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SOP 1024 Site in Selima Oasis: The Lithic Material Analysis

Introduction

The large surface site SOP 1024 is situated about 6 km northwest of Selima Oasis (northern Sudanese part of the Eastern Sahara) in a flat depression which is surrounded by small outcrops (Fig. 1). The site was discovered in 2011 during the first field season of the Selima Oasis Project (SOP) and then excavated by Friederike Jesse, Jan Kuper (both University of Cologne) and the late Amged Bashir (inspector of NCAM) in November 2013 during the second field season of SOP.[1]

The archaeological material found on the site spreads over an area of about 1000 x 300 m, and comprises lithic artefacts, mainly made of quartzite,

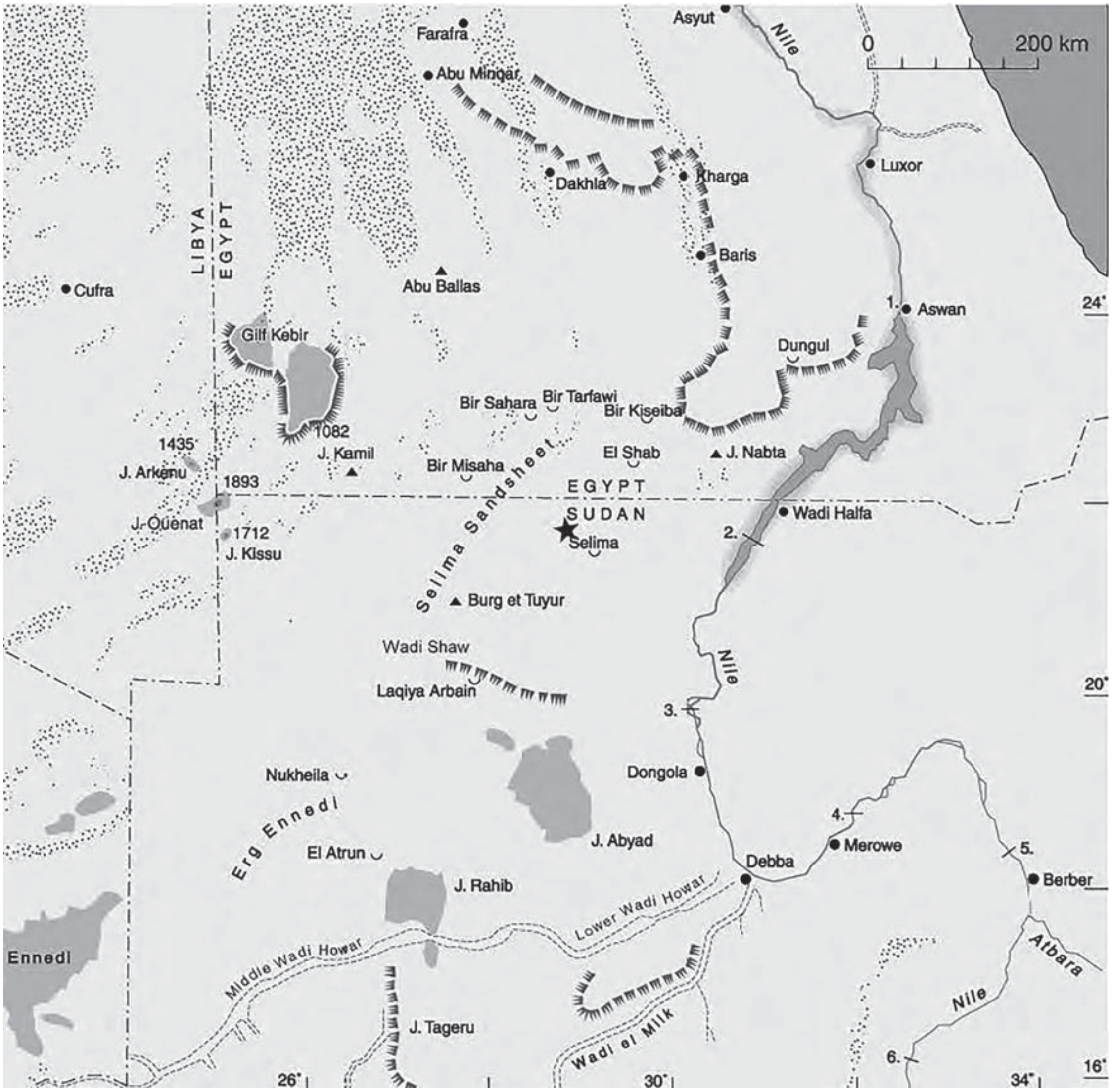

Fig. 1: The location of site SOP 1024 (black star) close to Selima oasis, (after Jesse et al. in press).

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1 Jesse et al. 2015.

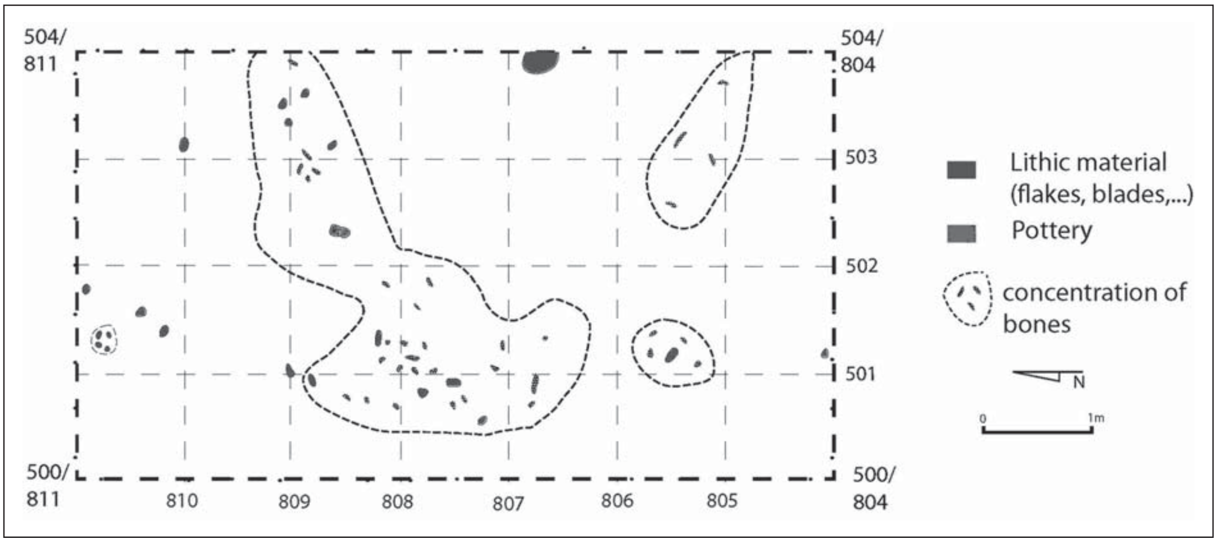


Fig.2: The excavation area, trench SOP 1024-1, after the removal of the first layer of windblown sand (graphic implementation: Nader El-Hassanin).

a few potsherds of Early Khartoum type as well as fragments of bone and ostrich eggshell. Lithic materials represent the most frequent artefact class. Different denser concentrations of artefacts are visible as are numerous small mounds of gravel and / or stone which probably represent tumuli.[2] Around an area with a concentration of stone artefacts and some bones on the surface a trench (SOP 1024-1) extending 7 x 4 m was excavated (Fig. 2).

Besides numerous stone artefacts and two potsherds, more than 5000 bone fragments with a total weight of about 2kg were found during excavation. Only wild animals are present, especially gazelles and antelopes, which certainly have been hunted. It was possible to identify *Gazella dorcas, Nanger dama, Addax nasomaculatus, Alecelaphus buselaphus, Oryx dammah, and seldom hare (Lepus capensis*), few eggshell fragments (ostrich and other birds), the mandible of an unidentified hedgehog and the land snail Zootecus insularis. Some of the bones show traces of burning. The faunal remains indicate an (semi-)arid landscape (contracted desert vegetation or semi-desert).[3]

Two radiocarbon dates place the site at about 6010 calBC and 6150 calBC.[4] The radiocarbon dates were processed on bone samples in the Poznań Radiocarbon Laboratory. These dates confirm the attribution of site SOP 1024 to the Middle Holocene, already suggested by the archaeological material.

In the current paper, special focus is laid on the examination of the lithic artefacts of SOP 1024 site, especially on flaked ones and their technological aspects.[5] The main analytical task of this study is to gain key data on lithic procurement, modification, and use, in order to arrange this information according to the concept of the "chaîne opératoire"[6] (operational sequence) as the paper's main conclusion.

