II.1.3, II.2.3, II.2.4, II.3, II.3.4, II.4.3, II.4.4, II.5.3, II.5.4.3, II.6.1
Long bone without epiphysis	II.4.2, II.1, II,2	II.1, II.1.1, II.1.2, II.1.4, II.2, II.2.1, II.2.4, II.3, II.3.3, II.4, II.4.1, II.4.2, II.6.1
Metapodial	II.1.4, II.1.3, II.3.4	II.2.3, II.2.4, II.3.4, II.4.3, II.4.4, II.5.4.3
Phalanx	II.3.4, II.2.4	-

TABLE 2

Classification of the fresh fracture morphotypes by anatomical element and taxa used on Cova de les Cendres level XI (Real, 2021) and El Salt level Xa (Pérez, 2019).

what lower than in the rabbit remains, although it does remain constant, which is typical of specific, repeated butchering human activities. However, the variety of morphotypes at El Salt continues to be high, possibly linked to the aforementioned conditions and to the somewhat more varied processing of the different taxa accumulated by human groups, depending on the anatomical element and size of the prey.

CONCLUSIONS

The application of this new methodology, including the numerical codes, has been effective in the subsequent analysis of the data collected. If we compare the use of the traditional definitions (such as "proximal part plus fragment of diaphysis"; "complete circumference" and "length of diaphysis greater than half") with the new formulae (550, 5 and 4), we observe a reduction in text and greater homogeneity between the descriptions of the remains, allowing them to be grouped according to common characteristics and compared. Furthermore, fracture morphotypes also provide greater objectivity when characterising types of fracture and extracting repeated consumption patterns, especially in the case of lagomorphs, which are so abundant at sites in the Mediterranean area of the Iberian Peninsula.

Archaeozoological assemblages always present specific characteristics based on different factors (location, chronology, preservation), so it is therefore difficult to compare and contrast data. The aim of the proposed DB is to extract as much information as possible in the most objective manner, leaving its interpretation for the data analysis phase. By using this methodology for various sites that have been studied, from different contexts and faunal assemblages with diverse features and states of preservation, it is possible to overcome the problems of recording and comparing data that often arise in archaeozoological and taphonomic analyses.

Our intention is to continue with this project and provide a version of the database and codes in both Spanish and English. It would be very helpful to apply it to other faunal bone assemblages and for other researchers to use it in order to continue checking its usefulness and further improve the records. Lastly, our ultimate goal would be to create a website from which to obtain and download the database interface in a free version, together with an explanation of how it works and the new codes and abbreviations. As a result, a Big Data repository could also be created in which to store the raw data for each archaeological assemblage, with open access for the scientific community. For the moment, we offer the possibility to download the FileMaker version from here: https://doi.org/10.5281/zenodo.6670359

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SUPPLEMENTARY MATERIAL

See supplementary material at https://revistas.uam.es/img/Archeofauna/Supplementary_Material_Real_et_al.pdf

