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New insights into the characterization and provenance of chlorite objects from the Jiroft civilization in Iran

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ABSTRACT

New excavations at prehistoric sites within Jiroft County provide a good opportunity re-examining the archaeological records about the south-eastern cultures of Iran. Symbolic, decorative and carved stones are among the most important objects which have been found in Jiroft and have previously been identified as Soapstone. Geochemical analysis using QXRD, XRF and light microscopy suggests that the chlorite objects excavated from the Jiroft area appear to be mostly derived from provincial chlorite outcrops. These quarries have a type of metamorphic rocks produced by dynamothermal metasomatism along the subduction orogeny zone of Zagros. The distribution and composition of these artefacts suggests that talc and tremolite was not occurred within the samples. Therefore previously reported Soapstone from Jiroft should be redefined as chlorite with two major phases, Clinochlore and Sapphirine.

1. Introduction

Jiroft is imaginably one of the most significant Middle Eastern archaeological sites to be unearthed, dating back to the early Bronze Age (3rd millennium BC) (Muscarella and Madjidzadeh, 2001). Initial excavations of the area were started during 2001 by (Muscarella and Madjidzadeh, 2001; Madjidzadeh and Pittman, 2008) and focused on Konar Sandal (Madjidzadeh and Pittman, 2008). Madjidzadeh provided the first archaeological interpretation about the Halil Basin and consequently hypothesised during the 1970s that the Jiroft areas was the birthplace of the Aratta civilization (Majidzadeh, 1976). Jiroft is also associated with other significant archaeological sites such as Shahr-i Sukhta, Bampur, Shahdad, Tal-e Iblis and Tepe Yahya (Lamberg-Karlovsky, 1972; Lamberg-Karlovsky and Tosi, 1973; Ascalone, 2014). Jiroft and Halil River areas are assumed important cross-cultural bridge between Elam civilization in the west and Indus valley civilization into the east (Madjidzadeh and Pittman, 2008). The importance of this region as an independent Bronze Age civilization has led to many publications about the remarkable objects and monuments from within the Jiroft area (Madjidzadeh and Pittman, 2008; Pittman, 2003; Potts, 2005; Fouache et al., 2005; Vidale, 2015).

The early evidence of the chlorite stone objects was considered by De Mecquenem in 1931 (de Mecquenem, 1931). During the Susa excavation carried out by Mecquenem in 1911, a chlorite double-vase was discovered in the Acropolis of Darius the Great (Fig. 1 bottom) (de Mecquenem, 1931; Kohl, 2004). It was not possible to apply any archaeological context to the artifact during the initial characterization. Subsequent excavations by de Morgan at the beginning of the 20th century identified this double-vase as chlorite and suggested that it was from the Temple of Inshushinak (Madjidzadeh and Pittman, 2008). However, additional technological and archaeological context was still lacking (de Mecquenem, 1931; de Mecquenem, 1911) as artefacts of different functions which were manufactured from the same stone were identified (Fig. 1 upper left) (Muscarella and Madjidzadeh, 2001; Madjidzadeh and Pittman, 2008).

Many of the stone objects from Jiroft are decorated with unique figurative designs called Hand-Bag (Fig. 1 upper right). Such chlorite objects is described to be the once-called “intercultural style” production (Vidale and Micheli, 2012). Hand-Bags described for the first time regarding to their peculiar polishing traces clearly visible on the handle and along its contour. The strong wear proposes that the hand-bag was postponed for a long time on a cord; and that in this setting it was regularly polished while rubbing against a soft surface (Vidale, 2015; Vidale and Micheli, 2012).

The discovery of such urban areas and stone objects has inspirited many art historians archaeologists over the past 20 years (Voigt and

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Fig. 1. A) Chlorite cylindrical double-vase from Susa which was discovered by de Moegan. B) Cylindrical vessel with architectural façade excavated from the Halil Rud valley, south of Jiroft. C) Hand-Bags of intercultural style, decorated with intertwined snakes found from Jiroft excavation. (Muscarella and Madjidzadeh, 2001).

