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the Island of Ibiza
(Spain):
contributions from
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THE PRESENCE OF AFRICAN INDIVIDUALS IN PUNIC POPULATIONS FROM THE ISLAND OF IBIZA (SPAIN): CONTRIBUTIONS FROM PHYSICAL ANTHROPOLOGY

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RESUMEN: El origen de la población púnica de la isla de Ibiza ha sido una cuestión debatida, tanto desde el campo de la antropología, como del de la arqueología. El establecimiento de asentamientos rurales y el crecimiento demográfico por toda la isla, especialmente a partir del s. IV aC, ha sido reconocido como un proceso de colonización involucrando la inmigración de gente a la isla. La cultura material de este periodo parece indicar que el origen más probable de estos inmigrantes es el área central del Mediterráneo, especialmente Cartago.

En este trabajo, se comparan las medidas de cráneos de Ibiza, datados entre los siglos VI y II aC, con las medidas de los cráneos de poblaciones modernas americanas, utilizando un programa de discriminación forense FORDISC 2.0 (Ousley y Jantz, 1996). A pesar de las limitaciones de este método, los resultados sugieren la presencia en la isla de algunos individuos de descendencia norteafricana y subsahariana.

PALABRAS CLAVE: Ibiza, poblamiento púnico, cráneos, origen ancestral, FORDISC 2.0.

ABSTRACT: The origin of the Punic population of Ibiza has been a much debated issue, not only in the field of anthropology, but in archaeology as well. The establishment of rural settlements and the apparent demographic growth throughout the island, especially from the 4th century BC onwards, has been mainly recognised as the result of a colonization process involving a large-scale immigration of people. The material culture from this period seems to indicate that the probable origin of these immigrants was the area of the Central Mediterranean, especially Carthage.

This paper compares measurements from Ibizan skulls dating from between the sixth and second centuries BC with craniometric data from modern American populations by employing the forensic discriminant functions of the FORDISC 2.0 (Ousley and Jantz, 1996) computer program. In spite of the method's limitations, the results seem to suggest the presence of several individuals of North African and sub-Saharan ancestry in Punic Ibiza.

KEY WORDS: Ibiza, Punic population, skulls, ancestry, FORDISC 2.0.

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INTRODUCTION

A journey of a thousand miles must begin with a single step.

Lao-Tzu (c.6th century BC)

This work aims to contribute to the understanding of the origin of the Punic population in the island of Ibiza. In this paper, the discipline of physical anthropology is in charge of furthering this knowledge. Through the examination of ancient human skeletal remains, it is hoped that skull measurements introduced into a forensic computer programme will identify the ancestry of some individuals in the population. It is not expected that the answer will pinpoint a specific geographical location. Rather, it should indicate a wider geographical region such as the boundaries known today as Europe, the Eastern Mediterranean, North Africa and sub-Saharan Africa.

This research has important implications in the study of the Punic colonization process in Ibiza, or at least with regards to its population's composition. With larger and more representative samples in the future, the research agenda can compare rural and urban contexts, male and female migration patterns, and provide further understanding of the funerary context, not only in Ibiza but also in other Punic enclaves in the Western Mediterranean. In addition, by establishing the presence or absence of individuals with African ancestry, physical anthropologists are informed as to what methods to employ when undertaking a routine anthropological analysis, such as the most appropriate method for stature estimation. Within a palaeopathological perspective, the identification of migration patterns has implications for studies on health and disease.

This present work differs from other human skeletal studies on Punic Ibiza in that it considers an individual skeleton as a single sample, rather than using a population mean composed by a group of skeletons. Moreover, it employs forensic discriminant functions.

A brief geographical and chronological background to Ibiza is provided below. This is followed by an insight into the debate surrounding the origins of Ibiza's Punic population. A review of anthropological studies on Ibizan skeletal remains is then provided. After the latter, the materials and methods employed are described. Following the results, there is space for discussion and interpretation. Finally, a conclusion is reached and further research questions are raised.

IBIZA: GEOGRAPHICAL AND CHRONOLOGICAL BACKGROUND

The island is broken up at intervals by notable plains and highlands and has a city named Eresus, a colony of the Carthaginians. And it also possesses excellent harbours, huge walls, and a multitude of well-constructed houses.

Diodorus Siculus,
1st century BC (Book V:16)¹

Today, Ibiza forms part of the Balearic Islands (Spain). The island is located at approximately 92 km from the Iberian Peninsula and 82 km from Majorca (Vallès, 2000a), with the North African coast at a distance of about 240 km. Ibiza's estimated land surface, including its surrounding islets, covers an area between 541 and 570 km², with a maximum length and width of 41 km and 21 km respectively (Vallès, 2000a). There is a capital city of the same name, 'Ibiza' or *Eivissa*.² In January of 2003 there was an estimated population of 105.103 inhabitants (INE, 2003).³ Further aspects on Ibiza's physical geography and climate can be found elsewhere (see Naval Intelligence, 1941; Vallès, 2000b, 2000c).

Through its history, Ibiza has had a variety of language influences such as Punic, Latin, Greek, Arabic, Catalanian and Spanish. It has also seen a variety of funerary practices including cremation, inhumation, Pagan, Christian and Islamic burials. These discontinuities through time must occur, to a great extent, due to the immigration of peoples. The Punic period is the focus of this study. Before providing a background to Punic Ibiza, the preceding Prehistoric and Phoenician periods are worth reviewing. This sets the debate surrounding population origins into a better context.

Early Human presence

Currently, no traces of early hominids have been found in the Mediterranean islands. There is some evidence to suggest that, for *Homo* was present in Sicily and Sardinia dating to the Middle Pleistocene (Schüle, 1993: 399). Early human remains in Sardinia date to circa 9120 +- 380 BP (Spoor and Sondar, 1986). Island isolation contributed partly to this lack of earlier remains. Even when the sea reached its lowest level circa 18,000 years ago, Ibiza and Formentera still remained isolated from the rest of the Balearic Islands and the Spanish mainland (Shackleton *et al.*, 1984).

