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The Fayum Epipalaeolithic in the Light of New Discoveries

Introduction

This article will present some new discoveries regarding the Fayum Epipalaeolithic culture. These new discoveries were made through the survey and surface artefact collection as part of the UCLA/RUG Fayum project. The survey area is located in the northeastern part of the Fayum. It runs between Kom Aushim (the ancient Karanis) in the east and Qasr el-Sagha in the west, and includes the northeastern shore of Lake Qarun in the south and the rocky terrain in the north which marks the northern fringe of the Fayum Depression. The 2003-2006 seasons' fieldwork concentrated on the eastern half of the area (Fig.1). The Fayum has been investigated by several research projects in the last century, and information about the spatial distribution of Epipalaeolithic remains and the lithic technology and subsistence of the Fayum Epipalaeolithic culture has been obtained (Brewer 1989; Caton-Thompson and Gardner 1934; Mussi et al. 1984; Puglisi 1967; Wendorf and Schild 1976; Wenke et al. 1988). The new survey aimed at locating and reinvestigating previously-published Epipalaeolithic sites and recording any other archaeological features that were encountered. Since no new radiocarbon date was obtained through this survey, the attribution of finds to the Epipalaeolithic depends solely on the previous information about the technological features of this culture. The time span of the Fayum Epipalaeolithic is presently understood as around 7530-6090 cal.BC (Table 1), based on the latest calibration of published radiocarbon dates (Hendrickx 1999: 34).

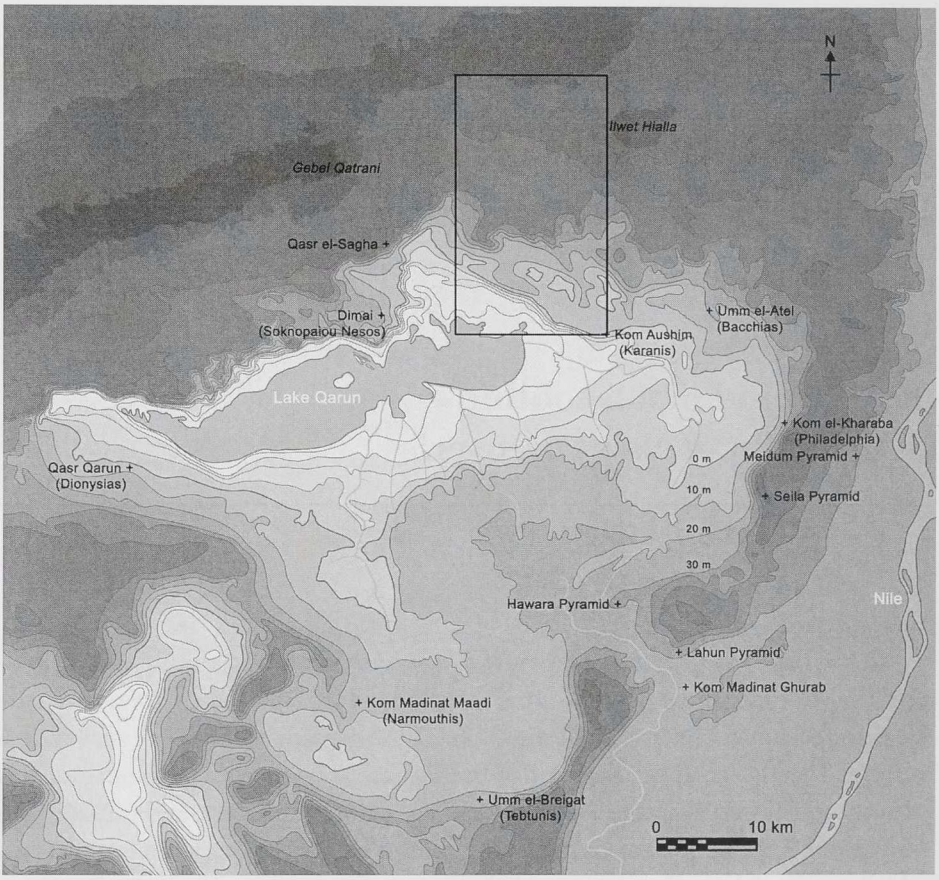

Fig.1. General map of the Fayum and the location of the area surveyed.

Low desert in the survey area

The low desert close to the present lakeshore is marked by four large basins, which were named by Caton-Thompson as the Z Basin, X Basin, L Basin and K Basin (Fig.2) respectively from the west to the east (Caton-Thompson and Gardner 1934: pl.CIX). According to a reconstruction of lake level fluctuations in the Pleistocene and Holocene (Hassan et al. 2006), the water margin of the lake has moved between 40 m asl and 40 m bsl. These basins have been filled with water as long as the lake level was higher than 10-15 m asl. Epipalaeolithic remains have been located on the shores of these basins at elevations between 5 m asl and 20 m asl.

Table 1. Archaeological cultures in the Fayum and neighbouring regions in the Early-Middle Holocene

cal.BC	Dakhleh Oasis	Djara	Fayum	Negev & Sinai	Southern Levant
5000	Bashendi B		Neolithic	Timnian	Ghassulian (Chalcolithic)
		Djara B			Qatifian (Late Pottery Neolithic)
	Late Bashendi A		?	Early Pottery Neolithic	Lodian (Jericho IX)
6000					Yarmukian (Early Pottery Neolithic)
	Early Bashendi A	Djara A	Epipalaeolithic		
				Tuwailan	PPNC
7000		Epipalaeolithic			
	Masara			Desert PPNB	LPPNB
8000					MPPNB

Site E29H1

Site E29H1 is located on the gentle slope of the northeastern shore of the X Basin. The site has been recognised and reported by Caton-Thompson in the 1920s as an unnamed surface site (Caton-Thompson and Gardner 1934: 74 and pl.CX). Thereafter, it was revisited and studied in more detail by the Combined Prehistoric Expedition in 1969 (Wendorf and Schild 1976: 181-199). The Combined Prehistoric Expedition found vast scatters of Epipalaeolithic lithic artefacts in this site, and studied the lithic assemblage from the surface collection and excavation squares named Areas A, B, and C (Wendorf and Schild 1976: Fig.121). Although the Combined Prehistoric Expedition published main typological indices of tools from Areas A and C on the basis of the Tixier typology while dealing with 310 tools in total (Wendorf and Schild 1976: Table 17 and Fig.210), few drawings of the tools were presented (Said et al. 1970: Figs.6 and 7), and it was only briefly

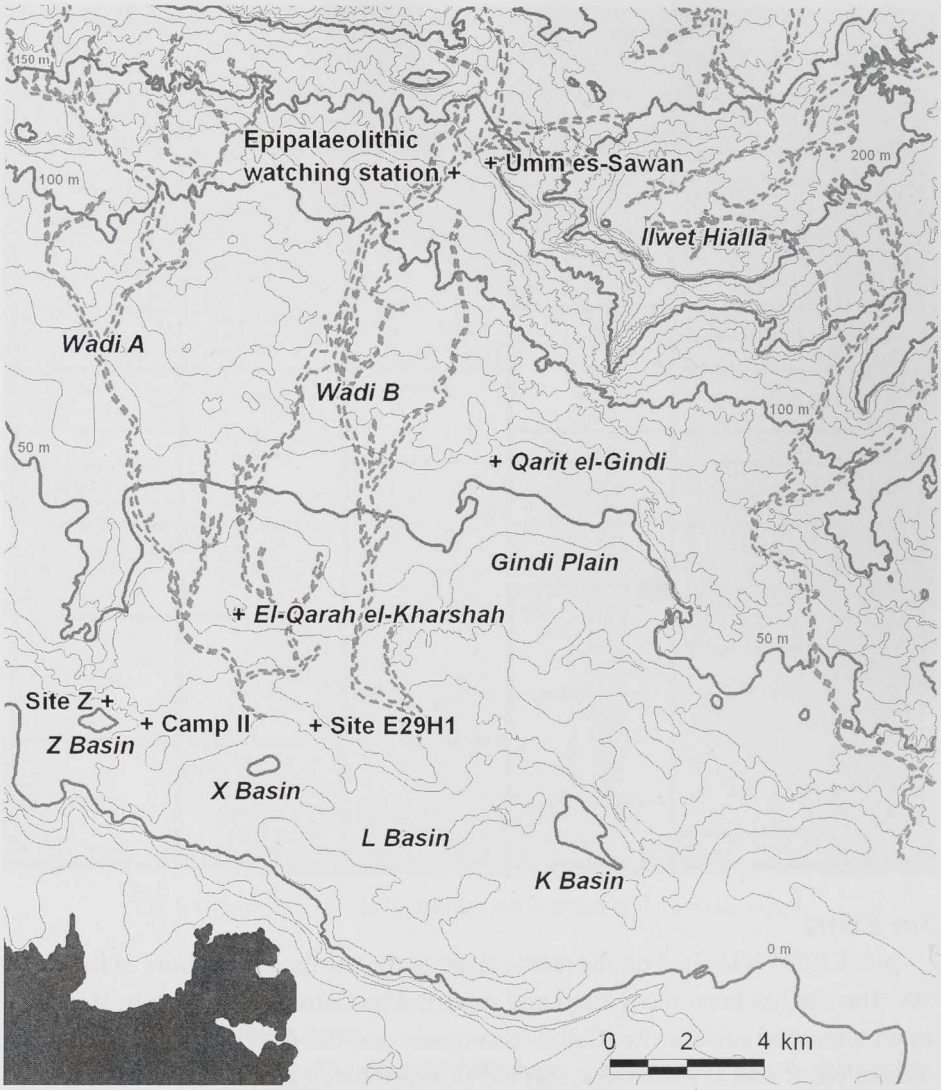

Fig.2. The area surveyed.

mentioned how the cores in this lithic assemblage looked. Therefore, how the lithic technology was organised remains unclear.

