

Research article

Published
2025-10-24

Cite as
Felicia J Fricke and Jason E
Laffoon (2025) *Osteological
and isotopic analysis of skeletal
remains at Fort Amsterdam, St.
Eustatius, Dutch Caribbean*,
Peer Community Journal,
5: e117.

Correspondence
fejr@hum.ku.dk

Peer-review
Peer reviewed and
recommended by
PCI Archaeology,
[https://doi.org/10.24072/pci.
archaeo.100607](https://doi.org/10.24072/pci.archaeo.100607)



This article is licensed
under the Creative Commons
Attribution 4.0 License.

Osteological and isotopic analysis of skeletal remains at Fort Amsterdam, St. Eustatius, Dutch Caribbean

Felicia J Fricke¹ and Jason E Laffoon²

Volume 5 (2025), article e117

<https://doi.org/10.24072/pcjournal.643>

Abstract

This study presents the results of osteoarchaeological and isotopic analyses conducted on human skeletal remains from the site of Fort Amsterdam, an eighteenth century depot that held enslaved captives on the Dutch Caribbean island of St. Eustatius. Owing to coastal erosion, human burials are frequently exposed, and partial burials have therefore been recovered in the context of rescue excavations over several years by archaeologists from two institutions. Archival evidence indicates that this burial ground was used by the African and Afro-Caribbean population of St. Eustatius, but is unclear about whether its use was restricted to the captives at Fort Amsterdam or whether it also served the wider population of the island. We applied osteological analysis to construct biological profiles for these individuals (n=22) including information about sex, age, and palaeopathology. We also conducted multiple isotope (strontium, oxygen, carbon) analysis on a subset of the individuals (n=6) to determine if they were locally born or first generation forced migrants, assess their childhood diets, and investigate their natal origins. Despite preservation challenges, the osteological analysis showed that this population consisted of 4 non-adults (3 infants and 1 adolescent), 16 adults (including 3 females and 1 male), and 2 unidentifiable individuals. Observed pathologies included dental pathologies and occupational markers. These findings, while limited, provide information about the life experiences of the buried population. Meanwhile, the isotopic analysis indicated that three adult female individuals were born in Africa, while the adult male individual and two of the infants were Creole. Therefore, the burial ground was probably used by both the captives at the depot and by the wider African and Afro-Caribbean population of the island. We show that even complex collections of partial remains are extremely important archives of information about the lives of past peoples for whom historical evidence is often sparse. N.B. A plain language summary is available at the end of the article.

¹Saxo Institute, University of Copenhagen, Copenhagen, Denmark, ² Faculty of Archaeology, Leiden University, Leiden, Netherlands



Introduction

Bioarchaeological research has a great deal of value for our understanding of the lives of enslaved people during the colonial period. This study from the Dutch Caribbean island of St. Eustatius (Statia) exemplifies the ad hoc, challenging nature of such research in the insular Caribbean, but as in similar studies it also demonstrates that information can be gleaned even from partial remains, like those curated in heritage institutions across the region (see for example Fricke et al. 2019; Laffoon et al. 2018). However, its publication and dissemination have faced several setbacks since the paper was first written in 2019. This article is therefore aimed at disseminating the results of the research, not only to the archaeological community, but also to the descendant community in St. Eustatius, to whom this information belongs. We give a description of the archaeological context and methods of analysis, before moving on to the research results and conclusions. We also include (following the recommendation of Seferidou et al. 2026 in the edited volume *Ethics in Caribbean Archaeology*) a summary of the avenues of community outreach and engagement followed during the research. We hope that such information will soon become common in bioarchaeological publications, as a way to understand their social context and to hold academics to account for their engagement efforts. The landscape of archaeology and cultural heritage management in St. Eustatius has changed significantly since these analyses were conducted, and we hope that the current encouraging trends in Caribbean archaeological ethics will continue into the future (Haviser et al. 2022; Statia Government 2022; kok 2022; Seferidou et al. 2026).

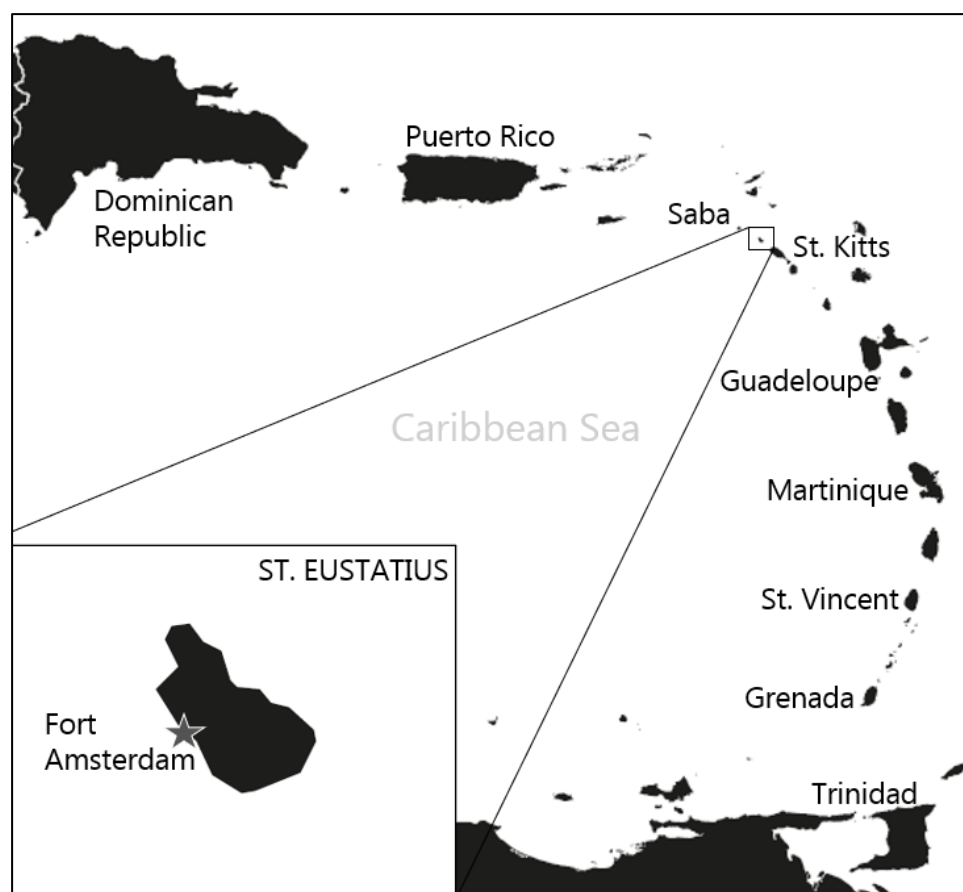


Figure 1 - Map of the Caribbean showing the location of St. Eustatius (map by Pepijn van der Linden & Felicia Fricke).

St. Eustatius is a small island of 21km² in the eastern Caribbean (see Figure 1) (Haviser 2001). In the mid to late eighteenth century, it was a thriving free trade centre under the control of the Dutch West India Company (WIC) (Emmer 2006; Karklins & Barka 1989). Possessing a flat agricultural plain between two areas of volcanic hills, as well as a sheltered bay on the Caribbean side, St. Eustatius became an attractive prospect for European merchants, who could take advantage of its location between islands colonised by the British, French, and Swedish (Oostindie 2015). In the countryside, sugar plantations not only produced their own cane, but also processed cane from the surrounding islands (Cook 2015). The island's strategic importance made it a prime target for attack in times of inter-imperial war, and it changed hands between European powers twenty-two times in the years from 1629 to 1816 (Haviser 2001; Karklins & Barka 1989). Thereafter, it remained Dutch, although its multinational populace ensured that its most commonly spoken language came to be English. After World War II, St. Eustatius, along with the other five Dutch islands, became part of an overseas protectorate of the Netherlands called the Netherlands Antilles. In 2010, a referendum on the future of the Netherlands Antilles resulted in St. Eustatius becoming a public body of the Netherlands, strengthening colonial oversight and placing the island at a disadvantage compared to Dutch municipalities in Europe (Oostindie 2013). Today, it has a population of around 3,000 people and is a comparatively quiet island that has not experienced a tourism boom.

During its economic peak, St. Eustatius' geographic location made it an ideal transshipment point for West African captives soon to be enslaved on Caribbean plantations. Indeed, the ship on which the famous abolitionist and former enslaved man, Olaudah Equiano, was a sailor stopped there to collect "a live cargo, as we call a cargo of slaves" during the mid eighteenth century (Equiano 1999). These captives were held at Fort Amsterdam, which had been constructed as a battery in the late seventeenth century. Intended to protect Oranje Bay with cannon fire, it fell out of use during occupations of the island by the French and English. When the Dutch returned to St. Eustatius in the 1720s, they repurposed the battery as a depot. At two storeys high and only 16.4 by 6.4 metres square, the building held 450 people at a time (Morsink 2012). In 1780, erosion caused the southern wall of the building to fall into the sea, but by this time the slave trade had abandoned St. Eustatius as an important nodal point and the depot was no longer in use (Hartog 1997; Morsink 2012). A map dating to 1781 (see Figure 2) shows the depot and, beside it, an enclosed area probably representing the adjacent burial ground (Morsink 2012). It also shows that the burial ground was located in close proximity to the town of Oranjestad and to enslaved villages on the Godet and DeGraaff estates. People living on the plantations or in the town could thus have used the Fort Amsterdam site as a location for burying and remembering their dead.

Additionally, we know from historical evidence that the burial ground at Fort Amsterdam was in use from at least the 1730s onwards. A document dating to 1738 mentions a burial ground, located close to some manchineel trees and the Godet property, which served the African and Afro-Caribbean population of the island (Knappert 1932). The Fort Amsterdam burial ground does indeed have manchineel trees (see Figure 3) and is on the border of the Godet property. However, the 1738 document does not specify whether the people buried there were captives being held at the depot, or whether they also came from some of the surrounding plantations, or from the town, where they might have variously been enslaved sailors, domestic servants, sex workers, or specialist craftspeople. If they were being held at the depot, they may have died soon after their ship arrived at St. Eustatius – these ships were notoriously disease-ridden, and captives were immunocompromised through physical and psychological stress (Kelley & Angel 1987; Lamur 1991; Madrigal 2006). If so, the people buried at Fort Amsterdam would represent victims of the transatlantic slave trade who did not live long enough to be sold in the Caribbean. The question of who used this burial ground is central to this osteological and isotopic investigation.



Figure 2 – Close-up of 1781 map of St. Eustatius by P. F. Martin showing Fort Amsterdam. In the red circles can be seen two nearby enslaved villages (solid lines) and the burial ground (dashed line) (map available from the Dutch Caribbean Biodiversity Database, <https://www.dcbd.nl/resource/3398>).



Figure 3 – The burial ground at Fort Amsterdam in 2016, showing the site overgrown with trees, including manchineel trees. The ruins of the fort can also be seen collapsing onto the beach (photo by Felicia J. Fricke).

