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Functions and uses of metallic axe-heads and arrowheads from Safah, Oman: An analysis of metalwork wear and weapon design

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ABSTRACT

This paper seeks to identify possible functions and uses of the Early Iron Age copper-alloy axe-heads and arrowheads which were found in the Safah metal workshop. In order to achieve this objective, metalwork wear analysis of twenty-four arrowheads and fifteen axe-heads are discussed in respect of design, use, typological resemblances and rock art representations of these weapons. Metalwork wear on each specimen is recorded with the help of handheld magnifiers. The recorded traces are compared with the published findings of the experiments which were conducted with copper-alloy weapon reproductions. The metalwork wear analysis of axe-heads and arrowheads is presented in line with the preliminary typological groupings which were categorised by the Safah excavation team. This article should be viewed as a preliminary analysis of axe-heads and arrowheads from Safah, not a full-scale study of metalwork wear, because of two factors: (1) the absence of experiments which are done with precise reproductions of these weapons and (2) thick corrosion on the samples. In view of these biases, technological and typological considerations are augmented by the examination of macro deformations. In the case of arrowheads, notches and breakages are the most common marks and they are mostly spotted on the lateral edges of the blades. Some edge deformations were also recorded on the lower half and the tang of the arrowheads. Pertaining to experimental studies, the former is associated with backwards movement and technological treatments and the latter is usually linked with the shaft's backlash with the point. Asymmetrical cutting edges, casting flows, micro-folds and breakages were observed on the axe-heads. Micro folds and breakages could not be associated with a certain activity, inarguably. Only one axe-head displays possible marks of combat. Casting flows illustrate the casting activity taking place in Safah. Asymmetrical cutting edges of one axe-head exhibit a relatively long span of use and sharpening. Most of the axe-heads in Safah were not deformed intensively. This point suggests that if these were brought to Safah for recycling they were not gathered there due to loss of function.

1. Introduction

The possible functions and uses of metallic weaponry is a largely unadressed subject in southeast Arabian archaeology and no study has been conducted in respect of the experimental studies on weapon use (see: Potts, 1998; Yule, 2014, 42). This paper aims to fill this void to a certain degree by covering the results of metalwork wear analysis of axe-heads and arrowheads from Safah, Oman. Safah lies on the border of an alluvial fan within the sandscape of Rub' al Khali. The site has recently renamed as Uqdat al-Bakrah in a forthcoming publication in respect to the official maps of Oman (Yule and Gernez, in press). Here, the first toponym, Safah, is adopted in order to be compatible with the terms that were used in the present literature about the site (Genchi et al., 2013; Yule and Weisgerber, 2015, 26). The site comprised of two major sectors separated by a dune belt: Safah 1 and Safah 2. Given its mobility, the dune does not constitute a permanent boundary between these sectors, but a temporary one. Overall, two hundred furnaces and a large number of weapons were discovered in an area of twenty hectares by the research team. It is also important to highlight that not just weaponry but bronze bowls, hoes, hammers, spatulas, shallow open-mouth vessels, tweezers, pieces of gold were documented in the site (Al-Bakri et al., 2013, Slides 40–62; Genchi et al., 2013; Yule and Weisgerber, 2015, Table 7). Safah is identified as an Early Iron Age metal workshop in view of used/folded metal artefacts, unfinished metal artefacts, furnaces, charcoal pits, crucible fragments, casting residues and Early Iron Age stone vessels and pottery (Genchi et al., 2013; Yule and Weisgerber, 2015, 26).

2. Methodology

Fifteen axe-heads and twenty-four arrowheads from Safah were subjected to metalwork wear analysis (Tables 5–10). “Metalwork wear”

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Table 1
Axe-head dimensions.

