C^{14} references and cultural sequence in the Proto-history of Lanzarote (Canary Islands)

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Resumen. Hasta la década de los años 80' del siglo XX la actividad arqueológica desarrollada en la isla de Lanzarote no había aportado ninguna datación cronométrica; a partir de la segunda mitad de esa década y hasta el presente los trabajos de excavación que hemos efectuado en yacimientos de la isla han proporcionado una amplia serie de fechas radiocarbónicas que permiten secuenciar con precisión la etapa protohistórica, retrasar el momento del inicio de la colonización humana del Archipiélago Canario a un instante cercano al cambio del II al I milenio a.C. y fortalecer la hipótesis que otorgaba a Lanzarote la primacía temporal en el proceso poblador frente a las restantes islas del archipiélago.

Referéncias C14 y la secuencia cultural en la protohistoria de Lanzarote (Islas Canarias)

Abstract. Up until the 1980s, the archaeological activity carried out on the island of Lanzarote had not provided any chronometric dating. From the second half of the 1980s to date, the excavation work that we have done at sites on the island has provided an ample series of radio-carbon dates that enable us to offer an accurate sequence of the proto-historic stage, push back the moment in which human colonization of the Canary Islands started to somewhere close to the change from the II to the I millennium BC and strengthen the hypothesis that Lanzarote was the island that spear-headed the settlement process, ahead of the other islands.

1 Introduction

Almost sixty years after the first radio datings were published for archaeological sites in the Canary Islands, taken from a range of samples from proto-historic burial sites in Gran Canaria [Fus59: 21-22] and Tenerife [Cus68: 211-212], there is still a certain distrust in island archaeology of the real potential of radio-carbon dating and the need to revise the criteria that lead to the use of C^{14}, regarding both the kind of samples that should be selected and the number of radiometric analyses required for an archaeological site to be considered correctly dated.

In the archaeology practised on the island of Lanzarote, radio-carbon dating has been infrequent, preventing us from having a time line that establishes the first human presence on the island and its cultural development until recently. The first absolute datings were taken in the El Bebedero site (Teguise) in the late 1980s [Ato89], followed by new references from other sites [Ato09a, Ato11], and we now have an ample series of dating that allow for an appropriate approach to the time limits in which the proto-historic period unfolded and its different stages and phases.

Despite this initial absence of chronological references, the geographic proximity of Lanzarote to Africa has driven sporadic research to consider the possibility that the colonization of the Canary Island Archipelago started there, hence giving it certain priority over the other islands in the process that gave rise to human settlement. This is an idea that the series of C^{14} datings available, together with other dates obtained by thermo-luminescence in the nearby islet of La Graciosa [Gon07, Gon09], allows us to start considering a conjecture with some scientific backing. The possibility of verifying the hypothesis of an early settlement of the Canary Islands, starting at the easternmost point and spreading west, was one of the reasons that has lead us to focus much of our research work on Lanzarote over the last thirty years.

2 Lanzarote: isotopic datings

Neither literary sources (classic Greco-Latin, Ethno-Historic, etc.), nor archaeological practise has been able to document actual human activity in the Canary Islands prior to the 10^{th} century BC; between this moment and the 15^{th} century AD, is when the proto-historic stage unfolds, a period in which Lanzarote witnessed a series of cultural processes that we have

attempted to delimit from a chronological point of view. To such end, we feel it is necessary to have the largest possible number of radiometric references per excavated site and per stratigrahic unit identified, organised in coherent series based on objective criteria determined by the layer of origin, the kind of sample and the analysis procedure used.

We have forty three C^{14} references obtained from samples of different kinds (charcoal, organic sediment –micro-carbon-, bones from sheep and goats and snail shells), processed in the laboratories of Groningen (Centrum voor Isotopen Onderzoek, Rijksuniversiteit Groningen), BETA (Beta Analytic Radiocarbon Dating Laboratory, Florida) and UBA (14CHRONO Centre, Queen's University, Belfast, Northern Ireland) using both standard C^{14} and AMS as procedures of analysis. This diversity of parameters has given rise to certain difficulties when comparing the results directly, making it necessary to establish an order based on the nature of the sample and the isotopic procedure used (Table 2). As a result, we have seen that the datings obtained by AMS for the same stratum and/or sub-stratum as slightly later than the datings obtained by standard C^{14} and a comparison of the results provided by the different laboratories that processed the samples reveals a notable degree of similarity and, therefore, reliability of the results.

The forty three chronometric references (Table 3) date four archaeological sites (El Bebedero, Buenavista, Caldereta de Tinache and Los Corrales) and one non-archaeological site (Valle de Femés). The broadest series covers El Bebedero (20 references), followed by the Buenavista series (12 references) and the Caldereta de Tinache series (8 references). The Los Corrales site is dated with two dates and Valle de Femés with one; in this latter case for a stable profile with no archaeological evidence.

