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An Applied Study on Using Laser for the Conservation of an Archaeological Textile Embroidered with Metal Threads at the Museum of the Faculty of Applied Arts, Helwan University (No. 121/5)

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Abstract

There is an urgent need to use laser cleaning for a complicated textile because it is an effective technique for metal artifacts. It offers a high degree of control, especially in cleaning fragile and very detailed artifacts (Abdel-Kareem & Al-Saad, 2007). The inherent unique properties of laser light, such as intensity, monochromaticity, directionality, and coherence, have made lasers effective tools in a variety of applications in the industrial and biomedical fields. Furthermore, a good understanding of the phenomena happening at the interaction of laser radiation with materials is fundamental for the success and optimization of any laser-based application. Therefore, laser cleaning depends on the nature of the material to be removed (Fotakis, Anglos, Zafiropulos, Georgiou, & Tornari, 2007). The study adopted Q-switched Nd:YAG laser, which is the most common type in conservation. It employed investigation and analysis devices, such as SEM-EDX, XRF, and XRD.

Keywords

Laser, Archaeological Textile, Metal Threads, Deterioration, Sewing Support

1. Introduction

Precious metals have been used for the decoration of textiles since ancient times to create luxury objects for the secular and religious elite. Metal threads have been interwoven into fabrics, used decoratively in tapestry and embroidery. They are traditionally associated with the use of silk. They are considered luxury materials engaged in the manufacture of the finest and most expensive fabrics (Karatzani, 2012). Embroidery cloths were one of the finest textile products in the 16th century in Europe (Cybulska, 2015).

Metal threads are primarily copper, zinc, silver, or gold plated. Because they were made of precious metals and organic fibers, embroidered clothing was a sign of wealth and social status. There are many types of metal threads, including metal strips, wires, strip wound around a silk yarn (are shown in **Figure 1**). The thickness of the precious metal is some micron. The substrate of embroidered items is often cotton, flax, hemp, wool, or mixed-colored materials (Radojkouić, Ristic, Zrilić, & Suzana, 2015). Furthermore, gold threads were used in embroidery and made in different ways (Járó, 1990). The metals used in making metal threads were predominantly gold, silver, copper, and zinc, as a component of copper alloys (Timar-Balazsy & Esto, 1998).

1.1. Archaeological Description of the Textile

1.1.1. Archaeological Description from the Museum Records

The sample covered three square Italian-style cloth embroidered with gold and light brown threads on a red background decorated with floral and bird-like decorations. They are 260 gm and measure (86 cm × 86 cm). The textile is a double-layer embroidered with metal threads with many beige decorations on a background of red silk. The basic decorative element is a bird (butterfly) and dominated by different floral motifs (see **Table 1**).

1.1.2. Artistic Description of the Archaeological Textile

The monument is a piece of a squared red silk textile decorated with flying birds. The external frame and above the flying wings of the birds are beige, suggesting dense feathers. The birds are light beige, but the head is not clear enough. Furthermore, the background is decorated with floral motifs in the form of curled plant branches like semi-circles. Some branches have brown leaves surrounded by three-leaf and four-leaf light beige flowers in some parts. These brown branches dominate the four corners. In addition, some leaves are near the tail of the bird in the form of dense down-up branches that come out of a hidden stem because of the abundant (dark) brown leaves (are shown in **Figure 2**). The brightness of the brown color disappeared due to accumulations of aerosols, especially in the leaves.

There are many floral paintings in the form of a dark brown stem on a dark white background. The stem was somewhat shining before cleaning. In the lower part of the stem, there is a single leaf topped, from the other side, by three flat leaves with a dotted white corona reflecting them on a red background. It is topped by two leaves out of the stem. A part of the lower leaf is covered by the upper one. On the left, there is a bigger leaf linked with the head of the bird. The stem ends with two emerging small stems with three leaves each. The main stem is topped by a set of single or overlapping leaves like the end. The leaves are encircled by a shadow or a dotted white corona showing the leaves properly.

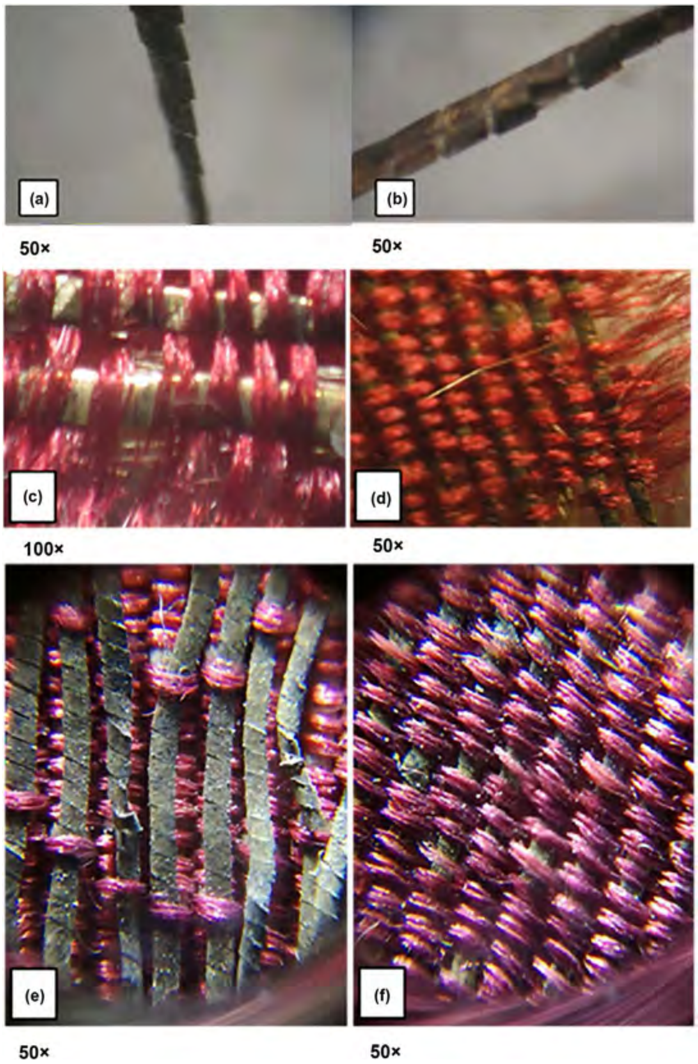


Figure 1. Stereo Microscope shows archaeological metal threads and direction (S) and the texture structure of the archaeological textile.

Table 1. Technical specifications of the archaeological textile.

Specification	Description
Measurement	90 cm × 85 cm
Warp density	1 yarns
Weft density	46 yarns
Weave structure	Atlas
Yarn twist direction	The direction of the warp and weft is S
Fibers	Silk fibers embroidered with copper threads
Colors	Red and embroidered with beige copper threads
Ornaments	Flying birds and floral motifs
Place of preservation	Museum of the Faculty of Applied Arts
Save number	(No. 121/5)

Figure 2. The archaeological textile, decoration figures on the archaeological textile.

These signs suggest the artists' link with the nature and ability to create a special one as shown in the art and depictions on this textile. When considering these light brown birds on a red background, two dimensions appear, even if the artist tried to integrate a simple part of the third dimension of the wings by highlighting the feather, taking an inclination in line with the flying wings. The artist did not adopt the three dimensions completely in depiction and modified the basic shape of birds. However, this did not show a lack of skills. Rather, it is a philosophy.

Since ancient times, the philosophy of modified art has appeared. It was clear in the era of Akhenaten of the New Kingdom when colossal sculptures, wall paintings, and papyri differed from the stereotyped nature of the masculine body that had feminine qualities. In implementing the artworks of Akhenaten, the artist always adopted certain ways to create an intersex form.

Furthermore, modified artifacts appeared in Coptic art, especially in the early period. The Coptic artist modified artworks significantly, which affected the Coptic textiles, especially tapestry. For example, the paintings were modified to be semi-human, semi-animal, and semi-bird. This was not because of the poor skills, but the Coptic artist who inherited the great Ancient Egyptian civilization had a religious and artistic philosophy. It might be due to the artistic features of the time.

In the early Islamic era, the modification of artworks was significant for religious purposes because painting and sculpture of the people and the animals were prohibited or undesirable. Therefore, the Muslim artist did not depict nature. Instead, he modified it greatly or adopted floral motifs and Arabic scripts.

If he used human and animal depictions, he made significant modifications to the dimensions. Thus, he benefited from the Sasanian and Ancient Near Eastern arts that were ruled by the Muslims. The artists in these areas modified their artworks based on imagination in deducing the shapes of animals or combining animals and birds. In the present artifact, the artist made substantial modifications to the birds.

He implemented them using a needle accurately, illustrating significant skill in implementation using metal threads. The selections of colors were successful. For example, the vivid red background attracts attention. Once seen, the artifact seems to be a unique colorful figure with its vivid and attractive red color. It shows a whole life with the reflections of the rainbow.

This integrated life comprises floral nature with leaflets of different lengths hanging down suggesting stability and environmental cohabitation. Their dark color within the brilliant red background. These leaves may belong to wild plants, suggesting harmony between the environment and the plants. In other words, they grow naturally and comfortably to highlight the artistic stability of the painting items.

The textile was implemented in a creative manner artistically. In terms of color selection and dimension, many eastern artistic traditions united, including accuracy, floral motifs, modified birds to mirror the spirit of the nature-loving artist. For example, birds were modified with unique flying wings to enrich the textile.

The tails had slight bowing, affirming the birds' stable movement. The coherent and stable movement of the wings and tails suggest that the birds are aware of their objectives. Furthermore, the birds' direction indicates the unity of objectives. Their coherent and stable movement suggests complete understanding in these places and familiarity with their positions.

Although the dimensions of birds are not atypical in terms of embodiment because of modifications and being 2D only, the dimensions between the body, tail, wing, and head were modified by the artist and differed completely from nature. The artist could create an amazing picture of the embodied birds moving towards a certain objective.

Studying the stand of the textile illustrates that it is made of hard white wood and measures 120 cm × 120 cm, but the textile measures 85 cm × 90 cm. The textile is fixed on a linen cloth on a wooden stand with external square wooden corners with a periphery of 4 cm × 4 cm × 4 m × 4 cm. Additionally, the wooden corners were supported in the middle with two white wooden planks with a periphery of 2.5 cm × 3.5 cm × 2.5 cm × 3.5 cm to support the surrounding blanks containing the cloth holding the textile. The first blank is about 37 cm to the right of the external frame, while the second one is 36 cm to the left of the external frame. The frame is cross-fixed in the middle with a wooden blank that measures 2.5 cm × 3.5 cm × 2.5 cm × 3.5 cm in order not to bend over the archaeological textile (see **Figure 3**).

The archaeological textile is fixed from the corners in the middle area of the linen cloth using magic stitches of a mean thick red silk yarn. It contains metal threads on a pale green background appearing from some lost parts. In the right low part, a large area and some small areas of the metal threads used to implement the paintings are lost. However, the background is almost complete, but with accumulated dirt and dust affecting the main color and turning it pale. Therefore, the green color is light and covered with much dust and dirt caused by air pollutants.

Many metal threads appear single and stretching down-up due to the loss of many metal threads connected with them. Some threads are slope, and others appear in the parts of the archaeological textile as they are disconnected from the others that lost integrity on the background. They are soft single hairy yarns.

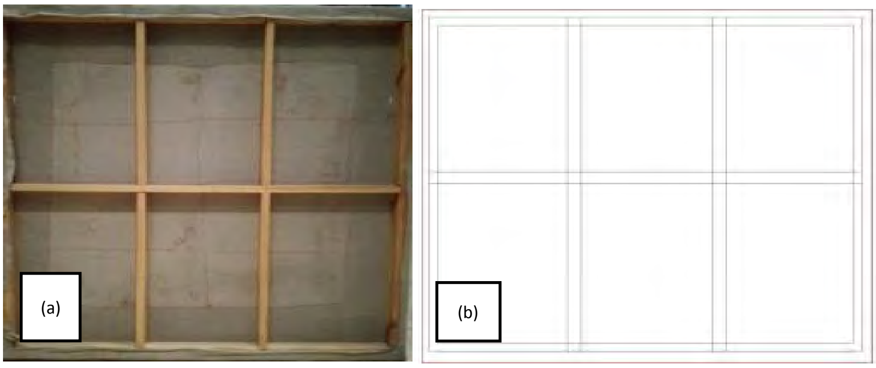


Figure 3. Background of the archaeological textile and the wooden stand.

The archaeological textile is rectangular and measures 85 cm × 90 cm. It comprises four pieces connected using a medium soft red yarn. It is in two parts. The right part is complete and measures 50 cm × 40 cm. The left part consists of three rectangular pieces. While the first lower piece measures 14 cm × 40 cm, the second measures 42 cm × 40 cm, and the third one measures 29 cm × 40 cm.

1.2. Deterioration Manifestations in the Artifact

The artifact has some deterioration manifestations, including lint in some parts and fading of the background color because of the inappropriate folding and storing. Consequently, the textile appeared as four attached pieces. A soft layer of dust and dark deposited aerosols covers the artifact, causing severe darkness of the metal threads (see Figure 4). There were clear color changes in the background that appeared because of losing parts of the layers.

There were some hard calcifications on and between the metal threads and inside the textile structure. The textile was harder and less flexible because of the deposited pollutants, dust, and aerosols, as well as humidity that integrated the granules and created hard micro-layers on the metal threads, between the textile structure, and on the background. Because of the high relative humidity and lack of good ventilation tools, some dyes, especially red, caused pale red spots on the weak green background. Furthermore, humidity dissolved some aerosols and dust from the polluted environment surrounding the Museum.

Various vehicles move directly beside the Museum and cause the deposition of hard compounds and aerosols and some of them are saturated with CO_2 and SO_2 oxidizing into SO_3. At available humidity, it turns into H_2SO_4.

$$SO_3 + H_2O \rightarrow H_2SO_4$$

In addition to its erosion power that causes textile combustion, especially in the background of the artifact, H_2SO_4 decreases the textile flexibility because of the interaction of SO_3 with internal humidity. Consequently, the water content that is appropriate for maintaining flexibility. When SO_3 interacts with some internal textile humidity, the textile has relative dryness and some parts break down (are shown in Figure 5), especially when handling or treating the textile.

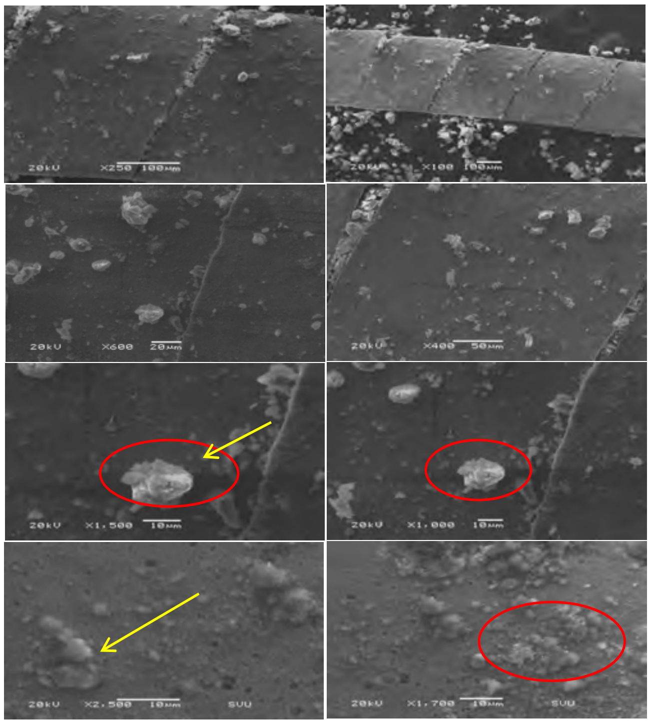


Figure 4. SEM shows corrosion products and dirt calcifications on the metal threads of the archaeological textile before laser cleaning.

Thus, it should be carefully handled. Furthermore, there are heavy dust accumulations, especially in the parts with composite decorations and some parts with lint. There are dirt accumulations in the parts with modified bird wings, stems, and floral motifs. Soot and aerosols are mainly in the shaped parts because they are the first areas they affect.

There are lost areas mainly in the lower right part. Large parts of the artifact are corroded and dry. Therefore, lining appears below the metal texture implemented in the Sirma technique. Reviewing and observing the surrounding areas reveals the deterioration of the metal threads because of loss or having weak yarns in the texture structure. The frame of the textile contains large parts prone to soot, affecting the color. In other words, there are color changes as a result of various soot deposits.

The external parts of the textile have severe lint that should be handled. In the upper right and left areas, some small parts are lost. The external or middle parts are dominated by small and large lesions that should be fixed with proper stitches in order not to affect the other parts and increase deterioration and lint of the metal threads (see Figure 6). Furthermore, the metal threads are non-sparking because of various pollutant deposits that interact with external or internal humidity chemically and result in color changes or corrosion of the metal layers of the metal threads (are shown in Figure 7). As a result of the occurring physical and chemical changes, deterioration rates increase, especially when having acid oxides, including CO_2, SO_2, SO_3, NO_2, and N_2O_3.

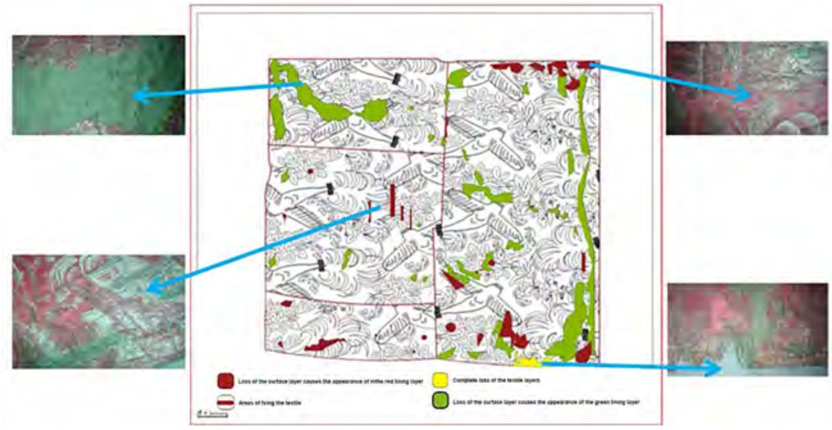


Figure 5. Stereo Microscope shows cuttings of the fibers in the metal threads.

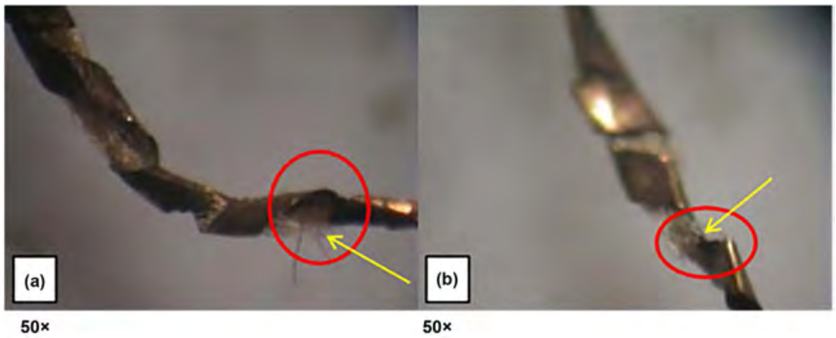


Figure 6. Lost parts in the archaeological textile.

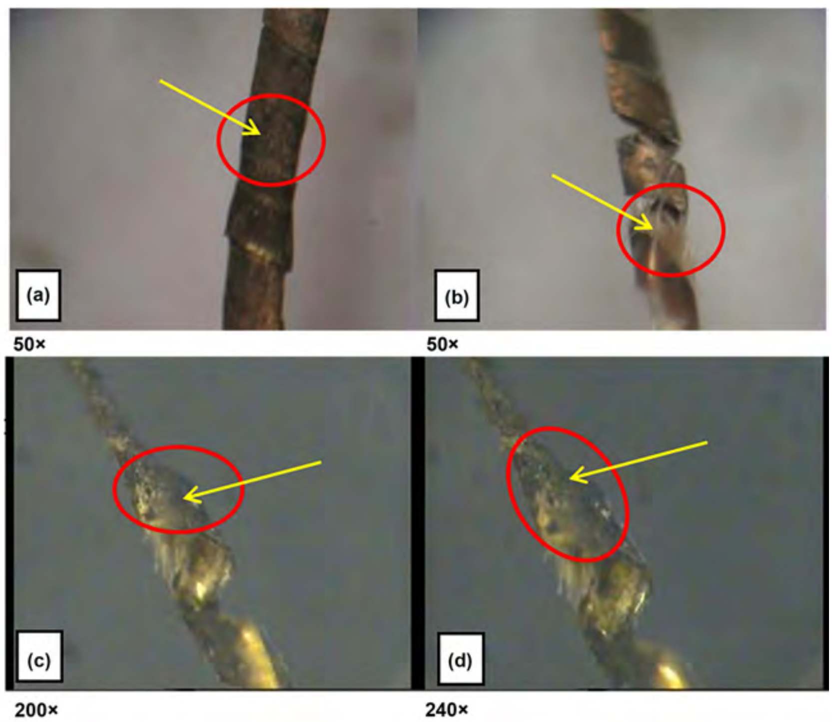


Figure 7. Stereo microscope illustrates the metal threads, as well as layers and effect of corrosion on the fibers before laser cleaning.

The red layer above the green background containing the artistic aspects of the metal threads appeared contrasting in colors. It was dominated by the dark color because of the deposition of dust and aerosols causing color changes. Deterioration increased because of being a two-layer textile embroidered with metal threads implemented in the Sirma technique on a background of red silk. The decorations were mainly a modified bird or butterfly with various floral motifs. The stand dried, and its color was dark significantly because of dirt and aerosol depositions. It was handled with mechanical and laser cleaning.

1.3. Laser Techniques and Applications

Cleaning the composite textile objects is very problematic and requires safe and accurate methods (Elnaggar et al., 2015). The cleaning techniques may be harmful to the metal and textile. Thus, the metal threads are often not cleaned (Hacke, Carr, & Howell, 2003). Many mechanical and chemical treatments were utilized to clean metal threads on the archaeological textile. However, it is highly recommended to avoid mechanical cleaning methods for metal embroidery threads because of their devastating results that they may remove the noble patina and the coating layer on the cleaned surface. Instead, various materials and methods could be used. Most of the chemical treatments commonly used for cleaning-metal threads are incompatible with the metals and the organic fiber's core, and it is almost impossible for the cleaning solution to avoid contact with the fibers (Abdel-Kareem & Harith, 2008). Therefore, chemical and mechanical cleaning methods are rarely applied in the case of the coated organic materials (Járó, 2009). The deterioration of metal threads in textile is a complicated problem that cannot be solved by the classical conservation methods. For example, the immersion taking place in chemical or electrolytic corrosion cleaning techniques may damage the fibers and dissolve any dye, while mechanical cleaning may remove the painting.

On the contrary, modern technology application has proved more effective than the traditional methods in the conservation of cultural heritage. Laser is one of the most significant techniques in cleaning, but it is still being examined because of the complexity of rays and the different materials of the textile with metal threads (Radojkouić, Ristic, Zrilić, & Suzana, 2015).

2. Materials and Methods

At this study used some methods Mechanical cleaning, Laser cleaning (see **Figure 8**), Stereo Microscope (SM) shows fixation with sewing and Scanning Electron Microscopy (SEM)[1] JEOL JSM-5500 LV Scanning Electron Microscope (JEOL, Japan), Central Lab, South Valley University to study an Archaeological Textile Embroidered with Metal Threads at the Museum of the Faculty of Applied Arts, Helwan University.

[1]Central Laboratory, South Valley University in Qena.

