Andean Past

Volume 14 *Andean Past 14* Article 16

8-30-2024

Pre-Columbian Tattooing Methods on the Peruvian Central Coast

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Pre-Columbian Tattooing Methods on the Peruvian Central Coast

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The number of tattoos documented on preserved human remains from archaeological contexts found along the Peruvian Central Coast presently outstrips any other region on Earth (Deter-Wolf 2023). This density likely reflects the unique preservation conditions of the region, but also reveals that the practice was widespread and deeply embedded in the pre-Columbian cultural milieu. Examples of preserved tattoos from the region have been described in archaeological literature since the late nineteenth century (see Deter-Wolf *et al.* 2024a). Nevertheless, the contemporary understanding of ancient Andean tattooing practices remains fragmentary. There are no definitive identifications of tattooing tools or other associated material culture from any site in the Andes (*ibid.*), and there has been little discussion of the method(s) used to create tattoos.

Herein we present the results of non-destructive digital imaging of tattoos preserved on pre-Columbian Andean remains in the collection of the Ethnologisches Museum of the Staatliche Museen zu Berlin (EMB). Analysis of the physical traits of those tattoos demonstrates that during the Late Intermediate Period (*c.* 1000–1470 C.E.) tattooers on the Peruvian Central Coast marked the skin using both puncture and incision techniques.

The Collection

Research at the EMB in 2023 examined ninety tattooed, disarticulated limbs and skin fragments representing a maximum of eighty-three pre-Columbian Andean individuals (Table 1). The sample was selected based on an initial collections study by Gerst. No complete bodies were included in this analysis, and sex could not be determined for any individual due to the fragmentary nature of the remains. All were judged to be adults based on relative size.

The Andean remains housed in the EMB were acquired in Peru between approximately 1868 and 1909. Museum accession records attribute most of the examined materials (n=49) to the efforts of Lima resident and textile merchant Wilhelm Gretzer. Seventeen of the examined remains are associated with excavations at Ancón by Wilhelm Reiß and Alphons Stübel (see Reiß and Stübel 1879: Plate 29), and nine were obtained by ethnographic collector Arthur Baessler. In addition to Ancón, specific locations identified in collections data include Chuquitanta, Huaca Caudivilla, Nazca, Magdalena, Pachacamac, and possibly Zapallal (Figure 1; see Table 1).

The precise chronological origins of the EMB collection are unclear due to incomplete provenience data. However, a stylistic comparison of the preserved tattoos with evidence from the art historical record and dated examples of tattooed remains from the region (*e.g.*, Enciso and van Dalen Luna 2023;

Morgan 2012) suggests the sample skews overall towards the Late Intermediate Period.

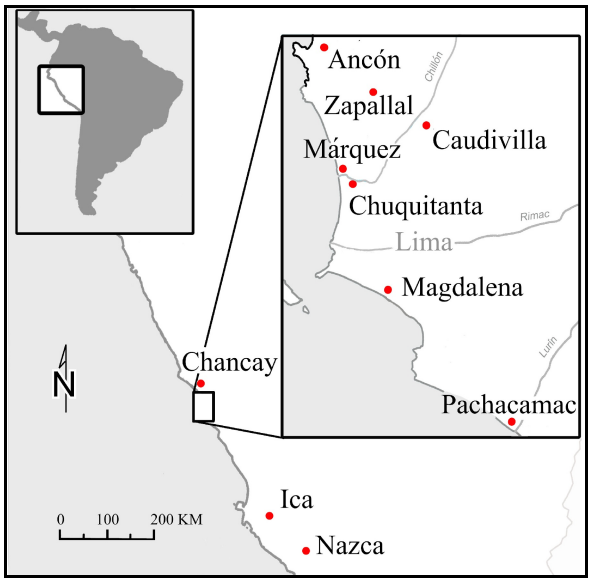

Figure 1. Map showing the location of sites identified in this article. Drawing by Benoît Robitaille.

Methods

All remains were documented using a variety of non-destructive digital techniques. An Olympus E-P2 Micro Four Thirds digital camera was first used to record high-resolution RAW (.ORF) images. Selected images were subsequently postprocessed using the DStretch enhancement plugin for ImageJ software in order to visualize faint tattoos (Göldner and Deter-Wolf 2023).

The samples were further documented as high-resolution RAW (.CRW) images using a Canon EOS M50 Mark II digital camera converted for infrared photography by Kolari Vision. Subjects were photographed under a combination of indirect institutional lighting and direct illumination with an ORDRO LN-3 infrared LED (20 diodes, 850nm wavelength). All infrared images were postprocessed in Adobe Photoshop to adjust color and contrast.

