Messages from the past; the petroglyphs of El Hierro Island

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Abstract

Ancient cultures have frequently made use of stone surfaces to carve and engrave symbols, letters and messages for others. These petroglyphs usually have a lasting character and are frequently preserved well beyond the survival of the culture that produced the petroglyphs. In this article we focus on the written and pictorial testimony of the pre-Hispanic era of the island of El Hierro (Canary Islands, Spain), which exploited a series of volcanic rock features to create a written testimony of their presence and their way of life. This specific cultural heritage has been adapted to the specific geological features on the island and the emerging stone masonry skill of the aboriginal culture of the original islander, creating a unique and lasting record of their ability to use geological elements for cultural development.

Introduction

The Canary archipelago lies in the eastern central Atlantic Ocean, some 150–500 km off the coast of north-west Africa. The seven larger Canary Islands are of different ages and relate to a mantle plume, as e.g. summarised by Troll and colleagues in 2015 and Carracedo and Troll in 2021. Typically, three fundamental types of igneous rocks are found in the Canary Islands, comprising (1) mafic lavas and scoria deposits ranging from subalkaline basalts to silica undersaturated nephelinites, (2) felsic rocks that range from trachytes to varieties of rhyolites and phonolites, and (3) plutonic rocks that include layered gabbro to alkali gabbro and syenite intrusives. Following Schmincke and Sumita's work in 2010, the most widespread rock type identified is mafic alkaline lavas and scoria, while highly evolved magma makes up a comparatively small volume on most of the Canary Islands including the youngest of the Canary Islands, El Hierro (**Fig.1**).

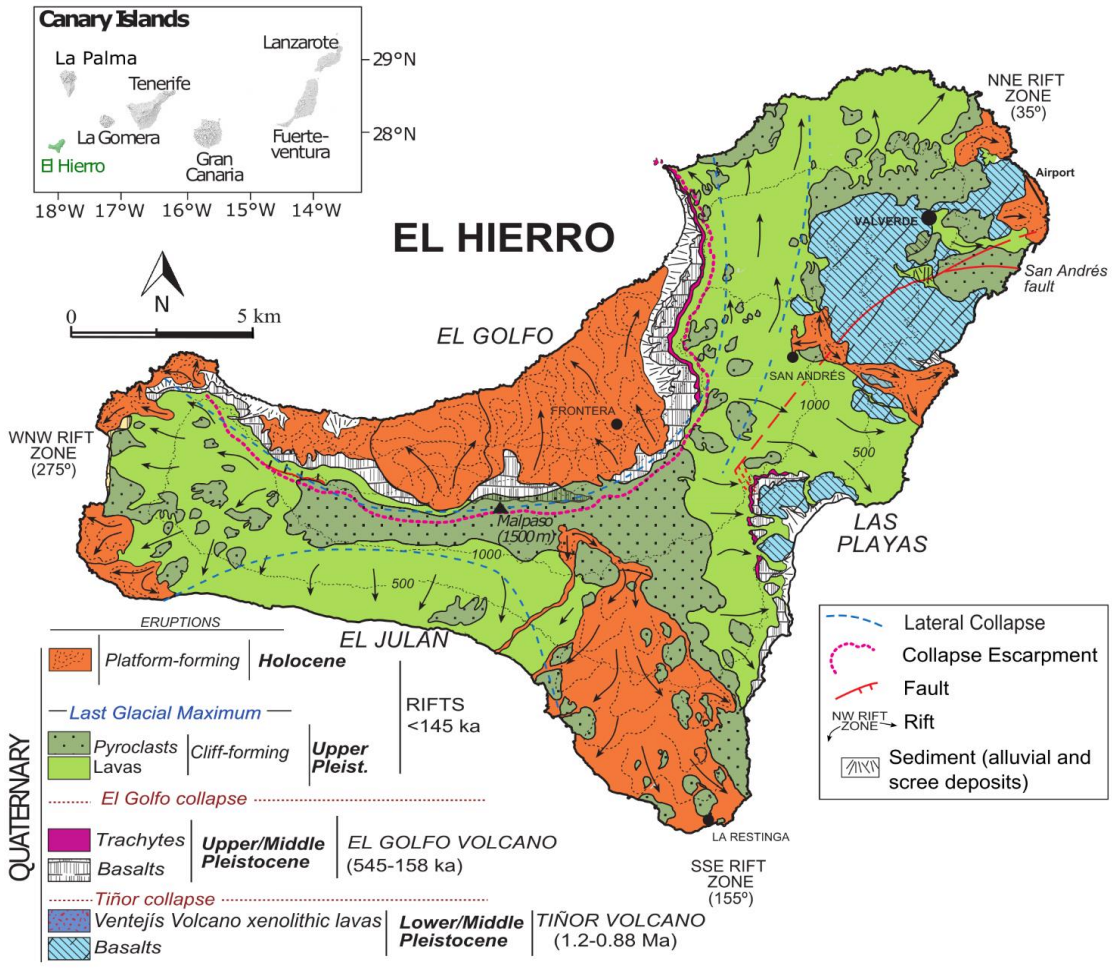

Figure 1. Geological map of El Hierro (Modified from: Carracedo and Troll, 2016), showing the three main rift arms of El Hierro and the giant landslide embayments in between the rift arms. The lava flows of the most recent (Holocene) eruptive episodes are marked in orange colour.

