



ELSEVIER

Contents lists available at ScienceDirect

Measurement

journal homepage: www.elsevier.com/locate/measurement

Multi-analytical characterization and provenance identification of protohistoric metallic artefacts from Picentia-Pontecagnano and the Sarno valley sites, Campania, Italy



Giuseppina Balassone^a, Mariano Mercurio^b, Chiara Germinario^{b,*}, Celestino Grifa^b, Igor Maria Villa^c, Giovanni Di Maio^d, Serenella Scala^d, Roberto de' Gennaro^a, Carmela Petti^e, Maria Carmela Del Re^e, Alessio Langella^b

^a Dipartimento di Scienze della Terra, dell'Ambiente e delle Risorse, DiSTAR, Università degli Studi di Napoli Federico II, Complesso Universitario di Monte S. Angelo, Via Cinthia 26, 80126 Napoli, Italy

^b Dipartimento di Scienze e Tecnologie, Università degli Studi del Sannio, Via De Sanctis, 82100 Benevento, Italy

^c Institute of Geological Sciences, Universität Bern, Baltzerstrasse 3, 3012 Bern, Switzerland

^d Geomed - Geoarcheologia e Ambiente, Via L. Sicignano, 84015 Scafati, Italy

^e Centro Musei delle Scienze Naturali e Fisiche, Università degli Studi di Napoli Federico II, Via Mezzocannone 8, 80134 Napoli, Italy

ARTICLE INFO

Keywords:

Spectroscopic techniques
Metal objects
Ore provenance
Pontecagnano
Sarno valley
Southern Italy

ABSTRACT

Protohistoric metal objects coming from the archaeological sites of Pontecagnano (Salerno, Italy) and Striano (Naples, Italy), preserved in the Pontecagnano National Archaeological Museum and the Paleontological Museum of Naples University “Federico II” have been studied by means of an archaeometric approach. A multi-analytical procedure including X-ray powder diffraction (XRPD), scanning electron microscopy and energy dispersive X-ray spectroscopy (SEM-EDS), micro X-ray fluorescence (μ -XRF) and lead isotope ratio mass spectrometry (LIRMS), was used to characterize these objects thus providing hypotheses on the possible provenance of metallic raw materials. The investigated samples are represented by lead, silver, copper and tin bronze-based objects. Corrosion processes affecting the bronze objects were recognized as well as crusts and patinae at different stages of evolution. LIRMS analyses suggested that most of Pontecagnano artifacts were manufactured with metals from southern Tuscany, where important metal reserves were located. On the other hand, due to the limited number of samples, the provenance of the Striano objects cannot be unambiguously identified although data so far available suggest a Sardinian source.

1. Introduction

Campania region (Southern Italy) is worldwide known for its valuable archaeological sites and cultural heritage, among which Pompeii stands out, as well as *Herculaneum*, *Oplontis*, *Paestum*, *Cumae*, etc. Among the abundant artifacts occurring in this archaeological sites (ceramics, stones, tiles, plasters, mortars, pigments, etc.) [1–12], many are metal objects, slags and smelting structures [2,3]. Moreover, numerous important archaeological settlements and related outfits, unknown outside the restricted regional context, are widespread in the whole territory, and many of them are not studied at all in the archaeometric perspective, i.e. by using combined instrumental techniques.

The archaeometric research uses all available techniques and methods developed within specialized scientific disciplines (i.e. chemistry, physics,

geology, biology) to mainly serve conservation science and archaeology [13]. One basic question that archaeologists pose to modern analytical archaeometry is the provenance of materials, i.e. their ore source [14]. This aspect implies the use of geochemical and isotopic tracers which significantly discriminate geographically and geologically different ore sources, thus linking the metallurgical product (raw metal, slag, metal object) to the source. So far, the most successful analytical approach for a correct identification of copper and bronze metals provenance is the lead isotope analysis, that carefully records the geological age of a deposit [14, and references therein]. Although ambiguities still occur due to geographically different deposits showing similar isotopic signatures, the availability of a well-selected and reasoned database can usually aid in the discrimination of the possible ore sources [14]. Many datasets of lead isotope data exist for many deposits in Europe and around the Mediterranean region [14–19,52].

