Approach to the Study of the Phenomenon of Multiple Burials at El Caño, Panama

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In this article we present a study that seeks to explain the nature of, and the mortuary practices behind, the burials containing multiple individuals at the site of El Caño, Panama (part of the "Gran Coclé" archaeological tradition, ca. AD 700–1000). We set out to test our first impression of these burials as products of sumptuous funerals held upon the death of the rulers that included, among other practices, human sacrifice. With this in mind, our research aims to elucidate the status relationships between individuals, the circumstances of their deaths, and the religious and symbolic significance of their burials. The results reveal the presence of an individual of higher status within every tomb, the existence of a pattern with respect to the status of those who accompany that individual, the practice of mortuary treatments typical of sacrificial contexts, toxic substances, an iconography referring to human sacrifice, and the clear intention of using a burial as a representation of social order. Considering all this, we conclude that multiple burials at this site should be interpreted as high status. Our study highlights the practice of human sacrifice in funerary rituals linked to that status.

Keywords: multiple burials, human sacrifice, complex societies, Gran Cocle tradition

En este trabajo se presenta un estudio que busca explicar la naturaleza de las prácticas mortuorias que están detrás de los entierros múltiples en el sitio El Caño, Panamá (tradición arqueológica de "Gran Coclé", ca. 700–1000 dC). Se intenta poner a prueba la hipótesis acerca de que estos entierros fueron producto de suntuosos funerales celebrados tras la muerte de los gobernantes, que incluían, entre otras prácticas, sacrificios humanos. Teniendo esto en cuenta, la investigación tiene como objeto esclarecer las relaciones de estatus entre los individuos, las circunstancias de sus muertes y el significado religioso y simbólico de los entierros. Los resultados revelan la presencia de un individuo de estatus superior, la existencia de un patrón con respecto al estatus de quienes lo acompañan, la práctica de tratamientos mortuorios típicos de contextos de sacrificio, sustancias tóxicas, una iconografía referida al sacrificio humano y una clara intención de utilizar a los entierros como representación del orden social. En función de esto, concluimos que los entierros múltiples de este sitio deben ser interpretados como entierros de alto estatus. Asimismo, este estudio destaca la práctica del sacrificio humano durante los rituales funerarios.

Palabras clave: entierros múltiples, sacrificio humano, sociedades complejas, tradición Gran Coclé

For decades, rich tombs containing multiple burials have been known in the Isthmus of Panama. Between 1930 and 1933, the Peabody Museum of Harvard University uncovered at Sitio Conte more than a hundred tombs containing individuals of different social status (Lothrop 1937; see Figure 1). Some of them were especially rich, which was why this archaeological site was considered an archetypal example of a hierarchical society (Briggs

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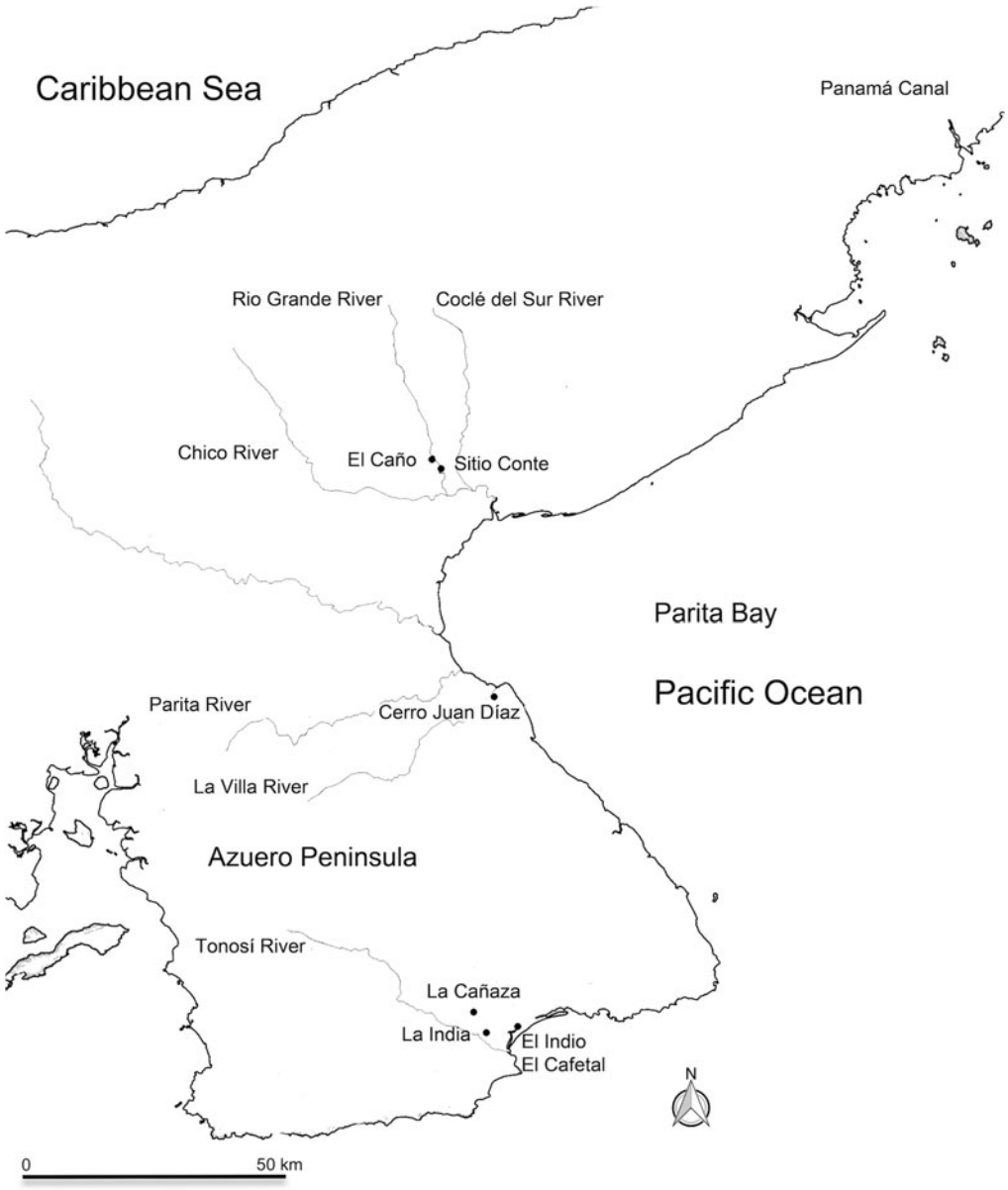

Figure 1. Map of the region.