Finally, a Dino-Lite Edge digital microscope and DinoCapture 2.0 software were used to record details of selected tattoos at magnifications up to 220x. Selected microscope images were postprocessed in Adobe Photoshop and/or using the DStretch plugin in ImageJ.

The resulting digital documentation was examined for information on pigment distribution and physical characteristics of the tattooed skin. These traits were compared to published descriptions and illustrations of preserved Andean tattoos, as well as to physical data from experimental studies examining the characteristics of tattoos created using different pre-electric methods and tools (Deter-Wolf *et al.* 2022). That recent research reveals that different tools and methods of tattooing produce marks with discernable physical characteristics. The same data set was recently used to reassess the tattoos of the European Copper Age individual "Ötzi," (Deter-Wolf *et al.* 2024b), thereby demonstrating the utility of the approach.

Results

The tattoos present on all ninety examined samples were entirely solid blackwork, with no evidence of color pigments, deliberate gradations, or shading. Tattoos varied in extent from relatively simple, isolated motifs to full, complex geometric sleeves composed of multiple design elements (Figure 2). Tattooing methods were unclear for fifteen of the examined remains due to incomplete preservation. The physical traits of all remaining tattoos in the collection reveal they were created by either puncture or incision methods.

Puncture tattooing involves the direct insertion of pigment into the skin on the tip(s) of a tool and is the most frequent method of pre-electric tattooing at a global scale (Robitaille *et al.* 2024). Puncture tattooing

results in marks that under magnification exhibit uneven edges resulting from the placement of adjacent wounds (Deter-Wolf *et al.* 2022). Filled areas may appear solid to the naked eye, but under close examination exhibit distinctive internal stippling and variations in pigment density (Deter-Wolf *et al.* 2022). A total of fifty-four specimens from the EMB collection were marked exclusively by puncture tattooing (Figure 3). Puncture tattoos within the EMB sample include fine line work, filled black zones, and geometric bands sometimes constructed around negative (untattooed) space.

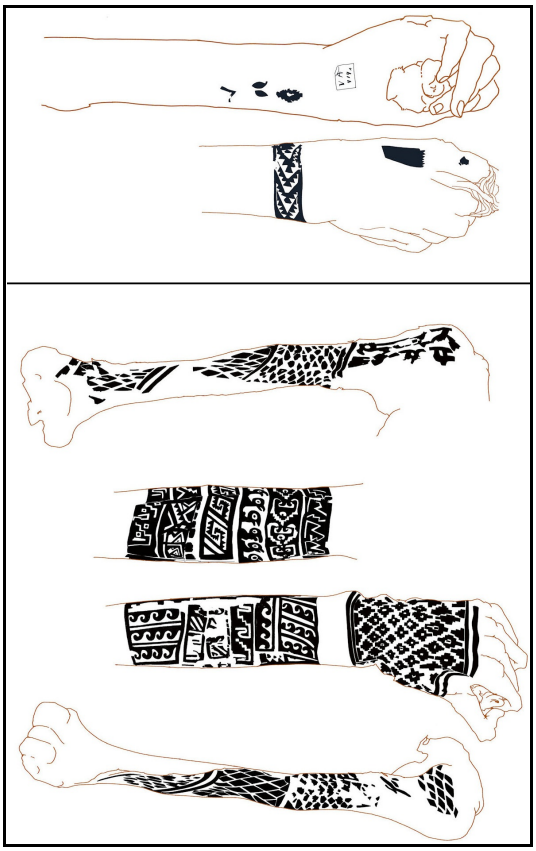

Figure 2. Examples of tattooed remains in the collection of the Ethnologisches Museum of the Staatliche Museen zu Berlin (V A 414 a, top; V A 5892, bottom). Drawings by Benoît Robitaille, after infrared photographs.

Figure 3. Infrared image showing puncture tattooing on the exterior forearm of V A 5901.

In one example from the EMB collection, (V A 60484 a) an isolated puncture tattoo mark was identified 2.6 milimeters outside of the nearest composition (Figure 4). That mark measures approximately 1.2 millimeters in diameter and, from the distribution of pigment, appears to have been created by a tool composed of six or seven fine points bundled into a round cluster. This arrangement is evocative of bundled cactus spines used historically for puncture tattooing by indigenous cultures elsewhere in South America, including the upper Amazon and Rio de la Plata watersheds and the Argentinian Chaco (see Deter-Wolf *et al.* 2024a).