El Hierro is the youngest, the smallest (268 km^2), and the westernmost of the seven main Canary Islands **(Fig. 1).** It is currently in the “shield-stage” according to Carracedo and Troll, who summarised the geology of the archipelago in 2016 and in 2021. The island was constructed via a group of coalescent volcano edifices, which all show evidence of mass-wasting events. The island is furthermore characterised by a triple-arm geometry (often referred to as Mercedes stat pattern), which shows three major landslide embayments within enclosing volcanic rift arms. As summarised by Manconi and others in 2009 and Carracedo and Troll in 2016, the oldest recorded giant landslide is now concealed, and is labelled the Tiñor landslide (age 882–545 ka). It preceded the El Julan landslide (~130 km3 , age ~200 ka), which affected mainly the southwest flank of the island. In addition, the Las Playas debris avalanche (25–50 km3 , aged between 176 and 145 ka) formed a prominent coastal embayment on the southeast flank of the island. Most recently, the El Golfo landslide removed an enormous portion (150–180 km3) of El Hierro’s northwest flank, producing a vast and well preserved scar, known as the El Golfo embayment, the site of some of the steepest onshore cliffs in all of Europe. Published K-Ar dates imply that this catastrophic debris avalanche is younger than 134 ka but older than 21 ka. The South and Southwest of El Hierro is characterised by extensive lava fields, such as the Lajiales region north of La Restinga, or the extensive lava fields in the El Julan region, which are often displaying spectacular pahoehoe textures. In addition, volcanic scoria cones, hornitos and associated lava tunnels and caves are a frequent feature in the lava fields of the island (**Fig 2**). The lava tubes and caves(the latter being often referred to as ‘juaclos’ on El Hierro) were serving as housing and primitive temporary shelter for aboriginal people, and can thus contain relics of aboriginal occupation and hence civilization.