1989). In 1940, attracted by the spectacular nature of the mortuary ensembles and offerings of the Sitio Conte tombs, the Anthropology Museum of the University of Pennsylvania also excavated at the site and subsequently published the discovery of a spectacular tomb, which they called Burial 11 (Hearne and Sharer 1992; Mason 1942). Of the 13 tombs with multiple burials at Sitio Conte, 10 held two individuals, and three held more than 15 (Briggs 1989).

The archaeologist in charge of the first excavations, Samuel Kirkland Lothrop (1937), claimed that the largest uncovered tombs containing multiple burials were the tombs of high-status individuals interred with their companions. He came to this conclusion after observing that the individual

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with the richest mortuary ensembles occupied the center of the interments. Additionally, he found parallels between Sitio Conte burials and the ethnohistorical data that refer to the sacrifice of prisoners and the suicide by poisoning of those close to the caciques when they died (Fernández de Oviedo 1853:454; Jopling 1994:64). J. Alden Mason (1942) agreed with this interpretation, although he proposed a different one for tombs in which more than one individual wore high-status symbols. He thought that the deceased in these cases were most likely "a group of chiefs and warriors slain in a single battle" (Mason 1942:105).That interpretation was supported by Olga F. Linares , who added new arguments concerning features such as the "decapitated skulls," which she believed could be war trophies; "disarticulated bones, shallow inconsequential graves" that could have belonged to war captives (Linares 1977:77); and an iconography "emphasizing certain values, most especially those that would be held by warriors" (Linares 1977:70). She referred also to the numerous ethnohistorical references of the existence of conflicts, not only in the Isthmus of Panama but also in other parts of Central America and Colombia, which were also traditionally recognized as territories controlled by powerful chiefs (Linares 1977:73–77).

In our opinion, in a scenario of constant rivalry between groups, multiple deaths may have occurred as a result of armed confrontation, and some of the elite individuals may have died in battle and been buried with their warriors. This possibility should be investigated using osteological evidence. Unfortunately, it is now too late to determine the cause of death of those buried at Sitio Conte because the bones were not kept; however, the recent discovery of large tombs at El Caño (Mayo and Mayo 2013; Williams 2012) has allowed us to further examine the phenomenon of multiple burials.

In earlier publications (Mayo and Mayo 2013; Mayo, Mayo, and Guinea 2021), we proposed that the burials of multiple individuals at El Caño are interments of high-status people buried with others who were sacrificed.[1] We based this interpretation on the following observations: (1) a high-status individual always occupied the center of the burial, (2) single burials of high-status individuals were not found, 3) all multiple burials were located in a specific sector of the cemetery, and, finally, 4) the iconographic corpus at El Caño includes depictions related to human offerings and sacrifices. Three more multiple burials, alongside the first ones, have since been excavated. These provide evidence for two new observations: the presence of perimortem violence, not only in the companions of high-status individuals but even in the high-status individuals themselves; also, unexpectedly, in one of these burials the higher-status individual does not occupy the center of the interment. Why was this burial different? Should it be interpreted in the same way as the others? The variability in mortuary contexts reflects the complexity of mortuary practices and the need for a careful analysis to explain the phenomenon of burials of multiple individuals at El Caño.

Goals, Hypothesis, and Strategy

This study seeks to understand the nature of the multiple burials and mortuary practices of El Caño. The hypothesis guiding our research is that these interments were the result of the organization, at the death of a ruler or someone important, of sumptuous funerals that included human sacrifice. Related to this hypothesis was our expectation that these burials, in addition to having religious and symbolic meaning, should contain elements demonstrating the existence of a hierarchy among individuals, as well as elements indicating, directly or indirectly, the practice of human sacrifice. With this in mind, we examined the relationships between social status, circumstances of death, and symbolic significance of the burials.

To assess the status of individuals, we analyzed two related elements: the mortuary ensembles of the individuals and the structural components of the tombs. In order to approximate the circumstances of the deaths, we examined age and sex patterns, the source of death, and related iconography, paying special attention to those cases that could be interpreted as human sacrifice and to osteological indications of violence. Finally, to determine the symbolic or religious importance of the burials, we examined how the bodies were placed. Each set of methods is explained in the relevant sections. All data

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Table 1. Radiometric (AMS standard) Dates of the Tombs of El Caño.

Beta	Submitter No.	Tomb	Unit	Conventional Age	Calendar Calibration (95.4% Probability)
338008	R:7173	1	105	1160 ± 30 BP	cal AD 780–900 (1170–1050 cal BP)/cal AD 910–970 (cal BP 1040–980)
303193	R:9557	2	134	1070 ± 30 BP	cal AD 900–1020 (cal BP 1050–930)
294052	R:4750	2	88	1120 ± 30 BP	cal AD 880–990 (cal BP 1070–960)
437128	MU125	4	391	1100 ± 30 BP	cal AD 885–1015 (cal BP 1065–935)
338006	R:4538	5	82	1250 ± 30 BP	cal AD 680–830 (cal BP 1270–1120)/cal AD 840–870 (cal BP 1110–1080)
294053	R:7214	5	82	1170 ± 30 BP	cal AD 780–900 (cal BP 1170–1050)/cal AD 920–960 (cal BP 1040–990)
439150	R:7674	6	125	1140 ± 30 BP	cal AD 775–790 (cal BP 1175–1160) and cal AD 800–980 (cal BP 1150–970)
405202	MU062	7	252	1170 ± 30 BP	cal AD 770–905 (cal BP 1180–1045) and cal AD 920–965 (cal BP 1030–985)
437129	MU145	8	420	1170 ± 30 BP	cal AD 770–905 (cal BP 1180–1045) and cal AD 920–965 (cal BP 1030–985)

Note: All samples were charred organic materials.

examined here come from a discrete set, which is why, before arriving at an interpretation, we ensured that the results complement each other and they make sense in their context.

El Caño Necropolis

The site of El Caño contains archaeological components from three different phases of the Late Ceramic period: Phases A, B, and C. This means that it was occupied between AD 700 and 1000, abandoned, and then reoccupied a century before the Spanish conquest. The period currently being investigated encompasses the first two phases. Throughout this time, the site had a cemetery as well as a ceremonial space, each of which had different structures and functions (Supplemental Figure 1). The cemetery occupies at least 5 ha and has at least two areas: Area 1, which contains rich multiple burials (Mayo, Mayo, Guinea Bueno, Hervás Herrera et al. 2021), and Area 2, located 110 m to the west (Lleras Pérez and Barillas Cordón 1985), with simple burials of low-status individuals. We have excavated at El Caño since 2008.

