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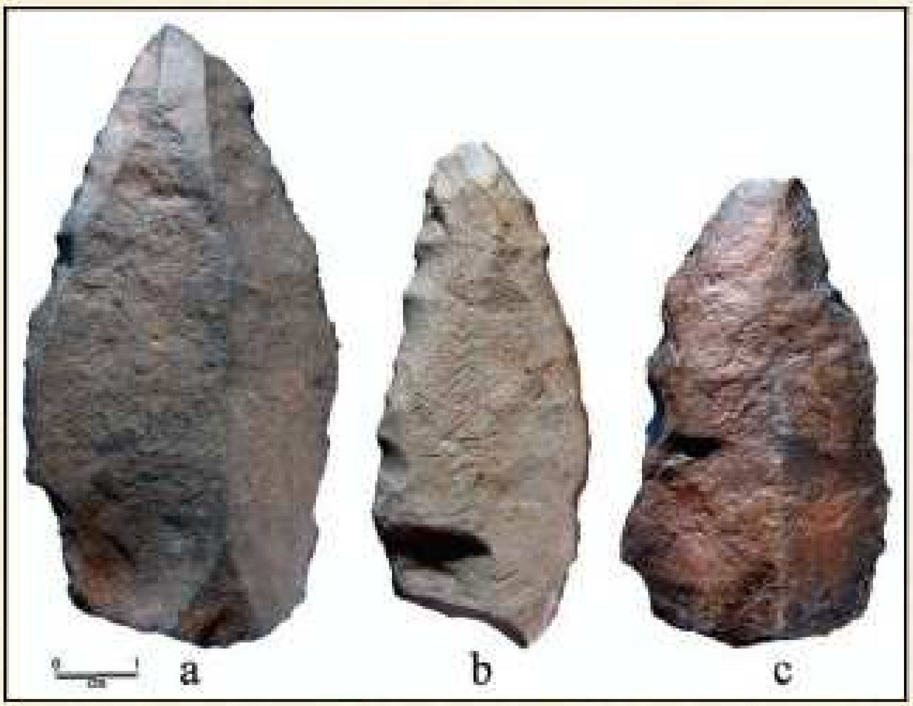
Three New Fauresmith Industry Sites in the Eastern Cape Province, Republic of South Africa



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Houston Archeological Society
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Front Cover: Photo of the three Levallois-like points from the Dalmanutha Site.

Editor's Foreword

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DALMANUTHA, ROSSLANDS AND SUNNY SLOPES FARMS: THREE NEW FAURESMITH INDUSTRY SITES IN THE EASTERN CAPE PROVINCE, REPUBLIC OF SOUTH AFRICA

Wilson W. Crook, III

Introduction

Examination of surface collections over the 1920's and 1930's led to the identification of the "Fauresmith Industry" over a large portion of South Africa including the Free State, Western Cape, Northern Cape and Guateng Provinces (Goodwin 1926a, 1926b; Goodwin and Van Riet Lowe 1929; Van Riet Lowe 1933, 1937; Beaumont 1990, 2004; Chazan et al. 2011; Underhill 2011). As originally described, the Fauresmith Industry was characterized by small hand axes and occasional cleavers, prismatic blades, Levallois flakes and retouched points, convex-edged scrapers, gravers, burins and prepared cores; all of which were created using the Levallois or Levallois-like technology (Goodwin and Van Riet Lowe 1929; Van Riet Lowe 1933, 1945; Dreyer 1953). This lithic assemblage represents a major change in technology from the traditional core tool, hand axe-driven Acheulean tradition which predominates over much of the Early Stone Age (ESA) in Africa. As such, the Fauresmith Industry was originally proposed to represent an intermediate culture between the Acheulean and the Middle Stone Age (MSA) (Goodwin 1926a, 1926b; Goodwin and Van Riet Lowe 1929). However, since its initial discovery and description, the Fauresmith Industry has variously been referred to as "Terminal Acheulean" within the ESA, the final phase of the Acheulean, the first intermediate stage between the ESA and the MSA, the sub-continent equivalent to the Middle Paleolithic, or "clearly" Mousterian in age (Bordes 1968; Beaumont and Vogel 2006; Herries 2011; Underhill 2011).

The lack of definitive age dates associated with these surface finds has somewhat blurred the distinction between the terminal Acheulean, the transitional industries and the MSA in South Africa. Recently a stratigraphically intact Fauresmith Industry site at Kathu Pan 1 (KP1) in the Northern Cape Province has been excavated and thoroughly analyzed (Beaumont 1990; 2004; Wilkins and Chazan 2012; Wilkins 2013). These excavations have shown a well-developed MSA assemblage is present at the site with a distinctive Fauresmith Industry assemblage (Levallois-like cores, retouched points, prismatic blades and large cutting tools) lying immediately underneath. The MSA at Kathu Pan 1 has been dated at between 336-254 ka with the underlying Fauresmith Industry dated at 464 +/- 47 ka by Optically Stimulated Luminescence (OSL) and 542+/- 107 ka using Electron Spin Resonance (ESR) (Porat et al. 2010). Acheulean ESA artifacts lie below the Fauresmith assemblage. Thus the Fauresmith Industry appears to be a true transitional phase between the end of the ESA Acheulean tradition and the beginnings of the MSA (Wilkins and Chazan 2012; Wilkins 2013).

Over the past 20 years the author has been allowed to explore on foot large portions of 21 farms across the Eastern Cape Province of the Republic of South Africa. These farms range from near the Eastern Cape-Free State border by Aliwal North to several areas in and around Burgersdorp (12 farms), three farms near Craddock, four farms in the general vicinity of Queenstown, and two location on the coast – one near Humansdorp and the other near East London. In 2013, at two locations near the town of Burgersdorp, large quantities of lithic tools were found exposed on the surface. The first location is near the small community of Dalmanutha (Dal-man-ootha in English; Dal-man-ita in Afrikaans), approximately 19 km (12 miles) northeast of Burgersdorp. The second location is on the Rosslands Farm located approximately 28 km (17 miles) south of Burgersdorp. At both locations, the artifact assemblage occurs on the surface with little to no stratigraphic depth. The artifact assemblages at both sites are identical to each other in terms of both toolstone composition and artifact assemblage which consists of prepared cores, prismatic blades, retouched Levallois points, scrapers of various types, small bifacial cutting tools, gravers, retouched flakes and hammerstones – all of which are characteristic of the transitional Fauresmith Industry. In 2017, a third location was discovered 4.4 km (2.7 miles) southeast of Dalmanutha on a property known as Sunny Slopes. This location proved to be a probable quarry site also of Fauresmith age. This paper thus serves to record all three sites, the first known locations of the Fauresmith Industry in the Eastern Cape Province, and analyzes a sample artifact assemblage from each with a focus on prismatic blade and Levallois-like point manufacture.

The Fauresmith Industry in South Africa

As mentioned above, a number of theories have been proposed concerning the terminology of the transition from the ESA to MSA and it is likely that it is far from a simple change that occurred at exactly the same time all across Africa. In Southern Africa, the Fauresmith Industry has been proposed to represent this transitional phase but the term has been misused throughout the last 90 years and the industry itself is not clearly defined (Dreyer 1953; Herries 2011; Underhill 2011). Part of this confusion stems from the fact that the Fauresmith Industry, as originally described by Goodwin and Van Riet Lowe (1929), contains aspects of both the ESA and MSA. Some of this confusion has been alleviated in part by the work of Beaumont (1990, 2004) and Wilkens and Chazan (2012) at Kathu Pan 1 in the Northwest Province.

