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AMS and controversies in history: The Spanish conquest of Peru

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Abstract

The quest for understanding the past often contains a subjective component. Legends, myths, traditions and personal beliefs can unconsciously influence the interpretation of the scientific outcomes or, in the worst instances, even lead to forgery. Fortunately, an increasing number of scientific tools are available nowadays and can be combined to discredit such detriments and offer more reliable foundations for an objective analysis. Radiocarbon dating by AMS is a relatively non-invasive method and is particularly useful when valuable historical artefacts are involved. In this paper, we will present controversial cases where AMS is playing an important role in understanding the past. In particular, we will discuss the use of AMS to authenticate historical documents revealing a new version of the conquest of Peru by Pizarro in the early 1530s.

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1. Introduction

AMS is a well-established and powerful analysis tool, which is affecting an ever broader spectrum of disciplines. For example, during the first 10 years of its existence, the ANTARES AMS facility [1] played an important role in a variety of historical debates. The most significant contributions are briefly summarised here.

The Venafro chessmen, discovered in 1932 in Venafro, a Roman necropolis in Southern Italy, are one of the most controversial chess related archaeological finds of this century. For more than 60 years, archaeologists formulated a variety of hypotheses to explain how it was possible that bone chess pieces of Arabic shape were discovered in a tomb of Roman age. Radiocarbon measurements carried out at the ANTARES AMS Centre yielded a calibrated age of 885–1017 AD (1σ) [2], compatible with the proposition that this game was introduced to Central Italy during the Saracen invasions of the 9th century AD.

The resin used to repair a terracotta cherub made by Donatello (1386–1466) for the *Annunciazione Cavalcanti* (Cathedral of Florence, Italy) was also dated at ANTARES. Our result for the glue, 1331–1429 AD (1σ) [3], proved that the

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restoration had been performed during the lifetime of the artist and perhaps carried out by Donatello himself, after damaging the statue in the kiln.

The *Carte d'Arborea* are a set of ancient codes and parchments from the 14th to 15th century, which were discovered around 1845 in Italy. They are a unique source of information encompassing many centuries of history of Sardinia. The authenticity of these documents has been discussed by eminent historians for the last 150 years. In particular, in 1870, an international committee of historians stated that the Carte d'Arborea were a fake. Our ^{14}C analysis yielded a calendar age of 1409–1436 AD (1σ) for these documents, supporting their authenticity.

The age of a Byzantine micromosaic from the museum of Sassoferrato in Italy representing Saint Demetrius has puzzled Italian historians for the last 300 years and our date, 1279 ± 26 yr AD (1σ), ruled out the original claim that this object had been made during the time of the Emperor Justinian (483–565 AD).

The Iron Crown of the first Holy Roman Emperor, Charlemagne, is held in the Cathedral at Monza, near Milan in Italy. The origin and age of the crown, later used to crown Napolean Bonaparte, are dubious. Historical records place its origin between the Roman and Middle Ages, a spread of several centuries. In 1996, it was discovered that the precious stones were held in place by a mixture of beeswax and clay, which provided the amount of carbon necessary for AMS radiocarbon dating. The analysis performed at ANTARES yielded an age between 700 and 780 AD [4], comparable with the crowning of Charlemagne on Christmas Night, 800 AD.

In the following, we present our recent contribution to the ongoing list of historical debates, this time in relation to Francisco Pizarro, the conqueror of Peru.

2. The conquest of Peru

The conquest of Peru by Francisco Pizarro (1474?–1541) in the early 1530s was one of the most important events of the colonisation of the American continent and one of the most successful military campaigns ever. Historians believe that this was, in fact, the beginning of globalisation, which is reaching full accomplishment at the dawn of the new millennium [5]. Its importance is also witnessed by the fact that Pizarro is represented in one of the scenes of a painted panorama in the frieze of the Rotunda of the US Capitol Building (Washington, DC) depicting significant events in American history. Furthermore, his portrait is also reproduced on the 1000 Spanish peseta banknote.

