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The archaeology of the first farmer-herders in Egypt : new insights into the Fayum Epipalaeolithic and Neolithic

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3. Background to research in the Fayum

3.1. Introduction

The Fayum has been a focus of scholarly research for a hundred years, and the sequence of human occupation ranging from the Palaeolithic to the Roman period has been revealed. Among the periods, the Epipalaeolithic and Neolithic are of great importance not only in terms of regional history but also in terms of the history of Egypt. The beginning of wheat/barley farming was attested first in the Fayum, in association with other new elements like cattle herding and pottery production, which may have derived from the Western Desert, and sheep/goat herding, which surely derived from the southern Levant but may have arrived in the Western Desert earlier than it did in the Fayum. Therefore, the Fayum Neolithic must be viewed as a unique culture at the intersection of one route from the southwest, and another from the northeast (Midant-Reynes 2000: 106). Any arguments concerning the beginning of wheat/barley farming in combination with animal herding in Egypt must rely on the Fayum data.

This chapter will firstly summarise the Fayum geography and geology and will review the history of academic research on the prehistoric Fayum and current discussions on the Epipalaeolithic-Neolithic sequence there. Secondly, on the basis of ecological and archaeological data obtained by previous research, local factors for the transition to food production in the Neolithic will be investigated in detail. Lastly, following these investigations, strategies for new research will be presented.

3.2. The Fayum geography and geology

The Fayum is located approximately 60 km to the southwest of Cairo. The Fayum Depression, covering an area of approximately 12000 km^2, is a circular depression carved out of the Middle-Upper Eocene bedrock of the Western Desert, and is bounded by cliffs on all sides (**Fig.3.1**). In particular, the northern ridge of the depression is marked by a huge, vertical scarp, and it attains the highest elevation above the floor of the depression. Most of the scarp face and the low-lying pediplain surface in the northern part of the Depression are the Upper Eocene bedrock.

According to geology (**Fig.3.2**), the Upper Eocene bedrock consists of the Birket Qarun Formation and the overlying Qasr el-Sagha Formation. The Birket Qarun Formation is composed mainly of calcareous sandstone and sandy limestone and is approximately 50 m thick, whereas the Qasr el-Sagha Formation is made up of four interfingering fossiliferous limestone-shale-sandstone facies and is approximately 180 m thick. The Oligocene beds of the Gebel Qatrani Formation are also exposed in the north of the Depression, overlying the Qasr el-Sagha Formation, and are formed of variegated sandstone with alternating shale and calcareous grit beds. The top of the Oligocene formation at the northern ridge of the Depression is capped by extensive basalt sheets. Overlying the basalt sheet, there is a series of Miocene red sand and gravel containing petrified wood trunks (Gingerich 1993; Issawi 1976: 152-153; Said 1993: 78-81; Van Couvering and Harris 1991; Wanas 2008: 41-43).

The western and southern scarps are much lower in height and are more dissected than the northern scarp, and the Middle Eocene bedrock is widely exposed. The terminology and divisions of the Middle Eocene formations in the Fayum have been changed due to the development of geological and palaeontological research in the last hundred years, and there still seems to be no agreement in the usage of terms among geologists and palaeontologists. The

Middle Eocene bedrock in the western and southern scarps consists of the Wadi Rayan Formation and the overlying Gehannam Formation. The Wadi Rayan Formation consists of hard limestone and is approximately 130 m thick, whereas the Gehannam Formation consists of gypseous shale, marl and limestone, and is approximately 50 m thick (Issawi 1976: 152-153; Said 1990: 451-486; Said 1993: 78-81; Wanas 2008: 41-43). The eastern ridge of the depression, which is formed of the Gehannam Formation and is called the Nile-Fayum Divide, is covered by Pliocene and Pleistocene gravel and gypseous deposits (Aref 2003; Bussemer *et al.* 2006; Mohamed 2003; Sandford and Arkell 1929: 5-10).