Lithic analysis

The lithic artefacts comprise altogether 2776 pieces of stone artefacts with a total weight of about 15 kg. Most of them were found in the excavation trench SOP 1024-1 (2752 pieces with a total weight of 14.5 kg). 24 stone artefacts were collected on the surface of the site, outside the excavated area. Grinding material is present, 22 pieces mostly made of sandstone (seldom quartzite) were found in the excavation, among them one complete lower grinder. These were not considered for further analysis. The total amount of flaked lithic tools studied is therefore 2754 pieces. Concentrations of stone artefacts have been observed during excavation, these are the areas where the two sub-surface strata of 5 cm thickness each were excavated (Fig. 2).[7]

2 Jesse et al. 2015: 167; Jesse et al. in press.
3 Jesse et al. in press
4 Jesse et al. 2015:168. Poz-63698: 7125±35 bp and Poz-64363: 7280±40 bp.

5 The description of the lithic material is based on the Master thesis „SOP 1024 Site in Selima Oasis. Techno-Typological Study of Lithic Materials" presented by Nader El-Hassanin at Cairo University in 2016. The Master thesis was supervised by Aboualhassan Bakry (Cairo University) and Friederike Jesse (University of Cologne).
6 For the concept and its applications, see Sellet 1993.
7 Jesse et al. in press

Methods of analysis

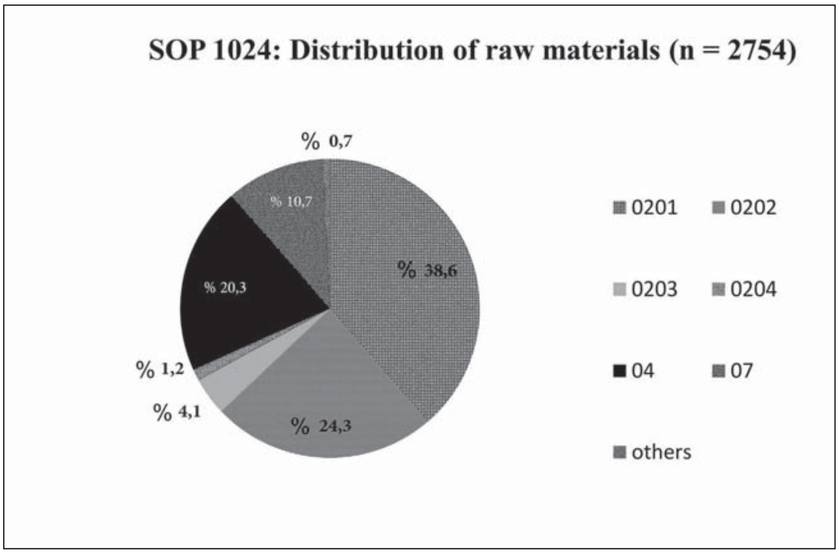


Fig. 3: Pie chart showing the percentages of major raw material types in the flaked lithics collected from site SOP 1024. Raw material codes: 0201 to 0204 - different varieties of quartzite; 04 - quartz; 07 - chalcedony; others - include Egyptian Flint (01), silicified (or fossil) wood (08), clay shale (10) and sandstone (16)

The typological approach will be used for the examination of the flaked lithic material; blank products, cores and tools. Morphologically and morphometrically the artefacts will be classified into types. The attributes within types will be done following measurements of blank size, striking platform and other qualitative observations. The process of lithic analysis proceeded through several steps: Firstly, the analysis of the debitage or blanks by classification into blades, flakes, and fragments according to the different raw material groups recognized, and taking metrical values of the complete blanks and their striking platforms (butt). Secondly, the analysis of the cores according to the standard type list in CLOSE (1977). Thirdly, the analysis of the tools which cover those pieces modified by distinct (formal) retouchment, but exclude use wear. Stone tools were classified by the standard list established by TIXIER (1963). Fourthly, the information gained in the former steps was integrated into a model of the "chaîne opératoire" (operational sequence).

Raw material: The raw materials of the flaked lithics recovered in the inventory of SOP 1024-1 comprise 7 different types or varieties thereof. Raw materials used for stone artefact production were seldom flint, mainly quartzite in different varieties, quartz, chalcedony, silicified (or fossil) wood, clay shale and sandstone (Fig. 3).

The raw material classification of the lithic material follows the system established within Cologne University's ACACIA project. It is described by a numerical code consisting of a first number which represents the major rocks (raw material type), such as quartzite (02), chalcedony (07) etc., and a second number which may express varieties, for instance, 'dark quartzite' (0202). For SOP 1024 site, a subdivision was needed for the quartzite, since it was the most frequently used raw material for lithic production at an archaeological site located in sandstone and siltstone formation

The colours of the quartzites found at SOP 1024 are characteristic for the Nubian Sandstone[8] with its dominating tones from yellowish to brown and reddish (0201). But also the dark quartzites (0202) are frequently to be found in the Nubian formations as ferruginous sandstone or quartzite. Quartzites dominate the lithic material of SOP 1024 with 68.2% clearly showing that this material can be regarded as local or sub-local in origin. Quartz (04; 20.3%) and chalcedony (07; 10.7%) rank second and third in the percentages on site SOP 1024 (Fig. 3). There is significant variation in colour and size of the chalcedony artefacts found on site SOP 1024. This may point to different sources. Although these sources are not known, they can be regarded as local to sub-local judging from the various remains on the site. All other raw materials are marginal in numbers accounting for not more than 2% in total. They comprise fossil wood and sandstone which likely originate in the local formations, but also Egyptian flint whose next sources are about 300 km to north-northeast.

Debitage: The lithic industry of site SOP 1024 is a flake based one. In the following analysis we will primarily concentrate on the quartzite (02), and here its main varieties 0201 and 0202, and the chalcedony (07), because they occur frequently and thus provide a good basis for statistical analysis.

In the analysis of the debitage only the complete blanks 'larger than 15 mm' from the excavation area SOP 1024-1 will be considered: 759 pieces. Complete flakes and blades have discernable dorsal and ventral surfaces, as well as a bulb of percussion and the striking platform (butt) present. For terminology and

8 See Said (ed.) 1990; Tawadros 2012.

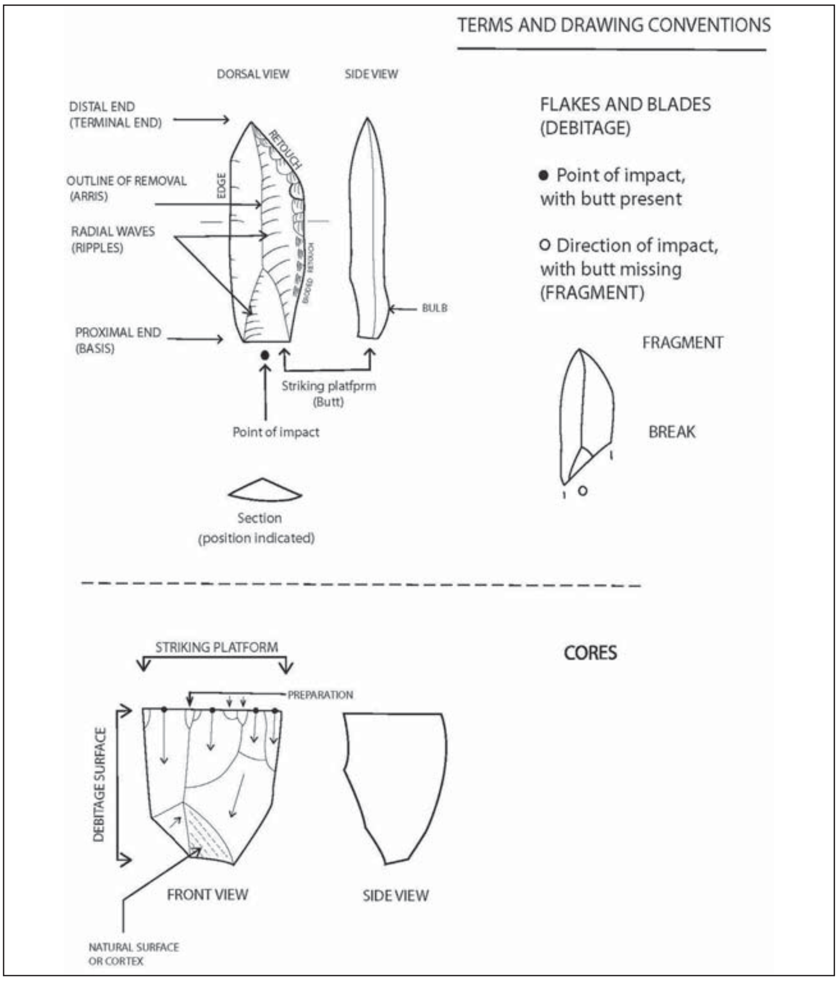
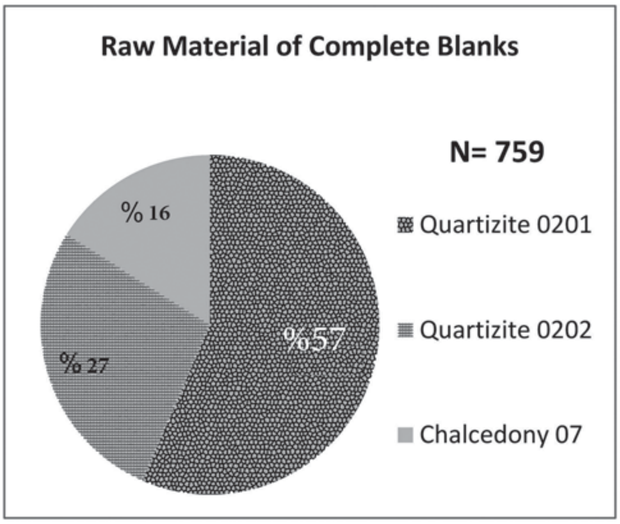