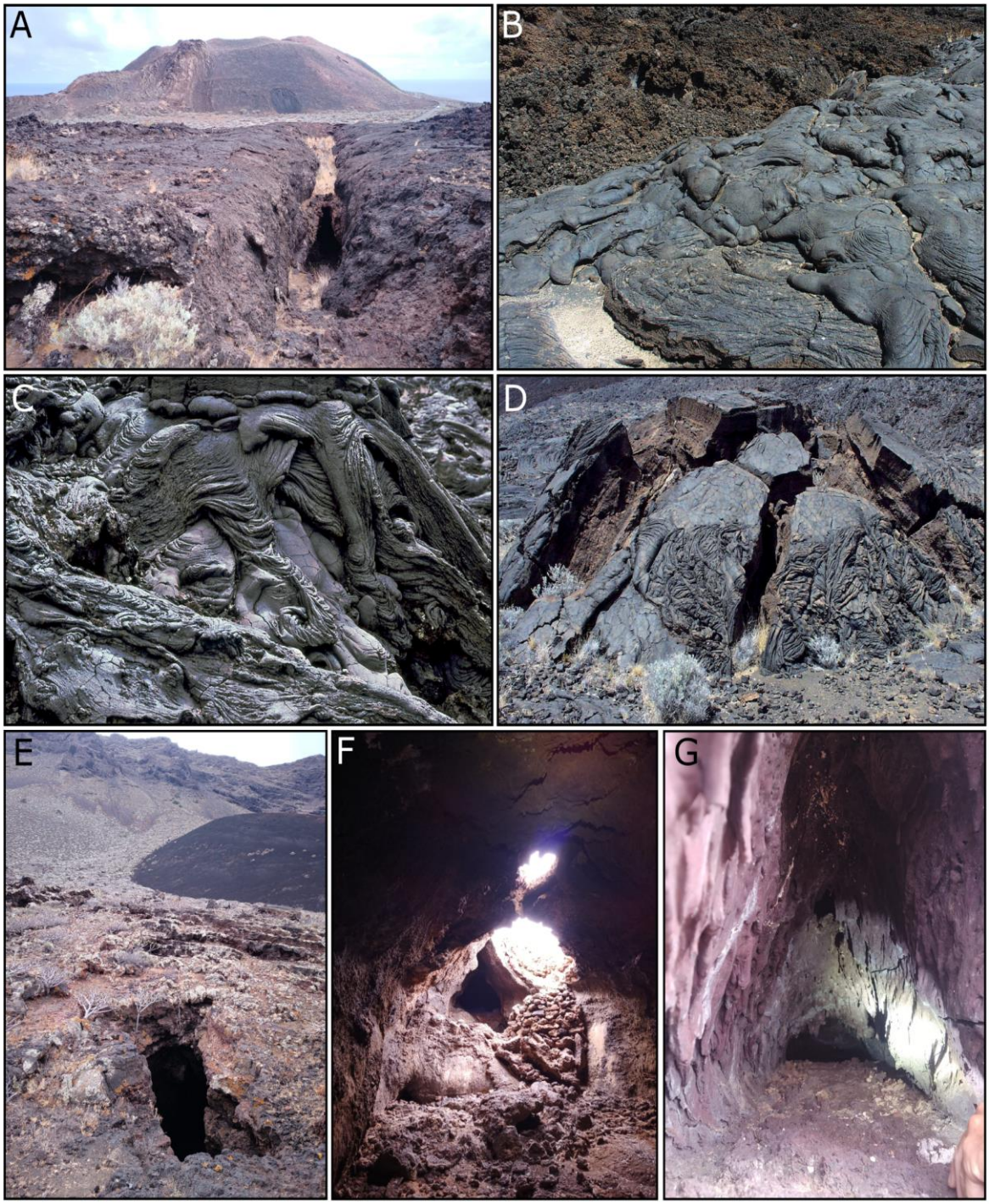

Figure 2. Examples of Lava fields and volcanic caves on El Hierro. **a)** Typical landscape of Southern El Hierro where cinder cones produced extensive lava fields and lava tubes. **b, c)** Pahoehoe lava flows often show smooth and glassy upper surfaces. **d.)** Tumuli are common where inflation of lava flows causes surface bulging and cracking as a result of internal pressure within lava flow channels under the hardened lava surface. **e-g)** Examples of an entrance, interior and termination of lava tubes (note hand in bottom right of panel g.), which served aboriginal populations of El Hierro as primitive housing, temporary shelter, and in places also as burial grounds.

The aboriginal people of El Hierro and their petroglyphs

At the time of the European conquest, from the fifteenth century AD, the Canary Islands were inhabited by a variety of indigenous communities, often referred to as 'the Guanches', although each island had a distinct aboriginal community, which also had distinct names for themselves. It appears that interaction between the islands was relatively limited in pre-Hispanic times, which led to somewhat distinct population characteristics and socio-cultural developments on the different islands as discussed by e.g. Troll and others in 2019 and Mitchell in 2023. The pre-spanish aborigines of El Hierro are called the Bimbape (or Bimbache), and unfortunately after the conclusion of Spanish colonisation, only a limited number of remains were left of their civilization. Thus we do not have a detailed record of their culture, origin and way of life. In respect of the arrival of the aboriginal settlers, the assumed dates range from the first to the fifth centuries BC and the most popular hypothesis is that they were related to or delivered by sea-faring Mediterranean peoples, who aimed to colonise the islands, as we know of for instance carthaginian expeditions around 500 BC that explored the coast and coastal islands of the NW Africa all the way to Cameroon. In addition, Libyan-Berber script was found in a number of pre-Hispanic settlements on the Canary Islands, supporting a broadly North African origin of the aboriginal (pre-Hispanic) population. Many of the mid-fourteenth to eighteenth century texts and the various archaeological remains found on the islands suggest that the aboriginal cultures were effectively living in a (forced) stone age, due to lack of metallic resources on the islands (compare Troll et al., 2019), and that societal classes had developed as had sophisticated religious practices. Veneration of the sun, the moon and the stars was widespread and religious practices were related to natural cycles, providing an annual rhythm to community life.

Genetic studies are instructive in considering the origin of the aboriginal Canarian population, and in 2003 Maca-Meyer and coworkers compared aboriginal mitochondrial DNA collected from Canarian archaeological sites to that of today's Canarian population. The results show that despite the Spanish colonisation and later influx of Latin American groups, direct aboriginal maternal lineages constitute between 42 and 73 percent of the present-day Canarian gene pool. In other words between about 40 and 75 percent of today's Canary population has some part of aboriginal ancestry. In another study in 2009, Fregel and coworkers estimated, based on Y-

chromosome and mitochondrial DNA haplogroup frequencies, that the relative female and male aboriginal contributions to the present-day Canary Island population is c. 42 percent and 16 percent, respectively. This estimate suggests that the female pre-Hispanic aboriginals are more strongly represented in today's population than male aboriginal influences, consistent with the radical transition brought about by the Spanish conquest. In addition, Fregel and team found Berber Y-chromosome lineages in the indigenous remains, confirming a north-west African origin for the ancestors of the pre-hispanic population, but also found a mild influence from the Middle East in some Canary ancestral groups. Regarding the Island of El Hierro, archaeological and anthropological research, dates the presence of the aboriginal population on El Hierro to at least the third century by dating organic remains through the ^{14}C method.