Figure 1 - Hut with structure of combustion. El Bebedero (Teguise. Lanzarote) (Photo P. Atoche)

Figure 2 - Structure E2. Buenavista (Teguise. Lanzarote) (Photo P. Atoche)

The dating references obtained from El Bebedero come from samples recovered from five stratigraphic cross sections (A7, A9, B3, X12 y PF), which we have grouped depending on whether they had been analysed by AMS (15 datings) or by standard C^{14} (5 datings). The dates of each of these groups, in turn, have been organised in sets based on the kind of matter analysed, charcoal (11 samples, ten of which were analysed by AMS and one by standard C^{14}), bones from sheep and goats (six samples, four of which were analysed by standard C^{14} and two by AMS) and organic sediment (three samples analysed by AMS, one of which comes from the structure of combustion found inside the exhumed hut and the other two were recovered from a stratigraphic unit laying underneath the first human presence in the place) (Fig. 1).

Figure 3 - Collecting C^{14} samples. Buenavista (Teguise. Lanzarote)

The twelve dating references from Buenavista were obtained from twelve samples of organic sediment, charcoal and sheep and goat bones collected from both inside and outside of structures E1 and E2. Specifically, one sample from cross section B6 (inside structure E1), two from cross sections E4 and F4 (inside structure E1), one from cross section B10, two from cross section D9, one from cross section H2, two samples from cross sections C8 and F1 (all outside of structure E1). The three remaining samples were obtained: one from cross section W7, another from cross

section X8 (both outside of structure E2) and the third one from cross section U3 (inside of structure E2) (Figures 2 and 3). All the samples were analysed by AMS.

The eight references from Caldereta de Tinache come from samples collected from three stratigraphic cross sections (East Profile, West Profile and North Profile), grouped in accordance with whether they had been processed by AMS (6 references) or by standard C^{14} (2 references). As with El Bebedero, the dates included in each of the two groups were organised in turn, in series based on the kind of sample analysed, charcoal (6 references analysed by AMS), bones of sheep and goats (1 reference analysed by standard C^{14}) or snail shells (1 reference analysed by standard C^{14}). In general, the Caldereta de Tinache series is very much in line with the series obtained both from El Bebedero and Buenavista, and with the dating of Valle de Femés. The two time references from Los Corrales site date the same stratigraphic cross section (B3) and both were processed by AMS.

The different dating series and the chronological sequence that they suggest are presented in Figure 4, where the diachronic regularity of the dates obtained can be seen, along with their fit from the beginning of the 1st millennium BC to the first third of the 2nd millennium AD. If these chronological references are analysed from a cultural perspective, three datings situated in the 3rd and 2nd millennia BC, obtained from El Bebedero and Caldereta de Tinache, enable us to confirm the absence of human activity in Lanzarote before the change from the 2nd to the 1st millennium BC, placing the oldest level of archaeological occupation at the Buenavista site, for now, dated with a chronological amplitude from the 10th century BC (960 cal. BC) to the 4th century BC (380/330 cal. BC), with an intermediate date of the 6th century BC (530 cal. BC). The ample series of dates from El Bebedero, Caldereta de Tinache, Los Corrales and the most recent ones from Buenavista are situated after this period, which, as a whole, lead us regularly from the 1st century BC to the 14th century AD, establishing the most recent chronological development of the proto-historic settlers that lived in Lanzarote quite accurately.