This article therefore describes the analysis of human remains uncovered at the Fort Amsterdam burial ground site in rescue excavations by the St. Eustatius Center for Archaeological Research (SECAR) and Texas State University, which took place between 2012 and 2018. It is one of a growing number of studies that investigate the lives and life experiences of enslaved people in the insular Caribbean. Indeed, human remains are one of the most important resources we have to study the lives of enslaved people, who often did not leave any written records behind them (Shuler 2011; Higman 2014). Bioarchaeological studies from the Caribbean and the wider Americas have provided new insights on a wide range of topics such as life expectancy, infant mortality, disease, population diversity, and spiritual beliefs in enslaved populations (Armstrong & Fleischman 2003; Lee et al. 2009; Barrett & Blakey 2011; Okumura 2011; Shuler 2011).

Prior bioarchaeological research on insular Caribbean slavery

The first systematic studies of the remains of enslaved people in the insular Caribbean occurred at Newton Plantation (Barbados), and indeed the research trajectory at this site can be said to mirror wider developments in the region, which progress from descriptive research studies in the 1970s, 1980s, and 1990s (Handler & Lange 1978; Corruccini et al. 1982, 1985, 1987; Handler et al. 1982, 1986, 1989); updated methods and the introduction of isotopic studies in the 2000s (Schroeder et al. 2009; Shuler 2005, 2011); and increasingly sophisticated and new types of analysis in the 2010s and 2020s (Schroeder et al. 2013; Laffoon et al. 2019). The level of detail that we can obtain about the lives of enslaved people is growing with the power of our analytical methods, and the frequency of such studies has also increased since the beginning of the twenty-first century as archaeologists become more interested in the time period of Caribbean slavery.

In the case of Newton Plantation, the context of the burial ground made the identification of the people buried there as enslaved people self-evident. This is often the case for buried populations in the Caribbean, since free (mostly white) people were generally buried in official cemeteries rather than in plantation burial grounds (although exceptions include for example Sabán burial traditions, see Espersen & Haviser 2019). Other sites where the interpretation of the buried population as enslaved was clear include, for example, the eighteenth century Harney site in Montserrat, where seventeen skeletons were excavated in the 1990s. This burial ground probably served the enslaved population at the nearby Barnsby Plantation (Watters 1994). In the French Caribbean, the enslaved burial ground at L'Anse Sainte-Marguerite (Guadeloupe) was partially excavated between 1997 and 2002 by the Direction Régionale des Affaires Culturelles (DRAC) – like many other enslaved burial grounds, it was located in the sand dunes of the coast (Bonnissent et al. 2018; Courtaud et al. 1999, 2014; Courtaud & Romon 2004; Courtaud 2013). Four burials at Seville Plantation in Jamaica were also excavated in the 1990s, located in the house-yards of the enslaved village. The buried individuals were three adult males and an adolescent female, thought to represent important members of the enslaved community. They were reburied in 1997 (Armstrong & Fleischman 2003).

Examples from the 2000s and 2010s include biomolecular analyses, which have increasingly contributed new data and insights on the diets and geographic origins of enslaved people in the Caribbean. Varney (2003, 2007) has investigated the carbon and nitrogen values of twenty individuals buried at the Royal Naval Hospital at English Harbour, Antigua, where differences in diet supported the theory that some members of the buried population were enslaved people working for the British Navy. In St. Maarten, analysis of ancient DNA from three individuals with dental modifications buried on a beach during the late seventeenth century indicated probable connections with modern populations residing in regions of northern Cameroon and Nigeria/Ghana (Schroeder et al. 2015). Analysis of strontium isotopes from the same individuals indicated they probably spent their childhood in Africa, and that they were therefore first-generation enslaved people (Schroeder et al. 2014).

In the past decade, scientists have extracted information from ever smaller assemblages of teeth and bone. At Spring Bay Flat (Saba), a lockbox excavated in the enslaved quarters of a sugar and indigo plantation contained five human teeth from the same individual. Analysis of strontium,

oxygen, carbon, and nitrogen isotopes from these teeth indicated that the individual was born in Africa and was therefore likely a first generation enslaved person (Laffoon et al. 2018). Also on Saba, isotopic evidence combined with historical evidence indicated that a woman buried at Bay Ridge in the eighteenth century, who probably died in childbirth due to an extremely narrow pelvic inlet, was a first generation enslaved person (Fricke et al. 2021). Indeed, the recovery of such isolated remains or very small buried populations has often necessitated the use of osteobiographical and descriptive approaches. These have the advantage of creating nuanced, personal stories which are perhaps more accessible for the public than larger demographic studies. In some cases, these analyses have been carried out on individuals who were excavated as long ago as the 1980s (see for example Fricke et al. 2019 in Curaçao). Smaller studies can therefore contribute to the wider landscape of knowledge on the lives and lifeways of enslaved people, even when the archaeological context is difficult to interpret and the remains are incomplete. In all these cases, isotopic analysis showing that buried individuals spent their childhoods in Africa was pivotal in their interpretation as enslaved people, often in combination with historical and other evidence.

In other cases, for example where isotopic data show that an individual was born in the Caribbean (i.e. was Creole), their identification as an enslaved person becomes less certain, although careful attention to historical and archaeological evidence can assist. At El Chorro de Maíta (Cuba), interpretation of one individual who may have been a first-generation enslaved person was tentative because although isotopic data indicated that they were born in Africa, their burial took place in the contact period before plantation slavery became widespread (Valcárcel Rojas et al. 2011). Similarly, archaeologists were cautious in their interpretations of individuals excavated at the beach of L'Anse du Vieux Fort and the burial ground of Morne Dauphine, both in Guadeloupe, due to poor preservation and a lack of contextual information (Courtaud et al. 1999). Three individuals found on waste ground close to the Willemstad wharf in Fleur de Marie, Curaçao, may have been those of free people (for example sailors), although the burial context and time period also make it very possible that they were enslaved (see Victorina & Kraan 2012). The remains of two more individuals from Veeris Plantation, Curaçao, date to around the time of abolition (1863) and may therefore have been enslaved or newly freed individuals living in a social system that still resembled slavery (Fricke & Laffoon 2019). Historical and archaeological contexts are therefore key to our understanding of which populations were using the burial grounds central to bioanthropological research in the insular Caribbean, and isotopic evidence combined with other data sources is often instrumental.

The burial ground at Fort Amsterdam, St. Eustatius

The burial ground at Fort Amsterdam lies along a low cliff to the north of the depot building, extending for around 20 metres (see Figure 3). It is probable that a significant number of graves have already eroded away over the past 250 years, and that the graves currently exposed to the sea were once in the middle of the site. In 2012, archaeologists from SECAR conducted a rescue excavation, and nine graves were partially excavated from the cliff face (Morsink 2012). More recently, a team from Texas State University has surveyed the clifftop burial area and excavated human remains from the site (Ahlman et al. 2017, 2018). In September 2017, Hurricanes Irma and Maria damaged the coastline, necessitating the removal of more skeletal elements by the SECAR archaeologist. As of 2019, seventeen burials had been excavated, and there were at least three more in imminent danger of erosion. The site remains vulnerable today. As a result of this ad hoc excavation strategy, the different numbering systems used by different groups of excavators are very difficult to reconcile with one another, presenting one of the biggest challenges of this research (see Table 1).

Table 1 – Reconciliation of burial numbers from Fort Amsterdam site by three different archaeological teams. Attempts have been made, as far as possible, to retain the numbering system initially implemented by Morsink (2012).

Burial No.	2012 (SECAR)	2017 (SECAR and Texas State University)	2018 (Texas State University)
1	1	8	104
2	2	16	110
3A	3N		112
3B	3S	5B	114
4A	4	14	115
4B	4	14	115
5A	5	6	117
5B	5	6	117
6 (Sk. 1)	6	7	
6 (Sk. 2)	6	7	
7	7	12	
8	8		
9	9		106
10			
11A		11	
11B		11	
12			12
13		13	13
14		15	118
15		3	107
16		5A	
17		17	
18		18	
19			
20			

The 22 individuals recovered from 17 graves were aligned east-west with the head to the west (i.e. towards the sea). In several cases, there was evidence for a coffin (iron nails, wood fragments) or grave goods and clothing, for example a pipe bowl in Burial 3A and buttons in Burial 1. Intercutting graves, skeletal disarticulation, erosion, and incomplete excavation of burials made it difficult to determine which skeletal elements belonged together, limiting the analyses that could be performed. Indeed, most of the skeletal elements were disarticulated. Due to the difficulty of interpreting the site in a way that made associations between different skeletal elements clear, we erred on the side of caution, although we determined that skeletal elements were more likely to belong together if they were excavated from the same grave. Most individuals are represented by only a few elements, most commonly the cranial elements.

Where possible, bioarchaeological analyses were conducted to develop biological profiles including age, sex, and any evidence for palaeopathology. Individuals with available teeth were targeted for isotopic analysis to determine whether they were local or non-local, and thereby to gain some insight into how the burial ground was being used – whether by Africans being held captive at the Fort Amsterdam depot, or by enslaved people from the surrounding area, or both.

Osteological methods

Osteological standards according to the British Association for Biological Anthropology and Osteoarchaeology (Brickley & McKinley 2004; Mitchell & Brickley 2017) were applied. Adult age assessment from the auricular surface was conducted according to Buckberry and Chamberlain (2002), and non-adult age assessment from epiphyseal fusion according to Schaefer et al. (2009). Sex assessment was more challenging, as the complicated stratigraphy of the site, the partial excavation of graves, and the high levels of disarticulation meant that individuals were most commonly represented by a cranium (and sometimes mandible) and a small number of post-cranial elements from the upper body. Sex assessments were therefore cautiously made using morphological traits of the cranium, which are less reliable than those of the pelvis and more population specific (Buikstra & Ubelaker 1994; Herrmann et al. 1990).

Isotopic methods

Isotopic analyses included strontium, oxygen, and carbon isotope measurements of dental enamel. The principles and methods used in the study are outlined elsewhere (Laffoon 2012; Laffoon et al. 2013). Briefly, strontium isotopes in human tissues represent the chemical environment of consumed food and water during the period of tissue formation (Bentley 2006) and are primarily used as an isotopic tracer of geographic residence. Oxygen isotope values in skeletal bioapatite reflect the oxygen isotope composition of consumed water, which varies globally based on geographical and climatic factors (Lightfoot & O'Connell 2016). In contrast, carbon isotope values in skeletal tissues are primarily influenced by the carbon isotope composition of the diet (Lee-Thorpe 2008) and are most often used to distinguish the relative proportions of different food groups. The isotopic composition of enamel samples represent the period during which the tissue formed, which varies between different dental elements from in utero (for deciduous teeth) to early childhood (for most permanent teeth), and extending into the adolescent period (~8-14 years of age) for third molars (AlQahtani et al. 2010; Hillson 1996).

