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# A review of pre-Hispanic dental decoration in Colombia and report of two new cases\*

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## Abstract

A review of the subject in Colombia and two new cases are reported for this country. A comparison is made of the cases found in Colombia with others of the E1 type in Mesoamerica in times close to the year 1000 BP. Another possible case B3-B6 is mentioned. The origin of this cultural practice in the region is discussed and it is concluded as a result of contacts with groups from the near Atlantic and Pacific coasts in earlier times.

**Keywords:** dental anthropology; dental decoration; Latin America; Colombia

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## Introduction

The practice of pre-Hispanic dental decoration has been widely referenced in studies of dentistry, archeology, and biological anthropology in America for more than 150 years (1). The intentional modification of teeth is a widely reported research topic around the world in the archaeological literature (2). Motivated by the quantity, context, time period, and ostentation of the findings, some researchers have proposed classifications (3,4) and typologies to identify stylistic patterns (5-13). In some cases, the stylistic patterns of intentional dental modification have been successfully associated with periods, cultural development zones, and chronology (14-17). These efforts have been useful in solving some local problems around the world related to contact between groups (18,19) and it is believed that their causes were due to different factors such as ornamentation, decoration or aesthetics (20-23), mourning expression, rites of initiation, marriage (24-26), imitation of power attributed to animals (20), status, trophies (27,28), divinity, and sacrifices (2,3,29,30). Other different evidences also allow us to see in some cases this practice in pottery (31), and ritual necklaces (32), but this field of research has been rarely explored. This is a very interesting field of research for Northern Andes Archaeology, although it is limited to very few cases. The objective of this research is to report a new case of intentional dental modification in a pre-Hispanic sample from northern Colombia.

## Materials

The pre-Hispanic cemetery of El Copey was excavated in multiple seasons within the archeology project entitled " Programa de Rescate y Monitoreo Arqueológicos en la Línea A500 kV Bolívar, El Copey, Ocana, Primavera y obras asociadas " financed by the Empresa de Interconexión Eléctrica ISA E.S.P. and executed by Instituto de Estudios Regionales de la Universidad de Antioquia INER, and later by the GAIA Foundation of Medellín city (33).

This cemetery was used by the pre-Hispanic inhabitants between the years 920 and 1550 AD. in the area currently known as El Copey, located in the Department of Cesar, in Northern Colombia. The total sample of skeletons from El Copey described here corresponds to 122 individuals (32 males, 43 females, 47 indeterminate) analyzed during 3 laboratory seasons between 2005 and 2017 (34). The bone samples were re-buried in 2017 through a re-burial ritual carried out by the local Arahua

community (Kogi) near the site of the archaeological excavations.

## Methods

A visual inspection of the teeth that presented the intentional modification was performed. The form was compared with the typologies of Romero (17). A query was made about references to other cases in Colombian archaeology.



Figure 1. Upper central incisors with decoration type E1. El Copey, Cesar, Colombia.

## Results

The individual E21-1 (female adult) presented intentional modification of the upper central incisors with incrustation of some material (not recovered during excavation) and reflects the E1 type (16,17). Type E1 is characterized by a simple circular inlay on the labial surface of the crown in the maxillary anterior teeth. In some cases, this type has also been reported in upper premolars and lower anterior teeth. In the physical anthropology report of Moscoso (33) was described as a fracture of the enamel. It is not abrasion or attrition since it does not limit the loss of enamel to mechanical factors (35). It does not correspond to a natural fracture of the enamel since these follow a vertical linear pattern or with closed angles (36). It is not localized hypoplasia that has caused posterior circular erosion, since it only occurs in central incisors, it is symmetrical and a slight carving can be observed on the upper and lateral edges of the circles (37). The distal surfaces of the midportion of the crowns show slight carving. The scale was not present when the material arrived at the laboratory for analysis. It is not possible to be certain of the moment of the loss of the inlays or the material with which they were made. Judging by the mud

that covered the holes, it can be thought that the encrustations fell at some point postmortem.