The palaeontological site of *Es Pouàs* in the northern part of Ibiza, seems to suggest human presence at least as early as the 5th or 6th millennium BC (Alcover *et al.*, 1994: 237; Costa, 2000; Costa and Benito, 2000; Costa and Guerrero, 2001).

Island colonization

The early colonization of the Balearic Islands is still uncertain, but a review of the available evidence (Calvo *et al.*, 2002: 182-183) reveals human presence before 3000 BC, and agriculture and herding becoming established between 2300 and 2100 BC.

¹ Translation by C. H. Oldfather in 1939. Loeb Classical Library, Harvard University Press, Cambridge, Massachusetts, USA/William Heinemann Ltd., London, UK.

² To avoid confusion, the word 'Ibiza' is used here as the English translation to indicate the whole island, while the word *Eivissa* will be used to refer to the capital city.

³ INE ('Instituto Nacional de Estadística') has this information on-line at <www.ine.es>.

With regards to Ibiza, current hypotheses indicate human settled occupation since at least the 3rd millennium BC (Costa and Benito, 2000; Costa and Guerrero, 2001, 2002). The neighbouring island of Formentera has provided the earliest human remains (see Gómez and Reverte, 1988) yet discovered in the ‘Pitiusas’ archipelago. These remains come from the megalithic burial site of *Ca Na Costa* (Fernández *et al.*, 1988) dated to circa 2000 BC (Costa and Guerrero, 2001: 35). In Ibiza, the earliest human skeletal evidence was found at the site of *Can Sergent*, dated to around 720 BC and 550 BC (Costa and Benito, 2000; Costa, 2000: 351). At least five individuals were interred here: three male, one female and one infant (González and Lalueza, 2000).

*Phoenician colonization*⁴

The Phoenician colonization can be considered as the roots of the Carthaginian culture (Tarradell, 1955: 66). The Phoenicians were people from the Eastern Mediterranean, and more specifically, the area of present day Lebanon. Their economy relied on trade rather than agricultural exploitation, and in the first millennium BC they were the principal carriers of goods and ideas throughout the Mediterranean (Hammond, 1972: 87, 91). In the 10th century BC they traded with India and by about 600 BC they had circumnavigated Africa (Casson, 1974: 45-46, 61). Since at least the 8th century BC, they established trading centres and outposts in the Mediterranean, first acting as merchants and then gradually setting up colonies.

The 7th century BC saw the greatest expansion of Phoenician trade in the Atlantic and the Mediterranean areas, with the urban centre of Cadiz in southern Spain taking a central role and founding trading posts in Ibiza, North Africa and other parts of the Iberian Peninsula (Aubert, 1995: 51). Several reasons have been given for this expansion (see Wagner and Alvar, 1989; Gómez *et al.*, 1990; Aubert, 1993; Sherratt and Sherratt, 1993). At this time, Ibiza became an important centre in an international trade network. Considering the winds and sea currents, it stood in the direct path of several east-west and north-south Phoenician trade routes (see Ruiz, 1991). Its importance also relied partly on its central location within the western Mediterranean (Chapman, 1990: 260, 263), as well as on its resources, such as salt (see Vilà, 1953).

During this expansion, the Phoenicians⁵ established a settlement, *sa Caleta*, in the SW part of Ibiza (Ramon, 1991, 2003). The settlement, which covered an area over 40,000 m², was only inhabited for about fifty years, after which the population probably moved to the area of the present day city of *Eivissa* (Ramon, 2003: 153, 159). Phoenician presence has been identified in several areas surrounding the urban centre (see Costa and Fernández,

⁴ By ‘colonization’ it is meant establishing a colony. *The Oxford English Dictionary* (1989, 2nd Ed., Vol. III. Clarendon Press, Oxford) defines ‘colony’ as «a settlement in a new country; a body of people who settle in a new locality, forming a community subject to or connected with their parent state; the community so formed, consisting of the original settlers and their descendants and successors, as long as the connection with the parent state is kept up». It is also worth reading the work of van Dommelen (2002) who, employing Punic and Roman Sardinia as a case study, provides an insight into some of the issues and problems involving the notion of ‘colonial’ and ‘colonialism’.

⁵ The term ‘Phoenician’ may here refer to both individuals from the Eastern Mediterranean, the origin of the Phoenician civilisation; and individuals that regardless of geographical or ancestral origin, lived and/or worked and were integrated in the Phoenician culture.

1986-1989; Ramon, 1994). Primarily through pottery evidence, the Phoenician inhabitants are thought to have come from the area of the Straits of Gibraltar (Aubet, 1993: 272; Ramon, 1994: 364).

Assuming the anthropological analysis is correct, around thirty Phoenician cremations from the cemetery of *Puig des Molins* in *Eivissa*, reveal the presence of young men, women, and children (Gómez, 1989, 1990), indicating that at least part of the immigrant population consisted of young families (Gómez *et al.*, 1990).

From the available evidence, at the end of the Phoenician period Ibiza was a proper colonial settlement with agricultural interest, an urban centre with a great natural bay and pottery workshops functioning after its establishment (Ramon, 1994: 365).

In the 6th century BC the Phoenicians lost control over their colonies in the western Mediterranean (Aubet, 1995). This created a separation between the eastern and western Mediterranean. In the West and Central areas, Carthage took economic and political control over previous Phoenician colonies such as Ibiza. This phase is known today as the Punic or Carthaginian period.

*The Punic (Carthaginian) period*⁶

The influence of Carthage on Ibiza was marked by deep transformations in the social, economic, political, ideological and religious spheres. These changes included an apparent demographic growth, colonization of the rural landscape and agricultural exploitation, changes in the funerary rite, intensive production of goods and the creation of a coin mint (Costa and Fernández, 1986-1989, 1995, 2000).