The Nile-Fayum Divide is approximately 5-15 km away from the Nile, and is breached by the Hawara Channel. Through this channel, the Nile water has flown to the depression and converted it into a lake. But the water could not flow back to the Nile, because the bottom of the depression is much lower than the Nile bed. Due to its proximity to the Nile and its reliance on Nile water and mud supply, the Fayum has had almost the same natural environment as the Nile

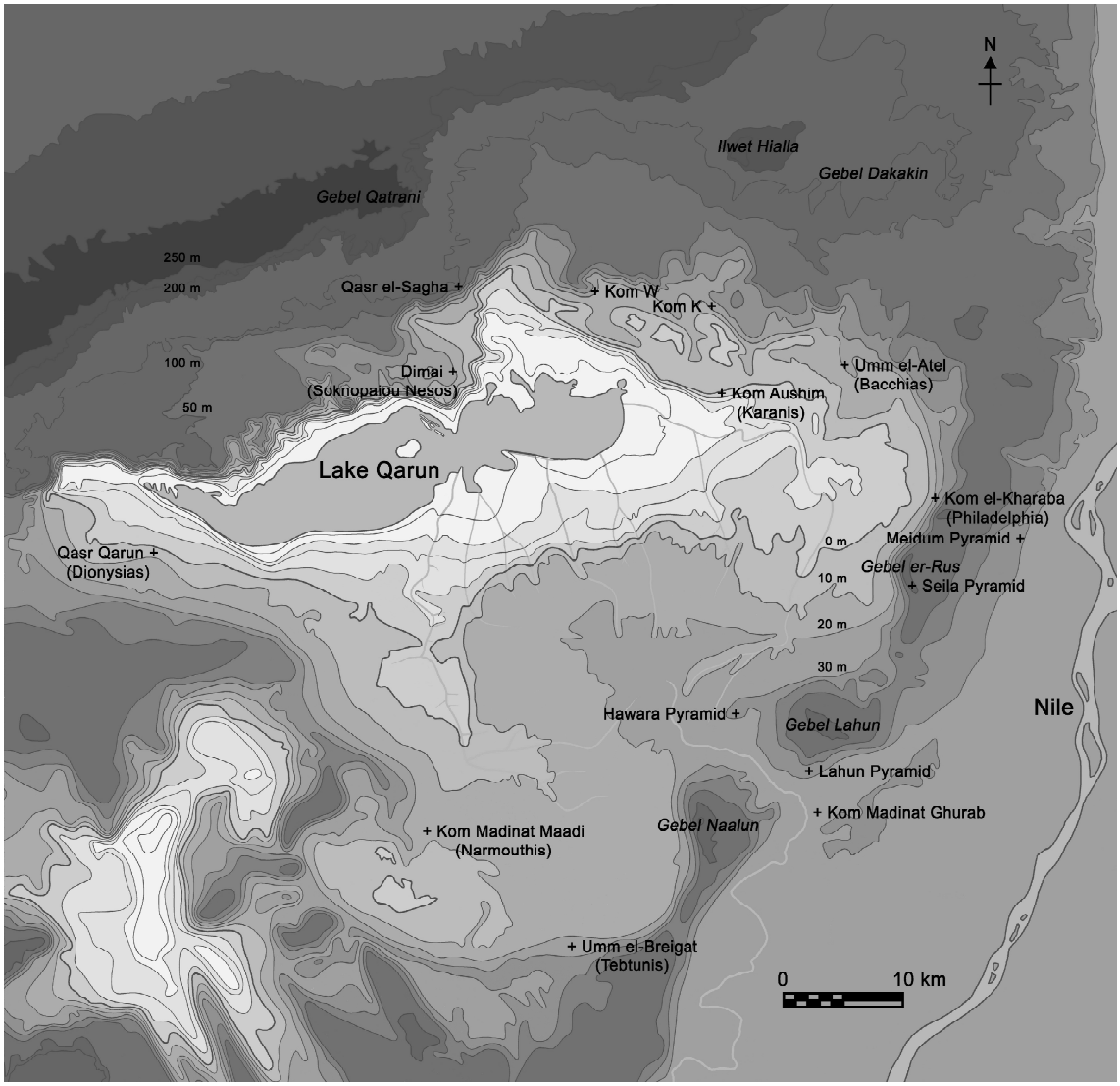


Fig.3.1. Geographical map of the Fayum



Fig.3.2. Geological map of the Fayum

Valley. The floor of the depression forms an undulating plain and its elevation ranges from 0 m up to 30 m above sea level. The surface of the plain is covered by Quaternary deposits like freshwater lacustrine sediments, diatomites, silt, gravel sheets, and deflated sand. They were deposited for the most part in the form of a lake-delta spreading out fan-wise from the point where the Nile water entered the Fayum Depression. The thickness of the deposits above the bedrock is approximately 8 m. The plain rises gradually toward its periphery and forms a series of terraces at various heights, ranging up to more than 40 m above sea level. These terraces mark the shorelines of an inland freshwater lake which was fed by the Nile and stood at different levels at different times. Studies of the various terraces have indicated that the Fayum Depression had already been hollowed out to its full depth before the Nile obtained access to it, and that the breaking of the Nile into the Fayum Depression and the consequent formation of the lake took place after the Pliocene. Thereafter, the level, area, and volume of the lake underwent a complicated succession of variations due to changes in the level of the Nile (Ball 1939: 33-35; Said 1993: 80-81).

At present, the Fayum is a large depression, and its lowest northwestern part is occupied by a brackish lake called Lake Qarun or Birket el-Qarun, which is 44 m below sea level and is approximately 200 km^2 in area. While the fertile southern half of the depression, which is approximately 1700 km^2, has been irrigated by canals and heavily cultivated, marginal desert and rocky terrains of the depression, which are the major natural features particularly on the north side of the lake, have remained undisturbed. Many archaeological sites dating from the Epipalaeolithic to the Ptolemaic and Roman periods have been better preserved on the north side of the lake, and hence research has concentrated on this terrain.