Key to the original characterization of the Fauresmith lithic assemblage is the absence of large pear-shaped Acheulean hand axes and the presence of "small" hand axes which are known in South Africa as Large Cutting Tools or "LCT's". These small hand axes differ from those made during the Acheulean not only in size (approximately 100 mm in length vs 150-175 mm) but also in the fact that they are constructed from flakes rather than from large cobbles. However, the Fauresmith is more rightly characterized by the first occurrence and accentuation of purposefully prepared Levallois-like technology tools, principally cores, prismatic blades, and purposefully shaped points (Wilkins and Chazan 2012; Wilkins 2013). In this regard, three principal core forms have been recognized: (1) circular or tortoise, approximately 50-100 mm in diameter, (2) triangular flake cores, 75-125 mm in size, and (3) rectangular blade cores that are thick and exhibit a striking angle of approximately 90 degrees (Wilkins and Chazan 2012; Wilkins 2012). Blades up to 200 mm (8 inches) were produced from pyramidal blades cores and/or on Levallois flakes (Beaumont1990; Wilkins and Chazan 2012). From the work at Kathu Pan 1, Wilkins (2013) observed that toward the end of the Fauresmith Industry more conical blade cores developed which produced shorter and straighter blades which average about 63 mm in length, 25 mm in width and 6 mm in thickness. Across South Africa, Fauresmith blades and Levallois points are predominantly made from hornfels (indurated shale), although other lithic materials such as banded ironstone, chert, quartz, quartzite and intrusive igneous rocks can be the preferred toolstone (Wilkins and Chazan 2012). The original suggestion put forward by some researchers that the Fauresmith Industry is merely a variant of the Acheulean, induced by the use of hornfels toolstone, is not supported by the subsequent findings that other Fauresmith sites have been found using additional types of toolstones, especially in areas of South Africa where hornfels does not occur (Humphreys 1970; Wilkins and Chazan 2012). Conversely, the associated small hand axes found in Fauresmith assemblages are almost exclusively constructed from chert and quartzite and not hornfels (Humphreys 1970; Beaumont 1990; 2004). In summary, while the Fauresmith Industry still remains to be clearly defined, most definitions today stress the co-occurrence of small hand axes, prismatic blades, and convergent Levallois points (Mitchell 2002; Underhill 2011).

The Fauresmith Industry takes its name from the town of Fauresmith in the southwestern part of the Free State. The type site, Brakfontein 231, is located nearby and lies about 160 km (100 miles) northwest of Dalmanutha, Rosslands and Sunny Slopes Farms. As noted above, almost all of the original sites ascribed to the Fauresmith Industry are surface finds. The Fauresmith Industry has been noted at sites along the Vaal River (Canteen Kopje, Nooitigedacht 2, Roseberry Plain 1, and Powers site), the Orange River, and the Seacow Valley, as well as pan sites near Kimberly (Rooidam 2 and Kathu Pan 1). While a number of sites have been attributed to this culture, securely dated contexts with Fauresmith assemblages are rare. Five more or less well-stratified Fauresmith sites exist including Pneil 6 in the Western Cape, Wonderwerk Cave, Canteen Kopje and Kathu Pan 1, all in the Northern Cape Province, and Rooidam 2 in the Free State. Of these, excavations at Wonderwerk Cave and Kathu Pan 1 have now confirmed that the Fauresmith Industry is indeed a culture-stratigraphic entity typified by the co-occurrence of Levallois points, blades and bifaces, and dates to between ca. 400 ka and 600 ka (Beaumont and Vogel 2006; Porat et al. 2010; Wilkins and Chazan 2012).

As noted above, Kathu Pan 1 in the Northern Cape has proven to be a critical site for helping to both date and delineate the artifact assemblage (notably the blades) of the Fauresmith Industry. Peter Beaumont excavated 11 sites in the general area during the period 1978-1990 (Beaumont 1990; 2004), but the best finds in terms of datable stratigraphic materials have been found at Kathu Pan 1. Kathu Pan is a shallow drainage that covers an area of approximately 0.3 square kilometers (74 acres) (Wilkins 2013; Wilkins and Chazan 2012). The site is an in-filled sinkhole with more than five meters of Early Stone

Age, Middle Stone Age and Later Stone Age deposits identified in five geological strata (Wilkins et al. 2012). In terms of the ESA-MSA lithic assemblages, three distinct strata are of note. Stratum 3 contains a well-defined set of MSA stone tools and has been dated by OSL at 291 +/- 45 ka (Porat et al. 2010), which is comparable to an ESR date of 279 +/- 47 ka for early MSA materials at Florisbad in the Free State (Grun et al. 1996). Stratum 4a lies immediately below Stratum 3 and contains an abundance of Fauresmith Industry tools. A total of 6,052 lithic artifacts including 972 blades, 679 cores and 149 Levallois-like points have been recovered from this interval (Wilkins and Chazan 2012). An Optically Stimulated Luminescence (OSL) date taken on sediments in direct association with Fauresmith tools has yielded an age of 464 +/- 47 ka and an *Equus capensis* tooth recovered adjacent to the OSL sample has produced a uranium series-ESR date of 542 +140/-107 ka (Porat et al. 2010). Thus ~400 ka appears to be the *terminus ante quem* for the Fauresmith from Stratum 4a at Kathu Pan 1 (Wilkins and Chazan 2012). Underlying Stratum 4a is Stratum 4b which contains Acheulean hand axes and no Levallois technique materials. It is thus concluded that the Fauresmith Industry may be a fairly long-lived culture, perhaps lasting as much as 200 ka and may even overlap the development of later MSA assemblages (Underhill 2011; Wilkins and Chazan 2012.

The complete distribution of the Fauresmith Industry across southern Africa remains to be defined but recent finds suggest that it may be replaced to the north along the Limpopo River by a differing tradition, the Lupenban Industry, that it is largely coeval with (Barham 2000; Clark 1954, 2001). Location of major Fauresmith Industry sites as well as the three new sites described herein is shown in Figure 1.

The Dalmanutha, Rosslands, and Sunny Slopes Farm Sites

The Dalmanutha, Rosslands, and Sunny Slopes Farm sites lie in the north-central portion of the Eastern Cape Province of South Africa. Dalmanutha, named for both the farm the site is located on as well as the nearby community of the same name, is approximately 19 km (12 miles) northeast of the town of Burgersdorp. The site is accessed via a gravel road east of Provincial Route R58, the main road between Aliwal North and Burgersdorp. The geologic setting of the site is very similar to that of Kathu Pan in that artifacts are exposed across a small (approximately 3 acre), hard alkaline pan that is fed by a series of fresh water springs. Artifacts are exposed at the surface over much of the pan but seem to be most heavily concentrated on west and east sides in the vicinity of several of the seep springs (Figures 2 and 3); presence of the springs is clearly visible by the darker color-

