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Petrographic Examination of Selected Pottery Vessels from Ḥorbat Duvshan

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Eleven pottery vessels from the Late Chalcolithic site of Ḥorbat Duvshan in eastern Galilee (see Smithline, this volume) were sampled for petrographic examination (Table 1).

The thin sections were examined under a polarizing microscope at magnifications from ×20 to ×200. The description of the thin sections was provided with the aid of charts and tables (Whitbread 1986:80). The following parameters were examined: mineralogy and approximate amount of silt-sized material, optical properties of the matrix, mineralogy of non-plastics and their volume in the sherd, grain size, shape and sorting. Firing temperature was estimated on the basis of the occurrence of mineralogical changes.

The petrographic data was compared to the geologic settings in the vicinity of the site. Existing petrographic data from various archaeological sites of Israel was used for comparison.

Petrographic Data

The examined samples can be divided into three petrographic groups on the basis of their temper. They all possess a very similar matrix.

Group A.— This group (Samples 1, 4, 6 and 11) is characterized by a ferruginous isotropic matrix containing a considerable amount of silty quartz (0.03–0.08 mm). Silt-sized grains of plagioclase, olivine (partially altered to iddingsite or having an iddingsite crust) and augite are present in lesser amounts, but are larger in size (0.1–0.2 mm). The sand-sized grains are holocrystalline basalt, angular to sub-rounded and varying in size between

Table 1. Inventory of Thin Sections

Sample No.	Locus	Basket	Vessel Type	Fig. No.[i]	Group
1	201	2007	Pithos	10:1	A
2	209	2029/1	Krater	-	B
3	209	2029/2	Handle	10:4	C
4	211	2037/2	Body sherd with rope decoration	10:6	A
5	215	2045/2	Body sherd with rope decoration	10:9	B
6	216	2046/2	Bowl	9:2	A
7	301	3004	Krater	9:8	C
8	303	3005	Handle	10:5	B
9	302	3007/1	Body sherd with rope decoration	10:7	B
10	302	3007/2	Body sherd with rope decoration	10:8	B
11	301	3008	Pithos	10:2	A

[i] See Smithline, this volume

0.5 and 2.0 mm. They comprise 5–8% of the volume of the sherds. These grains are partially or completely iddingsitized olivine in a groundmass of plagioclase, some augite and a small amount of iron oxides. Firing temperature is estimated at greater than 800ºC.

Group B.— This group (Samples 2, 5, 8, 9 and 10) is characterized by sand-sized, sub-rounded to rounded grains of trachytic basalt composed of pyroxene, olivine (with iddingsite crust) and iron oxides. The sizes of these grains vary from 0.3 mm to 1.7 mm and they compose 10–12% of the volume of the sherds. The firing temperature is estimated between 700ºC and 800ºC.

Group C.— In this group (Samples 3 and 7), the sand-sized material composes 12–17% of the sherd volume and is represented by mostly rounded grains of fine-textured alkali material with partially iddingsitized olivine. The size of these grains varies from 0.9 to 1.9 mm, while the size of olivine grains within them can reach 0.5 mm. Firing appears to have been at a lower temperature (about 750ºC) and for a shorter time than Groups A and B, which caused some optical activity of clay minerals and led to the presence of a gray core (Orton, Tyers and Vince 1993:68–70).

CONCLUSIONS

Comparison of the results of the petrographic examination with the geology of the vicinity of the site leads to the conclusion that the raw materials used in the production of the ceramic vessels from Ḥorbat Duvshan originated nearby. These raw materials (both the clay and the temper), most likely derived from the erosion and weathering of the Pliocene-Pleistocene basalts of the Golan Heights and the Korazim Plateau (Williams-Thorpe et al. 1991:34–35; Sneh, Bartov and Rosensaft 1998: Sheet 1). Such soils, termed 'Basaltic Brown Mediterranean' soils, are common in the Jordan River Valley of Upper Galilee (Wieder and Adan-Bayewitz 2002:406–410). They are ferruginous and should contain a large amount of basaltic minerals (plagioclase, olivine and augite). The silt-sized quartz material within the soil may be of aeolian origin, as it is very fine and well-sorted. The parameter that determines the categorizing of the examined pottery into separate groups is the sand-sized material.

As mentioned above, the matrix is similar in all the examined samples. The sand-sized tempering material of Group A is represented by holocrystalline basalt whose angular to sub-rounded grains seem to have been crushed intentionally and added to the groundmass to improve its quality.

Although the sand-sized material of Group B is also represented by basalt, its grains have a trachytic texture and are subrounded to rounded in shape. It possibly originates from a wadi deposit that was specifically chosen by the potter. The material was added to the paste in order to improve its quality, as was done in Group A.

The sand-sized material of Group C is composed of rounded grains and has a different texture from the tempers of Groups A and B. It is mostly basanite sand, which could originate from one of the wadis draining the area where basanite is exposed. There is also the possibility that these ingredients are an original, coincidental component of the soil used as raw material for both Groups B and C.

Previous petrographic examinations of Chalcolithic pottery from the Golan Heights, and comparison to nearby sediments, pointed to a local Golan origin (Porat 1998:344–345). The same geological situation is observed on the Korazim Plateau (Sneh, Bartov and Rosensaft 1998: Sheet 1). While this may suggest that the Ḥorbat Duvshan pottery was manufactured in relatively close proximity to the excavated site, the discrepancy in the size of sand-sized materials in each group may indicate the existence of several potters working in the area, each using their own source of raw material. The possibility that different tempering materials were used for different types of vessels serving different functions should be taken into account in future analyses. The small number of examined samples from the Ḥorbat Duvshan repertoire is statistically insufficient, in types and quantity, to draw any conclusions regarding temper versus function.

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