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# The Central Timna Valley Project: 5 Years of Ongoing Textile Research

In its initial five years of activity the Central Timna Valley Project has dedicated its efforts to the excavation of several Late Bronze and Iron Age sites (13<sup>th</sup>-9<sup>th</sup> centuries BC) in the southern Arabah Valley of Israel (fig. 1).<sup>1</sup> The project, headed by Erez Ben-Yosef of Tel Aviv University, explores the ancient exploitation of copper ores at Timna; these were utilised for the production of copper ingots that were traded throughout the southern Levant and possibly the greater Mediterranean region. It is within the strata of several newly excavated sites that a few hundred individual textile, cordage and rope fragments were uncovered. Furthermore, locally made, crude ceramic vessels

bearing the negative impressions of woven textile materials were also collected during excavations and surveys in the valley. In light of these discoveries, the team launched multiple investigations into many aspects of production and consumption of textile goods using an interdisciplinary approach that combines archaeological and archaeometric methods with methodologies applied in historiographical and ethnographic research. These ongoing studies attempt to reconstruct the ancient journey of the textile fragments from fibre to archaeological deposition while considering their significance within the temporal, geographical and cultural setting. Additionally, the



Fig. 1. Location of the Timna Valley just north of the Red Sea/Gulf of Aqaba (Image: Central Timna Valley Project)

Fig. 2. Site 34/“The Slaves’ Hill”: an Early Iron-Age smelting camp in the central Timna Valley (Image: Central Timna Valley Project).

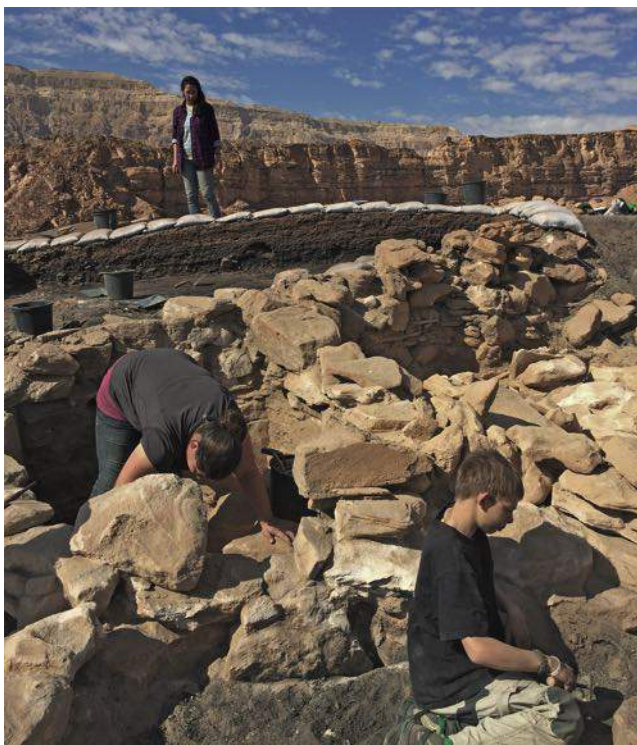


Fig. 3. Excavations of a copper smelting workshop at Site 34 (Image: Central Timna Valley Project).

project incorporates all available textile remains and data generated from studies performed during previous excavations within the valley (namely the Arabah Expedition directed by the late Beno Rothenberg; Rothenberg 1988; Sheffer & Tidhar 1988; Shamir & Baginski 1993) in order to provide an all-encompassing examination of ancient textiles utilised at Late Bronze and Iron Age Timna. The exceptional preservation conditions in the arid environment of the Timna Valley have permitted – for the first time – an extensive study of a large and unparalleled archaeological textile assemblage from this formative period in the southern Levantine region when Egyptian hegemony was replaced by the emergence of local polities such as the Edomite Kingdom and Ancient Israel.