Fig. 4: Terms and conventions used in the analysis of flaked lithics and in line drawing lithic artefacts (created by Nader El-Hassanin).

conventions used in technical graphic representations (see Fig. 4).[9]

Quartzites (0201; 0202) and chalcedony (07), dominate among the debitage. 0201 comprises 429 pieces, followed by 0202 with 208 pieces, while 07 yielded 122 pieces (see Fig. 5).

Most of the blanks are represented by 657 pieces of complete flakes, while the complete blades make up 106 pieces (see Fig. 6). Although, flakes dominate in all raw materials over blades, there are slight differences between the materials, with blades slightly more frequent in dark quartzite (0202) than in other raw materials. Furthermore, excavations revealed that there is a clear concentration of blanks in a specific area (in excavation squares 501/808 and 501/809; see Fig. 2) indicating that it was likely a knapping area for manufacturing stone artefacts. Such suggestion is also supported by the concentration of cores and some bone fragments in the same area.



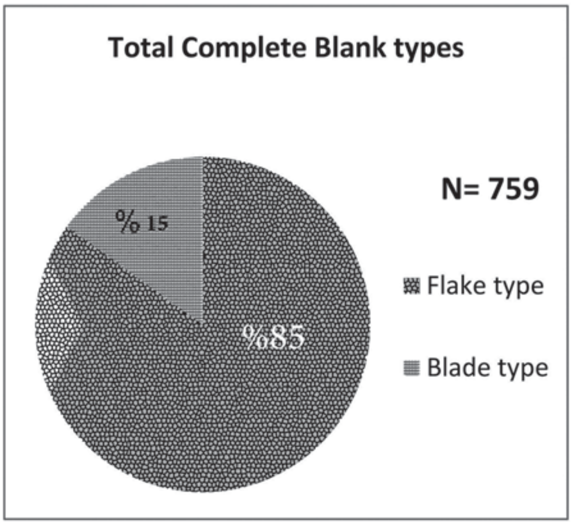


Fig. 5 (left) and Fig. 6 (right): SOP 1024, Blank types and raw material. The total number of blanks (> 15 mm) that derived from the primary production (debitage) comprises 759 pieces of the three chosen raw material categories (left). Flakes dominate in all raw materials over blades (right).

9 see Riemer 2011.

A metrical analysis of the 759 complete blanks was carried out to gain information about the size of blank products, and which size was probably wanted for the tool production (Fig. 7).

The scattergram of the 759 complete pieces shows the size distribution by length and width. It indicates that flakes (length to width ration < 2 :1) dominate the blank production over blades (length to width ratio > 2 :1). It is also of importance to note that among the flakes there are only very few flakes which are wider than long (length to width ration < 1 :1.)

About 90 % of the blanks center in a size range of up to 50 mm length and 40 mm width. This is also expressed in the average values and standard deviations given in the tables 1 and 2.

The length of blanks, arranged on the x-axis by size classes, by the different raw materials (Fig. 8) indicates that chalcedony blanks occur only in the classes up to 50 mm lengths, with a dominance under 30 mm, while quartzites range to 90 mm (0202) and 150 mm (0201) in lengths. The highest numbers in quartzites are also to be found in the classes under 50 mm.

The size range of chalcedony is likely to be explained by the smallness of raw material pieces which did not allow to produce larger blanks. In quartzites, the raw material pieces may have occurred in larger blocks, and as such are likely to represent local or sub-local raw materials. The presence of smaller quartzite blanks indicates that the quartzites have been flaked on the site.

The blank production of SOP 1024 site is flake-oriented, as shown above. A qualitative inspection of the blades indicates that they tend to show a rather irregular shape. Since a regular blade production is commonly thought to represent a more elaborate soft-hammer production (if indirect or pressure-flaking is not indicated), while irregular and flake-dominated assemblages mainly represent hard-hammer technique, it was of interest here to find a marker in the SOP 1024 blank production that would indicate the type of technique applied by the knapper.

Here, the approach by SCHÖN (1996) who has shown a relation between the relative platform size (butt) and the striking technique has been fol-

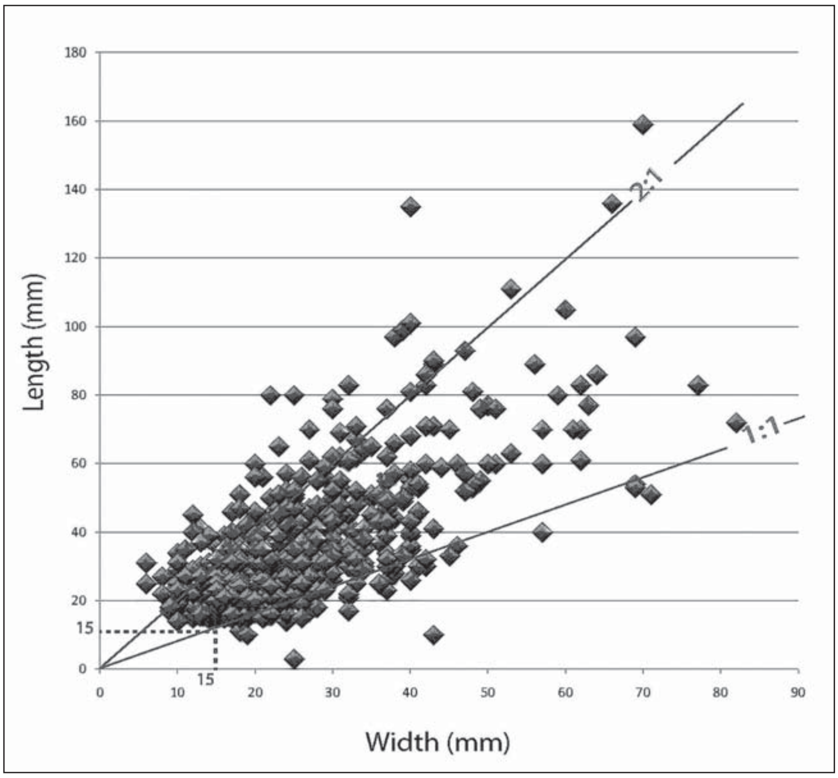


Fig. 7: SOP 1024, Scattergram of length/width ratio of 759 complete blanks. Blades (>2:1), flakes, and wide flakes (< 1:1) are indicated by sectors.

Complete unretouched debitage type	N	Mean		StDev		Max	
		L	W	L	W	L	W
Flake	653	31.2	23.6	16.4	11.5	159	82
Blade	106	43.1	20.9	21.4	9.7	135	56

Tab. 1: SOP 1024, Size of blanks >15 mm according to blank type, N= 759.

Flake/Blade	N	Mean		StDev		Max	
		L	W	L	W	L	W
0201	429	35.9	25.3	19.6	12.03	159	82
0202	208	33.03	23.2	15.9	11.2	135	69
07	122	24.01	18.3	7.2	5.7	47	38

Tab. 2: SOP 1024, Size of blanks >15 mm according to raw material, N= 759.