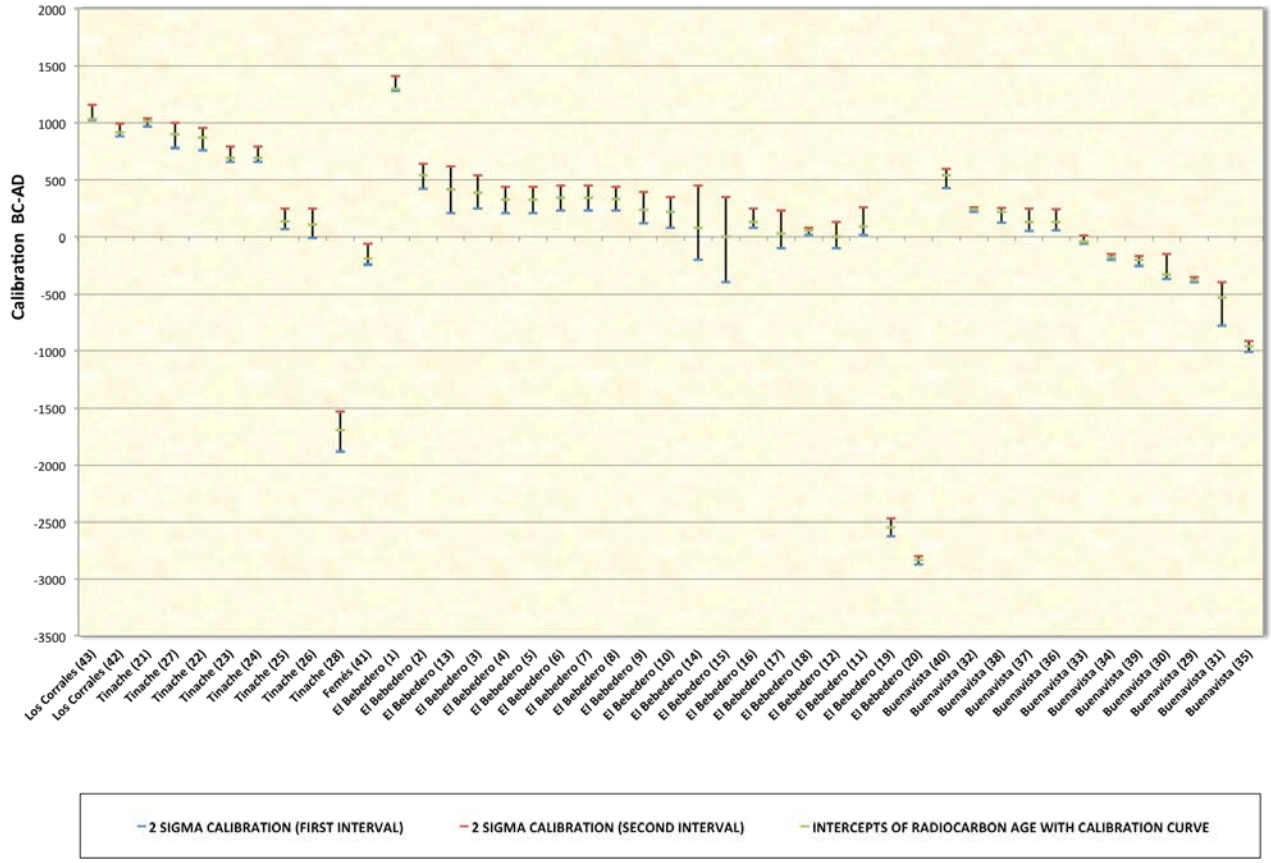

Figure 4 - Series of the calibration intervals to 2 sigmas (95% probability) of the radiocarbon datings from proto-historic contexts of Lanzarote

3 C^{14}, human settlement and proto-historic phases of colonization of the Canary Island Archipelago

The moment that colonization started and the first humans finally settled in the Canary Islands must be close to the oldest datings available, a group of C^{14} dates that set the first human presence in Lanzarote around the mid-10th century BC [Ato11: 153-156] and in Tenerife, in the early 9th century BC [Gon07: 54]. The age proposed by C^{14} dating has been corroborated by datings obtained by thermo-luminescence on pottery fragments modelled on a wheel recovered from the coastline of La Graciosa [Gar03, Gon09]. Consequently, the evidence suggests the 10th century BC as the lower limit for the start of human settlement in Canaries and for the start of the proto-historic stage, which would last for two and a half millennia, drawing to a close during the 15th century AD as a consequence of the process of conquering and settling the islands, starting in 1402 with the Norman expedition lead by Jean de Béthencourt and Gadifer de la Salle [Nfa80], which culminated with the Castilian conquest of Tenerife in 1494.

Regarding the datings obtained in Lanzarote, the oldest date was provided by the Buenavista site, which dates the base of the outside wall of structure E1, establishing that it was built in the mid-10th century BC. The use of this structure would continue until the last third of the 4th century BC, when the construction was amortised [Ato11]. In Buenavista the previous datings were followed by other from 200 cal. BC and 180 cal. BC, peers to the dating of 190 cal. BC obtained from Femés, which, as a whole, suggest the end of the Punic phase in Lanzarote was at some time close to the time that Carthage was destroyed in 146 BC.

From the first half of the 2nd century BC to the 6th century AD, the Buenavista site was once again occupied, when structure E2 was built, coinciding with the first occupation of the nearby hollow where El Bebedero site is located, at a time in island proto-history that marks the start of a phase characterised by the intensification of the use of the resources of the island, as shown by the new settlements built and distributed throughout the island. This opens a new stage for which we have a set of date references that situate strata of Buenavista, El Bebedero and Caldereta de Tinache at different moments between the 1st century BC and the 14th century AD, in the latter case at a time very close to the start of the Norman-Castilian conquest responsible for terminating Proto-history in the islands (Fig. 5).