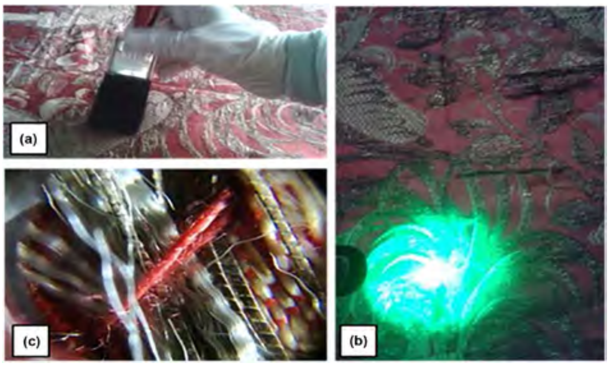


Figure 8. Treatment stages of the archaeological textile.

2.1. XRF Analysis

Identifying the chemical composition of all samples was carried out by the X-Ray Fluorescence Analysis (XRF), JEOL JSX Element Analyzer with Energy Dispersive X-Ray Fluorescence system (EDXRF). It helped analyze and identify the components of corrosion.

2.2. XRD Analysis

XRD Unit, Assiut University, Model PW 1710 control unit Philips, Anode Material Cu, 40 kV, 30 mA, 2 Cita from 4 to 60 was employed for analyzing the samples and identifying their components. It was applied to a two-layer textile embroidered with metal threads and beige metal decorations on a background of red silk. The simple mechanical cleaning using different brushes was adopted. The stand and the textile were cleaned mechanically in an area of good ventilation in order to make the textile fibers acquire humidity.

The content of relative humidity was increased indirectly through evaporating the surrounding area for many days using a spray far from the textile and the cloth stand. As a result, the textile fibers are wet appropriately to facilitate physical and laser cleaning.

Q-switched Nd:YAG lasers device was used to provide very short pulses of high energy and TEA CO_2 laser that was employed successfully to remove the painting (Koh & Sárady, 2003). In the case of 1046 nm wavelength, the metal surface changes and various colors, including orange, red, yellow, and blue, appear. The thermal contributions or effects when using 355 nm ultraviolet rays that are very small do not change the color surface (Ristic et al., 2014). Consequently, deteriorations were removed successfully from the silver surface in wavelengths of 532nm and 266nm. However, 1064 nm wavelength was inappropriate because they might cause metal melting, as well as cutting and burning the fibers (Koh, Lee, & Yu, 2003).

Laser cleaning is always related to one of the two types of damage to the surface of the metal. At high energy, deterioration takes place in the form of surface melting. At low energy, the original oxide layer turns into adhered drops of melted metal (Koh, 2005).

The wavelengths of 193 nm and 355 nm achieve better results, but with side effects of fading caused by 355 nm. Recently, laser applications have been developed to make choices of focusing ultrashort rays used successfully to prevent the mechanical and thermal side effects (Elnaggar et al., 2015).

Green laser[2] (Q-Switched Nd:YAG Lasers) of 352 nm wavelength was used (Koh & Sárady, 2003). The archaeological textile was treated using agreen laser for 10 minutes that resulted in good and appropriate results for both the metal threads and silk. It did not cause severe heating like the other types of laser employed in the experimental study, such as (Infrared laser of 1 - 64 nm wavelength, Ultraviolet laser of 355 - 266 nm wavelength) in terms of affecting the textile fibers.

3. Results

Laser cleaning achieved good results in cleaning corrosion products, including Cl, Al, Ca, and Fe without affecting the metal threads or background see (**Figure 9**, **Figure 10**). They were revealed by SEM-EDX, XRF, and XRD analyses.

4. Discussion

Results of EDX analysis shows the difference in the archaeological sample before and after laser cleaning, as well as the effect of laser cleaning on Cl, Al, and Ca. Before cleaning, Cu, O, Cl, Al, Ca, Fe rated (72.98), (19.47), (1.23), (0.35), (0.35), and (0.19), respectively. After laser cleaning, Cu increased to (79.24) and O increased to (20.22). Cl and Fe did not appear. Al and Ca decreased to (0.24) and (0.11), respectively. These results suggest the effectiveness of laser in cleaning the archaeological textile (see **Table 2**, **Figure 11**, **Figure 12** and **Figure 13**).

Results of XRF analysis of the first sample of archaeological textile illustrate a high percentage of CuO (70.831%). There are also small amounts of CaO (1.062%) and Ag_2O (28.107%). The second sample of the treated textile shows a high amount of CuO (68.557%) and small amounts of CaO (0.897%) and Ag_2O (30.546%) (see **Figure 14**, **Figure 15**).

Results of XRD analysis of the first sample of archaeological textile that is not deteriorated illustrates Cu as a major compound and Ag as a minor one. The second sample of the textile cleaned by laser shows Cu as a major compound and Ag as a minor one. Other resulting oxides appear, highlighting the effectiveness of laser in cleaning the archaeological textile (see **Figure 16**, **Figure 17**).

Sewing Support

After laser cleaning, the lost parts, lint, and external edges were fixed using silk yarns with colors close to those of the textile fibers (dark red-dark green-light beige-olive green) using herring bone stitch, Z-Whip stitch, Laid-couching and slip whip stitch, as well as edges and hole whip stitches (as shown in **Figure 18**, **Figure 19**, **Figure 20**). Consequently, the textile is ready for sorting and exhibiting (are shown in **Figure 21**).

[2]Laser Laboratory, Physics Department, Faculty of Science in Qena, South Valley University.

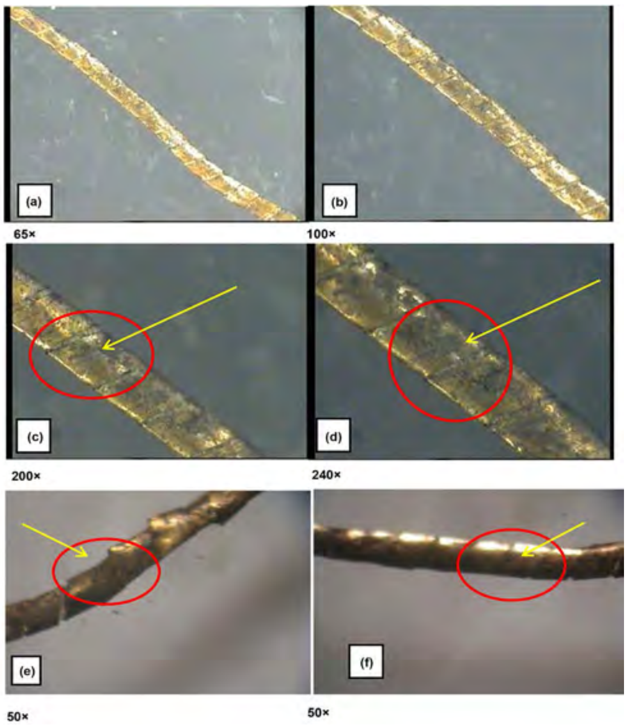


Figure 9. Stereo Microscope illustrates the metal threads, as well as layers and effect of corrosion on the fibers after laser cleaning.

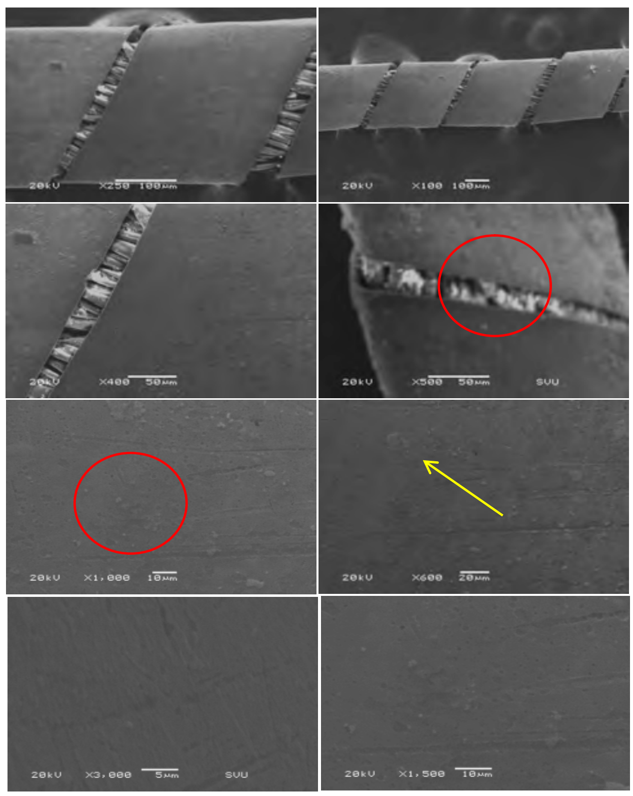


Figure 10. SEM illustrates the removal of corrosion products and dirt calcifications from the metal threads of the archaeological textile after laser cleaning.

4.1. EDX Analysis of the Archaeological Textile

Table 2. The difference of the archaeological textile before and after laser cleaning and effect on Cl, Al, Ca, and Fe after laser cleaning.

Samples	Elements	Before Leaser Cleaning	After Leaser Cleaning
1	Cu	72.98	79.24
	O	19.47	20.22
	Au	3.30	0.00
	Ag	2.14	0.19
	Cl	1.23	0.00
	Al	0.35	0.24
	Ca	0.35	0.11
	Fe	0.19	0.00

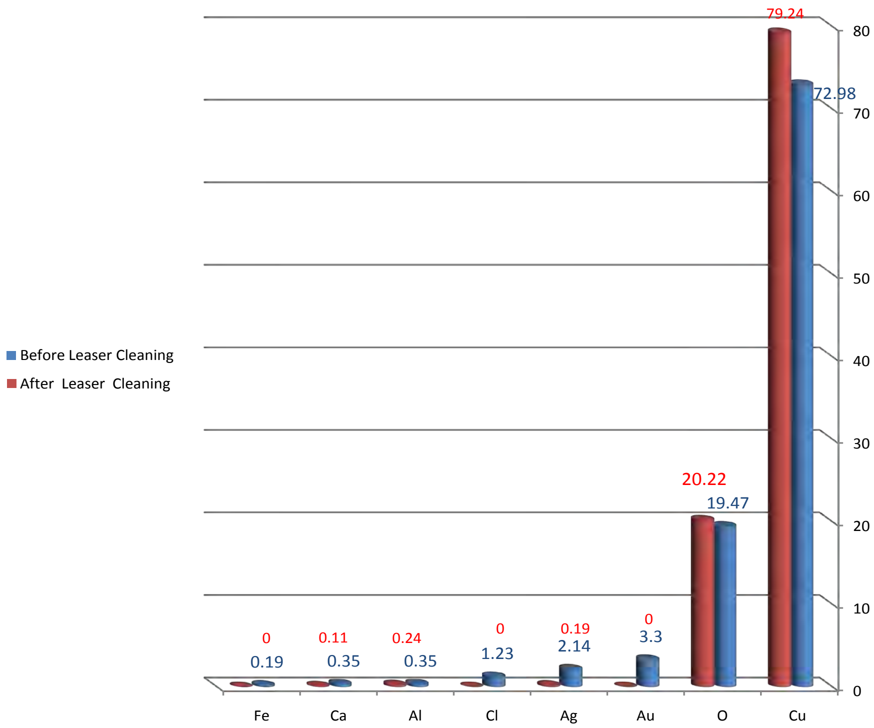


Figure 11. A difference in the archaeological sample before and after laser cleaning.

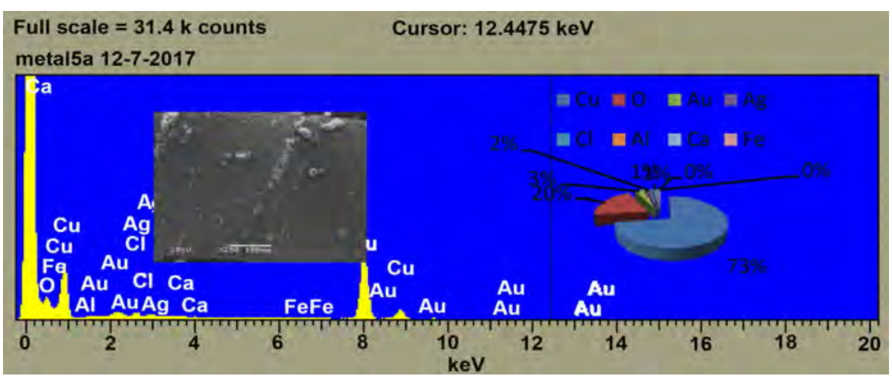


Figure 12. EDX Analysis of the archaeological metal thread before laser cleaning.

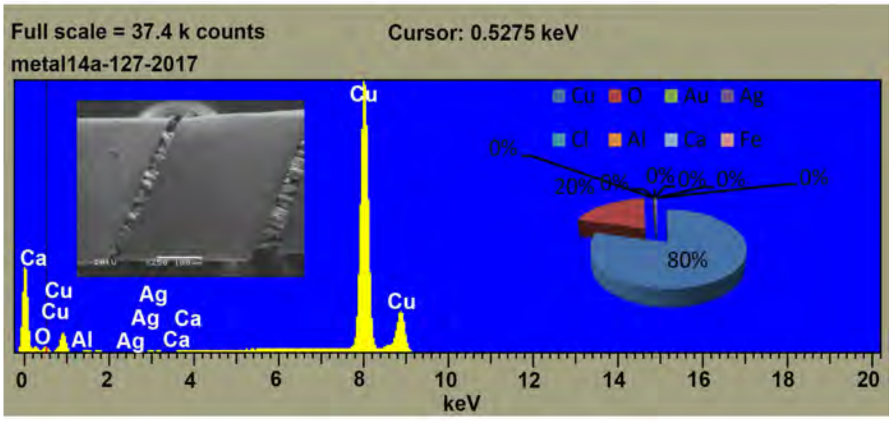
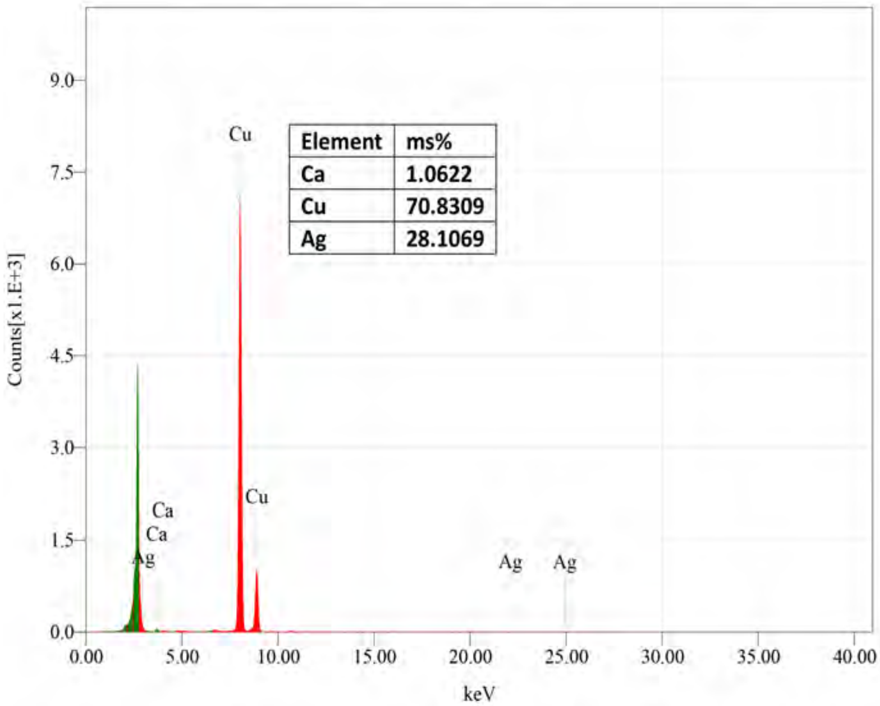


Figure 13. EDX Analysis of the archaeological metal thread sample after laser cleaning.

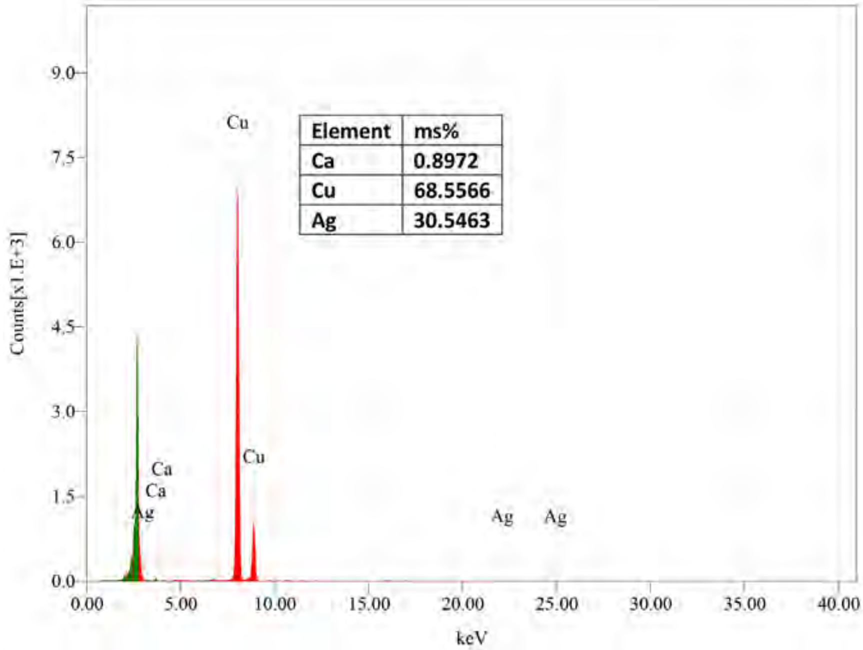
4.2. XRF Analysis of the Archaeological Textile[3] Reveals Some Pollutants and Deteriorating Oxides on the Metal Threads



Element	Line Type	Energy	ms%	mol%	K	Net	Error%
CaO	K	3.69	1.0622	1.8378	0.0003888	613	2.0797
CuO	K	8.04	70.8309	86.3944	0.0450768	137100	0.6696
Ag_2O	L	2.98	28.1069	11.7678	0.0282927	11452	3.8205

Figure 14. XRF Analysis of the archaeological metal thread sample before laser cleaning show some deteriorating oxides and deterioration residues.

[3]Central Laboratory, South Valley University in Qena.



Element	Line Type	Energy	ms%	mol%	K	Net	Error%
CaO	K	3.69	0.8972	1.6169	0.0003888	613	1.7565
CuO	K	8.04	68.5566	77.9281	0.0450768	137100	0.6481
Ag_2O	L	2.98	30.5463	20.4550	0.0282927	11452	4.1521

Figure 15. XRF Analysis of the archaeological metal thread sample after laser cleaning showing the effectiveness of laser cleaning.

4.3. XRD Analysis of the Archaeological Textile[4] Illustrates Cu, Ag, and CuO as Corrosion Products

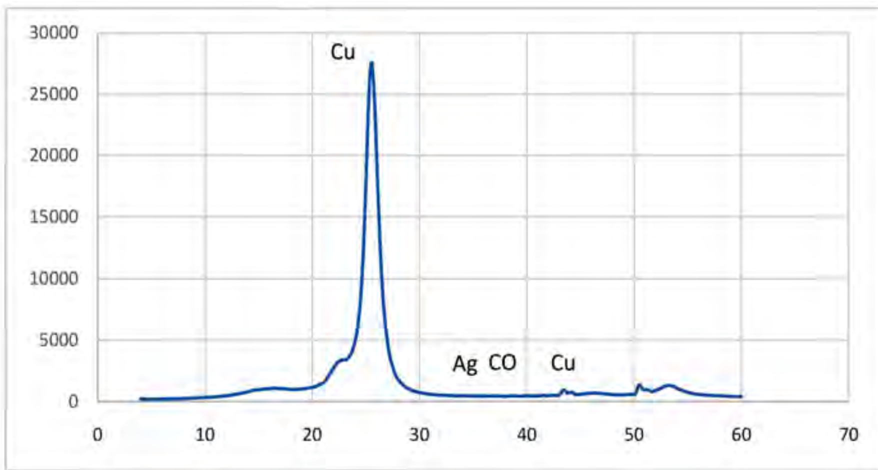


Figure 16. XRD Analysis of the archaeological metal thread sample before laser cleaning illustrates Cu, Ag, and CuO as corrosion products. Before treatment: Cu = copper, Co = cuprite (CuO); Ag = Silver.

[4]XRD Laboratory, Physics Department, Faculty of Science in Qena, South Valley University.

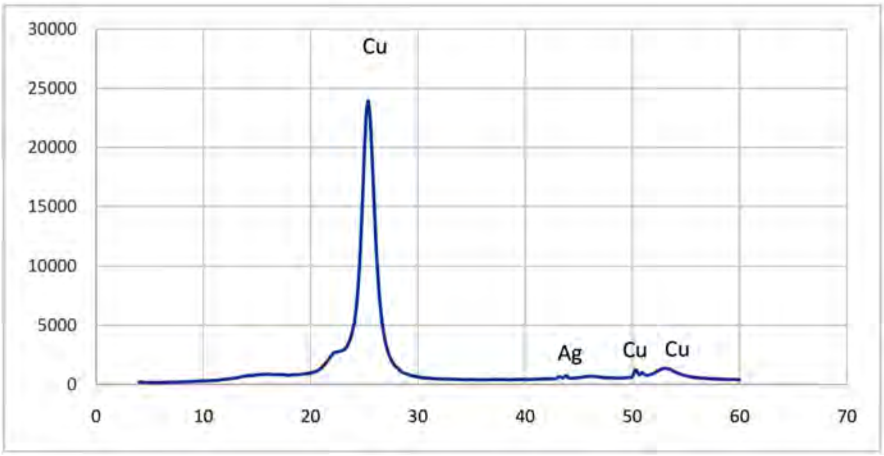


Figure 17. XRD Analysis of the archaeological metal thread sample after laser cleaning illustrates Cu and Ag and the effectiveness of laser cleaning in removing corrosion products. After treatment: Cu = copper; Ag = Silver.

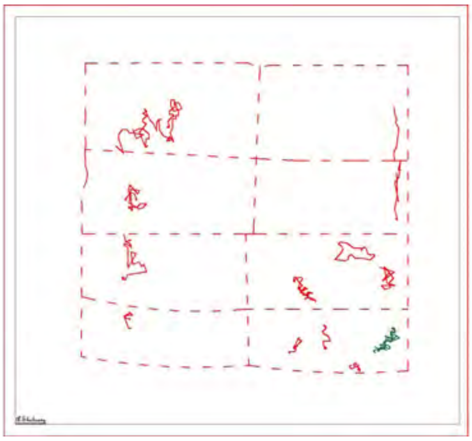


Figure 18. Stitches used in the conservation of the archaeological textile.

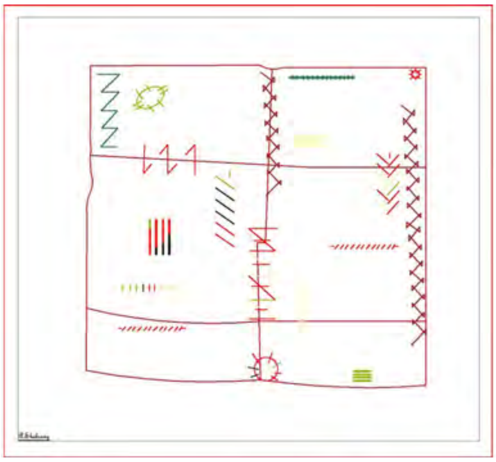


Figure 19. Stitches used in fixing the external edges and deteriorated internal parts of the archaeological textile.

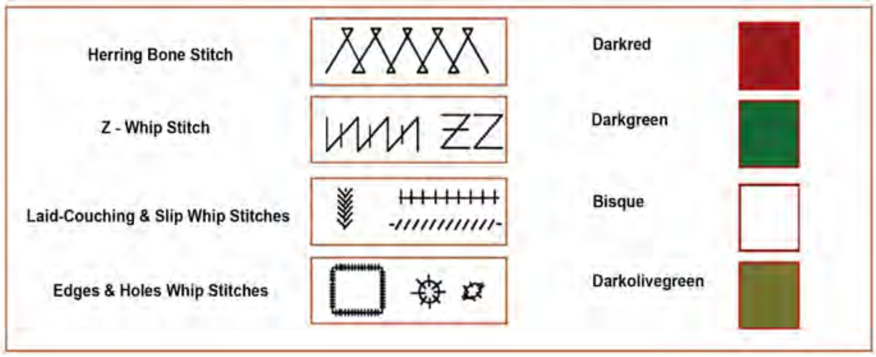


Figure 20. Types of stitches used in fixing the archaeological textile (Conservation Stitching Guide, Stitches Used in Textile Conservation, 1986).