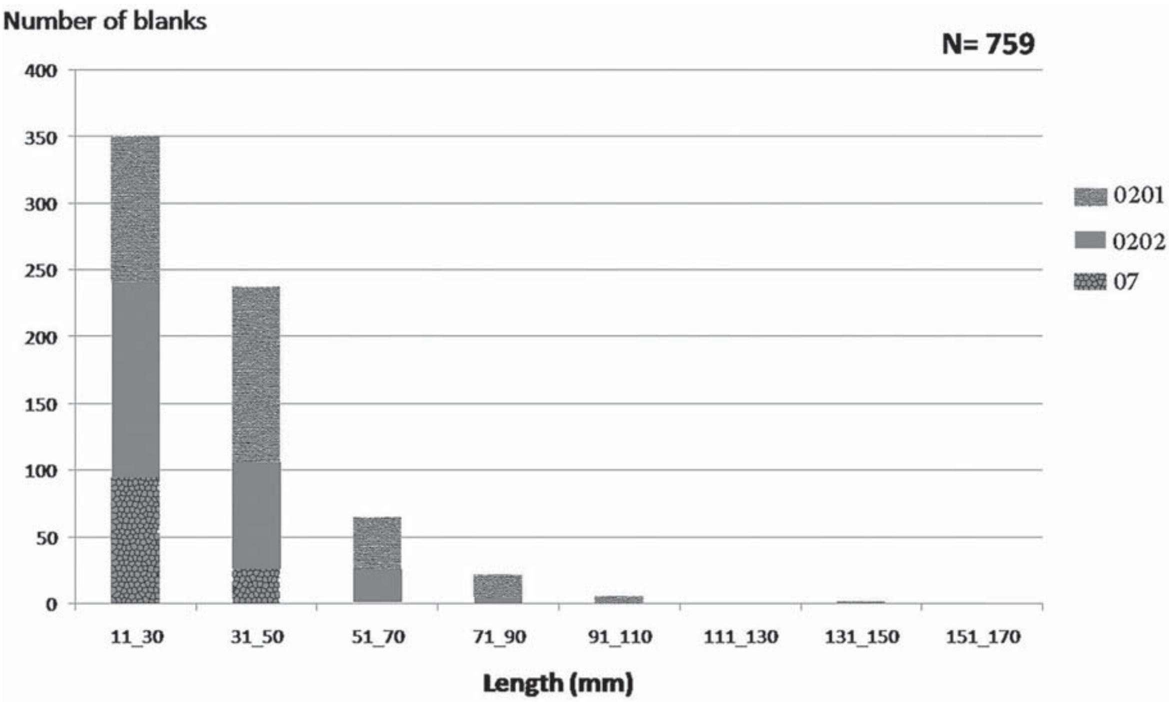


Fig. 8: SOP 1024, The frequency of complete blanks by length classes and raw material.

lowed.[10] The relative size is of importance, since the total size of the platform is defined primarily by the size of the blank. Therefore, the size of the striking platform (SP) is given relative to the size of a section through the blank. The complete formula to arrive at a relative site index (termed QS index by SCHÖN 1996: 64–71) multiplies the blank width with the blank thickness, and devides this result by the result from the multiplication of SP length with SP width.[11]

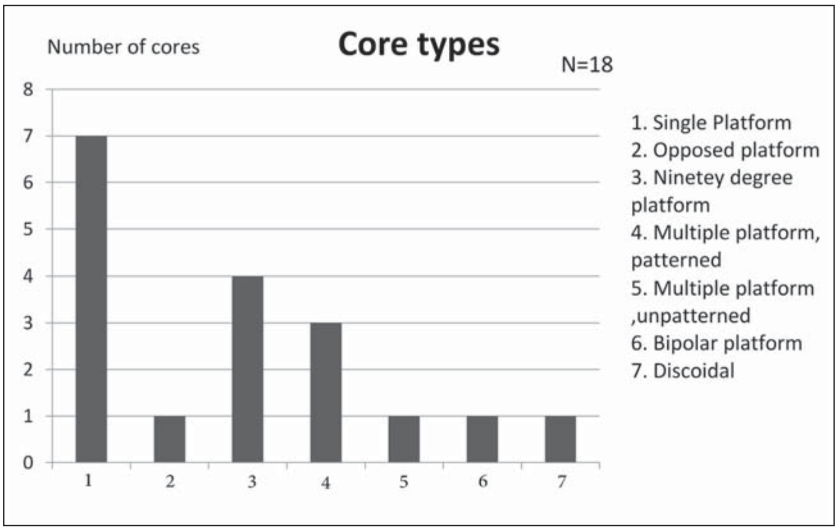


Fig. 9: Graph showing cores by type (after Close 1977: 54-56 and Marks 1968: 394-397) on the X-Axis and their frequencies in excavation trench SOP 1024-1.

$$\text{QS index} = \frac{\text{Width of blanks X Thickness of Blanks}}{\text{Length of SP X Width of SP}}$$

In a nutshell: The QS index is a statistical method on blanks to receive information on the prevailing striking technique in an assemblage.

According to SCHÖN (1996: 67), direct soft-hammer techniques are indicated by QS indices between 4.2 and 4.6, while direct hard hammer techniques are evidenced between 1.75 and 2.9.

Using the established mean values (cf. Schön 1996: 65; for the values see Tables 3 and 4), the QS indices of SOP 1024 have been calculated separately on the blades and flakes in order to be able to show evidence of a potential application of both techniques. The measures and the resulting QS indices are given in tables 3 and 4. They clearly indicate that blades and flakes show no significant difference (the more so as the blades indicate a slightly lower value (2.5) than the flakes (2.8). Both indices centre well in the range of indices associated with direct hard hammer technique.

10 The approach was developed by SCHÖN (1996) for the Wadi el-Akhdar (Gilf Kebir) lithic materials.
11 cf. Riemer 2011: 112.

		Mean	StDev	Max
Flakes	Width	23.6	11.5	82
	Thickness	8.1	7.2	144
Striking Platform	Length	12.3	7.9	53
	Width	5.5	3.9	32

Tab. 3: SOP 1024, Measures on striking platform and blank section to calculate the QS index for the flakes. For the calculation the mean values have been taken. QS index of the flakes = 2.8

		Mean	StDev	Max
Blades	Width	21	9.7	56
	Thickness	8.2	5.01	29
Striking Platform	Length	11.8	6.9	41
	Width	5.5	3.9	26

Tab. 4: SOP 1024, Measures on striking platform and blank section to calculate the QS index for the blades. For the calculation the mean values have been taken. QS index of the blades = 2.5

number and relative position of the platforms.

The graph on the frequency of core types from SOP 1024-1 illustrates that the single-platform type (no. 1) dominates, followed by the the ninety-degree type (no. 3), and the patterned multiple-platform type (no. 4) (Fig. 9; for examples see Fig. 11).

The examination of the core types by raw material shows that cores made of quartzites and chalcedony are most frequent (Fig. 10). This is fully in line with the dominating raw materials in the blank production, indicating that these materials were flaked on site. This is supported by the size of cores examined by raw materials. They show that quartzite cores (0201; 0202) are largest (ranging up to 71 mm) and chalcedony cores (07) are smallest (up to 40 mm), corresponding to the prevailing blank sizes. While the most frequent core types are well represented in quartzites and chalcedony, there are two bipolar cores that occur only in chalcedony and quartz. The latter materials show indications that the raw material pieces used as

Cores: A total of 18 cores were identified from different levels of the excavation at the site. Most of them, 13 pieces, were collected from the surface, while only 5 pieces came from the sub-surface levels. The cores have been classified into types which follow the definition by CLOSE (1977) mainly by the

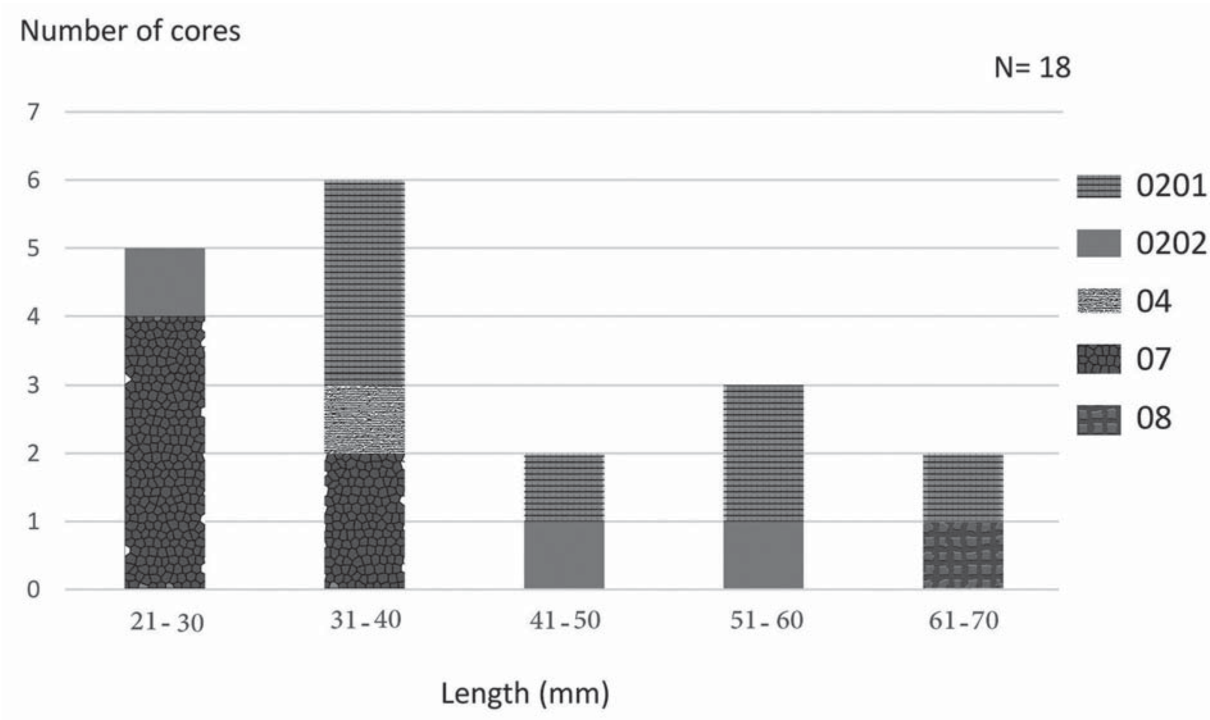


Fig. 10: Grap shows core length classes (X-axis) by raw material frequency.