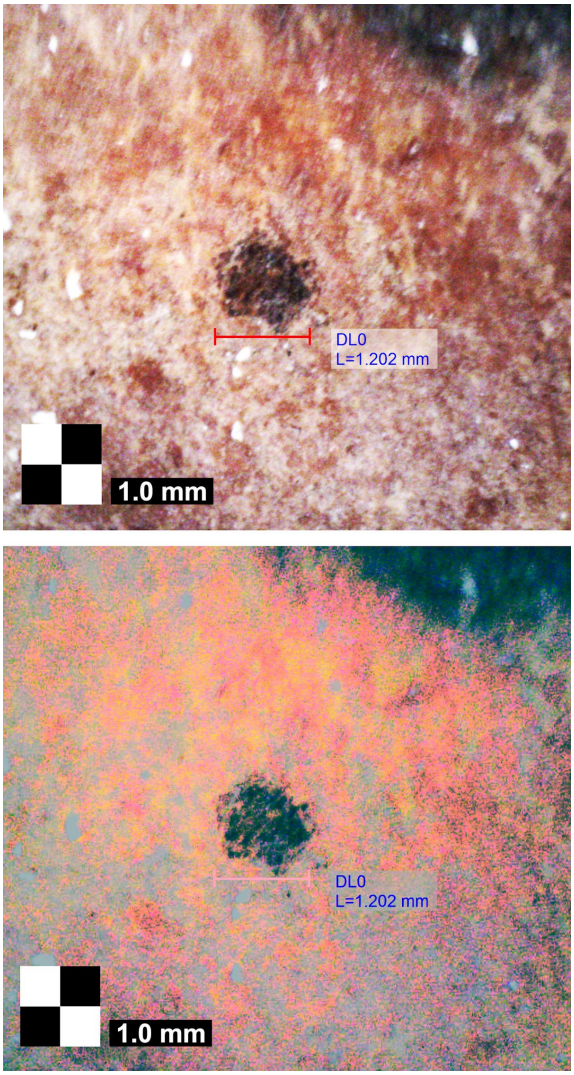

Figure 4. Microscopic detail of stray puncture tattoo mark on V A 60484 a (top), visualized using the DStretch YBL colorspace (bottom).

Incision tattooing employs a sharp tool to slice the epidermis in continuous cuts or to create small, closely spaced wounds (Robitaille *et al.* 2024). Tattooed lines created using this method are extremely thin, have clean margins, and exhibit tapering at one or both ends (Deter-Wolf *et al.* 2022) (Figures 5 and 6). Individual incised lines generally measure 0.2–0.3 millimeters wide, with some approaching 0.5 millimeters.

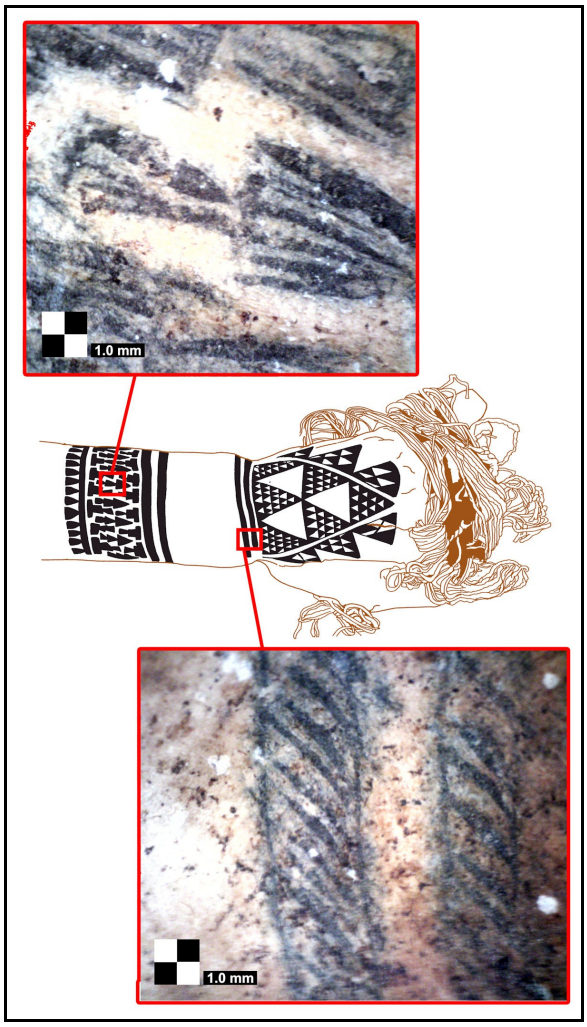

Figure 5. Incision tattooing on the exterior forearm of V A 60425. Drawing by Benoît Robitaille, after infrared photographs.