Here we describe one remnant of this lost aboriginal culture from the Canary Islands, being the relatively widespread petroglyphs recognised on the island, which document the interaction between aboriginal culture, stone mason skills and local geology (**Figs 3 & 4**). Archaeological research dates the presence of the aboriginal population on El Hierro to at least the third century by dating organic remains through the ^{14}C method. DNA examined from such remains, for example a genetic check of 61 people found in a cave at Punta Azul an archaeological site dating back to the 12th century, allowed Calderón Ordóñez and colleagues in 2017 to establishing a close connection between the island's aborigines and the ancient indigenous societies of North Africa, in particular with the the Berbers and Tuaregs that are widespread in present day Morocco and other NW African nations.

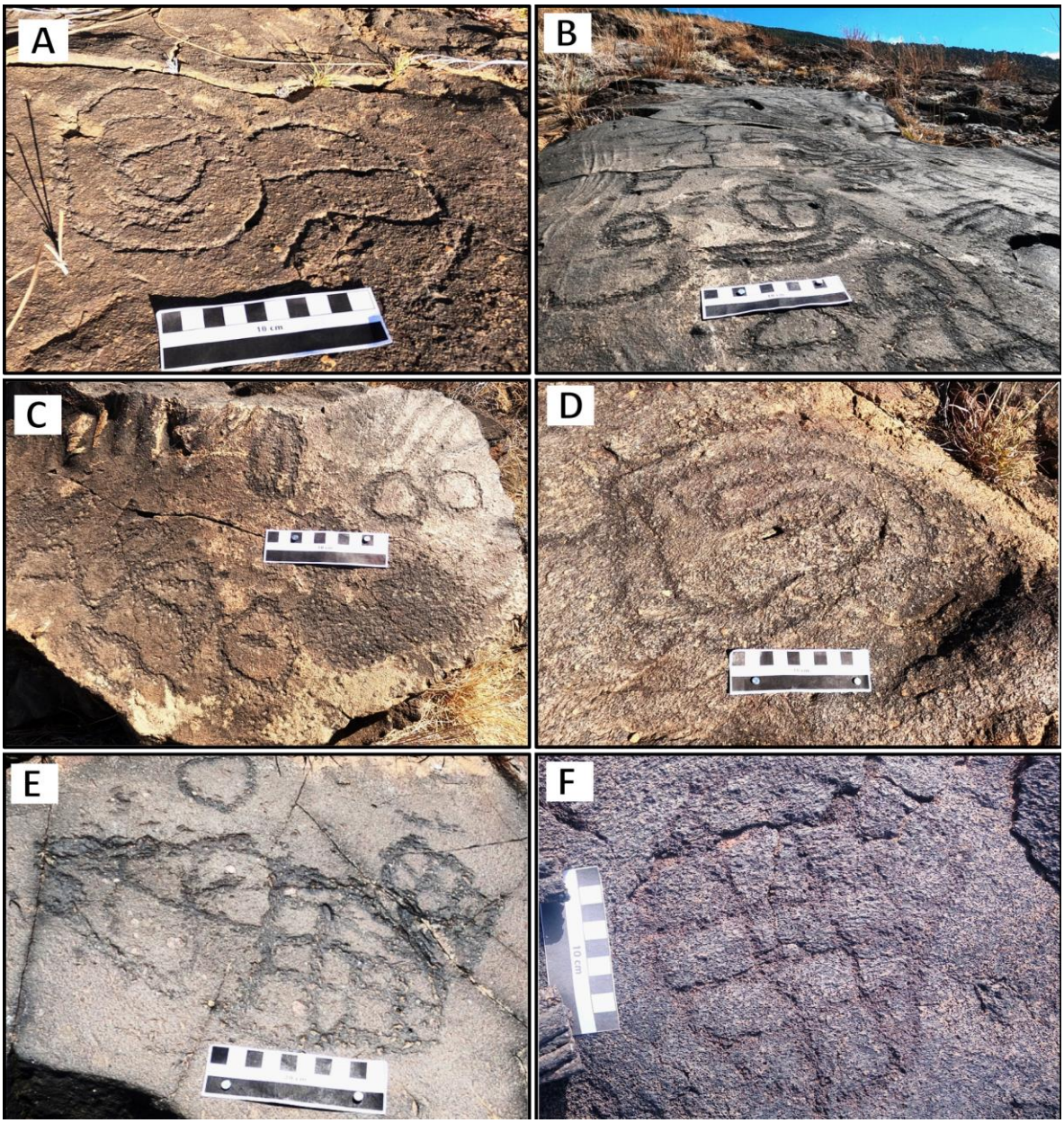

Figure 3. Aboriginal Petroglyphs on El Hierro of the geometrical type. A) "Labyrinth" or "spiral", El Julan. B) Set of geometrical and alphabetic patterns, El Julan. C) Symbol or ornamentation, El Julan, D) "Labyrinth" or "spiral", El Julan. E) Set of geometrical figures, El Julan. F) Geometric figure or "Checkerboard", La Restinga.