Figure 21. Textile after restoration and keeping at the Museum of the Faculty of Applied Arts, Helwan University (No. 121/5).

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Venetic Personal Anthroponyms

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Abstract

Our investigation has been conducted on a set of 854 Venetic personal anthroponyms from the area corresponding to the today's Veneto/Friuli and areas around, derived from the *Corpus Inscriptionum Latinarum* a continuously updated Latin inscription catalogue covering the Roman Empire period and its provinces. The Venetic anthroponyms appear deeply Latinised and the root of each Venetic personal anthroponym was identified by comparing it with corresponding lexemes in the present surviving Slavic languages. It results that the Venetic personal anthroponyms having sure Slavic roots in the set is 23.89% of the derived Venetic personal anthroponyms, which permits to estimate that during the Roman Empire period, i.e. about five cen., roughly about 24% of the Venetic population had Slavic ascendancies. This highlights that Slavs were already present in the today's Veneto/Friuli and in said areas around well before the Roman Empire period and the VII century A.D. of the generally accepted theory of the Slavs late arrival in Europe. The logical consequence is that this theory is wrong and should be rejected.

Keywords

Veneti, Anthroponyms, Slavs, Late Arrival, Latinization, Roman Empire, *Corpus Inscriptionum Latinarum*, Linguistics

1. Introduction

Ancient Veneti tribes coming from Caucasus populated different regions of the today's Europe: Armorica (FR), Constance Lake (DE), Lazio (IT), Veneto (IT), Slovenia (SI), Austria (AU), Vistula river delta (PL) and Paphlagonia (TU). A Veneti tribe, named also Eneti, was considered to be part of the Illyrian ethnic community (Herodotus, 2013: I.196) and inhabited the region around the North Adriatic Sea.

Later, it was explained that "The part of the plain near the Adriatic had never ceased to be in the possession of another very ancient tribe called the Veneti, differing slightly from the Gauls in customs and costume and speaking another language. About these people the tragic poets tell many marvellous stories." (Polybius, 2016: II.17.5-6). In our opinion, the expression "very ancient tribe" is a clear indication that this Veneti tribe was considered an autochthonous population of the northern Italy. The expression "speaking another language" is an indication that Veneti were a people distinguished from the Celts.

On the basis of information acquired by Meandrius, Veneti, named Eneti, allied to the Trojans, migrated from Paphlagonia to the North Adriatic Sea, after the Troy fall (Strabo, 1903: XII.3.25). Meandrius's information contains certainly something of true, but most probably Veneti/Eneti came to North Italy not by chance, but seeking refuge by their relatives. In fact, it is possible that the autochthonous Veneti (Polybius, 2016: II.17.5-6) inhabited the North Adriatic region before the Trojan War.

Venetic anthroponyms can be encountered in some publications (Pellergini& Prosdocimi, 1967; Šavli, Bor, & Tomažič, 1996) which do not deal with them in a systematic way. Exception is a publication (Pauli, 1891) in which they are listed systematically according to their appearance in the *Corpus Inscriptionum Latinarum* (*CIL*). However, this last publication does not consider their etymology.

2. Venetic Personal Anthroponyms

The above mentioned publication (Pauli, 1891), on pages 352 - 378, identifies 854 sure Venetic (V.) personal anthroponyms in either nominative, or genitive, or dative case and highlights them with a bold initial capital character. Pages 352 - 359 contain V. anthroponyms from the area corresponding to the today's Veneto/Friuli. Pages 359 - 378 contain V. anthroponyms from areas around the today's Veneto/Friuli: Istria, Liburnia, Dalmatia, Pannonia superior, Pannonia inferior and Noricum.

In our analysis, said V. anthroponyms were considered one by one and only those having sure Slavic roots were retained in alphabetic order in **Table 1** together with four other *CIL*. anthroponyms, indicated by * in **Table 1**, not recognized as V. in said publication but having sure Slavic roots.

Each record in **Table 1** comprises the progressive record number (Re.), the V. anthroponyms (V. Anth.) sharing the same Slavic root, the corresponding root meaning (R. Mean.), the corresponding lexemes in present surviving Slavic languages (Sl. Lexem.) from which the root meaning was inferred, the respective *CIL*. (*CIL*) entry and the page (Page) in said publication where each V. anthroponym resides. Records with *CIL*. entries more than the numbers of the V. anthroponyms indicate that at least one V. anthroponym is cited in more than one *CIL*. entry. Records with *CIL*. entries less than the number of the corresponding V. anthroponyms indicate that at least one *CIL*. entry cites more than one V. anthroponym. **Table 1** should be read bearing in mind the language conventions of **Table 2**.

Table 1. Venetic anthroponym list.

Re. V. Anth.	R. Mean.	Sl. Lexem.	*CIL*	Page
		A		
1	Adens: hell—Bos. Had, Blg. ад, Cro. Had, O.Ch.Sl. адъ, Rus. ад, Ser. хад, Ukr. ад; *CIL*. III, 1. no. 4332, p. 300.			
2	Arovinto: ardent—Bos. žarki, Blg. жарък, Cro. žarki, Pol. żarliwy, Rus. жаркий, Ser. жарки, Slv. horlivý, Ukr. жаркий; *CIL*. III, 1. no. 2993, p. 364.			
3	Atressa, Atresso, Atressus: quick—Bos. hitar, Cro. hitar, Lit. atrs, O.Blg. ѩдръ, Rus. хитрый, Ser. хитар, Slo. hitro; *CIL*. III, 1. no. 3380, p. 369; *CIL*. III, 1. no. 3687, p. 370; *CIL*. III, 2. no. 5275, p, 374.			
4	Ausco: ears—Bel. вушкі, Bos. uši, Blg. ушите, Cro. uši, Cze. uši, Lit. ausis, Mac. уши, Pol. uszy, Rus. уши, Ser. уши, Slo. ušesa, Slv. uši; *CIL*. III, 2. no. 5265, p. 374.			
5	Avetonia, Avetontiae, Avii/u/, Avvae: reality—Bos. java, Cro. java, Rus. явь, Ser. јава; *CIL*. III, 2. no. 5540, p. 377; *CIL*. III, 2. no. 5571, p. 377; *CIL*. III, 2. no. 5422a, p. 375; *CIL*. III, 2. no. 5563, p. 377.			
		B		
6	Basio, Baesio, Baezo, Bauso, Bizo: without—Bel. без, Bos. bez, Blg. без, Blg.dial. бизая, Cro. bez, Cze. bez, Lit. be, Mac. без, Pol. bez, Rus. без, Ser. без, Slo. brez, Slv. bez, Ukr. без; *CIL*. V, 1. no. 2887, p. 355; *CIL*. III, 1. no. 3437, p. 370; *CIL*. III, 1. no. 2781, p. 362; *CIL*. III, 2. no. 4889, p. 371; *CIL*. III, 1. no. 2782, p. 362.			
7	Bateiae, Bateli, Bato, Bataronis, Batonis, Batti, Boto: brother—Bel. брат, Bos. brate, Blg. брат, Cro. brat, Cze. bratr, Lit. brolis, Mac. брат, Pol. brat, Rus. брат, Ser. брате, Slo. brat, Slv. brat, Ukr. брат; *CIL*. III, 2. no. 5031, p. 373; *CIL*. III, 2. no. 5057, p. 373; *CIL*. III, 1. no. 4276, p. 368; *CIL*. III, 1. no. 3558, p. 370; *CIL*. III, 1. no. 2749, p. 365; *CIL*. III, 1. no. 3286, p. 369; *CIL*. III, 1. no. 3558, p. 370; *CIL*. III, 1. no. 3593, p. 370; *CIL*. III, 2. no. 5191, p. 374.			
8	Bellia: white—Bel. бел, Bos. bela, Blg. бял, Cro. bijela, Cze. bílý, Lit. balta, Mac. бело, Pol. biały, Rus. белый, Ser. бео, Slo. bela, Slv. biely, Ukr.білі; *CIL*. III, 2. no. 5155, p. 374.			
9	Beria: trust/faith—Bel. давер, Bos. poverenje, Blg. вяра, Cze. důvěra, Mac. доверба, Rus. вера, Ser. поверење, Slv. dôvera, Ukr. довіру; *CIL*. V, 1. no. 947, p. 357.			
10	Besna, Bisena: spring—Bel. вясна, Lit. versmė, Rus.весна, Ukr. весна; *CIL*. III, 1. no. 4597, p. 369; *CIL*. V, 1. no. 1363, p. 358.			
11	Boi*, Boiscus: fighter—Bel. баец, Bos. borac, Blg. боец, Cro. borac, Cze. bojovník, Mac. борец, Pol. bojowiec, Rus. боец, Ser. војник, Slo. borec, Slv. vojak, Ukr.боєць; *CIL*. III, 1. no. 3816, p. 367; *CIL*. V, 2. no. 8112, 17, p. 355.			
12	Boto, Bottia, Bottiae, Bottionis, Botucae, Butonis, Butto, Buttonis: water—Bel. вада, Bos. voda, Blg. вода, Cro. voda, Cze. voda, Mac. вода, O.Ch.Sl. вода, Pol. woda, Rus. вода, Ser. вода, Slo. voda, Slv. voda, Ukr. вода; *CIL*. III, 2. no. 5191, p. 374; *CIL*. III, 2. no. 4864, p. 371; *CIL*. III, 2. no. 4915, p. 371; *CIL*. III, 2. no. 6495, p. 373; *CIL*. III, 1. no. 3826, p. 367; *CIL*. III, 1. no. 3819, p. 367.			
13	Bregontio: shore—Bel. бераг, Blg. бряг, Cze. břeh, Mac. брегот, Pol. brzeg, Rus. берег, Slv. breh, Ukr. берег; *CIL*. V, 1. no. 3729, p. 354.			
14	Bucca, Bucci, Buccio, Bucioni, Buco, Buctor, Buctoris: beech—Bel. бук, Bos. bukva, Blg. бук, Cro. bukva, Cze. buk, Lit. buko, Mac. бука, Pol.buk, Rus. бук, Ser. буква, Slo. bukev, Slv. buk, Ukr. бук; *CIL*. III, 1. no. 3788, p. 366; *CIL*. III, 1. no. 3787, p. 366; *CIL*. III, 1. no. 3789, p. 366; *CIL*. III, 1. no. 3823, p. 367.			

Continued

15	Boudes: awake—Bel. абуджаны, Bos. budan, Blg. буден, Cro. budan, Cze. vzbudit se, Lit. pabudęs, Mac. буден, Pol. budzić, Rus. будить, Ser. будан, Slo. buden, Slv. bdieť, Ukr. будити; *CIL*. III, 2. no. 5477, p. 376.
16	Buio, Buioni, Buiio, Buioni, Buionis: rowdy—Bel. буян, Rus. буян; *CIL*. III, 1. no. 3790, p. 366; *CIL*. III, 1. no. 3855, p. 367; *CIL*. III, 1. no. 3826, p. 367; *CIL*. III, 1. no. 3860, p. 367; *CIL*. III, 1. no. 3826, p. 367; *CIL*. III, 1. no. 3866, p. 367.
17	Burrani, Burrus: storm—Blg. буря, Cze. bouřka, Mac. бура, Pol. burza, Rus. буря, Slv. búrka, Ukr. буря; *CIL*. III, 2. no. 5463, p. 376, *CIL*. III, 2. no. 5418, p. 375.
	C
18	Caliai, Calsasia, Calupa, Colla: mud—Bos. kal, Blg. кал, Cro. kal, Mac. кал, Ser. кал, Slo. kal, Ukr. кал; *CIL*. V, 1. no. 3840, p. 354; *CIL*. V, 1. no. 2414, p. 354; *CIL*. III, 2. no. 5061, p. 373; *CIL*. V, 1. no. 491, p. 361.
19	Coma, Comargus: stone—Bel. камень, Bos. kamena, Blg. камък, Cro. kamen, Cze. kámen, Lit. akmuo, Mac. камен, Pol. kamień, Rus. камень, Ser. камен, Slo. kamen, Slv. kameň, Ukr. камінь; *CIL*. III, 2. no. 4899a, p. 371; *CIL*. III, 1. no. 3158, p. 366.
20	Carmo: root—Bel. корань, Bos. korijen, Blg. корен, Cro. korijen, Cze. kořen, Lit. kastis, Mac. корен, Pol. korzeń, Rus. корень, Ser. корен, Slo. koren, Slv. koreň, Ukr. корінь; *CIL*. III, 2. no. 5644, p. 377.
21	Cicca: honor—Bos. čast, Blg. чест, Cro. čast, Cze. čest, Mac. чест, Pol. cześć, Rus. честь, Ser. част, Slo. čast, Slv. česť, Ukr. честь; *CIL*. V, 1. no. 1422, p. 359.
22	Cona: horse—Bel. конь, Bos. konj, Blg. кон, Cro. konj, Cze. kůň, Mac. коњ, Pol. koń, Rus. конь, Ser. коњ, Slo. konj, Slv. kôň, Ukr. кінь; *CIL*. III, 2. no. 5311, p. 374.
23	Craili: the end—Bos. kraj, Blg. край, Cro. kraj, Mac. крај, Rus. край, Ser. крај; *CIL*. III, 1. no. 4376, p. 368.
24	Cupiti, Cupitus*: to buy—Bel. купляць, Bos. kupiti, Blg. купувам, Cro. kupiti, Cze. koupit, Mac. купи, Pol. kupić, Rus. купить, Ser. купити, Slo. kupiti, Slv. kúpiť, Ukr. купувати; *CIL*. III, 2. no. 4889, p. 371; *CIL*. III, 2. no. 5151, p. 374.
	D
25	Dacisco: to oppress—Bos. tlačiti, Cro. tlačiti, Rus. давить, Ser. тлачити, Slo. tlačiti, Ukr. давити; *CIL*. V, 1. no. 1047, p. 358.
26	Dasi, Dassio: to give—Bel. даваць, Bos. dati, Blg. дадеш, Cro. dati, Cze. dát, Lit. duoti, Mac. дава, Pol. dawać, Rus. дать, Ser. дати, Slo. dajati, Slv. dať, Ukr. давати; *CIL*. III, 1. no. 3162 b, p. 366; *CIL*. III, 1. no. 2305, p. 365.
27	Derva, Dervoniae: tree—Bel., Bos. drvo, Blg. дърво, Cro. drvo, Mac. дрво, Pol. drzewo, Rus. дерево, Ser. дрво, Slo. drevo, Ukr. дерево; *CIL*. III, 2. no. 5419, p. 375; *CIL*. III, 1. no. 3659, p. 370.
28	Deusa, Deusi, Deusonis: soul—Bel. душа, Bos. duša, Blg. душа, Cro. duša, Cze. duše, Lit. dvasia, Mac. душа, Pol. dusza, Rus. душа, Ser. душа, Slo. duša, Slv. duše, Ukr. душа; *CIL*. III. 2. no. 5425, p. 375; *CIL*. III, 2. no. 5370, p. 375; *CIL*. III, 2. no. 5426, p. 375.
29	Dasi, Diso, Disocno, Disocni, Dizo: the tenth—Bel. дзясяты, Bos. deseti, Blg. десетата, Cro. deseti, Cze. д а ҳум, Lit. dešimtas, Mac. десеттиот, Pol. dziesiąty, Rus. десятый, Ser. десети, Slo. deseto, Slv. desiaty, Ukr. десятий; *CIL*. III, 1. no. 3162b, p. 366; *CIL*. III, 2. no. 5322, p. 374; *CIL*. III, 2. no. 5076, p. 373; *CIL*. V, 1. no. 893, p. 357.

Continued

30	Dumba: oak—Bel. дуб, Blg. дуб, Cze. dub, Mac. даб, Pol. dąb, Rus. дуб, Slv. dub, Ukr. дуб; *CIL*. III, 2. no. 5289, p. 374.
	E
31	Ettro: nucleus—Bel. ядро, Bos. jezgra, Blg. ядро, Cro.jezgra, Cze. jádro, Mac. јадро, Pol.jądro, Rus. ядро, Ser.језгро, Slo. jedro, Slv. jadro, Ukr.ядро; *CIL*. V, 1. no. 1133, p. 358.
	F
	G
32	Gannico: to hunt—Bos. goniti, Blg. гоня, Cro.goniti, Cze. hon, Lit. guiti, O.Ch.Sl. гонити, Pol. uganiać, Rus. гнать, Ser. гонити, Slv. hon, Ukr. гнати; *CIL*. III, 2. no. 5102, p. 373.
33	Getaciae, Getacio, Getacius: harvest—Bel., Bos. žetva, Blg. жътва, Cro. žetva, Mac. жетва, Rus. жатва, Ser. жетва, Slo. žetev, Slv. žatva, Ukr. жати; *CIL*. V, 1. no. 603, p. 362; *CIL*. V, 1. no. 554, p. 362.
34	Glago: verb—Bos. glagol, Blg. глагол, Cro. glagol, Mac. глагол, O.Ch.Sl. глаголъ, Rus. глагол, Ser. глагол, Slo. glagol; *CIL*. V, 1. no. 3679, p. 353.
35	Gnavo: anger—Bel. гнеў, Bos. gnjev, Blg. гняв, Cro. gnjev, Cze. hněv, Mac. гнев, Pol. gniew, Rus. гнев, Ser. гнев, Slv. hnev, Ukr. гнів; *CIL*. III, 2. no. 4725, p. 370.
	H
36	Hostilia: to remain/to stay—Bos. ostati, Blg. остават, Cro. ostati, Cze. zůstat, Mac. остане, Rus. остаться, Ser. остати, Slo. ostati, Slv. ostať; *CIL*. V, 1. no. 2066, p. 389.
	I
37	Iariovidius: ardent—Bos. žarki, Blg. жарък, Cro. žarki, Pol. żarliwy, Rus. жаркий, Ser. жарки, Slv. horlivý, Ukr. жаркий; *CIL*. V, 1. no. 3908, p. 352.
38	Iavi, Iavia, Iavolenus: to appear—Bel. З'явіцца, Bos. pojaviti, Blg. явявам се, Cro. pojaviti, Cze. objevit, Mac.појавува се, Pol. pojawić się, Rus. появляться, Ser. појавити, Slo.pojaviti, Slv. javí, Ukr. з'явитися; *CIL*. III, 1. no.2781, p. 362; *CIL*. V, 1. no. 3487, p. 353.
39	Iettus, Intona, Ioiti, Itionis, Itto, Ittu, Ituli, Itul(i), Ittunis : to go—Bel. ісці, Bos. ići, Blg. отида, Cro. ići Cze. jít, Lit. eiti, Mac. Да оди, O.Ch.Sl. ити, Pol. iść, Rus. идти, Ser. иде, Slo. iti, Slv. ísť, Ukr. йти; *CIL*. III, 1. no. 2768, p. 362; *CIL*. III, 2. no. 5133, p. 374; *CIL*. III, 2. no. 5131, p. 374; *CIL*. III, 2. no. 5242, p. 374;*CIL*. III, 2. no. 5640, p. 377; *CIL*. III, 2. no. 5505, p. 376; *CIL*. III, 2. no. 4934, p. 372; *CIL*. III, 2. no. 5425, p. 375; *CIL*. III, 2. no. 5489, p. 376; *CIL*. III, 2. no. 5640, p. 377.
	J
	K
40	Kanius: horse—Bel. конь, Bos. konj, Blg. кон, Cro. konj, Cze. kůň, Mac. коњ, Pol. koń, Rus. конь, Ser. коњ, Slo. konj, Slv. kôň, Ukr. кінь; *CIL*. V, 1. no. 992, p. 358; *CIL*. V, 2. no. 8307, p. 358.
	L
41	Laepici, Laepicus, Laepius, Laepocae, Laepocus: nice—Bos. lijepo, Cro. lijep, Rus. лъпока, Ser. леп, Slo. lepo, Ukr лепський; *CIL*. III, 1. no. 2922, p. 363; *CIL*. III, 1. no. 2431, p. 365; *CIL*. III, 1. no. 3804, p. 366; *CIL*. V, 1. no. 453, p. 361; *CIL*. III, 1. no. 3322, p. 369.

42	Laevica, Laevicus, Lavi: lion—Bel. леў, Bos. lav, Blg. лъв, Cro. lav, Cze. lev, Lit. liūtas, Mac. лав, Pol. lew, Rus. лев, Ser. лав, Slo. lev, Slv. lev, Ukr. лев; *CIL.* V, 1. no. 449, p. 360; *CIL.* V, 1, no. 449, p. 361; *CIL.* III, 1. no. 2792, p. 362.
43	Lannae, Lanno, Lannus: deer—Bel. алені, Bos. jelen, Blg. елен, Cro. jelen, Cze. jelen, Lit. elnias, Mac. елен, Pol. jeleń, Rus. олень, Ser. јелен, Slo. jelen, Slv. jeleň, Ukr. олень; *CIL.* V, 1. no. 3655, p. 353.
44	Lediae: ice—Bel. лёд, Bos. led, Blg. лед, Cro. led, Cze. led, Lit. ledas, Mac. лед, Pol. lód, Rus. лёд, Ser. лед, Slo. led, Slv. ľad, Ukr.лід; *CIL.* III, 2. no. 4743, p. 371.
45	Licnos, Licnus: personal—Bos. lični, Blg. личен, Cro. lični, Mac. лично, Rus. личный, Ser. лични; *CIL.* V, 1. no. 21, p. 359; *CIL.* V, 1; no. 1818, p. 357.
46	Lucania, Lucco*, Luccoia, Lucano, Lucanus, Lucconia: bow—Bel. лук, Bos. luk, Blg. лък, Cro. luk, Lit. lankas, Mac. лак, Pol. łuk, Rus. лук, Ser. лук, Slo. lok, Slv. lúk, Ukr. лук; *CIL.* III, 1. no. 3599, p. 370; *CIL.* V, 1. no. 523; *CIL.* III, 2. no. 5019, p. 372; *CIL.* III, 1. no. 4599, p. 369; *CIL.* III, 1. no. 4599, p. 369.
	M
47	Malabanus, Malai, Malos, Malsonis, Maltini, Mollico, Molligemia: small—Bel. маленькі, Bos mali, Blg. малък, Cro. mali, Cze. malý, Mac. мал, Pol. mały, Rus. малый, Ser. мали, Slo. majhen, Slv. malý, Ukr. малий; *CIL.* V, 1. no. 150, 359; *CIL.* III, 2. no. 5419, p. 375; *CIL.* III, 2. no. 5698, p. 378; *CIL.* III, 1. no. 3214, 9, p. 363; *CIL.* V, 1. no. 587, p. 362.
48	Mataronis, Meter, Metra: to throw—Blg. мятам, Rus. метать, Slo. metanje, Slv. metať, Ukr. метати; *CIL.* V, 1. no. 2608, p. 355; *CIL.* V, 1. no. 618, p. 362.
49	Mendae: lesser—Bel. менш, Bos. manja, Cro. manji, Cze. menší, Rus. меньший, Slo. manjši, Slv. menšie, Ukr. менший; *CIL.* III, 1. no. 3144, p. 364.
50	Mor(ano), Morano: sea—Bel. мора, Bos. more, Blg. море, Cro. more, Cze. moře, Mac. море, Pol. morze, Rus. море, Ser. море, Slo. morje, Slv. more, Ukr. море; *CIL.* V, 1. no. 8197, p. 362.
51	Mosgaito: brain—Bel. мозг, Bos. mozak, Blg. мозък, Cro. mozak, Cze. mozek, Mac. мозок, Pol. mózg, Rus. мозг, Ser. мозак, Slo. možgani, Slv. mozog, Ukr. мозок; *CIL.* III, 2. no. 5033, p. 373.
52	Mosicu, Musonis: man—Bos. muž, Blg. мъж, Cro. muž, Cze. muž, Pol. mąż, Rus. муж, Ser. муж, Slv. muž, Ukr. муж; *CIL.* III, 2. no. 5373, p. 375; *CIL.* III, 2. no. 5365, p. 375.
	N
	O
53	Obilo, Obilie: plentiful—Bos. obilan, Blg. обилен, Cro. obilan, Mac. обилен, Pol. obfity, Rus. Ukr. обильный, Ser. обилан, Slo. obilen, Ukr. обильний; *CIL.* III, 2. no. 5664, p. 377; *CIL.* III, 2. no.6503, p. 373.
54	Obuciori: beech—Bel. бук, Bos. bukva, Blg. бук, Cro. bukva, Cze. buk, Lit. buko, Mac. бука, Pol. buk, Rus. бук, Ser. буква, Slo. bukev, Slv. buk, Ukr. бук; *CIL.* III, 1. no. 3790, p. 366.
55	Occi: eyes—Bel. вочы, Bos. oči, Blg. очи, Cro. oči, Cze. oči, Lit. akys, Mac. очи, O.Ch.Sl. чи, Pol. oczy, Rus. очи, Ser. очи, Slo. oči, Slv. oči, Ukr. очі; *CIL.* III, 2. no. 4987, p. 372.
56	Ophus, Opiae, Opiaus: experienced—Blg. опитен, Cze. osvědčený, Pol. obyty, Rus. опытный; *CIL.* III, 1. no. 3322, p. 369; *CIL.* III, 1. no. 3144, p. 364; *CIL.* V, 1. no.320, p. 360.