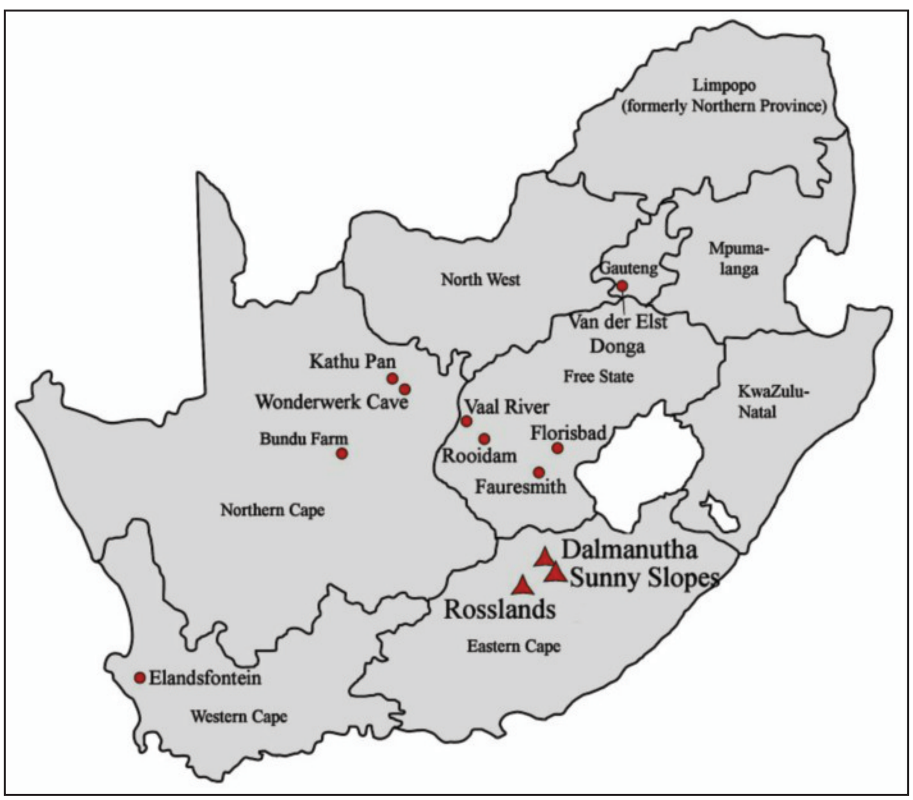

Figure 1. Location of major Fauresmith Industry sites in South Africa including Dalmanutha, Rosslands and Sunny Slopes Farms. (Illustration by Lance K. Trask)

ation difference in the soil (10YR 5/1 to 10YR 4/1). Twelve shovel tests covering the length of the pan showed that there is virtually no depth component to the occurrence with all artifacts being either fully exposed on the surface or within one to two centimeters of the surface (Figure 4). A hard, light yellow-brown to pale yellow clay (2.5Y 6/3 – 2.5Y 8/3) was encountered at 5-10 cm below the surface. No artifacts were found as deep as this impermeable clay unit. While there are low rolling hills in the general area, the site itself is very flat with the only surface features being recent termite mounds. Elevation at the site is a consistent 4,196 feet above sea level. Water is present both at the pan from springs and in a small stream (Barnard Spruit) located 900 meters (3,000 feet) to the east.

The Rosslands Farm site is located approximately 28 km (17 miles) south of Burgersdorp near the intersection of Provincial Route R397 and R56. This location is about 8 km (5 miles) west of the small town of Molteno. On the northeastern side of R397-R56 intersection is a prominent basalt-capped hill with a vertical relief of about 100 feet above the surrounding terrain (Figure 5). Immediately southeast of this hill is a small, north-south trending stream. The Rosslands Farm site is located on the eastern side of this stream directly in line with the basalt-capped hill. Unlike the alkaline pan at Dalmanutha, the Rosslands Farm site is in loose gray to light gray sand (10YR 5/1 – 10YR 7/1). The site is fairly flat with again the only significant surface features in the area of the artifact accumulations being termite mounds.

Figure 2. Alkaline pan containing the Dalmanutha site.

Figure 3. The Dalmanutha site looking east to west.

Figure 4.
Lithic cobble scatter across the surface of the Dalmanutha Site.

Elevation at the site is about 4,954 feet above sea level.

Artifacts are scattered over about one acre and were not as plentiful as at Dalmanutha. Shovel tests showed the site had a slight depth component (10 cm), but given the extremely unconsolidated nature of the sand, this could simply be the result of repeated aeolian exposure and re-burial.

A third site is located 4.4 km (2.7 miles) southeast of Dalmanutha on the Sunny Slopes property of Mr. Ben Lategan. Like Dalmanutha, the site is exposed on the surface in a dense cobble field composed of dolerite (diabase), hornfels, quartzite, quartz and chert. The cobbles cover an area of approximately 5 acres or more. Shovel tests showed the cobbles to be restricted to the surface with little to no depth component. Artifacts are found across the entire cobble field but unlike Dalmanutha, are not concentrated in any one area. Artifacts recovered consist primarily of expended cores and broken and/or discarded tools. As such, it is believed that Sunny Slopes represents a quarry site and not an occupational area like Dalmanutha and Rosslands Farms.

As all three sites were owned by a single land owner or his relatives (Mr. Bennie Lategan of Aliwal North, Eastern Cape Province), I was granted permission to take a small collection of the artifacts for study. As mentioned above, the Dalmanutha site was

Figure 5. Large basalt-capped mountain which is adjacent to the Rosslands Farm site. The site is located behind and to the right side of this feature.

significantly larger, both in aerial extent as well as in the number of artifacts. Literally thousands of lithic tools littered the surface of the pan and I collected a small sample (n=81) of what I felt were representative artifacts of the overall observed assemblage. A similar collection was made at Rosslands Farm but much less in number (n=11) due to the lesser amount of artifacts exposed. A total of 37 artifacts, mainly expended cores and broken blades, were collected from the Sunny Slopes Farm.

Geologic Setting

The area of the northern part of the Eastern Cape Province of South Africa lies within the major geologic feature known as the Great Karoo Basin (DuToit 1954). Rocks exposed on the surface belong to the siliciclastic Beaufort Group, which is part of the regional Permo-Triassic Karoo Super Group. The Karoo Super Group represents an immense area of deposition as rocks associated with this unit cover over 300,000 square kilometers of South Africa (DuToit 1954). Tectonically, the Karoo Basin has been interpreted as a retroarc foreland basin bounded by the Cape Fold Belt to the south. Deposition in the Karoo Basin began during the Carboniferous Period (359-299 Ma) with marine sedimentation followed successively by shallow marine, deltaic and fluvial lacustrine deposition. The last phase, which includes sediments of low sinuosity fluvial systems, is represented by rocks of the Burgersdorp Formation.

The Burgersdorp Formation comprises the uppermost part of the Beaufort Group and consists of grayish-red and greenish-gray colored mudstones, graywackes and interbedded fine-grained sandstones (Johnson 1976). The top of the Beaufort Group marks the base of the Triassic Stormberg Group which, from the base upwards, is composed of perennial braided stream deposits (Molteno Formation), overlain by continental red beds followed by aeolian sand deposits (Johnson 1976; Neveling et al. 2005). In the area of both the Dalmanutha, Rosslands, and Sunny Slopes Farm sites there is no evidence of red beds or aeolian sandstones, so those parts of the Stormberg Group have probably been eroded and are no longer present. As noted above, all three sites lie in unconsolidated sand. Given that the overlying material has been eroded away, the remaining sandy surface has likely been deflated resulting in the possibility of a mixing of occupational material. This possibility will be discussed further below in the discussion on the recovered artifact assemblage.

Approximately 180 Ma, an extensive igneous event (the Karoo Large Igneous Complex) deposited both continental flood basalts and dikes and sills of dolerite (diabase) composition throughout the Karoo Basin. The volcanism associated with this event effectively terminated deposition of the Karoo Super Group and served to protect much of the underlying sediments of the Burgersdorp and Molteno Formations from erosion since the Early Triassic (Senger et al. 2015). These igneous rocks both cap the sediments of the Burgersdorp and Molteno Formations in the area of Dalmanutha, Rosslands, and Sunny Slopes Farms (the basalt-capped mountain adjacent to the Rosslands Farm site is a classic example of this phenomena – see Figure 5) but also have caused contact metamorphism which produced the hornfels

Table 1. Artifacts by tool type and lithic composition, Dalmanutha Farm, Eastern Cape Province, RSA.

Artifact Type	Hornfels (Indurated Shale)	Chert	Quartzite	Total
Retouched Point Forms (Levallois)	16	0	0	16
Blades	23	5	0	28
Cores	6	3	0	9
Hand Axe	0	1	0	1
Bifaces	2	0	0	2
Scrapers (all types)	5	4	0	9
Graver	2	0	0	2
Notch	1	0	0	1
Large Flakes (>50mm)	4	1	0	5
Small Flakes (<50 mm)	3	3	0	6
Hammerstones	0	0	2	2
Total	62 (77%)	17 (21%)	2 (2%)	81

Table 2. Artifacts by tool type and lithic composition, Rosslands Farm, Eastern Cape Province, RSA.