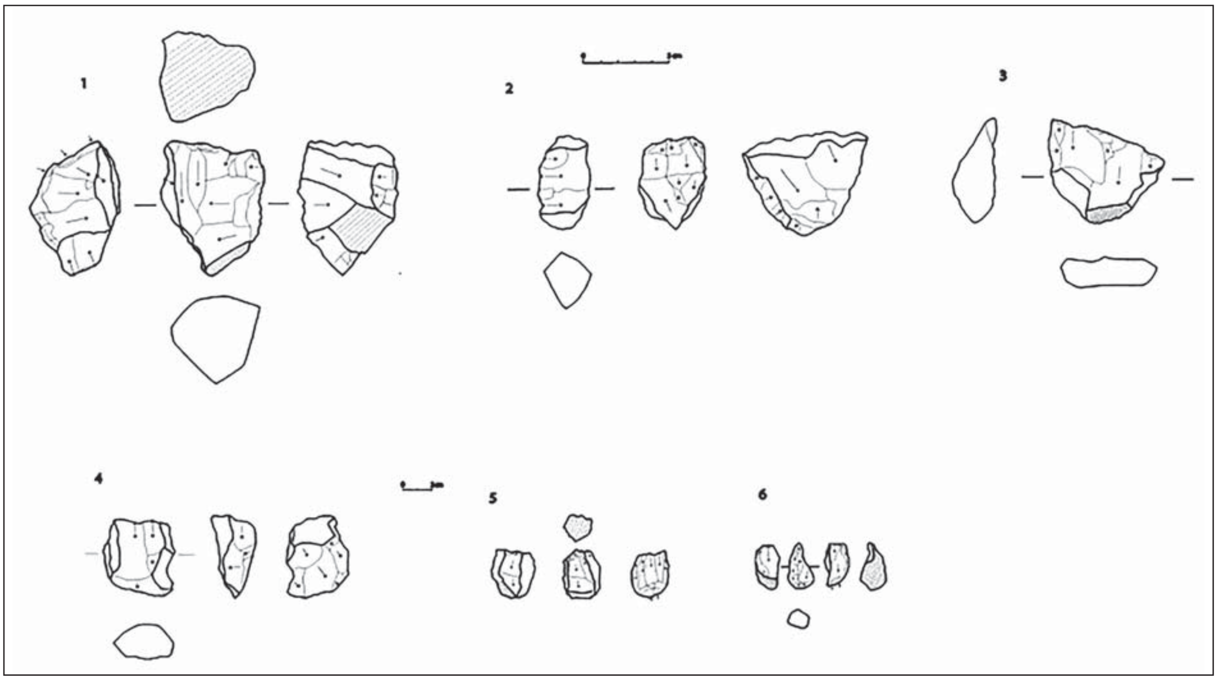


Fig. 11: SOP 1024, Examples of the different core types: 1, 3 - Multiple platform core; 2 - Ninety degree core; 4-5 - Single platform core; 6 - Bipolar core. Raw material: 1-4: quartzite; 5-6: chalcedony. Scale 2 :3 (Drawings: Nader El-Hassanin).

cores are small, and some occur as pebbles or small cobbles for which bipolar splitting is a common technique.

According to proposed analyses and some qualitative observations of the cores we can conclude that: large cores (> 40 mm length) are made exclusively

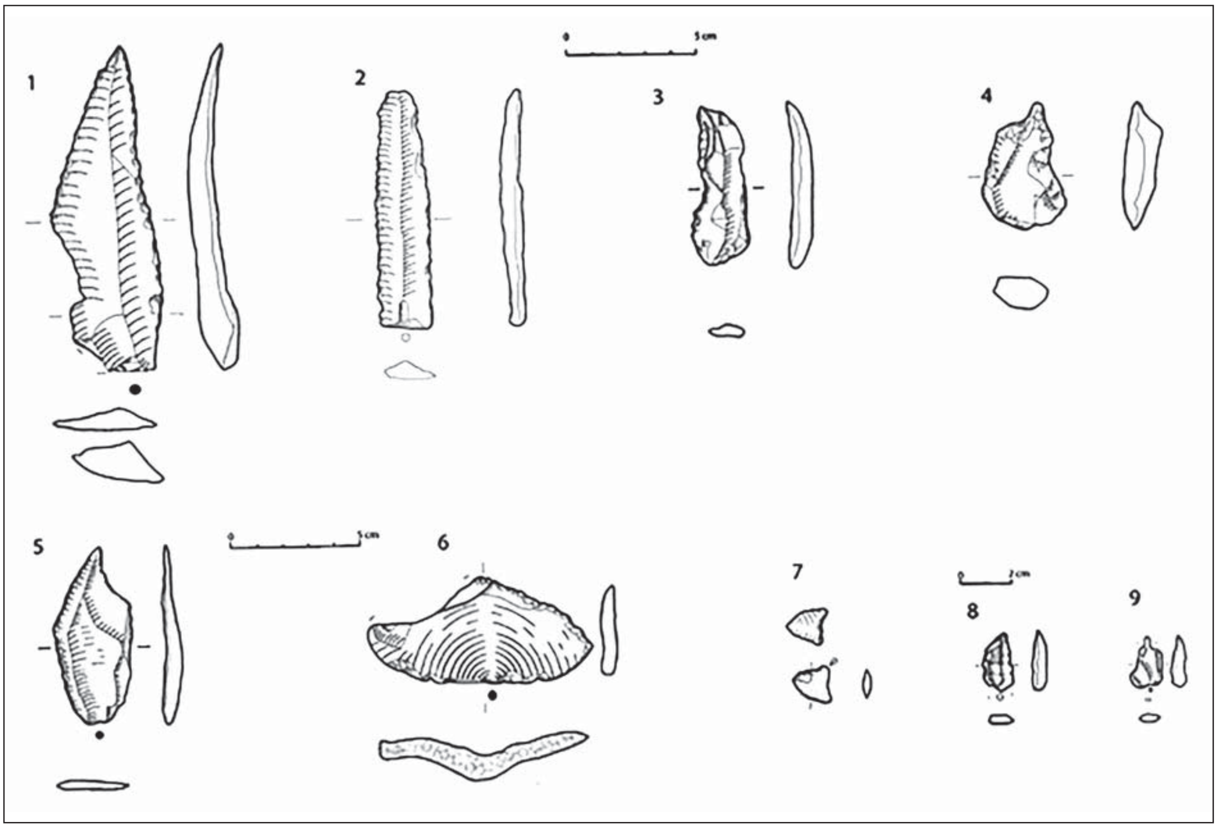


Fig. 12: SOP 1024, Examples of tools: 1 – 2: edge retouched blades (Tixier 105); 3: notched blade (Tixier76); 4-5: single piercer (Tixier 12); 6: Side-blow flake; 7: equilateral triangle (Tixier 89); 8: segment of semi-circle (Tixier 82); 9: shouldered bladelet (Tixier 64). Raw material: 1-2: quartzite; 3-5, 7-9: chalcedony; 6: Egyptian flint. Scale 2:3 (Drawings: Nader El-Hassanin).