To the east of Area 1, the necropolis has a ceremonial space (Area 3) that includes two alignments of monoliths, a group of at least 32 stone sculptures, two basalt columns with low reliefs, two altars, and a set of small stone figures (Verrill 1927). Recently, we discovered a large number of postholes there, indicating that most of the ceremonial enclosure of the necropolis was built of wood. Pottery collected in this area is of the Conte and Macaracas complexes (Late Ceramic period, phases A and B; Sánchez Herrera 2006), indicating that the ceremonial space is contemporaneous with the burials in Areas 1 and 2. Moreover, the sculptures in the ceremonial area and the sculpted-foot metates and grinding stones found in the tombs belong to the same style. A causeway of rounded stones connected the necropolis to the Río Grande, today located 450 m to the east.

Area 1 contained Tomb 5 and Tomb 6, two tombs dating to Phase A of the Late Ceramic period, with at least two individuals in each, and five tombs dating to Phase B of the Late Ceramic period (T1, T2, T4, T7, and T8; Supplemental Figure 2, Table 1). T1 contained eight individuals, T2 had 27, T4 had 32, T7 had between 28 and 41, and T8 had at least six. All the tombs contained offerings put in place at different times after the burial episode. These offerings were found on deposits of sediments that came from the landslide of the walls of the pits and from the annual flooding of the Río Grande during the rainy season. We interpret these as liminal and post-liminal offerings, tributes offered by relatives with the idea that the soul of the deceased would arrive in the afterlife (Mayo, Mayo, and Guinea 2021).

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Tombs of the first phase were partially destroyed by the excavation of pits for those of the second phase. For this reason, only data from tombs T1, T2, T4, and T7 have been used in this research. The information from tomb T8 was not included because it was also damaged by the construction of tombs T4 and T7.[2]

Status Relationships

To determine status, two elements that could be related were analyzed: (1) the mortuary ensembles and (2) the tomb structures that safeguarded the burials.

The Mortuary Ensembles

Individuals in the multiple burials of El Caño were interred with mortuary ensembles, which we assume were the material expression of their different social statuses. In order to approximate these statuses, we analyzed the quantity and variety of ordinary artifacts and the quantity of high-status artifacts associated with each of them.

The artifacts in the sample are pendants; adornments for ears, neck, and wrists; belts; bracelets; cuffs; breastplates and shin guards (mostly Conte style); and tools and weapons (projectile points, axes and adzes, chisels, pyrite mirrors, and metates). Seven of these are high-status symbols or prestige goods: breastplates and cuffs of gold; belts made from the teeth of sperm whales (*Physeter macrocephalus*), pumas (*Puma concolor*), and jaguars (*Panthera onca*), or of sheets of gold that once covered spherical beads of perishable material; pendants of great size made from different materials; emeralds; and figures carved from manatee (*Trichechus manatus*) ribs (Supplemental Figure 3). We interpret these as symbols of high status for the following reasons: (1) they were of great size, (2) they were made of materials with a high symbolic value (e.g., sperm whale, jaguar, and puma teeth), (3) the materials were imported (e.g., manatee rib and emeralds), (4) they are found in lesser quantity than other artifacts, (5) they usually appear together, and (6) they have not been found in single burials in small tombs. A detailed list of the artifacts associated with the adult males, women, and infants is currently being prepared for publication.

Results indicate that the mortuary ensembles are not the same in all burials, and that some of them contain special artifacts/status symbols, which is consistent with the existence of a hierarchy among different individuals (Supplemental Figure 4). Analyzing the resulting graphs, we noted the existence of three types of mortuary ensembles, which could indicate the existence of three main status groups: (1) those that include, among other objects, high-status symbols (status 1); (2) those that do not include high-status symbols (status 2); and (3) those that were made of perishable materials or where mortuary ensembles never existed (status 3). Mortuary ensembles from each of these groups do not have exactly the same quantity and variety of artifacts, which suggests the existence of ranges in status among individuals within each group.

The resulting graph also shows that in all tombs, not one but two high-status individuals were buried, and that one individual always outranked the other. We believe the main occupant to be the one who was buried with a greater quantity and variety of artifacts: in tomb T1, it was an adult of undetermined sex (I1), in T2 an adult male (I7), in T4 an adult male (I1), and in T7 an infant of undetermined sex (I4).

We also observed that all multiple burials contain the same variety of statuses and in the same proportion. Every one includes an individual with a clearly superior status, a second high-status individual, and, except for the T2 tomb, individuals of status 2 and 3, each in equal proportion to each other. In short, this analysis has led us not only to observe the existence of a hierarchy and to identify the highest-ranking individual of the tomb (main assumption) but has also revealed a pattern that seems to correspond to the practice of selecting individuals for slaughter according to their status.

The Structures

The analysis of the structures that housed the burials has been important not only in understanding the complexity and importance of the tombs but also in clarifying the rate of sedimentation. The latter is related to the accessibility of the burials, the phases of occupation, and the activities of the funerary rituals carried out inside the tombs after burial. Moreover, the study

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helped us to understand the construction processes and the challenges faced by the tomb builders. Because the tombs were built with organic materials, the forms and functions of the structural components were identified indirectly through the sediments and behavior of the deposits.

All the tombs of the Late Ceramic period Phase B had the following structural components: (1) a pit with a perimetric step midway up the wall, (2) a battery of posts placed at the perimeter of the lower section of the wall, (3) a wooden framework that covered the burial and upon which offerings were placed, and (4) a wooden structure (*bohío,* or thatched hut) that covered the hole.

The pits were dug into the ground, which is composed of layers of clay and silt in a horizontal tabular arrangement, sometimes cutting through deposits from older burials already covered by sediments. The pits are rectangular, with straight walls and rounded corners. About halfway up, each pit wall has a step, which served both to prevent the collapse of the wall and to support the edge of the wooden framework that covered the burial. The depth of the pits average between 4 and 4.8 m below the surface. T7, at 5.3 m, is the deepest.

A battery of posts reinforce the lower half of the pits, preventing the walls from collapsing and supporting the wooden framework that covered the space in which the burial was placed. The existence of both the posts and wooden framework indicates that this was originally an empty space or chamber. Over time, these open tombs were filled by the seasonal flooding of the river and the rise and fall of the water table, eroding the pit walls. The human bones were found articulated in strict anatomical connection, which indicates that the sediments covered the bodies prior to their decomposition.

The posts left two types of evidence: the postholes that had been excavated into the ground and the fillings that are the result of the decomposition, in situ, of the posts (Supplemental Figure 5). These typically appear along the perimeter of the bottom of a pit. The holes are circular or slightly oval in shape and have a flat bottom and vertical or slightly sloping walls. The average diameter at the crown is between 24 and 26 cm.