Continued

57	Ostiala: to remain/to stay—Bos. ostati, Blg. остават, Cro. ostati, Cze. zůstat, Mac. остане, Rus. остаться, Ser. остати, Slo. ostati, Slv. ostať, Ukr. ; *CIL.* V, 1. no. 2906, p. 355.
58	Ovi, Ovincii: sheep.—Bel. авечка, Bos. ovce, Blg. овца, Cro. ovca, Cze. ovce, Lit. avys, Mac. овца, Pol. owca, Rus. овца, Ser. овца, Slo. ovca, Slv. ovca, Ukr. овець; *CIL.* III, 1. no. 3796, p. 366; *CIL.* III, 2. no. 5139, p. 374.
	P
59	Paeticus: the fifth—Bel. пяты, Bos. peti, Blg. петият, Cro. peti, Cze. pátý, Mac. петтиот, Pol. piąty, Rus. пятый, Ser. пети, Slo. peti, Slv. piaty, Ukr. п'ятий; *CIL.* V, 1. no. 2035, p. 356.
60	Poia, Poio: to drink—Bel. піць, Bos. piti, Blg. да пия, Cro. piti, Cze. pít, Mac. да пие, Pol. pić, Rus. пить, Ser. пити, Slo. piti, Slv. piť, Ukr. пити; *CIL.* III, 1. no. 2994, p. 364; *CIL.* III, 2. no. 5020, p. 372.
	Q
	R
61	Rabutio: slave—Bel. раб, Bos. rob, Blg. роб, Cro. rob, Mac. роб, O.Ch.Sl. раба, Rus. раб, Ser. роб, Ukr. раб; *CIL.* V, 1. no. 3679, p. 353.
62	Raedo: joy—Bel. радасць, Bos. radost, Blg. радост, Cro. radost, Cze. radost, Mac. радост, Pol. radość, Rus. радость, Ser. радост, Ukr. радість; *CIL…* V, 2. no. 8320, p. 359.
63	Rumae, Rumnis: red—Bos. rujan, Blg. румен, Cro. rujan, Cze. rudý, Lit. rudas, Pol. rumiany, Rus. румяный, Ser. рујан, Slo. rdeča, Slv. ryšavý, Ukr. рудий; *CIL.* III, 2. no. 5350, p. 375; *CIL.* III, 2. no. 4966, p. 372.
64	Runcasiae: hand/arm—Bel. рука, Bos. ruka, Blg. ръка, Cro. ruka, Cze. ruka, Lit. ranka, Mac. рака, Pol. ręka, Rus. рука, Ser. рука, Slo. roka, Slv. ruka, Ukr. рука; *CIL.* V, 1. no. 3437, p. 353.
	S
65	Sebacauso: dog—Bel. сабака, Cze. skoba, Lit. šuo, Rus. собака, Ukr. собака; *CIL.* III, 2. no. 5027, p. 372.
66	Samanna, Sami, Samianta, Samicantuni, Sammucin(us), Samuco, Samudae: alone—Bos. sam, Blg. сам, Cro. sam, Cze. sám, Mac. сам, Pol. sam, Rus. сам, Ser. сам, Slo. sam, Slv. sám, Ukr. сам;*CIL.* III, 1. no. 2610, p. 365; *CIL.* V, 1. no. 1208, p. 358; *CIL.* III, 2. no. 5550, p. 377; *CIL.* III, 2. no. 5480, p. 376; *CIL.* V, 1. no. 3253, p. 353; *CIL.* III, 2. no. 4971, p. 372; *CIL.* III, 2. no. 5365, p. 375.
67	Sato: hundred—Bel. сто, Bos. stotinu, Blg. сто, Cro. сто, Pol. sto, Rus. сто, Ser. сто, Slo. sto, Slv. sto, Ukr. сто; *CIL.* III, 2. no. 5465, p. 376.
68	Scali: rock—Bel. скала, Blg. скала, Cze. skála, Pol. skała, Rus. скала;Slo. skala, Slv. skala, Ukr. скеля; *CIL.* III, 1. no. 4582, p. 369.
69	Secco, Siccai: cleaver—Bel. секача, Blg. секира, Cze. sekáček, Lit. skustuvas, Mac. секач, Rus. секач, Slv. sekáčik; *CIL.* III, 1. no. 3810, p. 367; *CIL.* V, 1. no. 366, p. 360.
70	Silanus*:force—Bel. сіла, Bos. silu, Blg. сила, Cro. sila, Cze. síla, Mac. сила, Pol. siła, Rus. сила, Ser. сила, Slo. silo, Slv. sila, Ukr. сила; *CIL.* V, 1. no. 3437, p. 353.

Continued

71	Soliae, Soleiae: salt—Bel. соль, Bos. soli, Blg. сол, Cro. sol, Cze. sůl, Mac. сол, Pol. sól, Rus. соль, Ser. со, Slo. sol, Slv. soľ, Ukr. сіль; *CIL*. III, 2. no. 5487, p. 376; *CIL*. V, 1. no. 1264, p. 358.
72	Sporilla: dispute—Bel. спрэчка, Bos. spor, Blg. спор, Cze. spor, Mac. спор, Pol. spór, Rus. спор, Ser. спор, Slo. spor, Slv. spor, Ukr. спірка; *CIL*. III, 2. no. 5441, p. 376.
73	Suri, Surinus, Suro, Suronis, Surus, Surato: severe—Bel. суровы, Blg. суров, Pol. surowy, Rus. суровый, Slv. surový, Ukr. суворий; *CIL*. III, 2. no. 5084, p. 373; *CIL*. III, 2. no. 5418, p. 375; *CIL*. V, 1. no. 483, p. 361; *CIL*. III, 1. no. 3821, p. 367; *CIL*. III, 2. no. 5095, p. 373; *CIL*. III, 2. no. 6513, p. 372; *CIL*. III, 1. no. 2753, p. 365; *CIL*. III, 2. no. 5153, p. 374.
	T
74	Tamacus: darkness—Bel. цемра, Bos. tama, Blg. тъмнина, Cro. tama, Cze. tma, Lit. tamsa, Mac. темнина, Rus. тьма, Ser. тама, Slo. tema, Slv. tma, Ukr. темрява; *CIL*. III, 2. no. 5080, p. 373.
75	Tottiae, Totto, Totulo: the one—Cze. ten, Lit. tą, Rus. тот, Slv. ten; *CIL*. III, 2. no. 5383, p. 375; *CIL*. III, 2. no. 5479, p. 376; *CIL*. III, 2. no. 5485, p. 376.
76	Treioni, Tritaneri, Tritano, Tritanoni, Tritanonis, Triti, Tritus: the third—Bel. трэці, Bos. treći, Blg. третият, Cro. treći, Cze. třetí, Lit. trečioji, Mac. третиот, Pol. trzeci, Rus. третий, Ser. трећи, Slo. tretji, Slv. tretia, Ukr. третій; *CIL*. III, 2. no. 6401, p. 365; *CIL*. III, 1. no. 2796, p. 363; *CIL*. III, 1. no. 2792, p. 362; *CIL*. III, 2. no. 6351, p. 365; *CIL*. III, 1. no. 2793, p. 363; *CIL*. III, 2. no. 6412, p. 363; *CIL*. III, 1. no 3058, p. 364; *CIL*. III, 2. no. 6411, p. 363.
77	Tergitio: bargain—Bel. торг, Cze. targ, Pol. targ, Rus. торг; *CIL*. III, 1. no. 4231, p. 368.
	U
78	Uttu: to go—Blg. отивам, Cze. jít, Lit. eiti, Mac. оди, Rus. идти, Ser. иди, Slo. iti, Ukr. йти; *CIL*. III, 2. no. 5523, p. 376.
	V
79	Vanni: bath—Bel. банята, Blg. баня, Lit. vonia, Mac. бања, Rus. баня, Ukr. баня; *CIL*. III, 2. no. 5421, p. 375.
80	Varbilo: willow—Bel. вярба, Bos. vrba, Blg. върба, Cro. vrba, Cze. vrba, Mac. врба, Pol. wierzba, Rus. верба, Ser. врба, Slo. vrba, Slv. vŕba, Ukr. верба; *CIL*. III, 1. no. 4600, p. 369.
81	Velleco: great/giant—Bel. вялікі, Bos. velik, Blg. велик, Cro. velik, Cze. skvělý, Pol. wielki, Rus. великий, Ser. велики, Slo. velik, Slv. skvelý, Ukr. великий; *CIL*. III, 2. no. 5425, p. 375.
82	Vendae, Vendo, Vendoni: to lead—Bos. voditi, Blg. води, Cro. voditi, Cze. vedení, Lit. vadovauti, Mac. да води, Rus. водити, Ser. водити, Slo. voditi, Slv. vodiť, Ukr. водити; *CIL*. V, 1. no. 3425, p. 353; *CIL*. III, 1. no. 2796, p. 363; *CIL*. III, 1. no. 2797; p. 363; *CIL*. III, 2. no. 6352, p. 365.
83	Vesclevesis: glory—Bel. слава, Bos. slava, Blg. слава, Cro. slava, Cze. sláva, Lit. šlovė, Mac. слава, Pol. sława, Rus. слава, Ser. слава, Slo. slava, Slv. sláva, Ukr. слава; *CIL*. III, 1. no. 3058, p. 364.

Continued

84	Vinioca, Vinioco, Vinonnio: wine—Bel. віно, Bos. vino, Blg. вино, Cro. vino, Cze. víno, Lit. vyno, Mac. вино, Pol. wino, Rus. вино, Ser. вино, Slo. vino, Slv. víno, Ukr. вино; *CIL*. III. 1. no. 3154, p. 364; *CIL*. III, 1. no. 2502, p. 365.
85	Volteregi, Voltisa, Voltisae, Voltani: power—Bos. vlast, Blg. власт, Cro. vlast, Pol. władza, Rus. власть, Ser. власт, Ukr. влада; *CIL*. III, 1. no. 3823, p. 367; *CIL*. III. no. 2900, p. 363; *CIL*. III, 1. no. 2891, p. 363; *CIL*. III, 1. no. 3821, p. 367.
	X Y W
	Z
86	Zaiio: rabbit—Bos. zec, Blg. заек, Cro. zec, Lit. zuikis, Mac. зајак, Pol., Rus. заяц, Ser. зец, Slo. zajec, Slv. zajac, Ukr заєць; *CIL*. III, 1. no. 2756, p. 365.

Table 2. Language conventions.

Bel. Belarus	Bos. Bosnian	Blg. Bulgarian	Cro. Croatian
Cze. Czech	Lit. Lithuanian	Mac. Macedonian	O. Blg. Old Bulgarian
O.Ch.Sl. Old Church Slavonic	Pol. Polish	Rus. Russian	Slo. Slovenian
Slv. Slovakian	Ser. Serbian	Ukr. Ukrainian	

3. Discussion

The *CIL*. is a continuously updated Latin inscription catalogue covering the period of the Roman Empire and its provinces, therefore, it is not surprising that **Table 1** V. anthroponyms are deeply Latinized. The Slavic root for each V. anthroponym was identified by comparing it with corresponding lexemes in the present surviving Slavic languages (**Table 2**), this because ancient Slavic documents are rare (Ambrozic & Tomezzoli, 2003; Ambrozic, 2005; Ambrozic et al., 2006; Pellergini & Prosdocimi, 1967; Šavli et al., 1996; Serafimov, 2006; Serafimov, 2007a; Serafimov, 2007b; Serafimov & Tomezzoli, 2009; Serafimov & Tomezzoli, 2012; Tomažič & Tomezzoli, 2003; Tomezzoli, 2001; Tomezzoli & Čudinov, 2002; Tomezzoli, Serafimov, & Vodopivec, 2009; Tomezzoli & Serafimov, 2013; Vodopivec, 2008; Vodopivec, 2009a; Vodopivec, 2009b) and normally contain few lexemes, insufficient for meaningful comparisons with **Table 1** V. anthroponyms.

3.1. Initial Considerations

The concept of nature is present in: T1.17 storm, T1.18 mud, T1.19 stone, T1.20 root, T1.22 horse, T1.23 the end, T1.27 tree, T1.30 oak, T1.31 nucleus, T1.40 horse, T1.42 lion, T1.43 deer T1.44 ice, T1.50 sea, T1.51 beech, T1.58 sheep, T1.63 red, T1.65 dog, T1.68 rock, T1.71 salt, T1.74 darkness, T1.80 willow T1.86 rabbit.

The concept of person is present in: T1.3 quick, T1.4 ears, T1.6 without, T1.9 trust/faith, T1.21 honor, T1.25 to oppress, T1.28 soul, T1.34 verb, T1.36 to remain/to stay, T1.39 to go, T1.41 nice, T1.45 personal, T1.47 small, T1.51 brain, T1.52 man, T1.55 eyes, T1.57 to remain/to stay, T1.60 to drink, T1.62 joy, T1.64 hand/arm, T1.70 force, T1.72 dispute, T1.78 to go, T1.79 bath, T1.81 great/giant, T1.83 glory, T1.86 power.

The concept of personality is present in: T1.2 ardent, T1.15 awake, T1.16 rowdy, T1.35 anger, T1.37 ardent, T1.38 to appear, T1.53 plentiful, T1.56 experienced, T1.73 severe, T1.75 the one.

The concept of family is present in: T1.7 brother, T1.29 the tenth, T1.49 lesser, T1.59 the fifth, T1.76 the third.

The concept of profession is present in: T1.11fighter, T1.24 to buy, T1.26 to give, T1.32 to hunt, T1.33 harvest, T1.46 bow, T1.48 to throw, T.61 slave, T1.67 hundred, T1.68 cleaver, T1.77 bargain, T1.82 to lead, T1.84 wine.

3.2. Intermediate Considerations

T1.1 hell is linked to the ancient Gr. Ἅιδης and indicates the underworld, a concept passed lately to the Christian tradition as hell.

T1.2 ardent, T1.37 ardent are linked to the theonym Iarovid/Iarovit indicating the Slavic fertility god, named also Jarilo. This theonym contains the Slavic roots jar: ardent, rod: give birth—Bos. roditi, Blg. раждам, Cro. roditi, Cze. porodit, Mac. роди, Pol. rodzić, Rus. рожать, Ser. породити, Slo. roditi, Slv. porodiť, Ukr. Родити and vid/vit: to be—Bel. быць, Bos. biti, Blg. бъда, Cro. biti, Cze. být, Lit. būti, Mac. биди, Pol. być, Rus. быть, Ser. бити, Slo. biti, Slv. byť, Ukr. бути.

T1.3 quick is linked to the hydronyms Adriatic the sea facing the today's Veneto/Friuli, Adrias/Atrianus a no longer existing, ancient channel of the today Po river delta, mentioned by Hecateus, Theopompus and Ptolemy (Wikipedia, 2018) and Jantra a today's Blg. river, tributary of Danube, which was named Athrys by the ancient Thracians.

The hydronym Plavis, the ancient name of the today's Po River coasting the today's Veneto, is linked to the Slavic root to swim/to flow—Bel. плаваць, Bos. plivati, Blg. плувам, Cro. plivati, Cze. plavat, Lit. plaukti, Mac. плива, O.Blg. плавати, Pol. pływać, Rus. плавать, Ser. пливати, Slo. plavati, Slv. plávať, Ukr. плавати.

T1.4 ears, T1.14 beech, T1.25 to oppress, T1.32 to hunt, T1.46 bow, T1.47 small, T1.66 alone, T1.69 cleaver, T1.81 great/giant, T1.84 wine preserve the suffix-ko present in today's Slavic personal anthroponyms: Vinko, Stanko and Slavko. T1.10 spring, T1.22 horse, T1.66 alone preserve the suffix-na present in today's Slavic personal anthroponyms: Dragana, Stana and Svetlana.

3.3. Final Considerations

In said publication (Pauli, 1891), the V. anthroponyms in the area corresponding to the today's Veneto/Friuli are 211 and in said areas around are 643 for a V. anthroponym total of 854 which represents a good sample for a statistical consideration. The V. anthroponyms in **Table 1** having sure Slavic roots are 204 which represent 23.89 % of the V. anthroponyms in said publication. This permits to estimate that during the Roman Empire period, i.e. about five cen., roughly 24% of the Venetic population had Slavic ascendancies.

4. Conclusion

Said 24% of Venetic population having Slavic ascendancies, in the today's Veneto/Friuli and said areas around during the Roman Empire period, highlights that Slavs were already present in the today's Veneto/Friuli and in said areas around well before the Roman Empire period and the VII century A.D. of the generally accepted theory of the Slavs late arrival in Europe. The logical consequence is that this theory is wrong and should be rejected.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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A Glimpse into Advances in Archaeological Research in North-Central Uruguay

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Abstract

The Tacuarembó Department of north-central Uruguay, and especially in the middle portion of the Negro River, has produced a rich and diverse archaeological record, mostly characterized by significant evidence of stone tool remains. The evidence comprises one of the largest collections of artifacts witnessing early human occupation in the region during the terminal Pleistocene about 11,000 - 10,000 uncalibrated radiocarbon years ago. As part of a long-term research program aimed at exploring and understanding diverse aspects of the regional archaeological process, mainly focusing on the earliest people who colonized the New World, as well as to deepen and expand knowledge on diverse aspects of the Late Pleistocene and post-Pleistocene stone tool technologies employed by the prehistoric people living in this part of southeastern South America. Systematic research enabled numerous field and laboratory activities to be conducted. To build a chronostratigraphic framework for the regional archaeological process, various dating methods were used. Furthermore, diverse technological analyses on lithic artifacts facilitated recognition of the existence of unreported techniques and reduction strategies employed by the prehistoric inhabitants. By this way this paper summarizes the observations and results obtained during the most recent field and laboratory investigation carried out in Tacuarembó by offering a glimpse into the use of diverse scientific disciplines and approaches that may help to deepen various topics concerning the regional prehistoric past. The archaeological excavations as well as the variety of dating methods used have allowed us to understand the chronology and certain aspects of the site formation process revealing important depositional gaps and hiatuses of several thousand years in the dated sedimentary deposit. The new technological investigations have permitted more detailed knowledge to be collected regarding diverse topics related to the reduction systems existing in the area since the terminal Pleistocene. Indeed, the Paleoindian remains add new finds to the record of the early colonizers living in Tacuarembó during the last millennium of the Pleistocene. Also, the identification of clear turtle-back Levallois-like cores agrees with earlier finds in other locations in southeastern South America and yielded excellent examples of the employment of the flaking strategy by the prehistoric populations living in Tacuarembó. From the experimental lithic technology perspective, modern reproductions of the stone tools afforded an understanding of various aspects of the reduction sequences and technical features of their analogs from the past.

Keywords

Hunter-Gatherer Archaeology, Paleoindian, Lithic Analysis, Chronology, Late Pleistocene-Holocene, South America

1. Introduction

The Uruguayan archaeological record has long been of intellectual interest (e.g. Figueira, 1892; Maruca Sosa, 1957; Cordero, 1960; Taddei, 1969, 1977, 1980, 1985; among many others). Professional research undertaken throughout the years across the country—particularly in north-central Uruguay in the Tacuarembó Department—has revealed a rich and varied archaeological record suggesting differences in subsistence and social organization (e.g. López Mazz et al., 2003-2004; Gianotti, 2005; Iriarte, 2006; Gianotti et al., 2013; among others). In particular, Tacuarembó has produced abundant vestiges characterized by significant evidence of stone tool remains. Besides those left by hunter-gatherers during the Holocene, these include one of the largest collections of artifacts evidencing the presence of early human occupation during the terminal Pleistocene at about 11,000 - 10,000 uncalibrated radiocarbon years ago (hereafter ~11.0 - 10.0 kya).

The archaeological activities in Uruguay were initiated as part of a long-term research program aimed at exploring and understanding diverse aspects of the regional archaeological process, mainly focusing on the earliest people who colonized the New World, as well as to deepen and expand knowledge on prehistoric lithic technologies from the Americas. Therefore, this investigation not only seeks to study the remains of the presence of the earliest foragers, but also to enhance information on diverse aspects of the Late Pleistocene and post-Pleistocene stone tool technologies employed by the prehistoric people living in this part of southeastern South America (Nami, 2001a, 2001b, 2007, 2010, 2013; among others). Moreover, a crucial topic to cope with the regional archaeological process is the building of a chronostratigraphic framework through the use of various complementary methods. This paper offers a glimpse into the results of the most recent field and laboratory investigation carried out in Tacuarembó.

2. Briefs on the Geological and Environmental Setting

Situated in southeastern South America, Uruguay is located within the Pampa biome and is largely characterized by fluvial sediments of the Rio de la Plata Basin, one of the five largest basins in the world (del Castillo Laborde, 2008). Covering a surface area of 15,438 km^2, Tacuarembó is the largest of the nineteen territorial departmental divisions of this subtropical temperate country (**Figure 1**). The climate presents a respective maximum and minimum temperature range of 5˚C and 41˚C, with an annual average of 18˚C, and annual precipitation varying between 1200 and 1400 mm.

Various geological events have occurred in Tacuarembó, forming different kinds of landscapes. Diverse geological formations manifesting a long geological process (Bossi & Navarrro, 1998; A.C.R.T., n.d.) are represented by two main Mesozoic formations. The oldest is constituted of sandstones and is named Tacuarembó; the other comprises extended basaltic outcrops and is called Arapey (A.C.R.T., n.d.). Briefly summarizing, the different topographical relief from east to west across the department are as follows. The largest part of the east is a peneplain characterized by hills with soft slopes, where the streams gently flow without very extensive alluvial plains; its northern portion is the area of the "sierra", comprising escarpments with mesas and plains; finally, the west is marked by a basaltic slope of the range Cuchilla de Haedo. This is a low-range system that begins at Cuchilla Negra on the Brazilian border, and ends at the confluence of the Negro River and the Uruguay River, the natural western border with Argentina (da Silva, 1970; A.C.R.T., n.d.; E.G.d.U., 2019). The landscape from the northern and southern portions of the department presents an interesting contrast. In the north, the pastures are sometimes interspersed with either isolated or groups of mesetiform hills, which have wide and flattened tops, and rocky outcrops with bushy vegetation on their slopes. However, the south is characterized by undulating basaltic low hills, mainly covered by stony prairie vegetation (**Figure 2**).

Figure 1. Location maps of the studied area: (a) South America; (b) Tacuarembó Department within Uruguay indicated with an arrow. Modified from NASA maps.