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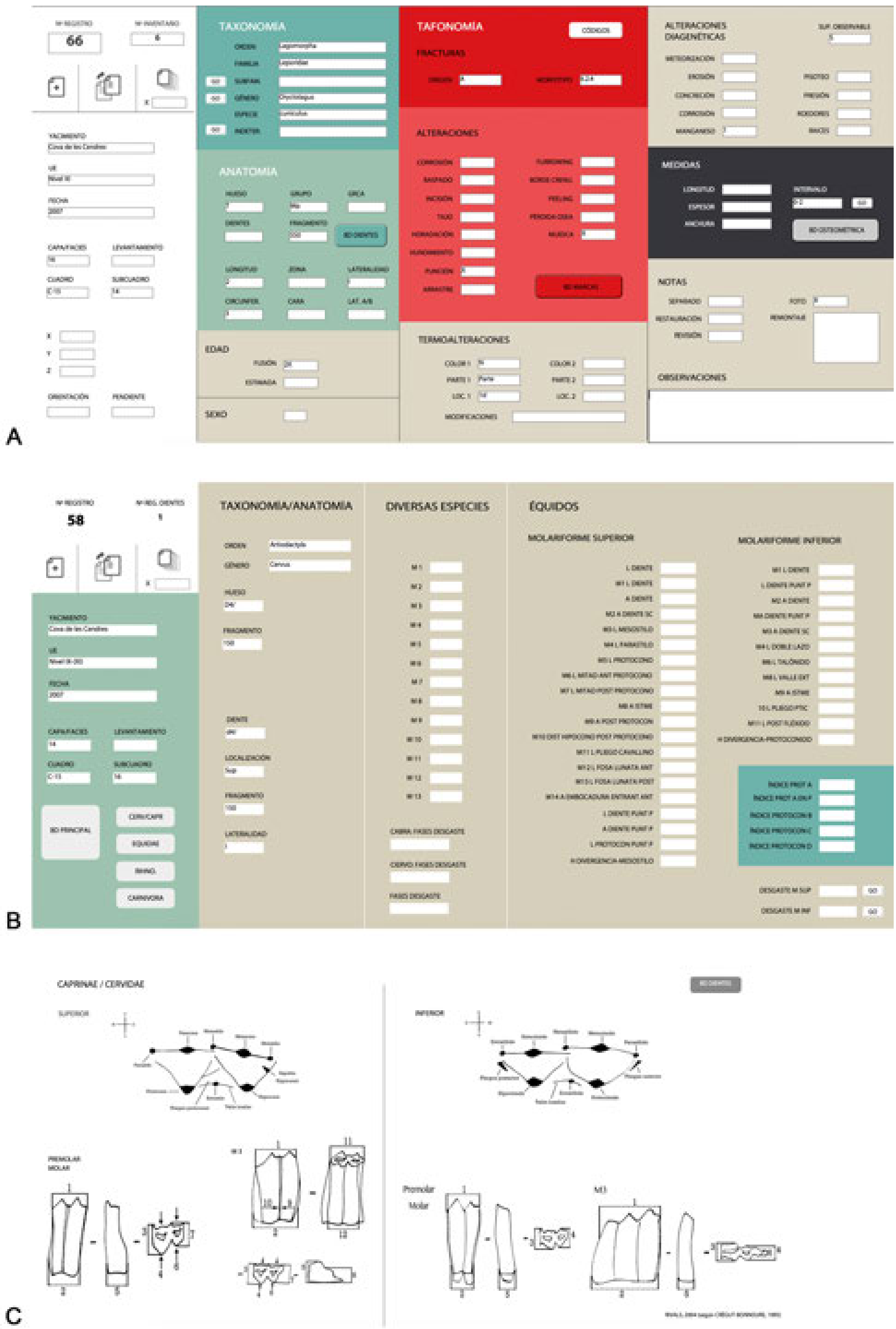
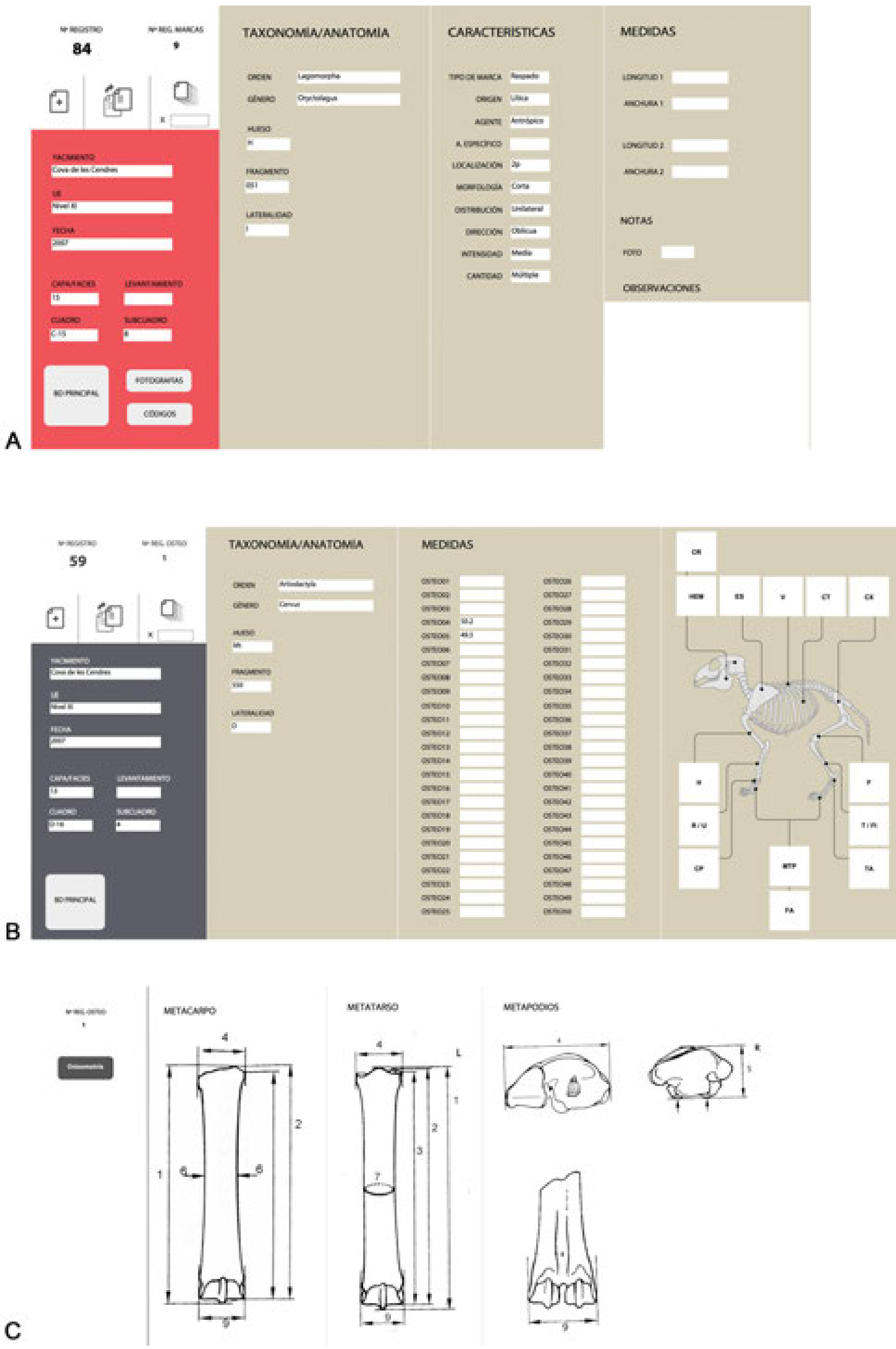
INTRODUCTION