The posts are not the only construction elements that were found deeper in the pit. This was covered with a wooden structure or framework that also served as a support for the offerings. The structure rested on the intermediate staggering of the long walls of the pit and on the tops of the battery of posts. Only charcoal fragments of the wooden framework in T2 were preserved. In the others, the framework is indicated by slopes of the groups of ceramic artifacts that were placed on them (Figure 2). These slopes are the products of the collapse of these frames. This is further evidence that beneath the wooden frameworks was an empty chamber, partially filled with sediment, at the time of their collapse. The pits and their contents were protected from the elements by *bohíos*, the floor plans of which are indicated by the postholes found on the interface corresponding to the floor of occupation when the tombs were built.

On the collapsed framework that covered the mortuary chambers, dense blocks of sediments were found with offerings on top. These sediments are very voluminous and homogeneous, which seems to indicate that they were formed from massive depositional episodes that occurred several times before the final infilling of the tomb. Taking the physiographic environment of the cemetery into account, it is most probable that they were the product of the seasonal flooding of the Río Grande (Hervás Herrera 2018).

In conclusion, we can say that what we discovered here are large, complex, and valuable structures, the type of tombs in which an important person is expected to be buried. Furthermore, the study of the structures and stratigraphic relations allows us to affirm that no person entered the mortuary chamber once it was closed.

Circumstances of Deaths and the Mortuary Treatment of the Corpses

In order to gather other complementary indicators of ritual deaths and to characterize practices around the deaths and at the time of burials, we analyzed (1) the frequency of sex and age, (2) the presence of lethal items, (3) iconography,

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Figure 2. View of the collapsed wooden lid of the mortuary chamber of tomb T7 and the ceramic offering placed on it. (Color online)

(4) osteotaphonomy, and (5) marks on human bones.

Sex and Age Frequency Analysis

We sought to identify patterns of sex and/or age among lower-status individuals, assumed to be sacrificed companions and/or prisoners. To do this, we first analyzed the human remains following the methods described in this section and then calculated the frequency of adult males and females and infants.

We only estimated sex in adult individuals, using the morphology of the coxal bone. When that bone was not recovered, we attempted to make an identification based on the skull and the mandible (chin and gonion), areas of high sexual dimorphism. In the cases when neither a coxal bone nor the skull were recovered, the sex of the individual was estimated by correlation equations calculated from metric variables of the postcranial skeleton, following Ríos Frutos (2005).

To estimate age, we used the state of tooth eruption (El-Nofely and Iscan 1989; Gaither 2004; Moorrees et al. 1963a, 1963b; Ubelaker 1978, 1984) and tooth development (mineralization status of crowns and roots; Boccone et al. 2010; Lewis 2007) to help identify younger individuals. In the few cases in which the teeth were not recovered, we used the length of the diaphysis (Boccone et al. 2010; Cardoso et al. 2014; López-Costas et al. 2012; Maresh 1970; Rissech et al. 2008). We identified adolescent individuals, defined here as from 15 years old until complete bone development, based on the state of epiphyseal unions (Brothwell 1981). We also referred to the ossification of the postcranial skeleton, following Brothwell (1981), Buikstra and Ubelaker (1994), Mays (2002), and Ubelaker (1984). In adult individuals, we used a

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variety of methods based on recovered bone pieces, including identifying changes in the pubic symphysis (Brooks and Suchey 1990), changes in the auricular surface of the ilium (Lovejoy et al. 1985, reviewing Buckberry and Chamberlain 2002), changes in the sternal extremity of the fourth rib (Iscan and Loth 1989), the closing of the cranial sutures (Masset 1982), and dental wear in molars (Brothwell 1989) and non-molar dental pieces (Bouville et al. 1983). In some cases, we had to estimate age relying only on dental wear due to the scarcity of bone pieces or their poor state of preservation.

Results indicate that in all tombs except T2, burials included adults and subadults as well as multiple age ranges (Supplemental Figure 6). In T2, all the individuals are adult males. In all other tombs, both males and females were buried. The data therefore do not show a clear pattern regarding the selection of a particular sex or age.

Poisonous Substances Analysis

In this analysis, we attempted to identify substances that could potentially be used as poisons in antiquity. Four fish specimens belonging to the family Tetraodontidae[3] were found in two tombs: one on the head of the highest-status individual in T7 and three inside a puffer fish–shaped pot found in T2.

Most of fish of the family Tetraodontidae contain tetrodotoxin, which varies in amount depending on species, anatomical distribution, regions, and diets (Núñez-Vázquez et al. 2012). Puffer fish poisoning, in severe cases, may lead to unconsciousness, respiratory paralysis, convulsions, and death (Noguchi and Ebesu 2001). The lethal dose is 0.5–2.0 mg (Yasumoto and Yotsu-Yamshita 1996).

The bones in T7 belong to a specimen of *Sphoeroides annulatus* (350–800 g). Those found inside the pot in T2 were from two fish belonging to the species *Guentheridia formosa* (300–500 g and 600–1000 g) and from one fish of the species *Sphoeroides annulatus* (300–700 g). The analyzed sample contained bones from all parts of these animals except the caudal skeleton: head bones (9.52%), splacnocranium (34.52%), axial skeleton (27.32%), skull (21.4%), and appendicular skeleton bones (7.14%).

The disarticulation of the puffer fish bones inside the T2 pot indicates that they were cooked. Also, given that most of the skeleton of each fish is present, it must have been put into the pot whole. Considering the context of a multiple burial featuring simultaneous deaths and the absence of traces of food offerings in other burials, we argue that these fish could have been used for their toxin in sacrificial acts.

The context of the puffer fish in T7 is different. The *Sphoeroides annulatus* bones found on the head of the main individual were still articulated, indicating that the fish was raw when placed there. Here it was used symbolically, communicating or explaining the manner in which the person on whom it was placed was killed.

Iconographic Analysis

Within the iconographic corpus of El Caño, we have identified five pieces whose images and context suggest that they could be related to human sacrifice. Only the images themselves enable us to approach the empirical or conceptual realities that inspired the creators, given the absence of written texts or oral traditions. As a first approach, we carried out a detailed study of the primary or natural thematic content. A good amount of information about the context in which the pieces were used allowed us to propose an interpretation of their secondary or conventional thematic content. For this we applied the iconographic principle of interaction; that is, the normal existence of an effective and functional relationship between the places and the contents and themes considered appropriate for them. Consequently, if the thematic content of a piece has several possible readings, we believe the most likely is the one appropriate to the mortuary context in which it was found, and about which the artist could have been inspired—when representing that scene or image—by having witnessed ceremonies or the re-creation of myths. A comparison with other iconographies in which similar themes are documented was also useful in the iconographic interpretation.