3.3. History of archaeological field research in the Fayum

3.3.1. The age of the antiquarians

The marginal desert plains of the Fayum Depression have been well known for the surface scatter of beautifully-made flint tools. Such tools had been collected and sold at antiquities markets by local people since the 19th century. Due to these circumstances, French and British antiquarians and early archaeologists had been drawn to the Fayum with curiosity, but they started to collect flint tools on the north side of Lake Qarun in a rather scholarly manner.

De Morgan, Reygasse and Seymour de Ricci are amongst French antiquarians who were active in the late 19th - early 20th centuries, and many of their collections are presently housed in the National Antiquities Museum of Saint-Germain en Laye near Paris (Beck and Amiet 1982: 78-95). Petrie, Randall-McIver, John Evans (father of Arthur Evans), Seton-Karr, Ruffer and Gayer-Anderson are among British people who were active in the late 19th - early 20th centuries, and they proudly donated their collections of flint tools to museums in Britain such as the Pitt-Rivers Museum and the Ashmolean Museum in Oxford. Seton-Karr was the most generous person, and after he left part of his collection to the Egyptian Museum in Cairo, the rest of his collection was distributed not only in Britain but also all over the world.

These early antiquarians had already recognised that carefully-retouched flint tools in their collections probably dated to the Neolithic period by analogy with the stone tools of the European stone age, and they published these flint tools as Neolithic artefacts. De Morgan's Fayum collection was published in a large volume as early as the 1890s and republished later (de Morgan 1896; 1926). Seton-Karr's Fayum collection was published in an authentic scholarly journal and the general catalogue of the Egyptian Museum in Cairo in the 1900s and 1910s (Seton-Karr 1904; 1905; Currelly 1913). However, it was not until the 1920s that the first modern academic investigations were carried out

by British scholars in the Fayum.