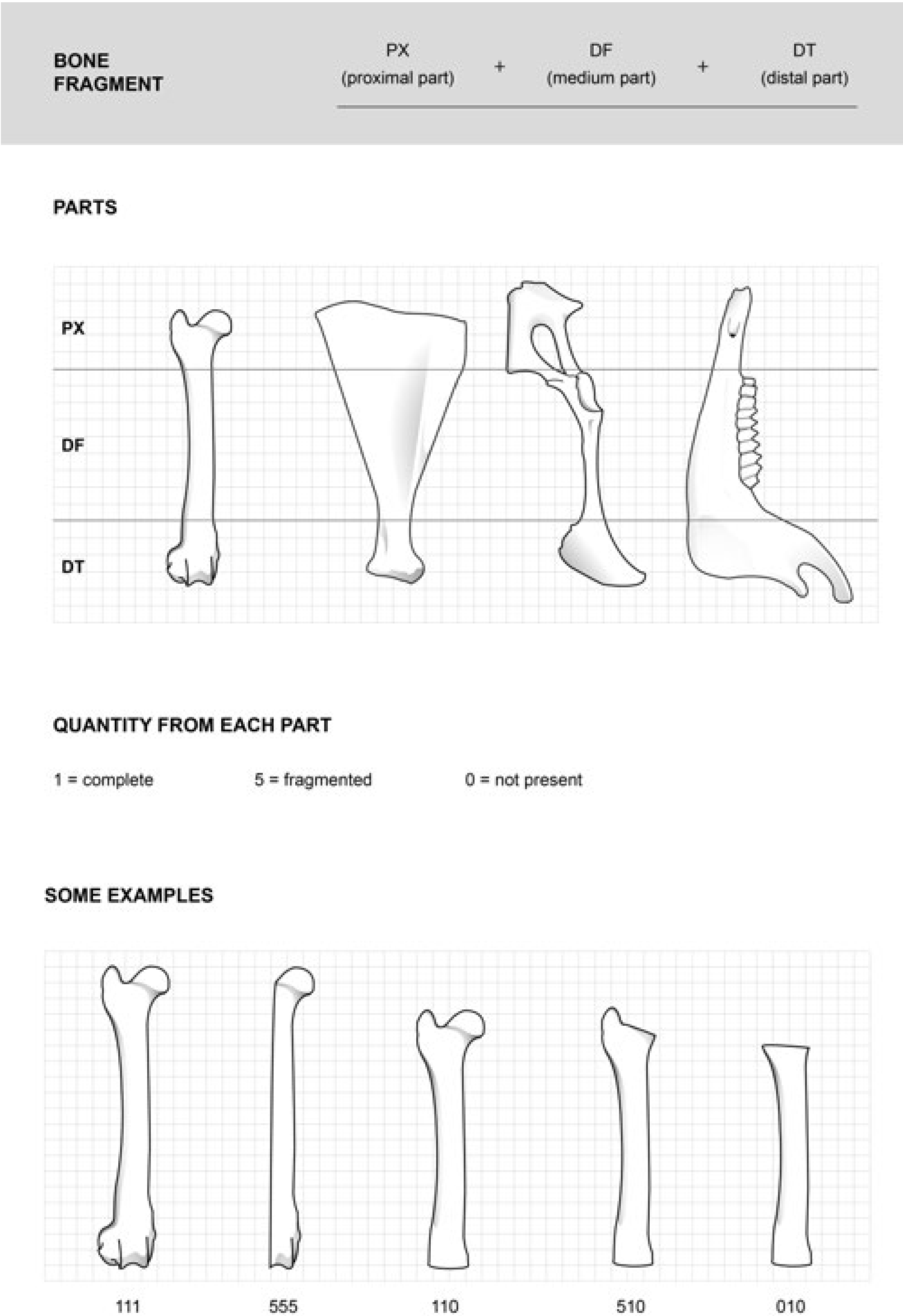


SUPPL. FIGURE 1
A) Main DB. B) Teeth DB. C) Explanation of how to measure the teeth.



SUPPL. FIGURE 2

A) Modifications DB. B) Osteometry DB. C) Explanation of how to measure the bone. Drawing taken from Drierch (1976).



SUPPL. FIGURE 3
Codes of *Bone fragment*.