A population increase is apparent through the thousands of hypogea, or rock-cut tombs, present in the cemetery *Puig des Molins* in urban *Eivissa*. While in the previous period this cemetery occupied an area between 6,000 and 10,000 m², in Punic times it probably increased to 50,000 m² (Costa and Fernández, 2003: 161). An estimated 3,000 hypogea belong to the Punic period (Tarradell, 1955: 86). In each hypogeum more than one individual may be interred. The high number of burials may reflect an immigration of peoples rather than the reproductive growth of the population (Tarradell, 1974; Costa, 1994). A similar pattern of demographic growth is seen in Malta (see Said-Zammit, 1997). One possible reason for these migrations is an apparent overpopulation in Carthage, with thousands of men and women emigrating and founding centres abroad (Dilke, 1985: 132). With regards to the rural context in Ibiza, there is a documented massive presence of humans especially from the 4th century BC onwards (Gómez, 1986: 187). This occupation can be attested through the presence of many rural cemeteries present at this time (see Román, 1920; Gómez, 1986; Tarradell *et al.*, 2000). Material culture from these sites shows homogeneity throughout the island, each rural cemetery revealing itself a small-scale replica of the larger urban cemetery *Puig des Molins* (Tarradell *et al.*, 2000; Benito

⁶ The definition of 'Phoenician', 'Punic' and 'Carthaginian' is complex in itself (see Moscati, 1988). Tarradell and Font (1975: 245) indicate that 'Phoenician' meant 'oriental', from Phoenicia; while 'Punic' was the name given by the Romans to the Carthaginians. The word 'Phoenician' is used here to refer to those establishments directly founded by those individuals coming from the eastern Mediterranean, and up to the 6th century BC. After this date the word 'Punic' will be used to refer to those areas in the Central and Western Mediterranean under the influence of Carthage. Finally, 'Carthaginian' will be used to refer to what is or derives from the city of Carthage (in present day Tunisia), including culture, products and people.

et al., 2000: 307). Rural settlements were occupied probably by small human groups, possibly families or blood related individuals as well as freemen (Benito *et al.* 2000: 307). Servants may also have been present (see Fernández and Fuentes, 1983; Gómez, 2000: 357). Any small indigenous human communities that may have been present since the Bronze Age would have been absorbed into the Punic identity of these rural inhabitants (Benito *et al.*, 2000: 307).

The 6th century BC also brought a change in the burial rite. The disappearance of cremation, the appearance of inhumations and the introduction of a new type of tomb, the hypogeum, may have been caused by the arrival of immigrants (Costa and Fernández, 1986-1989; Gómez *et al.*, 1990). Grave-goods also change and originate from the Central Mediterranean area (Gómez *et al.*, 1990; Ramon, 1992). Deities from the Phoenician-Punic pantheon are also venerated and sanctuaries are created (see Aubet, 1982; Ramon, 1982, 1987-1988).

From the 3rd century BC, there is a general phase of decline in Ibiza. This is probably associated with the Punic Wars and the destruction of Carthage in 146 BC by Rome (San Nicolás, 1987: 87). Pottery studies also verify this decline (see Ramon, 1981: 35-36).

THE QUESTION ON THE ORIGIN OF THE POPULATION

...el problema de l'origen del poblament...
(Tarradell and Font, 1975: 248)

One of the challenging questions in archaeology is to what extent cultural change in a region is affected by large-scale immigration (Brothwell, 1972: 80).

In the previous section it was shown how artefacts, tombs and settlements could indicate a considerable arrival of immigrants in Ibiza during the Punic period. Tarradell and Font (1975: 248) pointed out the problem of not knowing where the people were coming from during the Punic colonization process in Ibiza. The authors were also aware of the potential value of human skeletal remains on this issue.⁷

Diodorus Siculus (Book V. 16), writing in the 1st century BC, stated that Ibiza consisted of people from a variety of nationalities. Considering other Punic enclaves, human skeletal remains from Carthage, in North Africa, seem to indicate that there is no clear ethnic unity (Charles-Picard and Charles-Picard, 1958: 129), while epitaphs reveal the possible presence of individuals of Cypriotic and Phoenician origins (Benichou-Safar, 1982: 184). According to historical sources, the spreading of Punic settlements in western Sardinia since the 4th century BC is associated with peasant and slave immigration from North Africa (van Dommelen, 1997: 313, citing Bondi, 1987: 181). In antiquity, slaves were obtained from areas in the Mediterranean as well as northern Europe (Thompson, 2003: 3-4). In ancient Greece and Rome, some members of society came from sub-Saharan Africa (see Snowden, 1970). In later periods, between the 5th and 8th centuries AD, the Iberian Peninsula and the Balearic Islands also received merchants from the Eastern and Central Mediterranean (García, 1972). Examination of mandibles from

⁷ 'L'antropologia física és un dels buits més lamentables dins la investigació desl fenòmens colonials, i molt concretament en el cas fenici-cartaginès.' (Tarradell and Font, 1975: 249).

Mediaeval Ibiza has shown similar metric characteristics to mandibles from European Caucasoid, North African and sub-Saharan individuals (Gómez, 1989).

Turning to Punic Ibiza, the material culture imported from around 600 BC onwards derives from the Central Mediterranean area. For this reason, it has been suggested that immigrants, especially from Sicily, Sardinia and Carthage, may have been present in Ibiza (Costa and Gómez, 1987: 53; Guerrero, 1997: 240, 248). Moreover, the administration in an urban centre was likely to have high status representatives from Carthage (Guerrero, 1997: 249). This link with North Africa also seems reasonable due to the presence in Ibiza of ostrich eggs (see Astruc, 1957), Egyptian scarabs (see Blázquez, 1967; Fernández and Padró, 1982), possibly the present-day Ibizan hound or '*ca eivissenc*' (see Pedro, 1996; Cesarino, 1997: 98) and perhaps architecture (see Díes and Matamoros, 1989). Also, the presence of African individuals may be identified in artefacts such as terracotta figurines (see San Nicolás, 1987). Images of individuals with sub-Saharan physical features do seem to appear in earlier scarabs from Phoenician Ibiza (see Boardman, 2003). Finally, it is also worth noting that the name 'Ibiza' derives from a Phoenician-Punic word linked to god Bes (Solá, 1956; Tarradell and Font, 1975: 232-233). This god has been represented in many of Ibiza's Punic artefacts such as coins (see Planas *et al.*, 1989). This deity, originally from the Egyptian pantheon, seems to have its roots in Equatorial Africa (Padró, 1978; Planas *et al.*, 1989: 11). He served the main gods and was considered the protector of birth, sleep, love, marriage, childbirth and sexuality (Fernández, 1996). This evidence,⁸ however, only indicates an association with North Africa, mainly in terms of economy and culture.

