# VI JORNADES D'ARQUEOLOGIA DE LES ILLES BALEARS

FORMENTERA

(26 A 28 DE SETEMBRE DE 2014)

# VI Jornades d'Arqueologia de les Illes Balears

(Formentera, 26, 27 i 28 de setembre, 2014)

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Consell Insular de Formentera

Col·legi Oficial de Doctors
i Llicenciats en Filosofia i Lletres
i en Ciències de les Illes Balears
**Secció d'Arqueologia**

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# PRESENTACIÓ

Els dies 26, 27 i 28 de setembre de 2014 la Sala de Cultura de Formentera va acollir un acte de primer ordre en el camp de la recerca arqueològica a la nostra comunitat autònoma: les VI Jornades d'Arqueologia de les Illes Balears. Aquest congrés bianual, organitzat per la Secció d'Arqueologia del Col·legi Oficial de Doctors i Llicenciats en Filosofia i Lletres i en Ciències de les Illes Balears, arribava així, per primera vegada des del seu inici l'any 2006, a Formentera.

De les cinquanta-set comunicacions previstes en el programa, quatre derivaven directament d'intervencions portades a terme a Formentera. En aquesta illa, l'aprovació de la revisió de les Normes subsidiàries i del Catàleg del patrimoni cultural, el 30 de setembre de 2010, va suposar un abans i un després en la documentació i l'estudi del territori des del punt de vista del patrimoni arqueològic, amb l'adopció d'un protocol per a la realització d'intervencions preventives davant qualsevol indici de resta arqueològica, tant en sòl urbà com, sobretot, en sòl rústic. A més a més, també s'han de tenir en compte els tres projectes de recerca arqueològica –tramitats com a intervencions programades– que s'han autoritzat des de 2012 i que avui per avui encara es troben en desenvolupament, dos d'ells centrats en la prehistòria i un en l'època romana.

La Llei 12/1998, de 21 de desembre, del patrimoni històric de les Illes Balears, incideix no només en la protecció i en la conservació del patrimoni cultural, sinó també, en la investigació i en la difusió. Certament, la recerca i la transmissió del coneixement són dos esglaons indispensables per poder posar en valor el patrimoni històric, sense els quals la protecció i la conservació no tendrien cap sentit. Per aquest motiu, quan la Secció d'Arqueologia del Col·legi va plantejar al Consell Insular de Formentera la proposta de realitzar-hi les VI Jornades, des d'aquesta administració no només es va valorar com una opció, sinó gairebé com una obligació, entenent que es contribuiria a organitzar un fòrum científic de notable rellevància, encaminat a difondre els resultats de les darreres recerques en arqueologia desenvolupades arreu dels territoris que conformen les Illes Balears.

La publicació de les comunicacions presentades durant les VI Jornades, recollides per escrit en aquest volum en el qual també col·labora econòmicament el Consell Insular de Formentera, constitueixen una altra via per contribuir a la difusió del coneixement científic del patrimoni arqueològic de les nostres illes i, en definitiva, a aproximar-lo més a la ciutadania perquè pugui apreciar el seu valor com a testimoni del nostre passat.

Àrea de Cultura i Patrimoni
del Consell Insular de Formentera

# PRÒLEG

És tot un plaer poder presentar aquesta publicació com un recull dels articles presentats a les VI Jornades d'Arqueologia de les Illes Balears duites a terme a l'illa de Formentera durant els dies 27, 28 i 29 de setembre de l'any 2014, fruit de la reunió d'un nombrós i actiu conjunt de professionals del món de l'arqueologia vinguts de totes les Illes Balears, de diversos punts de la península i també de diferents Universitats d'Europa.

La Secció d'Arqueologia del Col·legi Oficial de Doctors i Llicenciats en Filosofia i Lletres i en Ciències de les Illes Balears, qui té la responsabilitat i el plaer d'organitzar aquestes jornades d'arqueologia autonòmiques amb caràcter biennal, ha contat aquest any amb el recolzament econòmic i una magnífica predisposició en tots els aspectes del Consell de Formentera, a qui volem donar les gràcies per l'ajuda prestada, la seva col·laboració i, sobretot, per obrir les portes de la seva illa a un projecte com aquest, que intenta consolidar les bases per a posar en comú la tasca arqueològica i la difusió en favor d'una creixent i acurada professionalització de l'arqueologia. Formentera ens ha envoltat com a un marc idoni per exposar els estudis més adients i actuals de l'arqueologia de les nostres illes que conformen l'arxipèlag Balear.