The lithic and metal tools used most frequently for incision tattooing in the global cross-cultural sample are nonporous, and so do not effectively transmit pigment into the skin (see Robitaille *et al.* 2024). As a result, incision tattooing typically includes a second step in which pigment is introduced into cut wounds by being rubbed in from the surface. This action will also remove any pre-marked stencil from the skin surface, and suggests that Andean tattooers working by incision did not pre-draw their designs, or perhaps developed a compartmentalized workflow of drawing,

cutting, and rubbing pigment into progressive sections.

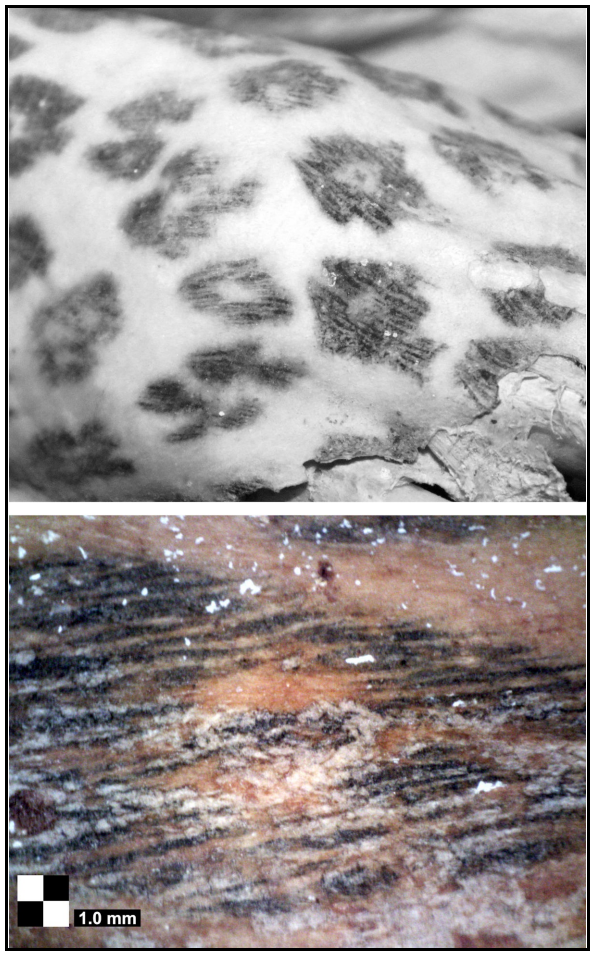

Figure 6. Infrared image of incision tattooing on V A 60484 b, and microscope detail of the incised lines within one fish motif.

Five of the examined remains in the EMB collection were tattooed entirely by incision, while sixteen examples featured tattoos created by both incision and puncture within the same composition(s) (Figures 7 and 8). No patterns were apparent regarding the selection of techniques as related to motifs or locations on the body.

Few tattoos observed in the EMB collection show evidence of motifs being outlined before they were filled in. All examples of incision tattooing, and some cases of puncture tattooing, were created as series of closely spaced parallel lines (see Figures 5 through 8). This line stacking method has been documented on other Andean remains (Deter-Wolf *et al.* 2024a), and is frequently used to create horizontal bands that comprise the borders of geometric compositions on forearms and wrists (see Figure 8). This technique visually recalls how patterns are constructed in weaving, using sequential passes of threads along the warp and weft to create parallel structures.