The present work aims to clarify this debate by examining what remains of the people themselves: their skeletons.

PAST AND PRESENT ANTHROPOLOGICAL WORK ON HUMAN REMAINS FROM IBIZA

Anthropology is the science of man, the science devoted to the comparative study of man as a physical and cultural being. The physical anthropologist studies man's physical characters, their origin, evolution, and present state of development (...).

Montagu (1960: 3).

The beginning of archaeology in Ibiza really starts with the work of Juan Román y Calvet and his son Carlos Román Ferrer in the early 20th century AD, and the foundation in 1903 of the archaeological society 'Sociedad Arqueológica Ebusitana' (Tarradell, 1974: 244; Fernández, 2000).⁹

At the beginning of the 20th century, the human skeletal material found in excavations seemed to be of little interest. The first published anthropological report

⁸ A DNA study on the living Ibizan population also shows an association with North Africa (Picornell *et al.*, 1996). As with other types of evidence using present day materials, the North African influence may not necessarily come from Punic times, but from other contexts such as the Medieval period.

⁹ Some work had been undertaken prior to the 20th century, especially on coins (see a review in Planas *et al.*, 1989). Further information on the initial development of Ibizan archaeology can be found elsewhere (see Tarradell, 1974, Tarradell and Font, 1975, Fernández, 2000, 2001).

known at present, was based on one Punic skull from Ibiza and published in 1930 by Francisco de las Barras de Aragón. This is followed by Santiago Alcobé's (1940, 1943) studies on ten Roman skulls from the necropolis of *Can Flit* (see Colomines, 1942). After a period of over thirty years, Ilse Schwidetzky publishes in 1979 a study on a small Punic sample from *Puig des Molins* and a Roman one from *Sant Antoni*. In the 1980s, work was undertaken by Francisco Gómez Bellard (1983, 1985, 1989, 1990) and José Manuel Reverte Coma (1986) on Phoenician and Punic cremations. Gómez Bellard in 1989 completes the first doctoral thesis on medical anthropology in Ibiza. This thesis includes, amongst other interesting aspects, demographic and palaeopathological examinations of skeletal samples from Punic, Roman and Islamic contexts, as well as information on the living population. From this time onwards, human remains are increasingly playing an important role in archaeological interpretation. Since the 1990s other studies have been published on small samples from Prehistory (González and Lalueza, 2000), the Punic period (González and Lalueza 1992, 2001; González, 1996)¹⁰ as well as Late Antiquity and Early Byzantine period (Márquez, 2002).

The Punic studies by Schwidetzky (1979; also see Schwidetzky and Ramaswamy, 1980) focused on employing skull measurements in order to identify the origin of the population. The author indicated that there were no real differences between the Ibizan populations and any other from the rest of the western and central Mediterranean area. This homogeneity, partly as a result of the active international commerce in antiquity, was also supported by González-Martín and Lalueza (1995, 2001: 118).

Current work by various authors includes a doctoral thesis, and general studies on other Phoenician cremations, Punic inhumations, Late Antique-Early Byzantine cemeteries, and Mediaeval Islamic burials. More specific research questions have included dietary analysis from dental calculus (Dr. Jordi Juan, pers. comm.) and stable isotopes (Márquez-Grant *et al.*, 2003). Finally, although there is a need for more specialist equipment and physical anthropologists on the island, the human bone specialist is increasingly proving to be an important part of the excavation team.

MATERIALS AND METHODS

The remaining part of my work relates to the bones; (...).
Celsius (25 BC-50AD), 'De Medicina' (Book VIII. 1).

Materials

Only skulls from the Punic period were selected for this study. The most complete crania were chosen from the rural necropolis of *Ses Païsses de Cala d'Hort (Can Sorà)* in the SW of the island and from the urban necropolis of *Puig des Molins*. The rural cemetery was used as a burial place between the 5th century BC and circa 100-75 BC (Ramon, 1995, pers. comm.). The bones employed from *Puig des Molins* were excavated in the year 2001

¹⁰ Description of a partially excavated inhumation. This description is included as a footnote (footnote 10, page 62) in RAMON, J. 1996. 'Puig des Molins (Eivissa). El límite NW de la necrópolis fenicio-púnica.', *Pyrenae*, 27: 53-82.

by the staff at Ibiza's archaeological museum (MAEF). This urban cemetery is located on the southern part of the present city of *Eivissa*. Its use as a burial place covers a period between the 7th century BC and the 3rd century AD (Fernández, 1983), although later Islamic burials are also present. The period of maximum use took place in the 5th and 4th centuries BC (Fernández, 1983). Various sectors of this cemetery have been excavated. A skull from one of these excavated sectors, *Via Romana, 47* (Gurrea and Ramon, unpublished), was also considered for the present investigation.

In order to enlarge the sample size, published skeletal data from other Ibizan samples was employed. This data originates from the following Punic rural cemeteries: *Can Marines* (Gómez, 1989), *Cas Jurat* (González-Martín and Lalueza, 1992; archaeology by Fernández and Ramon, 1974) and *Ca n'Eloi* (González-Martín and Lalueza, 2001; archaeology by Ramon, 2001) (table 1). Unfortunately, the individual crania that comprised Schwidetzky's (1979) mean values were not available in the publication nor from the university in which they were archived.