**Figure 2.** A lower central incisive with possible filing type B3-B6. Taken from Moscoso (2008).

Figure 1 shows the described feature. Another individual from Ent. 108 (re-buried) with unknown sex and age, presented intentional modification of the lower central incisors with very possible filing Type B3 combined with B6 (16,17), but it was confused as bruxism in the physical anthropology report of Moscoso (33). This last specimen was only recorded in the Moscoso report (33) with a low-quality photo and description (see with arrow in Fig. 2), and for this

reason we only mention here a possible case, since it could not be verified by the author under direct observation. Type B3 can be described as enamel carving removing a lateral portion of the crown and giving a J-shaped appearance. Type B6 is similar but with straight edges and an open angle close to 145 degrees (12). This last case can be confused with some type of occlusion or unintentional wear of the crown due to occupational practices, however, this type of wear generally accompanies both incisors (upper and lower) and it is not possible to verify here. This last case is not included in the final interpretation.

### Discussion and conclusion

From lines of archaeological evidence related to oral decoration, there are few depictions of intentional tooth modifications reported in pottery. Duque (38) reported a gold mask from Calarcá (Quindío) located in the British Museum with this characteristic, and a ceramic head from Tello (Huila). There are reports of a few other cases on intentional modification of the teeth of sightings and observations in some indigenous communities. Table 1 lists the case reports to date, where cases of pre-Hispanic skeletons and ethnographic descriptions are presented together.

**Table 1.** Cases of skulls with dental decoration reported for Colombia.

Region	Sample	Chronology BP	Culture	Type	Reference
Sogamoso	Suesca	1700	Muisca	E1	Duque, 1963
Amazonas	ICANH 036	Post-Hispanic	Unknown	¿?	Duque, 1963
Amazonas	ICANH 035	Post-Hispanic	Unknown	¿?	Duque, 1963
Amazonas	Ticuna	Post-Hispanic	Arawak	C8	Tessman, 1930
Amazonas	Miranas	Post-Hispanic	Huitoto	C8	von Martius, 1867
Amazonas	Churoye	Post-Hispanic	Guahibo	C8	Andre, 1884
Andes	Chucunes	Post-Hispanic	Chibcha	C8	Andre, 1884

A review of the database of the project "Construction of a dental database of American indigenous human groups for continental consultation and comparisons" (1) indicates that the type of incrustation E1 appears in numerous skulls and isolated teeth of America (153 pre-Hispanic individuals at least). In Mexico there are records of 109 cases with this pattern, in Guatemala 25, Belize 4, Honduras 3, El Salvador 3 and Costa Rica 1. The records indicate that the E1 type exists since the period called Early or Lower Preclassic since 3600 BP (39). In the case of South America, the E1 type has only been reported in 8 cases from Ecuador, all of them from diffuse contexts, but associated with the last 800 years BP.

We must pay particular attention to the specimens described by Saville (6) from Tosumpa (Esmeraldas Province) and Tonchigue (Manabi Province), since they denote a gold wire that served as a support and hook for the gold drops on the labial surface of the upper central incisors. That same wear in the mesial and distal surfaces of the midportion of upper central incisors could be observed in the El Copey specimen recorded here (Fig. 3). In this area, gold threads and wires have been associated with fine goldsmith work (40,41). An additional use could be the attachment or fixation of dental decorations, as we deduce from the wear mentioned in this individual from El Copey. Duque (38) reports a supposedly older specimen



Figure 3. Detail of wear possibly caused by hook wire.



Distribution of archaeological samples with type E1 in teeth pieces associated to Late Classic Period (1100-1000 BP or near). 1. Teotihuacan (10 cases); 2. Tacuba (1 case); 3. Chalchicomula (1 case); 4. Tepeaca (1 case); 5. Monte Alban (8 cases); 6. Cerro de Las Palmas (1 case); 7. Ticul-Progreso (2 cases); 8. Chiapa de Corzo (4 cases); 9. Isla de Jaina (59 cases); 10. Nacascolo-Jicaró-Cascabel (25 cases); 11. Ulua (1 case); 12. El Copey (1 case).

from Sogamoso with incrustations, but the cultural and chronological association are doubtful and cannot be compared with certainty. It is possible to consider that the inlays were held by hooks or wires, because they did not apply glue or solidifier to adhere them to the crowns.