Two of the pieces analyzed were part of the mortuary ensembles of the main individuals in tombs T4 and T6. The first (Figure 3) is a pendant of cast copper that represents a ritually

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Figure 3. Iconography referring to violence: a representation of self-sacrifice (7.7 × 6.3 × 3.6 cm). Figure scanned by Vicky Karas, Museum Conservation Institute, Smithsonian Institution. (Color online)

dressed human figure who has ripped off one eye and seems to be ripping off the other. In light of what has been said above, we interpret this act as a sacrificial self-mutilation of an eye, of which there are multiple examples prehispanic iconography (Guinea Bueno 2018a:102–104, 2018b). The piece from tomb T6 (Figure 4) represents a human figure with an infant in his arms and a monkey perched on his shoulders that is grabbing his head. The figure was carved on the tooth of a sperm whale to which gold caps were added. We could simply interpret this as a familiar scene, but we don't know of any representation of this character in the iconography of the Conte style, which makes that interpretation very unlikely. On the other hand, the attitude of the adult and the way the infant is carried suggest, rather, an offering or presentation for sacrifice of the infant, a theme that is very present in the iconography of prehispanic America

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Figure 4. Iconography referring to violence: a representation of a human offering (8.4 × 3.6 × 3.3 cm). Figure scanned by Vicky Karas, Museum Conservation Institute, Smithsonian Institution. (Color online)

(Guinea Bueno 2018a:101–102, 2018b). In addition, the reconstruction of the funerary ritual of El Caño indicates that such sacrifices could have taken place during its celebration (Mayo, Mayo, and Guinea 2021), so we propose that the figure represents the sacrificial offering of an infant.

The other three pieces are carved in stone and were found in the ceremonial area of the necropolis. One is a low relief on a basaltic column showing a beheaded male who is wearing a breastplate and is tied to a monolith (Figure 5). Although at first it may appear that the column has been vandalized, and therefore the head is missing, the finish of its top shows that this is not the case.[4] We believe that the piece in question never had a head, and that it represents a decapitated man. The man's breastplate marks him as high status. Another of the pieces, sculpted in the upper part of one basaltic column, shows a feline with one of its claws on the arm of a naked human lying motionless on the ground (Figure 6). There are multiple possible interpretations of this piece, but considering the context, it is possible that the carving represents a scene of human sacrifice in which the feline is a metaphor for the sacrificer or a shamanic transfiguration. The last piece is a rounded block of stone with a line of heads sculpted in low relief along the entire perimeter of its longest side. If we relate the image to that of the decapitated person referred to earlier, and the presence of severed heads in the tombs of El Caño, we can infer that it refers to human sacrifices by decapitation.

Osteotaphonomic Analysis

We observed that bones and parts of bodies are systematically preserved in some tombs but not in others. In this section, we intend to explain this differential preservation and whether it is due to a natural taphonomic process or to cultural behavior.

As a first task in the research process, we registered bones of each individual and analyzed the frequency with which types of bones were present. The results indicated that femurs and skulls, including jaws and teeth (denser and harder bones), were always present in tombs T1 and T2. When these bones did not appear in our samples from those tombs, they either were not excavated (as is the case of individual I7 in the upper platform of tomb T2) or were cut by the construction of another tomb (I1 and I8 in tomb T1). The circumstances of the T4 and T7 tombs are very different. The two reference bones are not always present in the individuals buried there (Supplemental Figure 7), and in all observed cases where femurs are missing, all the bones of the leg and head are also missing. In the case of the T4 tomb, one individual has no femur, one has no head, one head has no body, and one individual was buried with a head that had been previously cut off—we know this because the body was buried in the prone position with its head facing up. In the

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Figure 5. Iconography referring to violence: a sculpture representing a high-status decapitated male (96 × 25 cm). Figure scanned by Vicky Karas, Museum Conservation Institute, Smithsonian Institution.

case of the T4 tomb, one individual has no femur, one has no head, one head has no body, and one individual was buried with a head that had been previously cut off; we know this because the body was buried in the prone position with its head facing up.

The case of the T7 tomb is much clearer. In this tomb, 41 articulated human remains were found, but only 28 of them included the bones of the head, 15 lack the right femur, and 16 lack the left femur. Because these robust bones and teeth do appear in tombs T1 and T2, why are they not present in tombs T4 and T7? We believe it is not possible that their absence is the product of natural taphonomic processes because, as we have noted, in the two neighboring tombs, both were always present, and the environmental context was the same. Nor is it possible that the missing bones were later removed in ancestor worship rituals, or for any other purpose after the burial and closing of the burial chamber. The bones appeared in strict anatomical connection, indicating that the bodies had not decomposed before the burial and that they decomposed in sealed spaces, as we have observed after analyzing the structural remains of the tombs and the stratigraphic relations of all the contents of the pits. In our opinion, the reason for the missing bones is cultural, and is due to the fact that incomplete bodies and body parts were buried in both tombs, in addition to complete bodies.

Given the need to approximate the number of individuals per tomb for our research and the difficulty in doing so, we decided to calculate the minimum and maximum number of individuals in order to establish a range. The skulls gave us the minimum number. The maximum came from the total number of articulated human bones. Taking this into account, 31 or 32 individuals were buried in T4, and between 28 and 41 were buried in T7 (Mayo Torné and Herrerín 2018).

