



The Ground Stone Assemblage of a Metal workers Community: An Unexplored Dimension of Iron Age Copper Production at Timna

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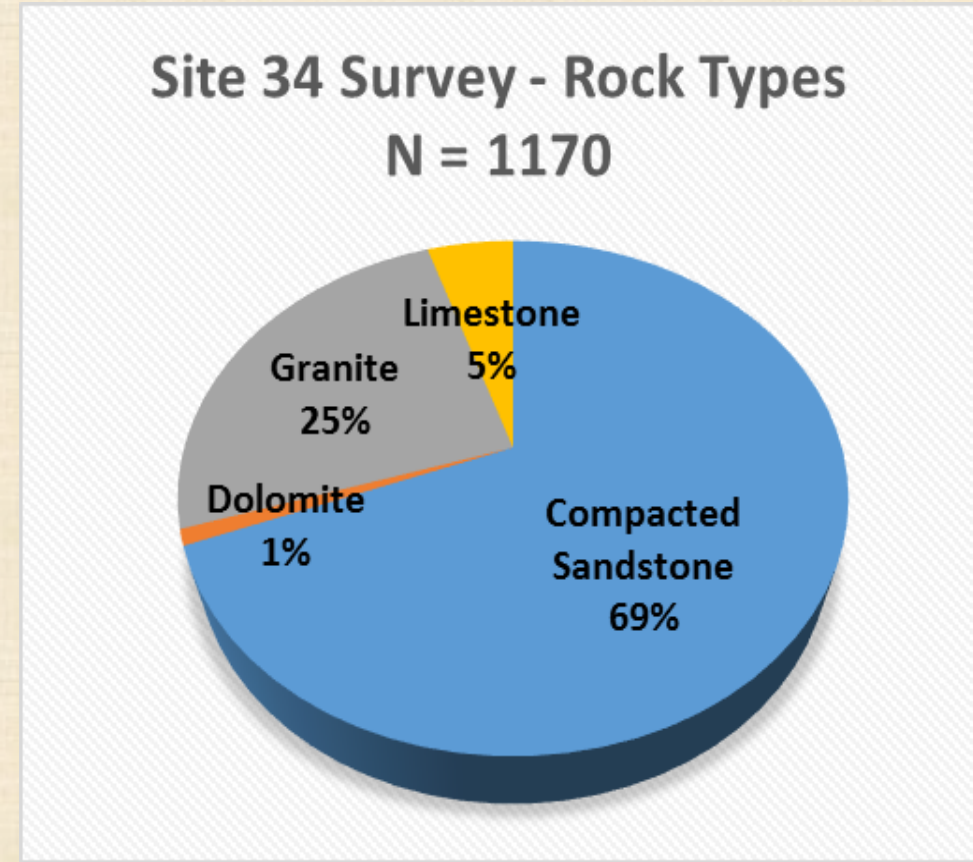
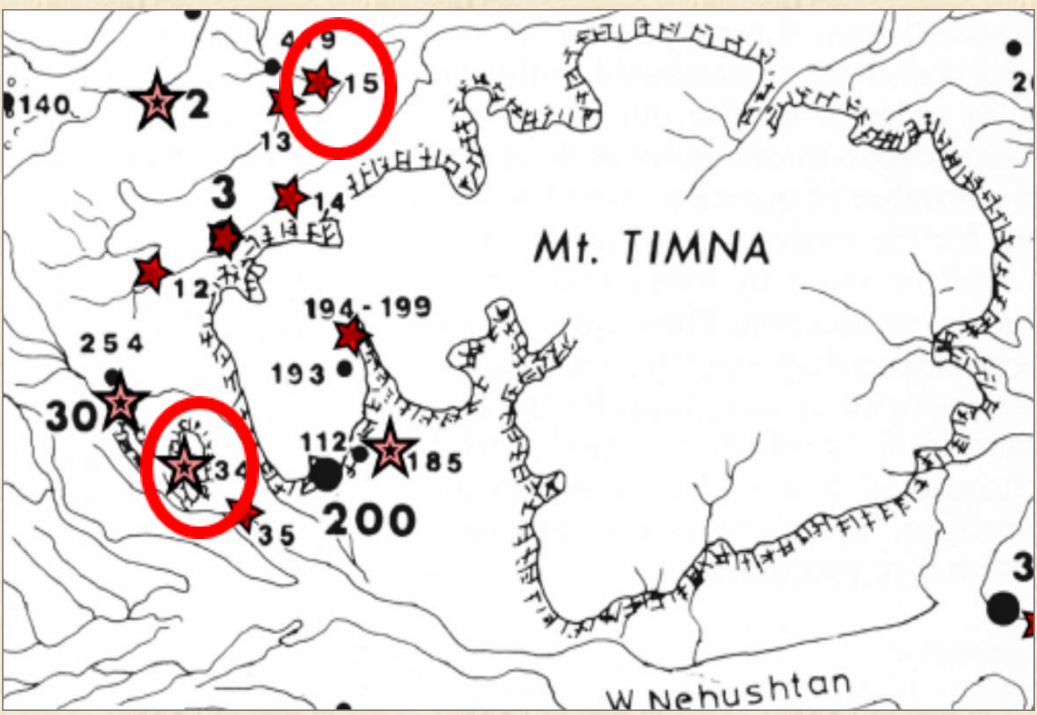