DIAPHYSIS CHARACTERISTICS

circumference + length + part/zone

CIRCUMFERENCE OF THE DIAPHYSIS

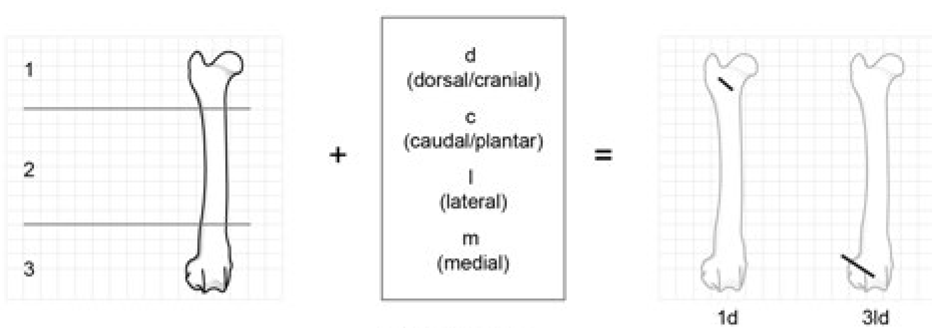
LENGTH

1 = to 10%
2 = to 25%
3 = to 50%
4 = to 75%
5 = 95-99% (almost complete)
6 = to 100%
7 = indeterminate fragment of diaphysis