Despite the similarity with Ecuadorian records, the El Copey specimen is slightly older from Late Period and corresponds to the Mesoamerican Terminal Classic Period (1.100-1.000 BP) or near later. At that time, the E1 type was present in people from Central Mexico such as Teotihuacan (10 cases), Tacuba (1 case), Chalchicomula (1 case), Tepeaca (1 case), Monte Alban (8 cases), and Cerro de Las Palmas (1 case). However, we must pay special attention to the records of samples from that time with type E1 near to Atlantic Coast, located in the Yucatan Peninsula in the South East of Mexico such as Ticul-Progreso (2 cases), Chiapa de Corzo (4 cases), Isla de Jaina (59 cases), Costa Rica in the archaeological sites of Nacascolo, Jicaró and La Cascabel (25 cases), and Honduras in the site of Ulua (1 case). Fig. 4 show a map with this distribution when we can see the Mesoamerican impact of this practice.

The provenience of this practice can be discussed. In Colombia, traditional archeology has established few interpretations about the possible relationships between local groups and other regions (42-46). For the last 3.000 years BP called Late Holocene - Meghalayan Period or Periods of Regional Developments and Incipient States by Reichel-Dolmatoff (47) the cultural evidence is interpreted as the result of more complex social structures of the chieftain type with high population density and highly stratified social hierarchy. During a period, close to 2.000 years, these groups carried out the modification of the environment and the construction of cities, ceremonial structures, canals and ridges. These landscape modifications are associated with two well-defined ceramic traditions called the Incised Grained Tradition or TGI (2.100 to 1.500 BP) and the Painted Modeled Tradition or TMP (1.800 to 1.000 BP). At the end of the TGI and TMP occupation sequence, a period of abandonment was recorded, which was later interrupted by the occupation of groups from the lower Magdalena River. These new groups, archaeologically recognized as Smoothed Incised Tradition or TIA, occupied the region's natural dikes from 1.300 BP until a couple of centuries after the Spanish invasion (47-50). Currently these ceramic complexes are associated with the Tayrona Classic Period (51).