The oceanic islands of the insular Caribbean (i.e. excluding Trinidad) possess a limited range of generally low strontium isotope ratios ($^{87}\text{Sr}/^{86}\text{Sr}$) relative to the global range of variation. Strontium isotope measurements of biological samples from these islands have $^{87}\text{Sr}/^{86}\text{Sr}$ from circa 0.7055 to 0.7095 (Schulting et al. 2018; Bataille et al. 2012; Laffoon et al. 2012; Giovas et al. 2016; Ostapkowicz et al. 2017). This limited range of bioavailable $^{87}\text{Sr}/^{86}\text{Sr}$ variation contrasts sharply with that observed for most continental areas of the world, where $^{87}\text{Sr}/^{86}\text{Sr}$ can be as high as 0.750 or higher (Faure & Mensing 2005). As $^{87}\text{Sr}/^{86}\text{Sr}$ ratios are strongly influenced by geological age, many areas of Africa underlain by relatively old bedrock (e.g. Precambrian cratons) contain very high $^{87}\text{Sr}/^{86}\text{Sr}$. The implication of this limited range of Caribbean $^{87}\text{Sr}/^{86}\text{Sr}$ in terms of paleomobility and provenance research, is that individuals with enamel $^{87}\text{Sr}/^{86}\text{Sr} > 0.7095$ could not have originated from the oceanic islands of the Caribbean. Although such individuals could theoretically have originated from a wide range of locations worldwide, in the colonial period, plantation or enslaved contexts (in the Americas), the most plausible interpretation of these higher $^{87}\text{Sr}/^{86}\text{Sr}$ signals is that they reflect African natal/childhood origins. Based on these principles, several studies have successfully identified first-generation (forced) migrants at various sites within the insular Caribbean (Fricke et al. 2019; Laffoon et al. 2018; Schroeder et al. 2009; 2014), and similar approaches have also been applied to contemporary populations elsewhere in the Americas (Goodman et al. 2009; Price et al. 2012; Bastos et al. 2016).

Oxygen isotope measurements of dental enamel are frequently used independently, or in combination with strontium isotopes, as a tracer in paleoenvironmental and paleomobility studies (Lightfoot & O'Connell 2016). In the context of studies of ancient migration, oxygen isotopes values ($\delta^{18}\text{O}$) have been shown to have limited utility for identifying movements within the Caribbean owing to fairly homogenous $\delta^{18}\text{O}$ within the Caribbean region, although they are potentially useful for identifying first-generation immigrants originating from outside of the Caribbean (Schroeder et al. 2009; Laffoon et al. 2013). Whereas carbon isotope values ($\delta^{13}\text{C}$) cannot be directly linked to

geography, once an individual has been identified as likely African born, enamel $\delta^{13}\text{C}$ signatures can be used to further constrain their origins within Africa (Schroeder et al. 2009). This is possible because enamel bioapatite $\delta^{13}\text{C}$ is highly correlated with the average $\delta^{13}\text{C}$ of an individual's whole diet, including carbohydrates derived from plant foods (Schoeninger & Moore 1992). In traditional African subsistence systems, the arid and semi-arid areas of northern and eastern Africa are characterized by heavy reliance on various C_4 plants (i.e. millet, sorghum) as staple crops, whereas in most of the tropical areas of Sub-Saharan Africa rice or root crops (both C_3 plants) were the staple foods (Harris 1976). C_4 plants possess very high $\delta^{13}\text{C}$ and C_3 plants very low $\delta^{13}\text{C}$ with no overlap in $\delta^{13}\text{C}$ values between them. These plant $\delta^{13}\text{C}$ values are subsequently incorporated into the enamel $\delta^{13}\text{C}$ of individuals that consume these plant foods (during childhood). As such, carbon isotopes can be effectively used as a supplemental geo-provenance proxy in the context of African diaspora studies.

Osteological results and discussion

The excavated population of 22 individuals consisted of four non-adults (three infants and one adolescent), 16 adults (including three females and one male), and two unidentifiable (although probably adult) individuals. The high number of individuals for whom sex is unknown is due to the frequent absence or poor preservation of cranial elements, which were used for sex assessment, as pelvic remains were generally not preserved. A summary of the osteological analysis can be found in Table 2. For the most incomplete individuals, information is extremely sparse. However, the most interesting palaeopathological observations are discussed in more detail below.

Dental pathologies

Carious lesions and periodontal disease such as those observed in Burial 6 (Sk. 2), Burial 10, Burial 11A, and Burial 13 (see Figure 4), can be caused by poor dental hygiene combined with a high carbohydrate diet (Hillson 2001; Ogden 2008). The development of carious lesions is often linked to the high consumption of sugars and carbohydrates (Cheng et al. 2009; Hillson 2001). Indeed, the enslaved Caribbean diet was often high in carbohydrates (Kiple & Kiple 1991). In some studies, enslaved women have had higher rates of carious lesions, perhaps due to their role in sugar cultivation (Okumura 2011).

Osteochondritis dissecans

The individual in Burial 7, an adult of unknown sex, exhibited porosity and new bone formation bilaterally at the patellar surfaces of both distal femora (see Figure 5). These joint surface irregularities are known as osteochondritis dissecans and are more common in males than in females, occurring when a piece of cartilage and underlying bone detaches from the surface of the joint (Ortner 2003, 351). They are usually caused when an individual engages in high levels of physical activity during adolescence (Kessler et al. 2014). Indeed, these lesions fit well with what we know about the impacts of forced labour on the human skeleton (Wilczak et al. 2009; Goode-Null et al. 2009) and have been observed in the context of Caribbean enslavement before, for example in Curaçao (Fricke et al. 2019).

Trauma or congenital anomaly

The adult male individual in Burial 10 had a mid-line cleft in the anterior arch of the first cervical vertebra (atlas) for which there are two possible explanations (see Figure 5). Firstly, he may have suffered a fracture with non-union to the anterior arch. The two arch ends have been remodelled, with lipping at their margins, forming a false joint (pseudarthrosis). In modern populations, this type of fracture is often caused by sporting accidents and requires total isolation of the neck for a full recovery (Kim & Shin 2019). This interpretation would make it likely that this individual (to whom immobilisation and surgery would have been unavailable) suffered neck and nerve problems for the rest of his life. The second explanation for this anomaly could be that this vertebra simply

developed this way, known as a congenital anterior mid-line cleft. These are rare, and modern medical practitioners have had difficulty distinguishing them from fractures in living patients. For individuals with this congenital anomaly, treatment is not always necessary (see Prempeh et al. 2002). Definitive diagnosis of the individual from Burial 10 is difficult also due to the fact that the atlas is incomplete, with the posterior arch missing either due to agenesis or due to taphonomic processes.

Table 2 - Osteological results from Fort Amsterdam. Dark grey individuals were sampled for isotopic analysis. Burials 17, 18, and 19 are not included because they were unexcavated when this research was conducted.

Burial No.	Elements	Age	Sex	Pathology
1	Cranial and Post-cranial	Adult	Unknown	None
2	Post-cranial	Adult	Unknown	None
3A	Post-cranial	Adult	Unknown	None
3B	Post-cranial	Adult	Unknown	None
4A	Cranial and Post-cranial	Non-adult (~3 years)	N/A	None
4B	Cranial and Post-cranial	Infant (1-2 years)	N/A	None
5A	Post-cranial	Adult	Unknown	None
5B	Post-cranial	Adult	Unknown	None
6 (Sk. 1)	Cranial	Adult (over 24 years)	Indeterminate	None
6 (Sk. 2)	Cranial and Post-cranial	Adult	Female	Periodontal disease, agenesis of the maxillary right second premolar, possible porotic hyperostosis
7	Post-cranial	Adult	Unknown	Bilateral osteochondritis dissecans at distal femora
8	Post-cranial	Adult	Unknown	Degenerative joint disease at foot phalanges
9	Post-cranial	Unknown	Unknown	None
10	Cranial and Post-cranial	Adult	Male	Separation on the anterior part of the atlas, carious lesions, ante-mortem tooth loss, periodontal disease
11A	Cranial and Post-cranial	Young Adult (18-25 years)	Female	Calculus, cribra orbitalia, contour change at occipital condyles
11B	Post-cranial	Adult	Unknown	None
12	Post-cranial	Non-adult (6-12 years)	N/A	None
13	Cranial	Young to Middle Adult (18-45 years)	Female	Calculus, periodontal disease, contour change at occipital condyles
14	Cranial and Post-cranial	Infant (~1 year)	N/A	None
15	Post-cranial	Adult	Unknown	None
16	Post-cranial	Adult	Unknown	None
20	Post-cranial	Unknown	Unknown	None



Figure 4 – Skeletal remains from Fort Amsterdam. (a) Burial 11A – inferior view of orbits showing bilateral cribra orbitalia. (b) Burial 13 – lateral view of dentition, showing calculus, periodontal disease, and carious lesion at left maxillary first molar. (c) Burial 13 – contour change at the occipital condyles (photos by Felicia J. Fricke).

Occupational markers

The individual in Burial 10 also has clearly demarcated muscle attachment sites on the humeri (at the attachment sites of the biceps brachii) and radii (at the radial tuberosities), and especially on the inferior aspects of the clavicles, which can be an indication of labour involving the arms (see Figure 5) (Mays 1999; Ponce 2012; Villotte & Knusel 2014). The clavicles are also asymmetrical (the right clavicle being 8mm longer than the left), which can be an indication of asymmetrical loading during occupational activities (Mays et al. 1999). In the context of St. Eustatius, such asymmetrical loading could occur during specialised craft activities (e.g. masonry), sugar cultivation, or animal husbandry.

Additionally, the young to middle adult female in Burial 13 exhibited contour change at the lateral and medial margins of both occipital condyles (see Figure 4). She was in the ideal demographic for labour involving carrying loads on the head, which was (and is) a West African and Caribbean custom and could have caused such contour change to develop in younger individuals (Wilczak et al. 2009; Momsen 2010; Stahl 2016; Fricke et al. 2019). Similar changes are seen in Burial 11A. Indeed, as women, the individuals from Burial 11A and Burial 13 also fall within the demographic desired by enslavers who exploited enslaved people for domestic tasks or for sex work (Madrigal 2006; Jordaan 2003). Carrying heavy loads would have been required for enslaved women laboring in the town or on the plantations in St. Eustatius.

Cribra orbitalia

The young adult female in Burial 11A also exhibited porosity of the orbital roof (cribra orbitalia), more pronounced on the left than the right (see Figure 4). The aetiology of cribra orbitalia is contested amongst scholars, who as early as the 1950s identified these lesions as evidence for iron-deficiency anaemia, as red blood cell production increases to compensate for this stress (Walker et al. 2009). However, more recently scholars have instead associated these lesions with

other types of anaemia, such as that caused by the destruction of red blood cells in people with malaria. The correlation between malaria and cribra orbitalia stands; however, it now appears unlikely that this is due to anaemia (Schats 2023). Scholars have also found an anatomic predisposition to acquire cribra orbitalia among those with meningo-orbital foramina, suggesting that these lesions are unrelated to anaemia or to malaria and instead are developmental in origin (Zdilla et al. 2021; Rothschild et al. 2020). Other possible causes put forward to explain this porosity of the orbital roof include vitamin deficiencies such as scurvy (Schats 2023). Cole and Waldron (2019) have additionally cautioned that there are three different types of cribra orbitalia: those with developmental origins; those due to periosteal new bone formation; and inflammatory expansion of the orbital roof. They underline that the term ‘cribra orbitalia’ should strictly speaking be used only to refer to the developmental, vascular, origin of these lesions. Since the individual from Burial 11A has, as Cole and Waldron (2019) describe, “no change from the normal concave curvature” of the orbital roof, this probably indicates that these lesions are developmental and vascular in origin rather than pathological. In prior studies, cribra orbitalia has been used as a stress indicator to demonstrate the impact of malnutrition on enslaved populations (see for example Fricke et al. 2019; 2021; Laffoon et al. 2018; Okumura 2011). However, new developments in the field of biological anthropology indicate that this interpretation may have to be rethought.



