

“RECYCLING” OF RAW MATERIALS 1500 YEARS BC

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Abstract

The aim of this article is to present the research, which identified the prehistoric human's relation to the natural resources that can be used repeatedly. For thousands of years human have been learning how to rationally manage nature reserves. The most interesting evidence of the prehistoric “recycling” is clay tablets with Linear B writing which were used in the administrative centre of one of Europe's oldest civilizations – Mycenaean. It had been developed from about the seventeenth to twelfth century BC in the area of Greece. Clay tablets were not only made of a material that was used again, but they also contained inscriptions showing that Mycenaean would mend and use again several of metal elements. “Recycling” could be used for the same reason for which we do it today as well – for the reasonable management of scarce non-renewable resources.

Key words: recycling, Mycenaean culture, metals, Linear B.

INTRODUCTION

The raw materials were in use by humanity from the beginning of civilization. The greatest proof is us the Mycenaean's products: linguistic data (Linear B script) and archaeological finds collected in Greece and in Crete.

Useful materials for Mycenaean society were copper, tin (ingredients of bronze), gold, lead and silver.

Workers were making various of gold, bronze and silver vessels, bronze elements of armour, bronze weapons with gold decoration, furniture with silver and gold elements, metal tools, gold and silver jewellery (Dialismas, 2001; Chadwick et al., 1973; Gillis, 1997).

Researches on the Linear B script have shown inscriptions with old and new elements of metal objects (Chadwick et al., 1973; Bennett, 1955; Killen, 1999).

Tablets with Linear B writing survived accidentally. They were made of clay, the wealth of Greece, dried on the sun and stored in archive for one year. After this time, scribes wet tablets and used them again (Kaczmarek, 2002). The Mycenaean repair workshops are also known from archaeological evidence (Giardino et al., 2008).

The majority of scholars is interested in methods of production, kinds of raw materials used by the Mycenaean and their importation from Mediterranean basin, workshops and tools for working with metals.

This research focuses on the approach of prehistoric man to the re-use of non-renewable natural resources.

MATERIALS AND METHODS

Data analyzed in this study were: clay tablets from Pylos (Sh, Ja, Jo, Jn series; Ta 641) dated between 15th and 12th century BC (Duhoux et al., 2008) and artifacts from Vivara port (Giardino et al., 2008).

The linguistic method was used to compare data gathered from the different inscriptions.

RESULTS AND DISCUSSIONS

Linguistic analysis has shown that tablet series Ja, Jo and Jn from Pylos have inscriptions about metals: bronze (Ja and Jn) and gold (Jo) as a raw material (Figure 1 and 2). It is visible on tablet Ja 1288 (Figure 3):

ka-ra-wi-so AES M 4 N 1 P 6
(probably man's name)+(ideogram of bronze) +

(weight measurements) (Raymoure, 2012).
 If the bronze is specified by the weight measurement, it is actually in the simple form before melting with fire on the first step of production.
 Pylos's tablet Ta 641 (Figure 1) includes ideograms of vessels, their names and number of handles.

The first verse says that tripod cauldron with one leg and other, with one leg "burnt away".
 We know from archaeological excavations that this type of vessel was made of metal, usually from bronze. It shows that one leg in both of cauldrons was broken, so scribes placed them on tablets in order to be repaired by bronze workers.