3.3.2. The first modern academic research in the 1920s and 1930s

Since it had already been recognised that geological information was essential for understanding the remote past of the Fayum, it was logical that the first comprehensive academic investigations in the Fayum were carried out by geologically-oriented archaeologists. A pioneering survey was conducted by a British geologist Beadnell of the Geological Survey of Egypt between 1898 and 1902 (Beadnell 1905). Thereafter, Caton-Thompson and Gardner focused on the Holocene geology and Neolithic human activities on the northern shore and southwestern shore of Lake Qarun, and carried out fieldwork under the auspices of the British School of Archaeology in Egypt and the Royal Anthropological Institute of Great Britain and Ireland (Caton-Thompson and Gardner 1934). Almost simultaneously, Sandford and Arkell were employed by the Oriental Institute of the University of Chicago and were asked to survey the eastern ridge of the Fayum Depression, which is called the Nile-Fayum Divide. They focused primarily on the Pliocene-Pleistocene geology and the earliest human activities (Sandford and Arkell 1929). As a result, the basic sequence of the Pleistocene and Holocene of the Fayum Depression in relation to the rise and fall of the lake level and the Nile level was reconstructed.

The fluctuations of the lake level have been a major focus of research since the initial work by Caton-Thompson and Gardner. Immediately after the publication of Caton-Thompson and Gardner's report, their ideas were re-examined at different locations of the Fayum by a geologist Little of the Geological Survey of Egypt (Little 1936). A further re-examination was attempted at different locations of the Fayum by Caton-Thompson and Gardner themselves with the help of a local geologist (Caton-Thompson *et al.* 1937). These works were later reviewed and reconsidered by a geologist Ball (1939).

While the survey by Sandford and Arkell has not yielded many archaeological finds, Caton-Thompson and Gardner carried out extensive surface survey and made good results in terms of the discovery of various archaeological sites dated from the Palaeolithic to the Roman period. While the southwest side of the lake was only briefly investigated, the north side of the lake was quite intensively investigated. Caton-Thompson and Gardner located a number of prehistoric artefact concentrations on the desert surface and gave them alphabetical site names, though they left several prehistoric sites unnamed but merely indicated them on their survey map.

The named and unnamed prehistoric sites on the northern shore of the lake are geographically divided into two clusters by a very large erosional basin named Moeris Bay (**Fig.3.3**). One cluster on the west side of Moeris Bay includes Site F, Site G, Site H, Site M, Site N, Site O, Site R, Site S, and Site T. It must be noted that Site N, Site O, Site R, Site S, and Site T are all located around the northern margin of a basin named the N Basin at the foot of the escarpment of Qasr el-Sagha, whereas Site F, Site G and Site H are located in a narrow strip of sandy beach farther to the southwest of the N Basin. Another cluster on the east side of Moeris Bay includes Kom K, Site K, Site L, Site V, Kom W, Site X, Site Z, Site ZI, Moeris I and Camp II. Many of these sites are also associated with basins in this area. Kom K and Site K are located at the northern margin of a basin named the K Basin. Site L is located at the northern margin of the L Basin. Site V, Kom W, Site Z, and Camp II are located at the northern and northeastern margins of the Z Basin. Site ZI and Moeris I are located on the northeast and eastern shores of Moeris Bay.

The most important discoveries on a desert ridge named the K Ridge to the north of the K Basin were two concentrations of storage pits named the Upper and Lower K Pits. Many of the pits were lined with matting, and some pits contained grains of domesticated wheat and barley. This is the sole place where grains of domesticated wheat and barley were found in a prehistoric context in the Fayum. Other important discoveries are a concentration of