La present publicació ha estat possible gràcies a la voluntat, entusiasme i esforç d'un conjunt de persones que han oferit amb il·lusió el seu temps i tots els recursos disponibles al seu abast. Les jornades i la publicació de les seves actes s'han materialitzat baix la coordinació de les sotasignants en representació de la Secció d'Arqueologia i de Jaume Escandell, en representació de l'Àrea de Patrimoni del Consell de Formentera. Però si des de les primeres Jornades realitzades a Manacor (Mallorca) l'any 2006 impulsades per l'arqueòloga municipal Magdalena Salas, hem arribat fins el dia d'avui ha estat també gràcies a l'empenta donada per tots els seus assistents i, en especial, als seus participants qui ofereixen els resultats de les seves investigacions per tal de fomentar la molt necessària tasca de difusió del nostre patrimoni arqueològic. A aquelles primeres jornades que semblen quedar llunyanes es va iniciar un aventura amb 12 comunicacions, a les II Jornades diutes a terme a Felanitx es va augmentar la participació fins a 16 comunicacions, seguides per les III Jornades realitzades a Maó on es varen presentar 23, a les IV Jornades celebrades a Eivissa el nombre de comunicacions va arribar fins a 36 i finalment a les V Jornades celebrades a Palma el 2010 es varen presentar 44 comunicacions amb un èxit de participació mai vist a les anteriors que arribava fins als 90 autors. L'augment paulatí i consecutiu de participació d'unes jornades a les següents és un clar èxit que ens ha conduit fins a les presents.

Actualment hem contat amb la participació de 99 autors que varen presentar 55 comunicacions a Formentera, d'entre les quals s'han presentat per a formar part de la publicació de les Actes un total de 45 articles que engloben des de la prehistòria fins als nostres dies amb temàtiques que inclouen projectes d'excavacions programades, intervencions d'urgència, estudis metodològics, restauració i projectes de difusió. A tots ells, gràcies per la feina i dedicació demostrada, i gràcies també als coordinadors predecessors per donar les primeres passes que obrien el camí que avui podem continuar desitjant que sigui llarg a fi de poder fomentar l'interès per l'arqueologia, lluitar per una professió digna i de qualitat i potenciar el respecte pel patrimoni arqueològic que ens envolta com a llegat històric i cultural dels nostres antecessors.

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# SUMARI

# SETTLEMENT OF IBIZA, SPAIN: FROM ROME TO ISLAM
# THE BIOLOGICAL EVIDENCE FROM THE DENTITION

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## SUMMARY/ABSTRACT

Dental non-metric traits were used to assess the biological affinity of three excavated skeletal samples from the island of Ibiza, Spain. The dating of these groups range from c. 3rd – 12th century AD and they were all excavated within the area of Ibiza town. The Mean Measure of Divergence (MMD) was calculated between each group and preliminary results indicate that all groups are biologically distinct and may represent different settlement waves in the islands history. Biological continuity between the groups was not evident.

## INTRODUCTION

The island of Ibiza is one of the smaller Balearic Islands that are found in the Mediterranean Sea, located off the eastern Spanish coastline. This location has led the island to have an interesting settlement history as it was used, amongst other locations, to control the seas of the Western Mediterranean – economically and militarily (Aubet 2001). Although the dates for the first human occupation of the island are contested, it is clear that more intensive settlements began with the Phoenicians around 650 BC (Marquez-Grant 2005 and Gomez-Bellard 1995). Ibiza's importance continued throughout time which can be recognised through the islands subsequent settlement by many of the major powers operating in the Mediterranean; e.g. the Roman Empire and Islamic powers – all of which sought to benefit from what Ibiza offered them (Garcia 1972 and Marquez-Grant 2005). Thus, as Ibiza has a rich and varied settlement history and archaeological record, the purpose of this investigation was to use excavated human skeletal material to assess biological continuity between three different population samples. The results of this analysis can aid in identifying different settlement groups within the archaeological record, assess potential continuity between populations, and may be of especial importance in identifying populations where few grave goods have been found.