Abstract

The ongoing archaeological study of the Timna Valley, which began over 50 years ago by Beno Rothenberg, has highlighted Timna as a key site for understanding ancient copper production technologies in the Near East and beyond. In the framework of the renewed excavations at several of the copper smelting sites at Timna, we conducted a pioneering study of the ground stones which were used in the production process.

Methodology

We conducted an intensive survey of Timna Site 34 (“Slaves’ Hill”) - an industrial copper smelting site dating to the Iron Age - and recorded basic information for over 1000 ground stones. A similar survey was done at the smaller smelting camp of Site 15, from which c. 80 ground stones were recorded. Additionally, ground stones have been found during the excavations at both of these sites.



• Although granite stones were available at Site 15, the pounding tools were made mostly of lime stones.

The Rock Types

The varied geological landscape of Timna provided various types of rocks that are reflected in the stone assemblages. Most of the ground stones used in the copper smelting industry at Sites 34 and 15 were made of red stones which were collected from nearby Mt. Timna. The smelters were familiar with different raw material properties and the requirements dictated by the tool functions; the entire assemblage represents a deliberate effort for acquisition.

Compacted Sandstone: The grinding stones were made of compacted coarse sandstone of the “*Amudei Shlomo*” geological formation (Early Cambrian Age).

Granite: The crushing elements were made mostly of the harder alkali granite rocks. These are igneous rocks which are exposed in many areas of Mt. Timna.

The Common Tool Types

A limited number of tool types were used in the copper production industry at Timna.