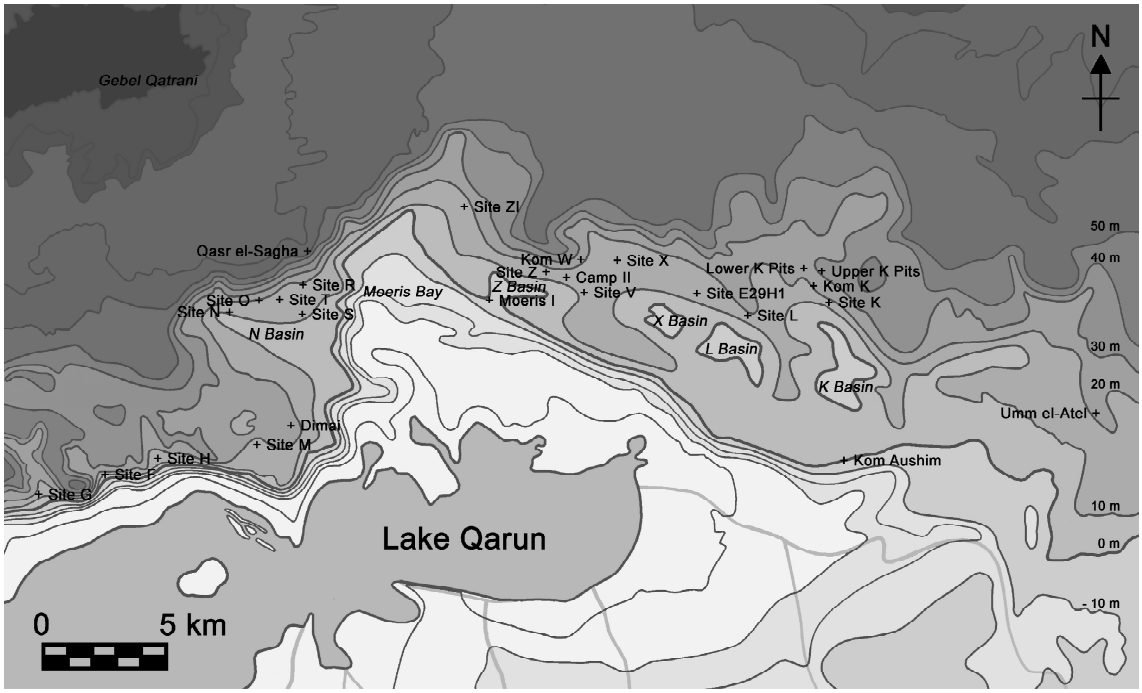


Fig.3.3. Map of Caton-Thompson's sites on the northern shore of Lake Qarun

fireholes excavated on a low, oval mound named Kom K in the vicinity of the K Ridge, and a similar site excavated at another low, oval mound named Kom W, which is 8 km to the west of Kom K. Both excavations yielded a large number of various pottery vessels, lithic artefacts and other categories of objects.

The study of artefacts obtained not only through excavations at Kom W, Kom K, and the Upper and Lower K Pits but also through surface collection at many other named and unnamed sites mentioned above helped Caton-Thompson recognise that the artefacts could be divided into two distinct prehistoric culture groups. One culture group, namely 'the Neolithic A group', is characterised by the presence of pottery vessels and bifacially-retouched flint tools and is associated with domesticates and granaries. Kom K and Kom W were regarded as the type sites of the Neolithic A group. Another culture group, namely 'the Neolithic B group', is characterised by the predominance of microlithic artefacts and the absence of pottery vessels and is not associated with domesticates. Therefore, the Neolithic B group was regarded as an impoverished culture.

It was also recognised that apart from the type sites of the A group culture, most other named sites often yielded mixed assemblages of the A group and B group artefacts, but that some unnamed and named sites at lower elevations of the lakeshore did not yield the A group artefacts. Since Caton-Thompson and Gardner assumed that the lake kept lowering through the Neolithic period, it followed that the sites located at lower elevations of the lakeshore should be later in date than those located at higher elevations. They concluded that the A group culture preceded the B group culture and that the A group people who had settled around the shores of the high lake had moved to lower elevations following the receding lake water and had culturally degenerated. Concerning the dating, Caton-Thompson speculated that the Fayum Neolithic culture would perhaps be dated to before 5000 BC and a total time span of the A group and B group cultures would be 800 years (Caton-Thompson and Gardner 1934: 93).

3.3.3. Resumption of research in the 1960s

There was a long interruption of scholarly research in the Fayum between the 1940s and the 1960s. According to my museum research, the Fayum was visited by renowned British anthropologists like Seligman and Evans-Pritchard during this period, and their stone tool collections are presently housed in the Pitt-Rivers Museum in Oxford. Even when Caton-Thompson and Gardner were still active in the Fayum in the 1920s-1930s, the Fayum was visited by a renowned American explorer De Prorok. He collected lithic artefacts at Kom Aushim and Qasr el-Sagha, and part of his collection is presently housed in the Egyptian Museum in Cairo. This means that the Fayum has been a popular flint hunting ground and thus has been plundered constantly.