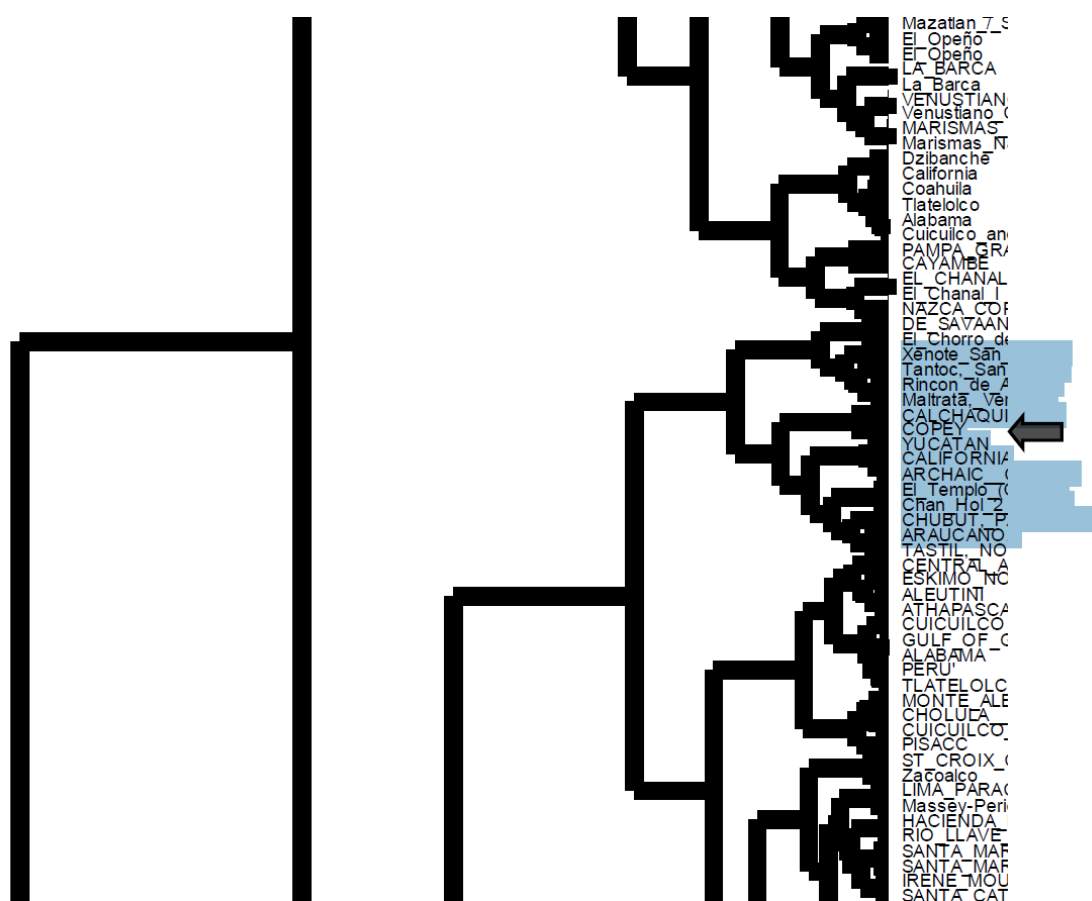


Figure 5. Cutout of original distance analysis where the El Copey samples are located.

There is numerous cultural evidence that connects the northern part of Colombia with Central America and Mesoamerica. Archeology has made interpretations of cultural contacts between these areas of the continent by comparing material culture as gold (52-54), ceramics (55), lithics (56), bone tools and art (57), ceremonial structures (51,58,59), food (60), funerary patterns (61), and genetics (62) among the most important pieces of evidence.

From a biological point of view, the population of El Copey has been analyzed using demographic, quality of life and biological distances data (34), finding some similarities with the hypothetical population structure proposed for the Tayrona culture (63). A previous analysis of biological distancing between the population of El Copey and American groups using ASUDAS dental non-metric traits showed that within the cemetery there were at least 4 related biological groups indicating a biological discontinuity among the population. At the continental level, El Copey joined a small cluster of 13 scattered samples in the Americas, of which we highlight in this discussion those of Xenote San Antonio, Tamtok,

Rincon de Aquila, Maltrata, Yucatan, El Templo and Chan Hol 2, all they are of Mesoamerican origin but from different chronologies (64). Figure 5 shows a cutout (the original image is 3 pages) of this analysis where the El Copey samples are located (34,65). This close biological relationship between groups from the Northern Andes and Central America had already been observed in other groups since at least 3000 years BP (45,46).

As a conclusion, we can say that the practice of dental decoration present in the individual E21-1 and possibly in Ent. 108 of the pre-Hispanic population of El Copey has cultural and biological reasons to be considered as an indicator of close relationships with other groups in the region. It can be interpreted as a consequence of a combination between stylistic traditions from Mesoamerica, and technical expertise in the handling of goldsmith materials from the Colombian-Ecuadorian Pacific coast. This combination took place for at least 1.500 years prior to the arrival of Europeans in northern South America. This can be translated as a reflection of Mesoamerican beliefs represented in dental

decoration but adapted to local techniques of metal handling. These are similar evidences of social representation, but made with different techniques and materials. Contrary to what some archaeological models suggest, it can be deduced that in late pre-Hispanic times, ideas traveled without geographical restriction over large areas of the region (Pacific and Atlantic coasts) and were materialized by experts, taking on different meanings by local groups. We cannot develop other broader relationships between this evidence and social interpretations of status, ceremonial, religious or commercial importance. The database used in this study is available by contacting the main author. The distribution maps presented here may vary with time and the inclusion of new finds. You can visit these maps at the following links;

Samples: <https://bit.ly/SamplesDentalMutilation>,  
Cases: <https://bit.ly/CasesDentalMutilation> .