Site	Site Code	Period	Context	Authors	Observations
<i>Puig des Molins</i> (& sector of <i>Via Romana, 47</i>) (Eivissa)	PM01 VR47	Punic (c.5 th -2 nd BC)	Urban <i>Eivisa</i> (South Ibiza)	(This author).	The measurements were taken from skulls VR47/U30 and PM01/UE59
<i>Ses Païsses de Cala d'Hort</i> (Sant Josep, Ibiza)	PCHN	Punic (c.5 th -1 st BC)	Rural (SW Ibiza)	(This author).	The measurements were taken from skulls PCHN-H4, PCHN-H7 and PCHN-H10
<i>Can Marines</i> (Santa Eulària, Ibiza)	CM	Punic (c.4 th BC)	Rural (East Ibiza)	Gómez (1989).	Data was selected from skull number 3.
<i>Cas Jurat</i> (Sant Antoni, Ibiza)	PORT	Punic (c. 3 rd -2 nd BC)	Rural (NW Ibiza)	González and Lalueza (1992).	Data was selected from skulls I, II, III, IV, V, VI, VII, VIII, XII
<i>Ca n'Eloi</i> (Santa Eulària, Ibiza)	CNE	Punic (c.3 rd -2 nd BC)	Rural (East Ibiza)	González and Lalueza (2001).	Data was selected from skulls 1, 2, 5, 6, 7, 8, 10, 12, 16

Table 1. Sites that have provided cranial measurements for the present analysis.

Only the most complete skulls (n = 24) from biologically adult individuals were selected. Due to poor preservation, those providing four or more measurements were considered. In every way possible only skulls from the Punic period were employed. However, partly due to the mixed and disarticulated nature of the bone assemblages, it may be possible that some individuals may be present from the early Roman period. This should only be a minor concern. In Ibiza, Punic customs did continue into the Roman period.

Unfortunately, on the one hand, individuals from Prehistoric and Phoenician times could not be included, due to poor skeletal preservation in the former and the cremated material in the latter. On the other hand, the Punic samples cannot be representative of the total population (see Waldron, 1994). The samples are small, the cemeteries cover a relatively wide chronological age, not all individuals of society may have been buried in the population, and only the more complete skulls were selected. There may also be age and sex preservation biases with the bones of the younger individuals being more resistant to disintegration than those from elderly individuals (Walker *et al.*, 1988; Walker, 1995). In

addition, most of the skulls employed here come from hypogea. It may be that these individuals are of a different social and economic status (see Tarradell and Font, 1975: 52; Fernández, 1986: 160; Marí and Hachuel, 1990), as well as ancestral origin than the individuals buried in simple fossae. These differences in social status, culture and/or ancestry may also have been present between individuals from inhumation tombs versus cremated skeletons, which were also present in Punic times (see Gómez, 1985; Reverte, 1986).

Methods

One assumption is made in the present work: there definitely were individuals in Punic Ibiza originating from Africa.¹¹ How can this be proved through physical anthropology? How can some of these individuals be identified?

Because of the skeletal nature of the ancient human remains uncovered in the island, craniometric data (skull measurements) was obtained. Measurements were undertaken by the present author on skulls from the site of *Puig des Molins* and *Ses Païsses de Cala d'Hort*. Guidelines were obtained from Buikstra and Ubelaker (1994). A spreading calliper and a digital sliding calliper were employed. Mandibular measurements were limited to a few as no mandibulometer was available. The cranial data was later introduced into a forensic discriminant programme, *FORDISC 2.0*, which allowed up to 24 cranial and 10 mandibular measurements. However, due to incomplete preservation, the number of measurements obtained was much reduced in the Ibizan samples. The most commonly occurring measurements are presented in table 2. Also, introduced data that was highlighted in red or blue colour in the programme were omitted, as it reduced the size of the comparative reference sample available in the computer programme. Only in the case of skull VR47/U30 was one of these measurements included (maximum frontal breadth). This allowed the inclusion of this skull as the urban context is poorly represented in the samples. The required measurements were also taken from the published data.

Neurocranium/Vault measurements	Facial measurements	Mandibular measurements
-Maximum cranial length	-Bizygomatic diameter	-Symphysis height
-Maximum cranial breadth	-Upper facial height	-Body height
-Basion-bregma height	-Nasal height	-Body breadth
-Biauricular length	-Nasal breadth	-Bigonial breadth
-Minimum frontal breadth	-Orbital breadth	-Bicondylar breadth
-Frontal chord	-Orbital height	-Minimum ascending ramus breadth
-Parietal chord	-Biorbital breadth	
-Occipital chord	-Interorbital breadth	

Table 2. A list of the most commonly occurring measurements in the Ibizan sample.

¹¹ This refers to individuals who were born in Africa and migrated to Ibiza; individuals with similar physical features to North and sub-Saharan Africans but who were born in a different geographical area and later migrated to Ibiza; and individuals born in Ibiza but whose parents or grandparents were original immigrants from North and sub-Saharan Africa.

Measurements were then introduced into the forensic discriminant programme FORDISC 2.0 (Ousley and Jantz, 1996). This programme was selected as it contains data from samples with a European Caucasoid background as well as data from individuals with a sub-Saharan ancestry. It also does not require the complete set of measurements, which is appropriate for the incompletely preserved Ibizan skulls.

FORDISC 2.0 (Ousley and Jantz, 1996) was created for forensic applications in the USA. The programme has two reference databases: the Forensic Data Bank (present day crania, forensic and modern cases) and the Howells database (Howells 1973, 1989). The Forensic Data Bank groups individuals into 'American Blacks', 'American Whites', 'American Indians', 'Japanese', 'Chinese', 'Vietnamese' and 'Hispanic'. The Howells database, groups individuals into geographical regions but was not applied to the Ibizan individuals. *A priori*, the latter reference database did not have sufficient samples that were appropriate for Ibiza. Preliminary analyses also resulted in Punic skulls having affinities with a variety of world populations. It was the Forensic Data Bank reference sample that was employed for the present study. Only two of its categories were used, determined by the nature of the research and the geographical and chronological background of Ibiza: 'American Blacks' with a reference sample of 150 males and 125 females, and 'American Whites' with 271 males and 195 females (Ousley and Jantz, 1996). Therefore, the study assumed that each skull belonged to either group.