Dental morphology was used to assess biological continuity between three skeletal groups issuing from different points in the archaeological record. Minor morphological variations in the dentition are known as dental non-metric traits (DNMTs) and these consist of differences in morphology resulting in differently shaped or sized crests, tubercles, cusps, roots and fissure patterns as well as changes in the normal number of teeth (Turner *et al.* 1991). The study of DNMTs provides a sound base for biological affinity studies as they are thought to be under close genetic control and therefore genes should have the largest impact on their presence, absence and expression (Turner *et al.* 1991). These genes seem to have a high level of heritability when compared to other genetic traits and are genetically stable, only evolving very slowly (Schnutenhaus & Rösing 1998 and Turner *et al.* 1991). Thus, different biological groups can have differences in trait presence, absence, frequency and expression of traits, making it possible for statistical analysis to determine a measure of dissimilarity or biological distance between the groups. The statistical method employed in the analysis of DNMTs is the Mean Measure of Divergence (MMD), a calculation of dissimilarity used to assess levels of genetic affinity based upon the phenetic expression of genes found in dental morphology (Berry 1976). This technique has several advantages in that it is non-destructive, inexpensive, and preservation of the dentition is generally superior to the preservation of bone in the archaeological record. Potential disadvantages stem from an incomplete understanding of genetic to phenetic expression and that environmental factors may have an impact on expression in individuals, but this influence is thought to be minor when considering trait frequencies in populations (e.g. Siegal & Doyle 1975a and Scott & Turner 1997).

This technique has been used by Scott and Dahlberg (1982) to calculate the MMD between seven Native American tribes that came from four linguistic families. The results of this statistical test were affirmed by ethno-historical and anthropological evidence: cultural and oral traditions as well as shared languages were found to be closer in the groups which shared more dental traits frequencies, this established a closer level of biological affinity between those groups. Other researchers have explored the origins of various skeletal groups in different areas: for instance Guatelli-Steinberg and colleagues (2001) examined the pre-conquest settlement of the Canary islands whilst Irish (2006) has investigated the peopling of Egypt from the Neolithic through to the Roman period. Thus, the technique is suitable for use to determine biological distances between the skeletal material from Ibiza.

## MATERIALS AND METHODS

### *Samples*

Three necropolises utilised in this study were all excavated in the area of Ibiza town within the last decade. The first sample was from the urban Roman site of Vía Púnica (n=52) which was excavated in 2008 and was found to be part of a larger necropolis. This site consisted of inhumations that followed typical Roman funerary traditions and grave goods were common – the pre-Christian coinage found with the bodies date to no later than the early fourth century AD (Llinás & Casanova 2009). Ibiza, upon the fall of Carthage in 146 BC, was established as a confederate city of Rome and remained under Rome's influence until the Vandal occupation in the mid fifth century (Fuller *et al*. 2010 and Foss 1975). The Roman Empire consisted of a vast geographical area, stretching from Northern England through continental Europe and into the Near East and North Africa, thus it will have encompassed many biologically distinct groups of people whose DNMTs will have varied (Potter 2006 and Scott & Turner 1997). Consequently, although the point or points of origin of the individuals or their ancestors are not known, the fact they are following Roman traditions suggests that they come from somewhere within the Roman Empire.