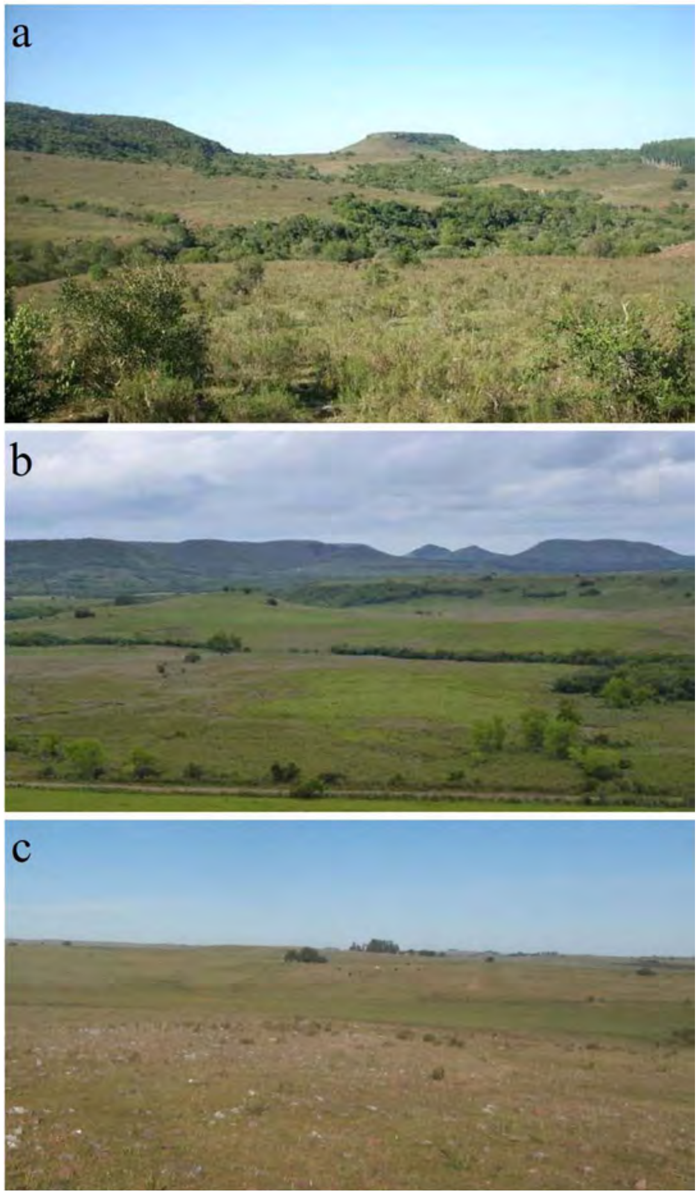

Figure 2. Examples of the varied topographical relief observed at Tacuarembó. (a) Mesetiform hill with a wide and flattened top; (b) Groups of hills observed from the Eden valley; (c) Peneplain mainly covered by stony prairie vegetation. Photographs courtesy: R. Cáceres.

The department is crossed by a large number of watercourses varying in magnitude (Praderi et al., 2006), the main ones being the Negro River and one of its most important tributaries, the Tacuarembó. The latter and its many watercourses, including the significant Caraguatá, Yaguarí, Veras, Cañas and Tres Cruces creeks, pass through the largest part of the department's northern portion. Dividing the south from the north of the country, the Negro River is the most important inner fluvial course in Uruguay. Originating to the north of Bage city about 70 km from Uruguay's northern border with Brazil, it flows west across the country to the Uruguay River. In Uruguayan territory, its drainage basin size is 70,714 km^2, with a total length of 750 km. In its middle basin, the river is dammed near Paso de los Toros city to create the Rincón del Bonete dam (also called the Gabriel Terra), which with a surface area of about 1500 km^2 represents one of the largest reservoirs in South America. In Tacuarembó Department, the Negro River also has several significant important streams that flow into its channel, including El Malo, Clara, Achar, Cardozo, and the Salsipuedes Grande, as well as its main tributary, the Salsipuedes Chico. One important feature of these fluvial courses is that along their shores is significant vegetation, forming a native riparian forest. Another remarkable characteristic of the main regional rivers such as the Tacuarembó and Negro is that along their courses are patches of extensive dunes of diverse sizes, a great part of them recently being consolidated with widespread eucalyptus forest (**Figure 3** and **Figure 4**).

Especially along the watercourses is alluvium of variable thickness, and that corresponding to the Late Pleistocene and Holocene is of particular archaeological interest. Characterizing the terminal Pleistocene, the former is called the Sopas-Dolores (Panario & Gutiérrez, 1999) or Dolores Formation (Martinez & Ubilla, 2004), and is an extensive brown to green sedimentary silt that can be identified throughout Uruguay (e.g. Martinez & Ubilla, 2004; Ubilla & Martínez, 2016; Feathers & Nami, 2018).

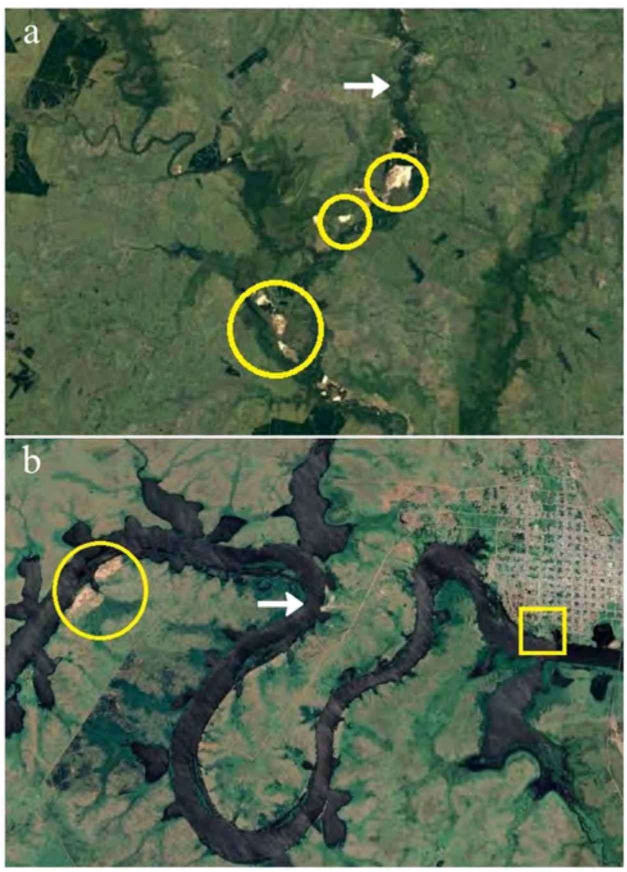

Figure 3. Satellite images of the dunes (marked with a circle) currently observable in the Tacuarembó (a) and Negro River (b) drainage systems, identified with an arrow. The square denotes consolidated dunes by eucalyptus forest. Modified from Google Maps.

Figure 4. Examples of unconsolidated dunes at Paso de los Novillos and Viuda de Salazar on the Tacuarembó Chico River (a) and (b), and consolidated dunes by eucalyptus forest at Parque de los Curas on the Negro River shore in the city of Paso de los Toros (c). (a) and (b) Photo courtesy of R. Cáceres. Apart from where clearly expressed, all pictures and illustrations are by Hugo G. Nami.

As can be seen in Figure 5, in some localities overlying the Sopas-Dolores (or just directly on the bedrock) are varied recent sedimentological strata, some being composed of pale brown and gray sandy sediments and/or a remarkably black clay stratum, which are probably remnant peats from wetlands that covered much of Uruguay during the Holocene (Iriarte, 2006). The black levels with high organic content suggest a climatic change to humid conditions (Iriarte, 2006), a conclusion supported by pollen (Behling et al., 2002; Iriarte, 2006), diatoms (Moro et al., 2004), and phytoliths (Iriarte, 2006).

Following is a summary of some of the chronological and archaeological issues in relation with the described geological framework.

3. A Synopsis of Research Advances

3.1. General Remarks

Advancing previous research in the Southern Cone, a long-term archaeological project commenced in Uruguay at the end of the 1990s. Different studies were

Figure 5. Illustrative examples of terminal Pleistocene/Holocene geological sections on the Negro River's shores. The arrows in (c) indicate the black clay stratum and the Sopas-Dolores Formation.

performed in different places across the country, but mainly in the Tacuarembó Department and principally in the middle Negro River basin (e.g. Femenías et al., 2011; Nami, 2001a, 2001b, 2007, 2013, 2017a; Nami & Castro, 2010, 2014; Feathers & Nami, 2018). They involved diverse kinds of fieldwork, including detailed studies on lithic artifacts curated at museums and private collections, as well as laboratory research. Given the lack of careful archaeological diggings in the region, it was crucial to excavate sites containing buried remains, not least because they have been disappearing due to fluvial erosion, and surviving sites on the riverbanks are continuously affected by water level fluctuations. Below is a synopsis of previous research and new data on the most recent results.

3.2. Archaeological Excavations

As exemplified in **Figure 6**, one of the most remarkable aspects of Uruguayan archaeology is that several localities and sites have yielded diverse kinds of Paleoindian surface finds, in particular the iconic "fishtail" or Fell points (FP hereafter), named after Fell's Cave, which was excavated by Junius Bird in the 1930s in the Magellan Basin of southern Patagonia (Bird, 1938, 1946). They have

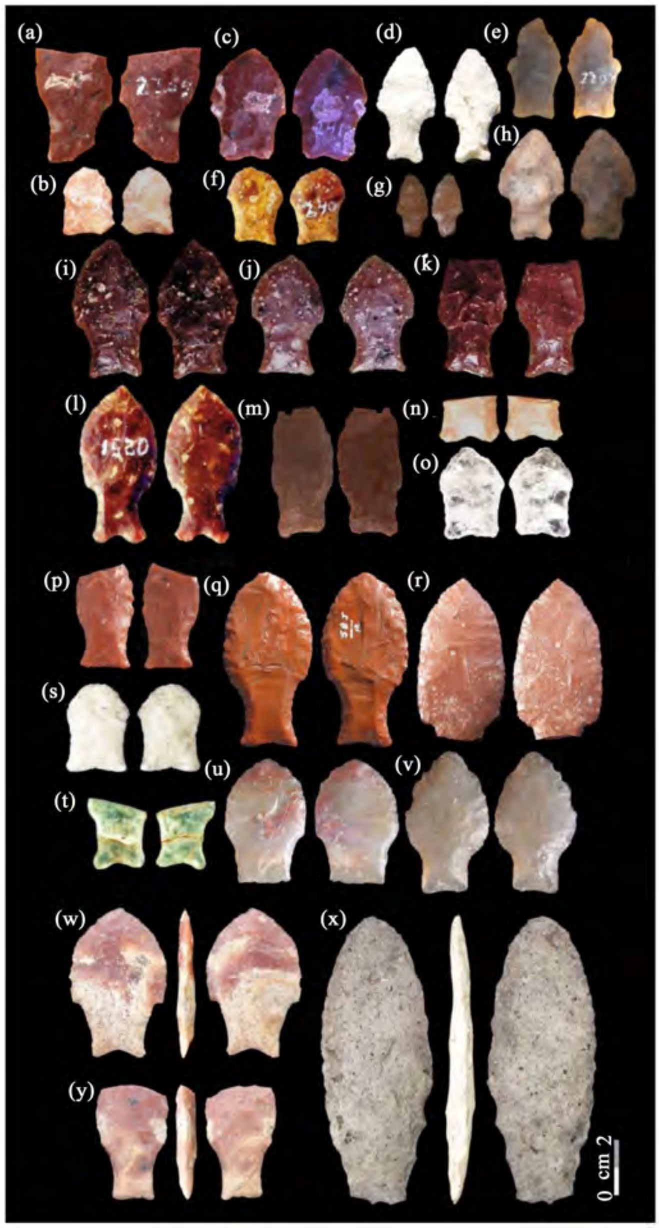

Figure 6. Examples of Fell or "fishtail" points recovered in the middle Negro River basin. ((a) and (b)) Los Molles, ((c)-(f)) Minas de Callorda, ((g)-(o)) Arroyo Cacique, (p) El Puente, ((q) and (r)) Rincón del Bonete Lake, (s) Los Espinillos, ((t)-(v)) Collares, ((w)-(y)) Jorge O. Femenías.

been reported from Mesoamerica to southernmost South America, but are most common in the Southern Cone (Nami, 2014a, 2019a). The densest concentration has been found in Uruguay (mostly as surficial finds), crossing the Rio de la Plata in the Buenos Aires Province of east-central Argentina (Flegenheimer et al., 2014; Nami, 2017a) and from there into southern Brazil (Loponte et al., 2015, 2016). The Tacuarembó Department—especially in the middle portion of the Negro River—has yielded the highest densities of findings on surficial localities from dunes and the eroded deposits of a few stratigraphic sites. These were visited, and following evaluation, Los Molles (LM) and Minas de Callorda (MC) were found to exhibit intact sedimentary deposits in spite of alluvial erosion, presenting the potential to discover Paleoindian occupations. Both are large sites about 1 km long, situated on the eroding banks of the Rio Negro close to the city of Paso de los Toros. Due to intensive erosion, hundreds of archaeological artifacts from sedimentary fluvial sections are exposed at the surface during the river's ebb. The most noteworthy finds are bifacial artifacts, mainly lithic points (Figures 6-8), including several FPs (Figures 6(a)-(f)), as well as other significant vestiges that deserve attention. At both sites, the grids were planned bearing in mind a north-south axis, and were identified using capital letters and numbers according to the cardinal points. The excavation was performed following the natural strata but using artificial levels of five centimeters. All of the findings were mapped and recorded. They were carefully examined, the most significant results being as follows.

LM (32˚48.32'S. Lat., 56˚33.45'W. Long.) is located on the mouth of Los Molles creek in the Negro River in Tacuarembó Department. Throughout the years, hundreds of flaked stone artifacts from the eroded deposit have been recovered

Figure 7. Diverse stemmed projectile points found at Los Molles.

Figure 8. Drawing and image of a bifacial knife recovered at Los Molles (after Nami 2017b: Figure 2).

along the shore of the river that has destroyed part of the site and the riverbanks. The most noteworthy are well-made bifacial artifacts (**Figures 6-8**), such as projectile points (most of them highly rejuvenated or broken through use), including three FPs, two of which are displayed in **Figure 6(a)** and **Figure 6(b)**.

The stratigraphy at LM exhibits four levels (**Figure 9**), which could be identified as follows: 1) the present vegetal humus surface; 2) a gray sandy layer; 3) a mottled sandy-loamy to loamy gray mottled deposit; and 4) a hard brown clay overlying basalt bedrock that may be comparable to the Dolores-Sopas Formation. In the excavated area of MC, the stratigraphy is similar but the hard brown clay level is ~0.30/0.40 m and the bedrock lies ~0.60 to 0.70 m below the current soil surface, whereas in LM the deposit is thicker, ranging from ~1 to ≥2 m in depth (**Figure 10**). In LM, Level 4 also represents the relict of a fully developed soil suggesting a period of non-deposition and landscape stability (Holliday, 1985). In contrast to the pre-Holocene deposit, the sedimentary section containing the archaeological remains has witnessed a very low deposition rate and non-conformities due to episodic sedimentation (Dott, 1983). Subsequently, the deposits registered a discontinuous sedimentary and archaeological record with gaps since the last millennium of the Pleistocene and Holocene (Feathers & Nami, 2018).

Although at LM some artifacts could be found in Level 2, the most abundant lithic finds start at ~0.90 - 1.00 m from the datum. Most prominent are artifact

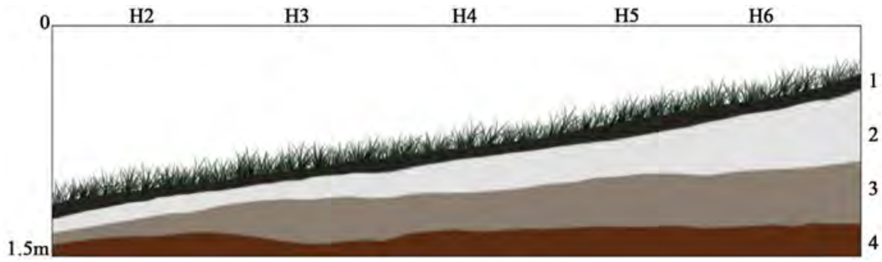

Figure 9. Example of a stratigraphic section from excavations at LM. The numbers on the right indicate the layers. The letters with a number at the top designate the grids. Graphic design in Figure 9 and Figure 10, Figure 13 and Figure 14, Figure 19 and Figure 23: H. G. Nami and G. Paez Reina.

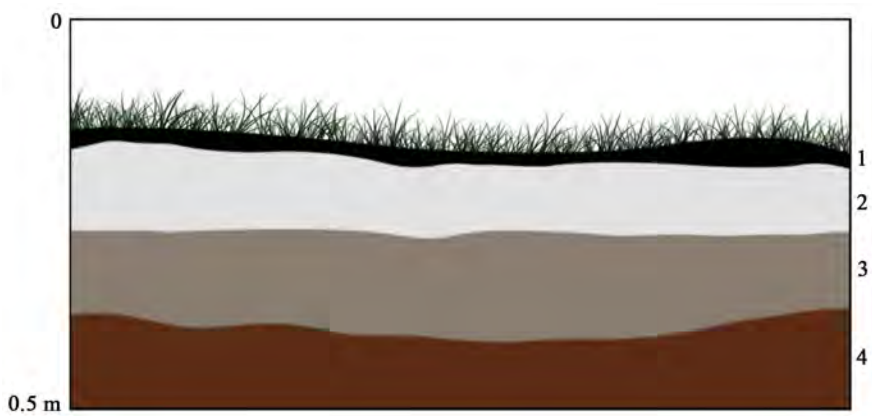

Figure 10. Stratigraphic section registered in the west profile of grid K1 from MC site. References: 0 = Datum, and the numbers on the right indicates de layers.

concentrations at ~1.15/1.20 m at the base of Level 3 and ~1.25/1.30 m in the upper part of Level 4. From a morpho-technological perspective, there are noteworthy differences between them. Lithic remains in Level 3 show unifacial tools, mainly with denticulate edges that are not very common in South American lithic assemblages. These were roughly shaped using diverse kinds of blanks, such as flakes and rounded chalcedony pebbles (**Figure 11(a)**, **Figure 11(c)** and **Figure 11(d)**). Interestingly, they were also manufactured on prepared prismatic core-like blanks. Those made from flakes resemble Middle Paleolithic tools (e.g. Karavanić et al., 2008; Nikzad et al., 2015, **Figure 4** and **Figure 5**), while those from core-like blanks are comparable with some scraper planes used by other traditional technologies across the world (e.g. White, 1968; Hester & Heizer, 1972, among many others). As observed in the surveys and explorations as well through the interviews with local collectors, such diverse kinds of notched and denticulate implements represent frequent finds in the Negro River, as well as in the Tacuarembó's drainage systems (Taddei, 1969, 1977, 1985, 1987; among others). These sorts of artifacts, along with the stemmed points, are also common as surficial finds in the area. However, the lower level displays delicate side scrapers and bifacial reduction strategies manufactured on highly selected cherts. Hence, it is likely that they represent different pre-ceramic human groups.

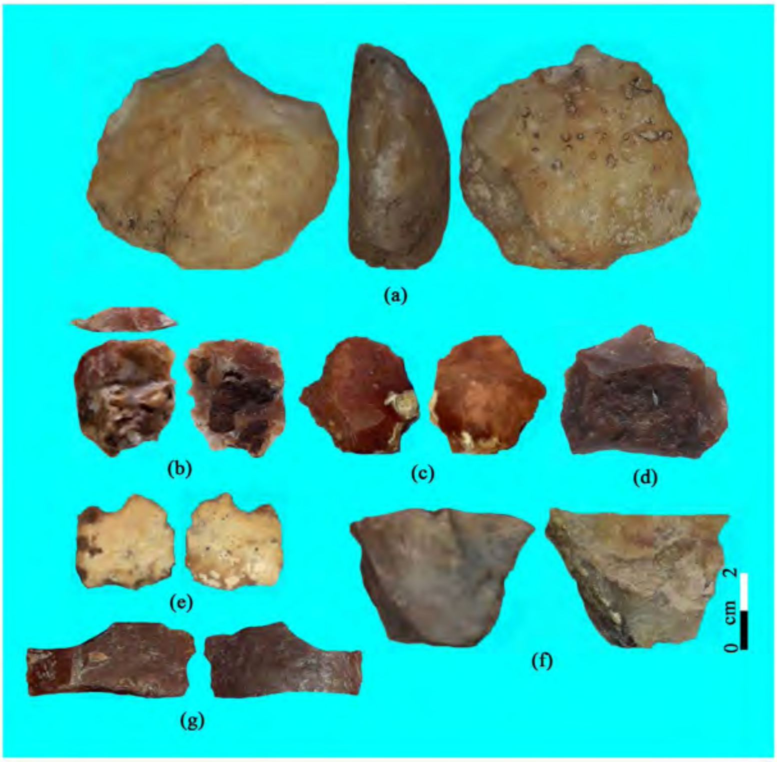

Figure 11. Examples of stone tools exhumed from level 3 ((a)-(e)) and 4 ((f)-(g)) in the LM excavation.

The archaeological remains from Level 3 can be attributed to middle Holocene foragers who used Umbu-like stemmed projectile points (Figure 7), while the lower archaeological level might be assigned to early Holocene hunter-gatherers (Figure 12) who employed similar points, but earlier Paleoindian material appears to be mixed in (Figure 6(a) and Figure 6(b)).

MC (32˚51.90'S, 56˚25.30'W) is located across the Negro River on the Durazno Department shore, immediately in front of Tacuarembó Department. Besides a dune and the floodplain flanking the river course, there is a terrace showing different sedimentary consolidated deposits (Figure 13). Like LM, over time this place has yielded hundreds of flaked stone artifacts, and local collectors have been visiting it for almost 50 years. The most significant finds are projectile points, including Paleoindian fishtail specimens (Figures 6(c)-(f)). Faunal remains are rare, but a bone fragment of an extinct species, probably of Pleistocene age, was collected at the site. Despite alluvial erosion, intact deposits appropriate for excavation remain. At MC, during the 1990s Baeza and others carried out an excavation on the alluvial plain of the river (Figure 13(1)) and identified a single Holocene archaeological component with a diagnostic find locally called a "foice" stemmed projectile point (Baeza et al., 2001). The newly excavated area (Figure 14) is located on the highest terrace of the river and about 70 m west, and shows a different stratigraphy of Baeza's excavation, albeit similar to the LM deposit, where the Sopas-Dolores Formation is not very deep from the surface and the Holocene alluvium (Figure 13(2)).

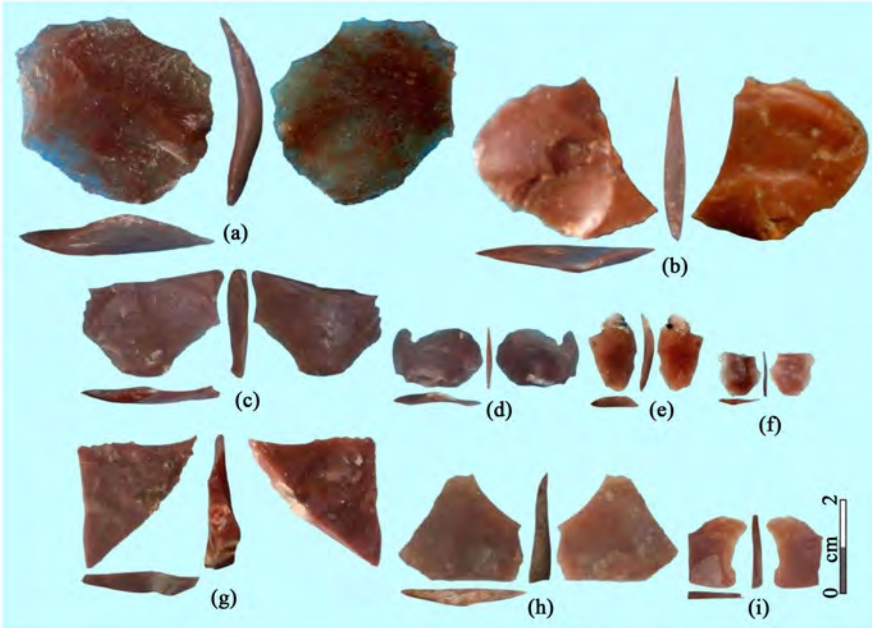

Figure 12. Bifacial archaeological debitage recovered in the lower level of Los Molles (after Nami, 2017b: Figure 21).