Figure 5 – Skeletal remains from Fort Amsterdam. (a) Burial 10 - superior view of the first and second cervical vertebrae showing anomaly at the anterior arch of the atlas. (b) Burial 7 – porosity and new bone formation on the patellar surfaces of both femora (osteocondritis dissecans). (c) Burial 10 – inferior view of asymmetrical clavicles showing clearly demarcated attachment sites for the costoclavicular ligament, the conoid ligament, the trapezoid ligament, and the subclavius muscle (photos by Felicia J. Fricke).

Isotopic results and discussion

The enamel isotope results and sample information are listed in Table 3, and displayed in Figures 6 and 7. In total, seven teeth were analysed from six separate individuals. Based on the

strontium isotope results, three individuals are identified as locals and three as non-locals (see Figure 6). As expected, both infants possess $^{87}\text{Sr}/^{86}\text{Sr}$ signals that fall within the range of Caribbean bioavailable $^{87}\text{Sr}/^{86}\text{Sr}$ (~0.7055-0.7095) and are consistent with the local range (0.7073-0.7090) for the island of St. Eustatius (Laffoon et al. 2012; Laffoon 2012). In addition, the single adult male (Burial 10) sampled also has a local $^{87}\text{Sr}/^{86}\text{Sr}$ signature (0.708853). It is improbable that these three individuals were captives being held at the depot, and likely that they instead represent enslaved people from the surrounding area. All three locals not only have broadly similar $^{87}\text{Sr}/^{86}\text{Sr}$ ratios (0.708853, 0.708893, 0.708907) but also very comparable $\delta^{13}\text{C}$ values (-8.8‰, -8.7‰, -9.4‰) indicating mixed diets comprised primarily of C_3 foods with smaller but significant contributions of C_4 plant and/or marine foods (see Figure 7). The oxygen isotope values for the three locals (-3.4‰, -2.1‰, -3.6‰) are consistently but slightly higher than the non-locals (-5.4/-4.3‰, -4.2‰, -4.5‰). However, enamel $\delta^{18}\text{O}$ values can be influenced by the consumption of breastmilk, which is enriched in the heavier isotope, and some of the sampled dental elements reflect periods of early infancy, while others do not. As such, the $\delta^{18}\text{O}$ values are not directly comparable to each other. Furthermore, the ranges of $\delta^{18}\text{O}$ for the Caribbean and much of tropical West Africa possess considerable overlap, limiting the efficacy of this isotopic proxy in this research context.

Table 3 - Sample information and isotope results from Fort Amsterdam, St. Eustatius. Note: for one individual, Burial 6 (Sk. 2), two different teeth were analysed.

Burial No.	Element	Age	Sex	$^{87}\text{Sr}/^{86}\text{Sr}$	$\delta^{13}\text{C}_{\text{en}}$	$\delta^{18}\text{O}_{\text{en}}$
4B	M1	infant	n/a	0.708893	-8.7	-2.1
6 (Sk. 2)	PM1	adult	female	0.724208	-6.6	-5.4
6 (Sk. 2)	M2	adult	female	0.723317	-7.3	-4.3
10	PM2	adult	male	0.708853	-8.8	-3.4
11A	PM1	adult	female	0.714934	-6.9	-4.2
13	PM2	adult	female	0.712467	-14.3	-5.5
14	M1	infant	n/a	0.708907	-9.4	-3.6

Interestingly, all three non-local individuals are adult females. Based on the small sample size and the site’s complexity, it is difficult to interpret the broader implications of this pattern, although one possibility is that some social or economic factor may have led to an over-representation of first-generation females within the Fort Amsterdam cemetery. The one individual who was sampled twice (Burial 6, Sk. 2) has nearly identical $^{87}\text{Sr}/^{86}\text{Sr}$ in both sampled teeth. All three non-locals possess $^{87}\text{Sr}/^{86}\text{Sr}$ signals that are too high (>0.7095) for insular Caribbean origins but are consistent with African origins. Additionally, the three non-locals have quite varied $^{87}\text{Sr}/^{86}\text{Sr}$ signatures (Burial 6: 0.724208 & 0.723217, Burial 11A: 0.714934; Burial 13: 0.712467) indicating that they did not share similar geographic origins but rather likely originated from three distinct regions of Africa (Schroeder et al. 2014). This interpretation is further supported by their somewhat variable $\delta^{13}\text{C}$ values (Burial 6: -6.6‰ & -7.3‰, Burial 11A: -6.9‰; Burial 13: -14.3‰), with two individuals having intermediate $\delta^{13}\text{C}$ values consistent with mixed diets, while one non-local has a very low $\delta^{13}\text{C}$ value that is more consistent with a pure C_3 diet and thus an origin in the tropical regions of west-central Africa (Schroeder et al. 2009). This pattern of diverse geographic origins and diverse diets has been previously observed based on isotope results from other enslaved burial populations in the Americas (Goodman et al. 2009; Price et al. 2012; Bastos et al. 2016). In fact, this pattern is even observable (Figures 6 and 7) amongst the relatively limited number of comparable (e.g. combined enamel oxygen and strontium) isotopic data sets produced to date for the Caribbean region (Schroeder et al. 2009; Laffoon et al. 2018; 2020; Fricke et al. 2019; Laffoon 2012). It is therefore possible that these women were captives being held at the Fort Amsterdam depot.

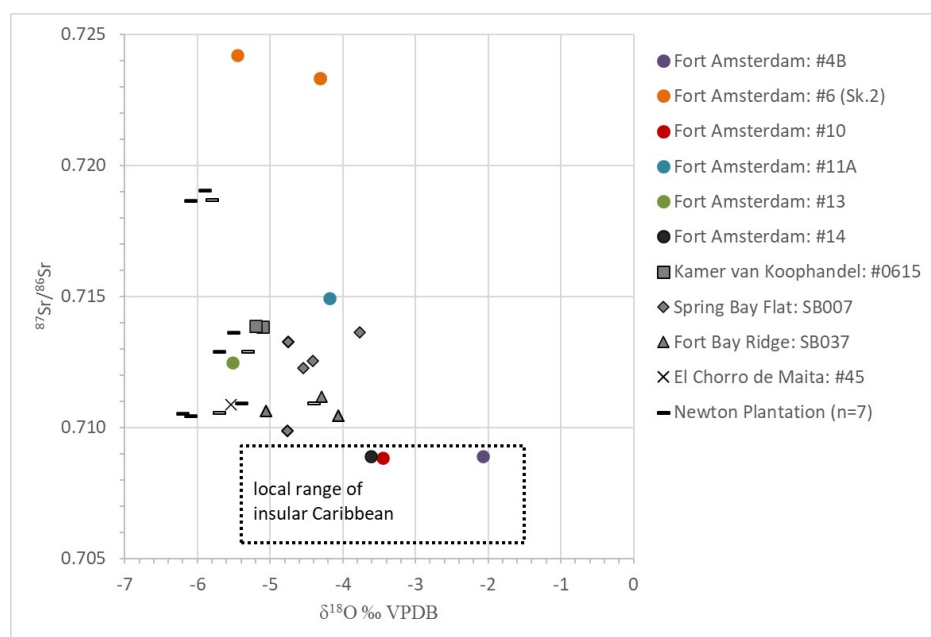


Figure 6 - Enamel strontium and oxygen isotope results from first-generation, African-born individuals in the insular Caribbean. Data sources: Fort Amsterdam, St. Eustatius (this study); Kamer van Koophandel, Curaçao (Fricke et al. 2019); Spring Bay Flat, Saba (Laffoon et al. 2018); Fort Bay Ridge, Saba (Fricke et al. 2021); El Chorro de Maíta, Cuba (Valcárcel Rojas et al. 2011); Newton Plantation, Barbados (Schroeder et al. 2009).

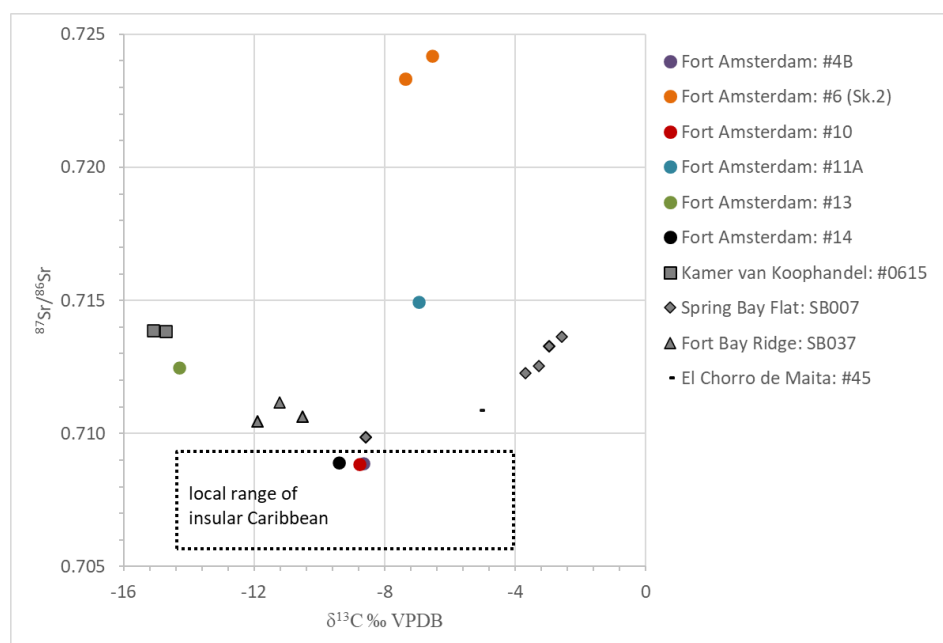


Figure 7 - Enamel strontium and carbon isotope results from first-generation, African-born individuals in the insular Caribbean. Data sources: Fort Amsterdam, St. Eustatius (this study); Kamer van Koophandel, Curaçao (Fricke et al. 2019); Spring Bay Flat, Saba (Laffoon et al. 2018); Fort Bay Ridge, Saba (Fricke et al. 2021); El Chorro de Maíta, Cuba (Valcárcel Rojas et al. 2011).

Conclusions

Scholars who have addressed the osteology of enslaved people in the Caribbean have been faced with numerous challenges. Enslaved burials are often located in marginal areas, for example along the coastline, which may make them difficult to access and vulnerable to erosion, a threat that is increasing with the severity of hurricanes and sea level rise influenced by global warming (Siegel et al. 2013; Bonnissent et al. 2018). There is a lack of funding, resources, and trained staff to deal with many of the burials that need rescuing. After excavation, high heat and humidity can cause rapid deterioration of the skeletons, which are seldom stored in climate-controlled facilities (Mickleburgh 2015). Building regulations do not always support development that includes archaeological assessment, and when such rules do exist local archaeologists may find them difficult to enforce (Kraan 2015). These circumstances combined have all led to the current situation at Fort Amsterdam, which is threatened by erosion, and has been the target of sporadic archaeological campaigns and subsequent fragmented recording.

Although the Fort Amsterdam population analysed here is too small for demographic or statistical studies, and the disarticulation of the skeletons and confused burial context do not allow the analysis of complete skeletons, the question of whether these individuals were captives from the fort, enslaved people from the nearby surroundings, or both, can be addressed by examining the historical, archaeological, osteological, and isotopic information available.