PART AND ZONE OF THE BONE

PART

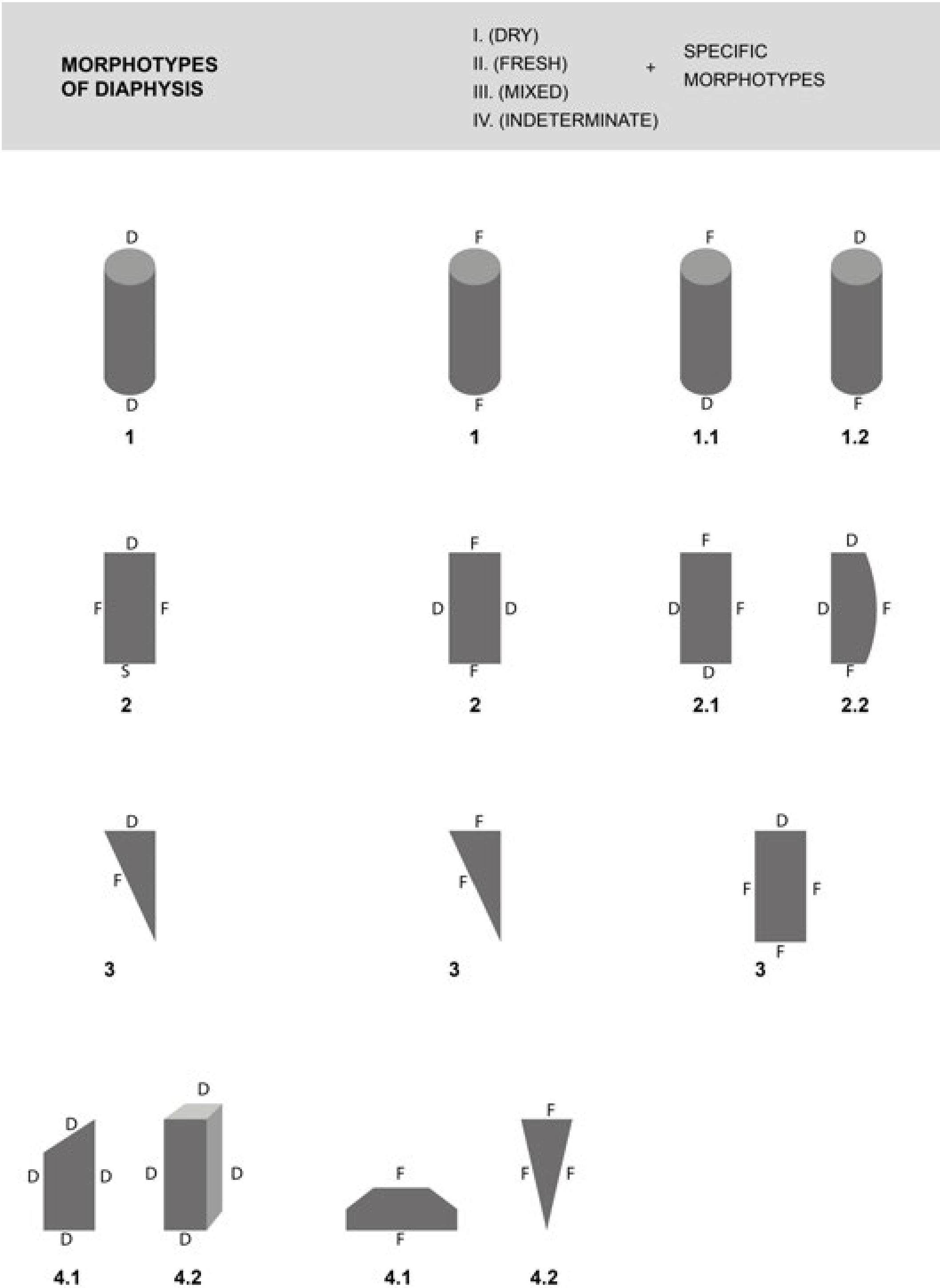
ZONE



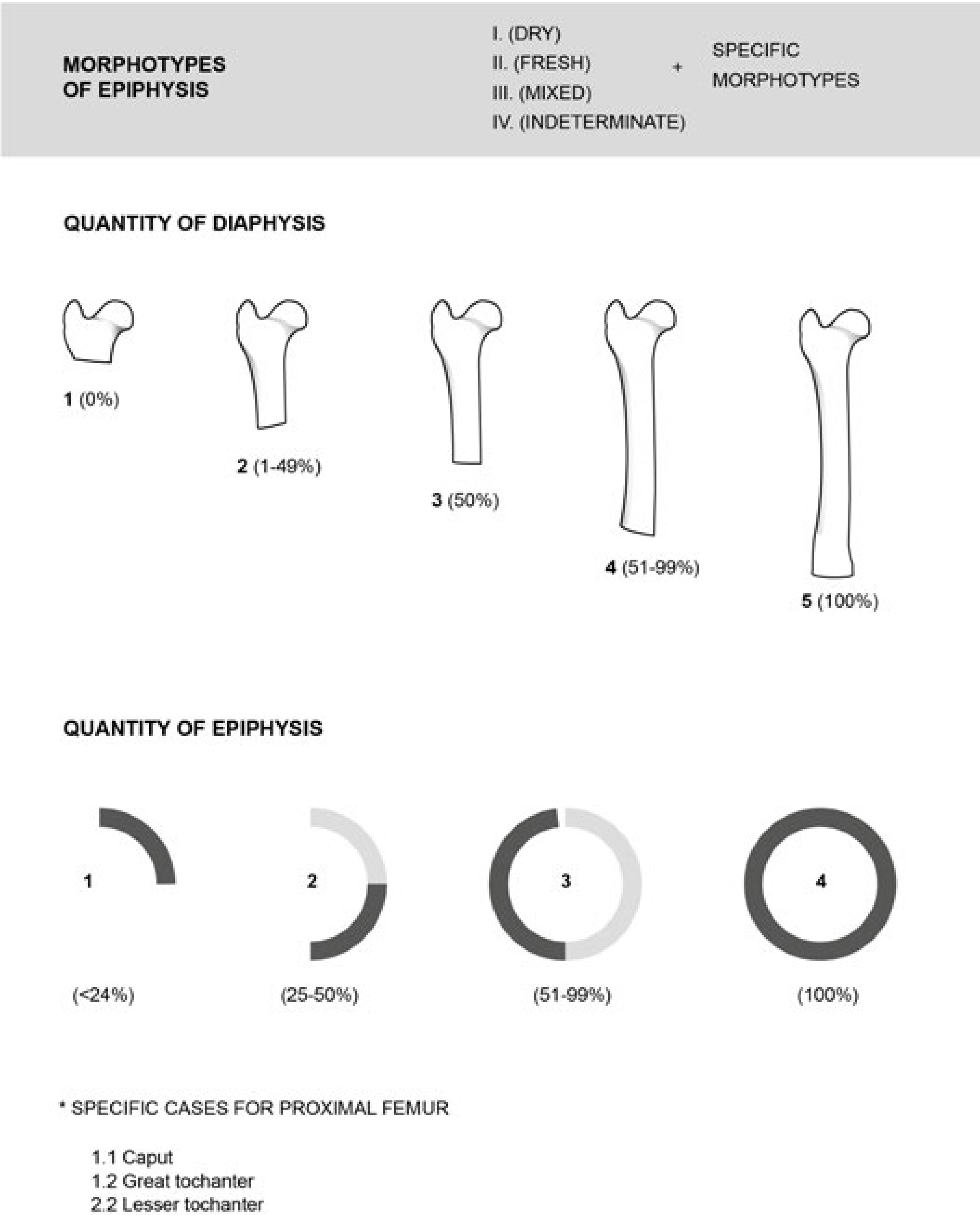
* More than one zone is combinable

SUPPL. FIGURE 4

Codes of *Diaphysis characteristics*: circumference, length, part and zone of the bone (location).



SUPPL. FIGURE 5
Morphotypes of diaphysis.