Even at present, the surface of the northeastern shore of the X Basin is littered with lithic artefacts. They are spread on the gentle slope of light yellow silty sediments thinly covered by fine-grained aeolian sand, mostly around 9-13 m asl, and their spatial extent is approximately 100 m by 300 m in an oval, extending

Fig.3. Site E29H1 hearth field (Looking the X Basin to the southwest).

from the northwest to the southeast. Judging from the location of two hillocks and a colluvial fan (described as a wadi) indicated on the sketch map made by the Combined Prehistoric Expedition (Wendorf and Schild 1976: fig.121), there is no doubt that the area of vast lithic artefact scatters corresponds to Site E29H1, although the elevation of the area in question is almost the same as indicated on Caton-Thompson's map but is approximately 5 m lower than that indicated on the Combined Prehistoric Expedition's map. The traces of a series of 18 trenches dug by the Combined Prehistoric Expedition in the centre of Site E29H1 are not seen on the present surface.

A particularly remarkable feature of the site is the hearth field (Fig.3), which is in the eastern half of the site recognised by the Combined Prehistoric Expedition. 18 stone-built hearths were recorded within the area of approximately 80 m by 80 m which is just to the east of the Combined Prehistoric Expedition's Areas B and C. There is a blank area in the middle of the hearth field, and no clear structural remains are visible, but its surface is covered by a tremendous number of lithic artefacts. Most of them are supposed to be dated to the Epipalaeolithic. It seems that

those lithic artefacts are not randomly scattered, but somehow concentrated in a wide meandering band running from the northwest to the southeast. This may be caused by wave action of oscillating basin water on the beach in the past. In spite of the possible water rolling, preservation of these lithic artefacts is generally very good, and edges and ridges of the artefacts are still sharp at the macroscopic level. This suggests that these lithic artefacts may have been disturbed by a single high energy wave event, and thereafter buried beneath lacustrine sediments for a long time, and have become exposed on the present surface very recently by wind erosion. Also as described below, five concentrations of Epipalaeolithic lithic artefacts in this hearth field exhibit extremely high integrity. Thus it is concluded that successive different wave events caused different degrees of disturbance even within the Epipalaeolithic period. In contrast, there is a tendency that apparently Neolithic bifacially-retouched tools which are sparsely seen in this hearth field are more heavily rounded. This may support the above-mentioned suggestion that Epipalaeolithic lithic artefacts have been buried intact beneath lacustrine sediments for a long time, but overlying Neolithic lithic artefacts have been subject to water/wind erosion for a longer period.

A 10 m x 10 m square was set up in this blank area, and all lithic artefacts on the surface were collected, in order to obtain a general idea about the lithic assemblage of this hearth field. In addition to the cores and debitage products listed (Table 2), there are 31 unused or only partly used whole flint pebbles. As mentioned above, the majority of the artefacts are Epipalaeolithic, but some are considered to be dated to the Neolithic on the basis of technological features.

The most commonly used raw materials are elongated or globular, subangular or rounded flint pebbles of less than 7 cm long and 4 cm wide. The surface of the pebbles is very smooth and not weathered. The colour of this flint is generally light brown to brown, and darker colour varieties are few. Larger and globular flint cobbles were also used. Cores are quite numerous in the collection. Cores can be divided into four different categories based on their original shape. The first is made on pebbles of various shapes. The second is made on conical or hemispherical chunks with almost 100 % cortex, which derived from elongated or globular pebbles, and the ventral face of the chunks were flaked. The third is made on other fragments of pebbles. The fourth is made on fragments of cobbles. Cores are dominated by single platform cores. In most cases, platforms are created on one end of an elongated or globular pebble by one strike, forming an angle of approximately 90 degrees or less with the longer axis of pebbles. Vertically half-split elongated pebbles were also used as cores, and a few flakes/bladelets were obtained from the

Table 2. Cores and debitage products from Site E29H1 hearth field surface collection square

	n	%
single platform core	215	58,27
opposed platform core	36	9,76
ninety-degree core	13	3,52
multiple platform core	78	21,14
discoidal core	7	1,90
unclassifiable/fragmentary core	20	5,42
total	369	100,00

Cores

	n	%
core tablet	18	0,89
primary chunk	134	6,66
chip/chunk	196	9,74
primary flake	210	10,43
flake from single platform core	569	28,27
flake from opposed platform core	35	1,74
flake from ninety-degree core	9	0,45
flake from multiple platform core	186	9,24
flake from discoidal core	1	0,05
unidentifiable flake	304	15,10
primary blade/bladelet	68	3,38
blade/bladelet from single platform core	206	10,23
blade/bladelet from opposed platform core	14	0,70
blade/bladelet from ninety-degree core	1	0,05
blade/bladelet from multiple platform core	4	0,20
unidentifiable blade/bladelet	58	2,88
total	2013	100,00

Debitage products

	n	mean (cm)	st.dev
length	291	2,59	0,89
width	291	2,40	0,52
thickness	291	2,04	0,91

Metric data of measured cores on pebbles

	n	mean (cm)	st.dev
length	31	2,16	0,59
width	31	2,28	0,49
thickness	31	1,86	0,56

Metric data of measured cores on conical or hemispherical primary fragments of pebbles

	n	mean (cm)	st.dev
length	10	2,97	0,98
width	10	2,60	0,48
thickness	10	1,36	0,47

Metric data of measured cores on fragments of pebbles

	n	mean (cm)	st.dev
length	17	2,65	1,15
width	17	3,35	1,02
thickness	17	2,66	0,93

Metric data of measured cores on fragments of cobbles

	n	mean (cm)	st.dev
length	1195	2,40	0,88
width	1195	1,73	0,60
thickness	1195	0,58	0,31

Metric data of measured debitage products

ventral face. Pyramidal cores are one type of single platform core. They were made on angular or subangular fragments of weathered or abraded large flint cobbles. The second most numerous cores are multiple platform cores. Opposed platform cores and ninety-degree cores are not numerous.

The predominance of single platform core in the assemblage is also indicated by a large number of flakes and blades/bladelets from single platform cores. One notable kind of primary piece is a conical or hemispherical chunk with a complete cortex. The chunk has an impact bulb on the naturally flat proximal end with no platform preparation, and a tiny breakage on the distal end, and the ventral face is flat with few or no surface undulations. This means that a considerable number of whole globular or elongated pebbles were brought here and the primary chunks were produced by bipolar wedging, in order to create a platform on one end of pebbles.

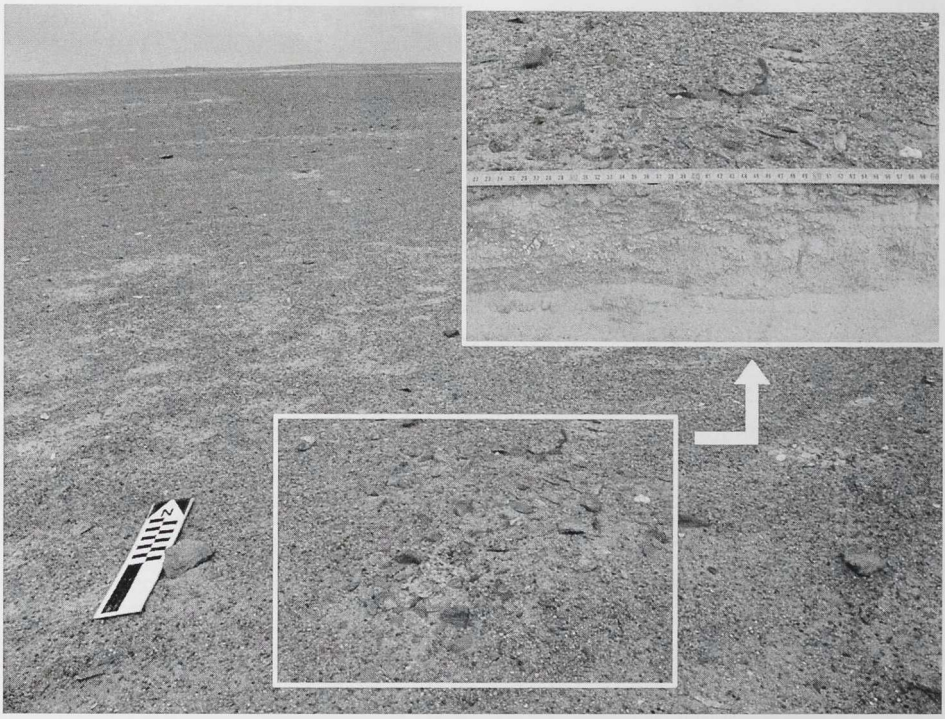

Fig.4. Lithic debitage dumping spot B in Site E29H1 hearth field.