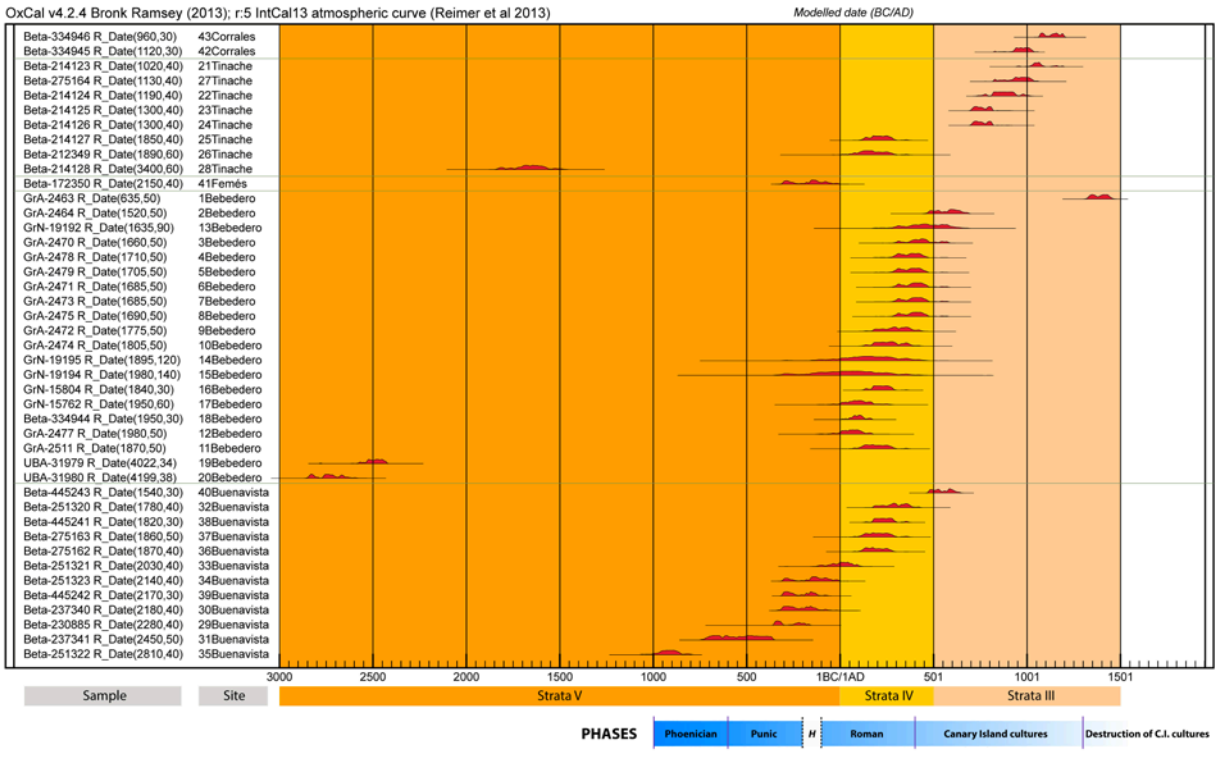

Figure 5 - Graph of probabilities of the C^{14} samples from proto-historic contexts of Lanzarote

Extensive exploitation of the territory of Lanzarote started in the 1st century BC, an economic phenomenon sustained by a kind of settlement that was an island model of agrarian factory represented by El Bebedero or Caldereta de Tinache, linked to the economic interests of the Roman world [Ato95]. Up until that moment, the island appears to have been subject to a single, low intensity wave of settlement, represented by both some of the enclaves on the coast (Rubicón) and inland (the deepest level of Buenavista). This dichotomy is reflected in the distinct forms of occupying the island: up to the 4th-5th centuries AD using a disperse pattern based on small, not very functional settlements aimed mainly at livestock production and from this moment onwards, using a majority pattern concentrated on different-sized urban settlements n synthesis, Buenavista is proof of the presence in Lanzarote of a group of humans fully established in the 10th century BC, which is associated with a material context characterised by the presence of artefacts of Punic-Phoenician origin, amongst other elements[1], apart from the objects that were already known for this island with a similar cultural origin [Ato97] [Ato99a, Ato99b, Arc00, Ato08b, Ato09b]. Hence, the datings provided by Buenavista imbue the process of settling the Canary Islands with greater chronological depth than has previously been considered and they confirm the age perceived from the dates published by Mª.C. del Arco *et al* [Arc97] for several sites around Icod de los Vinos (Tenerife)[2] and La Graciosa, islet where the El Descubrimiento site has provided material proof of the possible presence of Mediterranean sailors in waters of the archipelago in the transit from the 2nd to the 1st millennium BC [Gon09]. The various settlements and infrastructures located at strategic points of the Lanzarote coast (e.g. Pozo de la Cruz, in Rubicón [Ato99b])[3] (Figure 6) seem to date from the early moments of island colonization, settlement of the mooring point or factory kind, very probably the result of this process of passing maritime vessels that some researchers have related to the Tartessian Culture [Gar42: 177]. The sea route that runs down the Atlantic coast of what are now Morocco and Mauritania has been known at least since Cardial Neolithic times, which is when cultural relations were established between the southern Iberian Peninsula and North West Africa, which remain evident during the full and late Bronze Age. In fact, the drive that initially led to the discovery and posterior colonization of the Canary Island Archipelago must have started with the cultural and economic reactivation that occurred in Lower Andalusia in the late Bronze Age.

Figure 6 - Pozo de la Cruz, Rubicón (Yaiza. Lanzarote) (Photo P. Atoche)

4. Phases of Canary Island Proto-history

From the historic point of view, the material and chronological sequence experienced in Lanzarote marks the succession of two ample periods of time, articulated respectively in relation to the presence or absence in the material record of extra-island elements, first of Phoenician-Punic cultural origin and later, Roman, and the development of major transformations in the vegetation cover, soils, wildlife, the composition of the livestock, technological patterns, the form and intensity of the occupation of the island, etc.

Based on these data and taking our proposed phasing for Canary Island proto-historic cultures as a starting point [Ato08], the following stages and phases would have unfolded in Lanzarote (Table 1):

I. **First stage** (discovery, colonization and establishment[4] -*circa* 10th century BC to 4th century AD-). This encompasses almost a millennium and a half during which we would see the start and later development of the

[1] Different fragments of pottery modelled on a wheel can be found from the deepest stratum in Buenavista and metal artefacts of copper, bronze and iron, associated with an "indigenous" context dominated by hand-made pottery. The petrographic characterisation analyses of the clay has highlighted the great similarities between these pottery fragments made on a wheel with several of the pottery groups defined in the Phoenician-Punic colony of La Fonteta (Alicante) [Gon08].

[2] In Tenerife, the series of dates provided by some dwelling enclaves (caves of La Arena, Las Palomas, Don Gaspar and Los Guanches) place the oldest moment of its colonization at the start of the 1st millennium BC (820 cal. BC -Cueva de Los Guanches-) (Gak-14.599).