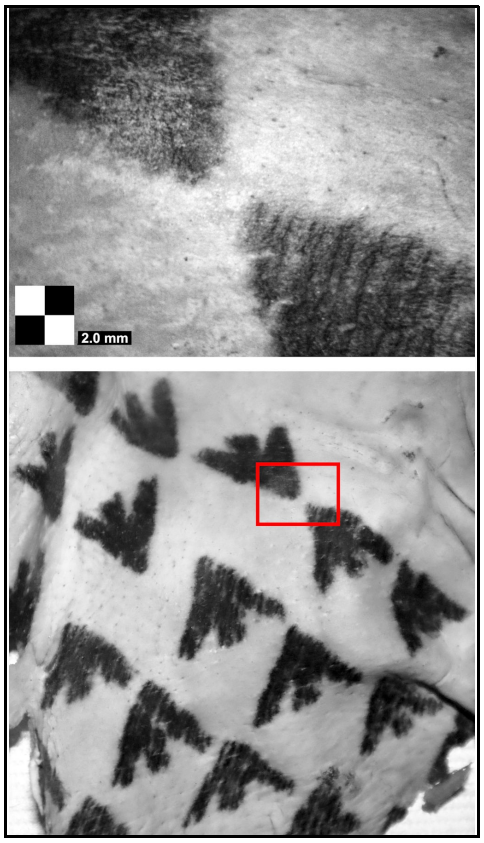

Figure 7. Incision (motifs pointed towards the top of frame) and puncture tattoos (motifs pointed towards the bottom of frame) within a single composition on V A 5890, seen in infrared and under magnification.

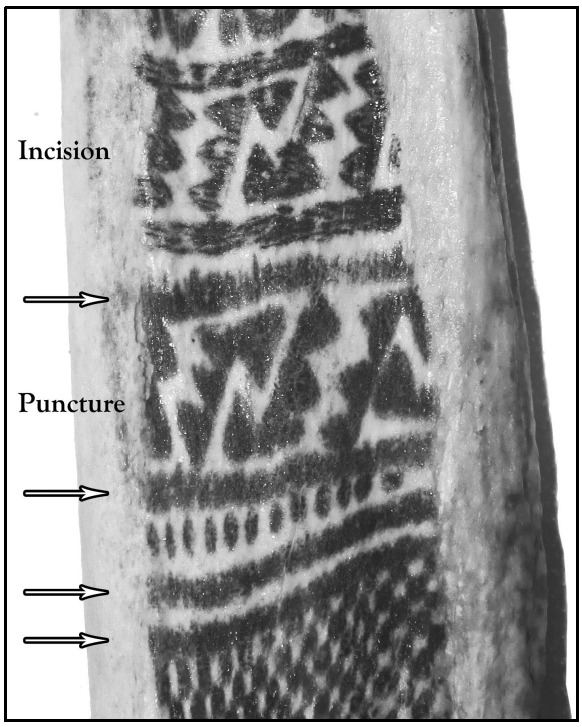

Figure 8. Infrared image of the interior forearm of V A 60469 showing incision and puncture tattooing within a single composition. Arrows denote line stacking technique created by puncture tattooing.

One example in the EMB collection, a right arm collected by Reiß and Stübel at the site of Ancón (V A 5915), exhibits overlapping marks that reveal sequential tattooing episodes. Along the top of the forearm, darkly filled motifs overlap a row of previously tattooed, lighter triangles (Figures 9 and 10). On the interior of the same forearm, a series of what may be eyed diamonds are mostly covered over by later, solid black ovals.

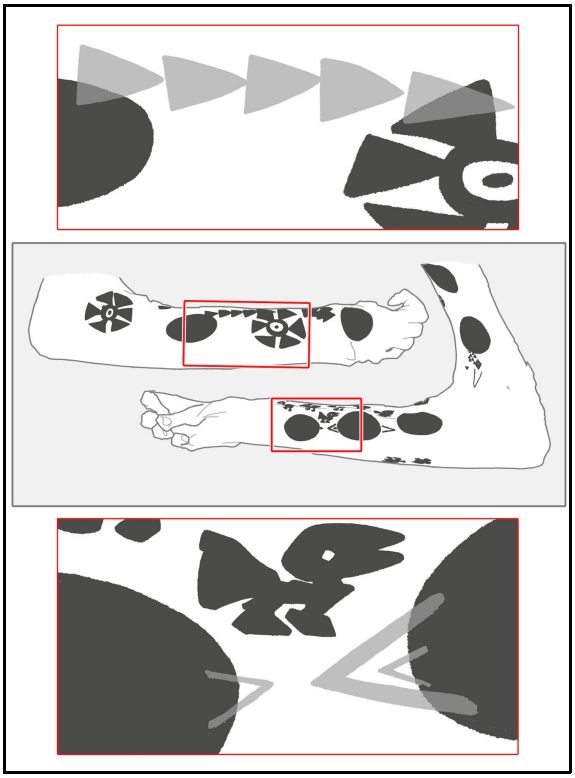

Figure 9. Overlapping tattoos on the forearm of V A 5915. Drawings by Benoît Robitaille, after infrared photographs.

Figure 10. Infrared images of overlapping tattoos on the forearm of V A 5915.