Formal retouched tools are not numerous in this assemblage, and the most predominant are bladelets without backing retouch. They are followed by various backed bladelets, including a number of straight-backed and pointed examples without basal retouch (Tixier's Type 45) and a few arch-backed ones without basal retouch (Tixier's Type 56).

Besides the vast scatter of lithic artefacts, interesting remains in this hearth field are extremely high density concentrations of lithic artefacts at five spots. Those lithic concentrations are less than 1 m in diameter, and the accumulation of those concentrations is not thick (Fig.4). Many pieces sit firmly on slightly consolidated, very fine-grained sand. They look like spots where toolmakers collected debitage products and discarded them. It is probable that the debitage products were originally dumped in a shallow pit dug in sand by toolmakers, but the light sand was later blown away, and heavier and more solid debitage products in the deeper parts remained intact and became gradually exposed on the surface as a discrete concentration.

In order to better understand the nature of these remains, two concentrations were chosen, and all artefacts were collected and studied. In one concentration, there are 23 cores and 431 debitage products (Table 3), but the success rate of refitting was

Table 3. Cores and debitage products from Site E29H1 hearth field debitage dumping spot A

	n	%
single platform core	14	60,87
opposed platform core	4	17,39
ninety-degree core	1	4,35
multiple platform core	4	17,39
total	23	100,00

Cores

	n	%
core tablet	3	0,70
primary chunk	31	7,19
chip/chunk	37	8,58
primary flake	30	6,96
flake from single platform core	111	25,75
flake from opposed platform core	8	1,86
flake from ninety-degree core	5	1,16
flake from multiple platform core	7	1,62
unidentifiable flake	74	17,17
primary blade/bladelet	21	4,87
blade/bladelet from single platform core	86	19,95
blade/bladelet from opposed platform core	3	0,70
blade/bladelet from ninety-degree core	2	0,46
blade/bladelet from multiple platform core	1	0,23
unidentifiable blade/bladelet	12	2,78
total	431	100,00

Debitage products

	n	mean (cm)	st.dev
length	18	3,13	1,12
width	18	2,52	0,63
thickness	18	2,03	0,99

Metric data of measured cores on pebbles

	n	mean (cm)	st.dev
length	4	2,25	0,72
width	4	2,63	0,72
thickness	4	1,28	0,15

Metric data of measured cores on conical or hemispherical primary fragments of pebbles

	n	mean (cm)	st.dev
length	209	2,46	0,90
width	209	1,50	0,52
thickness	209	0,48	0,28

Metric data of measured debitage products

not high. In another concentration, there are 14 cores and 312 debitage products (Table 4), and the success rate of refitting was very high. A successful example of refitting gives an idea about how the Fayum toolmakers handled raw materials (Fig.5). The reconstructed reduction sequence is as follows. Firstly, one end of an elongated flint pebble (approximately a quarter of a piece) is struck off by bipolar wedging in order to create a flat, unfacetted platform. Then, cortical flakes and bladelets were taken off continuously along the longer axis of the pebble by striking the edges of the platform. Finally, non-cortical bladelets and flakes were obtained in the same manner of striking the edges of the platform. This example also shows that the platform was rejuvenated by way of removing a core tablet. Other debitage products which could not be refitted also suggest that bladelet production was quite standardised by employing mainly single platform knapping. These characteristics are exactly the same as those which were found in the surface collection square of the hearth field described above. Therefore, it can be said that these remarkable lithic concentrations do not represent any special use of raw material or special toolmaking, but rather a common use of raw materials and toolmaking.

Table 4: Cores and debitage products from Site E29H1 hearth field debitage dumping spot B

	n	%
single platform core	11	78,57
opposed platform core	2	14,29
multiple platform core	1	7,14
total	14	100,00

Cores

	n	%
primary chunk	23	7,37
chip/chunk	9	2,88
primary flake	23	7,37
flake from single platform core	96	30,77
flake from opposed platform core	2	0,64
flake from ninety-degree core	2	0,64
flake from multiple platform core	8	2,56
unidentifiable flake	18	5,77
primary blade/bladelet	16	5,13
blade/bladelet from single platform core	108	34,62
blade/bladelet from opposed platform core	3	0,96
blade/bladelet from multiple platform core	2	0,64
unidentifiable blade/bladelet	2	0,64
total	312	100,00

Debitage products

	n	mean (cm)	st.dev
length	12	3,33	1,04
width	12	2,22	0,41
thickness	12	2,08	0,83

Metric data of measured cores on pebbles

	n	mean (cm)	st.dev
length	2	2,10	0,00
width	2	2,25	0,05
thickness	2	2,20	0,50

Metric data of measured cores on conical or hemispherical primary fragments of pebbles

	n	mean (cm)	st.dev
length	190	2,18	0,73
width	190	1,28	0,47
thickness	190	0,32	0,23

Metric data of measured debitage products

A question is where the source of the most commonly used flint pebbles is. Since flint pebbles of this size and shape do not naturally occur on basin shores, they must have been transported from elsewhere. It has been argued by the Combined Prehistoric Expedition that the source of flint pebbles used by the Epipalaeolithic people in the Fayum was on the escarpments between Qasr el-Sagha and Gebel Qatrani (Wendorf and Schild 1976: 311). There are certainly flint pebbles on these escarpments, but they are at the farthest 20 km away from Site E29H1, and there is no clear evidence that the pebbles were transported over this long distance. Moreover, the occupants of Site E29H1 have used not only elongated flint pebbles but also larger and globular flint cobbles. Such cobbles do not naturally occur on the escarpments in question. Therefore, it should not be assumed that Qasr el-Sagha and Gebel Qatrani are the sole sources of flint in the Fayum. A survey around the X Basin found that flint pebbles of that size and shape are available on the gentle slopes of low desert ridges which extend from a rocky and gravelly summit named Gebel Abyad or El-Qarah el-Kharshah, approximately 2.5 km to the north of the X Basin shore (Fig.2). This area would have been the nearest source of flint pebbles for the Epipalaeolithic toolmakers in the X Basin.

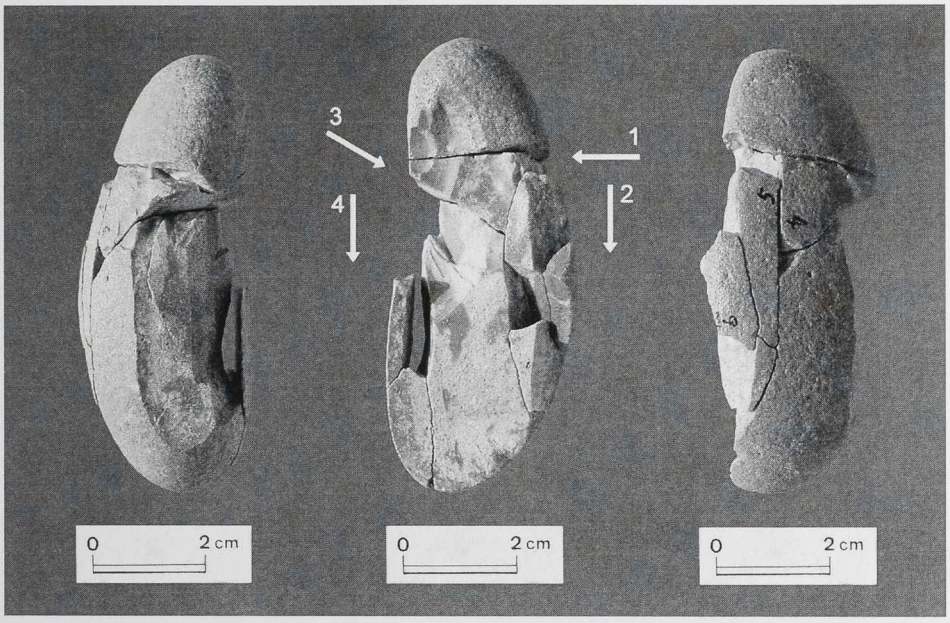

Fig.5. A refitted single platform core from lithic debitage dumping spot A in Site E29H1 hearth field.