The primary phase of this project commenced with comprehensive documentation of physical and technical aspects of the assemblage found during the 2013-2014 seasons of excavation at Site 34/“The Slaves’ Hill”, a large *mesa* in the central area of the valley covered with a dense network of structures related to the processing of copper ore (fig. 2). Nearly half of the objects were found in mounds of slag, the waste byproduct of the copper smelting process, and nearby workshop spaces (fig. 3). Others were found within well-preserved layers of dung and refuse accumulation situated on either

side of a small gate complex that controlled the only entrance to the site. Fibre types, spinning and weaving methods, decorative techniques, production quality and level of preservation were all documented in order to record the technical abilities and customs of ancient craftspeople working with woven materials. Unfortunately, only small fragments of the original objects were recovered; however, the wealth of information extracted from these artefacts was vast. The collection features a range of materials, including wool, goat hair and bast fibers (probably linen). The objects range in fineness and quality with some fragments appearing to originate from utilitarian objects such as sacks, tents and saddles while others are finely-woven fragments of garments (figs 4 and 5). Several objects are decorated with unique weaving techniques used to aesthetically augment the fabrics, design elements that are often found at or along the selvedge of the garments. The most astounding finds are fragments featuring well-preserved decorative red- and blue-coloured bands created by incorporating alternating dyed weft threads into the weave. These were executed with a high degree of skill and attest to the level of speciality employed by dyers, spinners and weavers working in the late 2<sup>nd</sup> millennium BC. Results of this stage constitute the work of Vanessa Workman’s MA thesis entitled *The Fabric of Copper Production: The Textile and Cordage Artifacts from Iron Age Timna*, under the supervision of Shamir and Ben-Yosef, which is currently being edited into a forthcoming publication. Various stages of the work were presented at international academic and professional conferences.<sup>2</sup> Textiles from the previously excavated Hathor Temple (Sheffer & Tidhar 1988, 224-232; Rothenberg 1988), a small structure enclosing an abundance of New Kingdom Egyptian finds in the vicinity of Site 34, were reevaluated within this study as a means of making connections between the material culture of cultic



Fig. 4. Plied goat hair cord (Image: Clara Amit, Israel Antiquities Authority).

and industrial activity of the Timnaic metal workers. The reoccurring appearance of the Egyptian goddess Hathor with textile finds within archaeological contexts, either as cultic offerings or in connection with the praise and worship of the goddess, continues to be developed within the context of Late Bronze / Early Iron Age Timna. During the Late Bronze Age, for at least a portion of the inhabitants of Timna, the goddess played an integral role in the success of their mining and smelting endeavours. Our research aims at a better understanding of how the textiles found in and around the temple contributed to Hathor worship and how these activities might be detected within the copper processing camps nearby.

A second phase of analysis was initiated focusing on detailed facets of the collection: dyes and animal fibres. Research headed by Naama Sukenik, and recently published in PLOS ONE (Sukenik et al. 2017), investigated the still vividly visible hues of red and blues dyes found in finely-spun wool threads in several textiles. The study used HPLC-DAD (High Performance Liquid Chromatography with Diode Array Detector) to isolate chemical compounds in the colouration in order to understand the composition and methods used to execute dyeing in the Early Iron Age. This was a particularly exciting opportunity to contribute information on dyeing processes and materials for the 11<sup>th</sup> and 10<sup>th</sup> centuries BC, a historical epoch with very little information regarding these topics. The analysis revealed that two colours, blue and red, were achieved using chemical dyeing processes and were made from organic plant materials of madder and indigotin respectively (probably *Rubia tinctoria* L. and *Isatis tinctoria* L., which are native to the Mediterranean region). These plants are among the earliest known in historical documentation of the dyeing craft, but evidence of their use is still limited in the archaeological record. As of today, the dyed fabrics from Timna constitute the earliest known results of these techniques from the Levantine region (dated to the late 2<sup>nd</sup> millennium BC).