Artifact Type	Hornfels (Indurated Shale)	Chert	Quartzite	Total
Retouched Point Forms (Levallois)	1	0	0	1
Blades	4	0	0	4
Cores	0	0	0	0
Hand Axe	0	0	0	0
Bifaces	0	0	0	0
Scrapers (all types)	2	0	0	2
Graver	0	0	0	0
Large Flakes (>50mm)	1	0	0	1
Small Flakes (<50 mm)	2	0	0	2
Hammerstones	0	0	1	1
Total	10 (91%)	0 (0%)	1 (9%)	11

and quartzites used by the ESA and MSA inhabitants of the region. Later fresh water springs helped to create the ephemeral lake bed where the Dalmanutha site is located. The surface of the Dalmanutha site today is largely the erosional remnants of fine-grained sands, silts and clays from the Burgersdorp and Molteno Formations, occasionally capped by flood basalts from the Karoo Igneous Complex. Eroded boulders of doleritic volcanic material litter the country side as do cobbles of hornfels, quartzite and quartz. The Rosslands Farm site is similar in terms of the presence of volcanic boulders on the surface, but the area in and around the site itself is largely a fine-grain, loose sand. Toolstone cobbles are sporadically present but are more concentrated in the bottom of the small stream that runs adjacent to the site.

Artifact Assemblage

As mentioned above, a total of 81 artifacts were collected from Dalmanutha and 11 additional artifacts from Rosslands Farm. An additional 37 artifacts were collected from the Sunny Slopes site. Tables 1-3 lists the artifacts recovered from each of the three sites both by tool type and by lithic composition. As can be seen from the tables below, hornfels is the predominant lithic material at all the sites, comprising 62 percent of the artifacts collected from Dalmanutha, over 90 percent of the artifacts from Rosslands, and 70 percent of the artifacts from Sunny Slopes Farm. The percentages from the three collections accurately reflect the remaining artifacts observed but not collected from both sites. Other lithic materials include chert and quartzite; the latter appears to have been used exclusively for hammerstones.

The most common artifact found at Dalmanutha and Rosslands are straight, prismatic blades. Systematic production of blades is uniquely associated with *Homo sp.* and confers an adaptive advantage over prepared core-flake production (Williams 2014). Blade technology characterizes the Upper Paleolithic and Later Stones Age assemblages, especially after 50 ka (Bar-Yosef and Kuhn 1999; Williams 2014). Earlier blade technologies are now emerging in the Levant (Amudian Industry) at Qesem Cave in Israel (420-320 ka), in East Africa in the Kapthurin Formation (509 +/- 9 ka), and at Kathu Pan 1 in South Africa (464 +/- 47 ka) (Gopher et al. 2010; Johnson and McBrearty 2010; Wilkins and Chazan 2012; Wilkins 2013; Williams 2014). Thus blades are now a recognized component marking the end of the Acheulean and the beginning of the MSA.

The most detailed study of blade manufacture from the Fauresmith Industry comes from Kathu Pan 1 where a total of 972 blades have been analyzed (Wilkins and Chazan 2012). Blade production was found to be a regular and purposeful practice by the MSA inhabitants of Kathu Pan as evidenced by the following characteristics: (1) blades are an abundant component of the overall lithic assemblage at the site, (2) they are relatively large in size and have a high length-to-width ratio, and (3) subsequent specific tools were manufactured from blades via retouch (Wilkins and Chazan 2012; Wilkins 2013).

Identifying a blade technology is not about the blades per se but the creation of specific blade cores that allow for the systematic production of prismatic blades. In this regard, core-blade reduction at Kathu Pan 1 is related to the Levallois technology as defined by Boeda (1995), but is not precisely the same as true

Table 3. Artifacts by tool type and lithic composition, Sunny Slopes Farm, Eastern Cape Province, RSA.

Artifact Type	Hornfels (Indurated Shale)	Chert	Quartzite	Total
Retouched Point Forms (Levallois)	2	0	0	2
Blades	6	2	0	8
Cores	12	5	0	17
Hand Axe	0	1	0	1
Bifaces	0	0	0	0
Scrapers (all types)	6	2	0	8
Graver	0	0	0	0
Large Flakes (>50mm)	0	0	0	0
Small Flakes (<50 mm)	0	0	0	0
Hammerstones	0	0	1	1
Total	26 (70%)	10 (27%)	1 (3%)	37

Levallois core-blade production. While some of the cores look similar, they are not produced using the same techniques of production (Thomas E. Williams, personal communication 2016). Therefore for the sake of this paper I will refer to the core-blade production at Kathu Pan 1 and other Fauresmith Industry sites as "Levellois-like". At Kathu Pan, cores consist of two asymmetrical convex surfaces with the flaking surface maintained in a way that created lateral and distal convexities to guide the shock wave of each predetermined hammerstone strike. However, unlike later core-blade technologies, the cores were not maintained with second generation crested flakes. Blades with cortex are present but their low frequency in the overall Kathu Pan 1 blade assemblage suggests blade cores were first prepared by flake removals; platforms were then created prior to final blade detachment (Wilkins and Chazin 2012; Wilkins 2013).

Average length of blades at Kathu Pan 1 is 70 mm but there is great variation in size ranging from 15-150 mm. Mean length-to-width ratio is about 2.5:1. The high frequency of large prominent bulbs of percussion, thick platforms and shattered bulbs are all consistent with production via hard hammer percussion that is away from the core edge (non-marginal or infra-marginal blades). The result is the production of sometimes quite long but flat (not curved) blades. Cores were extensively prepared for blade removal. Discarded blade cores have a distinct morphology with purposefully prepared platforms; all of which support the conclusion that blade production at Kathu Pan 1 was both purposeful and systematic (Wilkins and Chazan 2012; Wilkins 2013).

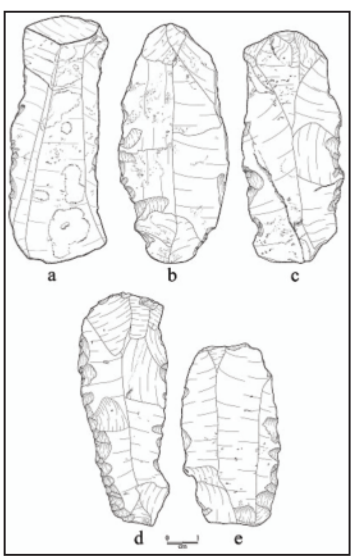

Figure 6. Illustration of representative blades from the Dalmanutha Site, Eastern Cape Province, RSA. Note prominent lateral edge retouch on all five blades and distal end retouch on blade (d). (Illustration by Lance K. Trask)

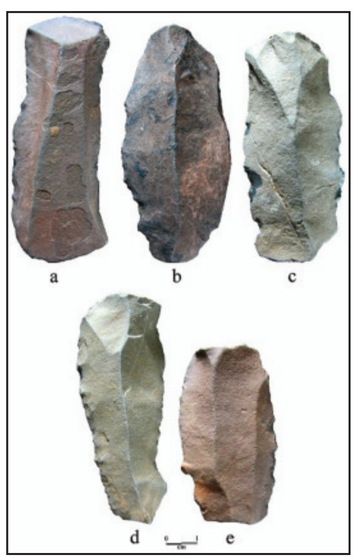

Figure 7. Photo of the five blades from the Dalmanutha Site illustrated in Figure 6. (Photo by Lance K. Trask)

Table 4. Large Blade Data – Interior B1 Blades* Dalmanutha Site, Eastern Cape Province, RSA