[3] Rubicón, on the southernmost tip of Lanzarote, is the model for settlements of this kind, characterised by presenting similar infrastructure to those found in the factories on the nearby coast of Africa founded in the Phoenician-Punic Age and reactivated by Juba II in Roman times, which remain in operation during almost the entire Roman-Mauritanian period to exploit the abundant marine and terrestrial resources of this region of the Atlantic.

[4] From four models of island settlement proposed for East Polynesia [Gra95].

exploration of the resources of the African Atlantic, the discovery of the "Canary Island archipelagos" [San02, Ato03, San06, San07, Lop09], their colonization and later the establishment of the first groups of humans on some of the islands. It must have been a highly dynamic stage in which several successive phases can be distinguished:

a. **Phoenician phase** (discovery and initial colonization -*circa* 10th to 6th centuries BC-). This coincides with the process of exploration, appraisal and exploitation of the Atlantic seaboard of Africa by Phoenician sailors and merchants settled in the Western Mediterranean. In the islands, this phase would start with a process of passing through as has been shown by sites such as El Descubrimiento in La Graciosa.
b. **Punic phase** (colonization and final establishment -*circa* 6th to 2nd centuries BC-). The closure of the Near Eastern markets to metals from the Western Mediterranean after the fall of Tyre (572 BC) and the consequent re-directing of the economy towards agricultural produce, intensified Punic contacts with the indigenous peoples of the West, with an increase in productive business, generating a need to continue and augment the establishment of population groups, not only in centres around the Mediterranean, but also on the Atlantic seaboard and very probably in the Canary Islands, by transplanting communities of *Lybio-Phoenicians*. If we accept the thesis of F. López Pardo [Lop91], the start of this phase would be very close to the process of creating colonies of Lybio-Phoenicians along the African Atlantic coast described by the Periplus of Hanno.
c. **Roman phase** (culmination of the colonization of the islands -*circa* 1st century BC to 4th century AD-). After the 1st century BC, the economic intensification initiated by *Iuba* II in the Atlantic Region of North Africa reactivated and/or maintained the presence in Canary Islands of non-natives, so that Romanised sailors from the *Circle of the Strait* passed through Canary Island waters until the 4th century AD [Ato95] [Ato99c, Ato06]. After the crisis that affected the Roman Empire in the 3rd century AD and the consequent abandonment of much of the province of Tingitana, came the end of the activities of a large number of factories along the Atlantic coast of Morocco [Pon65: 116-117].

II. **Second stage** (abandonment -*circa* 4th to 5th centuries AD-). This period has a very short timeline, determined by the end of external economic dependence as a consequence of the political-economic crisis that affected the Roman Empire in the 3rd century AD, a phenomenon that had nothing to do with the islands, but which would be responsible for their progressive isolation and the consequent crisis of island social formations that had been reliant on the outside world up until that moment. This is the start of one of the most interesting cultural processes of Canary Island Proto-history that gave rise to the development of endemic cultures that explain many of the differences observed in the different Canary Island cultures of the 1st millennium AD.

III. **Third stage** (isolation -*circa* 5th to 13th centuries AD-). The presence of sailors from the *Circle of the Strait* marked the start of a new stage in the islands that covers almost a millennium, in which what are known as "Canary Island cultures" start to appear, which base their development on autarchic economic and social processes. They are the result of the diversification of island social formations to readapt to the new circumstances caused by isolation from the outside world. This is the best documented stage from an archaeological point of view, encompassing a single phase:

a. **Canary Island phase** (constitution and development of the "Canary Island cultures"-*circa* 5th to 13th centuries AD-). Sudden contacts with the centres that gave rise to the discovery and posterior colonization of the Canary Islands would force the island populations to develop in relative isolation, generating cultural systems characterised by being immersed in a technological state that we have called "Forced Neolithic" [Ato97: 15]. One of the cultural aspects that they must have to have changed around that time was undoubtedly the economic sub-system, such that one can see at least two different models of subsistence over the course of Canary Island Proto-history, an initial one, characterised by its dependence on the outside world and unequal trade, which must have lasted to a greater or lesser extent from the time humans first settled in the 10th century BC up to the 5th century AD; and another, later autarchic model, based on a wide-ranging agrarian economy, which survived up until the 15th century AD, when the medieval Norman conquerors reached the islands and put an end to Proto-history. In Lanzarote, from a cultural point of view, this second economic model is what is known as the "Mahos Culture".

IV. **Fourth stage** (acculturation -*circa* 14th to 15th centuries AD-). This starts in the 13th century AD, when the Canary Island Archipelago is once again visited by European explorers responsible for what is known as the "rediscovery"

[Ser61, Mor71], what is really a new phenomenon of sailing by the islands that will prepare the Norman-Castilian conquest of the 15th century AD.

5. Conclusions

In the current state of archaeological research in the Canary Islands, the island of Lanzarote is, very probably, the island that has provided the stratigraphic sequences that go back the furthest. The sites that have dated timelines are situated in the open air, inside volcanic calderas or hollows, with powerful sedimentary packages in which rains produce seasonal deposits of water (*maretas*, as they are known locally). It is precisely the association of fertile soils and seasonal lagoons that lead these places to be constituted as ecologically-favourable environments for populations to settle on the basis of a subsistence economy based on the two main activities of livestock and agriculture, right from the beginning of the settlement of the island, while also explaining the existence of powerful archaeological strata comprising extensive human occupations. It is in sites of this kind that our team has been conducting systematic archaeological excavations over the last thirty years, which have provided broad stratigraphic sequences that, once compared, present notable similarities between them from both a morpho-genetic point of view and from the point of view of the archaeological record they contain.