Discussion

Marvin Allison and colleagues (1981:220–221) were among the first researchers to suggest the presence of multiple tattooing techniques in the pre-Columbian Andes. Through their examinations of preserved marks from the Ancash and Ica regions, Allison and colleagues hypothesized that pre-Columbian Andean tattooing employed both direct puncture and "stitching" methods. That second tattooing technique, today popularly known as "skin stitching", occurred historically in both Patagonia and eastern Brazil. In those regions, pierced cactus spines and, more recently, eyed metal needles were used to pull pigment-infused thread or sinew laterally beneath the epidermis (see Deter-Wolf *et al.* 2024a; Robitaille *et al.* 2024). As with other forms of tattooing, the "stitching" technique results in distinctive physical traits (Deter-Wolf *et al.* 2022). No examples of this method were identified in the EMB collection.

The identification of both puncture and incision tattooing in the EMB sample reaffirms the conclusions of researchers working at the site of Cerro Colorado. From a study of seventy-one mummified individuals, van Dalen Luna and colleagues (2018:361) suggested that Chancay inhabitants of that site were tattooed primarily by incision, and less frequently by puncture. Their identification of the incision method in that sample was correctly made based on tattoos consisting of multiple short, fine lines of pigment (Van Dalen Luna *et al.* 2018: figures 24 and 25).

The pre-Columbian artisans who created tattoos along the Peruvian Central Coast carefully planned their compositions, intertwining complicated iconographic and geometric compositions both within and independent of framing elements. Designs were laid out to account for undulations in the skin surface, and to employ both positive and negative space. The presence of multiple tattooing techniques, and therefore multiple yet-to-be-identified tool types, further reiterates craft specialization associated tattooing in Andean communities. To successfully create the intricate designs of Central Coast tattooing, practitioners would have been trained in the use, and possibly the creation, of both puncture and incision tools, as well as associated material culture such as pigments and ritual paraphernalia (Deter-Wolf 2013:15–20). The consistency and quality of tattoos in the EMB collection associated with multiple sites suggests these artists were not self-taught, but, instead, operated within an established craftwork tradition.

In the global sample of indigenous and historical tattooing traditions, there are frequent correspondences of skills and social roles between tattooers and other craftspeople (*e.g.*, Krutak 2007:15–16). The weaving-like approach to building some tattoos as sequential parallel lines perhaps suggests a connection between these practices. Weaver's toolkits or work baskets recovered archaeologically in the Andes sometimes contain fine, eyed needles (*e.g.*, Marcus 2015:15; Menzel 1977:14) used for tasks including finishing borders, seaming together larger pieces, embroidery, and creating netting (d'Harcourt 2002). Those same implements, along with eyeless needles, cactus spines, and bone and metal awls found within work baskets and funerary assemblages may also have acted as tattooing puncturing tools.

Tattooing in indigenous and historical societies was rarely a single event. Instead, an individual's tattoos evolved and expanded over their lifetime, mediated through changes to their social role, identity, beliefs, relationships, and accomplishments (*e.g.*, Krutak 2007). This study presents the first evidence of sequential tattooing in any archaeological culture. In the

example from Ancón, new tattoos were not intended to entirely cover or hide earlier marks, but neither did they avoid the space occupied by prior compositions. This reveals that tattoos were neither static nor sacrosanct, at least for some pre-Columbian Andean individuals.

Conclusions

This effort comprises the largest dedicated examination to date of tattoos preserved on archaeological remains from any region on Earth. Non-destructive digital imaging of preserved Andean remains in the EMB collection affirms that Late Intermediate Period tattooing on the Peruvian Central Coast included both puncture and incision techniques. These were not exclusive practices, but rather, as documented here for the first time, appear alongside one another on individual bodies and even within the same compositions. This duality may reflect stylistic or cultural choices by a single tattooers, or, perhaps, indicate marks received from separate tattooers in different cultural or geographic settings.

Understanding the methods of Late Intermediate Period tattooing on the Peruvian Central Coast lays the groundwork for future informed identifications of tattooing artifacts in archaeological and museum collections, and provides new perspectives through which to evaluate pre-Columbian communities of the region. To this end, future research should continue to include non-destructive, high-resolution digital documentation of preserved remains to create a permanent record of these fragile materials. That documentation can be used to understand geographic and chronological variations in tattooing methods and motifs, to identify and explore commonalities between tattoos and iconography from other forms of material culture, and to aid in the reconciliation of colonial collections and their places of origin.