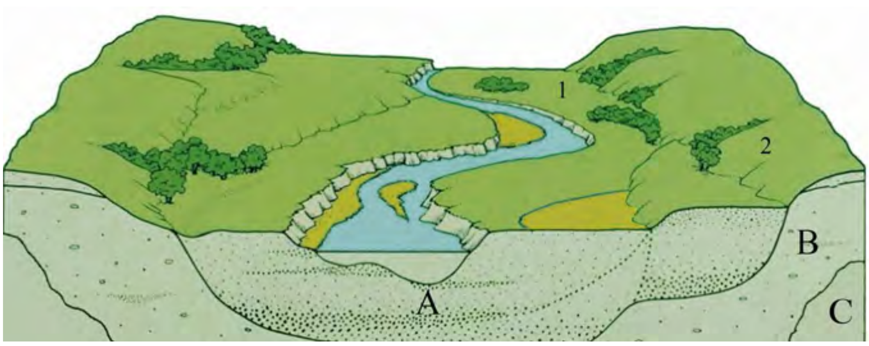

Figure 13. Idealized schematic section of the MC site, with the locations of the archaeological excavations carried out by Baeza and colleagues (1), and by the author (2). References: (A) recent alluvium; (B) Sopas-Dolores Formation; (C) basalt bedrock.

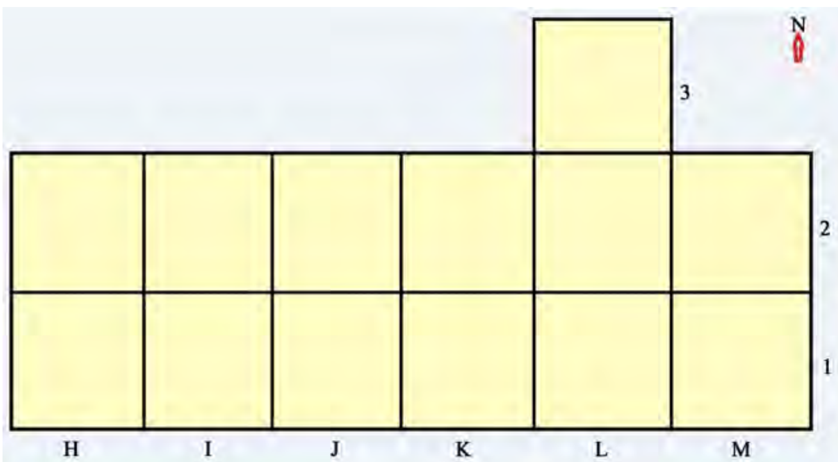

Figure 14. Grids of the archaeological excavation carried out at Minas de Callorda.

The first remains were found at the transition between Levels 1 and 2, the second in the lower portion of Level 3, and the third at the top of Level 4. The upper level shows scattered lithic artifacts, mainly debitage. The middle one is characterized by the presence of diverse types of end scrapers, among them an unusual bifacially flaked piece and others made from short blades and used as blanks, early stages of biface manufacture, and stemmed projectile points (Nami, 2007: Figure 3(a)), which may belong to an archaeological component similar to that identified by Baeza et al. (2001). This is akin to the broadly termed "Umbu" stemmed point that characterizes Holocene lithic assemblages in the territories located in southern Brazil, Uruguay, and northeastern Argentina (e.g., Miller, 1969; Schmitz, 1987; Rodríguez, 1998, 2001; Schmidt Dias, 2007; Nami, 2016a; Okumura & Araujo, 2014; Loponte & Carbonera, 2019; among others). Remains from the lower archaeological level exhibits sharp technological differences from those of the upper levels. Given the length, width and thickness of significant pieces, hereafter given in parentheses, a remarkably and likely Paleoindian broken fluted base (20 × 27 × 4 mm) was found in this level. It was made on red silicified limestone by pressure flaking that left parallel flake scars on one face, while the other shows a sort of flute obtained from its basal portion (**Figure 21(a)**). This level probably represents the Early Holocene/Late Pleistocene hunter-gatherers. FPs and preforms have been identified in several lithic assemblages from the Negro River basin (Bosch et al., 1980; Baeza & Femenías, 1999; Nami, 2001a, 2001b, 2009, 2013, 2017a). The majority of the remains from the top of Level 4 exhibit strong weathering, differing in this respect from the artifacts in the lower portion of Level 3.

The flaked stone artifacts in LM and MC were made from local cherts from secondary sources located along the river. About 4 km north of MC, around the Rincón del Bonete dam, two quarry sites have been identified. Rincón del Bonete 1 shows extensive secondary deposits of pebbles of diverse petrography and colors, ranging from 5 to 20 cm in diameter, among them ordinary to very high-quality cherts. Rincón del Bonete 2 is a primary source (see Luedtke, 1979) characterized by exposures of tabular nodules of silicified limestone. Flaking experiments using these rocks (Nami, 2015a, 2017a) have demonstrated that they have good to very good flaking qualities, ranking 3.5 on Callahan's (1979) lithic grade scale (see also Luedtke, 1994: pp. 86-87). Embedded in the exposed regional basaltic deposits are primary sources of white chalcedony, which were used to manufacture stone tools (**Figure 11(a)**). A quarry site with a certain abundance of crystal quartz nodules of varied size was recorded at Los Molles creek at about 300 m of the archaeological site.

3.3. Dating Methods and Building a Chronostratigraphic Framework

As an aspect of archaeological investigations, a crucial topic is the building of a chronostratigraphic framework through the use of various complementary methods. These comprise conventional and accelerator mass spectrometry (AMS) radiocarbon, as well as optically stimulated luminescence (OSL) dating (e.g. Nami, 2013; Feathers & Nami, 2018). These methodologies in conjunction with regional paleomagnetic research performed on varied terminal Pleistocene/Holocene sedimentary deposits are extremely useful in constructing a chronological frame for the regional archaeological process.

The age of LM was determined via the aforementioned methods. Radiocarbon dating was performed using different materials. Level 2 under the present vegetal humus yielded two small samples of charcoal from H3 and I3 squares. These were submitted for standard assays at Gliwice Radiocarbon Laboratory, Institute of Physics (Silesian University of Technology, Poland). Both samples (Gd-30118 and Gd-3020) indicated that the charcoal was "modern". The measured radiocarbon concentration in percent of modern carbon showed a relatively high value (133.97 ± 0.61 and 136.5 ± 1.2) of the so-called "bomb effect". Therefore, using the CALIBomb program (Reimer et al., 2004a, 2004b), both samples could be dated to 1962 CE or 1976-1978 CE, enabling us to ascertain that in the thinnest part of the sedimentary deposit, Level 2 was affected by the incorporation of modern material in the upper archaeological layer. From LM, a sample of sediment belonging to the upper part of Level 4 at 1.10 - 1.11 m deep was submitted for AMS dating at Leibniz-Labor für Altersbestimmung und Isotopenforschung, Universität Kiel Leibniz-Laboratory for Radiometric Dating and Stable Isotope Research (Kiel University, Germany). Its analysis yielded a 4650 ± 30 uncalibrated years BP (KI-5081), or 3525 - 3355 CAL BCE (Reimer et al., 2004a, 2004b). Employing the Oxcal 4.2.4 calibration program (Bronk Ramsey & Lee, 2013) and the ShCal13 curve for the Southern Hemisphere (Hogg et al., 2013), the following ranges of calibrated ages before present were obtained: 5467 - 5347 (53.9%), 5336 - 5282 (34.0%), 5164 - 5136 (4.0%), and 5106 - 5077 (3.4%) years. This date was obtained from the humic acid fraction of the sediment, which tends to provide more reliable ages for this kind of material (Ruiz Pessenda et al., 2001). However, this date yielded the apparent mean residence time (MRT) of the soil (Scharpenseel & Schiffmann, 1977), which is the mixing of the young organic carbon with the oldest from earlier stages of pedogenesis (Stein, 1992). Consequently, the MRT indicated that the deposit was open to organic material deposition during ~5 kya. This date may be considered as a minimum age, because MRT is a significant factor that must be considered when dating soil organic matter (Stein, 1992).

In addition, sediments from LM were also subjected to OSL dating (Feathers & Nami, 2018). For this purpose, three samples were obtained by driving PVC plastic tubes 12 × 5 cm vertically inserted into a horizontal section of the archaeological excavation across the Level 3 - 4 transition in square I7 at 1.21 - 1.31 m and 1.34 - 1.44 m depth from the datum (**Figure 15**). This ensured mixed samples. In the same grid, a third sample was horizontally taken at ~20 cm below the lower archaeological level at −1.65 m depth. The samples were submitted

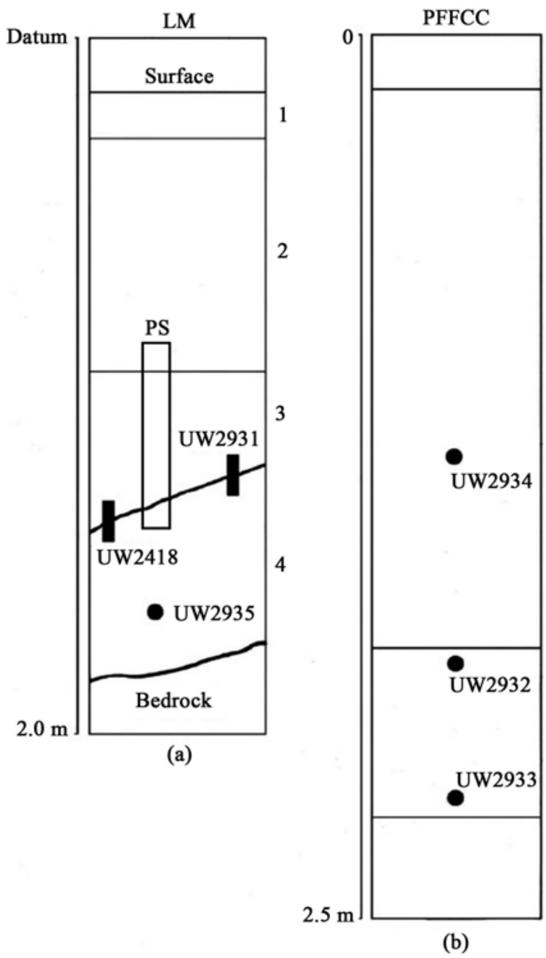

Figure 15. Schematic sections of LM (a) and PFFCC (b) sites showing the location of the OSL samples. The rectangle at LM denotes the paleomagnetic sampling (PS). The numbers on the right indicate the stratigraphic levels (slightly modified from Feathers and Nami, 2018: Figure 4).

and processed at the Luminiscence Dating Archaeology (University of Washington, USA). The results are presented in **Table 1**. Samples UW2918 and UW2931 yielded two ages, separated by 3.55 to 4.96 ka, respectively, reflecting a geological unconformity surface, as suggested by the relict of a fully developed soil observed at the upper portion of Level 4 (Feathers & Nami, 2018). The few local archaeological buried records obtained from sedimentary sequences also revealed episodic sedimentation and contained unconformities (Baeza et al., 2001; Nami, 2007). The youngest OSL dated from both samples was consistent with the minimum age obtained from the soil with AMS dating at the top of Level, 4 confirming that this level is a terminal Pleistocene/Early Holocene deposit. The age of Level 3 agrees with the AMS result, meaning that the archaeological component from this horizon belongs to the Middle Holocene. On the other side, the archaeological vestiges embedded in the transition of Levels 3 - 4 and the upper part of 4 is an early Holocene occupation that used stemmed projectile points in its weaponry (Nami, 2007: Figure 3(a); Feathers & Nami, 2018).

Table 1. OSL ages obtained from the samples taken at LM and PFFCC sites.

Site	Sample	Level	Ages (ka)
LM	UW2931	Transition 3/4	4.18 ± 0.32 9.14 ± 0.77
	UW2418	Transition 3/4	5.39 ± 0.97 8.94 ± 0.83
	UW2935	4	11.8 ± 0.83
PFFCC	UW2934	2	1.04 ± 0.08
	UW2932	3 (top)	2.12 ± 0.15
	UW2933	3 (base)	4.24 ± 0.29

Crossing the Negro River, another site dated with this method was Puente del Ferrocarril (PFFCC, 32˚49'20.03 S. Lat. 56˚30'48.01 W. Long.) which is situated across a railway bridge south of Paso de los Toros in Durazno department (Figure 5(b) and Figure 5(c)). Non-diagnostic scattered archaeological artifacts are found along the riverbanks eroded by the new course of the river after the dam construction. A sedimentary section about 2-2.5 m thick shows the following layers: 1) the present vegetal humus surface; 2) a clear brown sandy layer; 3) a dark gray/black clayed stratum, and 4) hard brown clay overlying the basalt bedrock (Figure 5(c), Figure 15(b)). The latter was tentatively identified as the Sopas-Dolores deposit. The obtained dates are depicted in Table 1. As an additional component of the local chrono-stratigraphical framework, the earliest date at Puente del FFCC agrees with the ages for Stratum 3 at Los Molles. This sample lies just above the suspected Sopas-Dolores formation; if it is right, then there is an unconformity reflecting no sedimentation for several thousand years. The later dates reflect a younger record that is missing at LM and poorly known in the Middle Negro in general. Along with the AMS date from La, they may also provide local ages for wetland deposits observed in other areas in Uruguay during the Holocene.

Paleomagnetism is another powerful discipline useful for establishing absolute or relative chronologies on varied kinds of sedimentary deposits (Herz & Garrison, 1998; Merrill & McFadden, 2005). Besides visiting diverse localities for evaluating its importance in archaeological research, a significant aspect of my investigation was to find exposed geological sections to carry out paleomagnetic studies. Hence, this investigation was performed to construct regional curves of paleosecular variations with chronostratigraphic purposes (e.g. Nami. 2006a, 2008, 2011a, 2012).

Several vertical paleomagnetic samplings were performed to study the regional geomagnetic field (GMF) directions. To collect samples, cylindrical containers (2.5 cm long and 2.0 cm in diameter) overlapping each other by about 50 percent were carefully pushed into the sections (Figure 16). Despite the fact that the paleomagnetic analysis remains in progress, some preliminary results can be reported. These were obtained from the samplings taken at the LM site and Larrachea (La),

Figure 16. Examples of the Larrachea sedimentary section with detailed paleomagnetic sampling observed on the right.

an archaeological locality that yielded a FP (**Figure 17(a)**, Nami & Yataco Capcha, 2020) and ubiquitous Umbu-like specimens, most of them resharpened and/or broken through impact (**Figures 17(b)-(m)**). At both sites, the samples showed oblique reverse polarity directions far from the present dipolar field, suggesting that the normal direction of the GMF was interrupted by a short time excursion (Nami, n.d.a). The ages from LM and an AMS radiocarbon assay made from the humic fraction of the La sediment yielded a minimum date of ~3.5 kya for the sampled deposit, suggesting that the geomagnetic event occurred during the middle Holocene at ~4 - 5 kya. These results are in agreement with the presence of an anomalous GMF behavior observed across the Southern Hemisphere during the terminal Pleistocene and early, middle and late Holocene (Nami, 2012, 2015b, 2019b; Nami et al., 2016, 2017, 2020). Particularly in this region, the existence of this anomaly has been suggested by a wide pulse in declination during the middle Holocene in previous studies undertaken at the Uruguay River shore in southeastern Corrientes Province on the Argentine-Uruguayan border (Nami, 2011a: Figure 7). Furthermore, as displayed in **Figure 18**, a sample from the Santa Lucia site showed that despite not useful to isolate a direction, it carried two magnetic components indicating that the vector changes from negative to positive inclinations (intermediate or reverse), moving in a great circle. This was confirmed by the detailed paleomagnetic records obtained at LM and La revealing paleosecular variations during the time of anomalous behavior, with a ~180˚ difference in directions with the present normal GMF. Although the results of this investigation have not yet been published (Nami, n.d.a), **Figure 19** illustrates the mean virtual geomagnetic pole (VGP) positions obtained at both sites compared with other Early Holocene (~9.2 kya) mean VGP positions obtained at Barrancas de Maipú in western Argentina (Nami et al., 2017). Interestingly, despite a ~4 - 5 ky difference, they are located in and close to Oceania, a fact that also happens in several geomagnetic excursions and polarity transitions occurred in Earth history (e.g. Hoffman & Singer, 2004; Gurarii, 2005; Laj & Channell, 2007).

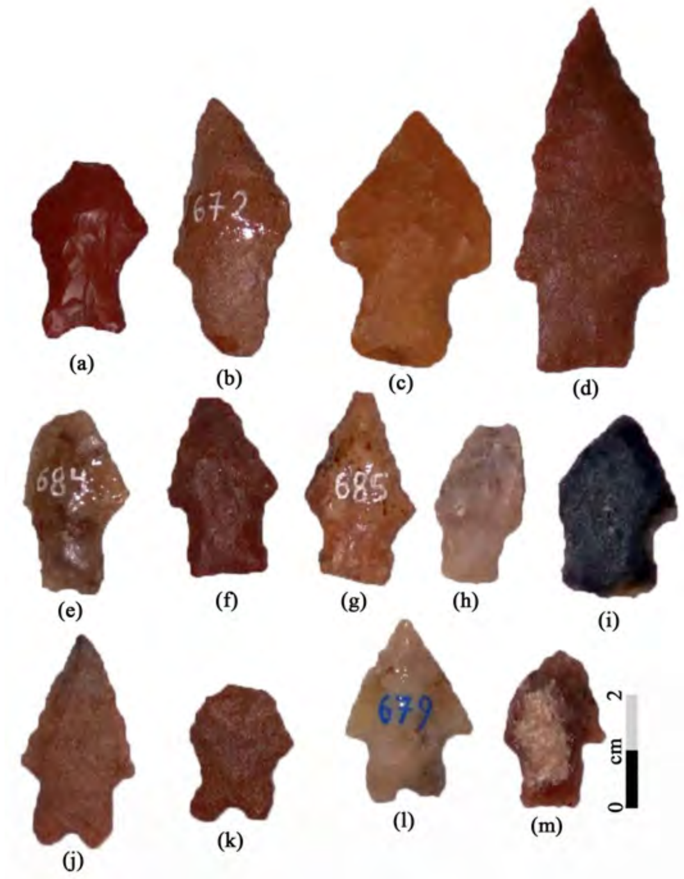

Figure 17. Armature tips found at Larrachea archaeological locality. (a) Fell, ((b)-(m)) stemmed Umbu like points.

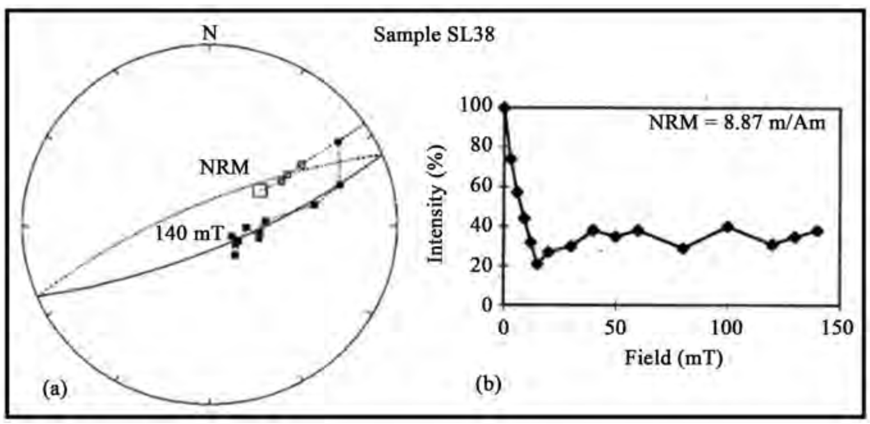

Figure 18. Great circle (a) and curve (b) observed during the demagnetization process of the SL38 sample (after Nami, 2011a: Figure 4).

A number of paleomagnetic studies conducted at different sites belonging to diverse sedimentary environments in the Southern Cone of South America have yielded normal, intermediate and reversed directions. This suggests that in southern South America during the Early, Middle and Late Holocene, the Earth's magnetic field probably underwent short-lived excursions (Nami, 1995a, 1999, 2019b;

Figure 19. Location of mean virtual geomagnetic poles calculated from continuous records with oblique directions from Los Molles, Larrachea (Uruguay) and Barrancas de Maipú (Argentina).

among others). Similar events have been identified in different sections and materials from Eurasia and North and South America. This may suggest that some anomalous geomagnetic phenomena have occurred globally during the more recent geological epoch. In fact, during the last ~11/10 kya, the normal polarity of the Earth's magnetic field has been interrupted by several short-lived reversed polarity events (Nami, 2012). In this scenario, the observed anomalous directions at La and LM might be another short-term manifestation of this process, corresponding to a Late/Middle Holocene excursion. In other words, anomalous GMF directions at the sampled sites suggest that they were recorded during the Late/Middle Holocene (Nami, 2012). Therefore, they reinforce and complement the ages reported above.

In summary, the paleomagnetic results obtained at La and LM can be interpreted as additional paleomagnetic regional records in southeastern South America (e.g. Nami, 1999, 2006a, 2011a, n.d.a). In addition to the expected normal directions, some of them show significant directional changes in declination and inclination with intermediate and reverse VGP positions during the terminal Pleistocene and Holocene (e.g. Nami, 1995a, 1999, 2011a, 2019b; Nami et al., 2017). Therefore, these results should simply be interpreted as chronostratigraphic tools. Hence, if the anomalous directions do represent an excursion, this may also be used as a dating device, rendering it an excellent magnetostratigraphic marker for the period when this event occurred, and serving to correlate regional stratigraphies and calibrate relative and absolute chronologies (Tarling, 1983; Herz & Garrison, 1998; Merrill & McFadden, 2005).

3.4. Investigations into Stone Tool Technologies

The mid-eastern part of southeastern South America in southern Brazil, northeastern Argentina, and Uruguay indicates that human populations living in the area since the terminal Pleistocene had a remarkable lithic technology. Indeed, the archaeological record is characterized by the existence of flaked stone tools of extraordinary manufacture, revealing their makers' elevated technical knapping skills (e.g. Okumura & Araujo, 2014; Lourdeau et al., 2017; Nami, 2013, 2017b; among others).

The area under study reveals an abundant lithic record traditionally classified in terms of rigid and intuitive morphological typologies. Despite its important quantity and quality, a lack of in-depth studies from a contemporary viewpoint is apparent. In response, several trips were performed to the cities of Paso de los Toros and Tacuarembó, respectively located in the northern and southern parts of the department. The technological investigations were carried out from observational and experimental perspectives. The former was not only performed on artifacts recovered in systematic excavations, but also by studying institutionally and privately curated collections, mostly made from surface finds recovered in known and unknown sites and/or localities. Additionally, once significant evidence to deepen the aforementioned topics had been discovered, I visited the locality and/or the sites where they were found whenever possible.

The abundant lithic remains found at Tacuarembó were left by the different hunter-gatherers societies living in the area during the last 11 kya. An important number of artifacts may be used to discuss issues of archeological relevance from the technological and functional viewpoints. Consequently, to deepen existing knowledge of the lithic morpho-technological variability of the regional archaeological record, the following are detailed observations and salient information on a number of remarkable artifacts that deserve attention.