Archaeometric analysis of the fibres was performed by Margarita Gleba, whose work partially focuses on tracking the developments in wool quality throughout the Mediterranean and Near East via the introduction of sheep species and selective breeding. Samples taken from a variety of textile objects were analysed using a scanning electron microscope (SEM) to measure fibre diameters. This data was compared to both modern and ancient samples collected from across Europe, the Mediterranean basin and the Near East in order to understand preferences and technological revolutions in the selection and processing of raw materials for various classes of textile industries and



Fig. 5. Fragment of a well-preserved woollen textile with red and blue bands (After Sukenik et al. 2017: 6, fig. 4; Image: Clara Amit, Israel Antiquities Authority).

workshops. It was discovered that some of the textiles had highly-processed threads including combing and sorting practices applied to fibres prior to spinning. The results of this study were presented at the British Association of Near Eastern Archaeology conference in Glasgow this past January (Gleba, M., Shamir, O., Workman, V., Sukenik, N. and Ben-Yosef, E. Defining the value of wool in the Iron Age: the case of textiles from Timna (Israel). BANE, Glasgow, 6 January 2017).

After several stages of analysis, we have begun to construct a picture of textile consumption and economy within the Timna Valley at the height of copper production there during the Late Bronze and Early Iron Ages. While the textile collection varies greatly in quality and workmanship, many of the artefacts were a product of highly-skilled craftspeople and were likely considered items of luxury at the time. As no spinning and weaving tools were discovered in excavations, the textile objects seem to have been brought into the valley by the people who came to work there or via the copper trade network. Together with faunal and archaeobotanical material from the sites, we infer that those operating the smelting furnaces and those responsible for copper production operations were not slaves as was once proposed (hence the moniker "The Slave's Hill"). These skilled workers with knowledge of advanced metalworking techniques achieved a commendable status worthy of imported fine goods such as choice cuts of meat (Sapir-Hen & Ben-Yosef 2014), fish and fruit originating from the



Mediterranean region (Ben-Yosef et al. 2017) and valuable, colourful textile goods. While the environment of the Timna Valley is neither hospitable nor suitable for sustained occupation, the local elite, including the metalworkers, appear to have enjoyed small luxuries in the form of imported goods, the likes of which are found among remains associated with persons of prominent stature in other archaeological contexts. We continue to research the way in which this hierarchal system came to be which enabled the maintenance of a large-scale enterprise in the mines and smelting camps; whether it may be attributed to the success of the copper commerce or perhaps that of a greater entity profiting from operations within the copper district of Timna.

During the current phase of research, we are proceeding to document and analyse textile finds from the 2015 to 2017 seasons, working towards a final publication of all Late Bronze- and Iron-Age objects from the Central Timna Valley Project's expedition thus far. As our understanding of the inhabitants and craftspeople in the valley evolves, the project continues to reevaluate the status of textile goods and their utilisation in all aspects of daily life, intertwined with subsistence and copper production.

### Notes

1. The project is supported by the Israel Science Foundation (ISF) Grant #1880/17, and the Marie Curie FP7-PEOPLE-2012-CIG Grant #334274 (both to E. B.-Y.). For a general overview of the project see: Ben-Yosef (in press); for further information on the site see Ben-Yosef et al. 2012; Ben-Yosef 2016; for updates see: <https://archaeology.tau.ac.il/ben-yosef/CTV/>.
2. Shamir, O., Workman, V. and Ben-Yosef, E. Textiles and textile impressions on pottery from the Hathor Temple and Iron Age smelting sites at Timna, The Annual Meeting of the American Schools of Oriental Research (ASOR), San Diego, November 2014; *ibid.*, Textiles and Textile Industries in the Near East and Eastern Mediterranean (5<sup>th</sup>-1<sup>st</sup> mill. BC): Recent Research, Loyola Marymount University, 24 November 2014; Workman, V., Shamir, O. and Ben-Yosef, E. Iron Age textile remains from a smelting site at Timna: A preliminary case study for the intangible, Traditional Textile Craft—an Intangible Cultural Heritage? The Jordan Museum and CTR, Amman, March 2014.
3. The authors are grateful to Mimi Lavi at the Institute of Archaeology at the Hebrew University

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