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### Declaration of Interest

None

### References

- Rodríguez Florez CD, Rodríguez EL. Research report: a review of pre-Hispanic dental decoration in Ecuador and report of a new case. *Journal Anthropologie*, 2024; 62(1): In Press.
- Burnett SE, Irish JD – Editors. *A World View of Bioculturally Modified Teeth* Gainesville: University Press of Florida, 2017. <https://doi.org/10.2307/j.ctvx0712v.7>
- Alt KW, Pichler SL. Artificial Modifications of Human Teeth. In: Alt KW, Rösing FW, Teschler-Nicola M. (eds) *Dental Anthropology*. Springer, Vienna, 1998. [https://doi.org/10.1007/978-3-7091-7496-8\\_20](https://doi.org/10.1007/978-3-7091-7496-8_20)
- Milner GR, Larsen CS. Teeth as artifacts of human behavior: intentional decoration and accidental modification. In: Keller, M.A. & Larsen, C.S. Eds. *Advances in Dental Anthropology*. New-York, Willey-Liss, 1991; 357-378. <https://core.tdar.org/document/80838/teeth-as-artifacts-of-human-behavior-intentional-decoration-and-accidental-modification>
- Magitot E. *Essai sur les decorations ethniques*. Paris, 1885. [https://www.persee.fr/doc/bmsap\\_0301-8644\\_1885\\_num\\_8\\_1\\_6356](https://www.persee.fr/doc/bmsap_0301-8644_1885_num_8_1_6356)
- Saville MH. Precolumbian Decoration of the Teeth in Ecuador. With Some Account of the Occurrence of the Custom in Other Parts of North and South America. *American Anthropologist*, New Series, 1913; 15(3): 377-394. <https://www.patrimoniocultural.gob.ec/wp-content/uploads/2022/09/Precolumbian-decoration-of-the-teeth-in-Ecuador.-Saville-1913.pdf>
- van Rippen B. *Pre-Columbian operative dentistry of the Indians of Middle and South-America*. The Dental Cosmos. Philadelphia, 1917.
- Montadon G. *L'olognese culturelle traite' d'ethnologie Culturelle*. Editorial Payot, Paris, 1934.
- Dembo A, Imbelloni I. *Deformaciones intencionales del cuerpo humano de carácter étnico*. Buenos Aires, 1938.
- De La Borbolla DFR. Types of tooth decoration found in Mexico. *American Journal of Physical Anthropology*, 1940; 26(1): 349–365.
- Delfino A. Alteraciones dento-maxilares intencionales de carácter étnico. Nueva clasificación. *Revista del Museo de La Plata*, 1947; Tomo IV No. 19: 93-116. <https://publicaciones.fcnym.unlp.edu.ar/rmlp/article/view/1734/720>
- Romero J. Los patrones de mutilación dentaria prehispánica. *Anales del Instituto Nacional de Antropología e Historia*, 1952; 4: 177-221, México. <https://revistas.inah.gob.mx/index.php/anales/article/view/7130>
- Marcellino AJ. La mutilación dentaria intencional en Argentina. A propósito de un nuevo caso de un cráneo trofeo de la provincia de Córdoba. *Instituto de Antropología, UNC*. Argentina, 1972; 1-31. <https://suquia.ffyh.unc.edu.ar/handle/suquia/443>
- Romero J. Últimos hallazgos de mutilaciones dentarias en México. *Anales del Instituto Nacional de Antropología e Historia*, 1960; 12: 151-215, México.