Camp II

Camp II is the place where Caton-Thompson pitched her second camp during her fieldwork in the 1920s (Caton-Thompson and Gardner 1934: 76-77). It is located at the eastern margin of the Z Basin. She stayed on the bottom of a narrow cove, which was divided from the main body of the Z Basin by a linear dune and was named the Camp II Basin by her. Surface artefact scatters are quite extensive from the bottom of the Camp II Basin, which is around 7-10 m asl, onto the eastern slope and ridge of the Basin, which is around 15-18 m asl (Fig.6). The Camp II Ridge is actually the eastern shore of the Z Basin, and its surface is marked by an approximately 100 m wide white band of beach sediments, consisting mainly of calcium carbonate pellets.

Lithic artefact scatters are particularly dense around the eastern margin of the white band of beach sediments on the ridge, though there are no structural remains like hearths. Lithic artefacts from two squares of 5 m by 5 m set up at the eastern margin of the white band of beach sediments were surface collected and studied. In one square, four unworked flint pebbles as well as 49 cores and 170 debitage products were collected (Table 5). In another square, five unworked flint pebbles as well as 34 cores and 95 debitage products were collected (Table 6). Cores from the two squares show that there are two distinct kinds of flint. One

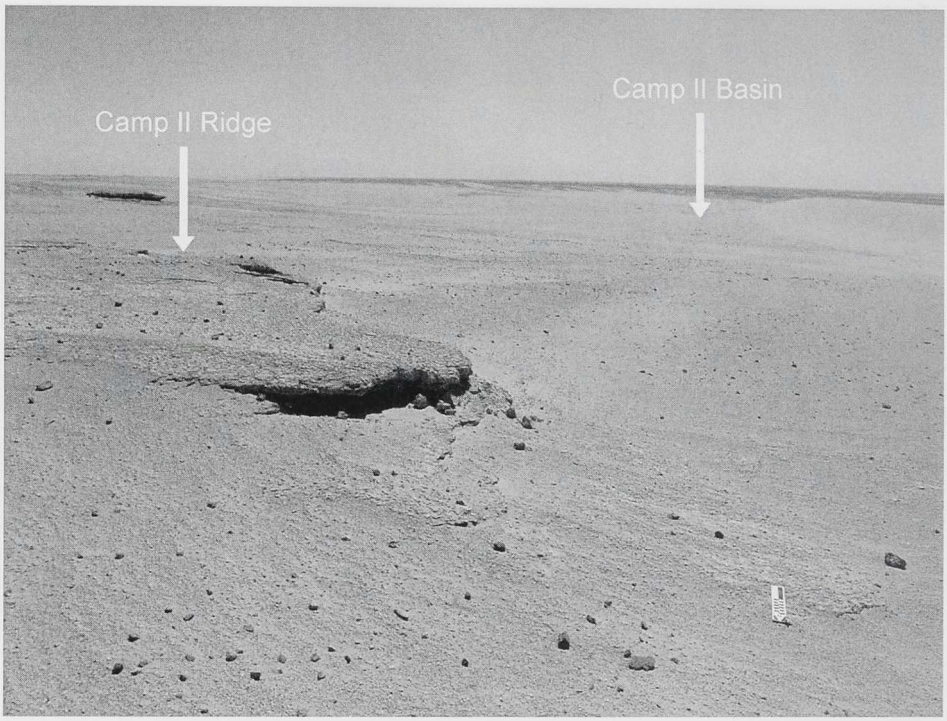

Fig.6. Overview of Camp II Ridge and Camp II Basin (Looking south).

is elongated pebble, and another is globular cobble, though globular cobbles are numerous (Fig.7). Since such pebbles and cobbles do not naturally occur in these beach sediments, they must have been transported from elsewhere. There is no refitted example for discussing the tool making process, but the cores and debitage products suggest that toolmakers knapped flint pebbles and cobbles in a regular manner. Knapping was generally bladelet-oriented, and tools include numerous backed bladelets (Tixier's Types 45, 52-53, and 95) and microbladelets.

Apart from the surface collection in the two squares, one particular location was noticed approximately 400-500 m to the east of the two squares. It is a long, low mound stretching north-south along the eastern shore of the Z Basin, and the surface is covered by porous calcrete duricrusts. The western face of the mound is more severely eroded, and laminated calcium carbonate and sand are exposed. It seems that this mound was made and eroded by a westerly wind and wave action of oscillating water on the eastern shore of the Z Basin. Lithic artefacts are scattered on and around this low mound, and some artefacts are about to be eroded out of the laminated calcium carbonate and sand.

Table 5. Cores and debitage products from Camp II Ridge surface collection square A

	n	%
single platform core	39	79,59
opposed platform core	5	10,20
ninety-degree core	3	6,12
discoidal core	2	4,08
total	49	100,00

Cores

	n	%
core tablet	3	1,76
primary chunk	6	3,53
chip/chunk	1	0,59
primary flake	13	7,65
flake from single platform core	69	40,59
flake from opposed platform core	11	6,47
flake from ninety-degree core	21	12,35
unidentifiable flake	17	10,00
primary blade/bladelet	8	4,71
blade/bladelet from single platform core	18	10,59
blade/bladelet from opposed platform core	2	1,18
unidentifiable blade/bladelet	1	0,59
total	170	100,00

Debitage products

	n	mean (cm)	st.dev
length	29	3,09	0,72
width	29	2,64	0,66
thickness	29	2,64	0,85

Metric data of measured cores on pebbles

	n	mean (cm)	st.dev
length	20	3,27	0,94
width	20	3,35	0,63
thickness	20	2,28	0,78

Metric data of measured cores on cobbles and their fragments

	n	mean (cm)	st.dev
length	107	2,40	0,86
width	107	1,90	0,57
thickness	107	0,57	0,32

Metric data of measured debitage products

Table 6. Cores and debitage products from Camp II Ridge surface collection square B

	n	%
single platform core	21	61,76
opposed platform core	3	8,82
ninety-degree core	3	8,82
multiple platform core	6	17,65
discoidal core	1	2,94
total	34	100,00

Cores

	n	%
core tablet	2	2,11
primary chunk	2	2,11
primary flake	10	10,53
flake from single platform core	58	61,05
flake from opposed platform core	3	3,16
flake from ninety-degree core	5	5,26
flake from multiple platform core	6	6,32
unidentifiable flake	5	5,26
blade/bladelet from single platform core	4	4,21
total	95	100,00

Debitage products

	n	mean (cm)	st.dev
length	17	2,64	1,03
width	17	2,75	0,80
thickness	17	2,33	0,85

Metric data of measured cores on pebbles

	n	mean (cm)	st.dev
length	7	2,17	0,45
width	7	2,47	0,62
thickness	7	1,49	0,46

Metric data of measured cores on conical or hemispherical primary fragments of pebbles

	n	mean (cm)	st.dev
length	10	3,25	1,46
width	10	3,81	0,73
thickness	10	2,75	0,78

Metric data of measured cores on fragments of cobbles

	n	mean (cm)	st.dev
length	71	2,45	0,89
width	71	2,29	0,73
thickness	71	0,63	0,27

Metric data of measured debitage products

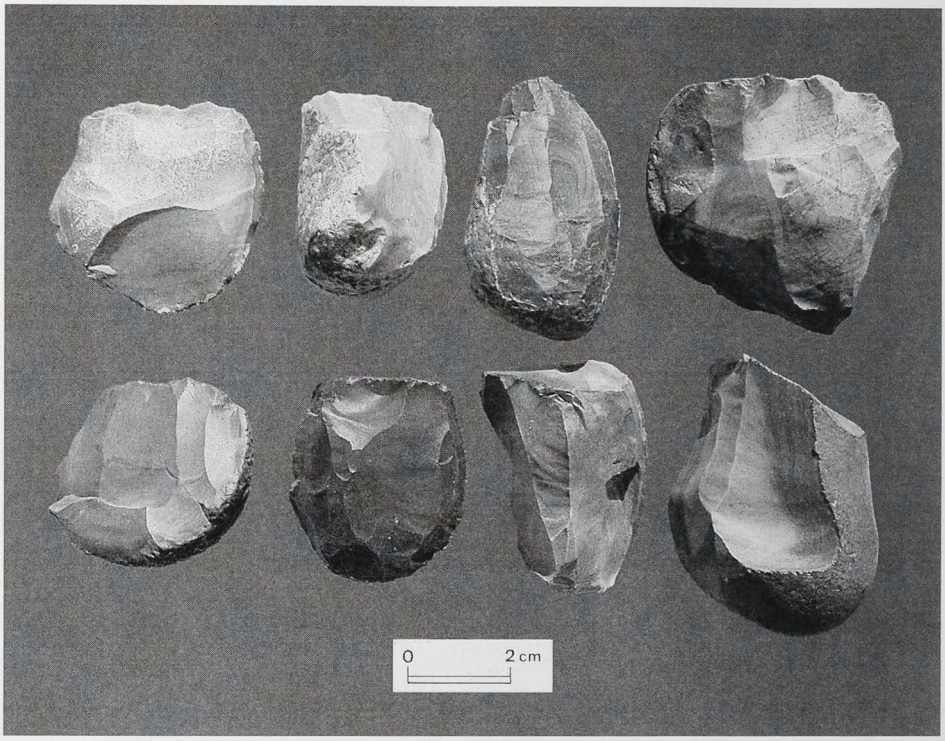

Fig.7. Cores from Camp II Ridge.