As mentioned above, we know from historical evidence that the burial ground at Fort Amsterdam served the African population of the island at a time when plantation slavery was the defining structure of Caribbean societies. Archaeological evidence from other Caribbean islands, such as St. Maarten and Guadeloupe, indicates that enslaved people often buried their dead on marginal coastal land (Bonnissent et al. 2018; Courtaud et al. 1999; Schroeder et al. 2014). Meanwhile, white people and free people of colour in St. Eustatius were likely to be buried in official cemeteries such as Old Church Cemetery at the corner of Fort Oranjestraat and Mansion Road – free people of colour were included in the death registers kept by the St. Eustatius government, while enslaved people were not (Nationaal Archief, NL-HaNA, St. Eustatius, St. Maarten en Saba tot 1828, 1.05.13.01, inv.nr. 246 Register van overleden personen, gehouden ter secretarie).

In this study, osteological and isotopic evidence have shown that the buried population at Fort Amsterdam includes two infants born in the Caribbean (most likely on St. Eustatius), an adult male born in the Caribbean, and three adult women born in Africa. The women could have been captives from the depot; or alternatively enslaved women from the Godet or DeGraaff estates, or from the town. The infants, gestated and born in the Caribbean, are likely to have belonged to enslaved women living nearby. Finally, the Creole man may have been enslaved as a plantation labourer, a sailor, or a craftsman given his asymmetrical skeletal development.

The conclusion of this research is therefore that the Fort Amsterdam burial ground, while its location in proximity to the depot indicates its use by African captives, also served the surrounding enslaved population of the island. Since the free (majority white) islanders were buried elsewhere, it served as a way for the Black and white, enslaved and free, populations of the island to be separated in death as well as in life. Fort Amsterdam was used as a depot for a span of only 56 years, but it is clear from the stratigraphy of the site that the burial ground was in use long enough for people to forget where others had previously been buried, causing grave intercutting and disarticulation. However, the presence of coffin nails indicates that the people here, like those buried at other enslaved burial grounds on St. Eustatius, were buried oriented east-west with the head to the west, in coffins (see for example Fricke 2019, 2020). This combined with the presence of grave goods such as pipes indicates that the people here were buried with respect, probably by those who knew and loved them in life.

Furthermore, the pathologies observed can help to build a picture of these people's lives. They include evidence for hard labour and high carbohydrate diets, which we know from other studies were experienced by enslaved people all over the Caribbean (Craton 1991; Kiple & Kiple 1991; Shuler 2011; Courtaud et al. 2014) and the wider Americas (Blakey & Rankin-Hill 2009). The evidence from Fort Amsterdam, though fragmentary, is not in disagreement with the findings from

larger such studies. Importantly for St. Eustatius, although previous archaeological research on the island has downplayed the severity of slavery here (see Cook & Stelten 2014; Gilmore III 2005), our findings from this study at Fort Amsterdam are in keeping with wider evidence that slavery in the Dutch Caribbean was not 'mild' (see Fricke 2019; 2020).

Despite the challenging nature of this site and of the skeletal remains, bioarchaeological and isotopic analysis of the Fort Amsterdam population has therefore provided information that supplements what we already knew about the site from other sources of evidence. Indeed, it has answered the question of who used the site by demonstrating that the buried population included both first generation and Creole enslaved people. Thus, the importance of this site is not only local, in that it contributes to our knowledge about slavery in St. Eustatius, but also regional, in that it demonstrates the usefulness of partial, disturbed, rescue sites that have been excavated and recorded by several groups of archaeologists. Its publication, more than a decade since the first Fort Amsterdam burial ground site report by Morsink (2012), also demonstrates that curated collections are able to contribute to the narrative on Caribbean enslavement, and this should encourage authors of grey literature reports to make their research results more widely available. Finally, we acknowledge the recent developments in St. Eustatius heritage management and welcome future research projects that respond first to the needs and wishes of the descendant community.

Dissemination and engagement

The osteological analysis for this study was carried out by Felicia J. Fricke as part of her doctoral research at the University of Kent (Fricke 2019). One third of the data for the thesis came from oral history interviews with St. Eustatius members of the public and cultural heritage experts, who also gave input on the analyses and interpretations of the project data. During her doctoral research, Dr. Fricke gave regular public lectures in St. Eustatius where stakeholders could see her work in progress, ask questions, and get involved (in 2016, 2017, and 2019). These events took place at the (then) Caribbean Netherlands Science Institute (CNSI) and were well attended by St. Eustatians. Although these events were effective at reaching their target audience, in the future we would encourage researchers to consider alternative event venues. The research findings of the doctoral study were ultimately published in a book aimed at a general audience and made available at the St. Eustatius public library (Fricke 2020), while the doctoral thesis is available open access online (Fricke 2019). To facilitate long-term commitments to St. Eustatius heritage, Dr. Fricke sends yearly research updates to the stakeholders who were involved in her doctoral project and to other interested members of the public.

Academic dissemination of the research findings was unfortunately limited due to the COVID-19 pandemic, which caused the 2020 conference of the (then) American Association of Physical Anthropologists (AAPA) to be moved online. There was therefore no opportunity for the academic discussion of the poster submitted by the authors to this event, although it was subsequently made available open access on the conference website. Additionally, the authors originally planned to publish this case study elsewhere, and submitted a completed text for publication in 2019. However, delays to this publication caused the authors to retract their text in 2024, opting instead to disseminate these research findings online at the Peer Community in Archaeology. This responds to calls for open science (see for example Palmisano & Titolo 2024) as well as to calls from the St. Eustatius community for the release of their ancestors' data. In community consultations organised by the St. Eustatius Heritage Research Commission (SHRC) and the St. Eustatius Cultural Heritage Implementation Committee (SCHIC, of which Dr. Fricke is a member), some local community members have expressed interest in the origins and lifeways of enslaved people, as well as concerns about the way that archaeological research has been conducted on the island (Haviser et al. 2022; The Daily Herald (online) 2025). This is leading to welcome reform of the policies for heritage management in St. Eustatius.

Acknowledgements

We would like to thank Vrije Universiteit Amsterdam for facilitating the isotopic analysis; the St. Eustatius Center for Archaeological Research (SECAR) for access to the human remains; and the Caribbean Netherlands Science Institute (CNSI) and American Association of Biological Anthropologists (AABA) for helping with research dissemination to public and professional audiences. Thanks to Pepijn van der Linden for help with the map. Finally, we would like to thank marjolijn kok (St. Eustatius Afrikan Burial Ground Alliance) for reaching out to ask what had happened to the research results from this study, which was a welcome encouragement to pursue alternative publication venues. Preprint version 4 of this article has been peer-reviewed and recommended by Peer Community In Archaeology (<https://doi.org/10.24072/pci.archaeo.100607>; Queffelec & Goude, 2025).

Funding

Funding for Dr. Fricke's doctoral fees was provided through the University of Kent Centre for Heritage's scholarship fund, and funding for the doctoral fieldwork was kindly provided by the UK Society for Latin American Studies. No specific funding was received for the isotopic analysis.

Conflict of interest disclosure

The authors declare that they comply with the PCI rule of having no financial conflicts of interest in relation to the content of the article.

Plain language summary

From the 1720s to 1780, the Fort Amsterdam battery building was used by Statian merchants as a depot in which to imprison African captives awaiting sale and transshipment to other parts of the Americas, where they would be enslaved in houses and on plantations. A historical document dating to 1738 mentions a burial ground close to Fort Amsterdam, which was used by the African and Afro-Caribbean population of St. Eustatius. The document does not say whether the people buried there were captives from the depot, or perhaps enslaved people living on the island, or both. For many years, skeletons have been eroding out of this burial ground and on to the beach. Archaeologists have been excavating the graves on the edge of the burial ground that are in danger of falling into the sea. This has happened sporadically over a period of years and has been done by people from different institutions (the St. Eustatius Center for Archaeological Research and Texas State University). Because the site and the circumstances of its excavation are so complicated, an analysis of the skeletons is very difficult. The skeletons are incomplete and it is often impossible to tell which bones belong to which person.

In this article we, an osteologist (a person who studies human skeletons) and an isotope specialist (who uses the chemistry of teeth to understand where a person was born and grew up, and what they ate as a child), try to make sense of the Fort Amsterdam skeletons formerly curated at SECAR, and now at Heritage House. We originally wrote this article for publication in 2019, but delays with publication meant that we decided to publish online instead. Public engagement for the research took place in St. Eustatius in 2016, 2017, and 2019. Academic engagement for the research was limited by the COVID-19 pandemic. Further public-oriented information on this site can be found in Felicia Fricke's book *Slaafgemaakt: Rethinking Enslavement in the Dutch Caribbean*, which is available from the St. Eustatius public library.

The skeletons discussed in this article belong to twenty-two people: three infants, one teenager, three women, one man, and twelve to fourteen adults of unknown sex. The information available from their skeletons includes not only age and sex, but also evidence for diseases and stresses. These were, for example, dental disease and evidence for hard labour. A specific case is that of a man whose asymmetrical collarbones indicate he may have done hard labour that worked one

side of his body more than the other (for example, masonry, sugar production, or animal husbandry). Another specific case is that of a woman with changes to her neck that may indicate she was carrying heavy loads on her head. A third specific case is that of an adult of unknown sex with damage to their knee joints, which indicates that they did too much exercise in adolescence.

Because dental enamel (of tooth crowns) forms early in life and does not undergo subsequent chemical changes, teeth represent an important archive of an individual's early life history. By measuring the isotope chemistry of tooth enamel we can learn about an individual's diet and where they came from. The results of the chemical (isotopic) analysis on the teeth of six people showed that there were both first-generation enslaved people (born in Africa) and Creole people (born in the Caribbean) present. The first-generation enslaved people were women whose diets indicate that they came from different parts of Africa, while the Creole people were two infants and one man. This indicates that the Fort Amsterdam burial ground was probably used for the burial of captives from the depot as well as for enslaved people living in St. Eustatius. The two Creole infants probably belonged to women enslaved on nearby plantations or in the town. Since free (mostly white) people were buried in the official cemeteries such as the Old Church Cemetery, the site at Fort Amsterdam served as a way to separate the Black and white populations of the island, even in death. While the depot was in use for only 56 years, the fact that the graves often cut through each other indicates that the burial ground was perhaps in use for longer - long enough for people to forget where ancestors had previously been buried. Nevertheless, the people buried here were laid to rest with respect, oriented east-west with their heads to the west, in coffins, clothed, and with grave goods (for example, a clay pipe).

Although the analysis of these skeletons was such a challenge, the information available does indicate that important results can be obtained from the analysis of partial remains. The evidence for diseases and stresses shows that the people buried here experienced conditions similar to enslaved people in other parts of the Caribbean. This study and others like it contradict earlier archaeological work saying that slavery in St. Eustatius was 'mild'. Finally, we are optimistic about the ways that St. Eustatius archaeology can become better regulated and more community-focused in the future.