The second sample, from the urban site of Avenida España (n=24), was excavated as part of a rescue project when it was discovered during road infrastructure maintenance in 2003. Preliminary studies suggest that it belongs to the Islamic period and could be linked to the Islamic quarter of the city, consequently it may date from c. 8$^{th}$ Century AD to the early 17$^{th}$ Century (Barricarte 2003). The individuals were buried in traditional Islamic style: in single pits orientated towards Mecca, lying on their right sides and with no grave goods or headstones - this may suggest that the individuals were Muslims (Halevi 2011 and Barricarte 2003). The Islamic conquest of Spain and the Balearic Islands began around 711 AD, with Ibiza being officially occupied by Islamic forces in 902AD and Muslim control of the areas lasted almost 800 years (Kennedy 1996 and Gurrea & Martin 2000). As grave goods were not found to suggest a place of origin and poor bony preservation precluded the use of morphological and metrical ancestry estimation, it is not known where these individuals originated or if they represent a biologically different group to earlier skeletal populations.

Similarly buried were the individuals of the third group, from Moli de Can Fonoll (n=30). This excavation was undertaken from 2006-8 after being discovered during motorway construction and consisted of a necropolis of 167 individuals (Castro 2009). The necropolis dates from c. AD 1000-1235 which corresponds to the period of Islamic domination of the Iberian Peninsula. It is the first rural medieval cemetery to be found on Ibiza, and its location suggests that the population it represents had connections to the agricultural settlements that surrounded Ibiza town in the medieval period. Again, the individuals in this cemetery have a lack of grave goods and poor bony preservation to suggest place of origin or relationship to other groups upon the island. Thirty individuals were randomly chosen for MMD analysis in order to minimise the bias created by measuring small samples against much larger samples which could artificially inflate the value leading to an invalid result (Harris & Sjøvold 2004).

### *Methods of observation and analysis*

The prevailing methodological system for recording and scoring DNMTs is the Arizona State University Dental

Anthropology System (ASUDA) designed by Turner and his students (1991). The traits selected to be included in the ASUDA system were chosen due to their being easily and reliably observed, can normally survive attrition well and have low or no sexual dimorphism (Turner *et al*. 1991). All of these factors combined make the selected traits very useful in determining biological affinity as they should be fairly straightforward to identify, score and record. The data used in this study was gathered by three researchers between 2010 and 2012 and 18 dental morphological traits from the ASUDA system were selected for analysis (Springs-Pacelli 2010, Martinez 2011 and Girdwood 2012).

Intra- and inter-observer scoring differences are potential sources of error in this study. Intra-observer error may be caused by scoring inconsistently throughout the data collection period, the possibility of this was known to all researchers and efforts were taken to minimise this. However, due to time constraints there was no opportunity to re-examine any material in order to measure concordance between the initial scoring and later scoring. However, in all the studies, where there was any doubt of a trait in an individual, a note was made and an image taken to be reassessed at a later time. These instances were then reassessed at the end of the observation period and scored appropriately in order for the data to be consistent throughout the study. Inter-observer error may be caused by inconsistent scoring between researchers which may result in trait frequencies derived from affected traits being incomparable due to the subjective method of scorings. This may artificially inflate the affected trait frequencies due to differences in data collection methods and would not represent actual differences in trait frequencies between the populations. Differing levels of preservation was also an issue in this investigation as the teeth in the Can Fonoll sample were poorly preserved and covered with a taphonomic deposit which made the smaller surface crown traits harder to confidently score (Springs-Pacelli 2010). For these reasons, a conservative approach to analysis was undertaken in order to minimise error in the calculation of biological affinity. Therefore, only DNMTs where confidence of concordance between researchers was high (n=18) were utilized. A list of these traits can be found in Table 1.

| **Maxilla** | **Mandible** |
|---|---|
| Shovelling UI1 | Double-rooted Lower Canine LC |
| Tuberculum Dentale UI2 | Cusp Number LM2 |
| Interruption Grooves UI2 | Cusp 6 LM1 |
| Lateral Incisor Variant UI2 | Cusp 7 LM1 |
| Root Number UP1 | Groove Pattern LM2 |
| Cusp 4 UM2 | Protostylid LM1 |
| Cusp 5 UM1 | Deflecting Wrinkle LM1 |
| Carabelli UM1 | |
| Parastyle UM2 | |
| Enamel Extension UM1 | |
| Root Number UM2 | |