- <https://revistas.inah.gob.mx/index.php/anales/article/view/7171>
15. Romero J. Los patrones de mutilación dentaria prehispánica. *Anales del Museo Nacional de México*, 1965; 17: 199-256, México.  
<https://revistas.inah.gob.mx/index.php/anales/article/view/7130>
  16. Romero J. Dental decoration, trephination and cranial deformation. *Handbook of Middle American Indians*, 1970; 9: 50-67. Universidad de Texas, Austin. <https://doi.org/10.7560/700147-004>
  17. Romero J. Nuevos datos sobre mutilación dentaria en Mesoamérica. *Anales de Antropología*, 1986; 23(1): 350-365.  
<https://doi.org/10.22201/iaa.24486221e.1986.1.656>
  18. von Ihering H. Die Kunstliche Deformirung der Zahne. *Zeitschrift fur Ethnologie*, 1882; XIV: 213 – 262.
  19. Koesbardiati T, Murti DB, Suriyanto RA. Cultural Dental Modification in Prehistoric Population in Indonesia. *Bull Int Assoc Paleodont*. 2015; 9(2):52-60. <https://hrcak.srce.hr/file/221001>
  20. Comas J. *Manual de Antropología Física*. Editorial UNAM, México D.F. 1966; 374.
  21. Scott RG, Turner II CG. *The Anthropology of Modern Human teeth*. Cambridge University Press, Cambridge, 1997.  
<https://doi.org/10.1017/CBO9781316529843>
  22. Haour P, Pearson JA. An instance of dental modification on a human skeleton from Niger, West Africa. *Oxford Journal of Archaeology*, 2015; 24: 427 – 433. <http://dx.doi.org/10.1111/j.1468-0092.2005.00245.x>
  23. Vukovic A, Bajzman A, Zukic S, Secic S. Cosmetic dentistry in ancient times – a short review. *Bull Int Assoc Paleodont*. 2009; 3 (2):9-13.  
<https://hrcak.srce.hr/file/71007>
  24. Fitting W. Fitting W. Les mutilations dentaires dans le cadre des mutilations rituelles [Tooth mutilation in the scope of ritual mutilation]. *Actual Odontostomatol (Paris)*. 1989; Jun;42(166):191-203.
  25. Sawyer DR, Allison MJ. Tooth mutilations in pre-Columbian Peru and Chile and modern-day Nigeria. *Ann Dent*. Summer, 1992; 51(1):24-6.
  26. Takenaka M, Mine K, Tsuchimoci K, Shimada K. Tooth removal during ritual tooth ablation in the Jomon period. *Indo-Pacific prehistory Association Bulletin*, 2001; 21: 49 – 52.  
<https://journals.lib.washington.edu/index.php/BI/PPA/article/view/11761/10390>
  27. Drugan CS, Downer MC. Dental filling as an indicator of socio-economic status. *Journal of Public Health*, 2005; 27: 397-398.  
<https://doi.org/10.1093/pubmed/fdio70>
  28. Tayanin GL, Bratthall D. Black teeth: beauty or caries prevention? Practice and beliefs of the Kammu people. *Community Dentistry & Oral Epidemiology*, 2006; 34: 81-86.  
<https://doi.org/10.1111/j.1600-0528.2006.00264.x>
  29. Mower JP. Deliberate ante-mortem dental modification and its implications in archaeology, ethnography and anthropology. *Papers from the Institute of Archaeology*, 1999; 10:37-53.  
<https://doi.org/10.5334/pia.137>
  30. León XA. Entierros prehispánicos y practicas funerarias. *La muerte en Veracruz*. Editorial Universidad Veracruzana, Veracruz, 2019.  
<https://www.uv.mx/bdh/files/2019/02/Entierros-prehispanicos-y-pra%CC%81cticas-funerarias-La-muerte-en-veracruz.pdf>
  31. Núñez A, Barzuna M. La sonrisa en la cerámica prehispánica. *Odontología Vital*, 2017; 27: 7-14.  
<https://www.scielo.sa.cr/pdf/odov/n27/1659-0775-odov-27-7.pdf>
  32. Talavera A, Salas ME, González LA, Rojas JM. Dientes humanos en un área de culto: estudio de un entierro ofrenda de Cueltajuchitlan, Guerrero. *Estudios de Antropología Biológica*, 1997; VII: 173-189.  
<https://www.revistas.unam.mx/index.php/eab/article/view/42798/38874>
  33. Moscoso OJ. Programa de rescates y monitoreos arqueológicos de la línea a 500kV. Bolivar-El Copey-Ocana-Primavera y obras asociadas. Informe Final. ISA. Instituto de Estudios Regionales INER, Universidad de Antioquia, Medellín, 2008.
  34. Rodríguez-Florez CD. Antropología física del proyecto arqueológico Subestación de Energía del Copey (Copey, Cesar). Informe Final. Corporación GAIA, Medellín, 2017; Pp: 1-33.
  35. Dobrovsky M. Abrasiones dentarias en cráneos de indios Patagones. *Revista del Museo de La Plata*, 1946; No. 16: 301-347.
  36. Dembo A, Paulotti O, Billinghamurst A. Criterios para la diagnosis de las mutilaciones dentarias intencionales. *Revista RUNA*, 1949; 2: 139-147.  
<https://doi.org/10.34096/runa.v2io.4867>
  37. Hurtado PM, Tobar F, Osorio J, Orozco L, Moreno F. Amelogénesis imperfecta: Revisión de la literatura. *Rev. estomatol*. 2015; 23(1):32-41.  
<https://docs.bvsalud.org/biblioref/2018/01/878035/6-hurtado-amelogenesis-imperfecta.pdf>
  38. Duque L. Mutilaciones dentarias prehispánicas en Colombia. In: A Pedro Bosch-Gimpera en el septuagésimo aniversario de su nacimiento, 1963; Pp:157-162. México.
  39. Lagunas Z, Ocaña B. Nuevos casos de mutilación dentaria en Cholula prehispánica. *Estudios de Antropología Biológica*, 2013 16: 119-132.