Blade Number	1	2	3	4	5	6	7	8	9	10	Large Blade Mean
Maximum Length	80.2	71.5	74.9	59.9	48.2	83.5	75.8	74.8	66	56.7	70.5
Maximum Width	28	30	28	23.2	26.5	29	32.1	34	27.1	29	29.5
Max. Thickness	10.5	14.1	10	9.2	11.8	10.8	11.1	9.1	7.8	10.3	10.5
Platform Angle (°)	110°	104°	110°	108°	104°	123°	104°	114°	104°	108°	108°
Platform Width	16.9	13.8	15.8	14.9	16.5	17.8	15.3	15.5	13.7	15.5	14
Platform Depth	9	13	10	8.2	11.8	10.8	10.8	9.1	7.8	10.3	9.8
Index of Curvature	3.5	4	1.3	3.7	1.7	1.1	2.1	3.3	1.8	1.4	3.6
Ratio Length:Width	2.86	2.35	2.68	2.58	1.82	2.88	2.36	2.2	2.43	1.96	2.39
L + W + T	118.7	115.6	112.9	92.3	86.5	123.3	117	117.9	100.9	96	110.4
Ratio L/L + W + T	0.68	0.62	0.66	0.65	0.56	0.68	0.65	0.63	0.65	0.59	0.64
Ratio W/L + W + T	0.24	0.26	0.25	0.25	0.31	0.24	0.27	0.29	0.27	0.3	0.27
Ratio T/L + W + T	0.09	0.12	0.09	0.1	0.14	0.09	0.09	0.08	0.08	0.11	0.1
Basal Facets	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A
Approximate % Cortex	None	None	None	None	None	None	None	None	None	None	N/A
Blade Material	Hornfels	Hornfels	Hornfels	Hornfels	Chert	Hornfels	Hornfels	Hornfels	Hornfels	Hornfels	N/A

* All measurements are in mm and on complete blades only.

Table 4 (Cont.). Large Blade Data – Interior B1 Blades* Dalmanutha Site, Eastern Cape Province, RSA

Blade Number	11	12	13	14	15	16	17	18	Large Blade Mean
Maximum Length	105	72.5	79.3	82	55	54	60	70	70.5
Maximum Width	45	25	29.9	37	28	22.5	22.5	34	29.5
Max. Thickness	13.5	8.9	8	12.3	10.5	8	8.4	14.1	10.5
Platform Angle (°)	106°	106°	109°	110°	105°	104°	108°	102°	108°
Platform Width	15	11.5	9.5	15	11.5	7	9	13	14
Platform Depth	10	8.5	8.5	10	9.3	8	7	13.5	9.8
Index of Curvature	5.1	4.4	6.1	7.3	4	5.2	4	4.8	3.6
Ratio Length:Width	2.33	2.9	2.65	2.22	1.96	2.4	2.67	2.06	2.39
L + W + T	163.5	106.4	117.2	131.3	93.5	84.5	90.9	118.1	110.4
Ratio L/L + W + T	0.64	0.68	0.68	0.62	0.59	0.64	0.66	0.59	0.64
Ratio W/L + W + T	0.23	0.23	0.26	0.28	0.3	0.27	0.25	0.29	0.27
Ratio T/L + W + T	0.08	0.08	0.07	0.09	0.11	0.09	0.09	0.12	0.1
Basal Facets	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A
Approximate % Cortex	None	None	None	None	None	None	None	None	N/A
Blade Material	Hornfels	Hornfels	Hornfels	Hornfels	Hornfels	Hornfels	Hornfels	Chert	N/A

* All measurements in mm; only includes data from complete blades

At Dalmanutha, a total of 28 blades were recovered, 18 of which were complete. These blades have been measured using the comparative system developed by Collins (1999) and Collins and Lohse (2004) (Table 4). The majority of the blades (82 percent) are constructed from a black to gray-colored hornfels (7.5YR 2.5/1 Black to 7.5YR 3/1 Very Dark Gray to 7.5YR 4/1 Dark Gray), are triangular in cross-section, and typically show unifacial lateral or even distal end retouch (Figures 6 and 7). The remaining five blades are constructed from a yellow-brown chert (7.5YR 6/8). It should be noted that all of the blades described herein are very heavily patinated, polished both by time in the sun and wind-blown sand. In fact, geologically they would be characterized as "ventifacts". This desert polish helps to identify fresh fractures from various taphonomic processes versus those from original manufacture as new breaks are easily spotted. All of the retouch seen in the blades described herein is ancient and the product of purposeful manufacture.

As can be seen in Table 4, length of the 18 measured blades from the Dalmanutha site varies from 48.2 mm (Blade 5) to 105.0 mm (Blade 11), with an average of 70.5 mm; almost precisely the same as the average of 70 mm reported by Wilkins from Kathu Pan 1 (Wilkins and Chazan 2012). Blade widths vary from 22.5 mm (Blades 16-17) to 45.0 mm (Blade 11), with an average of 29.5 mm. Average length-to-width ratio for the 18 blades is thus 2.39:1, within 4% of that reported for the blade assemblage from Kathu Pan 1.

Platform widths are very large (8.0-17.8 mm) and deep (7.0-13.0 mm). Both plain and faceted platforms are present. The presence of basal facets reinforces the idea that the blades were constructed as infra-marginal blades ("interior" blades as described by Wilkins and Chazan (2012)). The "facets", basically multiple flake scars on the dorsal surface of the blade along the platform, are used to adjust the angle of the blade platform. This is a common technique seen in the Levallois technology (Geneste et al. 1990; Van Peer 1992; Delganes 1995; Williams 2014). Index of curvature on all the blades is extremely low, averaging just 3.6. This is indicative of the simple nature of the blades which are basically straight with little to no curvature between the proximal and distal ends.

The four blades recovered from the Rosslands Farm site are identical in general shape and construction as those observed at Dalmanutha. All four were constructed from hornfels and had extensive lateral edge retouch. However, all of the blades were broken so that no complete blade measurements could be taken. Similarly, the eight blades recovered from the Sunny Slopes site were also broken during manufacture and thus complete measurements could not be taken. Six of these blades were made from hornfels while two were constructed from yellow-brown chert.

Several types of cores are present at the Dalmanutha site including circular (or "tortoise") and

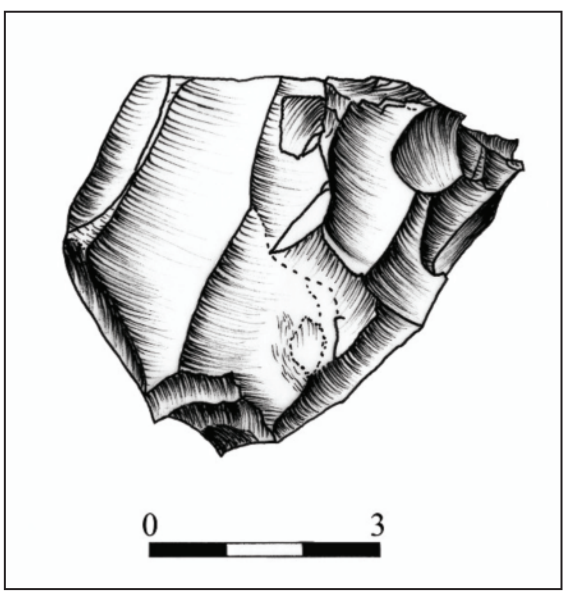

Figure 8. Illustration of a discarded Levallois-like core from the Dalmanutha Site, Eastern Cape Province, RSA. Note the prominent blade scars on the dorsal surface. (Illustration by Dr. Claudia Penati)

Figure 9. Photo of the discarded Levallois-like core from the Dalmanutha Site depicted in Figure 8.

triangular flake cores. The circular cores in particular are Levallois-like bifacial blade cores with domed upper surfaces, steep lateral edges, and bidirectional flake scars. Several blades were removed from two opposing platforms before the core was ultimately discarded (Figures 8 and 9). At Dalmanutha, nine cores were recovered including six blade cores made from gray-black hornfels and three of yellow-brown chert (10YR 6/8); the latter appear to have been used to make flake tools and not blades. No cores were recovered at Rosslands Farm.