Analysis of Trauma

We looked for signs of trauma that would indicate the cause of death and the mortuary treatment that these people received. All articulated

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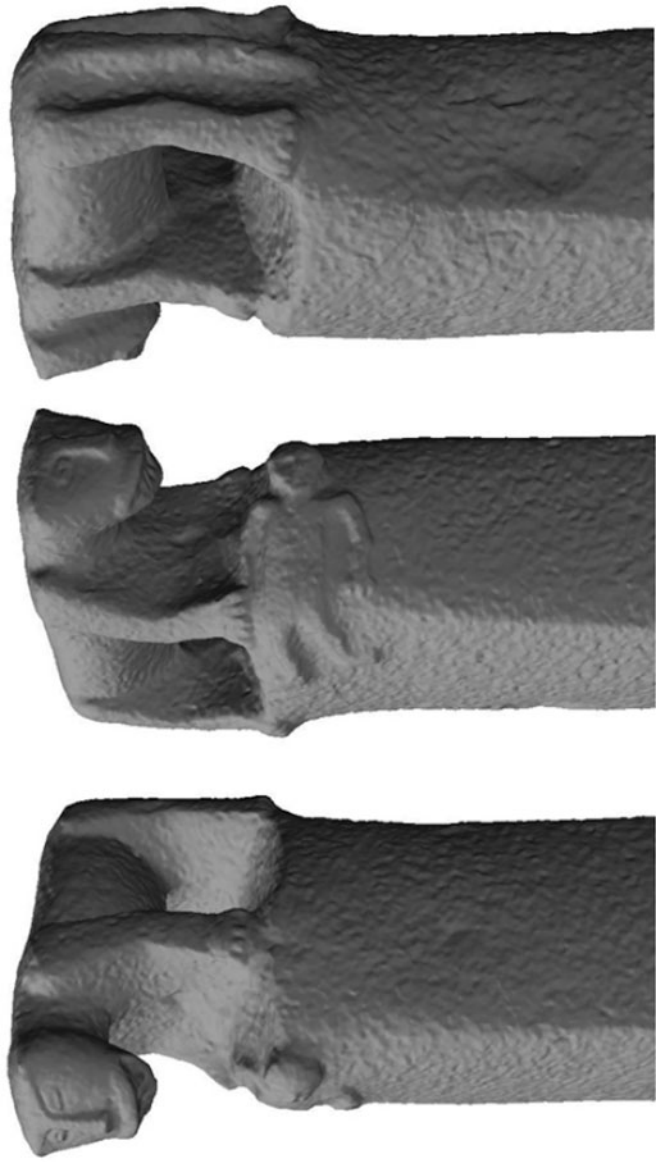

Figure 6. Iconography referring to violence: a feline attacking a human (unknown dimensions). Figure scanned by Vicky Karas, Museum Conservation Institute, Smithsonian Institution.

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Table 2. List of Individuals with Missing Head Bones and/or Femurs.

	T4		T7	
	Ind. Code	Total	Ind. Code	Total
Individuals without head	I23 (♂)	1	I14(SA), I15(♂), I27(SA), I36(♂), I25(♂), I28 (♀)	6
Skull and cervical vertebrae	I9 (♂)	1	I10(♂), I19(SA), I38(♂)	3
Individuals without one or both legs	I22(SA)	1	I2(♀), I11(♂), I16(♂), I37(♂), I40(♂), I42(♂)	6
Individuals without a head and a leg		0	I33(♀), I44(♂)	2
Arm		0	I20(♂)	1
Leg		0	I13(♀)	1
Spinal column		0	I45(SA), I46(SA), I47(SA)	3
Beheaded body	I1(♂)	1		0
Total		4		22

Note: SA = subadult.

human bones were analyzed using a Zeuss Stemi 2000C stereomicroscope and an Axiocam ERc 5s camera and front-flush light. Six parameters were observed: (1) type of mark, (2) timing, (3) bone element, (4) part of the bone, (5) sex, (6) age, and (7) status of individuals. Information about the marks was cross-checked with the data from the first analysis (absence or presence of bones) in order to find possible relationships.

In T4, there was a decapitated individual (I1) and a headless individual (I23). Two skulls with jaws and teeth that are articulated with some cervical vertebrae—the head we call I9 and the head associated with the body of I1—were also found (Table 2). The marks (Table 3) are nevertheless not related to these decapitations but to other actions:

(a) Multiple chop marks and simple cuts in the diaphysis of left-side limbs. Chops and cuts appear only on limbs on the left side of bodies. These are the product of repeated blows at the same point. The blows could have been made to cut the limbs, given the fact that three individuals have left-side limbs cut in half (I28, I29, and I30; Supplemental Figure 8).
(b) Parallel cut marks. Such marks next to the condyle in the humerus have been left by cuts that stripped off the muscle *biceps brachii*. Parallel marks on the skull were left by scalping.

In both cases, marks are parallel and linear, which means that the individuals did not resist. Therefore, these are perimortem marks made soon after death . We have not been able to discover whether beheadings occurred before or after death. What we do know is that some decapitated individuals were high status (I1 and I9), and one of them was the highest-ranking individual in the tomb (I1).

In T7, articulated human remains were classified into three groups (Table 2): (1) individuals without skulls and skulls that included jaws articulated to cervical vertebrae, (2) individuals without femurs and human remains that are legs, and finally, (3) individuals without skull and femurs. We also found an articulated arm, a forearm, and three vertebral columns.

Marks were classified into five groups: (1) skull cuts; (2) femur cuts in the neck of the bone, under the trochanter, and near the condyle; (3) chops and cuts in the diaphysis of the left arm and leg bones; (4) chops in the skull; (5) chops and cuts in the metatarsus bones; and (6) cuts in the hips, vertebrae, and the calcaneus (Table 3). None of these is related to dismemberment because all appear in corpses that have not been fragmented. Other possible actions that explain the existence of these marks are:

(a) Cuts in femurs. These marks were identified in various parts of this bone and were made during the removal of the different muscles. The cuts in the neck of the bone were left during the cutting of the sartorius, iliopsoas, and rectus femoris muscles (Supplemental Figure 9). Cuts under the trochanters (Figure 7) resulted from cutting the gluteus maximus. Cuts near the condyles resulted from cutting the hamstring muscles (Supplemental Figure 10).

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Table 3. Type of Marks and Location.

		Chops								Cuts											Group of cuts			Puncture	
	Sex/age	Left femur Diaphysis	Right femur Diaphysis	Left tibia Diaphysis	Right tibia Diaphysis	Left hummer Diaphysis	Hip	Skull	Metatarsus	Left ulna Diaphysis	Left hummer Diaphysis	Left femur Neck	Left femur Diaphysis	Right femur Neck	Right femur Diaphysis	Skull	Metatarsus	Hip	Calcaneus	Vertebra	Skull	Left hummer Neck	Left femur Trochanter	Condyle left femur	Skull	Hip
T4																										
I1	M						2																			
I3	IND					6																				
I4	SA									1																
I7	M										1											1				
I13	IND			3																						
I14	M	4																								
I21	M																				1					
I28	M							3																		
I29	M	2																								
T7																										
I26	SA													3												
I24	SA											2	5				4									
I28	F						1					2			4											
I9	SA															5										
I19	SA															1										
I31	M																2									
I6	F					1			1																	
I30	M																			1						
I7	M							2																		
I22	SA	2						1													1					
I14	SA	3																								
I3	SA																				1					
I35	SA							4															1			
I21	SA																							1	1	
I15	M						2																			1
I29	M												2						2							

Note: M = adult male, F = adult female, IND = adult of undetermined sex, SA = subadult.