Although most of the absolute datings recorded throughout the Canary Island Archipelago are situated after the 1st millennium AD, there is also an ample series of chronologies situated in the 1st millennium BC, which enable us to adjust the time limits for the start of Canary Island Proto-history in which the cultural context was marked successively by a Phoenician-Punic presence and a Roman presence. An historic analysis of the archaeological data provided by the Buenavista site indicate that the colonization of at least one of the Canary Islands (Lanzarote) had already taken place in the 10th century BC, opening up the possibility that the discovery of the archipelago and visits to it could have occurred sometime prior to this moment. Initially, it must have been a state-sponsored enterprise, a process of colonization for geo-strategic purposes and for agricultural exploitation [Lop92, Wag00] in which the raw materials of the region would also have been of colonial interest, using contingents of North African settlers from the same geographical and cultural context, the paleo-Berbers in contact with the Phoenician culture in North Africa. The likely later contributions of populations to the colonization process would not necessarily have affected all the islands to the same extent, as this would depend on the interests that drove those responsible for programming and implementing the colonising effort at any one time. In fact, after the 8th and 7th centuries BC and up until the 1st century AD, we can find several moments in which the necessary conditions were in place for reactivating the island colonization process, on the basis that the Canary Islands were at the centre of a rich economic zone open to exploitation in a broad range of possibilities that would depend solely on the law of demand and supply. In any event, the island colonization process must have intensified after the 6th century BC in connection with the expansion of Carthage [Fan88, Fru91, Aub94], a city that, at that time set out to dominate large territories of Africa and to close the Gibraltar Straits to other sea traffic in order to control and monopolise the economic resources to be found on the other side of the Columns of Hercules [Lop92].

The information available from sediment and pollen [Ato09] indicate until the change of Era, Lanzarote would only have been the objective of low-intensity colonization. From that moment on, the start of an extensive exploitation of the island territory can be observed, based on a kind of settlement that was an island model of agricultural factories (El Bebedero, Caldereta de Tinache,...) aimed at producing goods derived from the livestock (skins, etc…) and linked to the economic interests of Rome [Ato95]. The economic intensification that occurred in the Canary Island-North African Atlantic in the last third of the 1st century BC, which Juba II was responsible for, maintained the actual presence of non-natives in the islands. These were Romanised sailors from the *Circle of the Straits* that sail through Canary Island waters until the late 3rd century or the early 4th century AD, and their presence in the island came to an end after the political-economic crisis of the Roman Empire and its abandonment of much of its province of Tingitana, putting an end to the activities of a large number of purple factories and salting factories to be found on the Atlantic coast of Morocco. At this time, the Canary Islands enter a phase of abandonment, with a very short timeline (*circa* 3rd-4th c. AD), marked by the end of economic dependent on the outside world as a result of the crisis that affected the Roman Empire in the 3rd century AD, something that had nothing to do with the island, but which would be responsible for its isolation and for the crisis of the social formations that had, until that moment, focused on the outside world, which entered a new phase that would lead them to develop social and economic strategies marked by the island syndrome.

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TABLES

Table 1 - Proposed phases for proto-historic Canary Island cultures (corrected from [Ato08: 329])

<table>
<tr><th>STAGES OF HUMAN SETTLEMENT</th><th>CULTURAL PHASES</th><th>VARIABLES EXPLAINIGN CULTURAL CHANGE</th><th>DRIVER OF CHANGE</th><th>ISLANDS COLONISED OR SETTLED</th></tr>
<tr><td rowspan="3">1st STAGE

DISCOVERY, COLONIZATION AND ESTABLISHMENT (cir. 10th c. BC to 3rd c. AD)</td><td>PHOENICIAN PHASE (cir. 10th to 6th c. BC)

PUNIC PHASE (cir. 6th to 2nd c. BC)</td><td>Commercial expansion in the Atlantic</td><td>Economic integration of the islands in the Mediterranean circuits as producers of raw materials (Carthage unified Western Phoenicia)</td><td>Settled: Lanzarote, Tenerife, G. Canaria (?)

Colonised: La Palma and Fuerteventura (?)</td></tr>
<tr><td colspan="3">HIATUS (circa 2nd to 1st centuries BC)
Crisis in the Punic colonization model</td></tr>
<tr><td>ROMAN PHASE (cir. Ist c. BC to 4th c. AD)</td><td>Economic intensification in the African Atlantic</td><td>Economic expansion in Mauretania Tingitana

Economic intensification: integration of agricultural-fisheries production</td><td>Consolidation of human presence in the settled islands and the final settlement of people in islands that thus far had only been colonised</td></tr>
<tr><td>2nd STAGE

ABANDONMENT (cir. 4th to 5th c. AD)</td><td rowspan="2">CANARY ISLAND PHASE: CONSTITUTION AND DEVELOPMENT OF CANARY ISLAND CULTURES (cir. 4th to 13th c. AD)</td><td rowspan="2">End of economic dependence on outside world and development of autarchic economic and social processes</td><td>Political-economic crisis of paleo-Canary Island social formations</td><td rowspan="2">Settled: all</td></tr>
<tr><td>3rd STAGE