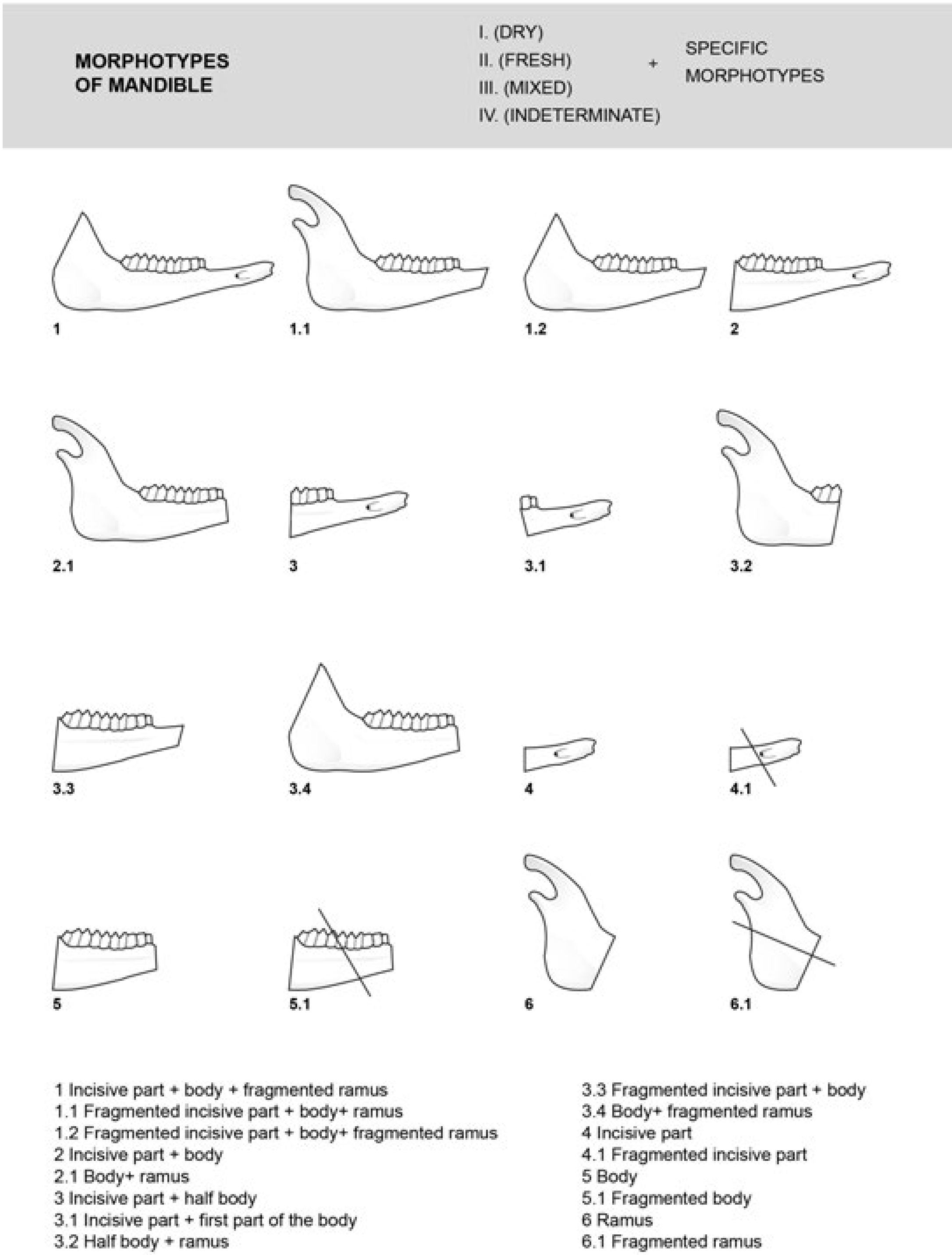


SUPPL. FIGURE 6

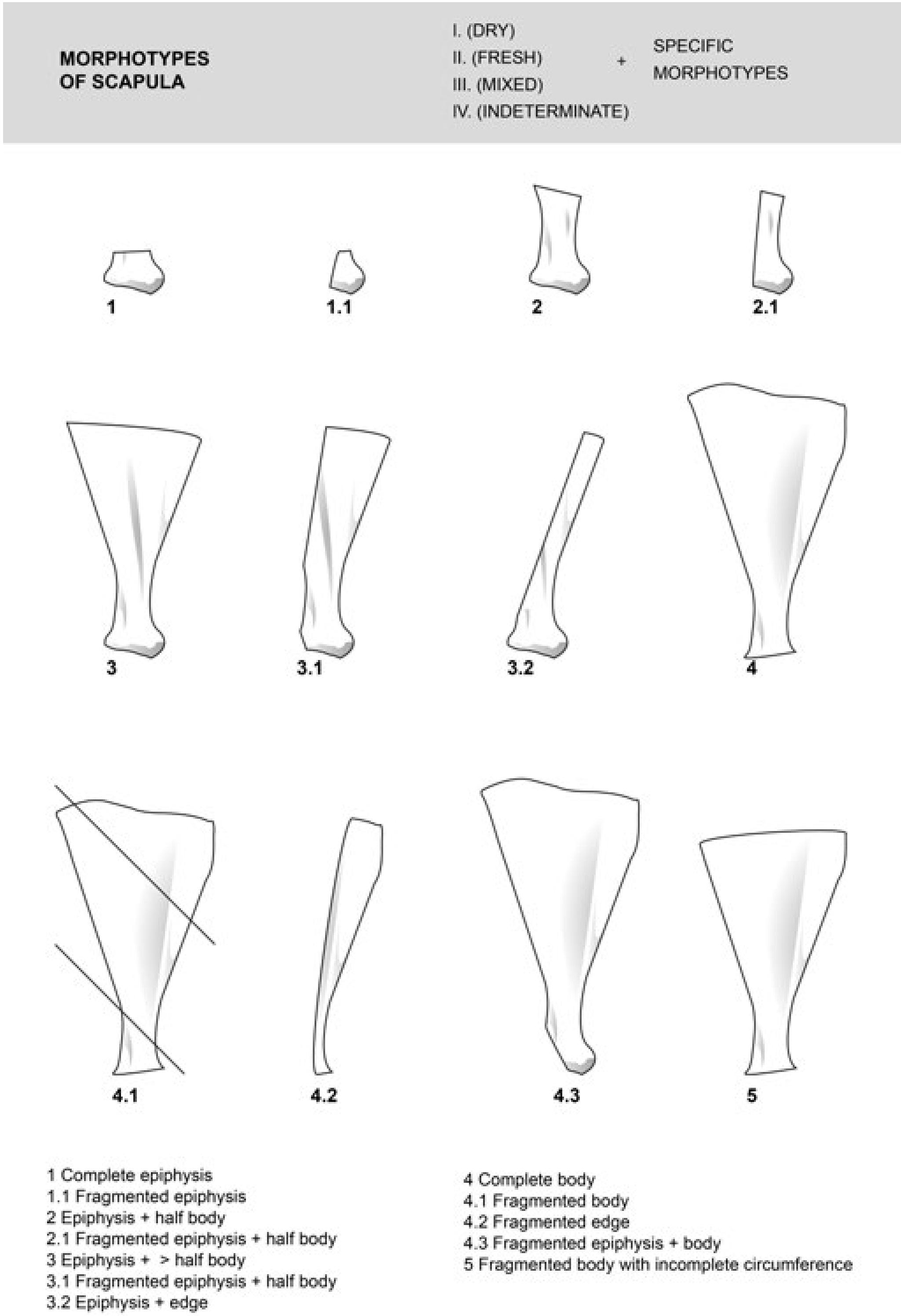
Morphotypes of epiphysis.