Tixier type		Blank type		Raw Material					SUM
		Flake	Blade	01	0201	0202	07	16	
Perforators	12	1		-	-	-	-	1	**1**
	13	-	1	-	-	-	1	-	**1**
	16	-	3	-	1	1	1	-	**3**
Burins	17	2	-	-	1	-	-	1	**2**
Backed pieces	42	-	1	-	-	-	1	-	**1**
	64	-	1	-	-	-	1	-	**1**
Notches	74	1	-	-	-	-	-	1	**1**
	76	-	2	-	-	-	2	-	**2**
	77	-	5	-	2	1	2	-	**5**
Truncations	80	1	-	-	-	-	1	-	**1**
Geometric Microlithic	82		2	-	-	-	2	-	**2**
	89	1	-	-	-	-	1	-	**1**
Continuous edge retouch	105	-	11	-	11	-	-	-	**11**
	Side-blow flake	2	-	2	-	-	-	-	**2**
	Tanged bifacial point	-	(1)*	(1)*	-	-	-	-	**1**
	Bifacial foliate	-	(1)*	(1)*	-	-	-	-	**1**
		8	**28**	**4**	**15**	**2**	**12**	**3**	**36**

Tab. 5: SOP 1024, Frequencies of tool types according to TIXIER's type list. Blank type and raw material are indicated.

of quartzites (0201, 0202) and silicified wood (08), while cores made of quartize (04) and chalcedony (07) are 40 mm and less (Fig. 10). In the smaller cores (< 40 mm) we find all raw materials represented. The small quartzite cores are suggested to be more exhausted varieties of larger blocks and cores. However, even the large cores often represent multiple platform cores showing that they were flaked from even larger blocks. Remains of such large blocks (or cores) did not show up on the site, so that quarry sites are suggested to exist outside the place and in the same distance to the site

Most quartz and chalcedony cores show remains of cortex, which refer to small wadi pebbles or small balls of chalcedony. Yet, the size variability is obviously larger in chalcedony than in quartz; Raw materials in cores should be considered as of local or sub-local origin; most quartzite cores represent single to multiple platform cores or intermediate stages of a developed core reduction. Chalcedony cores are more varied. Larger cores show different types of a freehand reduction, while one bipolar core is a small pebble split by bipolar knapping. Bipolarity is also indicated in some quartz flakes and splits of pebbles, however, only one probable quartz core has been identified, representing a 90-degree core.

Main result of the spatial analysis of core scatter in the excavated area of SOP 1024-1 shows a clear distribution pattern of cores. This cluster parallels the main concentration area of all lithic material in the excavation trench which is confined roughly to squares 500/807, 500/808, 500/809 and 501/807, 501/808, 501/809 (see Fig. 2). Yet, the core distribution is much clearer confined on this concentration area than the blank products, and practically no core appears from sub-surface squares elsewhere in the trench. The cluster of cores refers to the interpretation that lithic material has been flaked there, and that this cluster circumscribes the place where the knapper(s) flaked the blanks.

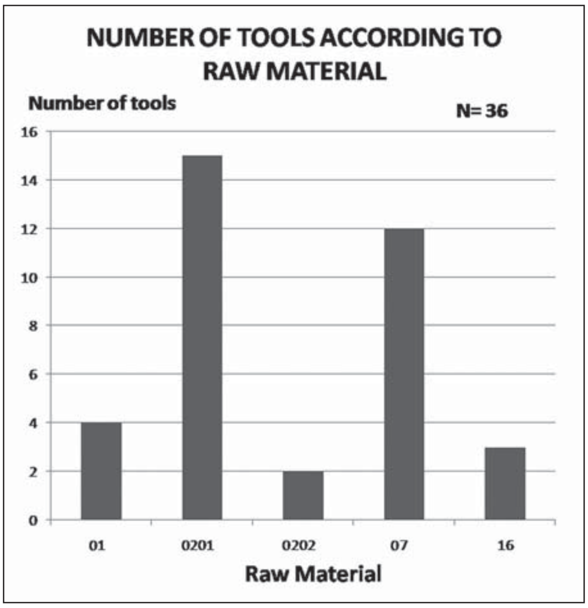


Fig. 13: SOP 1024, The number of flaked stone tools according to raw material.

Tools: A total of 36 retouched tools were found (18 pieces were excavated and 18 collected). The tools have been classified into types following TIXIER's description of flaked stone tools[12] where definitions of the tools can be found. Predominant are pieces with continuous edge retouch (Tixier type 105), followed by notched pieces and perforators (see Table 5 where a complete catalogue of tools from site SOP 1024 is given listed by raw material and blank type; for examples of tools see Fig. 12).

The analysis of the tools by raw material shows that the prevailing materials in blanks and cores are also most frequent in the tools (Fig. 13). This indicates that most tools were produced on site and perhaps in the nearer surrounding of the site where quartzites and chalcedony occur. Nevertheless, there are a number of outliers represented by exotic materials that do not show up in cores and blanks. This is best represented in four tools made of Egyptian flint (01), for which no indication is given that they were flaked on site. The same is valid for a number of tools made of sandstone (16), which has no equivalent in the blanks and cores. It is clear that this material was quarried from sandstone formations, but its exclusive appearance in the tools suggests a non-local character of such outcrops. It is also evident among the local materials that the dark quartzite (0202) has been flaked extensively on site, but that only two tools were out of this material.

The metrical analysis of the flaked tools indicates a great variety in tool size ranging from under 20 mm in a number of microliths to over 140 mm (Fig. 14). Tools under 70 mm lengths dominate, however. Only one third of the tools are larger than 70 mm, mainly represented in edge retouched blades (Tixier type 105).

Considering the blank types, tools are preferably made on blades, especially the larger tools, while flake tools range in size to not more than 60 mm. The exception are two side-blow flakes (see Fig. 12,6) made of Egyptian flint which have a considerable high width (Fig. 15).

There is a clear restriction of chalcedony tools (07) to the size classes 30 to 70 mm. This again matches the smallness of the blank production, including the tools of this raw material. In turn, quartzite tools are to be found in all size classes up to 150 mm, paralleling the quartzite (0201) blank production and some larger cores of this material. Therefore, the production of quartzite and chalcedony tools is clearly evidenced from the size measurements of tools compared to blanks and cores recovered from the excavation.

Conclusion: Chaîne opératoire model for SOP 1024 site's lithic material

At the end a model of the production sequence (chaîne opératoire) is prepared, where two different strategies on the site could be found (Fig. 16):

Strategy 1: there are few exotic materials on the site. It is represented by the Egyptian flints (01) which do not origin from the Nubian Sandstone, but came from the limestone formations in Egypt. The absence of flint cores and blanks indicate that the tools were worked elsewhere and brought to the site as finished products. The types of the flint tools, namely bifacials and side-blow flakes, are likewise an exotic element in the local tool tradition. They are clearly represented by the tool tradition characteristic for the Egyptian Limestone Plateau[13] and its adjacent oases, like Kharga, Dakhla, and Farafra.[14]

Strategy 2: the local or sub-local raw materials are represented in cores, blanks and tools on the site showing that they have been knapped on SOP 1024. This is also given by the scatter pattern of artefacts in the excavated area which shows a concentration cluster, especially defined by cores and blank frequency, which indicate a knapping zone for these materials. Among these local materials we can identify further sub-strategies connected to individual raw material types, strategies 2A to 2D:

12 Tixier 1963, 1974.

13 Kindermann 2010.

14 McDonald 1999; Barich et al. 2014.

• The quartizites are most frequent and represented in all flaked classes, from cores, to blanks and tools (sub-strategies 2A-B). Although the largest cores of the site are made from quartzites, they do not exceed 71 mm in length (according to debitage axis), meaning there are no very large cores (so-called "mega cores") or tested blocks. This does mean that the quartzites were not quarried on or next to the site, and should be regarded as rather sub-local in origin.

• Although chalcedony is likewise well-represented in cores, blanks and tools (sub-strategy 2C), there is a significant difference in the size of the artefacts compared to quartzites. Quartzite cores range from 20 to 71 mm (see Fig. 10), while chalcedony cores are between 20 to 40 mm. The reason for this size pattern can be seen in the different sizes, in which the raw materials occur naturally, with the quartzites occuring in their geological layers in large blocks, and the chalcedony usually in small balls or sub-angular pieces. Unlike most quartzite cores, chalcedony cores were usually not continuously exploited. In turn, many chalcedony cores show cortex and a rather occasional flaking. Moreover, bipolar knapping is evidenced in one tiny split-pebble core (see Fig. 11,6). This technique occurs characteristically on small pebbles to split them for further reduction or the occasional production of blanks. In contrast, quartzite cores often went through several stages of reduction, so that the core size variation is larger in quartzites.