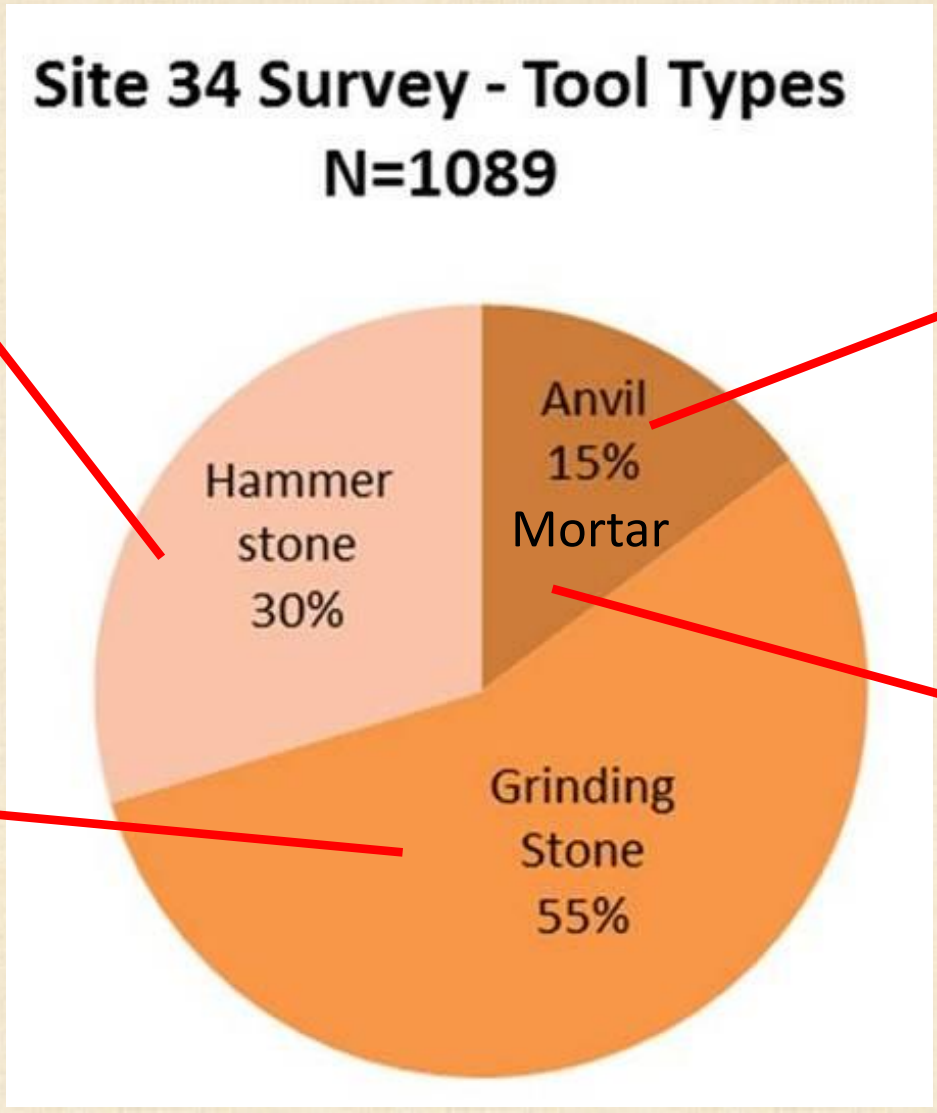
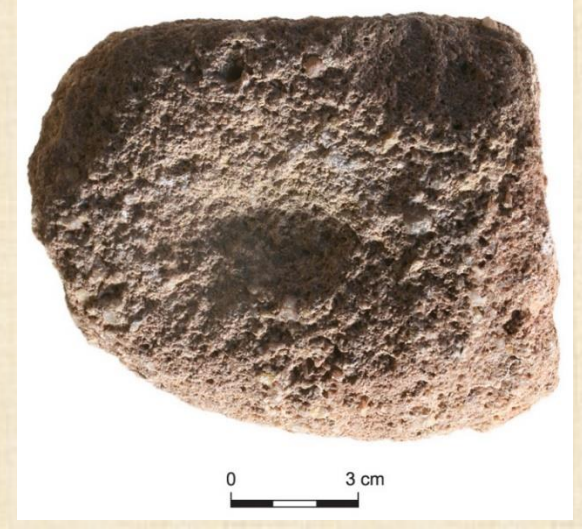
Hammer stones/Pounders:

These granite stones are usually palm-sized, and had dimples on multiple sides which were created as a result of continuous pounding.



Grinding Stones:

These compacted coarse sandstones were often reused for pounding after they broke or wore down from the intensive use. This is indicated by the dimples found in many of them.



Anvils: These granite or dolomite stones are usually large and irregular. They often have many cup marks as a result of a continuous pounding action.

Mortars: These large granite stones were used as part of the grinding process or the finer crushing.

* The distribution of tool types was similar at Site 15

Conclusions: The Ground Stones’ Function

Despite the difficulties*, our analysis of the tool types, combined with experimental archaeology and X-ray fluorescence testing have enabled us to reach the following conclusions:

- The copper ore was crushed and grinded into a powder using the grinding slabs and mortars.
- Slag (which is found at the site in various sizes) was crushed between the granite pounders and the anvils to extract copper prills.
- Some of the slags were further crushed and grinded (perhaps within the mortars cut into the bedrock) into fine material which could be used as temper in pottery and smelting installations.
- We plan to assess the Timna ground stone assemblage in its wider southern Arabah metallurgical context (and beyond), in order to define the ancient smelters’ ground stone “tool kit” typical of ancient metal production.

* Determining the function of the various types of ground stones in the copper production process is difficult since most are surface finds. Furthermore, ethnographic parallels for pre-industrial copper production is lacking.

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