Specimen											
Inventory Number	Type (Genchi et.al.2013)	Blade Thickness (from rib)	Blade Thickness of the Edge (cm)	Blade Length (cm)	Bottom Blade Width (cm)	Middle Blade Width (cm)	Blade Point Width (cm)	Tang-Socket Length (cm)	Tang-Socket Width (cm)	Total Length (cm)	Weight (grams)
DA 32065	Type 2-A	1.50	0.28	11.58	2.50	3.50	5.50	5.20	3.62	15.20	442.08
DA 30099	Type 2-A	1.10	0.30	11.40	1.90	3.00	6.30	5.15	3.40	14.80	313.03
DA 30088	Type 2-A	0.95	0.25	10.00	2.10	2.80	5.40	4.00	2.90	12.90	192.02
DA 30100	Type 2-A	0.95	0.28	10.00	1.75	2.70	4.78	4.83	2.70	12.70	201.02
DA 30095	Type 2-A	0.90	0.20	8.10	0.90	1.39	2.00	4.30	2.20	10.30	97.04
DA 30241	Type 2-A	1.10	0.90	7.42	1.52	2.10	3.50	3.80	2.58	10.00	116.08
DA 32064	Type 2-A	1.10	0.25	7.50	0.98	1.70	3.00	4.00	2.30	9.80	108.00
DA 27325	Type 2-A	1.39	0.50	6.90	1.55	2.00	3.40	4.40	2.50	9.40	206.03
DA 30094	Type 2-B	1.20	0.75	5.35	2.15	3.15	5.70	5.00	3.55	8.90	214.02
DA 30097	Type 3-A	1.90	0.90(Broken)	10.77	2.60	3.00	4.70	5.55	3.78	14.55	453.04
DA 30089	Type 3-A	0.98	0.30	7.67	1.35	1.10	3.70	3.62	2.33	10.30	109.04
DA 30091	Type 3-B	1.00	0.28	7.62	2.90	3.20	5.53	4.90	2.72	10.34	234.04
DA 29670	Type 3-B	1.60	0.42	7.82	2.30	2.80	4.80	5.40	2.52	10.34	341.06
DA 30105	Type 4	0.90	0.40	3.90	2.08	2.00	3.50	3.10	2.20	6.10	67.03
DA 30104	Type 5	1.00	0.85	3.92	1.50	1.70	2.40	3.15	2.90	6.82	71.02

is a term proposed by Andrea Dolfini and Rachel Crellin (Dolfini and Crellin, 2016, 79). I prefer to use this term instead of use-wear analysis because it is a more comprehensive term that encompasses all types of wear including use, manufacture and post-depositional related deformations on metal objects. It must be noted at the outset of this paper that only the objects that are stored in the Ministry of Heritage and Culture of the Sultanate of Oman were accessible for this analysis. The majority of metal objects from Safah were being conserved and stored in the Oman National Museum at the time of my research in March 2015. For these reasons, only a narrow set of objects were examined. Acknowledging the influence of external factors on the present research, the data is collected by means of analytical steps underlined below.

2.1. Measurements

Numerous variables, such as blade thickness, blade length, blade width(s) and tang-socket length of *each* specimen, were measured with

Table 2
Arrowhead dimensions.

Specimen									
Inventory Number	Type (Genchi et al., 2013)	Blade Thickness in cm (from rib)	Blade Length (cm)	Bottom Blade Width (cm)	Middle Blade Width (cm)	Blade Point Width (cm)	Tang-Socket Length (cm)	Total Length (cm)	Weight (grams)
DA 29855	Group 1	0.30	3.20	1.10	1.40	0.90	1.60	4.80	6.00
DA 29847	Group 1	0.35	3.10	1.40	1.50	0.80	1.70	4.80	5.02
DA 29864	Group 1	0.28	3.40	1.80	1.40	0.70	1.20	4.60	4.03
DA 29858	Group 2-A	0.60	4.80	1.75	1.90	0.55	2.00	6.80	12.07
DA 30115	Group 2-A	0.47	5.00	1.60	1.40	0.80	1.70	6.70	9
DA 29865	Group 2-A	0.40	4.80	1.20	1.80	0.90	1.80	6.60	11.05
DA 30231	Group 2-A	0.41	4.70	0.90	1.20	0.60	1.60	6.30	6.04
DA 29848	Group 2-A	0.35	4.30	1.00	1.48	0.70	1.90	6.20	10.04
DA 29853	Group 2-A	0.40	4.30	1.90	1.20	0.70	1.30	5.60	7.00
DA 29852	Group 2-A	0.30	3.70	1.15	1.40	0.70	1.60	5.30	6.02
DA 29851	Group 2-A	0.50	3.50	1.30	1.70	0.90	1.50	5.00	8.08
DA 30132	Group 2-A	0.40	3.20	1.20	1.40	0.70	1.00	4.20	6.02
DA 30229	Group 3	0.38	5.40	1.70	1.40	0.90	1.30	6.70	6.06
DA 32051	Group 3	0.30	4.80	1.50	1.20	0.60	1.80	6.60	8.03
DA 30232	Group 3	0.30	3.70	1.00	1.40	0.60	1.50	5.20	6.02
DA 29850	Group 6	0.40	5.50	1.30	1.60	0.60	1.50	7.00	13.08
DA 30123	Group 6	0.48	4.60	1.00	1.10	0.70	1.70	6.30	11.00
DA 30226	Group 7	0.30	4.00	1.80	1.70	1.10	2.10	6.10	6.04
DA 32052	Group 7	0.30	2.80	1.30	1.22	0.90	1.60	4.40	4.09
DA 30117	Group 7	0.30	2.40	1.20	1.30	0.80	1.80	4.20	6.03
DA 30074	Group 9	0.20	7.50	1.00	0.80	0.45	1.50	9.00	6.00
DA 30143	Group 9	0.50	6.60	0.90	1.40	0.60	1.20	7.80	14.03
DA 30237	Group 9	0.20	5.70	1.10	1.00	0.90	0.70	6.40	4.00