Figure 7. Cuts in the trochanter of the left femur. Individual I25 in T7. (Color online)

(b) Cuts in skulls. These are long and thin and occupy large areas of the skull. They were made during the process of scalping (Supplemental Figure 11).
(c) Cuts in joints. We refer here to marks on bones at the joints. A cut in a vertebra related to cutting the muscle *latissimus dorsi* was observed (Supplemental Figure 12), as well as a cut in a calcaneus related to cutting the Achilles tendon (Supplemental Figure 13).
(d) Chops in skulls. Only one individual displays a group of three chops in his head. Signs of healing indicate that he received the blows a few days before his death. This is the only perimortem mark clearly made before death among all those found.
(e) Chops and cuts in the diaphysis of bones. Unlike what we saw in the T4 tomb, in T7 we did not find individuals who lack a half limb. For this reason, we think that the chops and cuts observed here were probably made to skin or to strip away muscles.

Despite the ubiquity of the marks on the human remains, none of them has a direct bearing on the deaths of individuals. Their proximity when they appear in a group (which occurs in most of the cases) and the fact that they are usually arranged in parallel, next to each other, indicate that all—with the exception of the marks on the skull of individual I7 in tomb T7—are the product of practices carried out after the death of the individuals. All were found on articulated human bones, which is why we know that the marks were made before the decomposition of the bodies. The investigation has allowed us to observe that males and females, adults and sub adults, and individuals of different statuses, including those with high status, exhibit marks on some of their bones.

Why did people treat the bodies the way they did? And what did they do with the flesh, skin, heads, and body parts? There are two practices that could produce marks similar to these: ancestor worship and the ritual consumption of the sacrificed victim. The first is a widespread practice. The goal is to ensure the well-being of the ancestors in their new existence and their willingness to help the living, and to secure the continuity of lineage. In addition to bones being offered in worship, it is normal for them to be cut and even for some of them to be removed. There are some signs of this practice in the isthmus. According to Cooke (2001), the extraction of teeth and the cuts in jaws that were found in accessible spaces highlight the veneration of ancestors in Cerro Juan Díaz. This practice is roughly contemporaneous to the occupation of El Caño, but we believe that the marks analyzed here are not the product of this type of practice for two reasons: (1) all of the marks were found on articulated bones in strict anatomical connection, indicating that the corpses had muscles and were covered with soil before the time of decomposition. Unearthing the bones while keeping them articulated, once the land that covered them dried up, would have had to be done with archaeological precision (rehydrating the earth to soften it and excavating the bones with fine tools)—something that is beyond improbable; and (2) the wooden lids of the burial chambers were not disturbed, which means no one entered them once they were closed after the burial. The detailed knowledge of the stratigraphic context of these bones allows us to ensure with certainty that all practices described previously were done at some point after the

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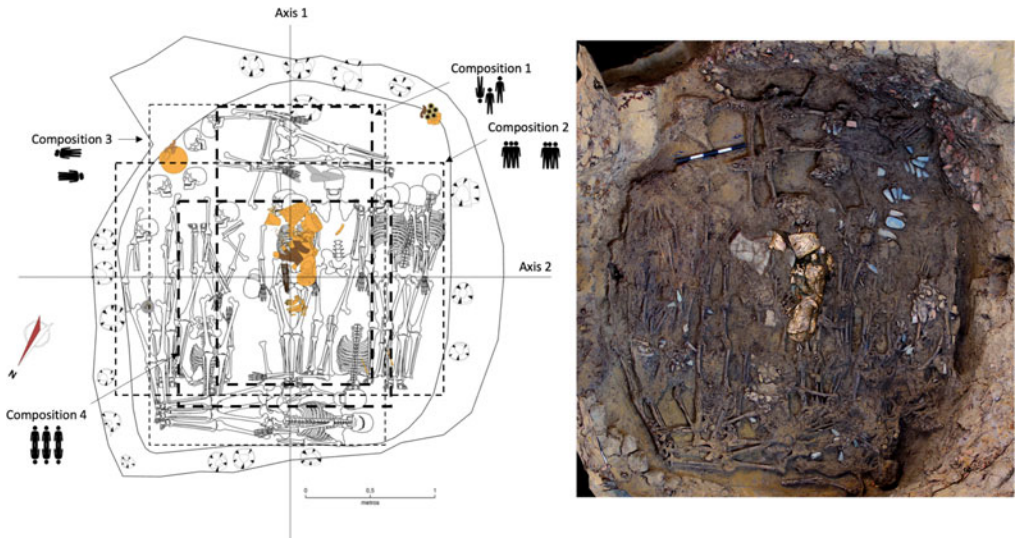

Figure 8. Symmetries in T2. (Color online)

deaths and before the decomposition of the bodies. The dismemberments, for the same reasons, were made before the decomposition, although we don't know whether they occurred before or after the deaths of the individuals. Because some of these actions were aimed at extracting the fleshier parts of the bodies (thighs and buttocks), we believe that consumption could be at least one of the possible practices behind the cuts and chop marks.

Religious and Symbolic Meaning of the Burials

To complete the study, we examined how the bodies and body parts were placed in tombs in order to identify the symbolism expressed in the interments. We then examined the relationship between body compositions, violence, and status.

Results show that some burials are perfect symmetrical compositions (T1 and T2 tombs), whereas T7 only contains some symmetries, and T4 has none. Symmetries are of two types: central (side by side, with the head of one individual near the feet of another) and specular (side by side, with the heads lined up at one end and the feet at the other). T1 has two groups of bodies, each with its own composition. The first group contains the two high-status individuals placed in central symmetry. The second group contains the remaining individuals, placed in specular symmetry. T2 has three groups of bodies placed on different platforms. Groups placed on the highest platforms seem to be part of the same burial because the resulting composition is one of specular symmetry. Bodies at the lower level (the interment that contains the highest-status individual) represent four symmetrical compositions—two in specular symmetry and two in central symmetry (Figure 8). The main individual serves as the axis of symmetry of all but one of the compositions.

T7 contains only two compositions. To create them, four—or maybe six—bodies were used. The first composition consists of two individuals of status 1 in specular symmetry. The second consists of four half bodies of either two or four individuals. This is an extremely uncommon burial for the study of which the bioanthropological analysis was fundamental (Supplemental Figure 14).