References

- Ahlman, Todd, Ashley McKeown, and Nicholas Herrmann. 2017. 'NSF REU Site: Exploring Globalization through Archaeology, Texas State'. Report: Texas State University.
- Ahlman, Todd, Ashley McKeown, and Nicholas Herrmann. 2018. 'Godet Site Report.' St. Eustatius: St. Eustatius Center for Archaeological Research and Texas State University.
- AlQahtani, Sakher J., Mark P. Hector, and Helen M. Liversidge. 2010. 'Brief Communication: The London Atlas of Human Tooth Development and Eruption'. *American Journal of Physical Anthropology* 142 (3): 481–90. <https://doi.org/10.1002/ajpa.21258>
- Armstrong, Douglas V., and Mark L. Fleischman. 2003. 'House-yard burials of enslaved labourers in eighteenth-century Jamaica'. *International Journal of Historical Archaeology* 7:33–65. <http://dx.doi.org/10.1023/A:1023227303302>
- Barrett, Autumn R., and Michael Blakey. 2011 'Life Histories of Enslaved Africans in Colonial New York: A Bioarchaeological Study of the New York African Burial Ground'. In *Social Bioarchaeology*, edited by Sabrina C. Agarwal and Bonnie A. Glencross, 213–51. Chichester: Wiley Blackwell. <https://doi.org/10.1002/9781444390537.ch8>
- Bastos, Murilo Q. R., Ricardo V. Santos, Sheila M. F. M. de Souza, Claudia Rodrigues-Carvalho, Robert H. Tykot, Della C. Cook, and Roberto V. Santos. 2016. 'Isotopic Study of Geographic Origins and Diet of Enslaved Africans Buried in Two Brazilian Cemeteries'. *Journal of Archaeological Science* 70:82–90. <https://doi.org/10.1016/j.jas.2016.04.020>
- Bataille, Clement P., Jason Laffoon, and Gabriel J. Bowen. 2012. 'Mapping Multiple Isotope Source Effects on the Strontium Isotopic Signatures of Ecosystems from the Circum-Caribbean Region'. *Ecosphere* 3 (12): 1–24. <https://doi.org/10.1890/ES12-00155.1>

- Bentley, R. Alexander. 2006. 'Strontium Isotopes from the Earth to the Archaeological Skeleton: A Review'. *Journal of Archaeological Method and Theory* 13 (3): 135–87. <https://doi.org/10.1007/s10816-006-9009-x>
- Blakey, Michael, and Rankin-Hill, Lesley, eds. 2009. *The New York African Burial Ground: Unearthing the African Presence in Colonial New York, Volume 1*. Washington, DC: Howard University Press.
- Bonnissent, Dominique, Patrice Courtaud, Yoann Legendre, Damien Leroy, Thomas Romon, Jérôme Rouquet, and Christian Stouvenot. 2018. 'Les Cimetières Littorales de la Période Coloniale. Prévenir une Destruction Annoncée en Guadeloupe et en Martinique'. *Les Nouvelles de l'Archéologie* 150:59-64. <https://doi.org/10.4000/nda.3904>
- Brickley, Megan, and Jacqueline I. McKinley. 2004. 'Guidelines to the Standards for Recording Human Remains'. Reading: Institute for Archaeologists.
- Buckberry, Joanne L., and Andrew T. Chamberlain. 2002. 'Age Estimation from the Auricular Surface of the Ilium: A Revised Method'. *American Journal of Physical Anthropology* 119:231–39. <https://doi.org/10.1002/ajpa.10130>
- Buikstra, Jane E., and Douglas H. Ubelaker. 1994. *Standards for Data Collection from Human Skeletal Remains*. Arkansas: Arkansas Archaeological Survey.
- Cheng, Ran, Hui Yang, Mei-ying Shao, Tao Hu, and Xue-dong Shou. 2009. 'Dental Erosion and Severe Tooth Decay Related to Soft Drinks: A Case Report and Literature Review'. *Journal of Zhejiang University Science B* 10 (5): 395–99. <https://doi.org/10.1631/jzus.B0820245>
- Cole, Garrard, and Tony Waldron. 2019. 'Cribra Orbitalia: Dissecting an Ill-Defined Phenomenon'. *International Journal of Osteoarchaeology* 29: 613–621. <https://doi.org/10.1002/oa.2757>
- Cook, Reese. 2015. 'Archaeological Research and Data Recovery of Fair Play Plantation, St Eustatius, the Dutch Caribbean'. St. Eustatius, Dutch Caribbean: St. Eustatius Center for Archaeological Research (SECAR).
- Cook, Reese, and Ruud Stelten. 2014. 'Preliminary Investigation of the Slave Quarters at Fair Play Plantation, St Eustatius, Caribbean Netherlands: A Mid-Eighteenth to Mid-Nineteenth Century Sugar Plantation'. St. Eustatius, Dutch Caribbean: St Eustatius: St Eustatius Centre for Archaeological Research (SECAR).
- Corruccini, R. S., J. S. Handler, R. J. Mutaw, and F. W. Lange. 1982. 'Osteology of a Slave Burial Population from Barbados, West Indies'. *American Journal of Physical Anthropology* 59:443–59. <https://doi.org/10.1002/ajpa.1330590414>
- Corruccini, R. S., K. P. Jacobi, J. S. Handler, and A. C. Aufderheide. 1987. 'Implications of Tooth Root Hypercementosis in a Barbados Slave Skeletal Collection'. *American Journal of Physical Anthropology* 74:179–84. <https://doi.org/10.1002/ajpa.1330740206>
- Corruccini, R. S., J. S. Handler, and K. P. Jacobi. 1985. 'Chronological Distribution of Enamel Hypoplasias and Weaning in a Caribbean Slave Population'. *Human Biology* 57:699–711. <https://www.jstor.org/stable/41464779>
- Courtaud, Patrice. 2013. 'Le Cimetière, Comme Miroir de l'Esclavage: Approche Archéologique. Le Cimetière d'Anse Sainte-Marguerite (Guadeloupe)'. *In Situ*, 20. <https://doi.org/10.4000/insitu.10092>
- Courtaud, Patrice, André Delpuech, and Thomas Romon. 1999. 'Archaeological Investigations at Colonial Cemeteries on Guadeloupe: African Slave Burial Sites or Not?'. In *African Sites Archaeology in the Caribbean*, edited by Jay Havis, 277-90. USA: Mark Wiener Publishers.
- Courtaud, Patrice and Thomas Romon. 2004. 'Le Site d'Anse Sainte-Marguerite (Guadeloupe, Grand Terre). Présentation d'un Cimetière d'Époque Coloniale'. *Journal of Caribbean Archaeology*, Special Publication #1:58–67.
- Courtaud, Patrice, Thomas Romon, and Olivier Dutour. 2014. 'Conditions de Vie, Conditions de Mort: Contribution Du Cimetière de l'anse Sainte-Marguerite (Guadeloupe)'. In *Archeologie de l'esclavage Colonial*, edited by A. Delpuech and J. Jacob, 361–75. Paris: La Découverte. <https://doi.org/10.3917/dec.delpu.2014.01.0361>

- Craton, Michael. 1991. 'Death, Disease and Medicine on the Jamaican Slave Plantations; the Example of Worthy Park, 1767-1838'. In *Caribbean Slave Society and Economy: A Student Reader*, edited by Hilary Beckles and Verene Shepherd, 183–96. London: James Currey.
- Emmer, Piet. 2006. *The Dutch Slave Trade 1500-1850*. Oxford: Berghahn Books.
- Equiano, Olaudah. 1999. *The Life of Olaudah Equiano, or Gustavus Vassa, the African*. New York: Dover Thrift Publications Inc.
- Espersen, Ryan, and Jay Haviser. 2019. 'Cist Graves on Saba: Funerary Traditions in the Colonial Caribbean'. *Antiquity* 93:1-17. <http://dx.doi.org/10.15184/aqy.2019.112>
- Faure, Gunter, and Teresa M. Mensing. 2005. *Isotopes: Principles and Applications*. New York: Wiley.
- Fricke, Felicia. 2019. 'The Lifeways of Enslaved People in Curaçao, St Eustatius, and St Maarten/St Martin: A Thematic Analysis of Archaeological, Osteological, and Oral Historical Data'. PhD thesis, Canterbury: University of Kent.
- . 2020. *Slaafgemaakt: Rethinking Enslavement in the Dutch Caribbean*. Champaign, IL: Common Ground Research Networks.
- Fricke, Felicia, and Jason Laffoon. 2019. 'Osteobiography: A Window on Post-Emancipation Curaçao'. In *Proceedings of the 27th International Association for Caribbean Archaeology Congress, 24-28 July 2017, St Croix*, 433–53.
- Fricke, Felicia, Jason Laffoon, and Ryan Espersen. 2021. 'Unforgotten: The Osteobiography of an Enslaved Woman and Child from 18th Century Saba'. *Journal of Archaeological Science Reports* 36:102838. <https://doi.org/10.1016/j.jasrep.2021.102838>
- Fricke, Felicia, Jason Laffoon, Amy Victorina, and Jay Haviser. 2019. 'Delayed Physical Development in a First Generation Enslaved African Woman from Pietermaai, Curaçao'. *International Journal of Osteoarchaeology* 30 (1): 43–52. <https://doi.org/10.1002/oa.2829>
- Gilmore III, R. Grant. 2005. 'The Archaeology of New World Slave Societies: A Comparative Analysis with Particular Reference to St Eustatius, Netherlands Antilles'. PhD thesis, London: University College London.
- Giovas, Christina M., George D. Kamenov, Scott M. Fitzpatrick, and John Krigbaum. 2016. 'Sr and Pb Isotopic Investigation of Mammal Introductions: Pre-Columbian Zoogeographic Records from the Lesser Antilles, West Indies'. *Journal of Archaeological Science* 69 (May): 39–53. <https://doi.org/10.1016/j.jas.2016.03.006>
- Goode-Null, Susan, Kenya Shujaa, and Lesley M. Rankin-Hill. 2009. 'Subadult Growth and Development'. In *Skeletal Biology of the New York African Burial Ground, Part 1*, edited by Michael Blakey and Lesley M Rankin-Hill, 227–53. Washington, DC: Howard University Press.
- Goodman, Alan H., Joseph Jones, J. Reid, Mark E. Mack, Michael L. Blakey, D. Amarasiriwardena, P. Burton, and D. Coleman. 2009. 'Isotopic and Elemental Chemistry of Teeth: Implications for Places of Birth, Forced Migration Patterns, Nutritional Status, and Pollution'. In *Skeletal Biology of the New York African Burial Ground, Part I*, edited by Michael L Blakey and Lesley M Rankin-Hill, 1:95–118. The New York African Burial Ground: Unearthing the African Presence in Colonial New York. Washington DC: Howard University Press.
- Handler, Jerome S., Arthur C. Aufderheide, Robert S. Corruccini, Elizabeth M. Brandon, and Lorentz E. Wittmers Jr. 1986. 'Lead Contact and Poisoning in Barbados Slaves: Historical, Chemical, and Biological Evidence'. *Social Science History* 10:399–425. <https://doi.org/10.2307/1171025>
- Handler, J. S., M. Conner, and K. P. Jacobi. 1989. *Searching for a Slave Cemetery in Barbados, West Indies: A Bioarchaeological and Ethnohistorical Investigation*. Research Paper No. 59. Carbondale: Centre for Archaeological Investigations, Southern Illinois University.
- Handler, J. S., R. S. Corruccini, and R. J. Mutaw. 1982. 'Tooth Mutilation in the Caribbean: Evidence from a Slave Burial Population in Barbados'. *Journal of Human Evolution* 11:297–313. [https://doi.org/10.1016/S0047-2484\(82\)80021-3](https://doi.org/10.1016/S0047-2484(82)80021-3)
- Handler, Jerome S., and Frederick W. Lange. 1978. *Plantation Slavery in Barbados: An Archaeological and Historical Investigation*. Cambridge: Harvard University Press. <https://doi.org/10.4159/harvard.9780674332362>