The present research builds on an emerging picture of the Peruvian Central Coast as the center of a vibrant, yet relatively unrecognized indigenous tattooing tradition that existed at a scale potentially without parallel in the pre-modern world. Following millennia of cultural expression, these traditions were extinguished during European conquest, leaving virtually no trace in colonial histories. Recognizing the significance of tattooing to the lived experiences of pre-Columbian Andean communities, and foregrounding the discussion and archaeological documentation of those traditions will set in motion the recovery process of an important aspect of indigenous culture. This will open a little-explored branch of Andean iconography that is bound to yield new insights into coastal cosmovision, religion, and ritual practice, while simultaneously contributing to the construction of contemporary Peruvian cultural identity and the formation of modern communities of practice. Through careful and respectful documentation, tattooed pre-Columbian communities of the Andean Central Coast may once again share their cultural knowledge.

Acknowledgments

The authors thank the staff of the Ethnologisches Museum of the Staatliche Museen zu Berlin. Tina Brüderlin, Ute Schüren, Manuela Fischer, Kai-Patricia Engelhardt, and Jule Padluschat all provided essential guidance and collections assistance. Comparative data used in this analysis were gathered with the support of an Experimental Archaeology grant from John Kiernan and EXARC (https://exarc.net/ark:/88735/10654).

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Museum Nº	Element	Collector/Year	Location	Techniques	Notes
V A 414 a	R. hand and forearm	Otto Antonio Heredia (1872, Collector) Theodor von Bunsen (1872, Seller)	Zapallal? ("Three leagues from Carabello [Carabayllo?] on the way to Chancay")	puncture	Match with V A 414 b
V A 414 b	R. hand and forearm			puncture	Match with V A 414 a
V A 414 c	R. hand and forearm			puncture	
V A 414 d	R. hand and forearm			puncture	
V A 5889 a	Skin from torso	Wilhelm Reiß and Moritz Alphons Stübel (1868-1876)	Ancón	puncture	Match with V A 5889 b
V A 5889 b	Skin from torso			puncture	Match with V A 5889 a
V A 5890	Skin from torso			puncture, incision	
V A 5891	R. arm from shoulder to hand			puncture	Match with V A 5892
V A 5892	L. arm from shoulder to hand			puncture	Match with V A 5891
V A 5893	R. hand and forearm			puncture, incision	
V A 5894	R. hand and forearm			puncture, incision	
V A 5895	L. hand and forearm			puncture	
V A 5896	L. hand and forearm			puncture	
V A 5897	L. hand and forearm			puncture	
V A 5898	L. hand and forearm			puncture	
V A 5899	R. hand and forearm			puncture	
V A 5900	L. hand and forearm			puncture	May match with V A 5901
V A 5901	R. hand and forearm			puncture	May match with V A 5900
V A 5910	R. lower leg and foot			unclear	Match with V A 5911
V A 5911	L. lower leg and foot			unclear	Match with V A 5910
V A 5915	R. arm from shoulder to hand			puncture, incision	
V A 11633	L. hand and forearm	von Gehlig (1895)	Ancón	incision	
V A 16612	R. hand and forearm	Bolivar (1909)	Nasca	puncture, incision	
V A 2616 a	L. hand and forearm	W. Velten (1877)	Ancón	puncture	
V A 2616 b	L. hand and forearm			puncture	
V A 28484	head	Arthur Baessler (1896-1898)	Huaca Capila Marquez	unclear	
V A 28494	head		Chuquitanta	unclear	
V A 28501	head		Chuquitanta	unclear	
V A 28505	L. hand and forearm		Chuquitanta	puncture	
V A 28506	L. hand and forearm		Chuquitanta	puncture, incision	
V A 28507	R. hand and forearm		Accession data states Chuquitanta, but labeled Caudivilla	puncture	
V A 28508	L. hand and forearm		Accession data states Chuquitanta, but labeled Caudivilla	puncture, incision	

Table 1. Summary of remains from the Ethnologisches Museum of the Staatliche Museen zu Berlin examined in this study.