The lithic artefacts include a number of backed bladelets, but the most notable artefacts are a side-notched and tanged projectile point, a barbed and tanged projectile point, and a leaf-shaped projectile point (Fig.8), which are reminiscent of not only those of the so-called (bi)facial techno-complex in the northern half of the Western Desert in the late 7th - early 6th millennia cal.BC (Riemer 2007a; 2007b) but also those of the Levantine Pre-Pottery and Pottery Neolithic (Gopher 1994: 34-41). As Caton-Thompson has reported, Camp II and its vicinity has yielded an extremely large number of peculiar projectile points whose dates were uncertain (Caton-Thompson and Gardner 1934: 76-77 and pl.LI), and these new discoveries reconfirm the uniqueness of Camp II. Although the precise dates of these projectile points remain uncertain, they give some clue for reconsidering the Fayum chronology and cultural connections with neighbouring regions (Table 1).

Site Z

Site Z is located on the northern slope of the Z Basin. The entire site was already surveyed by Caton-Thompson in the 1920s, and it was reported that sur-

face artefacts were scattered between 6 m asl and 18 m asl, and the width of the artefact scatters was approximately 700 m (Caton-Thompson and Gardner 1934: 59-60, 77-78 and pl.CX). It is probable that Puglisi's Site S4 was located around the easternmost part of Site Z. At present, artefact scatters on the northern slope of the Z Basin at lower elevations are spread over the entire stretch of approximately 1200 m wide, but are disrupted by strips of fine-grained aeolian sand or colluvial deposits of limestone fragments and fossil shells extending north-south at several locations. Concentrations of sandstone and limestone cobbles which seemed to be hearths, and concentrations of bone fragments, are observed on the slope surface in the areas which are not disturbed and obscured by natural features mentioned above. The majority of the finds on the surface are Epipalaeolithic lithic artefacts. Apparently Neolithic artefacts were very rarely found.

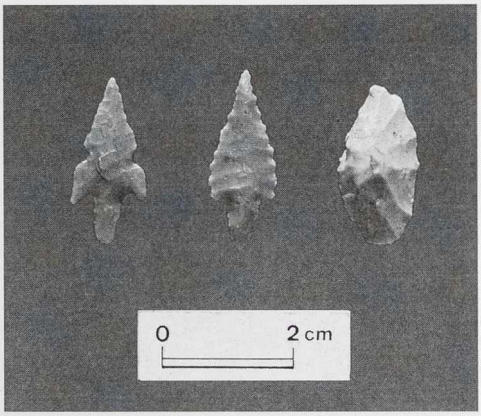

Fig.8. Small projectile points from Camp II Ridge.

One particular locality of Site Z was chosen for surface artefact collection. This locality is in the eastern half of Site Z and on the gentle slope of approximately 13-15 m asl. It is marked by a concentration of turtle bone fragments surrounded by sandstone and limestone cobbles in a circle (Fig.9). A 5 m x 5 m square was set up to contain this concentration, and lithic artefacts were surface collected and studied (Table 7). In addition, since the size of sample from around the concentration of turtle bone fragments is small, a 5 m x 25 m square was set up longitudinally along the north-south axis 10 m to the east of the 5 m x 5 m square, in order to cover the slope of the northern shore of the Z Basin which gently rises northwards, and all lithic artefacts were surface collected in the 5 m x 25 m square and studied (Table 8).

The most common lithic raw material at this locality is subangular or rounded, globular or irregularly-shaped flint pebbles of various colours from light to dark brown. The surface of the pebbles is quite smooth and well polished. Another raw material is globular flint cobble of various colours from light to dark brown. The cortical surface of cobble is weathered and exhibits a dark brown colour. A further variety of raw material is translucent brown chert of uncertain original shape. All of them do not naturally occur on this basin shore, and hence must have been transported from elsewhere.

Fig.9. A concentration of turtle bone fragments surrounded by sandstone and limestone cobbles at Site Z (Looking the Z Basin to the south).

Cores are not numerous in the collection. There are 18 single platform cores. Except for one single platform core made on an angular fragment of a weathered cobble, the rest are made on pebbles of various shapes. Conical or hemispherical chunks with almost 100 % cortex, which derived from pebbles, were often used as cores, and their ventral face was struck. All of these single platform cores seem to be for flake or microbladelet production. There are four opposed cores made on pebbles or chunks. There are 11 multiple platform cores, five of which are made on fragments of cobbles and the rest are made on chunks or pebbles. There are two discoidal cores made on primary chunk and flake, and their ventral face was struck radially. As already suggested by the cores, debitage products are dominated by flakes rather than bladelets. Other notable debitage products are primary chunks. Apparently, such a chunk was obtained by striking one end of an elongated pebble.

There is no refitted specimen for discussing the tool making process, but the cores and debitage products suggest that toolmakers knapped flint pebbles in a slightly irregular manner according to the different shapes of pebbles. It appears that they

Table 7. Cores and debitage products from Site Z turtle bone concentration

	n	%
single platform core	14	60,87
opposed platform core	1	4,35
multiple platform core	7	30,43
discoidal core	1	4,35
total	23	100,00

Cores

	n	%
primary chunk	2	1,80
chip/chunk	13	11,71
primary flake	10	9,01
flake from single platform core	40	36,04
flake from opposed platform core	5	4,50
flakes from ninety-degree core	6	5,41
flake from multiple platform core	7	6,31
flake from discoidal core	1	0,90
unidentifiable flake	15	13,51
primary blade/bladelet	3	2,70
blade/bladelet from single platform core	5	4,50
blade/bladelet from opposed platform core	3	2,70
blade/bladelet from multiple platform core	1	0,90
total	111	100,00

Debitage products

	n	mean (cm)	st.dev
length	22	1,87	0,68
width	22	2,71	0,74
thickness	22	2,43	1,29

Metric data of measured cores on pebbles

	n	mean (cm)	st.dev
length	68	2,02	0,92
width	68	1,80	0,81
thickness	68	0,50	0,30

Metric data of measured debitage products

Table 8. Cores and debitage products from Site Z surface collection square

	n	%
single platform core	18	51,43
opposed platform core	4	11,43
multiple platform core	11	31,43
discoidal core	2	5,71
total	35	100,00

Cores

	n	%
primary chunk	15	1,93
chip/chunk	66	8,51
primary flake	73	9,41
flake from single platform core	341	43,94
flake from opposed platform core	33	4,25
flakes from ninety-degree core	33	4,25
flake from multiple platform core	29	3,74
unidentifiable flake	99	12,76
primary blade/bladelet	25	3,22
blade/bladelet from single platform core	51	6,57
blade/bladelet from opposed platform core	5	0,64
blade/bladelet from ninety-degree core	5	0,64
blade/bladelet from multiple platform core	1	0,13
total	776	100,00

Debitage products

	n	mean (cm)	st.dev
length	7	2,41	0,86
width	7	3,11	0,81
thickness	7	2,69	0,64

Metric data of measured cores on pebbles

	n	mean (cm)	st.dev
length	19	1,69	0,70
width	19	2,35	0,32
thickness	19	1,67	0,59

Metric data of measured cores on conical or hemispherical primary fragments of pebbles

	n	mean (cm)	st.dev
length	6	2,43	0,83
width	6	2,72	0,82
thickness	6	1,77	0,70

Metric data of measured cores on fragments of cobbles

	n	mean (cm)	st.dev
length	466	1,74	0,67
width	466	1,51	0,61
thickness	466	0,41	0,24

Metric data of measured debitage products

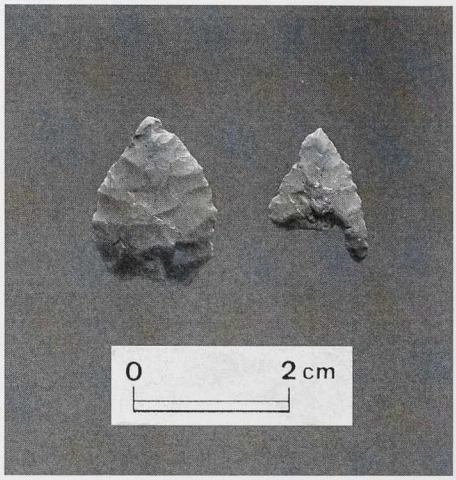

Fig.10. Small projectile points from Site Z.