- Harris, David R. 1976. 'Traditional Systems of Plant Food Production and the Origins of Agriculture in West Africa'. In *Origins of African Plant Domestication*, edited by A. Stemler and J. Harlan, 311–356. Berlin: De Gruyter. <https://doi.org/10.1515/9783110806373.311>
- Hartog, Johan. 1997. *De Forten, Verdedigingswerken En Geschutstellingen van Sint Eustatius En Saba, van Pieter van Corselles Tot Abraham Heyliger 1636-1785*. Zaltbommel: Europese Bibliotheek.
- Haviser, Jay. 2001. 'Historical Archaeology in the Netherlands Antilles and Aruba'. In *Island Lives: Historical Archaeologies of the Caribbean*, edited by Paul Farnsworth, 60–81. Tuscaloosa: The University of Alabama Press.
- Haviser, Jay, Rose Mary Allen, Luc Alofs, Richenel Ansano, Xiomara Balentina, Ishmael Berkel, Alissandra Cummins, et al. 2022. 'Report of the Statia Heritage Research Commission (SHRC) for the Government of St. Eustatius, Netherlands Caribbean'. Oranjestad, St. Eustatius: Statia Heritage Research Commission (SHRC).
- Herrmann, Bernd, Gisela Grupe, Susanne Hummel, Hermann Piepenbrink, and Holger Schutkowski. 1990. *Prähistorische Anthropologie. Leitfaden Der Feld- Und Labormethoden*. Heidelberg: Springer. https://doi.org/10.1007/978-3-642-61514-6_4
- Higman, B. W. 2014. 'Survival and silence in the material records of slavery and abolition', *Slavery and Abolition* 35:527–535. <https://doi.org/10.1080/0144039X.2014.944036>
- Hillson, Simon. 1996. *Dental Anthropology*. Cambridge: Cambridge University Press.
- . 2001. 'Recording Dental Caries in Archaeological Human Remains'. *International Journal of Osteoarchaeology* 11:249–89. <https://doi.org/10.1002/oa.538>
- Jordaan, Han. 2003. 'The Curaçao Slave Market: From Asiento Trade to Free Trade, 1700-1730'. In *Riches from Atlantic Commerce: Transatlantic Slave Trade and Shipping, 1585-1817*, edited by J. Postma and V. Enthoven, 219–57. Leiden: Brill. https://doi.org/10.1163/9789004474772_018
- Karklins, Karlis, and Norman F. Barka. 1989. 'The Beads of St. Eustatius, Netherlands Antilles'. *BEADS: Journal of the Society of Bead Researchers* 1:55–80. <https://doi.org/10.5399/beads/1.6067>
- Kelley, Jennifer Olsen, and J. Lawrence Angel. 1987. 'Life Stresses of Slavery'. *American Journal of Physical Anthropology* 74:199–211. <https://doi.org/10.1002/ajpa.1330740208>
- Kessler, Jeffrey I., Hooman Nikizad, Kevin G. Shea, John C. Jacobs, Judith D. Bechuk, and Jennifer M. Weiss. 2014. 'The Demographics and Epidemiology of Osteochondritis Dissecans of the Knee in Children and Adolescents'. *American Journal of Sports Medicine* 42:320–26. <https://doi.org/10.1177/0363546513510390>
- Kim, Moon Kyu, and Jun Jae Shin. 2019. 'Comparison of Radiological and Clinical Outcomes after Surgical Reduction with Fixation or Halo-Vest Immobilization for Treating Unstable Atlas Fractures'. *Acta Neurochirurgica* 161 (4): 685–93. <https://doi.org/10.1007/s00701-019-03824-5>
- Kiple, Kenneth F., and Virginia H. Kiple. 1991. 'Deficiency Diseases in the Caribbean'. In *Caribbean Slave Society and Economy: A Student Reader*, edited by Hilary Beckles and Verene Shepherd, 173–82. London: James Currey.
- Knappert, Laurentius. 1932. *Geschiedenis van de Nederlandsche Bovenwindsche eilanden in de 18de eeuw*. 's-Gravenhage: Martinus Nijhoff. <https://doi.org/10.1163/22134360-90001125>
- kok, marjolijn. 2022. 'A Future That Does Not Forget: Collaborative Archaeology in the Colonial Context of Sint Eustatius (Dutch Caribbean)'. BAT-Report 1. Rotterdam: Bureau Archeologie en Toekomst.
- Kraan, Claudia. 2015. 'An Integral Heritage Approach for Bonaire and Curaçao, Dutch Caribbean'. In *Proceedings of the 25th International Association for Caribbean Archaeology Congress, 15-21 July 2013, Puerto Rico*.
- Laffoon, Jason. 2012. 'Patterns of Paleomobility in the Ancient Antilles: An Isotopic Approach'. PhD thesis, Leiden: Leiden University.
- Laffoon, Jason, Gareth Davies, Menno Hoogland, and Corinne Hofman. 2012. 'Spatial Variation of Biologically Available Strontium Isotopes (87Sr/86Sr) in an Archipelagic Setting: A Case

- Study from the Caribbean'. *Journal of Archaeological Science* 39 (7): 2371–84. <https://doi.org/10.1016/j.jas.2012.02.002>
- Laffoon, Jason, Ryan Espersen, and Hayley L Mickleburgh. 2018. 'The Life History of an Enslaved African: Multiple Isotope Evidence for Forced Childhood Migration from Africa to the Caribbean and Associated Dietary Change'. *Archaeometry* 60 (2): 350–65. <https://doi.org/10.1111/arcm.12354>
- Laffoon, Jason, Roberto Valcárcel Rojas, and Corinne Hofman. 2013. 'Oxygen and Carbon Isotope Analysis of Human Dental Enamel from the Caribbean: Implications for Investigating Individual Origins'. *Archaeometry* 55 (4): 742–65. <https://doi.org/10.1111/j.1475-4754.2012.00698.x>
- Laffoon, Jason, Roberto Valcárcel Rojas, Darlene Weston, Menno Hoogland, Gareth Davies, and Corinne Hofman. 2020. 'Diverse and Dynamic Dietary Patterns in Early Colonial Cuba: New Insights from Multiple Isotope Analyses'. *Latin American Antiquity* 31 (1): 103–21. <https://doi.org/10.1017/laq.2019.103>
- Laffoon, Jason E., Kristina A. Shuler, Andrew R. Millard, James N. Connelly, and Hannes Schroeder. 2019. 'Isotopic Evidence for Anthropogenic Lead Exposure on a 17th/18th Century Barbadian Plantation'. *American Journal of Physical Anthropology* 171:529–38. <https://doi.org/10.1002/ajpa.23938>
- Lamur, H. E. 1991. 'Demographic Performance of Two Slave Populations of the Dutch Speaking Caribbean'. In *Caribbean Slave Society and Economy: A Student Reader*, edited by Hilary Beckles and Verene Shepherd, 209–20. London: James Currey.
- Lee, Esther J., Lisa M. Anderson, Vanessa Dale, and D. Andrew Merriwether. 2009 'MtDNA origins of an enslaved labor force from the 18th century Schuyler Flatts Burial Ground in colonial Albany, NY: Afrians, Native Americans, and Malagasy?'. *Journal of Archaeological Science* 36:2805–2810. <https://doi.org/10.1016/j.jas.2009.09.008>
- Lee-Thorpe, J. A. 2008. 'On Isotopes and Old Bones'. *Archaeometry* 50 (6): 925–50. <https://doi.org/10.1111/j.1475-4754.2008.00441.x>
- Lightfoot, Emma, and Tamsin C. O'Connell. 2016. 'On the Use of Biomineral Oxygen Isotope Data to Identify Human Migrants in the Archaeological Record: Intra-Sample Variation, Statistical Methods and Geographical Considerations'. *PLoS ONE* 11 (4): e0153850. <https://doi.org/10.1371/journal.pone.0153850>
- Madrigal, Lorena. 2006. *Human Biology of Afro-Caribbean Populations*. Cambridge: Cambridge University Press. <https://doi.org/10.1017/cbo9780511542497>
- Mays, Simon. 1999. 'A Biomechanical Study of Activity Patterns in a Medieval Human Skeletal Assemblage'. *International Journal of Osteoarchaeology* 9:68–73. [https://doi.org/10.1002/\(sici\)1099-1212\(199901/02\)9:1<68::aid-oa468>3.0.co;2-m](https://doi.org/10.1002/(sici)1099-1212(199901/02)9:1<68::aid-oa468>3.0.co;2-m)
- Mays, Simon, James Steele, and Mark Ford. 1999. 'Directional Asymmetry in the Human Clavicle'. *International Journal of Osteoarchaeology* 9:18–28. [https://doi.org/10.1002/\(sici\)1099-1212\(199901/02\)9:1<18::aid-oa455>3.3.co;2-1](https://doi.org/10.1002/(sici)1099-1212(199901/02)9:1<18::aid-oa455>3.3.co;2-1)
- Mickleburgh, Hayley L. 2015. 'Skeletons in the Closet: Future Avenues for the Curation of Archaeological Human Skeletal Remains in the Dutch Caribbean and the Rest of the Region'. In *Managing Our Past into the Future: Archaeological Heritage Management in the Dutch Caribbean*, edited by Corinne L. Hofman and Jay B. Haviser, 113–30. Leiden: Sidestone Press.
- Mitchell, Piers D., and Megan Brickley. 2017. 'Updated Guidelines to the Standards for Recording Human Remains'. Reading: Chartered Institute for Archaeologists.
- Momsen, Janet. 2010. *Gender and Development*. Abingdon: Routledge.
- Morsink, Joost. 2012. 'Archaeological Assessment Godet/Fort Amsterdam Cemetery (SE600) St. Eustatius, Caribbean Netherlands'. St. Eustatius, Dutch Caribbean: St. Eustatius Center for Archaeological Research (SECAR).
- Ogden, Alan. 2008. 'Advances in the Palaeopathology of Teeth and Jaws'. In *Advances in Human Palaeopathology*, edited by R. Pinhasi and Simon Mays, 285–309. London: John Wiley & Sons. <https://doi.org/10.1002/9780470724187.ch13>