At the quarry site on the Sunny Slopes Farm, a large number of cores (n=17) were found. All were either bifacial blade cores or triangular flake cores – the latter constructed to produce triangular Levallois-like points. The majority (71%) were made from hornfels with the remainder from yellow-brown chert. Cores made from hornfels were used to produce prismatic blades and Levallois-like points; cores made from chert produced flakes which in turn were modified into cutting and/or scraping tools.

At the Dalmanutha site, 16 wider blades have been significantly retouched into stone points characteristic of the Levallois technology (Bordes 1968; Boeda 1995; Wilkins and Chazan 2012; Wilkins et al. 2015). Eight of these points are complete while the other eight suffered significant damage either to upper third or to the base of the point. All eight of the complete points had also undergone basal modification. A complete Levallois-like point was also found at the Rosslands Farm site but differed from those at Dalmanutha in the lack of basal modification. The two points found at the Sunny Slopes site were broken during manufacture and discarded and thus show no edge or basal modification. All of the Levallois style points from the three sites were constructed from gray-black hornfels. An illustration and photograph of three complete Levallois-like points from the Dalmanutha site is shown in Figures 10 and 11.

Physical measurements of the eight complete points from Dalmanutha and the one point from Rosslands are listed in Table 5. Average length of the points is 69.3 mm, very similar to that for the blades as they are both constructed from the same general Levallois-like blade technology. All of the points have been unifacially retouched, exclusively on the dorsal surface and heavily focused on the distal end (tip) of the points (see Figure 10, a and b). As can be seen in Figures 10 and 11, all of the Levallois-like points from the Dalmanutha site show some evidence of modification near their bases. Wilkins et al. (2012) found that about 13 percent of the Levallois points recovered from Kathu Pan 1 had some form of basal modification. This modification usually consisted of the removal of 2-7 flakes which was interpreted as possible evidence of modifying the point for hafting to a spear (Wilkins et al. 2012; Wilkins et al. 2014; Wilkins et al. 2015; Wilkins and Schoville 2016). The exact same type of basal modification can be seen in eight of the complete points recovered from Dalmanutha (see Figures 10 and 11). The single Levallois-like point recovered from Rosslands Farm lacked any basal modification and in fact, had extensive lateral retouch all along both edges such that the base of the tool (proximal end) was the widest point of the artifact. Wilkins et al. (2014; Wilkins and Schoville 2016) found that some Levallois points at Kathu Pan 1 had more extensive retouch and damage concentrated along the lateral edges, especially near the mid-point. These tools were assumed to have been cutting

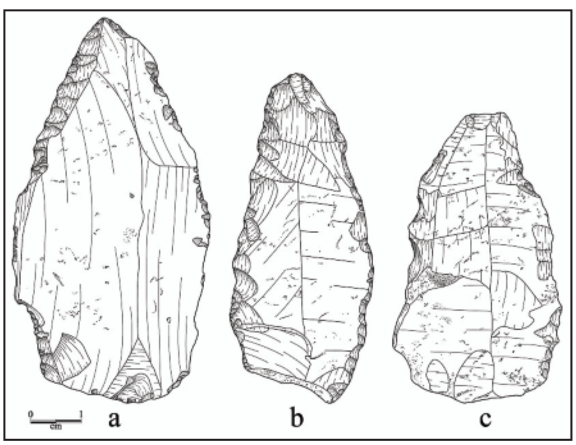

Figure 10. Illustration of three typical Levallois-like points from the Dalmanutha Site, Eastern Cape Province, RSA. Note the retouch on the dorsal surface of all three points, especially near the tip as well as flakes removed near the base. (Illustration by Lance K. Trask)

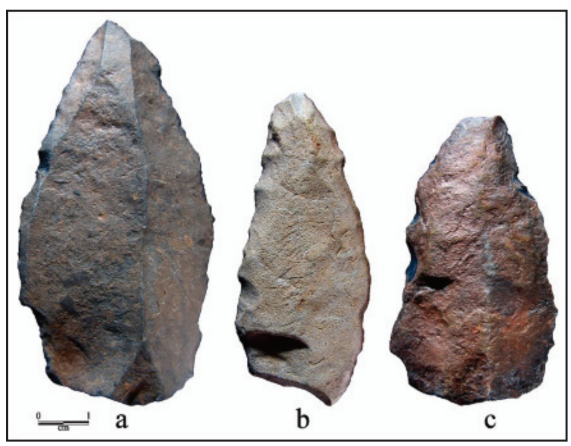

Figure 11. Photo of the three Levallois-like points from the Dalmanutha Site depicted in Figure 10.

Table 5. Levallois Point Data, Dalmanutha and Rosslands Farm Sites, Eastern Cape Province, RSA*

Point Number	1	2	3	4	5	Point Mean
Location	Dalmanutha	Dalmanutha	Dalmanutha	Dalmanutha	Dalmanutha	N/A
Maximum Length	74.3	66	55.8	66	84.3	68.3
Maximum Width	38	27.1	31.5	36.5	40	34.9
Max. Thickness	10.8	8.2	10.2	11.2	9.9	10.6
Ratio Length:Width	1.96	2.43	1.77	1.81	2.11	1.96
Dorsal Face Retouch	Yes	Yes	Yes	Yes	Yes	N/A
Basal Modification	Yes	Yes	Yes	Yes	Yes	N/A
Impact Damage	No	No	Yes	Yes	Yes	N/A
Blade Material	Hornfels	Hornfels	Hornfels	Hornfels	Hornfels	N/A

Point Number	6	7	8	9	Point Mean
Location	Dalmanutha	Dalmanutha	Dalmanutha	Rosslands	N/A
Maximum Length	48.7	71.5	64.5	83.2	68.3
Maximum Width	35.9	37.5	28.7	39.2	34.9
Max. Thickness	10	10.8	12.4	12.1	10.6
Ratio Length:Width	1.25	1.91	2.25	2.12	1.96
Dorsal Face Retouch	Yes	Yes	Yes	Yes	N/A
Basal Modification	Yes	Yes	Yes	No	N/A
Impact Damage	Yes	Yes	Yes	No	N/A
Blade Material	Hornfels	Hornfels	Hornfels	Hornfels	N/A

* All measurements in mm; only includes data from complete points

tools (possibly knives) and thus differed from Levallois points modified for hafted spear use. The two triangular points found at the Sunny Slopes Farm site were both broken during manufacture and thus had no retouch or other modification.

Some but not all MSA and Middle Paleolithic points are known to have been hafted to spears. The most direct evidence of the use of this technology comes from a *Pelorovis* (extinct wild cattle) vertebra at Klasies River Mouth in South Africa (Milo 1998) and from an equid vertebrae recovered from Umm el Tlel in Syria (Boeda et al. 1999). In South Africa, spear technology dates to at least the Middle Pleistocene (MSA) at Kathu Pan 1 where a total of 149 stone Levallois points were recovered (Wilkins and Chazan 2012). Kathu Pan points exhibit a number of characteristics that suggest their use as spear points (and not just as cutting tools) including edge damage that is concentrated at the tip of the point, modification of the bases to facilitate hafting, and microfractures that are consistent with use as a spear tip (Wilkins et al. 2012; Wilkins et al. 2015; Wilkins and Schoville 2016). Wilkins and her colleagues have conducted a wide range of experiments including the manufacture of Levallois stone points, hafting them to wooden spear shafts made from local acacia wood, and projecting them into both animal carcasses (Springboks) as well as ballistic gelatin blocks (Wilkins et al. 2014; Wilkins and Schoville 2016). The results of these experiments have shown that damage occurs to the tips of hafted points nearly five times as often as to the lateral edges. Moreover, while untipped wooden spears will pierce the vital organs (lungs, etc.) of an animal just as effectively as stone-tipped spears, the wound channels are significantly larger for stone-tipped spears (Wilkins et al. 2014). This is due to the fact that when the stone point reaches about 80 percent of its track length the wound channel widens significantly due to tearing of the tissue cause by the edges of the stone point (Wilkins et al. 2014). Larger wound channels create a faster bleed-out of the animal and a more prominent blood trail for the hunter to follow; both significant technological advantages over sharpened wooden spears. In addition, high velocity spears serve to increase the distance between the hunter and his prey animal which significantly reduces the potential risk of injury to the hunter.