* Corresponding author.

E-mail address: chiara.germinario@unisannio.it (C. Germinario).

The present research was carried out on various metallic findings from two areas of Southern Italy, namely Pontecagnano (Salerno, Italy) and Striano (Sarno Plain, Naples, Italy), preserved in the collections of the Pontecagnano National Archaeological Museum and the Paleontological Museum of Naples University “Federico II”, respectively [20–22]. All these objects have never been studied before from an archaeometric point of view. A mineralogical and geochemical characterization of metallic artifacts spanning in age from early Eneolithic/Bronze Age to IV century BC was carried out by means of a multi-analytical procedure accounting for X-ray powder diffraction (XRPD), scanning electron microscopy coupled with energy dispersive X-ray spectroscopy (SEM-EDS), micro X-ray fluorescence (μ -XRF), as well as Pb isotope analysis. A careful chemical and mineralogical characterisation is here provided along with hypotheses on the possible geological provenance of metallic raw materials forming the studied artifacts. On this account, it should be remarked that in Campania, as well as in most of its surrounding regions in southern Italy (the only limited exception to this rule is Calabria region, Southern Italy), metal ore exploitation was almost totally absent. Such raw materials, in ancient times were therefore necessarily imported from countries endowed with this kind of deposits. These countries could have been either part of the current Italian territory, like Tuscany and Sardinia or, far more likely scattered throughout the Mediterranean area [15, and references therein]. Therefore, searching for the primary geological sources of the metallic objects in Campania can provide useful hints for a more detailed characterization of the commercial routes across the Mediterranean Sea (each of them related to distinct cultural facies and hence variable through time), making these issues of great interest for the archaeological research.

2. Archaeological background and sample description

2.1. Pontecagnano – Salerno

The investigated objects were provided by the Pontecagnano National Archaeological Museum in the town of Pontecagnano

(Salerno, Italy) (Fig. 1), and come from the namesake archaeological site and nearby areas [23,24].

The ancient town of Pontecagnano was formerly called “Amina” and renamed “Picentia” by the Romans (Fig. 1) and represents the largest Etruscan outpost in the south of the Italian peninsula [25–27]. Archaeological investigations – started since the 1960s – certify that the area had been inhabited as early as late Neolithic. At the beginning of the 3rd millennium BC the area was settled by peoples of Gaudio culture, probably immigrated from Anatolia [24]. Gaudio population worked metals, as attested by copper daggers and other weapons excavated from more than 9.000 tombs in the area. The Pontecagnano Archaeological Museum (also called National Archaeological Museum of the Agro Picentino) was instituted in 2007 and contains more than 8000 findings mainly related to tomb outfits [23–26]. The main Etruscan settlement was founded between the end of the X and beginning of IX century BC on the left side of the *Picentino* river (in the corresponding *Picentino* valley). Its greater development was during the “Orientalizing” age (end of VIII-VII century BC), when great and wealthy aristocratic families (the so-called “Princes”) took the power, as also attested by precious artifacts found in the Pontecagnano burials. Then, the settlement took urban connotations, becoming a frontier community. The different historical phases were marked by the recovery of several archaeological finds, among which are several metal artefacts. Pontecagnano, together with Capua (another important and large settlement of Etruscans in Campania) and *Veii* (in Latium, Italy), was among the favourite partners of the Greeks in the Tyrrhenian coast. The Greeks favoured their growth as they were the most advanced groups, founders of large settlements characterized by remarkable political cohesion and strongly hierarchical social relationships. Moreover, they had already been trading with other populations of ancient Italy and the Phoenicians for fifty years [27]. Pontecagnano greatly developed during the “Orientalizing” age, becoming one of the most important settlements of the Campania region, together with *Cumae* and *Pitheculsa* (Ischia island, Italy). After “Orientalizing”, populations from Etruria relocated the site.



Fig. 1. Location of the sampling sites in the Campania region, Southern Italy (modified from <https://www.google.it/maps/>).

Download English Version:

<https://daneshyari.com/en/article/7120132>

Download Persian Version:

<https://daneshyari.com/article/7120132>

[Daneshyari.com](https://daneshyari.com)