- Okumura, M. 2011. 'The End of Slavery: Disease Patterns and Cultural Behaviours of African Americans in Suriname'. *International Journal of Osteoarchaeology* 21:631-42. <https://doi.org/10.1002/oa.1170>
- Oostindie, Gert. 2013. 'Confronting Caribbean Challenges: Hybrid Identities and Governance in Small-Scale Island Jurisdictions'. Leiden: Royal Netherlands Institute of Southeast Asian and Caribbean Studies (KITLV).
- . 2015. 'Modernity and the Demise of the Dutch Atlantic, 1650-1914'. In *The Caribbean and the Atlantic World Economy: Circuits of Trade, Money and Knowledge*, edited by Adrian Leonard and David Pretel, 108–36. London: Palgrave Macmillan UK.
- Ortner, D. J. 2003. *Identification of Pathological Conditions in Human Skeletal Remains*. Academic Press: London. <https://doi.org/10.1016/B978-0-12-528628-2.X5037-6>
- Ostapkowicz, Joanna, Fiona Brock, Alex C. Wiedenhoeft, Christophe Snoeck, John Pouncett, Yasmin Baksh-Comeau, Rick Schulting, et al. 2017. 'Black Pitch, Carved Histories: Radiocarbon Dating, Wood Species Identification and Strontium Isotope Analysis of Prehistoric Wood Carvings from Trinidad's Pitch Lake'. *Journal of Archaeological Science Reports* 16:341–58. <https://doi.org/10.1016/j.jasrep.2017.08.018>
- Palmisano, Alessio, and Andrea Titolo. 2024. 'The Good, the Bad and the Ugly: Evaluating Open Science Practices in Archaeology'. *Archeologia e Calcolatori* 35 (2): 75–84. <http://dx.doi.org/10.19282/ac.35.2.2024.09>
- Ponce, Paola. 2012. 'A Comparative Study of Markers of Occupational Stress in Coastal Fishers and Inland Agriculturalists from Northern Chile'. In *Proceedings of the Twelfth Annual Conference of the British Association for Biological Anthropology and Osteoarchaeology. BAR International Series 2380*, edited by Piers D. Mitchell and J. L. Buckberry, 71–85. Oxford: Hadrian Books.
- Prempeh, R. C., J. C. Gibson, and J. J. Bhattacharya. 2002. 'Mid-line clefts of the atlas: a diagnostic dilemma'. *Spinal Cord* 40: 92-93. <https://doi.org/10.1038/sj.sc.3101230>
- Price, T. Douglas, James H. Burton, Andrea Cucina, Pilar Zabala, Robert Frei, Robert H. Tykot, and Vera Tiesler. 2012. 'Isotopic Studies of Human Skeletal Remains from a Sixteenth to Seventeenth Century AD Churchyard in Campeche, Mexico: Diet, Place of Origin, and Age'. *Current Anthropology* 53 (4): 396–433. <https://doi.org/10.1086/666492>
- Queffelec, Alain, and Gwenaëlle Goude. 2025. 'An osteoarchaeological and isotopic analysis of 18th-century skeletal remains from St. Eustatius suggests these individuals were enslaved'. *Peer Community in Archaeology*, 100607. <https://doi.org/10.24072/pci.archaeo.100607>
- Rothschild, Bruce M., Matthew J. Zdilla, Lyman M. Jellema, and H. Wayne Lambert. 2020. 'Cribra Orbitalia is a Vascular Phenomenon Unrelated to Marrow Hyperplasia or Anemia: Paradigm Shift for Cribra Orbitalia'. *The Anatomical Record* 304: 1709-1716. <https://doi.org/10.1002/ar.24561>
- Schaefer, Maureen, Sue Black, and Louise Scheuer. 2009. *Juvenile Osteology: A Laboratory and Field Manual*. London: Academic Press. <https://doi.org/10.1016/B978-0-12-374635-1.00010-2>
- Schats, Rachel. 2023. 'Developing an Archaeology of Malaria: A Critical Review of Current Approaches and a Discussion on Ways Forward'. *International Journal of Palaeopathology* 41: 32-42. <https://doi.org/10.1016/j.ijpp.2023.03.002>
- Schoeninger, Margaret, and Katherine Moore. 1992. 'Bone Stable Isotope Studies in Archaeology'. *Journal of World Prehistory* 6 (2): 247–96. <https://doi.org/10.1007/bf00975551>
- Schroeder, Hannes, María Ávila-Arcos, Anna-Sapfo Malaspinas, G. David Poznik, Marcela Sandoval-Velasco, Meredith L. Carpenter, José Victor Moreno-Mayar, Martin Sikora, Philip L. F. Johnson, Morten Erik Allentoft, José Alfredo Samaniego, Jay B. Havis, Michael W. Dee, Thomas W. Stafford Jr., Antonio Salas, Ludovic Orlando, Eske Willerslev, Carlos D. Bustamante, C. and M. Thomas P. Gilbert. 2015. 'Genome-Wide Ancestry of 17th-Century Enslaved Africans from the Caribbean'. *Proceedings of the National Academy of Sciences* 112:3669–73. <https://doi.org/10.1073/pnas.1421784112>

- Schroeder, Hannes, Jay B. Haviser, and T. Douglas Price. 2014. 'The Zoutsteeg Three: Three New Cases of African Types of Dental Modification from Saint Martin, Dutch Caribbean'. *International Journal of Osteoarchaeology* 24 (6): 688–96. <https://doi.org/10.1002/oa.2253>
- Schroeder, Hannes, Tamsin C. O'Connell, Jane A. Evans, Kristrina Shuler, and Robert E. M. Hedges. 2009. 'Trans-Atlantic Slavery: Isotopic Evidence for Forced Migration to Barbados'. *American Journal of Physical Anthropology* 139:547–57. <https://doi.org/10.1002/ajpa.21019>
- Schroeder, Hannes, Kristrina A. Shuler, and Simon R. Chenery. 2013. 'Childhood Lead Exposure in an Enslaved African Community in Barbados: Implications for Birthplace and Health Status'. *American Journal of Physical Anthropology* 150:203–9. <https://doi.org/10.1002/ajpa.22193>
- Schulting, Rick, Mike Richards, John Pouncett, Bryan Naqqi Manco, Ethan Freid, and Joanna Ostapkowicz. 2018. 'Absence of Saharan Dust Influence on the Strontium Isotope Ratios on Modern Trees from the Bahamas and Turks and Caicos Islands'. *Quaternary Research* 89 (2): 394–412. <https://doi.org/10.1017/qua.2018.8>
- Seferidou, Eleni, Oriana Chiappa, Daniel Brito, and Nelda Issa Marengo Camacho. 2026. 'From Theory to Practice: Evaluating a Decade of Progress on Ethical Approaches in Human Bioarchaeological Research in the Caribbean Region'. In *Ethics in Caribbean Archaeology: Past, Present, and Future*, edited by Felicia Fricke, Eduardo Herrera Malatesta, and Maaïke S. de Waal. Gainesville, FL: University Press of Florida.
- Shuler, Kristrina. 2011. 'Life and Death on a Barbadian Sugar Plantation: Historic and Bioarchaeological Views of Infection and Mortality at Newton Plantation'. *International Journal of Osteoarchaeology* 21:66–81. <https://doi.org/10.1002/oa.1108>
- Shuler, Kristrina. 2005. Health, History, and Sugar: A Bioarchaeological Study of Enslaved Africans from Newton Plantation, Barbados, West Indies. PhD thesis, Southern Illinois University Carbondale.
- Siegel, Peter E., Corinne L. Hofman, Benoît Bérard, Reg Murphy, Jorge Ulloa Hung, Roberto Valcárcel Rojas, and Cheryl White. 2013. 'Confronting Caribbean Heritage in an Archipelago of Diversity: Politics, Stakeholders, Climate Change, Natural Disasters, Tourism, and Development'. *Journal of Field Archaeology* 38:376–90. <https://doi.org/10.1179/0093469013z.00000000066>
- Stahl, Ann Brower. 2016. 'Historical Process and the Impact of the Atlantic Trade on Banda, Ghana, c. 1800–1920'. In *West Africa During the Atlantic Slave Trade: Archaeological Perspectives*, edited by C. DeCorse, 2nd ed., 38–55. Oxford: Bloomsbury.
- Statia Government. 2022. 'Statia installs cultural heritage implementation committee - Engagement Community Is a Priority'. 19 October 2022. <https://www.statiagovernment.com/news-and-tenders/news/2022/10/19/statia-installs-cultural-heritage-implementation-committee> (accessed 22 March 2025).
- The Daily Herald (online). 2025. 'Community Discussion about Heritage, Reburial of Enslaved'. *The Daily Herald*, 10 February 2025. https://www.thedailyherald.sx/islands/community-discussion-about-heritage-reburial-of-enslaved?fbclid=IwY2xjawlgCtRleHRuA2FibQlxMQABHaRgyzCV_VFJ16VpJaVaS9Gflu7bc1E75KnnuyvKL047PBPN1WHq_2IKTg_aem_rjgcJKL-gGLD4dotmStK8Q&sfnsn=mo (accessed 20 October 2025).
- Valcárcel Rojas, Roberto, Darlene Weston, Hayley Mickleburgh, Jason Laffoon, and Anne van Duijvenbode. 2011. 'El Chorro de Maíta: A Diverse Approach to a Context of Diversity'. In *Communities in Contact: Essays in Archaeology, Ethnohistory and Ethnography of the Amerindian Circum-Caribbean*, edited by Corinne Hofman and Anne van Duijvenbode, 225–51. Leiden: Sidestone Press.
- Varney, Tamara L. 2003. Reconstructing Diet and Tracing Life Histories in Colonial Populations of the Northeastern Caribbean using Stable Carbon and Nitrogen Isotopes (Antigua, Guadeloupe, Montserrat). PhD thesis, University of Calgary.
- Varney, Tamara L. 2007. 'Does Diet Reflect Group Membership? A Stable Isotope Analysis of Human Remains from the Royal Naval Hospital Cemetery at English Harbour, Antigua'. In

- Proceedings of the 21st International Congress of Caribbean Archaeology, St Augustine, Trinidad*, 667–76.
- Victorina, Amy A. and Claudia Kraan. 2012. *Vondsten uit de Bodem van Fleur de Marie te Curaçao: Een Archeologisch Bureau - en Inventariserend Veldonderzoek*. Curaçao: National Archaeological Anthropological Memory Management (NAAM).
- Villotte, Sébastien, and Christopher J. Knusel. 2014. “‘I Sing of Arms and of the Man...’: Medial Epicondylitis and the Sexual Division of Labour in Prehistoric Europe’. *Journal of Archaeological Science* 43:168–74. <http://dx.doi.org/10.1016/j.jas.2013.12.009>
- Walker, Phillip L., Rhonda R. Bathurst, Rebecca Richman, Thor Gjerdum, and Valerie A. Andrushko. 2009. ‘The Causes of Porotic Hyperostosis and Cribra Orbitalia: A Reappraisal of the Iron-Deficiency-Anemia Hypothesis’. *American Journal of Physical Anthropology* 139:109–25. <https://doi.org/10.1002/ajpa.21031>
- Watters, David R. 1994. ‘Mortuary Patterns at the Harney Site Slave Cemetery, Montserrat, in Caribbean Perspective’. *Historical Archaeology* 28:56–73. <https://doi.org/10.1007/bf03374190>
- Wilczak, Cynthia, Rachel Watkins, Christopher C. Null, and Michael L. Blakey. 2009. ‘Skeletal Indicators of Work: Musculoskeletal, Arthritic, and Traumatic Effects’. In *Skeletal Biology of the New York African Burial Ground, Part 1*, edited by Michael Blakey and Lesley M Rankin-Hill, 199–226. Washington, DC: Howard University Press.
- Zdilla, Matthew J., Nicholas S. Nestor, Bruce M. Rothschild, and H. Wayne Lambert. 2021. ‘Cribra Orbitalia is Correlated with the Meningo-Orbital Foramen and is Vascular and Developmental in Nature.’ *The Anatomical Record* 305: 1629-1671. <https://doi.org/10.1002/ar.24825>