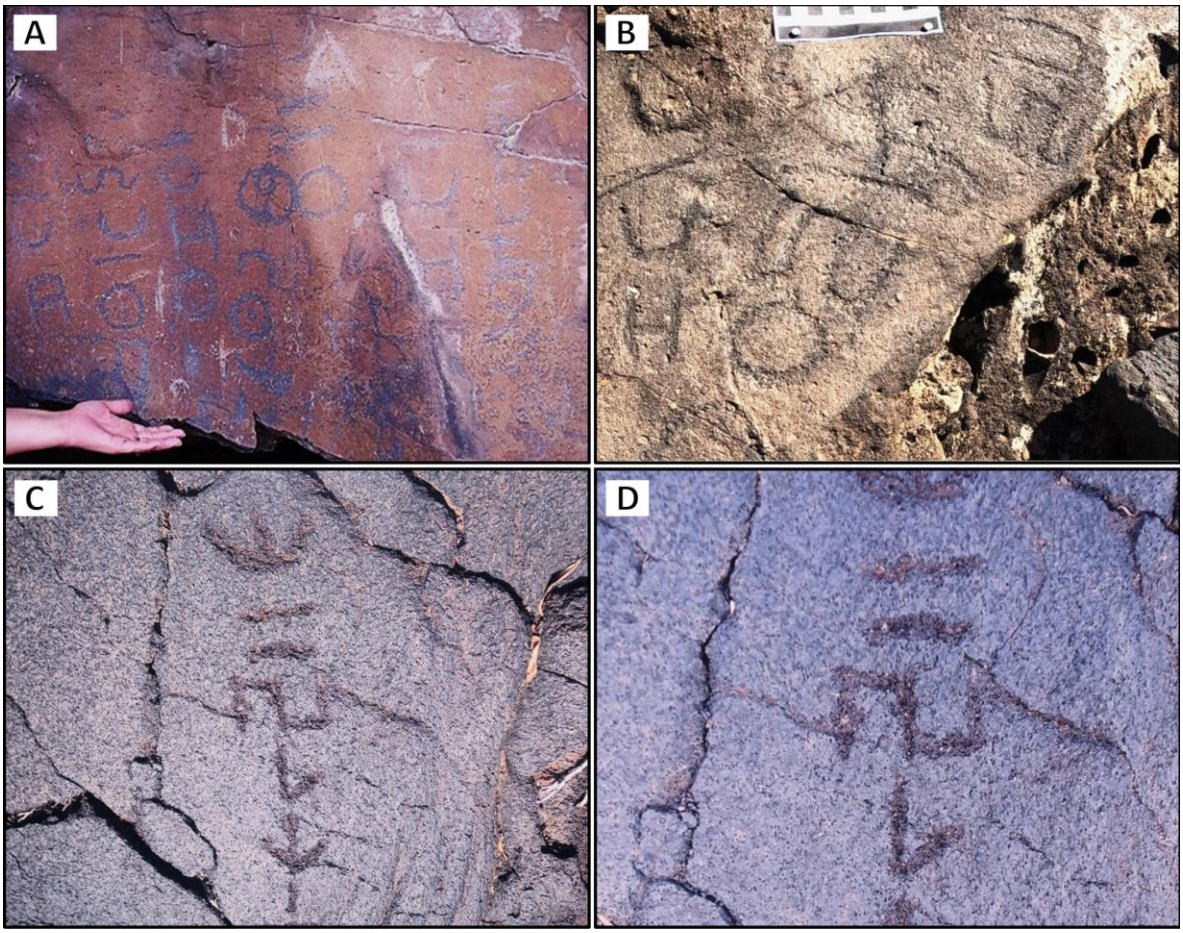

Figure 4. Alphabetical patterns amongst aboriginal Petroglyphs of “libyco-berber” style. A) Alphabetic patterns outside the cave of„La Candia“, El Tamaduste. B) Alphabetic patterns, El Julan. C) Alphabetic patterns in vertical arrangement, La Restinga. D) Closeup of picture C.

A glimpse into the Bimbapes life is possible when inspecting the archaeological remains that can be seen in different aboriginal shelters and workplaces found in many places on the island. The places of life and work are at times associated with the writing of symbols and also words in stone using a specific alphabet, the so-called "libyco-berber". Most literal researchers and historians have compared the indigenous text of El Hierro with the ancient languages and alphabets of the pre-Islamic Saharan culture. By comparing petroglyphs' textual representations on the island of El Hierro and in North Africa, linguist Mora Aguiar has been able to follow the migratory trail of the aborigines during this period of antiquity in her 2021 study. "After the romanization, the southern Libyan alphabet was widespread in Northern Africa, reaching what is today the Tafilalt and the Draa valley in Morocco. From these regions, the alphabet could have reached the Canary Islands in the Christian era."