Several Paleoindian artifacts were recently registered and analyzed. In the Negro River basin, these usually come from eroded sedimentary sections likely belonging to the Late Pleistocene Sopas-Dolores Formation, or the sites located in the above-mentioned dunes at the river shorelines. In actuality, numerous archaeological artifacts were found, suggesting the extensive use of the dunes by prehistoric societies. Just as in other times and places around the world (e.g. Bórmida, 1968; Jodry, 1999; Burley, 2005; Kandel & Conard, 2013), at Tacuarembó the dunes were highly significant in their life-way since the earliest human occupations by some reason that must be seriously explored.

The new observations were realized on pieces belonging from the following collections: Mr. Justo Olivera curated at the *Museo del Indio* (Tacuarembó city), Mr. Segundo Ademar "Pocho" Muga Prieto (currently *Museo Histórico Casa Muga*, San Gregorio de Polanco village), and Mrs. A. Castillo, R. Cáceres and F. Moreira. These studies permitted the identification of new exemplars of extreme technological interest. Paleoindian diagnostic FPs has been recovered at surface sites all across Uruguay, but the main concentration is in its central part, especially in the Negro River basin. Besides being an important place for the colonizers' groups, this fact is also probably due to a geo-archaeological artifact, because the construction of the dam has raised the river's level and eroded the old sites located on some of its terraces. The study of the recently identified FPs has enabled knowledge to be advanced of its morphological variability, technology, and function (e.g. Nami, 2009, 2010, 2017a; Nami & Castro, 2010; Nami, 2014a; among others). Like in other parts of South America (e.g. Bell, 1965), the Uruguayan record shows that besides the "typical" fishtailed forms, there is broad variation both in terms of stems and blade shapes (Nami, 2014a). In many cases, the precise location of the FPs has not been registered or only a very general location is known, so interpretations must be treated with caution (cf. Suárez & Leigh, 2010; Femenías et al., 2011). Despite recovery by non-professionals, these data may be used to gather valuable technological information from several viewpoints. In this regard, a very interesting piece is a variety of FP (**Figure 20(a)**) that was found at La Fuzarca, a site on a dune on the Tacuarembó River shoreline. This specimen (58.2 × 33.4 × 9.4/8.6 mm) is made from sandstone, a material available in northern Tacuarembó as well in the neighboring departments to the north. Due to its shape, this exemplar is comparable with the so-called

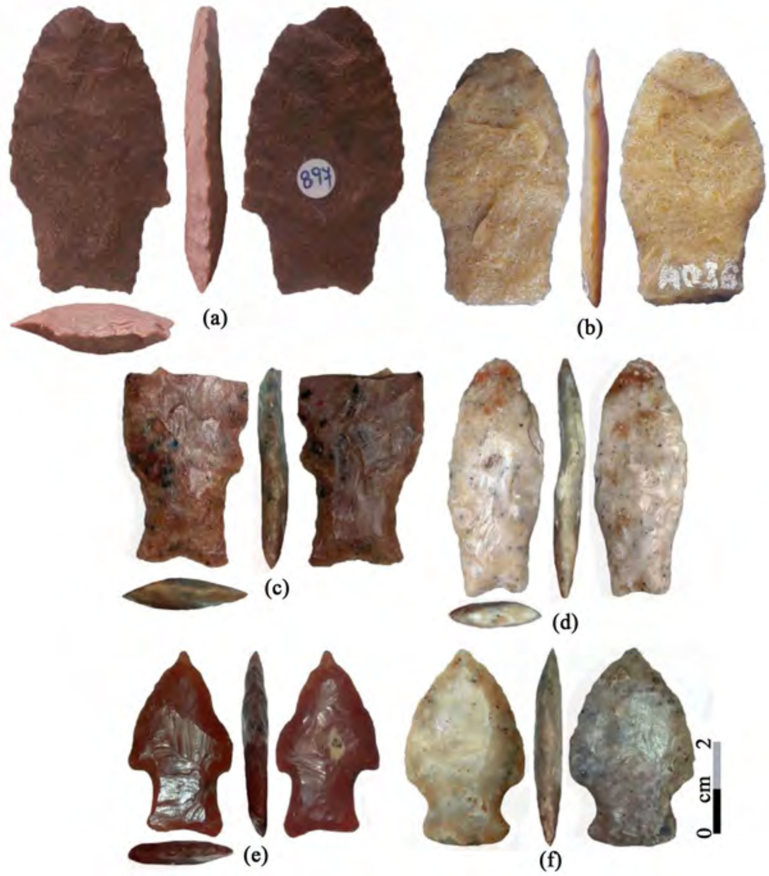

Figure 20. Fell points (a)-(d), and possible exemplars (e) and (f), found in Tacuarembó Department. (a) La Fuzarca, (b)-(d) San Gregorio de Polanco, (e) and (f) unknown origin.

"El Inga broad stemmed", which is an FP variant characterized by a wide stem and generally with straight borders (Nami, 2014a, 2014b), but which is sometimes not recognized and documented as an FP. Interestingly, as displayed in **Figure 20(b)**, another comparable piece has been collected by Mr. Muga in San Gregorio de Polanco village on the shore of the Negro River. This FP (56.8 × 32.9 × 6.4 mm) is made from quartzite on a previously thinned biface blank. Both items show an impact cone initiating fracture in the tips (Weitzel et al., 2014: p. 91). Also probably broken by impact is a unit with a "typical" stem defining the FPs found at San Gregorio de Polanco village (**Figure 20(c)**). With the same origin, another interesting lanceolate FP (55.5 × 22.2 × 7.1) shaped on a flake of whitish-gray silcrete is presented in **Figure 20(d)**. Olivera's collection contains two armature tips of unknown origin, which due to some of their general characteristics might be deemed FPs. One is displayed in **Figure 20(e)**, presenting a straight shoulder, and made using a red material, a color preferred by the colonizers for use in their weaponry FPs (Nami, 2017a). In the other specimen, apart from the convex stem's base, the rest of its techno-morphological attributes agree with the points in question (**Figure 20(f)**). Both items, on one of its faces, show short flutes and were finished by short pressure retouches applied by pressure on previously bifacially thinned preforms.

Significant is an unusual piece (**Figure 21(b)**) from a small dune on the shore of the Tacuarembó Grande River, 60 km north-east of Tacuarembó city by Route 26. It is a triangular bifacial flaked specimen (67.2 × 31.4 × 6.4 mm) made from fine-grained sandstone. It manifests pressure flaking on both faces applied to a previously thinned biface by percussion that in the center of its basal part has a prepared platform with a nipple from which a relatively short flute has been detached. Due to these features, it could be identified as a possible unfinished Paleoindian point. Another broken-fluted preform was recently found at a site on the north shore of the Rincón del Bonete dam. Exhibited in **Figure 21(c)**, this piece represents the basal portion of a preform broken by a reverse hinge fracture produced during fluting (Nichols, 1970). It is made from a fine-grained gray silcrete commonly used in the region to manufacture early tools (Nami, 2017a). At this point, it is worth recalling that in the early 2000s several fluted preforms and one prepared nipple were identified in the Cerro de los Burros locality (southern Uruguay), as well as Paso del Puerto, a dune site located in the Negro River basin at the eponymous department (Nami, 2001a, 2001b). Like the newly reported items, several of these showed parallel borders and beveled bases, some with isolated nipples for fluting (e.g. **Figure 21(d)** and **Figure 21(e)**). It is also important to mention that similar platform preparations in FP making have been recorded in many places across South America (e.g. Nami, 2014b: Figures 10-15; Nami, 2016a: Figures 2(c)-(e)).

Another documented instrument is a noteworthy unifacial implement that is rare in the Uruguayan archaeological record (**Figure 22**). It is an example of a remarkable multipurpose tool, usually called knives and side-scrapers, found across the country, with striking technological and typological similarities with

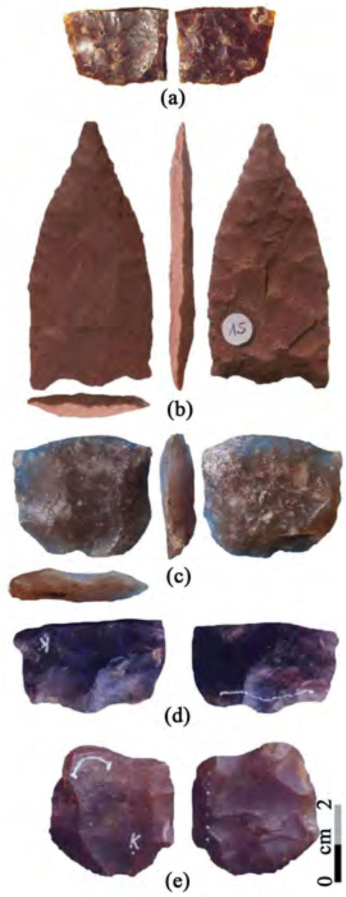

Figure 21. Paleoindian preforms showing fluting and prepared platforms by isolating a nipple. (a) Minas de Callorda, (b) Tacuarembó Grande River, (c) Rincón del Bonete, (d) and (e) Paso del Puerto.

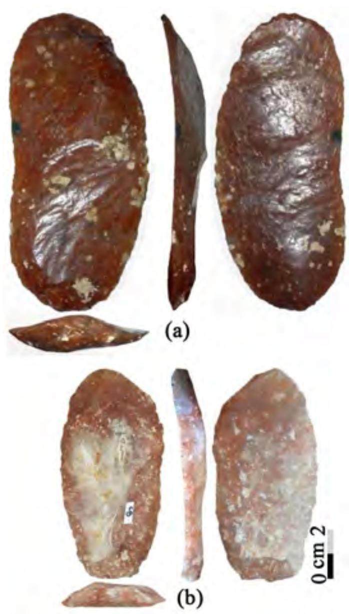

Figure 22. Highly possible Paleoindian unifacial tools. (a) Tacuarembó Department; (b) Cañada El Bravío.

pieces from surface and stratified FP sites in the Southern Cone (e.g. Nami, 2019a). In this regard, as displayed in **Figure 22(a)**, one specimen (97.7 × 43.9 × 9.5/6.3 mm) from Olivera's collection might be considered as a tool of the Paleoindian lithic assemblage (Nami, 2013, 2014a, 2017b). In general, they are well-made from thin flake blanks that were probably obtained from some sort of prepared cores (e.g. Nami, 2006b, 2013, 2017a, 2017b). They are also mostly manufactured using reddish silcrete, a raw material preferred by the colonizers (Nami, 2017a). Curiously, crossing the Negro River a similar piece was recently identified in the Soriano Department, where interesting Paleoindian remains have also been recovered (Nami, 2017b). Illustrated in **Figure 22(b)** and also manufactured from silcrete, this piece comes from a small watercourse called *Cañada El Bravío*, a place where significant bones of extinct Pleistocene fauna have been collected.

Situated on the banks of a small stream that bears the same name (**Figure 23**), La California (LC) is a quarry-workshop site (**Figure 24**) located 38 km northwest of Tacuarembó city in the northern part of the department. Here there are extensive outcrops that constitute a primary source (Luedtke, 1979) of silicified sandstone, where a large number of archaeological artifacts can be observed at the surface, as well as being buried in a level of black sediment overlying the sandstone bedrock (**Figure 23(2)**). Useful to know the first stages in stone tool production (Ericson & Purdy, 1984), the remains observed at LC mainly consist of cores and waste, implying that this part of the production process was performed here, as suggested by several archaeological, experimental, and ethno-archaeological investigations (e.g. Callahan, 1979; Binford, 1986). In this regard, a remarkable discovery was the presence of well-prepared Levallois-like cores to detach predetermined flakes. Since the discovery of the employment of such cores and their variants in the Southern Cone of South America (e.g. Nami, 1992, 1995b), they have been documented in several localities below the Tropic of Capricorn, particularly in Uruguay (Nami, 2013). However, among the great

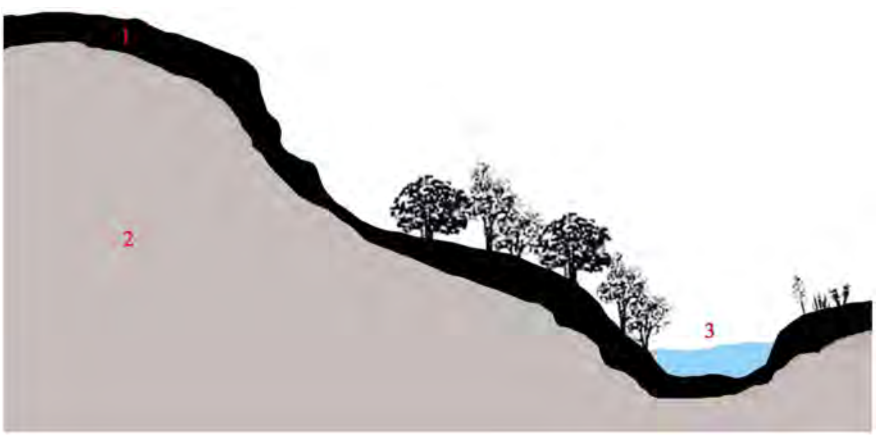

Figure 23. Schematic transversal section of the archaeological black sedimentary level (1) containing the archeological remains in the quarry-workshop site in relation to the sandstone bedrock (2) and La California creek (3).

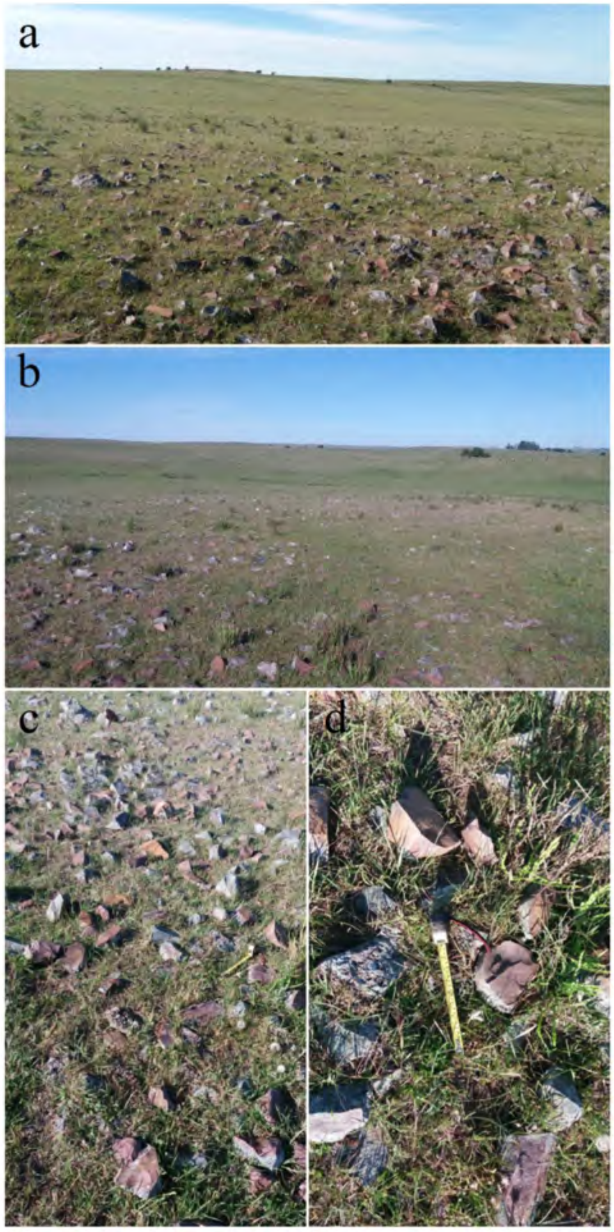

Figure 24. Different views of the La California quarry-workshop site. (a) and (b) General perspective of the flaking waste observed at the surface of the site. (c) and (d) Images of the different kinds of remains resulting from the first step in the stone tool production process.

variety of shapes, the Levallois-like core presence was documented with a number of specimens. Figure 25 displays two excellent examples of predetermined flakes detached from a previously prepared core. The specimen (107.4 × 115.4 × 62.1 mm) exhibited in Figure 25(a) shows a clear flake scar left by a flake detached from a shaped striking platform by isolating a point of percussion of ~85˚ where the blow was applied to obtain it. In the lower panel of the same figure, a "turtleback" core (104.2 × 101.4 × 33.0 mm) with two flake extractions can be seen, one on each face, the main one being obtained from a platform of ~82˚/83˚.

Figure 25. Levallois-like cores from La California site.

Found at El Tala creek, an interesting piece manufactured on similar LC fine-grained sandstone is a biface with a plane-convex cross-section (107.8 × 66.6 × 29.8 mm). As illustrated in **Figure 26(a)**, both faces exhibit a non-patterned flake removal sequence (Callahan, 2010) with flake scars suggesting that they were obtained by applying percussion flaking with some kind of soft or semi-soft percussors (Callahan, 1979). Despite several flakes being detached on its flattest face, the remains of the ventral face of the flake used as a blank are still observable. It is worth mentioning that this kind of artifact is uncommon in the regional archaeological record, although a similar piece from the Saladero site on the Uruguay River shore in Entre Ríos Province, Argentina, was recently reported (Nami, 2016b: Figure 3). On one portion of the convex face, a strong abrasion (**Figures 26(b)-(d)**) is visible with the naked eye on some flake scars' ridges, some of which are denoted with an arrow in **Figure 26(a)**. Abrasion on the bifaces may owe to different causes, such as final shaping (Disselhoff, 1972: p. 277), surf action (Stanford et al., 2014), bag transportation (Frison & Bradley, 1980), and the action of the sand resulting from soil movements (Stapert, 1976),

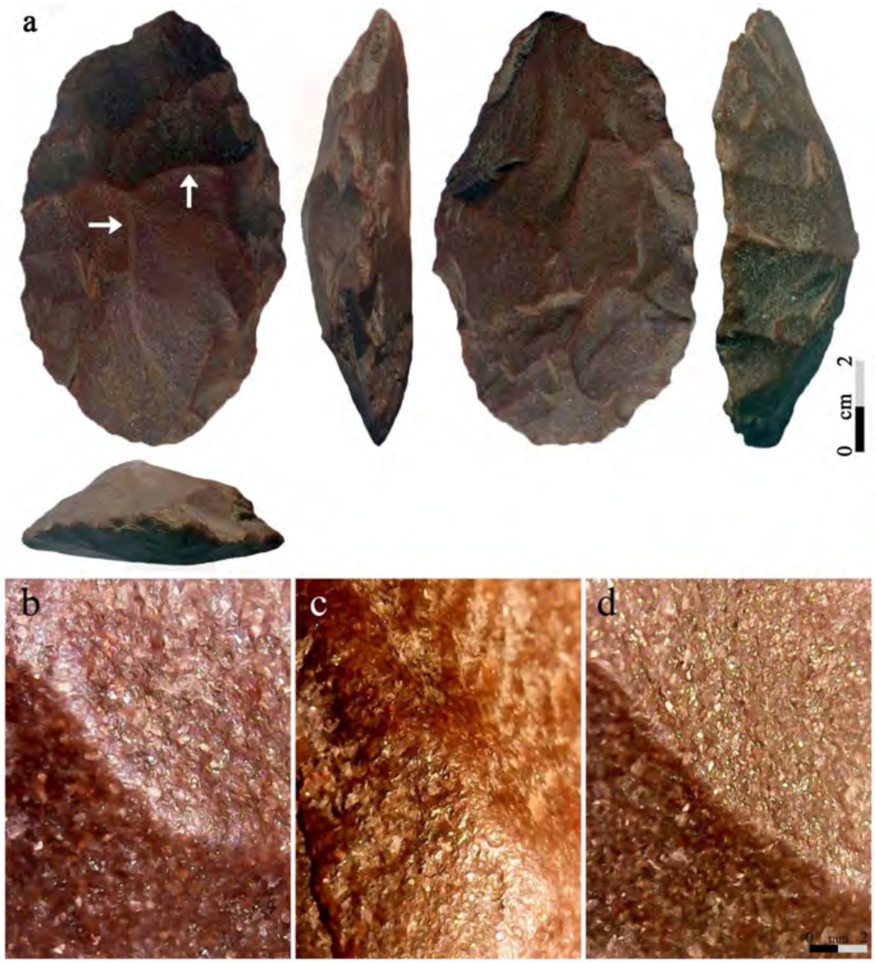

Figure 26. (a) Biface with plane-convex cross-section from El Tala creek. (b) and (c) Microphotographs showing examples of abraded. (b) and (c) and non-abraded ridges (d), denoted with arrows in (a).

among others. Given that it is only present on a few ridges, in the described item the abrasion was probably made by the manufacturers with an unknown aim. As a topic that must be seriously investigated, this sort of artifact might either be a tool or a preform for a kind of instrument with a unifacial edge made on a previously prepared blank, such as has been used in some Late Pleistocene-Early Holocene lithic assemblages in Brazil and Argentina (e.g. Viana Sibeli & Borges, 2014; Nami & Civalero, 2017; Civalero & Nami, 2019).

From an actualistic perspective (Nami, 2018), various experiments were conducted to build a baseline and thus develop an approach to examine diverse regional reduction sequences. Therefore, several replicative experiments were carried out with the FPs (**Figure 27**), notably the bifacial knives (**Figure 28**) and the ubiquitous ground/flaked discoid stones (Nami, 2010, 2017c, n.d.b). Of particular importance was an experiment conducted to identify and understand the helical and beveled cross-sections of the common stemmed points (**Figure 29** and **Figure 30**, Nami, 2019c). Found at more than 500 sites (Rodríguez, 2006: p. 144), and distributed in southern Brazil, northeastern Argentina, and all across

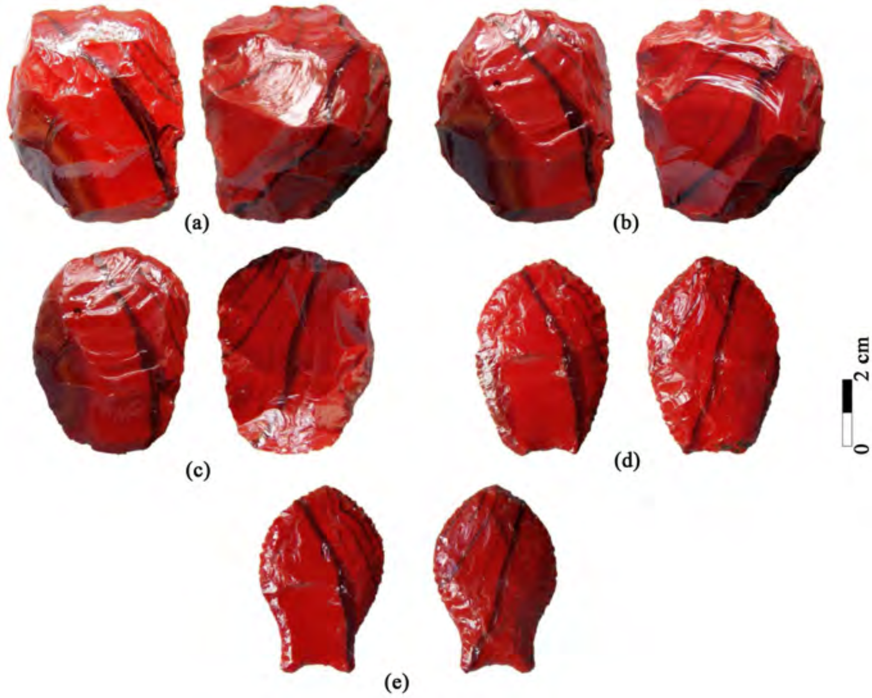

Figure 27. Example of an experimental reduction sequence with bifacial thinning of a FP. ((a)-(e)) Stages 2 to 6 (after Nami, 2010: Plate 19).