Archaeozoologists generally study bone assemblages that contain a large number of remains, to which we apply taxonomy, osteometry, taphonomy and other type of analyses. There also tend to be great differences in these assemblages depending on the type of site and/or chronologies in question. For this reason, the most convenient and effective way of storing all the information is to use a standardized database.

Nowadays it would be impossible to conduct any archaeological research project without cre

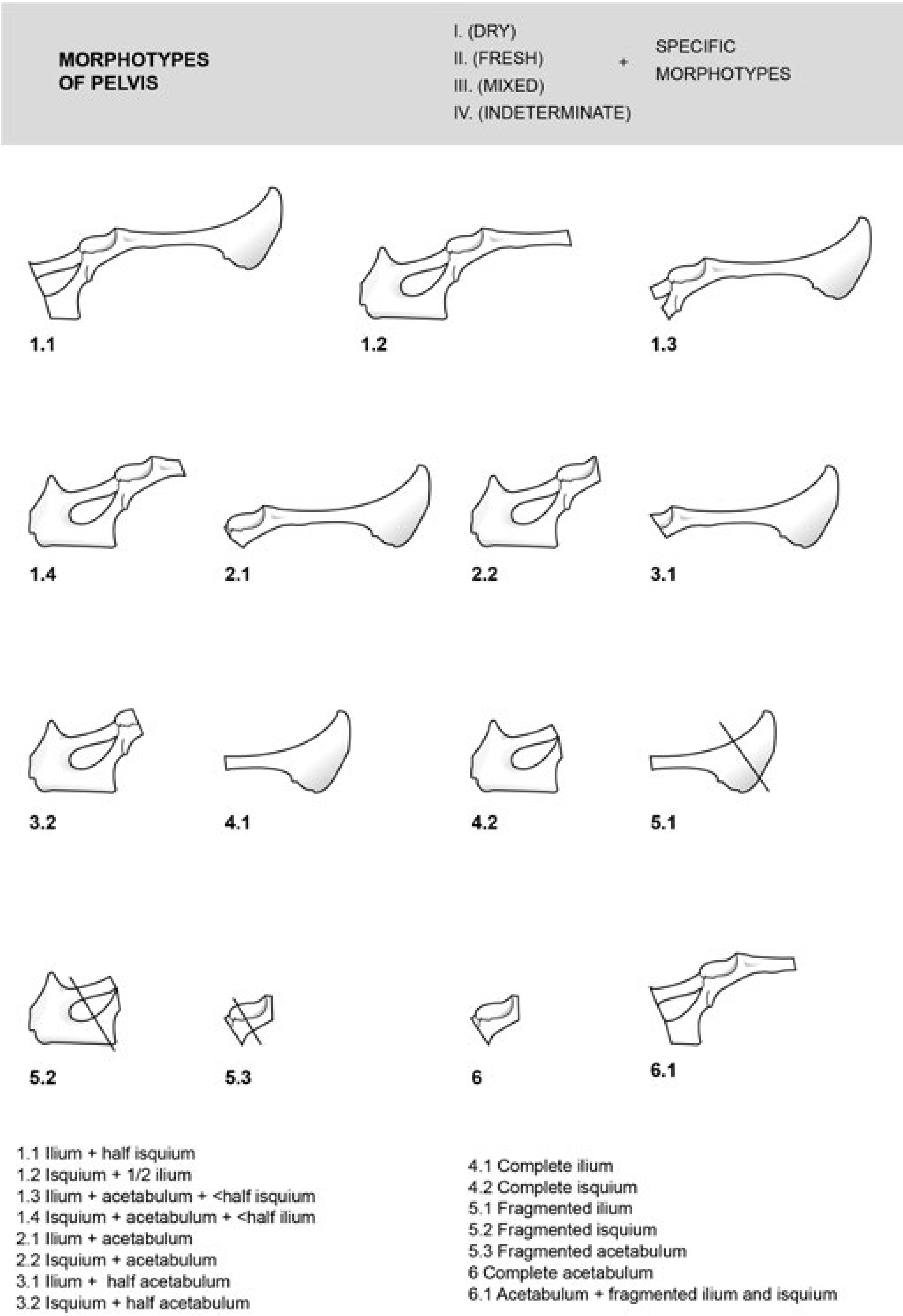


SUPPL. FIGURE 7
Morphotypes of mandible.