Looking at the blank production, blank size clearly follows the core size. While chal-

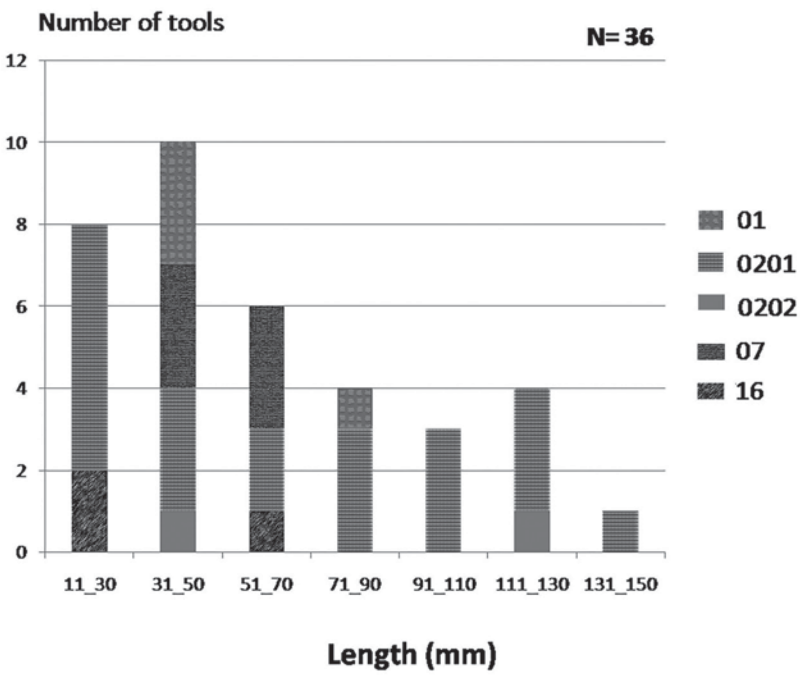


Fig. 14: SOP 1024, Tool length classes by raw material (code 16 represents sandstone).

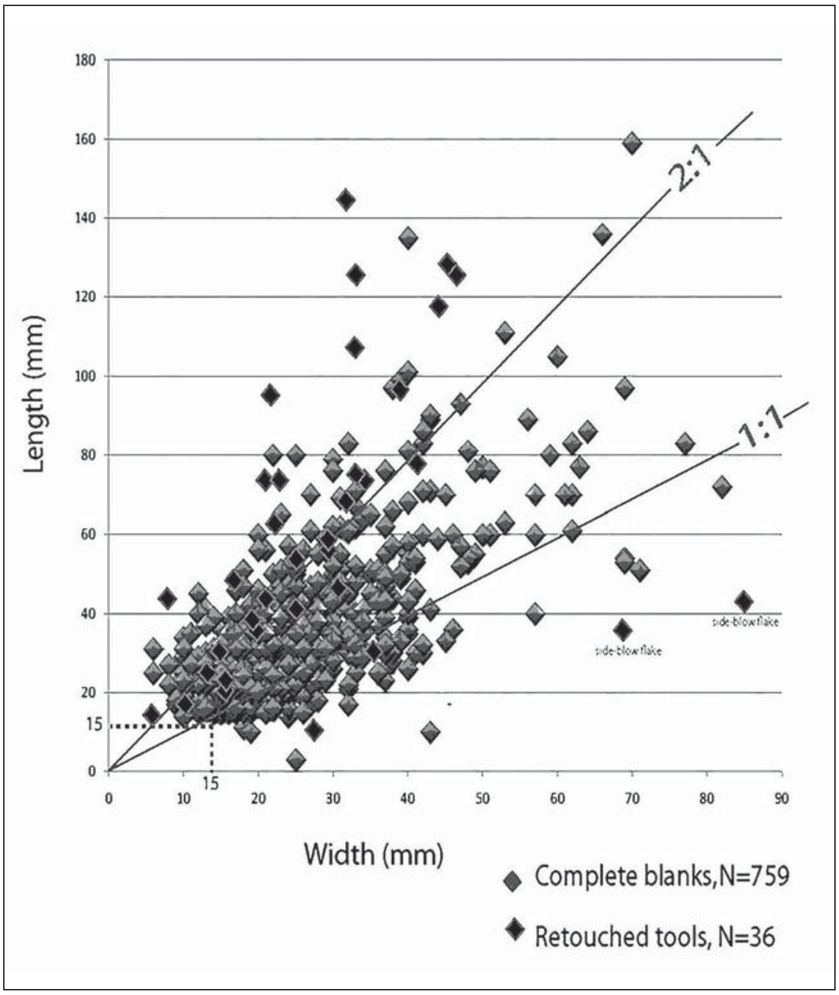


Fig. 15: SOP 1024, Scattergram of length/width ratio of complete blanks compared to retouched tools. Blades (> 2:1), flakes and wide flakes (< 1:1) are indicated by sectors.

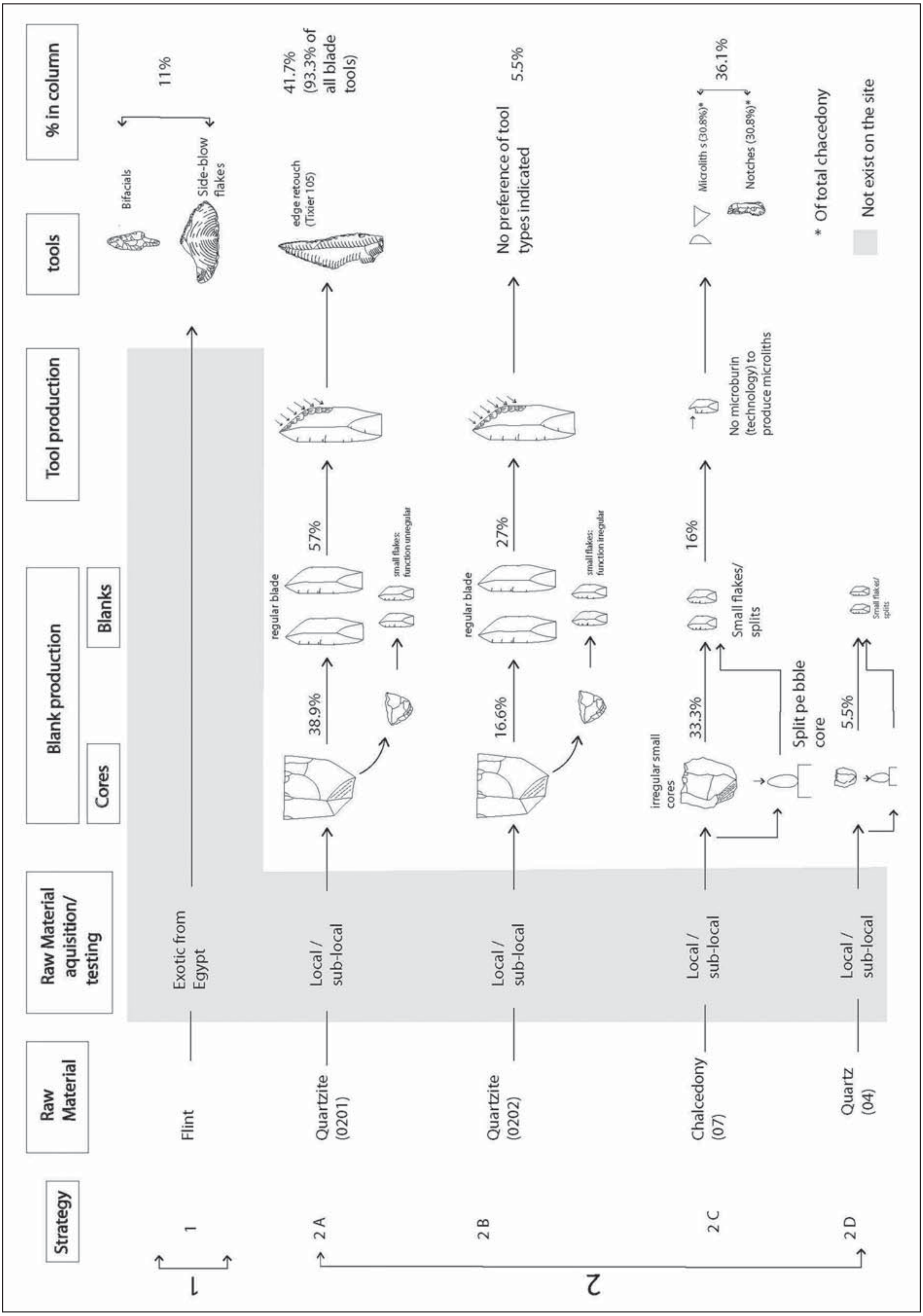


Fig. 16: Model of the "Chaîne opératoire" in the lithic production of site SOP 1024 showing the probable production strategy, with percentages of lithic types resulting from the quantitative analysis of blanks, cores and tools. Uncompleted blanks are not listed. (graphics: Nader El-Hassanin).

cedony blanks are never larger than 50 mm in length, quartzite blanks occur in all size classes up to 160 mm length. The same picture appears from the tools which were certainly produced from the blanks. Yet, there are a number of detailed observations on the tools production to be reported:

• Firstly, tools are preferably made on blades, except some distinct flake tools, such as the side-blow flakes (see Fig. 15), meaning that most of the flakes can be regarded as wast of the production.