Scholarly research in the Fayum was resumed in the late 1960s by the Sapienza University of Rome team led by Puglisi. He revisited not only the Nile-Fayum Divide surveyed by Sandford and Arkell but also several named and unnamed sites investigated by Caton-Thompson on the northeast side of the lake, and carried out surface collection of Palaeolithic, Neolithic and Predynastic stone tools (Puglisi 1967). Parts of his collection were later studied in detail by his fellow scholars (Casini 1984; Mussi *et al*. 1984). According to sketch maps (Casini 1984: fig.2; Mussi *et al*. 1984: fig.1), it seems that Puglisi visited Caton-Thompson's Kom K, Kom W, Site V, Site Z, Site ZI, Site M and other unnamed sites at lower elevations that are close to the present lakeshore, and gave them new names. For instance, Kom K was indicated as V, and Kom W was indicated as KW, and Site V was indicated as KI. Site Z was re-named as S4, and Site ZI was re-named as MB, and Site Moeris I was re-named as MOE.

Puglisi was soon followed by the Combined Prehistoric Expedition led by Wendorf and Schild. After the rescue campaign in Lower Nubia, Wendorf and Schild changed their direction to the downstream of the Nile, in order to strengthen their knowledge of the Pleistocene-Holocene archaeology and geology of the Nile Valley obtained in Lower Nubia, and took a trip to the Fayum for a geoarchaeological investigation in 1969. Although their fieldwork was short in time and their research area on the north side of the lake overlapped Caton-Thompson's survey area, this new research contributed to an important revision of the succession of the two prehistoric cultures identified by Caton-Thompson (Said *et al*. 1970; 1972; Wendorf and Schild 1976).

They revealed that the lacustrine deposits and shore features recorded at least four successive episodes of lake transgression in the Late Pleistocene and the Early-Middle Holocene. Lake Qarun, which presently occupies the northwestern part of the Fayum Depression, is the remnant of a larger lake called the Moeris Lake in the Ptolemaic period, and it has been known that the lake was much larger before the Ptolemaic period. According to the reconstruction by the Combined Prehistoric Expedition, the lake started its largest in the Pleistocene, and then has undergone repeated shrinking and expanding through the Holocene. The first highest lake in the Early Holocene is named the Paleomoeris Lake. The second highest is named the Premoeris Lake, and the third highest is named the Protomoeris Lake. The name of the Moeris Lake is assigned to the lake which has been present since the beginning of the Middle Holocene (**Fig.3.4**). These four successive lake stages are divided by sudden drops of water level. Contrary to Caton-Thompson's assumption that the lake kept lowering, their idea is that the lake level has risen and fallen repeatedly. Caton-Thompson's Neolithic B group culture was associated with the Premoeris and Protomoeris Lakes which were relatively low, and the Neolithic A group culture was associated with the Moeris Lake which was relatively high, suggesting that the Neolithic B group culture preceded the Neolithic A group culture. Subsequently, the Moeris Lake lowered temporarily, probably causing the decline of the Neolithic A group culture (Wendorf and Schild 1976: 222-226).

In addition, they excavated *in situ* flint tools at sites such as Site E29G1 (Caton-Thompson's

Site ZI), Site E29G3 (Caton-Thompson's Site R) and Site E29H1 (Caton-Thompson's unnamed site at the northeastern margin of the X Basin) (**Fig.3.3**), and concluded from the study of the assemblages that Caton-Thompson's Neolithic B group culture included mixed associations of Epipalaeolithic and Neolithic stone tools, and thus the B group culture was an invalid entity. They identified a purely Epipalaeolithic assemblage, and proposed to name it the Qarunian. On the basis of radiocarbon dates, they also argued a gap of approximately 1000 years between the Qarunian and the A group cultures. It was assumed that Qarunian people abandoned the Fayum due to the drying-up of the Protomoeris Lake, and new people with domesticates and new material items like pottery vessels migrated to occupy the Fayum as the Moeris Lake began to appear (Wendorf and Schild 1976: 311-319).