ISOLATION (cir. 5th to 13th c. AD)</td><td>Re-adaptation and diversification of paleo-Canary Island social formations</td></tr>
<tr><td>4th STAGE

ACCULTURATION (cir. 14th and 15th c. AD)</td><td>PHASE OF DESTRUCTION OF CANARY ISLAND CULTURES</td><td>Commercial expansion in the Atlantic</td><td>Widespread crisis among paleo-Canary Island social formations</td><td>Settled: all</td></tr>
</table>

STRATA AND SUB-STRATA		EL BEBEDERO				CALDERETA DE TINACHE			BUENAVISTA		FEMÉS	CORRALES
		CROSS SECTIONS A7/A9/B3/X12/PF				EAST/WEST PROFILES	NORTH PROFILE		CROSS SECTIONS B6/C8/E4/F1/F4/D9/H2/W7/X8/U3	CROSS SECTION B10	SOUTH PROFILE	CROSS SECTION B3
		O.S. SERIES		O.B. SERIES		O.S. SERIES	O.B. SERIES	S.S. SERIES	O.S. SERIES	O.B. SERIES	S.S. SERIES	O.S. SERIES
		AMS	ST. C14	ST. C14	AMS	AMS	ST. C14	ST. C14	AMS	AMS	AMS	AMS
III	III-1				1300 AD	1010 AD						1030 AD
	III-2				540 AD	900 AD 870 AD 690/690 AD			540 AD			920 AD
IV	IV-1			415 AD								
	IV-2	385/330 AD										
	IV-3	345/330 AD										
	IV-4	345/335 AD 235 AD 220 AD 90 AD 60 AD	30 AD	130 AD 80 AD 0 AD/BC		140 AD	110 AD		220 AD 130/130 AD	240 AD		
V	V-1	0 AD/BC							40 BC 180 BC 200 BC 330 BC 380 BC 530 BC 960 BC		190 BC	
	V-2							1690 BC				
	V-3	2546 BC										
	V-4	2835 BC										
	V-5											

Table 2 - Lanzarote. Stratigraphic distribution of calibrated datings (2 sigma) resulting from the interception of the radiocarbon age with the calibration curve, organised by site of origin, stratigraphic cross section, strata, sub-strata, series and isotopic dating method used (corrected from [Ato09a: 123])

Table 3 - Lanzarote. List of datings available. Conventional signs used: SS = Surface Settlement; P.S. SP = Sedimentary Profile. The order number is the same as the one assigned to the datings in Figures 4 and 5 (corrected from [Ato09a: 131-132])

Nº	SITE --- STRATIGRAPHIC DETAILS	LABORATORY NUMBER --- METHOD OF ANALYSIS	CONVENTIONAL RADIOCARBON AGES	± YEARS	2 SIGMA CALIBRATION (BC-AD) INTERCEPT OF RADIOCARBON AGE WITH CALIBRATION CURVE	SAMPLE	TYPE SITE
1	El Bebedero 90 A9/III-1	GrA-2463 AMS	635 BP	50	1280-1410 AD cal. 1300 AD cal.	Ovicaprid bones	SS
2	El Bebedero 90 A7/III-2	GrA-2464 AMS	1520 BP	50	420-640 AD cal. 540 AD cal.	Ovicaprid bones	SS
3	El Bebedero 90 A7/IV-2	GrA-2470 AMS	1660 BP	50	250-540 AD cal. 385 AD cal.	Charcoal	SS
4	El Bebedero 90 A7/IV-2	GrA-2478 AMS	1710 BP	50	210-440 AD cal. 330 AD cal.	Charcoal	SS
5	El Bebedero 90 A7/IV-3	GrA-2479 AMS	1705 BP	50	210-440 AD cal. 330 AD cal.	Charcoal	SS
6	El Bebedero 90 A7/IV-3	GrA-2471 AMS	1685 BP	50	230-450 AD cal. 345 AD cal.	Charcoal	SS
7	El Bebedero 90 A7/IV-4	GrA-2473 AMS	1685 BP	50	230-450 AD cal. 345 AD cal.	Charcoal	SS
8	El Bebedero 90 A7/IV-4	GrA-2475 AMS	1690 BP	50	230-440 AD cal. 335 AD cal.	Charcoal	SS
9	El Bebedero 90 A7/IV-4	GrA-2472 AMS	1775 BP	50	120-390 AD cal. 235 AD cal.	Charcoal	SS
10	El Bebedero 90 A7/IV-4	GrA-2474 AMS	1805 BP	50	80-350 AD cal. 220 AD cal.	Charcoal	SS
11	El Bebedero 90 A7/IV-4	GrA-2511 AMS	1870 BP	50	20-260 AD cal. 90 AD cal.	Charcoal	SS
12	El Bebedero 90 A7/V-1	GrA-2477 AMS	1980 BP	50	110 BC-130 AD 0 BC/AD cal.	Charcoal	SS
13	El Bebedero 90 A7/IV-1	GrN-19192 Standard C^{14}	1635 BP	90	210-620 AD cal. 415 AD cal.	Ovicaprid bones	SS
14	El Bebedero 90 A7/IV-4	GrN-19195 Standard C^{14}	1895 BP	120	200 BC-450 AD cal. 80 AD cal.	Ovicaprid bones	SS
15	El Bebedero 90 A7/IV-4	GrN-19194 Standard C^{14}	1980 BP	140	400 BC-350 AD cal. 0 BC/AD cal.	Ovicaprid bones	SS
16	El Bebedero 87 B3/IV-4	GrN-15804 Standard C^{14}	1840 BP	30	80-250 AD cal. 130 AD cal.	Ovicaprid bones	SS
17	El Bebedero 87 B3/IV-4	GrN-15762 C^{14} Estándar	1950 BP	60	100 BC-230 AD cal. 30 AD cal.	Charcoal	SS
18	El Bebedero 11 X12/IV-4	Beta-334944 AMS	1950 BP	30	20-80 AD cal. 60 AD cal.	Organic sediment	SS