Table 1: 18 traits used for MMD comparison

Although DNMTs show continuous expression, they were examined and quantified by using a nominal scoring system in each case as the ASUDA 3D casts were not available to any of the researchers and consequently the breakpoints were set in order that they would as clear as possible to limit subjectivity. Key teeth only have been used in this analysis due to time-constraints but these teeth are thought to be the least variable in terms of disruption to trait expression (Scott & Turner 1997). Where a tooth was missing or damaged by wear or pathology to such an extent that a trait could not be confidently recognised and scored, it was recorded as being unobservable (i.e. see Scott & Turner 1997; Turner *et al*. 1991 and Burnett *et al*. 2010). As the samples are small, antimeres were scored in order to produce a larger data pool as these tend to be more representative of a population (Turner *et al*. 1991). The sexes were pooled as the selected DNMTs have little or no sexual dimorphism (Irish 1997). Additionally, DNMT side and sex associations were examined through testing with statistical analyses such as chi-squared, Fisher's exact test and Cramer's V Test (Springs-Pacelli 2010, Martinez 2011 and Girdwood 2012).

In order to assess the biological affinity between populations the MMD was utilized to convert the trait frequencies into numerical values, with the result that the greater the dis-

similarity between the two groups, the greater the value produced (Harris & Sjøvold 2004). This is based upon the assumption that any similarity or dissimilarity between trait frequencies in populations will reflect the similarity or dissimilarity in genetic materials belonging to said populations - and so the genetic contact between populations will be measured (Irish 2010). The genetic contact between groups result in a sharing of genetic material and this is thought to affect the DNMTs within populations and their frequencies (Scott & Turner 1997). The Freeman-Tukey transformation advised by Green and Suchey (1976) was used to prepare the trait frequencies for the MMD calculation as an inverse sine transformation needs to be applied in order to stabilize variance which occurs as sample size decreases (Harris & Sjøvold 2004). This variance must be controlled and stabilised in order to get a more accurate result by reducing the bias inherent in small samples (Green & Suchey 1976). The MMD is then calculated by converting the trait frequencies into numerical values that represent a degree of genetic affinity based upon the phenetic appearance of the traits. As a result, a low value from this formula implies similarity between groups whilst higher values imply greater phenetic distances (Irish 2010). The values will be considered significant if they surpass the 0.05 significance level and can only be considered as truly significant if the value is at least twice that of its standard deviation (Sjøvold 1977). This is due to small samples being able to produce a non-zero MMD value simply due to sampling fluctuations instead of true biological difference (Harris & Sjøvold 2004).

## RESULTS

Side and sex associations in DNMTs were very rare and when found were weak ($x^2$<3.841, p<0.05). The most frequent traits in the Can Fonoll group were Cusp Number and Upper Premolar Root Number, whilst the most frequent traits in Vía Púnica were Cusp Number and Shovelling. Avenida España's most frequent traits were Cusp 4 and Upper Premolar Root Number. A breakdown of the number of observable traits and their presence can be found in Table 2.

| Trait | Vía Púnica | Can Fonoll | Avenida España |
|---|---|---|---|
| Shovelling UI1 | 29/19 | 24/7 | 11/5 |
| Tuberculum Dentale UI2 | 25/3 | 19/3 | 10/0 |
| Interruption Grooves UI2 | 24/6 | 20/0 | 16/2 |
| Lateral Incisor Variant UI2 | 25/0 | 25/0 | 17/1 |
| Root Number UP1 | 19/7 | 26/18 | 9/4 |
| Cusp 4 UM2 | 28/4 | 28/1 | 12/9 |
| Cusp 5 UM1 | 31/4 | 22/1 | 12/2 |
| Carabelli UM1 | 27/7 | 21/0 | 13/4 |
| Parastyle UM2 | 29/0 | 26/0 | 10/2 |
| Enamel Extension UM1 | 30/1 | 21/0 | 12/1 |
| Root Number UM2 | 17/6 | 17/6 | 9/2 |
| Double-rooted Lower Canine LC | 25/1 | 20/0 | 9/11 |
| Cusp Number LM2 | 31/1 | 23/12 | 11/9 |
| Cusp 6 LM1 | 30/1 | 29/0 | 11/0 |
| Cusp 7 LM1 | 32/2 | 29/0 | 15/0 |
| Groove Pattern LM2 | 31/3 | 23/2 | 10/1 |
| Protostylid LM1 | 28/1 | 28/0 | 10/6 |
| Deflecting Wrinkle LM1 | 25/1 | 29/0 | 8/1 |