3.3.4. New research after the 1970s

The investigation by the Combined Prehistoric Expedition was followed by a joint team of the Jagiellonian University in Cracow and the

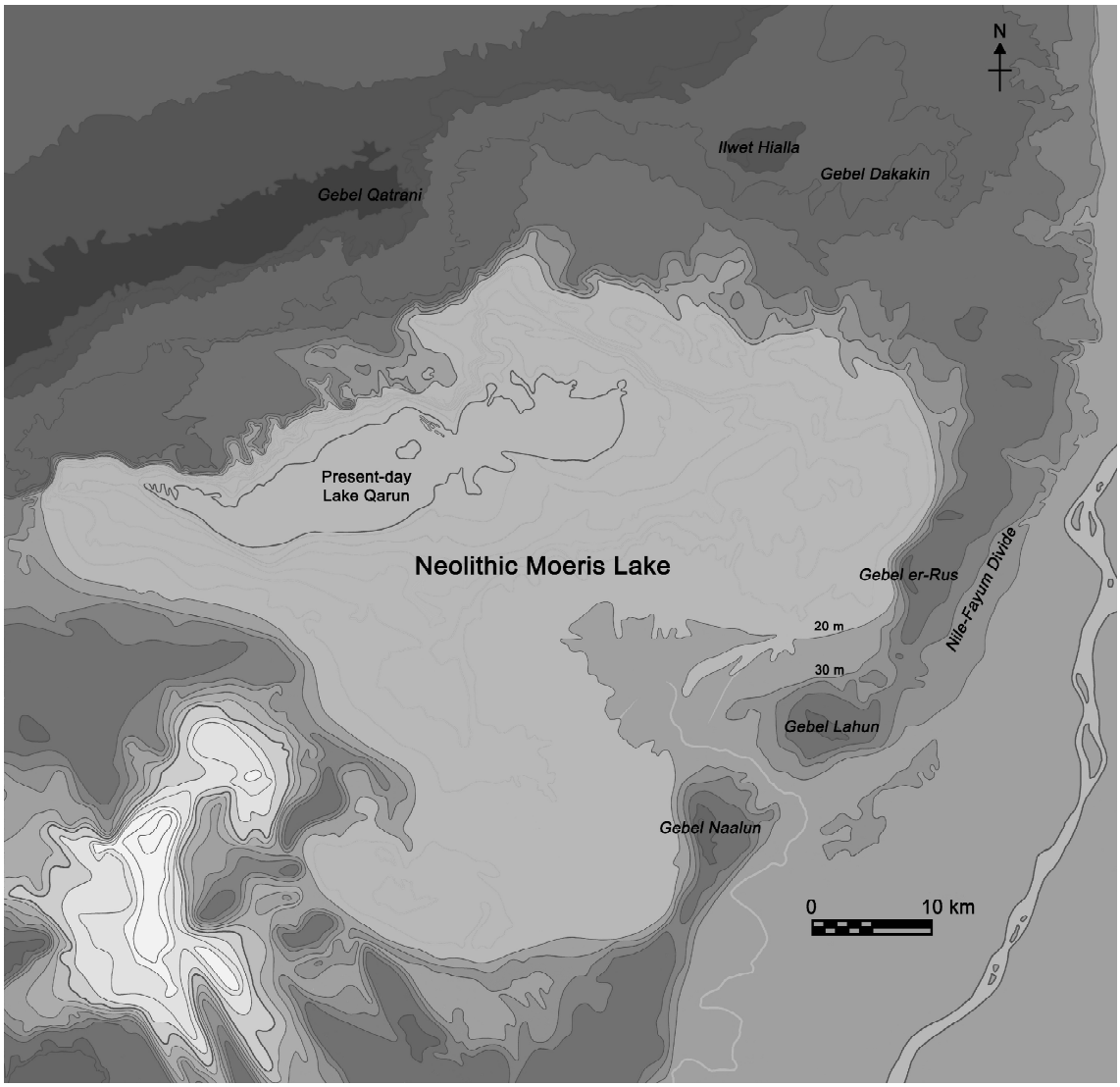


Fig.3.4. The maximum extent of Neolithic Moeris Lake in the Middle Holocene

German Archaeological Institute in Cairo led by Ginter and Kozlowski (Dagnan-Ginter *et al*. 1984; Ginter and Kozlowski 1983; 1986; Ginter *et al*. 1980). They conducted geological surveys and excavations around Qasr el-Sagha on the north side of Lake Qarun. Their sites, including QS I/79, QS V/79, QS VII/80, QS IX/81, QS XI/81 among others, are all located in the area named the N Basin which has intensively been investigated by Caton-Thompson and the Combined Prehistoric Expedition.

Based on the examination of stratigraphy and the associated inventories of stone tools and pottery types, they distinguished two phases of Neolithic culture and designated the earlier as the Fayumian culture and the later as the Moerian culture. While the Fayumian was associated with the episode of lake transgression and was equivalent to Caton-Thompson's Neolithic A group, the Moerian was associated with the episode of lake recession and was discerned from Caton-Thompson's Neolithic A and B group cultures. They also revealed that the previously-accepted view on the stone tool inventory of Caton-Thompson's Neolithic A group culture had been distorted by her selective collection of bifacial and core tools, and that the true Neolithic culture of the earlier phase included many flake tools as well. As for the Moerian, they revealed the occurrence of blade tools that showed affiliations with Epipalaeolithic techniques, and suggested the invasion of Saharan people with an Epipalaeolithic tradition into the Fayum after the decline of the Fayumian due to the lake recession.

They also reconstructed the lake level fluctuations in the Early-Middle Holocene based on the data obtained around Qasr el-Sagha (Kozlowski and Ginter 1989; 1993), but their reconstruction does not agree with the reconstruction published by Wendorf and Schild at many points, and gives the impression that the reconstruction by Wendorf and Schild was rather simplistic. For instance, while Wendorf and Schild's reconstruction suggested that the Neolithic