19	El Bebedero 12 PF/V-3	UBA-31979 AMS	4022 BP	34	2622-2470 BC cal. 2546 BC cal.	Organic sediment	SS
20	El Bebedero 12 PF/V-4	UBA-31.980 AMS	4199 BP	38	2871-2799 BC cal. 2835 BC cal.	Organic sediment	SS
21	Caldera Tinache 05 PE1/III-1	Beta-214123 AMS	1020 BP	40	970-1040 AD cal. 1010 AD cal.	Charcoal	SS
22	Caldera Tinache 05 PE2/III-2	Beta-214124 AMS	1190 BP	40	760-960 AD cal. 870 AD cal.	Charcoal	SS
23	Caldera Tinache 05 PE2/III-2 Base	Beta-214125 AMS	1300 BP	40	660-790 AD cal. 690 AD cal.	Charcoal	SS
24	Caldera Tinache 05 PE2/III-2 Base	Beta-214126 AMS	1300 BP	40	660-790 AD cal. 690 AD cal.	Charcoal	SS
25	Caldera Tinache 05 PE2/IV-4	Beta-214127 AMS	1850 BP	40	70-250 AD cal. 140 AD cal.	Charcoal	SS
26	Caldera Tinache 05 PN1/IV-4	Beta-172349 Standard C^{14}	1890 BP	60	10 BC-250 AD cal. 110 AD cal.	Ovicaprid bones	SS
27	Caldera Tinache 05 PO/III-2	Beta-275164 AMS	1130 BP	40	780-1000 AD cal. 900 AD cal.	Charcoal	SS
28	Caldera Tinache 05 PN3-4/V-2	Beta-214128 Standard C^{14}	3400 BP	60	1880-1530 BC cal. 1690 BC cal.	Snail shells	SS
29	Buenavista 06 B6/II-1	Beta-230885 AMS	2280 BP	40	400-350 BC cal. 380 BC cal.	Organic sediment	SS
30	Buenavista 07 E4/II-1	Beta-237340 AMS	2180 BP	40	370-150 BC cal. 330 BC cal.	Organic sediment	SS
31	Buenavista 07 F4/II-3	Beta-237341 AMS	2450 BP	50	780-400 BC cal. 530 BC cal.	Organic sediment	SS
32	Buenavista 08 B10/I-1	Beta-251320 AMS	1780 BP	40	220-260 AD cal. 240 AD cal.	Ovicaprid bones	SS
33	Buenavista 08 D9/I-2	Beta-251321 AMS	2030 BP	40	60 BC-10 AD cal. 40 BC cal.	Organic sediment	SS
34	Buenavista 08 H2/I-2 Base	Beta-251323 AMS	2140 BP	40	200-150 BC cal. 180 BC cal.	Organic sediment	SS
35	Buenavista 08 D9/II-3 Base	Beta-251322 AMS	2810 BP	40	1010-910 BC cal. 960 BC cal.	Charcoal	SS
36	Buenavista 09 C8/I-2	Beta-275162 AMS	1870 BP	40	60-240 AD cal. 130 AD cal.	Organic sediment	SS
37	Buenavista 09 F1/I-2	Beta-275163 AMS	1860 BP	50	50-250 AD cal. 130 AD cal.	Organic sediment	SS
38	Buenavista 16 W7/I-2	Beta-445241 AMS	1820 BP	30	125-255 AD cal. 300-315 AD cal. 220 AD cal.	Organic sediment	SS
39	Buenavista 16 X8/II-1	Beta-445242 AMS	2170 BP	30	355-275 BC cal. 255-165 BC cal. 125-120 BC cal. 200 BC cal.	Organic sediment	SS
40	Buenavista 16 U3/I-1	Beta-445243 AMS	1540 BP	30	425-595 AD cal. 540 AD cal.	Charcoal	SS
41	Valle de Femés 05 P/V-1	Beta-172350 AMS	2150 BP	40	360-280 BC cal. 240-60 BC cal. 190 BC cal.	Snail shells	SP

42	Los Corrales 12 B3/II Base	Beta-334945 AMS	1120 BP	30	880-990 AD cal. 920 AD cal.	Organic sediment	SS
43	Los Corrales 12 B3/II	Beta-334946 AMS	960 BP	30	1020-1160 AD cal. 1030 AD cal.	Organic sediment	SS