The Petroglyphs

Pre-Hispanic petroglyphs can be found in several places on El Hierro. The most prominent places include the southern slopes of El Julan, in the ravines of the islands northern part (Tejeleita), on the basaltic cliffs of the coast of La Caleta and on the pahoehoe-lava flows (Lajiales) of La Restinga, the southernmost part of El Hierro, and in fact all of the present day country of Spain (see **Fig. 1**). In addition, caves have been a popular sites for petroglyphs as El Hierro offers a great variety of natural volcanic caves and underground tubes, still locally referred to as the '*juaclos'*, an aboriginal word that describes short (max 10s of metres) volcanic caves used by the Bimbapes as habitat, burial chambers and of course as stone-art galleries, like for instance the juaclo in Isora or in the outside part of the cave of La Candia.

The invention of the technique of lettering, and especially alphabetic patterns, is evidently one of the most substantial contributions to the progress of human civilization. The need to write is related to the intellectual and economic development of complex societies, with the aim of recording and storing information, both in the present and also for the long term. The written word, apart from being a comprehensible means of communication between people, also has the ability to stand the test of time and thus be preserved for future generations. In a study by NASA, aiming to find the best way to store information long term, it was concluded that CDs and floppy discs are only short term storage devices, like for 10 years or a little more. Books can store information for hundreds of years, but are vulnerable to fire and water damage. The longest known preservation is in fact in stone, lasting for thousands of years, as seen in e.g. the Rosetta stone and similar engravings from ancient Egypt. However, in order to write down information a civilization must first develop 'calligraphic tools' to write down the information in an understandable form and teach people to read the information correctly. This implies that there may have been an intergenerational "school" of literate individuals amongst the aboriginal population of El Hierro that was capable of transmitting the alphabetic contents and also skilled in the necessary 'writing techniques'.

Prehistoric Writing and Stone Mason Techniques

Chopping and scratching basalt stone and cut lava was one of the few possibilities the Bimpapes had for writing and drawing. Many of the so-called “Letreros” are produced by repeated and coordinated chisel, impact, and groove marks, presumably using hard volcanic rock as chisel and likely also as mallets to achieve lasting chipping and impact cratering on the surface of often glassy pahoehoe lava crusts and on volcanic rocks with thin layers of oxidation. The latter was especially relevant inside volcanic tubes and caves (juaclos) and at coastal rock exposures, where thin coatings of oxidised material and manganese-rich coatings are frequent, which have been chipped and carved away to produce visible colour differences and also negative forms in the rock, although these were often no more than on a mm scale in terms of depth of impact.

Specifically, since iron or bronze were likely not known to the aboriginal peoples of El Hierro, because the island has no deposit of metal ores, rocks are to be considered as the most significant resource to get instruments. Here it becomes clear that the geomorphological characteristics of the island and its distribution of various rock types are decisive for the performance and the amplification of these works of art. Massive lava rocks poor in vesicles are often extremely tough and were likely the preferred raw material for the instruments used to create the petroglyphs. The most commonly used technique of realisation can be called pricked (picado), which forms grooves of variable texture and deepness with uneven borders. Two different types of workmanship have been noted by Hernández Pérez in 2002, some engravings that have a more regular surface along with percussion points close to each other and some irregular in groove and borders with separate or even isolated percussion points from each other. Another technique, but with a smaller number of existing engravings, is the so-called pointed (puntillado) method, i.e using hundreds of small impact dots, which bears similarities with the much younger art form of ‘pointillism’. These puntillado engravings are designed only by percussion points separated from each other without the elaboration of any connecting trenches. The technique of the re-pricked (repicado) is a combination of picado and puntillado and is observed with the fulfilment of points in the interior of the grooves (**Fig 5**). The Bimbapes could either have worked with only a single stone instrument, which would mean direct manual impacts on lava as discussed by Steiner in 1998, or, more likely, they acted like sculptors, with the

application of several stones at the same time. Here, smaller stones for fixing and larger ones for beating on, similar to the use of hammer and chisel, may have allowed to create a better control of the artwork design and may have reduced impact pressure on hands and ankles of the artist (**Fig 6**). In either case, this technique of repeated impact damage allows to produce a larger ornamental arrangement that is visible from a considerable distance due to a variation in relief on the rock surface and exposure of less glassy (or in cases less weathered) material underneath the primary rock surface, thus creating (i) variation in exposed material and (ii) a shadow effect to to the change in relief.