• Secondly, there is a clear difference between the quartzite (2A-B) and chalcedony sub-strategies (2C). All microlithic tools, such as the segment and the triangles are made of chalcedony; and there is also a preference of chalcedony for the notches. Nevertheless, the chalcedony artefacts do not include any microburin or other waste products of secondary modification (of microlithic products). This does mean, that the microlithic tools were unusually produced directly from convenient flakes, chunks, or split elements, such as the triangle, but not notched out of blades. This refers to the fact that chalcedony occurs only in small balls or other irregular pieces which apparantely do not allow for a regular blade or bladelet production.

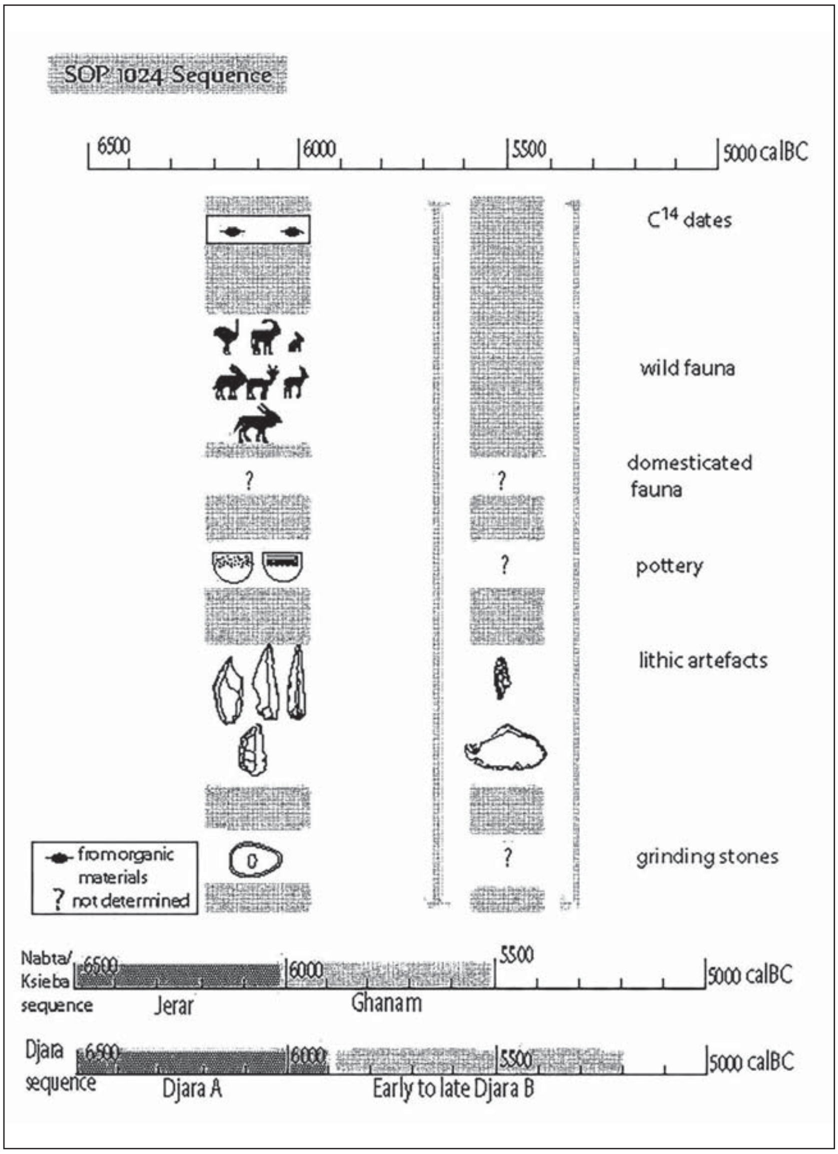


Fig. 17: Site SOP 1024, sequence of occupation phases (graphics: Nader El-Hassanin).

On the other hand, yellow quartzite (0201; sub-strategy 2A) has almost exclusively been used for blade tools, in particular edge retouched, often pointed tools on regular large blades. But it needs mentioning that these blade tools entirely came from the surface of the site out of the excavation trench, while in the excavation no such core and rather few blades were recovered which match the length of these edge-retouched blades. Due to the fact that the blade tools are made of the same raw material variety as the most frequent quartzite from the excavation (0201), it can only be suggested that the tools have been produced elsewhere on the site.

Another mystery is in the black quartzite (0202; sub-strategy 2B) which shows no preference in tool production. Moreover, there are only two pieces retouched from this material, though there is a clear emphasis on blades in the blank production of this material.

It is important to mention the quartz flaking (sub-strategy 2D), as this is the second largest group in artefact frequency. Yet, there is only one distinct core and no tool made of quartz. Qualitative observations may point to the dominance of small pebbles of quartz. The splitting and knapping of the latter by bipolar technique is indicated, which usually produces large amounts of shatter, but few regular or identifiable flakes. Likewise does the high number of quartz pieces refer to its omnipresence on and around the site.

Finally, comparing the lithic material from the excavated area and from the surface collections of the whole site, to its nearer (Al Jerar and Ruat El Ghanam phases at Nabta- Kiseiba region[15]) and wider (Djara B[16]) surroundings we can see evidences of the phases of occupation at the site SOP 1024. According to typological comparison, we can place the site SOP 1024 into two phases of occupation of the Middle Holocene in the Eastern Sahara (see Fig. 17): an early phase which shows striking similarities to Al Jerar phase of Nabta Playa dating to the final end of the 7th millennium BC. The late phase which is identified so far only by the presence of side-blow flakes and few bifacial tools found at the surface represent a younger period of reoccupation which is parallel with Early Djara B dating to the 6th millennium BC.

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15 see e.g. Wendorf & Schild (eds.) 2001.

16 see Kindermann 2010.

Zusammenfassung

Im Rahmen der zweiten Geländekampagne des Selima Oasis Project (SOP) im Herbst 2013 fanden Ausgrabungsarbeiten auf dem ausgedehnten Oberflächenfundplatz SOP 1024 statt. Dieser liegt etwa 6 km nordwestlich der Oase Selima im Nordsudan (Fig. 1). Steinartefakte dominieren deutlich das Fundspektrum, insgesamt wurden 2776 Steinartefakte am Fundplatz geborgen, davon stammen 2752 Stück aus der Grabungsfläche SOP 1024-1. Die Analyse der geschlagenen Steinartefakte und deren technologischen Aspekte stehen also im Mittelpunkt der Ausführungen.

Bei der Analyse ging es vor allem darum, Schlüsseldaten zur Herstellung, zur Modifikation und zur Nutzung der Stücke zu gewinnen, also zu Rohmaterial, Grundformenproduktion und Werkzeugen. Ergebnis der Steinartefaktuntersuchung ist das Modell einer Arbeitsschrittsequenz, der „chaîne opératoire" für den Fundplatz (Fig. 16). Abschließend wurde anhand eines typologischen Vergleichs der Steinartefakte von SOP 1024 mit Inventaren der näheren und weiteren Umgebung versucht, den Fundplatz SOP 1024 in die verschiedenen Besiedlungsphasen des Mittleren Holozän der Ost-Sahara einzubinden (Fig. 17).

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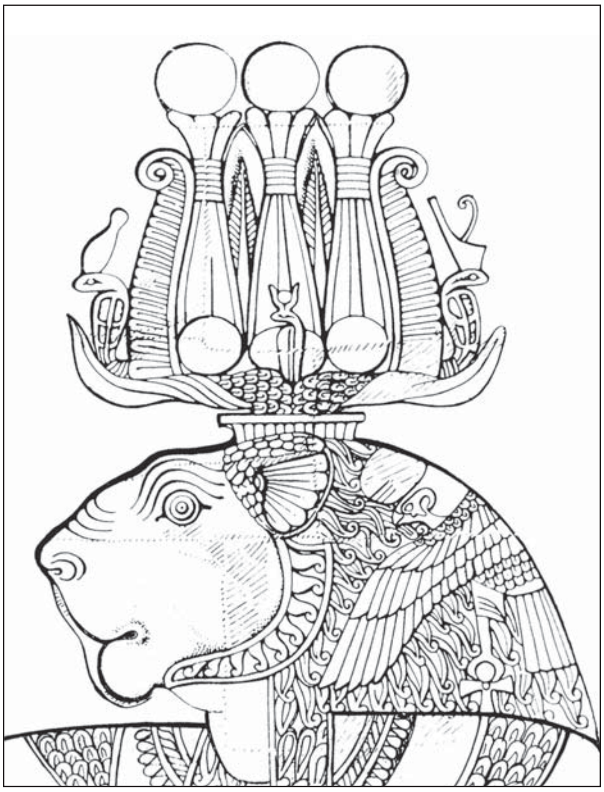

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