Dyson, 2000; Muscarella and Madjidzadeh, 2001; Lamberg-Karlovsky and Tosi, 1973; Pittman, 2003; Fouache et al., 2005; Pittman et al., 2001; Thornton et al., 2002; Muscarella, 2008; Vahdati, 2011). Many of these stone artefacts are described and characterized by means of archaic mineralogical terms, as steatite or soapstone (Voigt and Dyson, 2000; Madjidzadeh and Pittman, 2008; Durrani, 1964), soft stone (Pittman et al., 2001; Kohl, 1976; David, 1996), chlorite (Fouache et al., 2005; Zarins, 1992; Perrot and Madjidzadeh, 2006; Lamberg-Karlovsky, 1988) and serpentine (De Cardi, 1968).

The provenance of this collection of extraordinary Iranian artefacts has been a source of much debate among archaeologists (Muscarella and Madjidzadeh, 2001). However, many now believe that these artefacts originated in the Jiroft area of Kerman province in Southern Iran. To date, these studies have primarily focused on a comparative analysis of objects excavated from the Halil Basin. However, many stone metals and pottery pieces were looted from around the Halil Basin in 2000 and transferred to Europe and American museums (Madjidzadeh and Pittman, 2008; Razani et al., 2010).

The importance of chlorite stone for Bronze Age civilizations within the Middle East, in particular the south central Iranian plateau, is a source of some debate between archaeologists due to a lack of historical context and documentation. Indeed based on previous investigations of stone artefacts from Tepe Yahya, Shahdad, and Shahr-i Sokhta (Lamberg-Karlovsky and Tosi, 1973; Kohl, 1976; Kohl, 1977; Kohl et al., 1979), stone artefacts from Jiroft may potentially have been mischaracterized as soapstone or steatite rather than chlorite.

The appearance of these stone are mostly reported in the archaeological literature and proved to scattered in a very large corridor from Mesopotamia in Iraq via Iranian plateau into the Indus valley (Pittman, 2003; Zarins, 1992; Potts, 1989; Pittman, 2001). These kind of stone artefacts are reported in northern part of Mesopotamia (Mari, Khafajah, Nippur, Ur) (Potts, 1989) to the north part of the Arabian Peninsula (Failaka, Saar, Umm an-Nar) (Zarins, 1978; Reade and Searight, 2001) through south Iranian desert (Jiroft, Tepe Yahya, Shahdad, Bampur) (Pittman et al., 2001) toward to the Panjab region (Mohenjo-Daro) (Tosi, 1973). Most important investigation and results concerning the numerous soft-stones (or steatite) which have been found from Mesopotamia into the Indus Valley, has published by Kohl, Harbottle and Sayre in 1979 (Kohl et al., 1979). They published important data about essence of chemico-physical properties of these kind of soft-stone, chlorite and other metamorphic stones with emphasize in their cultural aspect through Middle East. With respect to the broader studies, finally, Tepe Yahya was described as a centre for the production and trade of decorative chlorite stones during the Bronze Age by Lamberg-Karlovsky in the 1970s (Lamberg-Karlovsky and Tosi, 1973; Lamberg-Karlovsky, 1988; Magee et al., 2004). Based on the investigations which have been reported by Muscarella and Majidzadeh in 2001 concerning their stylistic features of such artefacts – from Jiroft to Shahr-i Sokhta – all explored samples were made of chlorite and none of them is characterized as steatite (Muscarella and Madjidzadeh, 2001). However, Jiroft is to be recognized as the “Land of Aratta”, that mysterious civilization where surprisingly no specific similarities to Mesopotamian are presented there. Due to this theory the objects are suggested for considering as part of the Sumerian art which have originated in the south eastern Iran, in the province of Kerman. (Muscarella and Madjidzadeh, 2001; Cleuziou, 2003; Nobari et al., 2012; Basafa and Rezaei, 2014).

Such a huge scattering is devoting the idea for a migration of historical, stylistic and technological features of stone artefacts through 3th millennium B.C., and as a matter of fact, Jiroft could be the focal point of this intercultural movement.

1.1. Mineralogical, geological overview

By means of the suggestions which are mentioned above, nowadays chlorite and chlorite dominated rocks are prevalent terms in archaeological literature for green-grey stones (Kohl, 1976; Kohl, 1977; Kohl et al., 1979; Kohl, 2001). In general these kind of stones may be considered as chloritite, since the structures seems not to be oriented (or schistosity).

Soapstone (or mentioned mostly as: steatite) is generally used for any talc-bearing schist, whereas in some geological setting soapstone in wide varieties of color are also considered. These variations are based on the metamorphism grade and facies. These kind of stones are categorized geologically in three groups; carbonate-bearing ultramafic rocks are: ophimagnesites (antigorite-magnesite), soapstones (talc