Although they might appear to be part of the same individual, I28 and I40 were registered separately in the field because the spine of I40 had a twist that prevented it from linking to the hip of I28. As it turned out, the bioanthropological parameters of each are very different. The

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dimorphic zones of I40—including the mastoid, inion, and glabella—are masculine, and the epicondyle width of the right humerus has a male discriminant (Ríos 2005). In contrast, I28 has very feminine characteristics. The pelvis was not preserved, but all the variables consulted—dimensions of femurs, tibias, patellas, calcaneus, and metatarsals—are consistent with those of an indeterminate or female (but not male) individual. It should be noted that the parameters of the lower extremities are not as conclusive in the rest of theindividuals as they are in this particular case. The estimated ages of the two individuals also differ. I40 was between 25 and 35 years old, whereas I28 was between 35 and 45 years old. Our interpretation of this burial is that they are two individuals, a male and a female, who were dismembered and then buried together in apparently articulated fashion. It may be a coincidence, but we believe this corresponds to a ritual performance because we found a similar situation of two individuals (I2 and I25) who were placed in parallel, to the north of individuals I28 and I40, making up a central symmetry—which, as we have seen, is a typical burial composition at this site.

Despite having an apparently perfect anatomical connection, I2 and I25 were registered in our fieldwork as different individuals because they have very different bioanthropometric values. I2 shows clearly feminine values in the morphology of the skull and the humerus (Ríos, 2005). In contrast, all the recovered bones of I25 are very robust. The femur, for example, has a large, very robust rough line, and the pelvis has a masculine sciatic notch. With respect to their ages, both are between 35 and 45 years old.

The location of each individual was carefully planned in all cases. In tombs T1 and T2, the compositions are strictly symmetrical and hierarchical. The main occupant, placed in the center of the group, seems to represent the backbone of society, the articulating entity, the person who guaranteed balance and social order. Furthermore, the practice of sacrificing retainers and/or companions, and the hierarchy of compositions, imply a belief in an existence beyond death and the importance of social rank in the afterlife. Ultimately, for the main individuals and their companions in these two tombs, the future is presented as a continuity of the world in which they once lived.

In tombs T4 and T7, this burial scheme has broken down. Although the high-status individuals were, in some cases, buried at the center of the compositions, and symmetrical constructions have been observed, these are now confined to a few specific cases. Most of the bodies of the main individual's companions were placed in a clear and intentional asymmetry. Why are the bodies placed so differently in these tombs? At this point in the investigation, we reviewed other differences between the burials. The most notable ones are the treatment given to the bodies of low-status individuals and the presence of signs of violence in high-status ones.

This observation leads us to think that a relationship could exist between violence, status, and symbolism. We propose that the manner in which the main occupants died determined the mortuary treatments that they and their companions received and the manner in which their bodies were arranged. Their deaths were valued and had a different meaning according to how death happened, and this circumstance is something that those who prepared the burials wanted to highlight. Under what circumstances did high-status individuals die? High-status individuals buried in tombs T1 and T2 do not show signs of violence, so we assume they died a nonviolent death. In contrast, high-status individuals in the T4 and T7 tombs show numerous signs of perimortem violence resulting from actions that could have proven lethal if they indeed occurred before death. The main individual in T7, on whose head a puffer fish was placed, could have been poisoned, and the high-status companion was beaten on the head as many as three times before dying. In T4, the main individual was decapitated before or after death. Only the head of his high-status companion was buried, which indicates he was also decapitated before or after death. In both cases, the principals could have died violently in ritual or non-ritual circumstances, and then been buried as their status merited, surrounded by riches and companions, ready to embark on their final journey to the afterlife. An existence beyond death appears to be uncertain, or in any case was very different

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from the future reserved for the principals of the other two tombs.

Those who survived also had a different life ahead of them. The necropolis of El Caño was abandoned around AD 1000. We have no evidence of similar ceremonies after this date, either here or in the other known necropolis, Sitio Conte. This seems to indicate human sacrifices at the funerals of high-status people ceased to be practiced thereafter.

Final Words

Different lines of research complement each other to offer an account of circumstances that prevailed during the funerary rituals of El Caño. This approach to the study of the particular burials of this site also allowed us to test our initial impressions and highlights the importance of approaching human sacrifice from multiple angles, cross-checking iconographical, archaeological, and osteological information and examining carefully the distribution of data in contexts.

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Data Availability Statement. Article data can be obtained by contacting the author, Julia Mayo, at juliamayo@fundacionelcano.org, and/or accessing the El Caño Archaeological Project data repository at the following link: www.odafec.org/nata.

Supplemental Material. For supplementary material accompanying this article, visit https://doi.org/10.1017/laq.2019.99.

Supplemental Figure 1. Map of El Caño.

Supplemental Figure 2. Map of Area 1 and the multiple simultaneous burials.

Supplemental Figure 3. Burial of individual I1 in tomb T1. This individual's bones were found in a very poor state of preservation, but the mortuary ensemble was intact. Two pectorals can be seen at chest height, a belt at waist height, and shin guards on the legs below the knees.

Supplemental Figure 4. Histogram of the quantity and variety of common artifacts and high-status symbols associated with individuals.

Supplemental Figure 5. Postholes excavated at the bottom of the grave of tomb T7.

Supplemental Figure 6. Histogram of age and sex. In tomb T7 articulated human remains (fragments of bodies) were counted.

Supplemental Figure 7. Histogram of bones present in tombs T1, T2, T4, and T7.

Supplemental Figure 8. Multiple butchery marks in the left humerus of individual I14 in T4.

Supplemental Figure 9. Cuts in the neck of the right femur of individual I26 in T7.

Supplemental Figure 10. Cuts in the condyle of the left femur of individual I21 in T7.

Supplemental Figure 11. Multiple cuts in skull of individual I21 in T4.

Supplemental Figure 12. Cuts in a vertebra of individual I30 in T7.

Supplemental Figure 13. Cuts in calcaneus of individual I29 in T7.

Supplemental Figure 14. Symmetries in T7.

Notes

1. By "sacrifice" we mean "any killing of an individual for ritual/symbolic reasons" (Eeckhout and Owens 2008:375).

2. The Proyecto Arqueológico El Caño has an online repository where additional information, including research materials, can be obtained: http://oda-fec.org/nata.

3. Bones were identified by Máximo Jiménez of the Smithsonian Tropical Research Institute.

4. The sculptures of El Caño bear marks in different parts of their surfaces. Also, in some cases, the lack of limbs and heads was a product of intentional blows. All these marks are very characteristic. They have a rough surface and an edge. In the case of this sculpture, the upper edges and the entire surface where the head should be were worn or polished. The sculpture does bears a stroke mark with the typical characteristics of the marks of the sculptural ensemble of El Caño, next to the right arm.

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