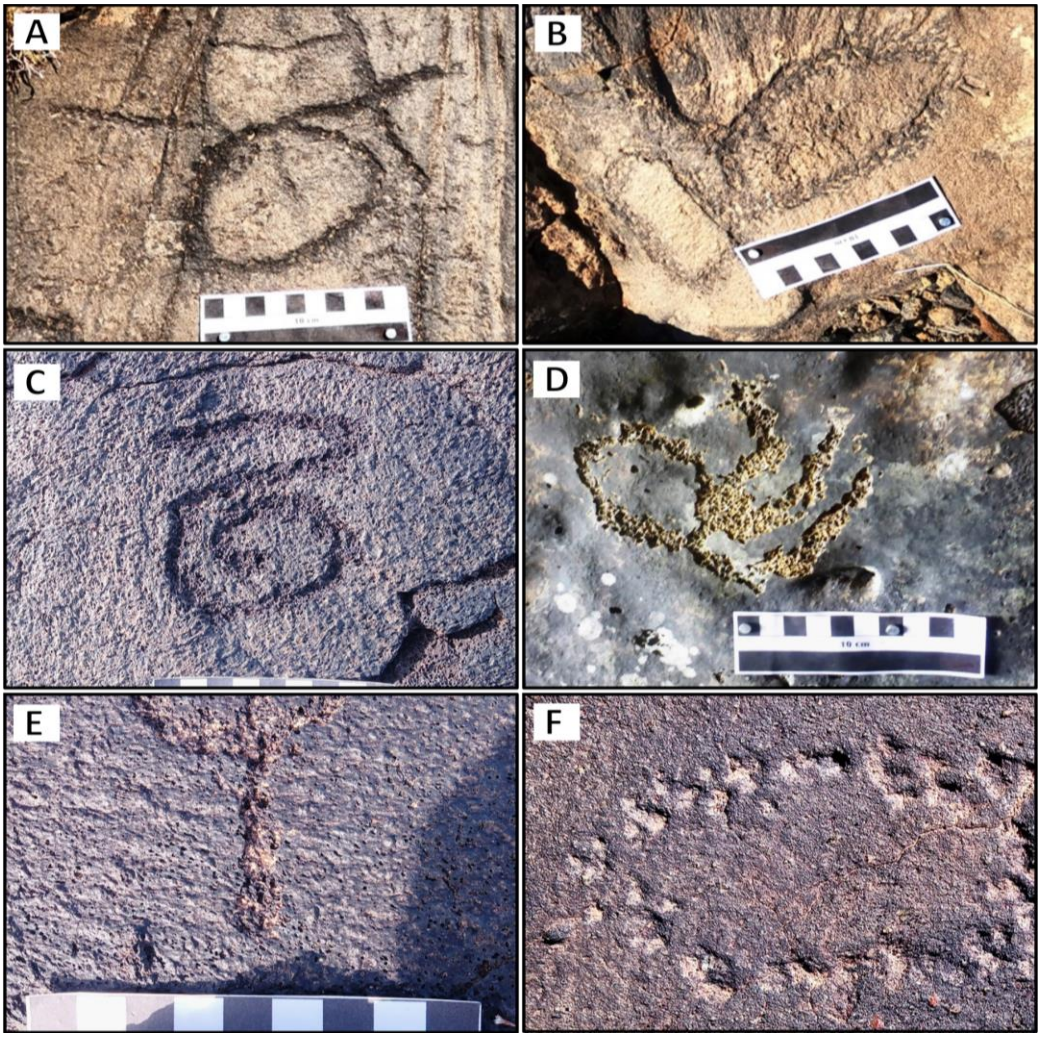

Figure 5. Closeups of different petroglyphs unravel the technique used for the creation of the El Hierro petroglyphs. A) Anthropomorphic figure (possibly human). El Julan. B) Sign, symbol or ornamentation, El Julan. C) Sign, symbol or ornamentation, La Restinga. D) Sign, symbol or ornamentation. Inside the „La Cueva del Agua“cave, Isora. E) Sign, symbol or ornamentation, La Restinga. F) Closeup of *puntillado technique*, El Julan, showing that the El Hierro petroglyphs were produced by repeated hammering with stone tools to create small point-like impact damages on the often glassy lava rock surface. When repeated, this technique gives an ornamental larger arrangement that is visible from a considerable distance due to a variation in relief and exposure of less glassy (or in cases less weathered) material underneath, this creating variation in exposed material and a shadow effect to the change in relief.