The measurements, rounded to the nearest number in millimetres, were introduced into the programme and analysed using discriminant functions. Measurements that were thought 'dubious' or 'erroneous' by the programme were omitted. The first step, taken here, was to determine the sex of the skull through metric data. This was later compared to the sex determined by the anthropologist using non-metric morphological data. In four cases from Ibiza there were discrepancies in the sex determination. The sex was classified as 'probably male' or 'probably female', depending on the skeletal traits and measurements, the age of the individual, as well as the FORDISC 2.0 result. Following the sex determination of the skull, only the 'Black male'-'White male'-'Black female'-'White female' categories were selected. The system compared the result of the unknown skull to the means of each of the reference groups, after which it classified it into the most similar group. The FORDISC 2.0 analysis later provides a posterior probability and a typicality score for the skull. The posterior probability is the probability of the unknown individual belonging to each of the groups, with the highest score (equal or nearer to 1) counting the most. The typicality indicates how typical the skull is within that group or, explained in a different way, it reflects how many individuals in that group share similar characteristics with the unknown skull.

Some limitations with FORDISC 2.0 must be highlighted. It is sometimes difficult to assign an unknown skull to a category that is based on social perceptions of 'race' such as language or skin colour (Ubelaker, 1998: 131; Lumb, 2001: 35, 57, 61). Even if the skull comes from a group identity different to those in the database, which is the case of the Ibizan material, the programme will still classify the specimen with the closest group available (Ubelaker, 1998: 131). Also, the system is based on American populations. No North African samples are available in the database. Caution applying FORDISC 2.0 to non-American ancient populations has been highlighted elsewhere (see Ubelaker *et al.*, 2002).

Employing cranial morphology is also problematic. Among the major geographical regions there is low genetic and craniometric variation in modern humans (Relethford,

1994). Within a population, variation in cranial shape depends on both genetic and environmental factors (Larsen, 1997: 227). Variation due to sex and age is obvious. Skull growth and changes can occur continually throughout an individual's life (Ruff, 1980). Gene flow may have affected certain skull dimensions in ancient Japanese populations (Nakahashi, 1993; Kaifu, 1997). Although some recent authors have proved the contrary, the work of Boas (1912) and Shapiro (1939) have pointed out that environmental factors can affect the skeleton. It may be very likely that the individuals born in Ibiza had certain physical characteristics that were different to their parents or grandparents born and brought up elsewhere. Skull shape may be related to climatic adaptation (see Weiner, 1954; Beals *et al.*, 1984; Franciscus and Long, 1991; Hernández *et al.*, 1997; Bharati *et al.*, 2001). Geographical isolation, climate and altitude contributed to the variation in prehistoric skulls from South America (Rothhammer and Silva, 1990). Diet and masticatory stress also have an effect on cranial variation (see Price, 1945; Carlson, 1976; Carlson and Van Gerven, 1977). Exercise may also affect the skeleton as, for instance, the pelvic changes due to horseback riding (see Erickson *et al.*, 2000). Culture can also affect skull shape. Cranial artificial deformation has been observed in Chile (Gerszten, 1993) and North Africa (Bertholon and Chantre, 1913: 88-91). Pathology, such as premature closure of the cranial sutures, trauma, leprosy or considerable tooth loss may also affect cranial morphology. Finally, *post-mortem* rituals and/or damage may distort cranial form. The Punic specimens employed here do not present artificial deformation and have not been significantly altered by pathology or *post-mortem* distortion.

Despite these limitations, both craniometry and FORDISC 2.0 have been valuable in furthering our understanding of Punic Ibiza.

RESULTS

Measurements from each skull were introduced into the programme. The results of each specimen are given in table 3.

Skull	Vault measurements	Facial measurements	Mandibular measurements	Sex	Result	Probability	Typicality
<i>VR47/U30</i>	4	-	-	M	<i>BM</i>	.748	.916
<i>PM01/UE59</i>	2	2	4	F	<i>BF</i>	.920	.003
<i>PCHN-H7</i>	5	2	-	M	<i>BM</i>	.811	.445
<i>PCHN-H4</i>	2	2	-	M	<i>BM</i>	.595	.167
<i>PCHN-H10</i>	2	7	-	M?	<i>BM</i>	.745	.683
<i>CM-3</i>	3	5	-	F	<i>BF</i>	.985	.023
PORT-I	7	7	-	F	WF	.811	.003
PORT-II	5	1	-	F	WF	.538	.852
PORT-III	4	6	-	F?	WF	.997	.400
PORT-IV	6	4	-	M	WM	.981	.467
PORT-V	8	8	-	F	WF	1.000	.951
PORT-VI	6	4	2	M	WM	.992	.282
PORT-VII	6	8	2	M	WM	.985	.264
<i>PORT-VIII</i>	3	4	-	M?	<i>BM</i>	.914	.387
PORT-XII	5	-	-	M	WM	.607	.508
<i>CNE-1</i>	8	8	3	F?	<i>BF</i>	.888	.140
<i>CNE-2</i>	4	6	-	M	<i>BM</i>	.979	.009
<i>CNE-5</i>	8	3	-	M	<i>BM</i>	.957	.405
CNE-6	8	-	-	F	WF	.905	.057
<i>CNE-7</i>	5	-	-	F	<i>BF</i>	.597	.392
<i>CNE-8</i>	5	-	-	F	WF	.691	.191
<i>CNE-10</i>	5	-	-	M	<i>BM</i>	.764	.239
CNE-12	6	3	2	F	WF	.994	.009
<i>CNE-16</i>	4	-	2	M	<i>BM</i>	.642	.602

Table 3. Results for each of the Punic skulls from Ibiza. Those lines in ‘italics’ are those that resulted in a ‘Black’ male or female. Sex codes: M = male, F = female, M? = probably male, F? = probably female. FORDISC 2.0 category codes: BM = Black male, BF = Black female, WM = White male, WF = White female. The first two skulls, VR47/U30 and PM01/UE59, come from the urban context; the rest come from rural cemeteries.