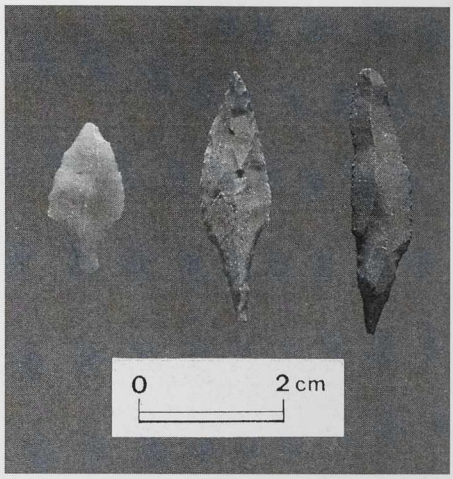

Fig.11. Ounan-Harif point and Ounan points from Site Z.

tended to use fragments of pebbles or cobbles rather than whole pebbles, and that their major objective was to obtain non-cortical microbladelets and short flakes.

As for tools, bladelets are numerous, including many microbladelets of less than 2 cm long without additional retouch. Other notable tools are backed bladelets, but they are not numerous. The majority of backed bladelets at this locality are straight-backed ones with slightly convex cutting edge, which are identical to Tixier's Types 45-47. Other formal tools include two bifacially-retouched small projectile points. One is a tanged and winged variety of projectile point, and another is leaf-shaped and thoroughly retouched on one face and laterally retouched on another (Fig.10). They are similar to not only those of the so-called (bi)facial techno-complex of the Western Desert in the late 7th - early 6th millennia cal.BC but also those of the Levantine Pottery Neolithic.

Apart from the systematic surface collection, some noteworthy tools were collected in close proximity to the surface collection square at the same elevation of the slope. One Ounan-Harif point and two Ounan points were found on the surface (Fig.11). The Ounan-Harif point appears to be associated with a deflated circle of sandstone and limestone cobbles. These typical Epipalaeolithic projectile points of North Africa have been found at sites in the Western Desert, Eastern Desert, and Nile Valley, but the presence of these types of projectile points in the Fayum has not widely been recognised. The Ounan points have appeared in the collection made by Seton-Karr somewhere probably around Site V or Site Z in the Fayum in the 1900s without being designated the Ounan points (Currelly 1913: pl.XXXVII), but later visitors to the

Fayum have never reported such projectile points at the sites they studied. The online catalogue of Caton-Thompson's Fayum lithic collection which is presently housed in the Petrie Museum of Egyptian Archaeology in London exhibits at least two Ounan Points (UC3435 and UC3436) from Camp II and one Ounan-Harif point (UC3788) from Site N, although she did not publish them. Therefore, these new finds at this locality of Site Z reconfirm that the Fayum Epipalaeolithic has something in common with other Epipalaeolithic industries in Egypt, and that the Fayum Epipalaeolithic is not an isolated culture but is situated in a wider North African Epipalaeolithic context.

Moreover, the presence of the Ounan points in the sites of the Fayum can be used as a chronological marker, because these peculiar projectile points have been dated to around 7500-6500 cal.BC, though some have persisted later than 6500 cal.BC (McDonald 2003; Riemer et al. 2004). This time span corresponds to that of the Fayum Epipalaeolithic, and hence this locality of Site Z, which yielded these projectile points, is also securely put within this time span. However, the later date of occupation at this locality of Site Z suggested by the presence of the projectile points which are reminiscent of those of the Western Desert (bi)facial techno-complex and the Levantine Pottery Neolithic may contradict the possible occupation span suggested by the presence of the Ounan points. Therefore, it may be assumed that the lithic assemblage obtained on the surface of this locality is the mixture of those from earlier date and later date, and that this locality has been visited repeatedly throughout the long span of the Epipalaeolithic period. Alternatively, this locality may be dated to a transitional period when the Ounan points gradually disappeared and unifacially/bifacially-retouched, tanged or leaf-shaped projectile points appeared in the middle of the 7th millennium cal.BC. As far as the presently-available Fayum lithic collections are concerned, it seems that the Ounan points in the Fayum tend to co-occur with unifacially/bifacially-retouched, tanged or leaf-shaped projectile points and do not occur alone. Both Site N and Camp II in particular are known for the concentration of many unifacially/bifacially-retouched, tanged or leaf-shaped projectile points (Caton-Thompson and Gardner 1934: 76-77 and 84-85). This situation suggests that the co-occurrences are not necessarily accidental, and supports the latter assumption that the locality under consideration may perhaps be dated to the middle of the 7th millennium cal.BC.

Another particular spot of Site Z was chosen for surface artefact collection. It is an extremely high density concentration of lithic artefacts, and is located on the gentle slope at lower elevations of the basin shore near the westernmost part of Site Z. This lithic concentration is approximately 3 m in diameter, and it exhibits a strong contrast to the surrounding area, which is marked by very sparse scatters of lithic artefacts and several strips of colluvial deposits stretching north-south. In

Table 9. Cores and debitage products from Site Z debitage concentration

	n	%
single platform core	71	66,36
opposed platform core	22	20,56
ninety-degree core	5	4,67
multiple platform core	6	5,61
discoidal core	3	2,80
total	107	100,00

Cores

	n	%
core tablet	2	0,36
primary chunk	69	12,41
chip/chunk	15	2,70
primary flake	51	9,17
flake from single platform core	194	34,89
flake from opposed platform core	16	2,88
flake from ninety-degree core	23	4,14
flake from multiple platform core	3	0,54
unidentifiable flake	16	2,88
primary blade/bladelet	28	5,04
blade/bladelet from single platform core	128	23,02
blade/bladelet from opposed platform core	8	1,44
blade/bladelet from ninety-degree core	3	0,54
total	556	100,00

Debitage products

	n	mean (cm)	st.dev
length	80	3,53	0,86
width	80	2,08	0,62
thickness	80	1,72	0,66

Metric data of measured cores on pebbles

	n	mean (cm)	st.dev
length	8	2,24	0,42
width	8	2,50	0,30
thickness	8	1,61	0,68

Metric data of measured cores on conical or hemispherical primary fragments of pebbles

	n	mean (cm)	st.dev
length	17	2,55	0,65
width	17	1,85	0,59
thickness	17	1,26	0,59

Metric data of measured cores on fragments of pebbles

	n	mean (cm)	st.dev
length	2	3,60	0,70
width	2	3,80	0,50
thickness	2	1,35	0,25

Metric data of measured cores on fragments of cobbles

	n	mean (cm)	st.dev
length	368	2,18	0,80
width	368	1,38	0,48
thickness	368	0,41	0,27

Metric data of measured debitage products

this concentration, lithic artefacts sit loosely on coarse-grained sand and slightly consolidated silty sediments of the slope. All artefacts and five unworked natural pebbles in this concentration were collected and studied (Table 9). A number of pieces could be refitted to an extent that the original shape of raw materials was understood. Therefore, it is assumed that this was a lithic manufacturing spot, or a debitage dumping spot. However, it is not certain if the debitage products were dumped in a shallow pit dug in sand by toolmakers but the sand was later gone and heavier debitage products in the deeper parts remained undisturbed and became gradually exposed on the surface, because the spatial extent of the concentration seems to be too wide to be considered as a remnant of a pit for such a purpose.

Cores are quite numerous in the collection, and they amount to 107 in total. The majority of the cores are made on subangular or rounded, elongated or

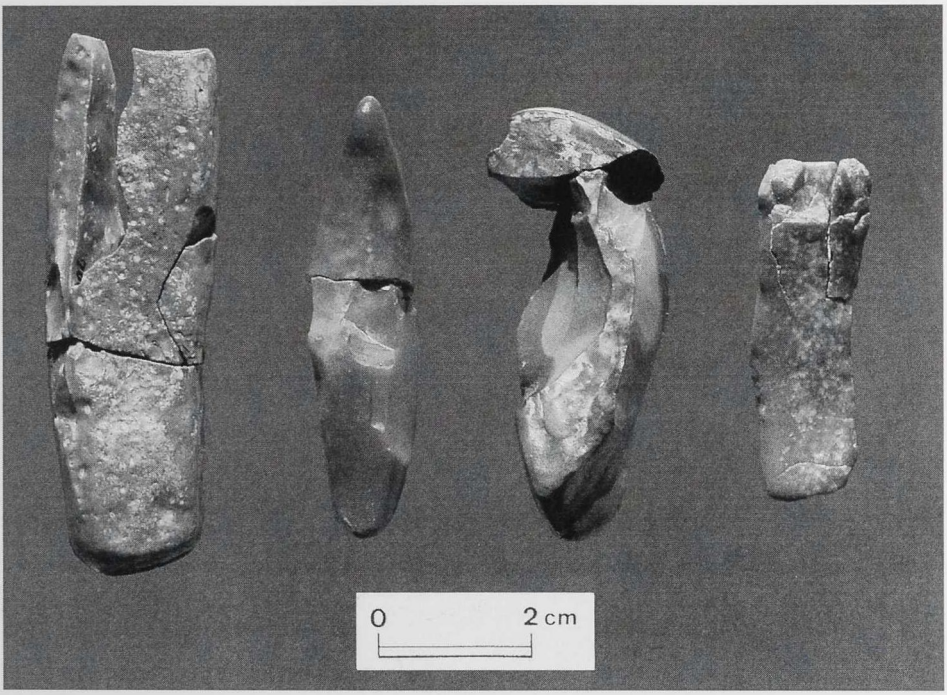

Fig.12. Refitted single platform cores from a lithic debitage concentration in Site Z.

tabular, or irregularly-shaped flint pebbles of various colours from light to dark brown. The surface of the pebbles is generally smooth and well polished. These peculiar kinds of flint pebbles do not naturally occur on the surface of this basin shore. A survey in the vicinity revealed that such flint pebbles were abundantly scattered on escarpments at elevations of more than 30 m asl, which were approximately 1 km to the north of this locality. These escarpments have been visited by Caton-Thompson, and she found nothing other than thin gravel carpet with some Levallois flakes and a large bifacial arrowhead possibly not of the Neolithic (Caton-Thompson and Gardner 1934: 78). But these gravelly escarpments seem to have been the nearest source of pebbles used as raw material. Therefore, it can be assumed that the Epipalaeolithic toolmakers of the Z Basin procured lithic raw materials within easy walking distance.