The heavy patination present on the Dalmanutha and Rosslands Farm artifacts makes them problematical for use-wear study. However, of the Levallois-like projectile points from the Dalmanutha site , at least six have apparent impact fractures to the point tip which are consistent with their use as spear tips (see Figures 10 and 11, point (c)).

Other artifacts recovered from the Dalmanutha site include a broken piece of a small hand axe. The hand axe is constructed from the same yellow-brown colored chert (7.5YR 5/8 Strong Brown on outer cortex varying to 7.5YR6/6-6/8 Reddish-Yellow and 7.5YR 6/8 Yellow-Brown across the flaked artifacts) as some of the blades and three of the cores described above (see Table 1). The hand axe has been constructed from a large flake as opposed to a single cobble. This fact, coupled with its relative small size (74.0 x 54.1 x 17.0 mm) help distinguish it as a "small hand axe" diagnostic of the Fauresmith Industry and not a much larger Acheulean hand axe (Underhill 2011; Herries 2011; Wilkins and Chazan 2012). The tool appears to have been broken toward the proximal end and subsequently re-sharpened to extend its effective use life (Figure 12). While hornfels, quartz and quartzite can be found all across the area surrounding the Dalmanutha site, chert is absent outside of the immediate area of the pan where the MSA occupation is located. Chert has been reported from some lenses within the Burgersdorp Formation (Johnson 1976; Neveling et al. 2005) but the writer could not find a single outcrop of chert on the Dalmanutha property. This material must have been imported into the site and as such, was highly prized for its quality as a toolstone. This observation is further supported by the fact that almost every flake of chert found at the site had been retouched into some useful expedient tool (scraper, worked flake, graver, etc.). Chert cobbles are a common component at the Sunny Slopes quarry site, 4.4 km to the southeast. It is highly likely given the close proximity of both sites that this area is the source for the yellow-brown chert artifacts recovered from the Dalmanutha site.

Figure 12. Small hand axe (LCT) from the Dalmanutha Site constructed from chert.

Figure 13. Large broken bifacial cutting tool from the Dalmanutha Site.

A second type of cutting tool was recovered from the Dalmanutha site which appears to have been made from a large flake but has been bifacially flaked into a cutting tool (Figure 13). The biface has had more retouch on the dorsal surface, typical of many Fauresmith Industry lithics, but has also had minor retouch on the ventral surface; enough so that the artifact is clearly ovoid-shaped in cross-section. The biface is constructed from dark-gray to black hornfels and has been broken across the mid-point (see Figure 13). Wilkins et al. (2014) noted than many Fauresmith cutting tools made from blades at Kathu Pan 1 suffered the heaviest damage to the edges near the mid-point. The Dalmanutha biface is 60.9 mm in length, 48.9 mm in width and 17.1 mm in thickness but was undoubtedly considerably longer when originally constructed. No bifacial tools were found at the Rosslands or Sunny Slopes Farm sites.

Other cutting and scraping tools from Dalmanutha include nine scrapers and eleven worked flakes. The majority of the scrapers are concavo-convex side-scrapers with extensive side trimming along the arch. One of these (Figure 14) is a classic tortoise-shaped ('turtle-back") scraper made from hornfels. Dimensions of the scraper are 61.7 mm x 55.5 mm x 19.3 mm. The artifact appears to have possibly once been a blade core which was re-used a number of times, probably resulting in a much smaller sized tool as compared to its original form. The last flakes on one edge created a very steep bit-edge which would have made it ideal as a scraping tool for hides (see Figure 14). Of the nine scrapers recovered from Dalmanutha, five were made from hornfels and four from what appears to be relict cores of the same yellow-brown chert used to make all the other chert artifacts found at the site. Two similar concavo-convex side scrapers made from hornfels were recovered from the Rosslands Farm site.

Two broken blades found at the Sunny Slopes quarry site had been extensively retouched on the distal end to create a steep-edged end scraper (Figure 15). The tools show little to no use wear under high power microscopic examination (60-80x) so it is unknown why they were left at the quarry site.

A total of 14 worked flakes were recovered from both sites, 11 from Dalmanutha and three from Rosslands Farm. As can be seen in Tables 1 and 2, these have arbitrarily been classified as either "large" or "small" with a length of 50 mm set as the dividing line between classifications. With a few exceptions, most of these tools are constructed from hornfels, are unifacially retouched, and probably used as expedient cutting tools. One of the larger of these worked flakes (85.5 x 44.9 x 11.9 mm) is shown in Figure 16 below. While the flake has had some retouch on both the left and right lateral edges, the most extensive preparation has been on the right lateral edge where a series of steep flakes have been removed to create a scraping like tool.

One triangular-shaped flake which appears to have been removed from the top of a Levallois-like core made from hornfels, has had two very intentionally created graver points made on the distal end (Figure 17). While it is very difficult to ascertain true

Figure 14. Circular tortoise-shaped scraper from the Dalmanutha Site.

Figure 15. End scraper created at the distal end of a broken blade from the Sunny Slopes Farm site.

Figure 16. Large worked flake made from hornfels from the Dalmanutha Site.

use-wear from such a heavily patinated tool, examination of the graver tips under a binocular microscope at 20-60x revealed some circular smoothing which could be the result of the tool's use as a perforator - borer - graver. No graver tips were found on any of the flakes present at the Rosslands Farm or Sunny Slopes sites.

A single flake recovered from the Dalmanutha site had been worked on one lateral edge to create a concave notch (Figure 18). Examination under a high power microscope at 60-100x shows some smoothing from use wear, potentially from having been used to shape a wooden spear shaft.

Lastly, three representative hammerstones were recovered, two from Dalmanutha and one from Rosslands Farm. All three are of a white to gray-colored quartzite, circular to oval in shape, and display a considerable amount of battering on the cobble's exterior cortex in at least one area. On both hammerstones from the Dalmanutha site, one final blow split the cobble through an internal fracture which resulted in their final discard. The origin of the quartzite, like the hornfels, appears to be local at both sites. Quartzite cobbles can be found across the Dalmanutha Farm and in the small stream that runs adjacent to the Rosslands Farm site.

As noted above, all three sites occur in unconsolidated sands above a harder pediment surface which introduces the possibility that the sites have been deflated over time thus resulting in a mixing of occupational material. Since no large hand axes made from cobbles were found at any of the sites it is believed there was never an older Acheulean (Early Stone Age) occupation. Middle Stone Age assemblages younger than the Fauresmith contain essentially the same material but the smaller hand axes disappear (see Figure 12) (Herries 2011; Underhill 2011; Wilkins 2013). The material recovered from the Dalmanutha, Rosslands and sunny Slopes Farm sites is consistent with lithic assemblages from Kathu Pan 1 and other Fauresmith sites. Thus while it appears that the three sites represent a single Fauresmith occupation, the possibility that some later Middle Stone Age material is present cannot be completely dismissed.

Conclusions and Discussion

Both the Dalmanutha, Rosslands, and Sunny Slopes Farm sites appear to represent Fauresmith Industry occupations of the MSA as originally described by Goodwin and Van Riet Lowe (1929) and Van Riet Lowe (1933) and more recently redefined by Beaumont and Vogel (2006), Herries (2011), Underhill (2011) and Wilkins and Chazan (2012). All the components of the culture including purposefully prepared cores, blades, Levallois-like retouched points, concavo-convex side scrapers, worked flakes, gravers, hammerstones, etc. are present at Dalma-

Figure 17. Worked flake made from hornfels with two graver points from the Dalmanutha Site.

