

## PETROGRAPHIC RESULTS OF MIDDLE BRONZE AGE POTTERY FROM A KILN AT TEL MALOṬ (EAST)

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### INTRODUCTION

Upon the discovery of a Middle Bronze Age pottery kiln at Tel MaloṬ (East) (see Parnos, Milevski and Khalaily, this volume), the excavators and the author initiated a petrographic study of the pottery found within.<sup>1</sup> Petrographic analysis of pottery from a kiln is significant as it provides reference data concerning local production. Comparison data, derived from pottery retrieved from other kilns in the region, assists in distinguishing between various production sites. For the present study, the geological setting of the excavated site and its vicinity was considered, with the aim of identifying the provenance of the raw materials used for pottery production at the site.

The pottery analyzed included seven vessels (figure numbers refer to Parnos, Milevski and Khalaily, this volume): five from inside the kiln (bowl B4085/2, L425, Fig. 12:3; bowl B4083/2, L425, Fig. 12:1; jar B4073/2, L425, Fig. 12:10; krater(?) B4078, L425, Fig. 12:4; stand(?) B4083, L425, Fig. 12:15) and two from the fill above it (bowl B4065/5, L422, Fig. 12:17; jar B4065/2, L422, Fig. 12:21).

#### *Geological Setting of Tel MaloṬ*

Tel MaloṬ is located 5 km southeast of Rehovot, between the points where Naḥal Ayalon and Naḥal Soreq debouche into the coastal plain. Both these wadis drain the Judean Mountains and the Shephelah region, and are characterized by alluvial sediments. The immediate area of Tel MaloṬ is characterized by clay and sand of the Plio-Pleistocene Pleshet and Yaffo formations (Sneh and Rosenshaft 2004). Calcareous

sandstone (locally known as *kurkar*) ridges outcrop west of the site. Grumusols and *hamric* alluvial soils cover the bedrock in the Tel MaloṬ area (Ravikovitch 1970; soil map of Rishon Le-Ziyyon, 1:50,000). Red sand and loam (locally called *hamra*) cover a wide area west of the site (Ravikovitch 1970; Sneh and Rosenshaft 2004).

To the east of the site, in the Shephelah region, chalk, chert and marl rocks from the Paleocene to Eocene ages are exposed (Sneh, Bartov and Rosenshaft 1998). In the vicinity of Tel MaloṬ (c. 1 km from the site) there are limited exposures of Pliocene sediments and Neogene to Pliocene volcanic rocks (Sneh, Bartov and Rosenshaft 1998; Sneh 2004; Sneh and Rosenshaft 2004).

### RESULTS AND DISCUSSION

All the analyzed sherds were made of calcareous clay; they contained foraminifera, dating to the Paleogene age. Non-plastic components (f:c ratio<sub>{0.062 mm}</sub> = ~90:10),<sup>2</sup> comprising mainly well-sorted, fine quartz grains (up to 300 µm) with a few rare dolomite, chert and *nari* (caliche) fragments, including feldspar and oxihornblende grains (Fig. 1). Three samples of pottery from inside the kiln contained rounded basalt fragments (bowl B4083/2, jar B4773/2 and stand B4083), partly altered to iddingsite (Fig. 2).

The clay is identified as marl of the Paleocene Taqiye Formation, while the abundance of quartz grain inclusions, accompanied by some feldspar and oxihornblende grains, indicates an aeolian contribution from the coast. Outcrops of

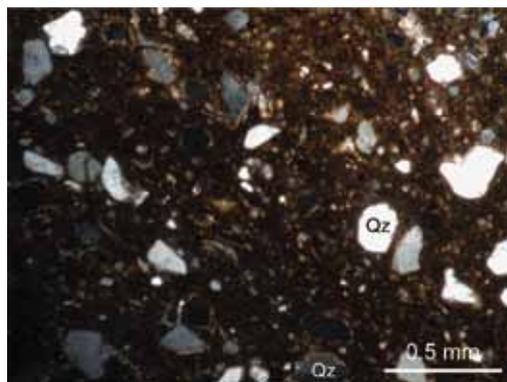


Fig. 1. Photomicrograph of stand B4083: Quartz grains embedded in carbonatic clay. Qz = quartz.

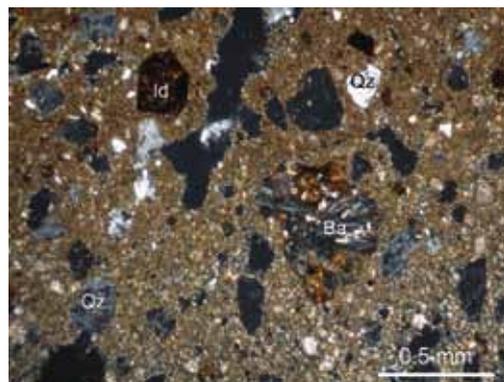


Fig. 2. Photomicrograph of bowl B4083/2: Basalt, quarts and iddingsite fragments embedded in carbonatic clay. Ba = basalt, Qz = quartz, Id = iddingsite.

the Taqiye Formation in the Shephelah, located a short distance from deposits of coastal sand, are the likely origin of the clay observed in the sample. A similar combination of Taqiye clay and fine coastal quartz sand has been observed in the 'Amarna Tablets from Gezer (Goren, Finkelstein and Na'aman 2004:271–273) and in the Late Bronze Age and Iron Age I pottery from Tel Batash (Cohen-Weinberger 2006). Chert, dolomite and *nari* (caliche) fragments were derived from the Judean Mountains and the Shephelah region.

An exposure of Neogene to Pliocene basalts, about 1 km to the south of the site, is a likely source for the basalt fragments found within the studied samples. This conclusion is consistent with the finds from the kiln, indicating that raw materials for pottery were obtained locally. Noteworthy is the existence of a Middle Bronze Age kiln or *tabun* at Yesodot (about 4 km south of Tel Malot), which reveals a composition of aeolian soil with basalt fragments.<sup>3</sup>

#### NOTES

<sup>1</sup> The petrographic method is based on preparing thin sections of ceramic samples, which are then examined under a polarizing microscope. Such a method allows for a close observation of the texture of the matrix and the identification of the mineral assemblage and rocks within. The identification of these components commonly suggests a geographic region in which the source materials are located (e.g., geological formations and/or soils used). For

more details concerning the petrographic method, see, e.g., Whitbread 1995; Vaughan 1999.

<sup>2</sup> The f:c ratio expresses the relative proportions of the fine (f) and coarse (c) components of a fabric. In this case, the ratio (=0.062 mm) represents the boundary between silt and sand size (Kemp 1985:22).

<sup>3</sup> The pottery from the kiln/*tabun* from Yesodot (Permit No. A-3260) was studied by the author.

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