2.1. The Miccinelli documents

The manuscripts *Historia et Rudimenta Linguae Piruanorum* and *Exsul Immeritus Blas Valera populo suo*, which were found in the family papers of Neapolitan historian, Clara Miccinelli, are commonly known as the "Miccinelli documents" and discuss events and people associated with the Spanish conquest of Peru. Since a more detailed description can be found in historical oriented publications [6–9], only the key characters and events discussed in the documents will be presented here.

In addition to details about reading literary *quipus* – Inca documents which were written using a combination of textile ideograms and knots [6] – *Historia et Rudimenta Linguae Piruanorum* [7] (History and Rudiments of the Language of the Peruvians) includes the incredible claims that Pizarro conquered the region after poisoning Inca generals with arsenic-tainted wine and condemned the Inca emperor, Atahuallpa, to death instead of granting him an audience with the King of Spain. The account departs markedly from the long-held version of the event that Atahuallpa was put to death for ordering the execution of his brother and rival. Furthermore, the manuscript suggests that the chronicler, Guamán Poma de Ayala (1538?–1620?), author of one of the most important works on Inca Peru, the *Nueva Corónica y Buen Gobierno* (New Chronicle and Good Government) written sometime before 1618, merely lent his name to a work actually written by the Jesuit priest, Blas Valera.

Valera is also believed to be the author of the manuscript, *Exsul Immeritus Blas Valera populo suo* [8], an account of his own actions. According

to this document dated 10 May 1618, Valera was forced to fake his own death in 1597 and, under false name, was able to live in Peru between 1599 and 1618 and write the *Nueva Corónica y Buen Gobierno*. Attached to *Exsul Immeritus Blas Valera populo suo* there were:

1. A letter from Francisco de Chaves [9], a *conquistador* and chronicler on Pizarro's expedition. The letter dated 5 August 1533, was addressed to Charles V, King of Spain, and is the source of the accusations already suggested in *Historia et Rudimenta Linguae Piruanorum* and *Exsul Immeritus Blas Valera populo suo*.
2. A wax box containing a fragment of a letter from Columbus and the contract between Guamán Poma de Ayala and Blas Valera. As said by the agreement, Ayala lent his name to Valera after payment of a horse and a chariot.
3. Few literary *quipus*.

2.2. The radiocarbon dating of the Miccinelli documents

The historical significance of the discovered material is immense and historians considered it to be of primary importance to verify the authenticity. As a part of a worldwide research collaboration [8], ANSTO performed the radiocarbon dating of five samples associated with the Miccinelli documents (see Table 1).

Due to the unknown history of the textile fibres and the consequent uncertainty regarding possible sources of contamination, it was decided to split the samples into two fractions and apply two different chemical pre-treatment procedures. It was reported [10] that museum textile fibres could be adequately treated using a neutral detergent to remove dust. The first fraction of each sample was placed in neutral detergent solution and sonicated for 15 minutes. The solution was decanted and the fibres were washed thoroughly with demineralised (reverse osmosis) water, then washed three times with 18 MΩ water using sonication for 15 minutes and finally dried at 60°C overnight.

Table 1
The samples submitted to radiocarbon dating

ANSTO code	Description
OZD251	Wool of a literary quipu attached to *Historia et Rudimenta*
OZD252	Wool ideogram (yaya) of a quipu attached to *Exsul Immeritus*
OZD253	Wool ideogram (ullu) of a quipu attached to *Exsul Immeritus*
OZD254	Wax seal of the letter from Chaves to the King of Spain
OZD255	Wax box containing the contract between Ayala and Valera

The second procedure is the harsher AAA method, which should remove carbonate contaminants and human grease. Since many historical textiles do not survive this procedure [11], the alkali treatment was performed quickly at room temperature. For one sample (OZD253) up to 81% of the material was lost during this step, the other samples (OZD251 and OZD252) were more robust, with approximately 20% of the material dissolving. The fibres were treated with HCl (2 M, 60°C) for 2 h, followed by alkali treatment (NaOH, 1%) for 15 minutes and the acid treatment repeated. At last the fibres were washed thoroughly with deionised water and dried at 60°C overnight.