A variety of results is present above in terms of probability, typicality and group categories. Those skulls providing a high probability (>80%) and high typicality (>80%) can be identified through the American reference sample as individuals of Caucasian or sub-Saharan ancestry. This is only provided by skull PORT-V identified as ‘White female’. However, skulls VR47/U30, PCHN-H10, PORT-III, PORT-IV, CNE-5 and perhaps PCHN-H7 portray convincing results, all having fairly high probabilities and typicalities. Three of these skulls were classified as ‘Black’, likely proving the presence of individuals in the Ibizan populations with sub-Saharan ancestry. Moreover, although the sample is small, it seems that both urban and rural contexts include individuals of sub-Saharan African ancestry. Both male and female skulls were classified in this group. A further discovery appears to be a clear difference between the PORT site and the CNE site in terms of results. The anthropological report for the former cemetery indicated a minimum number of 15 individuals (González-Martín and Lalueza, 1992), and the latter a minimum number of 16 adult individuals (González-Martín and Lalueza, 2001). This means that the skulls represented in the above table, the most complete ones in each sample, comprise 60% and 56.2% of each population respectively. This is insufficient to allow any final interpretation, but it may reveal a more homogenous population in the northern site (PORT) than the other site (CNE). In the PORT sample only one individual (1/9 = 11.1%) is classified as having sub-Saharan ancestry, while in the latter there are more individuals classified in this category (6/9 = 66.6%).

Exploring this matter further, the population means of each site were taken as a matter of interest and tested on FORDISC 2.0. This allowed for the inclusion of those individuals with fewer measurements. The results (table 4) also reveal a difference, with the classification 'White' appearing in the PORT site and the category 'Black' in the CNE site.

Site	Sex	Result	Probability	Typicality
PORT (Male means)	M	WM	.997	.264
PORT (Female means)	F	WF	1.000	.332
CNE (Male means)	M	BM	.836	.233
CNE (Female means)	F	BF	.891	.045

Table 4. FORDISC 2.0 results from means taken from two of the rural populations. Codes: M = male, F = female, M? = probably male, F? = probably female. FORDISC 2.0 category codes: BM = Black male, BF = Black female, WM = White male, WF = White female. PORT = *Cas Jurat*; CNE = *Ca n'Eloi*.

This difference is also revealed by an analysis undertaken by Prof. Richard Wright in Australia. Wright examined the mean values against a database with data from Euro-Mediterranean groups as well as that from Howells (1973, 1989). The PORT male mean values were closer to the Poundbury population of northern Europe (probability 0.942). The CNE male population and, surprisingly, the PORT female population, were closer to a Bedouin population from Western Asia with probabilities of 0.965 and 0.991 respectively.

DISCUSSION AND INTERPRETATION

Having suggested the likely presence of individuals of Sub-Saharan ancestry from Ibizan skulls, identified by *reasonable* probabilities and typicalities (in skulls with both values above 60%), there are a number of skulls (e.g. PM01/UE59, CM-3, CNE-2) with high probabilities, both 'White' and 'Black' but with low typicalities. What may these results suggest? It does seem that a result such as 'White female' and a high probability, will indicate that it is not 'male' and not 'Black' (Luís Cabo, pers. comm.). However, if the typicality is low there might be a considerable chance that it is not a 'Black female' (Luís Cabo, pers. comm.). It is true that by providing only a choice between 'White' (European Caucasoid ancestry) and 'Black' (sub-Saharan ancestry), the computer programme might force skulls of North Africa or Eastern Mediterranean ancestry into the category 'Black'. In order to understand these results, further tests were made on crania from known ancestry.

Published data was selected from locations that may have had a genetic influence on Ibiza such as the Iberian Peninsula, the Eastern Mediterranean, North Africa and sub-Saharan Africa. Male population means were taken from Prehistoric to Mediaeval sites from the Iberian Peninsula (gathered from various authors by Lalueza *et al.*, 1996). By selecting the FORDISC 2.0 options 'White male' and 'Black male', all the populations indicated 'White male'. In terms of probabilities and typicalities, the results were over

0.990 except for a Neolithic population, as well as the Basque, Jewish, and Muslim samples, all of which produced slightly lower values. The results from a 20th century female population sample from Granada (du Souich *et al.*, 2003) indicated a 'White female' sample with high probability (0.947) and high typicality (0.987). Data from an Ibiza forensic case by Gómez (1989), assuming it was a Caucasoid male originally from Ibiza, resulted in 'White male' with high probability (0.997) but low typicality (0.087). Population means were also available from a variety of studies by different authors (gathered in Schwidetzky, 1979) on Tunisian, Algerian, Majorcan, Spanish mainland and Sardinian populations, provided probabilities lower than 0.663 for all groups (most under 0.500), regardless whether the classification was 'White' or 'Black', but high typicalities. The most complete skulls from a study on Neolithic Alicante (data from Soler and Roca, 1999) in the Spanish coast and relatively near to Ibiza, also produced the category 'White Male' with probabilities of 0.858, 0.641, 0.946 and typicalities of 0.345, 0.436 and 0.645 respectively.

Population means from Jordanian Bedouins (Henke and Disi, 1980) provided low probabilities (under 0.500) for either group but high typicalities (over 0.900). The most complete skull from a Phoenician sample from Israel (Smith *et al.*, 1990) provided a 'Black male' result with high probability but low typicality. Probabilities ranging between 0.600 and 1.000 in the category 'Black', with typicalities mainly under 0.400 were present in Punic skulls from Carthage (Bertholon and Chantre, 1913), Neolithic and proto-historic skulls from Sahara and sub-Saharan Africa (data collected by Chamla, 1968), and in modern African skulls measured by Barras de Aragón (1911). Most of these skulls are of known origin, although others such as the archaeological specimens from Carthage are really of unknown ancestry. However, it may be assumed that most were from that region, perhaps with some individuals from sub-Saharan Africa and the eastern Mediterranean. Many of the skulls classified as 'Black' revealed probabilities between 0.600 and 0.900, and low typicalities (see Table 5). In the light of these results, and considering the FORDISC 2.0 results from populations in Iberia, North Africa and sub-Saharan African which have not been presented here due to space limitations, it can be suggested that those Ibiza skulls classified as 'Black' with reasonable to high probabilities and low typicalities clearly have an African, and perhaps an Eastern Mediterranean, ancestry.