- <https://www.revistas.unam.mx/index.php/eab/article/view/56684>
40. Bouchard JF. Hilos de oro martillado hallados en la Costa Pacífica del sur de Colombia. *Boletín del Museo del Oro, Banco de la Republica*, 1979; No. 5: 21-24.  
<https://publicaciones.banrepcultural.org/index.php/bmo/article/view/7346>
  41. Scott DA, Bouchard JF. Orfebrería prehispánica de las llanuras del pacífico de Ecuador y Colombia. *Boletín del Museo del Oro, Banco de la Republica*, 1988; No. 22: 3-16.  
<https://publicaciones.banrepcultural.org/index.php/bmo/article/view/7102>
  42. Falchetti A. Colgantes Darién. Relaciones entre áreas orfebres del occidente colombiano y Centroamérica. *Boletín del Museo del Oro, Banco de la Republica*, 1979; No. 4: 1-55.  
<https://publicaciones.banrepcultural.org/index.php/bmo/article/view/7351>
  43. Falchetti A. La tierra del oro y el cobre: parentesco e intercambio entre comunidades orfebres del norte de Colombia y áreas relacionadas. *Boletín del Museo del Oro, Banco de la Republica*, 1993; No. 34-35: 3-75.  
<https://publicaciones.banrepcultural.org/index.php/bmo/article/view/6998>
  44. Lleras R. Diferentes oleadas de poblamiento en la prehistoria tardía de los Andes Orientales. *Boletín del Museo del Oro, Banco de la Republica*, 1995; No. 38-39: 3-11.  
<https://publicaciones.banrepcultural.org/index.php/bmo/article/view/6973>
  45. Rodríguez-Flórez CD, Colantonio S. Biological affinities and regional microevolution among pre-Hispanic communities of Colombia's Northern Andes. *Anthropol. Anz.* 2015; 72/2: 141-168.  
<https://doi.org/10.1127/anthranz/2015/0454>
  46. Rodríguez-Flórez CD. Contribución de la antropología dental al conocimiento de los orígenes biológicos de algunos grupos indígenas contemporáneos en el Norte de Sudamérica. *Boletín Antropológico*, 2021; Año 39. julio - diciembre - 102: 400-424.  
<https://bit.ly/sundadonts>
  47. Reichel-Dolmatoff G. Arqueología de Colombia: un texto Introductorio. Biblioteca familiar Presidencia de la República, Bogotá, 1997.  
<https://www.bibliotecadigitaldebogota.gov.co/resources/2078171/>
  48. Plazas C, Falchetti A. Asentamientos prehispánicos en el bajo río San Jorge. Bogotá. Fundación de Investigaciones Arqueológicas Nacionales. Banco de la República, Bogotá, 1981.
  49. Plazas C, Falchetti A, Sáenz J, Archiva S. La Sociedad Hidráulica Zenú. Estudio arqueológico de 2.000 años de historia en las llanuras del Caribe colombiano. Colección bibliográfica. Banco de la República. Santafé de Bogotá. Colombia, 1993.
  50. Falchetti A. El Oro del gran Zenú. Metalurgia prehispánica en las llanuras del caribe colombiano. Banco de la República, Santafé de Bogotá, Colombia, 1995.
  51. Oyuela A. De los Taironas a los Kogi: una interpretación del cambio cultural. *Boletín del Museo del Oro, Banco de la Republica*, 1986; No. 17: 32-43.  
<https://publicaciones.banrepcultural.org/index.php/bmo/article/view/7229>
  52. Duque L. La pieza del museo. *Boletín del Museo del Oro, Banco de la Republica*, 1978; No. 1: 54.  
<https://publicaciones.banrepcultural.org/index.php/bmo/issue/view/342>
  53. Plazas C, Falchetti A. La orfebrería prehispánica en Colombia. *Boletín del Museo del Oro, Banco de la Republica*, 1978; No. 3: 1-53.  
<https://publicaciones.banrepcultural.org/index.php/bmo/article/view/7354>
  54. Plazas C, Falchetti A, Saenz J. Investigaciones arqueológicas en el Río San Jorge. *Boletín del Museo del Oro, Banco de la Republica*, 1978; No. 2: 1-18.  
<https://publicaciones.banrepcultural.org/index.php/bmo/article/view/7339>
  55. Angulo C. La tradición Malambo, un complejo temprano en el noroeste de Sudamerica. *Boletín del Museo del Oro, Banco de la Republica*, 1980; No. 9: 34-36.  
<https://publicaciones.banrepcultural.org/index.php/bmo/article/view/7327>
  56. Bray W, Arias A. Cruzando el tapón del Darién: una visión de la arqueología del Istmo desde la perspectiva colombiana. *Boletín del Museo del Oro, Banco de la Republica*, 1990; No. 29: 3-51.  
<https://publicaciones.banrepcultural.org/index.php/bmo/article/view/7037>
  57. Legast A. La fauna mítica Tairona. *Boletín del Museo del Oro, Banco de la Republica*, 1992; No. 13: 1-18.  
<https://publicaciones.banrepcultural.org/index.php/bmo/article/view/7273>
  58. Valderrama B, Fonseca G. Exploraciones en la vertiente Norte de la Sierra Nevada de Santa Marta. *Boletín del Museo del Oro, Banco de la Republica*, 1981; No. 11: 1-41.  
<https://publicaciones.banrepcultural.org/index.php/bmo/article/view/7303>
  59. Serje M. Arquitectura y urbanismo en la cultura Tairona. *Boletín del Museo del Oro, Banco de la Republica*, 1987; No. 19: 87-96.  
<https://publicaciones.banrepcultural.org/index.php/bmo/article/view/7198>