Figure 18. Hornfels flake with prominent concave notch from the Dalmanutha Site.

nutha. A much smaller assemblage is present at Rosslands Farm but the tools recovered from the site (blades, point, scrapers, worked flakes) are identical both in lithic composition and production technique to that found at Dalmanutha. Material from the Sunny Slopes site is likewise consistent with the Fauresmith Industry albeit consists of expended cores and failed blades. As such, the site appears to represent a quarry location and may indeed be related to the occupation at Dalmanutha, 4.4 km to the northwest.

All three sites mark the first reported occurrence of the Fauresmith Industry from the Eastern Cape Province of South Africa and thus extends the known extent of its range. The discovery is not completely unexpected as the original type location for the Fauresmith Industry lies just 160 km to the north in the southwestern part of the Free State. In fact, the discovery described herein is likely attributable to the author's access to substantial privately-owned acreage across the Eastern Cape Province, something not generally available to most archeologists.

The Pleistocene Period (ca. 2.58-0.01 Ma) was the scene of dramatic climatic events across the face of the earth. It was also the period that saw the most rapid evolution among hominins leading ultimately to the development of modern humans, *Homo sapiens*. In a macro sense, geologists now divide the key evolutionary components of the Pleistocene into four sub-periods: (1) the Gelasian Stage from ca. 2.58-1.81 Ma, (2) the Calabrian Stage from ca. 1.81-0.781 Ma, (3) the Ionian Stage, from 781 ka to the beginning of the Marine Stage 5 Interglacial Period at 126 ka (beginning of the Upper Pleistocene), and (4) the Upper Pleistocene or Tarantian Stage from ca. 126 ka to the beginning of the Holocene (Ogg 2009). Dramatic climatic changes are now seen to be the catalyst for these global temporal changes. Plio-Pleistocene cooling at high latitudes occurred in a series of steps beginning with the onset of glaciation in cycles of roughly every 41 ka beginning after ca. 2.8 Ma (Cronin 2009). A further shift toward cooler conditions and higher amplitude 41 ka glacial cycles occurred after ca. 1.5-1.6 Ma, and a pronounced shift toward still higher amplitude 100 ka glacial cycles occurring after ca. 1.2-0.8 Ma (Cronin 2009). In Africa, faunal and paleoclimatic records suggest that the period between 1.2-0.8 Ma was a shift toward increasingly variable, drier conditions (savannah grasslands) that was accompanied by changes in some faunal assemblages and perhaps, speciation (deMenocal 2004). The Ionian Stage is also a period where we see a transition from the Early to the Middle Stone Age and the end of the long standing Acheulean Industry in Africa (Klein et al. 2007; Herries 2011). In Southern Africa this change has typically been defined as the changeover from a Large Cutting Tool (Acheulean Hand Axe) culture to one where smaller hand axes are made from flakes coupled with the use of projectile points and blades from prepared core technology; specifically the Levallois style method (Van Peer 1992; McBrearty 2003). The Ionian Stage is also a period when a broad group of potential modern ancestors, generally attributed to "Archaic Homo" (*Homo heidelbergensis*, *Homo rhodesiensis*) evolved to become the first modern humans (Clark 1970; Sampson 1994; Ritemire 2001; Van Peer et al. 2003; Barham and Mitchell 2008; Millard 2008).

Approximately 500-600 ka the Fauresmith Industry appears in Southern Africa which signals the beginning of a marked change in lithic technology. Blades were systematically manufactured from specifically prepared cores. Blade platforms were purposefully prepared prior to detachment by hard hammer percussion using rudimentary Levallois style technology. Some blades were then unifacially retouched into points. When cores are systematically prepared and maintained for blade production, and the same strategies reoccur for numerous core reductions at numerous sites across an entire region such as Southern Africa, these strategies could represent a learned technological behavior that was shared across generations (Wilkins and Chazan 2012).

The presence of well-developed blade tools and prepared core technology in a lithic industry such as the Fauresmith, now firmly dated as between 450-600 ka (Porat et al. 2010; Wilkins and Chazan 2012), is of considerable interest in terms of the development of modern humans. In East Africa (Kenya), blade tools co-occur with Acheulean bifaces, Levallois flake production and points in the Kaphthurin Formation, dated to between 509-545 ka (Johnson and McBrearty 2010). The Fauresmith assemblage in South Africa is bracketed by two dated discoveries; the Elandsfontein skull (Western Cape) which is associated with Acheulean artifacts and attributed to *Homo heidelbergensis* or Archaic Homo and dated by faunal association to ca. 320-790 ka (Ritemire 2001; Klein et al. 2007; Millard 2008), and the Florisbad skull (Free State) which is associated with MSA artifacts and generally attributed to Archaic Homo and has been directly dated by ESR at 259 +/- 35 (Grun et al. 1996). Thus the presence of a core and blade technology in the Fauresmith Industry clearly predates the advent of modern *Homo sapiens* (ca. 200-300 ka).

Evidence of diversity in lithic technology in the earliest parts of the Middle Pleistocene supports a scenario in which hominin groups in Southern Africa were inventing new technologies to suit their own resource exploitation requirements. Core and blade technology has sometimes been attributed as evidence for conserving raw material (Humphreys 1970; Boeda 1995). Clearly, however, this is not the case at most Fauresmith sites in South Africa as toolstone resource is not a limiting issue. Where the Fauresmith Industry has been found at the same location as Acheulean tools, the raw material usage patterns are also nearly identical (Wilkins and Chazan 2012). Thus the capacity to invent core-blade technology may be related to other changes in the Early Middle Pleistocene (~780-350 ka). Clark (1970) believed the Fauresmith Industry might represent a technological response to adapting to new open grasslands. As noted above, the beginnings of the Ionian Stage of the Pleistocene resulted in substantial and frequent climatic fluctuations which may have increased selective pressures on human behavior. These technological and behavior shifts roughly correlate with the appearance of Archaic Homo (*Homo heidelbergensis / Homo rhodesiensis*) in Southern Africa and the corresponding increase in cranial capacity over *Homo erectus*.

One of the best lithic expressions of the new core-blade-point toolkit and the evolution of new hominin species in Southern Africa is the potential use of Levallois-like points as hafted spear tips. Humans are unique amongst all primates for relying on a skill-intensive strategy to acquire food resources (Wilkins et al. 2012; Wilkins et al. 2014). Changes in hunting technology provide insight into the development of human social interactions and cooperation (Marlowe 2005; Hill et al. 2009). Part of what makes us "human" is the ability to do multiple tasks and conduct goal-oriented behavior. This has been termed as the development of "working memory" (Hill et al. 2009). Hafting stone points to wooden spears could be direct evidence for the development of working memory as it requires the collection and preparation of a number of resources including wood, toolstone and hafting materials. By 500-780 ka hominins were regularly killing large game animals based on evidence of repeated processing of carcasses of Fallow Deer at Gesher Benot Ya'aqov in Israel (Rabinovich et al. 2008) and a number of butchered animals at Boxgrove (Amey's Eartham Pit) in the U. K. (Roberts and Parfitt 1999). The intentional modification of the bases of some Fauresmith Industry Levallois-like points coupled with observed impact fracture damage to point tips strongly suggests that these points were being hafted to wooden spears and used for hunting. If dramatic climatic change was producing new, open grasslands, the development of a stone-tipped spear technology would have provided a major technological advantage. As such, the Fauresmith Industry, including the three newly described sites from the Eastern Cape Province described herein, may provide evidence for new cognitive thinking in Southern African hominins.

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