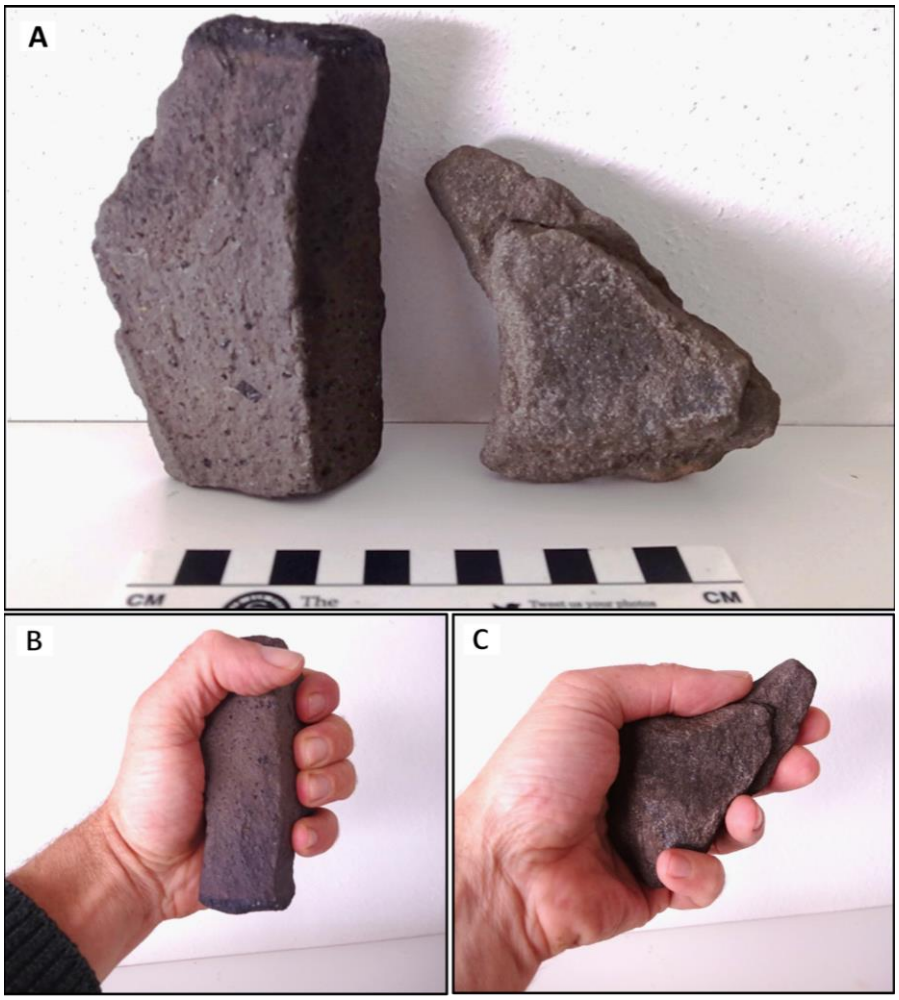

Figure 6. A) Experimental archaeology allows reconstructing tools thought to have been used as hammer and chisel to create petroglyphs. B) Example of a "hammer" using a massive, almost vesicle free basalt rod (e.g. a cooling column). C) Example of a "chisel" that would allow to transfer impact energy and create a geometrical design by determining the exact place of the impact site.

Meaning of the petroglyphs

El Hierro preserves the largest amount of aboriginal libyco-berber petroglyphs and other inscriptions in all the Canary Islands. The work of Irma Mora Aguiar from 2021 transcribed more than 100 "herreño inscriptions" and associated them with the texts and morphemes of the libyco-berber found in North Africa. According to Pichler in 1999 and Mora Aguiar in 2021, it is very likely that the Bimbapes wrote many names and/or group or family names related to origin or ethnicity. The aborigines likely also acted as geometricians and artists, not only as writers (**Figs 3 & 4**). Alongside the alphabetical inscriptions we find a multitude of rock engravings with various symbols and ornaments. Among them, we find symbols that have been interpreted as anthropomorphs (human), podomorphs (footprints), zoomorphs (animals), and various geometrical arrangements and figures such as circles, semicircles, triangles, squares,

spirals and labyrinths as outlined by Hernández Pérez in 2002. These geometric and symbolic signs either appear solitary or in compositional works and while this type of symbolism is more abstract, it can be speculated that it may have served as a form of communication to express political, religious or economic information, such as number of livestock, or territorial claims on grazing grounds.

In rarer cases, the existence of more complex geometric figures could represent playing fields (checkerboards), or figures to facilitate counting and calculation (a form of abacus) was suggested by Espinel and García-Talavera in 2022, hinting at the possibility of mathematical games and accounting. In the end, however, it is not easy to give a concrete interpretation of the different types of figurative petroglyphs, and so far, many possibilities have been presented about the content and purpose of these signs, ranging from ‘social’ to "political" and all the way to "ideological" meanings as discussed by Soler Segura in 2005 and that latter may include many “religious' representations amongst the petroglyphs that symbolise reverence of specific deities and also revitalisation and fertility (see e.g. work by Pichler in 2005). The employment of different geomorphological elements to create “culture”, as discussed by Guglielmi, in 2022, can furthermore be associated with the indigenous need to establish basic social and political structures which also served the purpose of surviving for centuries on a small volcanic island.

The beautiful and peculiar geodiversity of El Hierro Island, a UNESCO Global Geopark, which was formed by active ocean island volcanism gave rise to a fascinating and intriguing form of graphic representation of the culture of the pre-hispanic population of the island. Although shrouded in mystery as to the exact meaning of many of the symbols and even the symbolism as a whole, the interaction of the local population with the geological setting allowed the aboriginal population to detail, record and preserve messages to the present day. Although we have lost the ability to decipher them, they will be present for many thousand years beyond our present day culture, and maybe one day, a sophisticated software with a supercomputer behind it may suggest what the exact meanings of the symbols may have meant. A real pity it will likely not happen in the foreseeable future of our own lifetime.

Acknowledgments

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