Skull	Vault and facial measurements	FORDISC 2.0 Result	Probability	Typicality
Phoenician skull from Israel (Number 44 in Smith <i>et al.</i> , 1990).	10	BM	.816	.093
Modern Mulatto (Portuguese and African), Africa. (Number 1245-14 in Barras de Aragón, 1911).	12	BF	.864	.222
Modern Fantee, West Africa. (Number 1517 in Barras de Aragón, 1911).	11	BF	.633	0
Modern Mandingo, West Africa. (Number 1515 in Barras de Aragón, 1911).	11	BM	.606	.063
Modern Fullah, West Africa. (Number 1511 in Barras de Aragón, 1911).	12	BM	.748	.004
Punic Carthage, North Africa. (Sarcophagus 5 in Bertholon and Chantre, 1913).	12	BM	.605	.002
Punic Carthage, North Africa. (Sarcophagus 7 in Bertholon and Chantre, 1913).	12	BM	.967	.364
Punic Carthage, North Africa. (Sarcophagus 14 in Bertholon and Chantre, 1913).	12	BM	.782	.166
Neolithic Tehad, Central Africa (In Chamla, 1968)	9	BF	.678	.008
Neolithic Mali, Africa. (In Chamla, 1968)	8	BF	.600	.355
Protohistoric Sahara, Africa. (In Chamla, 1968)	9	BM	.626	.003

Table 5. ‘Black’ results with low typicalities still seems to indicate an African ancestry for the individuals. In fact, the lowest probabilities and lowest typicalities in this table are reflected by more central sub-Saharan African skulls, while those similar to values from Ibiza, with an increased probability but still low typicality are indicative of North African populations. However, the most ancient skulls have unknown ancestry *a priori*, but it may be assumed that they come from around that region, or in the case of Carthage also possibly from the eastern Mediterranean.

The above results indicate that a low typicality is also present in African skulls, perhaps because they obviously differ somewhat from the modern ‘American Black’ reference database. It seems that those with higher probability are North African, Eastern Mediterranean or Mulatto. Those with lower probability are from Sub-Saharan Africa and, in one case, from Sahara. For this reason, the results from individuals CNE-7, CNE-16 and PCHN-H4 may indicate a sub-Saharan ancestry. Other skulls, such as PM01/UE59, CM-3, CNE-1, CNE-10 may be likely to be North African or Eastern Mediterranean. The high probability and very low typicality in PM01/UE59, similar to those results provided by the Phoenician skull from Israel (Table 5), may reflect an Eastern Mediterranean origin or, at least, ancestry. In fact, a further analysis by Prof. Richard Wright provided a close affinity with Bedouin skulls from Western Asia (probability 0.962). Therefore, the results may suggest an Eastern Mediterranean provenance.

To summarize, the results revealing ‘Black’, especially those skulls meeting most of the required measurements, are probably not from the Iberian Peninsula. Very likely, they may have an African origin. Those classified by FORDISC 2.0 as ‘White’ may be from the Iberian Peninsula or other populations from the northern part of the Mediterranean.

CONCLUSION

Archaeological and historical evidence for the Punic period has revealed a possible immigration to Ibiza from African peoples. Within this framework in mind, measurements from Ibizan skulls were introduced into a forensic discriminant programme, FORDISC 2.0. A dichotomy was apparent from the crania. The results suggest the presence of individuals from both a Caucasoid and a sub-Saharan ancestry. Because Iberian, North African and present-day sub-Sahara African populations are not represented in the programme, populations from known geographical location were tested and explored in order to understand the probabilities and typicalities (see also Márquez-Grant, 2005). Those results were then compared to those deriving from the Ibizan skulls. The 'Black' results appearing in the African skulls indicate that the Ibizan skulls under this category, belonged to individuals that probably migrated from this continent or had an African ancestry (e.g. parents or grandparents).

Here, the presence of individuals from Africa or with an African ancestry in Punic Ibiza has been suggested, despite the limitations posed by the materials and methods employed in this work. The programme FORDISC 2.0, as a complementary method to other archaeological and historical sources (Márquez-Grant, 2005), has been a valuable tool for understanding Ibiza's past. To support this conclusion, more work is required on these cranial samples as well as with a larger number of specimens. Further tests on skulls of known origin would also be required, as well as the inclusion of more relevant reference samples. The likely differences between the sites of *Cas Jurat* (PORT) and *Ca n'Eloi* (CNE) are also worth investigating a little further. Other Punic settlements in the Mediterranean could be included in future analysis. This will allow for a better understanding of the patterns of migrations and the process of colonization. The limited sample size in this work does not really portray the initial wave of immigrants into the Punic period. These may have come from one or many geographical locations. Therefore, the results can only suggest, at present, that individuals with African characteristics were present in the Punic rural and urban populations.

New discoveries and methods may provide a better insight into immigration during Prehistory and Phoenician times, as well as later periods. Other disciplines, other than archaeology can be brought in. Future DNA analysis must be borne in mind when excavating human remains, so that contamination is minimized. Stable isotopes such as sulphur (see Richards *et al.*, 2001) and strontium (see Hodell *et al.*, 2004) can also contribute to understanding migratory patterns.

A few years ago, González-Martín and Lalueza (1995: 37) indicated that the challenge of physical anthropology was to determine whether African influences, in terms of biology, could be identified through the study of human skeletal remains.¹² This present study has achieved that.

¹² 'El repte de l'antropologia física és veure si, per mitjà de l'estudi de les restes humanes d'època púnica d'Eivissa, es poden descobrir aquestes influències africanes' (González-Martín and Lalueza, 1995: 37).

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Fig. 1. Facial reconstruction of a Punic skull from *Puig des Molins* (PM01/UE52). Drawing by Simon Lygo and anthropological study by N. Márquez-Grant. This skull has been studied elsewhere (Márquez-Grant, in press) and resulted in a 'White Male' with a posterior probability of .841 and a typicality OF .669.