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Museum Nº	Element	Collector/Year	Location	Techniques	Notes
V A 28509	L. hand and forearm		Chuquitanta	puncture	May match V A 28510
V A 28510	R. hand and forearm		Chuquitanta	puncture	May match V A 28509
V A 33629	L. hand and forearm	Eduard and Caecilie Seler (1905)	Chancay	puncture, incision	
V A 34535	R. hand and forearm	Dr. A. E. Pannenberg (1913)	Peru	puncture	
V A 43183	R. hand and forearm	Wilhelm Gretzer (1873-1904)	Pachacamac	unclear	
V A 60392	R. hand and forearm		Chuquitanta	puncture	
V A 60393	L. hand and forearm		Chuquitanta	puncture	
V A 60394	R. hand and forearm		Chuquitanta	puncture	
V A 60395	R. hand and forearm		Chuquitanta	puncture	
V A 60397 a	R. hand and forearm		Chuquitanta	puncture	Child / subadult; match with V A 60397 b
V A 60397 b	L. hand and forearm		Chuquitanta	puncture	Child / subadult; match with V A 60397 a
V A 60398	R. hand and forearm		Magdalena (Lima vicinity?)	puncture	
V A 60401	head		Lima vicinity	unclear	
V A 60425	L. hand and forearm		Ica region	incision	
V A 60426	R. hand and forearm		Ica region	unclear	
V A 60469	R. hand and forearm		Pachacamac (Labeled "Lurin")	puncture, incision	
V A 60470	R. hand and forearm		Pachacamac	puncture	
V A 60471	R. hand and forearm		Pachacamac	puncture	
V A 60472	R. hand and forearm		Pachacamac	puncture	
V A 60473	R. hand and forearm		Pachacamac	puncture	
V A 60474	R. hand and forearm		Pachacamac	puncture	
V A 60475	R. hand and forearm		Pachacamac	unclear	
V A 60475 a	R. hand and forearm		Pachacamac	puncture	
V A 60476	L. hand and forearm		Pachacamac	puncture	
V A 60477	L. hand and forearm		Pachacamac	puncture, incision	
V A 60479	L. hand and forearm		Pachacamac	puncture, incision	
V A 60481	L. hand and forearm		Pachacamac	puncture	
V A 60484 a	L. lower leg and foot		Pachacamac	puncture, incision	Match with V A 60484 b
V A 60484 b	R. lower leg and foot		Pachacamac	incision	Match with V A 60484 a
V A 60485 a	L. lower leg and foot		Pachacamac	unclear	Match with V A 60485 b
V A 60485 b	R. lower leg and foot		Pachacamac	unclear	Match with V A 60485 a
V A 60487	L. hand and forearm		Pachacamac	unclear	
V A 60541 b	L. hand and forearm		Pachacamac	puncture	

Table 1. Summary of remains from the Ethnologisches Museum of the Staatliche Museen zu Berlin examined in this study.

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Museum Nº	Element	Collector/Year	Location	Techniques	Notes
V A 60542	R. hand and forearm		Pachacamac	puncture	
V A 60543	L. hand and forearm		Pachacamac	puncture	
V A 60553	L. lower leg and foot		Peru	unclear	
V A 60554	R. foot		Peru	puncture, incision	
V A 60556	L. hand and forearm		Peru	puncture	
V A 60557	R. hand and forearm		Peru	puncture, incision	
V A 60558	L. hand and forearm		Peru	puncture	
V A 60559	L. hand and forearm		Peru	puncture	
V A 60560	R. hand and forearm		Peru	puncture	
V A 60561	R. hand and forearm		Peru	unclear	
V A 60562	R. hand and forearm		Peru	puncture	
V A 60563	L. hand and forearm		Peru	puncture, incision	
V A 60564	R. hand and forearm		Peru	unclear	
V A 60565	R. hand and forearm		Peru	puncture	
V A 60566	R. hand and forearm		Peru	puncture	
V A 60567	L. hand and forearm		Peru	puncture, incision	
V A 60568	L. hand and forearm		Peru	puncture	
V A 60569	L. hand and forearm		Peru	puncture	
V A 60570	R. hand and forearm		Peru	puncture	
V A 60571	L. hand and forearm		Peru	puncture	
V A NLS 1738	L. thumb	unknown	No further information	puncture	Stylistic evaluation suggests Peruvian Central Coast origin
V A NLS 1743	R. hand and forearm	unknown	No further information	puncture	Stylistic evaluation suggests Peruvian Central Coast origin
V A NLS 1749	Head and upper chest	unknown	No further information	puncture	Stylistic evaluation suggests Peruvian Central Coast origin
Shelf 7A	L. leg and foot	unknown	unknown	incision	Stylistic evaluation suggests Peruvian Central Coast origin
Shelf 7A	R. leg and foot	unknown	unknown	incision	Stylistic evaluation suggests Peruvian Central Coast origin

Table 1. Summary of remains from the Ethnologisches Museum of the Staatliche Museen zu Berlin examined in this study.