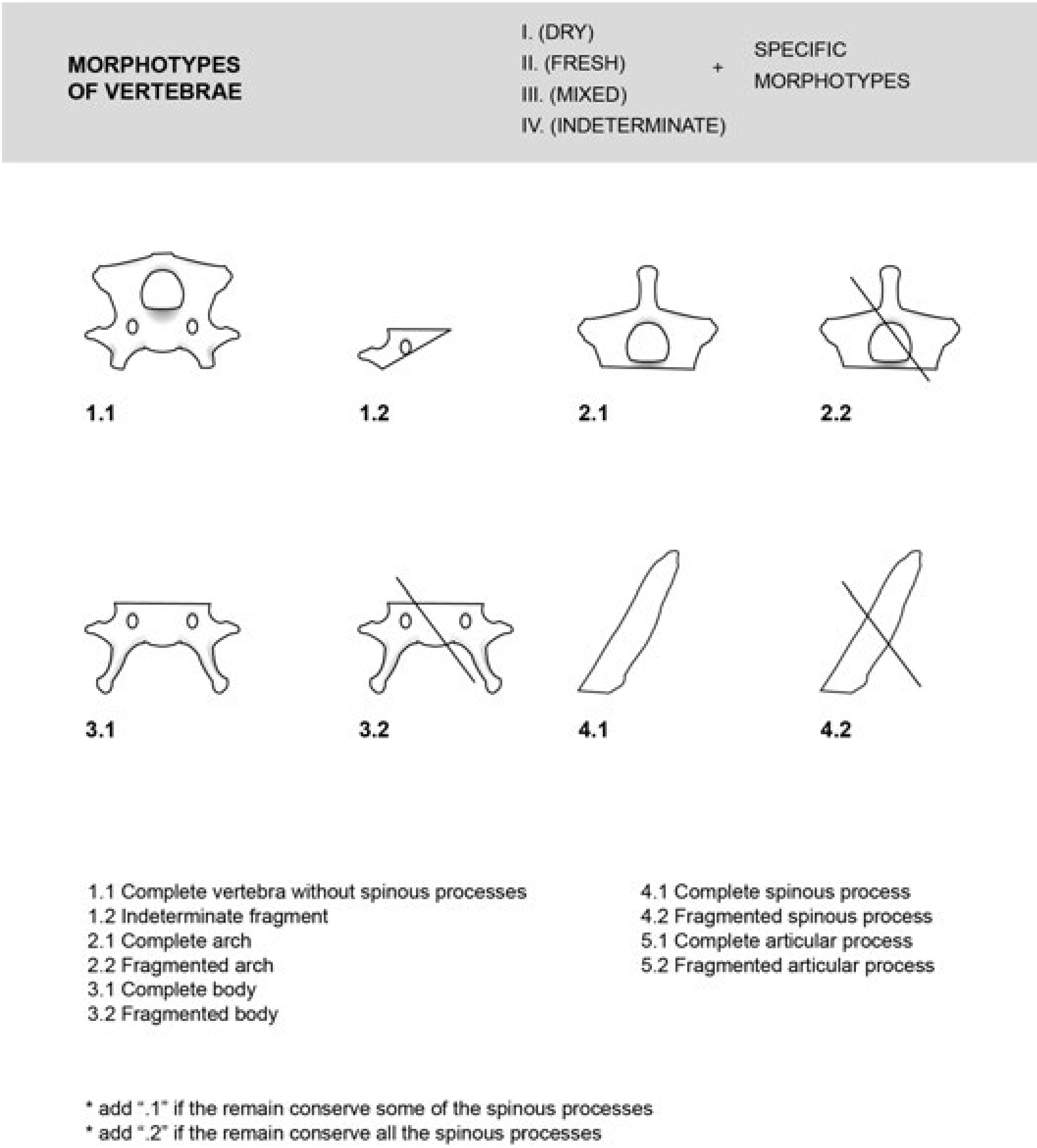


SUPPL. FIGURE 8

Morphotypes of scapula.



SUPPL. FIGURE 9
Morphotypes of pelvis.



SUPPL. FIGURE 10

Morphotypes of vertebrae.

CODE	DEFINITION
22	complete with ossified epiphysis
11	complete with nearly ossified epiphysis
12	nearly ossified proximal epiphysis and ossified distal epiphysis
21	ossified proximal epiphysis and nearly ossified distal epiphysis
00	complete without ossified epiphysis
02	unossified proximal epiphysis and ossified distal epiphysis
20	ossified proximal epiphysis and unossified distal epiphysis
10	nearly ossified proximal epiphysis and unossified distal epiphysis
01	unossified proximal epiphysis and nearly ossified distal epiphysis
X2	without proximal epiphysis and ossified distal epiphysis
2X	ossified proximal epiphysis and without distal epiphysis
X0	without proximal epiphysis and unossified distal epiphysis
0X	unossified proximal epiphysis and without distal epiphysis
X1	without proximal epiphysis and nearlyossified distal epiphysis
1X	nearly ossified proximal epiphysis and without distal epiphysis

SUPPL. TABLE 1
Codes for the epiphysis ossification.

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