For the wax samples (OZD254 and OZD255), the purification procedure was simpler and only a treatment with HCl (2 M, 60°C) for 2 h was required to remove contamination. As usual, the samples were then washed with deionised water and dried at 60°C overnight.

All pre-treated samples were then combusted to CO_2 using CuO at 900°C in sealed tubes and converted to graphite using the methods described in [12]. The graphite was loaded into an aluminium sample holder ready for the AMS measurement.

The $^{14}C/^{13}C$ isotopic ratio was measured relative to the internationally accepted HOxI standard material [13]. Corrections were then applied for the spectrometer background, for the contamination introduced in the preparation of the graphite target and for isotopic fractionation. Using the corrected radioisotopic ratio, the radiocarbon age was calculated and finally calibrated using the CalibETH software [14] and the tree ring data set of [15]. The calibrated ages are listed in Tables 2 and

Table 2
The measured ages for the wax samples

ANSTO code	$\delta(^{13}C)$ (‰)	Radiocarbon age (BP)	Range (AD)	Rel. probability (%)
OZD254	−26.30	440 ± 45	1429–1483	100.0
OZD255	−27.30	400 ± 35	1445–1511	83.2
			1600–1616	16.8

Table 3
The measured ages for the wool samples obtained with the two purification methods described in the text[a]

Code	$\delta(^{13}C)$ (‰)	Neutral detergent			AAA method		
		Radiocarbon age (BP)	Range (AD)	Rel. probability (%)	Radiocarbon age (BP)	Range (AD)	Rel. probability (%)
OZD251	−21.70	964 ± 60	1020–1065	36.6	1085 ± 64	893–934	34.2
			1074–1127	42.3		942–1013	65.8
			1133–1159	21.1			
OZD252	−25.95	498 ± 48	1405–1447	100.0	734 ± 56	1232–1305	96.2
						1368–1372	3.8
OZD253	−25.00	977 ± 61	1013–1064	41.1	844 ± 43	1168–1255	100.0
			1075–1127	39.2			
			1133–1159	19.8			

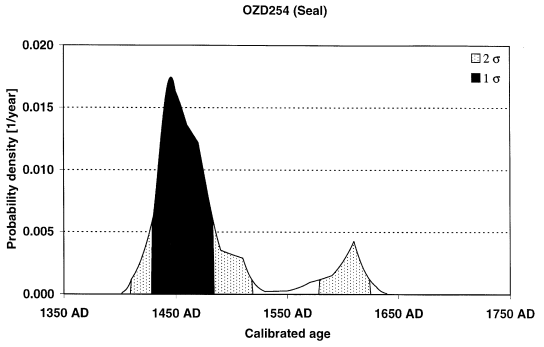

Fig. 1. The probability distribution obtained for sample OZD254, the wax seal of the letter dated 5 August 1533, from Chaves to the King of Spain.

3. Fig. 1 shows the probability distribution obtained for sample OZD254.

2.3. Discussion

The results show that, with a high degree of confidence, the wax used to seal the letter to the King of Spain originated earlier than 1533, the date on the letter. Similarly, the wax used for the box containing the agreement allowing Valera to write under false name *Nueva Corónica y Buen Gobierno*, most probably originated before 1618, the accepted completion date of this important document.

For the textile samples, the interpretation of the results is more difficult. According to *Historia et Rudimenta Linguae Piruanorum*, the *quipu* OZD251 was collected in an ancient Inca burial site and therefore should be pre-Hispanic. *Exsul Immeritus Blas Valera populo suo* informs us that the textile ideograms OZD252 and OZD253 were given as a gift to the grandfather of Blas Valera. Even considering the age variations induced by the different chemical procedures (for OZD251 and OZD253 these variations are well within the 2σ confidence level), all calibrated ages indicate that the wool originated much earlier than expected. This can be explained by the tradition to weave the most important textile *quipus* with old threads charged with the "strength of the ancestors".

3. Conclusion

The authentication of historical documents is always problematic. Carbon dating alone cannot reveal anything about the veracity of claims made in them. All that the scientists can do is to determine whether the material is of the correct age, as these results show. It is then up to the historians to argue the toss, and the results presented here are certainly fueling controversy among academic historians worldwide.

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