Most of the single platform cores made on elongated pebbles are for bladelet production. Conical or hemispherical chunks with almost 100 % cortex were also used as cores, and their ventral face was struck for flake and microbladelet production. Several successfully refitted pieces show the common pebble knapping sequence (Fig.12). One end of an elongated pebble is struck off by one strike, and

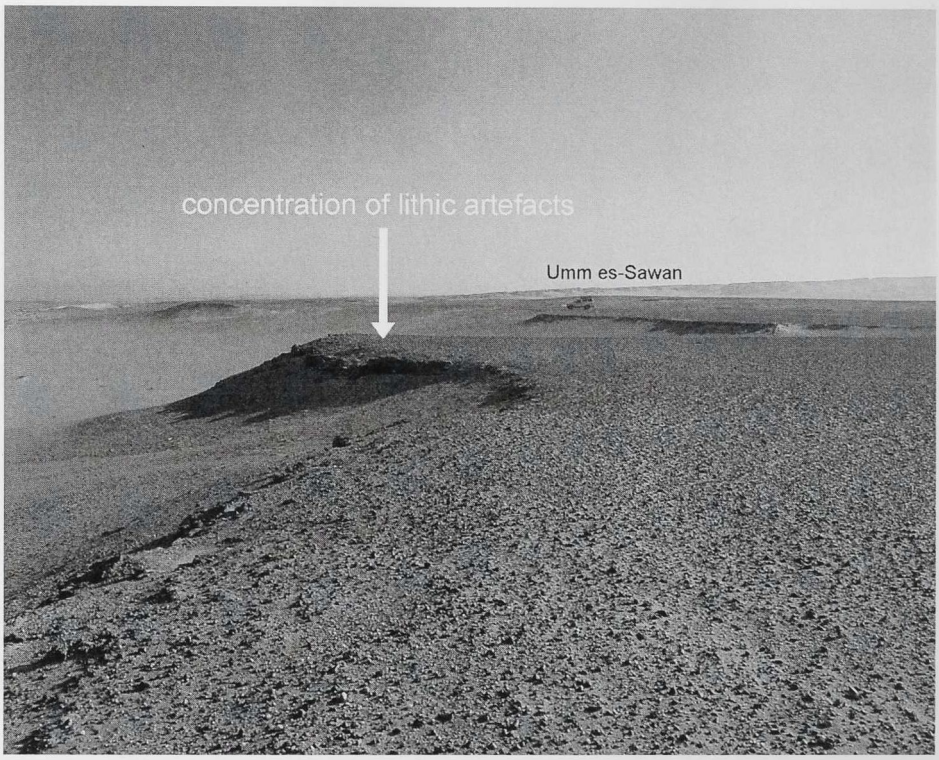

Fig.13. An Epipalaeolithic watching station in Wadi B (Looking northeast).

a striking platform is created, forming an angle of approximately 90 degree or less with the longer axis of pebbles. Then several flakes and bladelets were struck off.

There are only a small number of pieces which may derive from weathered or abraded flint cobbles, some of which have a white calcareous cortex. A further variety of raw material is chert of uncertain original shape and of translucent brown, but there are only two pieces of this raw material. The sources of these materials could not be located in the vicinity of the Z Basin.

Bladelets of approximately 3 cm long and microbladelets of less than 2 cm long are the major tools found in this collection. Backed bladelets are not numerous, and no other kind of retouched tools were found.

Area far from the lakeshore

It has been revealed by previous research that Fayum Epipalaeolithic people were heavily dependent on aquatic resources on the lakeshores (Brewer 1989). Furthermore, it has been suggested that most Fayum Epipalaeolithic sites might reflect

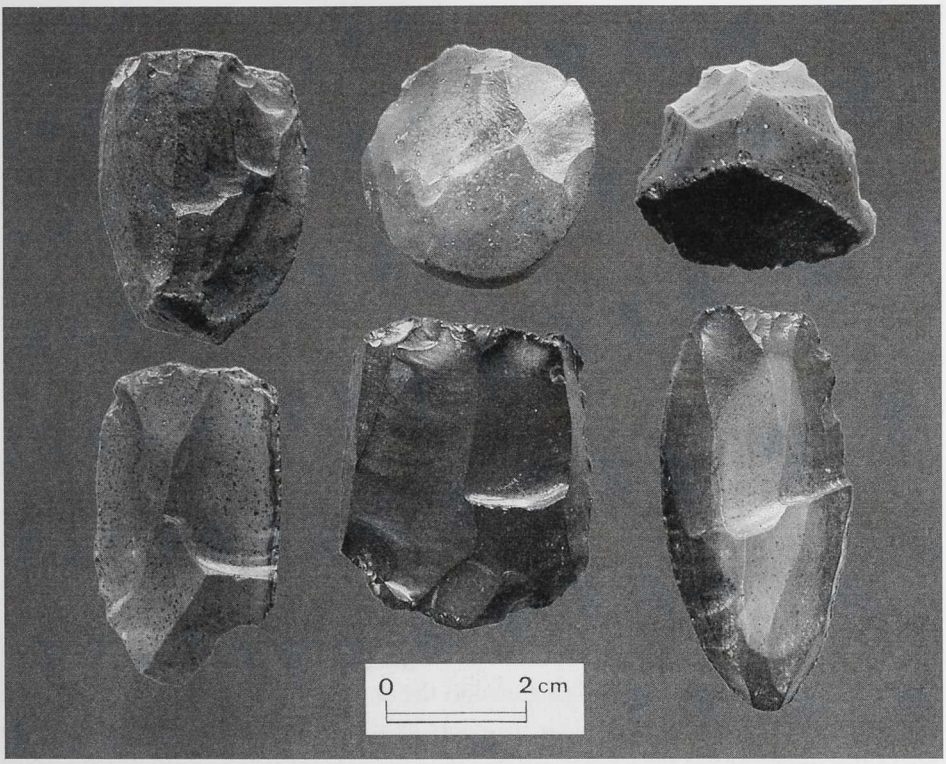

Fig.14. Cores from an Epipalaeolithic watching station in Wadi B.

seasonal fishing occupations, and that a very different economic emphasis might possibly be indicated for the same group when they utilised a different microenvironmental situation or in the base camps wherever they were located (Wendorf and Schild 1976: 317). However, this suggestion has not been substantiated by the discovery of base camps and other kinds of sites in different environmental situations.

New discoveries of the remains of Epipalaeolithic human activities were made in a desert wadi which connects the northern rocky terrain of the Fayum Depression and the lakeshore (Fig.2). Some Epipalaeolithic tools were found along the wadi during the survey, and the most important discovery in the wadi was a concentration of Epipalaeolithic lithic artefacts on a high wadi bank, which is approximately 15 km to the north of the Epipalaeolithic lakeshore and approximately 1 km to the southwest of Umm es-Sawan. The findspot is located on an edge of the eastern bank, whose elevation is around 130 m asl, overlooking the wadi floor to the northwest (Fig.13). Neither structural remains such as hearths or hut circles nor faunal remains were found in the surroundings. Therefore, the study

of this isolated concentration of lithic artefacts is the only way of understanding the nature of this locality. The surface of the bank is covered by flint gravel and fine-grained aeolian sand. On this gravelly and sandy surface, 105 pieces of lithic artefacts including a number of bladelet cores (Fig.14) and only a few retouched tools were concentrated within an approximately 5 m radius (Table 10). They sit on a slightly consolidated surface, but it is not certain whether more pieces are buried beneath the surface, because no excavation was attempted.

A remarkable thing about these artefacts is that many of them are produced from apparently large cobbles which are not seen in the immediate surroundings. Although rounded and abraded/polished, elongated pebbles which had been commonly used by Epipalaeolithic toolmakers of the X Basin and Z Basin naturally occur on the wadi bank, they were not exclusively used. Many cores are so fragmentary that it is not easy to imagine the original shape of cobbles, but it seems that the most commonly used cobbles are rounded and weathered/abraded, flat and oval cobble, or irregularly-shaped or subangular cobbles. It is probable that the sources of these cobbles are Pliocene gravel deposits which are to the south and northeast of Ilwet Hialla (Sandford and Arkell 1929: 16-22).