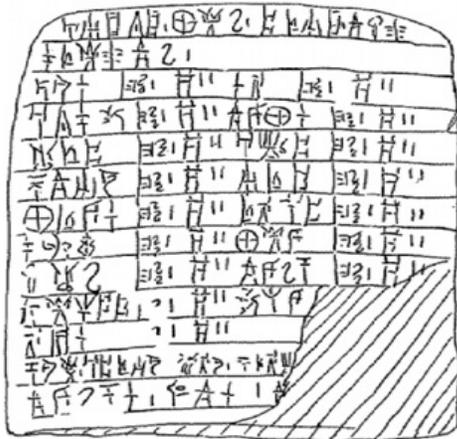


Figure 1. Tablet PY Jn 450

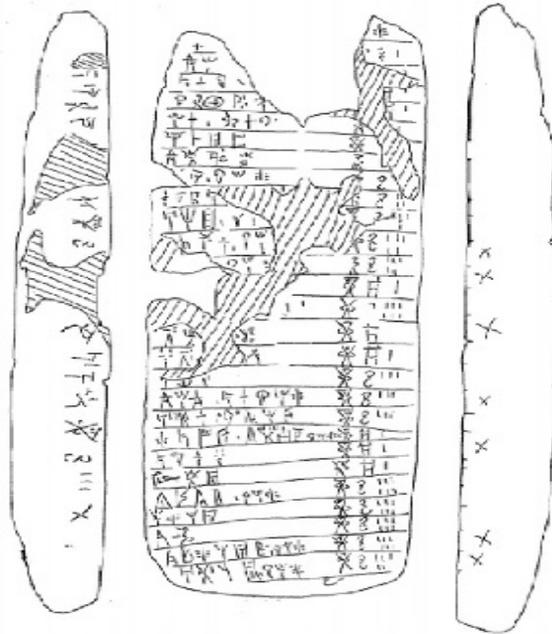


Figure 2. Tablet PY Jo 438

karawiso AES 3 4 # 1 2 6

Figure 3. Inscription from PY Ja 1288

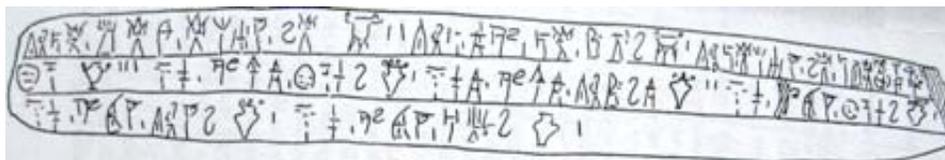


Figure 4. Tablet PY Ta 641

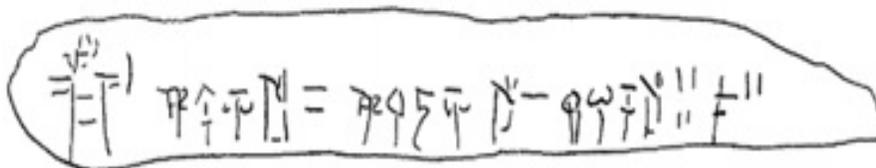


Figure 5. Tablet PY Sh 733

Inscription has also words: **me-zo-e**, which means: "old" and **me-wi-jo**, which means "new", to describe vessels (Bennett, 1955).

Probably these syllabograms are connected with the repair of metal vases. The old one was either divided into parts and components were

used for a new cauldron or it was intended to melting. Unfortunately, the inscriptions do not specify, if vessels are made from metal, or not. Inscriptions from Sh series found in Pylos include components of the armour. For example, Sh 733 (Figure 2):

**ARM 1 me-zo-a O 20 me-u-jo-a O 10
ko-ru-to O 4 PA 2**

(armour) + (old) + (probably *o-pa-wo-ta* - elements) + (new) + (helmet) + (probably *pa-ra-jo* – old) (Killen, 1999).

Inscriptions show that one armour was made of old and new elements.

It is necessary to mention that the armour was made by sewing either metal badges on the leather/cloth or it was made from metal bands. It makes sense, only if old armours were mended. Old and damaged bronze badges were replaced with new ones.

Archaeological researches on Vivara's port led to the discovery of a metal workshop connected with proto-Mycenaeans.

Vivara is an island in the area of Northern Tyrrhenian Sea, full of various metal sources. The Mycenaean artifacts from this island are one of earliest evidence of traces between The West of Aegean and The Helladic world. It is known due to the chemical and physical analysis of ceramics found in Vivara. Metallurgical activity included metalworking and melting. It is proven by drops of melted copper, copper ore and slag.

From the other side, evidence for "recycling" of metals is some of scrap elements. We can also see the repair of weapons in the rivets of the hilt and in grindstones, due to marks made by blades in sharpening (Giardino et al., 2008).

CONCLUSIONS

Clay tablets with Linear B inscriptions are indisputable evidence for "recycling" raw materials in prehistoric period.

Mycenaean society used clay as a renewable material in order to form tablets and would destroy them after one year to have substance for the next item.

Furthermore, inscriptions of Linear B writing, used in Bronze Age Greece, proved that many metal objects were repaired or melted by workers and used again.

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