60. Herrera LF. Buriticá 2000: Estudio de polen arqueológico. *Boletín del Museo del Oro, Banco de la Republica*, 1980; No. 8: 1-20. <https://publicaciones.banrepcultural.org/index.php/bmo/article/view/7329>
61. Groot AM. Buritaca 200: una fecha de radiocarbono asociada con objetos de orfebrería Tayrona. *Boletín del Museo del Oro, Banco de la Republica*, 1980; No. 8: 21-34. <https://publicaciones.banrepcultural.org/index.php/bmo/article/view/7330>
62. Bortolini MC, Salzano FM, Thomas MG, Stuart S, Nasanen SPK, Bau CHD, Hutz MH, Layrisse Z, Petzl-Erler ML, Tsuneto LT, Hill K, Hurtado AM, Castro-de-Guerra D, Torres MM, Groot H, Michalski R, Nymadawa P, Bedoya G, Bradman N, Labuda D, Ruiz-Linares A. Y-Chromosome Evidence for Differing Ancient Demographic Histories in the Americas. *Am. J. Hum. Genet.* 2003; 73: 524–539. <https://doi.org/10.1086/377588>
63. Langebaek CH. The pre-Hispanic Population of the Santa Marta Bays. University of Pittsburgh Latin American Archeology Reports 4. 2005; Pitt. [https://sites.pitt.edu/~ccapubs/pdfdownloads/PIT\\_Tro4\\_Langebaek\\_2005.pdf](https://sites.pitt.edu/~ccapubs/pdfdownloads/PIT_Tro4_Langebaek_2005.pdf)
64. Rodríguez-Florez CD. The Sinodont and Sundadont Dental Patterns and their Contribution to the Understanding of the pre-Hispanic Settlement of the Southern United States, Central America, and the Caribbean Islands (Spanish). Instituto de Investigaciones Antropológicas IIA. Editorial Universidad Nacional Autónoma de México UNAM, 2016; Mexico D.F. <https://bit.ly/sinodontia>
65. ISA-GAIA Programa de arqueología preventiva de la subestación El Copey, Cesar. Informe Final. ISA Intercolombia - Corporación GAIA, Medellín, 2017.