Table 2: Breakdown of trait frequencies (no. of observed teeth/trait presence)

The MMD values calculated between the 3 groups are presented in Table 3. The samples that are most genetically distant are the Can Fonoll – a confirmed Muslim group – and Avenida España – a presumed Muslim group. The least genetic distance was found between the 3rd-4th century Roman Vía Púnica group and the 11th-mid 13th century Muslim Can Fonoll group.

All the results are statistically significant (p<0.05) and are all over twice the value of their standard deviation. Thus, the results suggest that there is no biological continuity between the samples and that they all represent biologically distinct groups.

| | Vía Púnica | Can Fonoll | Avenida España |
|---|---|---|---|
| **Vía Púnica** | - | 0.997 | 2.099 |
| **Can Fonoll** | 0.997 | - | 2.264 |
| **Avenida España** | 2.099 | 2.264 | - |

Table 3: MMDs between the groups

## DISCUSSION

The analysis demonstrates that the three skeletal populations are all distinct biological groups that do not show evidence of biological continuity with one another. This result is not unexpected considering the time lapses between them and the known history of settlement upon Ibiza. It was unlikely that the urban Roman population would be related to the rural Muslim group of Can Fonoll that lived upon the island approximately 600 years later or the potential urban Muslim group of Avenida España. The Can Fonoll and Avenida España were arguably more likely to be related as it was possible that they were contemporaneous and shared similar burial style. However, this hypothesis was rejected based on our analysis thus it is possible that the two groups represent two different biological groups, perhaps of Muslims.

Different points of origin are important as they often result in different DNMTs frequencies as gene pools differ geographically (Scott & Turner 1997). Therefore, these results suggest that biologically different settlement groups replaced the population of the island over time and that it is unlikely that a sizable biological group stayed upon the island. However, this interpretation is based on a limited number of samples spread over a wide time period and therefore lacks finer details which would allow for discussion of the biological evidence for abandonment, settlement and retention of populations upon the island in detail. For instance, biological continuity between known historical events in order to determine retention of a population could also be assessed. Similarly, in combination with archaeological and historical evidence and with more dated skeletal samples, it would be possible to determine if abandonment of the island occurred quickly or gradually by a biological group. Additionally, further data would allow for the biological makeup of the new settlement groups to be explored.

In this respect, it is possible that the Can Fonoll and Avenida España groups are contemporaneous but that they represent different biological groups that have settled upon Ibiza. The conquest of Spain was undertaken with forces gathered from multiple Berber and Arab groups so it is unlikely that the associated settlement groups represented a homogenous biological grouping with homogenous DNMTs (Kennedy 1996). For instance, the ruling elite may have come from a different geographic area, and thus gene pool, than the other inhabitants of the island: the merchants, the workers and the slaves. This may result in burial grounds representing a range of individuals from different biological groups or there may be different burial areas for some of these different groups. In cases such as these, intra-site analysis to determine variability of DNMTs could identify some cases of biological or social differences, as in Stojanowski and Schillaci (2006), however this technique has not yet been performed on skeletal material from Ibiza mainly due to small sample sizes for most skeletal assemblages. This could determine if there is biological variability in the skeletal samples which would suggest multiple biological groups living together upon the island at a certain point of time. If DNMT data of Berber and Arab groups could be collected a comparison with our data might provide more information on their geographic origin. This would allow insight into the type of biological groups that came to Ibiza and during which periods.

The analysis of DNMTs may be of special use in aiding in the identification of skeletal samples whose archaeological or historical contexts are uncertain. For example, the lack of grave goods and the general lack of other archaeological evidence associated with the Avenida España sample did not aid attempts to identify and date it. However, when we contrast this sample with that of the Can Fonoll population, it is evident from DNMTs that they are not the same biological group and so must represent different biological populations. As discussed above, there may be more than one explanation for these results and the large gaps in this DNMT evidence

means it cannot be purposefully explored further without further data.