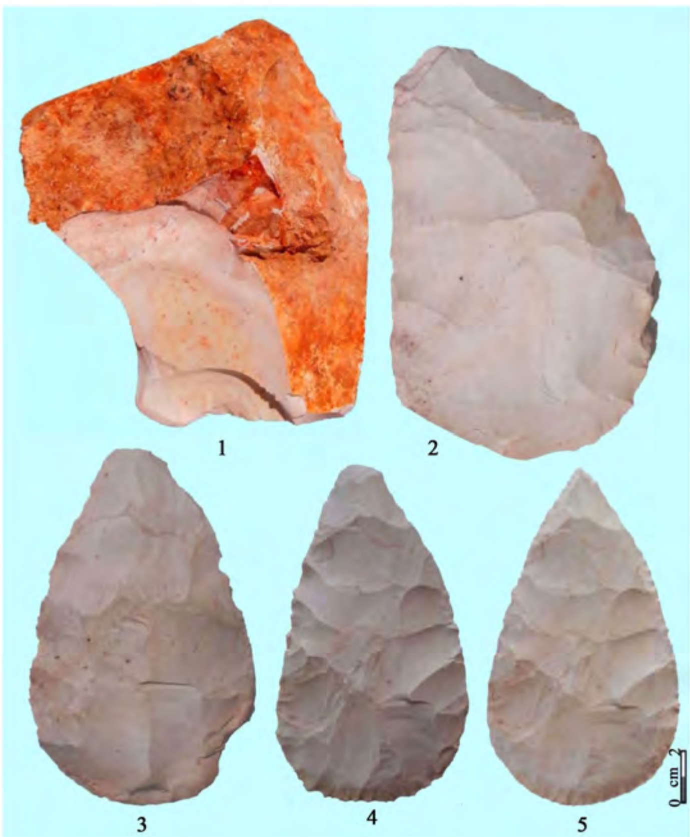

Figure 28. Bifacial reduction of the knives presented in this paper. The numbers indicate the manufacturing stages (after Nami, 2017c: Figure 26).

Figure 29. Archaeological exemplars showing the variations of stemmed Umbu-like projectile points with helical and beveled cross-sections from different places in northeastern Argentina and Uruguay (see Nami, 2019c: Table 1).

Uruguay, they are similar to the projectile points that from a traditional perspective broadly characterized the "Umbu tradition", according to Brazilian archaeologists (e.g. Miller, 1969, 1987; Schmitz, 1987). They are currently the topic

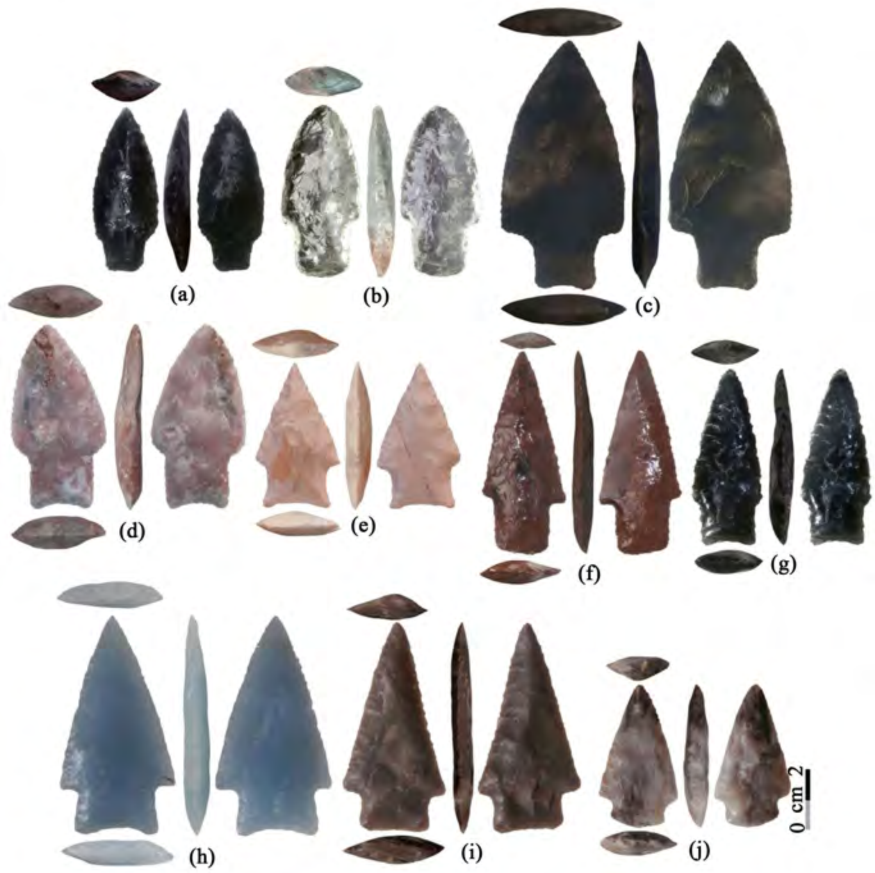

Figure 30. Examples of experimental reproductions of projectile points with beveled and helical cross-sections.

of debate, principally concerning their chronology and morpho-technology, among other issues (e.g. Schmidt Dias, 2007; Suárez, 2017; Moreno da Sousa & Okumura, 2018; Loponte & Carbonera, 2019; Moreno da Sousa, 2020). They show a wide range of variations in the shapes of their blades, stems, shoulders, and barbs (**Figure 7**, **Figure 17**, **Figure 29**). However, in many cases they share features in common, such as the aforementioned helical and beveled cross-sections (**Figure 29** and **Figure 30**). Serious and unbiased research considering the lithic assemblages accompanying them, the site formation and geo-archaeological process involved (Feathers & Nami, 2018), as well as complex deontological issues (Nami, 2011b, 2018), might help to unravel the complicated archeological skein built with these points in some places in the region. In this regard, recent excavations may help to clarify the oldest ages of some variants of such armature tips (Loponte & Carbonera, 2019).

4. Discussion and Conclusion

In summary, this paper has offered a glimpse into the use of diverse scientific disciplines and approaches that may help to deepen various topics concerning the prehistoric past at Tacuarembó. The archaeological excavations as well as the variety of dating methods used have allowed us to understand the chronology and certain aspects of the site formation process in the area. LM revealed important depositional gaps and hiatuses of several thousand of years in its sedimentary deposit. The lesson from LM might apply to other sites in the region, where low depositional rates alongside existing unconformities have added to the significant and powerful action of the fluvial erosive process, rendering highly fine-grained archaeological interpretations difficult. Becoming aware of some of these phenomena may facilitate more realistic, unbiased, and objective archaeological interpretations. This is especially relevant when dealing with the remains of the oldest occupations in the region, where mixing with the vestiges of subsequent occupations can make differentiation a challenge. In a nutshell, the AMS and OSL dates at LM showed gaps and unconformities in the sedimentary deposit. This is a fact that might be more common than previously thought, and is especially problematic at sites along river shores (Pouey Vidal, 2018). Besides the above mentioned geo-archaeological issues, adding a new piece of evidence demonstrating that the excavated archaeological sites on the riverbanks (particularly at the more proximate shores) are subjected to a myriad of processes that make archaeological interpretations difficult and doubtful, mainly when the evidence is treated with a biased attitude (see Feathers & Nami, 2018; Nami, 2018).

This report of new technological investigations has permitted more detailed knowledge to be collected regarding diverse topics related to the reduction systems existing in the area since the terminal Pleistocene. Indeed, the Paleoindian remains add new finds to the record of the early colonizers living in Tacuarembó during the last millennium of the Pleistocene. The FPs from La Fuzarca complement previous finds from Paso de los Novillos (López Mazz, 2017) in the north-central portion of the department, while the reported discoveries from the Negro River basin expand existing knowledge on the shape's variation within such artifacts, additionally confirming that this area is undoubtedly yielding the largest number of FPs in the country (e.g. Bosch et al., 1980; Baeza & Femenías, 1999; Nami, 2013, among others). In this regard, the new preforms and finished products append further data on barely known FPs' reduction sequences—mainly those whose bases were fluted—as well as to the morphological variations existing in the final manufactured goods. The identification of clear turtle-back Levallois-like cores at LC agrees with earlier finds in other locations in southeastern South America, which were previously identified in the Misiones Province in northeastern Argentina (Nami, 1995b), and particularly in Uruguay at the Negro River (Nami, 2013: Figures 8(a)-(d)). However, LC yielded excellent examples of the employment of the flaking strategy by the prehistoric populations living in Tacuarembó. From the experimental lithic technology perspective, modern reproductions of the stone tools afforded an understanding of various aspects of the reduction sequences and technical features of their analogs from the past.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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Enemy on the Walls: A Preliminary Report of the Throwing Remains on the Hellenistic Acropolis of Kastritsa (Epirus, NW Greece)

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Abstract

In this paper we present the artillery remains of a military conflict (i.e., mainly arrowheads) assumed to be related to the resistance of the Hellenistic city of Kastritsa in inland Epirus (NW Greece) during the last year of the Third Macedonian War (168 B.C). New archaeological evidence allowed us to link the Hellenistic city of Kastritsa to the ancient city of *Tekmon* mentioned by *Livy*.

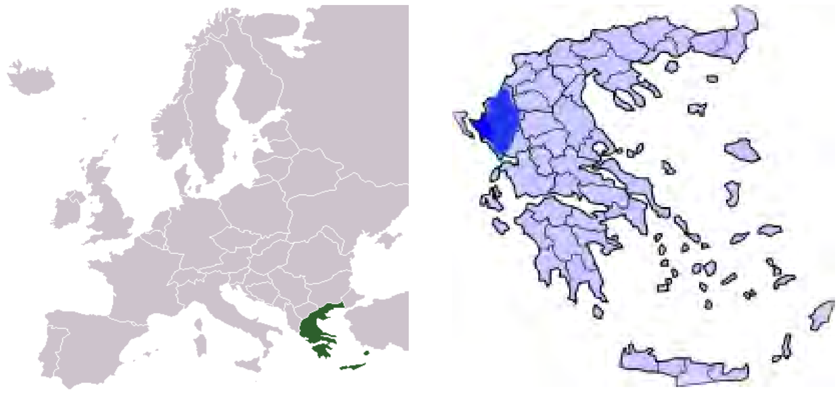
Keywords

Throwing(s), Hellenistic Battle Field, Arrow Heads, Tekmon, Kastritsa, Epirus (NW Greece)

1. Introduction

In Chapter 26 of Book 45 (Livy 45.26) of his monumental work on the history of Rome, Titus Livius (1905) describes the course of Roman General Lefkius Anikius in the summer of 168 BC from Illyria to the south, after his overwhelming victory over the king of Illyria Genthios in Skodra (now in Albania). This march resulted in the conquest of Epirus (**Figure 1**) by the Romans, and the subsequent destruction of its settlements, paying dearly their philo-Macedonian policy during the Third Macedonian War (171-168 B.C). *Livy's* text is as follows:

Leaving Illyria, Lefkius Anikius invaded Epirus (*Praepositis his Illyrico, reliquo exercitu in Epirum est profectus*), *with the city of Fanoti as his first station, which was delivered without a fight and the inhabitants rushed to welcome him* (*Ubi prima Phanote ei dedita est omiii multitudine cum infulis obviam effusa*). *Then, upon his arrival in Molossia, the general installed guards in most Molossian cities* (*apparently not meeting resistance*), *with the exception of four Passarona,*



(a) (b)

Figure 1. (a) Map of Europe showing the location of Greece; (b) Map of Greece showing the location of Epirus (Source: Wikipedia).

Tekmona, *Fylaki and Orraon* (*Hinc praesidio imposito in Molossidem transgressus*, *cuius omnibus oppidis praeter Passaronem et Tecmonem et Phylacen et Horreum receptis primum ad Passaronem ducit*).

From the text of the Roman historian we learn that the inhabitants of Passarona, despite the pressure of resistance by its two leaders, Antinous and Theodotus, chose to open the gates of the city and surrender to the Romans, with the two leaders falling dead in defense of their own decision to resist, not hoping anyway for the leniency of Rome (*Haec dicentem cum multitude sequeretur*, *Antinous et Theodotus in primam stationem hostium inruperunt atque ibi offerentes se ipsi volneribus interfecti; urbs dedita est Romanis*). The same perseverance and resistance were demonstrated by Kefalos, the leader of Tekmon, until his death in battle, when the city finally surrendered (*Simili pertinacia Cephali principis clausum Tecmonem ipso interfecto per deditionem recepit*). Neither Fylaki nor Orraon resisted the siege (*Nec Phylace nee Horreum oppugnationem tulerunt*).

The historian's references to the events of 168 B.C that marked the history of Epirus are not particularly detailed. Thus, the uncertainty of the sources and the unsafe identification of the settlements constitute a difficult pursuit for restoring the specific historical events (e.g., Cabanes, P. & Andreou, J., 1985: pp. 520-521; Dausse, M. P., 2007: pp. 197-233). Then again, the documentation of the destruction of the Epirotic settlements by the Romans, has been the subject of archaeological excavations of various sites in modern research, focusing mostly on identifying and dating the so-called "layers of destruction" (i.e. *in situ* preserved burnt and/or unburnt occupation layers) (e.g., Pliakou, G., 2014). However, modern research provides a milder picture of what was until recently believed as a widespread destruction and desolation, revealing partial recovery of the settlements (e.g., Karatzeni, V., 2001: pp. 163-179).

Therefore, a significant *desideratum* is the archaeological documentation of the war conflicts of the specific historical period (i.e., 168 B.C). The preservation and retrieval of such archaeological layers is rare, either due to their being overrun by subsequent occupation layers or because of the lack of targeted excavation sections. However, the archeological research in Epirus has occasionally identified preserved material remains and/or stratigraphic evidence that is directly related to—or could be linked-to warfare (e.g., Dakaris, S., 1964: p. 50; Baatz, D., 1982; Andreou, J., 1997: p. 28, Figure 4 and Figure 5; Gravani, K. & Katsikoudis, N., 2019). And yet, recent excavation at the Hellenistic acropolis of Kastritsa (Epirus-NW Greece) not only revealed vast evidence for a war conflict plausibly related with the Roman invasion in Epirus (i.e., 168/167 B.C) but also put a line of argument on the question regarding the identification of specific archaeological sites in Epirus successively linking the city once expanded inside the city walls of the Hellenistic acropolis of Kastritsa to the historic city of *Tekmon* mentioned by *Livy*.

2. Location

The Hellenistic city of Kastritsa is situated on a hill rising steeply on the southern outskirts of Lake Pamvotis, close to the modern city of Ioannina. The location fulfilled all the prerequisites for the foundation of a fortified city, offering a good site cover to the southern half of the Ioannina basin; good control of the two main road axes passing through its foothills; immediate access to the lake's aquatic and fertile habitat, and at the same time, offered a natural protection on its two steep sides (east and north) (**Figure 2**).

3. Unearthing the Archaeological Evidence of a War Conflict on the Hellenistic Acropolis of Kastritsa

Recent archaeological work on the Hellenistic Acropolis of Kastritsa has focused, inter alia, on the southern part of the fortification, and in particular, on its eastern projection, supported by two (2) towers, a quadrilateral and a triangular. According to the preliminary study of the fortification, the initial quadrilateral tower was strengthened by a strong triangular addition, which extended the projection of the tower by 17 meters (**Figure 3**, **Figure 4**) (Kappa, H. & Kontogiorgos, D., 2018). The excavation immediately in front of the triangle tower

Figure 2. View of the modern city of Ioannina from the site.

Figure 3. Aerial view of the eastern projection of the fortification.

Figure 4. Aerial view of the triangular tower.

unveiled an undisturbed "layer of battle" that intactly retains the remains of a war clash outside the city walls. The concentration of iron objects in the Kastritsa "battle layer" contained at least 50 iron arrowheads, 2 round stone projectiles, some iron nails, an iron chain, and two hooks. The iron arrowheads were largely of a pyramid-shape and only a few were triangular with hooked back ends and an elongated stem for nesting of the wooden posts. According to studies, the spearheads with a flute and pyramid-shaped peak with four sides are characterized as catapult arrow heads (e.g., Baatz, D. & Feugère, M., 1981: pp. 201-210, pp. 208-209, Figure 13).

The length of the arrowheads ranges between 7 cm to 13 cm and weighing between c.a. 27 and c.a.155 grams. Thirty (30) arrowheads from the Kastritsa "battle layer" were preliminary studied and grouped, according to weight, in four (4) main categories (**Figure 5**, **Figure 6**) (e.g., Baatz, D., 1982: pp. 229-231).

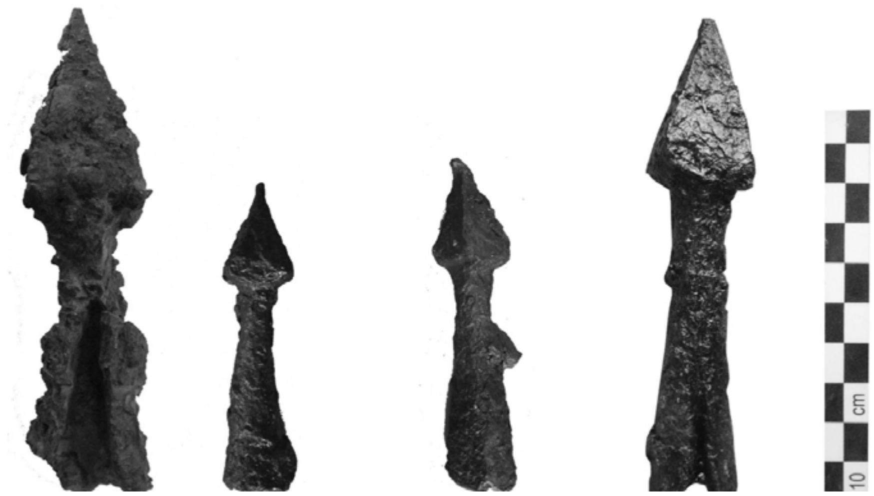


Figure 5. The four (4) main categories of arrowheads according to weight (from left to right: category I, IV, III, II).

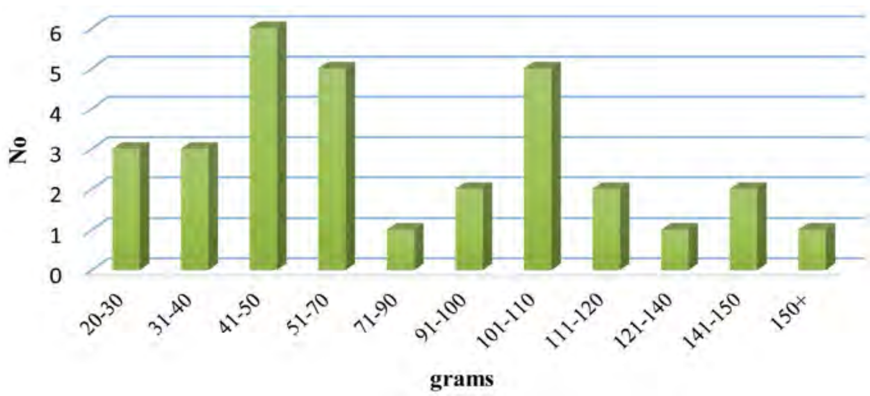


Figure 6. Comparative table displaying the numbers of arrowheads vs weight.

At least twelve (12) arrows were discerned exhibiting a long, heavy peak, ranging in length between 4 cm to 5 cm, and weighing more than 100 grams (category I); one (1) arrowhead weighted approximately155 grams (category II). Moreover, ten (10) arrow heads weigh between 40 and 50 grams and the peak length varies roughly between 2 cm and 3 cm (category III) while only three (3) weigh less than 30 grams (category IV) (**Figures 7-14**).

Despite the deformation of the arrowheads due to the high corrosion of the iron, a subsistent correspondence was detected between the total weight of the arrowhead and the lower diameter of the lumen, ranging between 12 mm (for arrowheads weighing between 25 and 30 grams) to 2 cm (for arrowheads weighing more than 100 grams); the lower inner diameter of the lumen of the heaviest arrow head (i.e., c.a. 155 grams) is c.a. 2.5 cm. Thus, the different characteristics of the Kastritsa arrowheads strongly point towards different catapult sizes depending on the size and weight of the projectile (e.g., Hacker, B. C., 1968: pp. 34-50; Baatz, D., 1978: pp. 1-17; Campbell, D. B., 2011: pp. 677-700). As for the stone missiles, their weight (4.60 and 6.3 kg) corresponds to 10 and 15 *mina* respectively, according to Filon's table (**Figure 15**) (e.g., Baatz, D., 1982: p. 223).

Figure 7. Arrowhead from Kastritsa (category II).

Figure 8. Arrowhead from Kastritsa (category I).

Figure 9. Arrowhead from Kastritsa (category III).

Figure 10. Arrowhead from Kastritsa (category I).

Figure 11. Arrowhead from Kastritsa (category I).

Figure 12. Arrowhead from Kastritsa (category I).

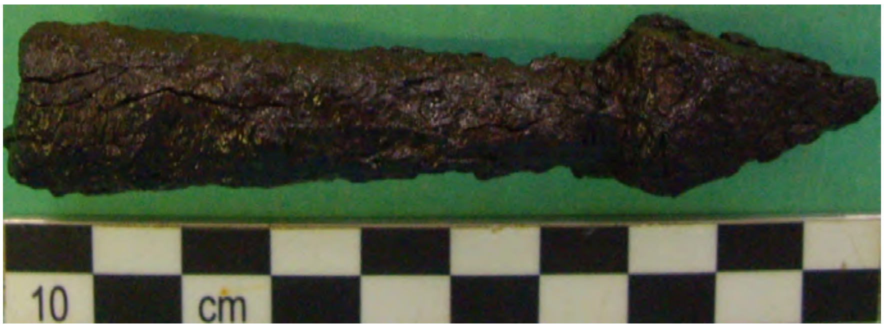


Figure 13. Arrowhead from Kastritsa (category I).

Figure 14. Arrowhead from Kastritsa (category IV).

Figure 15. Stone missiles from Kastritsa.

One question that arises is whether the missiles (iron and stone) come from the siege engines of the besieger or whether they are defensive missiles. Then again, the *in situ* detection of the arrowheads pointing towards the fortification wall and the distortions of the edges of the peaks might provide an indication, although by no means conclusive, of the remnants of the besieger's throwings. Additional evidence in favor of the siege and the resistance of the fortified Hellenistic city on the hill of Kastritsa are the detection, after excavation, of temporary masonry foundations, adjacent to the edge of the tower (Figure 16 and Figure 17). It is worth noting that the fortification of the Hellenistic city is intersected with the opposite hill (i.e., where the potential camping and attacking point of the enemy army might have been—although not yet confirmed by archaeological data) by a steep rocky cliff at least 200 meters long and ca 50 m deep preventing from direct attack (Figure 18).

Figure 16. Temporary masonry foundations, adjacent to the edge of the tower.

Figure 17. Temporary masonry foundations, adjacent to the edge of the tower.

Figure 18. The opposite hill-plausibly the potential camping and attacking point of the enemy army.

4. Conclusion

The archaeological data revealed rational preparation for defense and resistance from the defenders, which included: 1) the addition of the triangle edge to the eastern tower, the blunt surface of which was undoubtedly a difficult task for the besiegers and 2) the construction of additional fortifications, although moderate, outside the tower. Unfortunately, given the lack of epigraphic data, the exact identification the Hellenistic city that had been prepared for defense and siege, and clearly its policy was different from most Hellenistic cities of Epirus during the Third Macedonian War (171 B.C-168 B.C) except the four ones mentioned by *Livy* (i.e., Passarona, Tekmon, Orraon and Filaki) is a difficult task.

The material remains from Kastritsa depict that the city was prepared for resistance following a strikingly different policy than the unresisting one of Orraon and Fylaki and the loose resist of Passarona, as *Livy* reports. With the present archaeological data at hand, although by no means conclusive, we argue that the Hellenistic city lying on the hill of Kastritsa might have been *Livy's* Tekmon and the organized preparation for resistance, the result of strong anti-Roman attitude of its leader Kefalos as *Livy* mentions. This report provides preliminary evidence of a military conflict in front of the city walls of Kastritsa and attempts to link ancient literature (i.e., Livy) with an ancient city (i.e., Tekmon); however, is limited by the absence of precise dating of the "battle layer" and comparative examples. Future research will prove whether the approach presented above is sealed strongly with other co-finds in the "battle layer" or is just a heuristic interpretation.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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