Several isolated Epipalaeolithic finds along a wadi have already indicated that Epipalaeolithic people had passed through the wadi while making and using flint tools, but a concentration of lithic artefacts at a location on the wadi bank very far to the north of the lake substantiates that Epipalaeolithic people did stop and stay at such a distant locality. Considering this odd situation and the location with a fine view, it is most likely that this was a watching station or hunting stand, where Epipalaeolithic hunters sat down and made tools while watching for game animals in the wadi. These findings require reconsideration of the subsistence and mobility strategies of Fayum Epipalaeolithic people.

It must be considered that the Epipalaeolithic people who resided on the lakeshore had sometimes organised long distance hunting and monitoring trips to the wadi. A concentration of lithic debitage products at a wadi locality strongly suggests that people did not bring ready-made tools, but brought raw materials there from elsewhere and made tools as the occasion arose. As mentioned above, provided that sources of the raw materials may be located further to the east and northeast of the locality, it can be said that lithic raw material procurement was combined with, or embedded in, hunting and monitoring trips. This means that their hunting did not entail desperate stalking but was on an ambush basis. The rarity of backed blades which must have been made from large cobbles at this locality suggests that finished tools were taken away with

Table 10. Cores and debitage products from a watching station in Wadi B

	n	%
single platform core	21	87,50
multiple platform core	3	12,50
total	24	100,00

Cores

	n	%
core tablet	2	2,63
primary chunk	4	5,26
chip/chunk	9	11,84
primary flake	7	9,21
flake from single platform core	22	28,95
flake from opposed platform core	1	1,32
flake from ninety-degree core	1	1,32
flake from multiple platform core	7	9,21
primary blade/bladelet	2	2,63
blade/bladelet from single platform core	17	22,37
blade/bladelet from opposed platform core	1	1,32
blade/bladelet from multiple platform core	2	2,63
unidentifiable blade/bladelet	1	1,32
total	76	100,00

Debitage products

	n	mean (cm)	st.dev
length	4	2,43	0,61
width	4	4,00	0,42
thickness	4	2,98	1,29

Metric data of measured cores on pebbles

	n	mean (cm)	st.dev
length	2	2,25	0,05
width	2	2,85	0,25
thickness	2	3,30	0,50

Metric data of measured cores on conical or hemispherical primary fragments of pebbles

	n	mean (cm)	st.dev
length	7	2,94	0,76
width	7	3,07	0,77
thickness	7	2,40	1,00

Metric data of measured cores on pebble fragments

	n	mean (cm)	st.dev
length	11	3,81	1,53
width	11	3,56	0,79
thickness	11	2,25	0,52

Metric data of measured cores on fragments of cobbles

	n	mean (cm)	st.dev
length	38	3,85	0,94
width	38	2,47	0,78
thickness	38	1,00	0,61

Metric data of measured debitage products

the hunters to their lakeshore habitat. This can explain the presence of backed blades and the absence or rarity of associated large cores for blade production in the X Basin and Z Basin sites.

As mentioned above, this wadi locality is approximately 15 km far away from the nearest Epipalaeolithic habitation localities on the lakeshore, and there is no permanent standing water around the wadi locality. Therefore, it is assumed that the people could visit this wadi locality only when sufficient surface water became available by winter rain, and that hunting in the wadi was basically a winter activity and the appearance of game animals was predictable. Since no similar localities were found in the vicinity, it is unlikely that their visit to this wadi locality was the seasonal migration by the entire group of people who usually inhabited the lakeshore. It is more likely that a small task group was sent off to the wadi locality from

the lakeshore habitat, and the majority of people remained on the lakeshore. As ethnoarchaeological studies have suggested, a watching station or hunting stand was primarily an information gathering location, and hence animals were rarely killed directly from such a place, and the place was not necessarily the place for consumption of hunted animals (Binford 1978). Therefore, there may probably be the remains of butchering or camping in the wadi, but large portions of meat must have been transported to the lakeshore residential base.

Summary

In summary, two things must be stressed. The first thing is regarding the lithic technological organisation and mobility of Fayum Epipalaeolithic people. Although the sampling method and the size of sample were not consistent between sites studied, the collected data gave some new ideas about the similarity and variability in the uses of lithic raw materials and core reduction techniques in the Fayum Epipalaeolithic. Particularly, knowledge was augmented and strengthened by the information about what kind of flint pebbles and cobbles had preferentially been procured, from which sources, and how they had actually been knapped and discarded.

This information made it possible to consider life of Fayum Epipalaeolithic people in terms of their adaptive subsistence strategies. The location of Site E29H1, Camp II and Site Z suggests that the major subsistence activities were the exploitation of resources on the gently-inclined basin shores and in the shallow water. The natural condition of the sites on sandy basin shores, which are devoid of rock materials like flint pebbles and cobbles suitable for tool making and limestone/sandstone cobbles suitable for hearth making, as well as the presence of unused flint pebbles and a large number of lithic debitage products at the sites suggests that the whole lithic reduction sequence took place there, and that the site occupants recognised it adaptive and optimal to bring all necessary materials to the sites from somewhere else and to prepare for food procurement and consumption at the sites. This is opposed to making necessary tools in advance of visiting the sites, exploiting food resources at the sites, and then taking them away immediately back to their residential bases elsewhere. If they had gone hunting on a desperate stalking basis, or if they had been under time stress to exploit available food resources as quickly as possible, they could not have afforded to sit down and to start making tools upon arrival at the sites.

The fact that people could afford to start making tools at the sites suggests that the wild food resources which they exploited were predictable, stable, and not easily depleted, and that their exploiting strategy entailed watching, ambushing

and trapping, and not stalking. Fishing and fowling, which have been considered as the major subsistence of Fayum Epipalaeolithic people, are surely the activities achieved through watching, ambushing and trapping. As for mammals, it is possible that the sedentary mammals like wild cattle and hartebeest were hunted by the people in the same manner.

There is no reason to believe that the Epipalaeolithic people who resided in the X Basin and Z Basin travelled so far westwards as to the escarpments of Qasr el-Sagha and Gebel Qatrani in order to procure flint pebbles, because these escarpments are not the sole sources and similar flint pebbles are readily available on the gravelly escarpments to the north of the X Basin and Z Basin. Therefore, contrary to the previous idea about the source of flint in the Fayum, it must be emphasised that the procurement of flint pebbles in the Fayum Epipalaeolithic did not necessarily entail long distance trips. People could actually procure flint pebbles within easy walking distance from their subsistence loci. Considering the small size and light weight of flint pebbles and the short distance to the supposed sources, transporting a whole handful of flint pebbles repeatedly to subsistence loci would not have been burdensome. On the other hand, as is suggested by a watching station in a wadi far away from the lakeshore, it seems that flint cobble procurement was combined with, or embedded in, long distance hunting and monitoring trips by a small group of persons who were dispatched from the lakeshore habitat. This implies a logistical manner of mobility by people who maintained their residential bases on the lakeshore.

It is also significant to consider life in the Fayum Epipalaeolithic in terms of the disposal acts of site occupants. Concentrations of lithic debitage products seen at Site E29H1 and Site Z seem to be a clear indication of collective dumping acts by toolmakers. Lithic debitage dumping acts are quite normal if people stay at a site continuously, because the scatter of debitage products on the living floor is dangerous to their bare feet. Therefore, lithic debitage dumping acts may be regarded as evidence for the long stay of the site occupants.

The second thing which must be stressed in this summary is regarding the chronology of the Fayum Epipalaeolithic. As far as the Fayum Epipalaeolithic assemblages published so far are concerned, they look isolated from other contemporaneous lithic assemblages in neighbouring regions. However, some newly-discovered artefacts suggest cultural connections between Fayum inhabitants and its neighbours. The Ounan points in the Fayum are good indicators of such connections within North Africa. On the other hand, the presence of unifacially/bifacially retouched, tanged or leaf-shaped small projectile points in the Fayum are more difficult to understand without reliable radiocarbon dates. It is possible

that they fall in the early-middle 6th millennium cal.BC and hence that they are included in the Fayum Neolithic. However, it is not surprising if they already appeared in the Fayum in the second half of the 7th millennium cal.BC, given the fact that similar artefacts started to appear in the southern Levant and the Egyptian Western Desert in the second half of the 7th millennium cal.BC. When their presence in the Fayum in the second half of the 7th millennium cal.BC is substantiated, the presently-known time span and definition of the Fayum Epipalaeolithic culture may have to be reconsidered, because it is unreasonable to say that an 'Epipalaeolithic' culture with such artefacts persisted until the end of the 7th millennium cal.BC. It is a future task to find well-dated artefacts in the Fayum.

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