With more data gathered from a broader range of time periods, using both contemporary and non-contemporary samples, it would be possible to provide a more complete and rigorous examination of the biological background of the settlers of Ibiza. That being said, if dated skeletal samples relating to the Muslim period are examined, it would be possible to determine if the Can Fonoll or Avenida España groups are related to them and discuss Muslim settlement in more detail. Additionally, where unidentified and undated skeletal samples are found they could be compared to known populations and their biological relatedness compared in an attempt to identify them.

Our results seem to reject the hypothesis of biological continuity between the three samples in our analysis. However, in must be stressed that population movement in the past is a complex matter that cannot be controlled in our study. As an example, textual evidence points to the institution of slavery being established in some form in Mediterranean and surrounding lands since around the 2nd millennia BC (Snell 2011). Thus, as biologically different peoples from diverse geographic areas were enslaved, often moved in location, and potentially interbreeding with others, the genetic material of the populations concerned may have been affected. It is not known what impact this may have had on a genetic or phenetic level upon the DNMTs in a living population, or in the skeletal assemblages they leave behind. Additionally the small sample sizes in our study introduce some bias in the analysis, thus conclusions should be used with caution as they are only able to illuminate a very small part of Ibiza's settlement history.

Despite the aforementioned limitations it must be acknowledged that DNMTs have the potential to add considerably to bioarchaeological knowledge on Ibiza and can be used to enrich historical and archaeological knowledge of the settlement of the island over time. Thus more research needs to be done on other skeletal assemblages, employing other methods such as DNA in order to reconstruct a few more pieces of the island's fascinating history.

## CONCLUSION

DNMTs were used to measure the biological affinity between three skeletal samples from the island and no affinity was found. In order for a deeper investigation and understanding of the nature of the biological groups settling upon the island, more skeletal samples require to be analysed for DNMTs. This will enable a more acute examination of biological groups, for instance in an exploration of factors such as social status within skeletal samples and the relationship between contemporary biological groups. Additionally, they could be used to identify the biological affinity of isolated skeletons or skeletal samples with little associated archaeological evidence. From further investigations, more information upon the settlement, abandonment and possible retention of biological groups could be discussed within the context of the archaeological and historical evidence.

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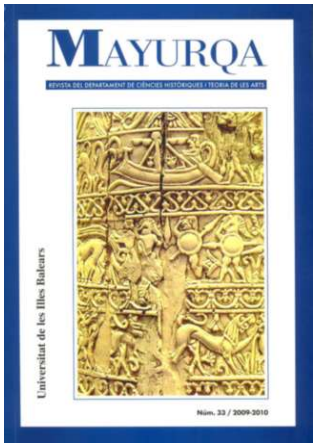
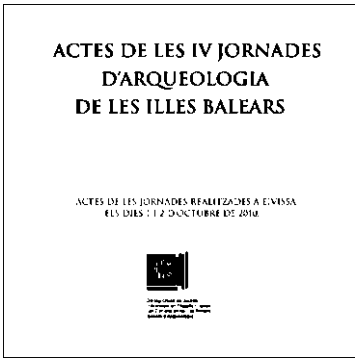
I[es]. Manacor. Setembre 2006

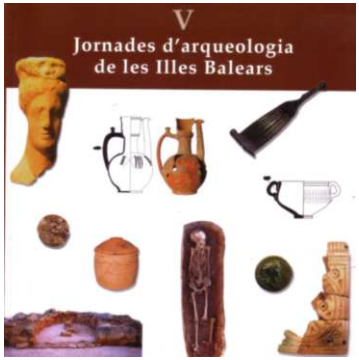



II[es] Felanitx. Novembre 2007


III[es] Menorca. Octubre 2008




IV[es] Eivissa. Octubre 2010




V[es] Palma. Setembre 2012


VI[es] Formentera. Setembre 2014

Col·legi Oficial de Doctors
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i en Ciències de les Illes Balears
**Secció d'Arqueologia**

Consell Insular
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