A or Fayumian culture appeared and flourished when the lake was on a constantly rising trend, Ginter and Kozlowski's reconstruction indicated that the Fayumian culture appeared when the lake was on a lowering trend, and that it was in the middle of the Fayumian period when the lake level started to rise. Such disagreements clearly show the difficulty of reconstructing a general long-term fluctuation pattern on the basis of fragmented data obtained at a limited number of locations.

While previous scholars concentrated mainly on the north side or northeast side of Lake Qarun, the University of Washington team led by Wenke focused on the southwest side of the lake (Wenke 1984; Wenke and Casini 1989; Wenke *et al*. 1983; 1988), for the reason that there had been few reports of early sites on this side except for Caton-Thompson's Site J (**Fig.3.5**). Wenke's research was the second attempt to locate prehistoric sites on the south side of the lake since the first survey by Caton-Thompson. Wenke had been interested in general questions regarding the transition from hunting and gathering to farming and herding in a worldwide perspective, and had a strong motive to answer these questions by using the data obtained from the relatively undisturbed area of the Fayum.

His general questions about the beginning of farming and herding in Egypt include 1) when and how the first domesticates appeared in Egypt, 2) what kind of subsistence preceded farming and herding there, 3) whether Egyptian hunter-gatherers were converted to farmer-herders or were simply replaced by farmer-herders moving into Egypt from outside. Concerning the Fayum evidence, the foreign origin of farming and herding in the Fayum had already been suggested by Caton-Thompson. The reason for the late appearance of domesticates in the Fayum in contrast to the early use of domesticates in the Levant as well as the place of the ultimate origin of the Fayum culture had been the focus of debate. However, previous investigations in the Fayum had not clearly demonstrated what kind of resources other than domesticates were actually exploited by the inhabitants of the Fayum. Therefore, the research by Wenke and his associates in the Fayum was devoted to revealing subsistence changes, based mainly on the analysis of the distribution of

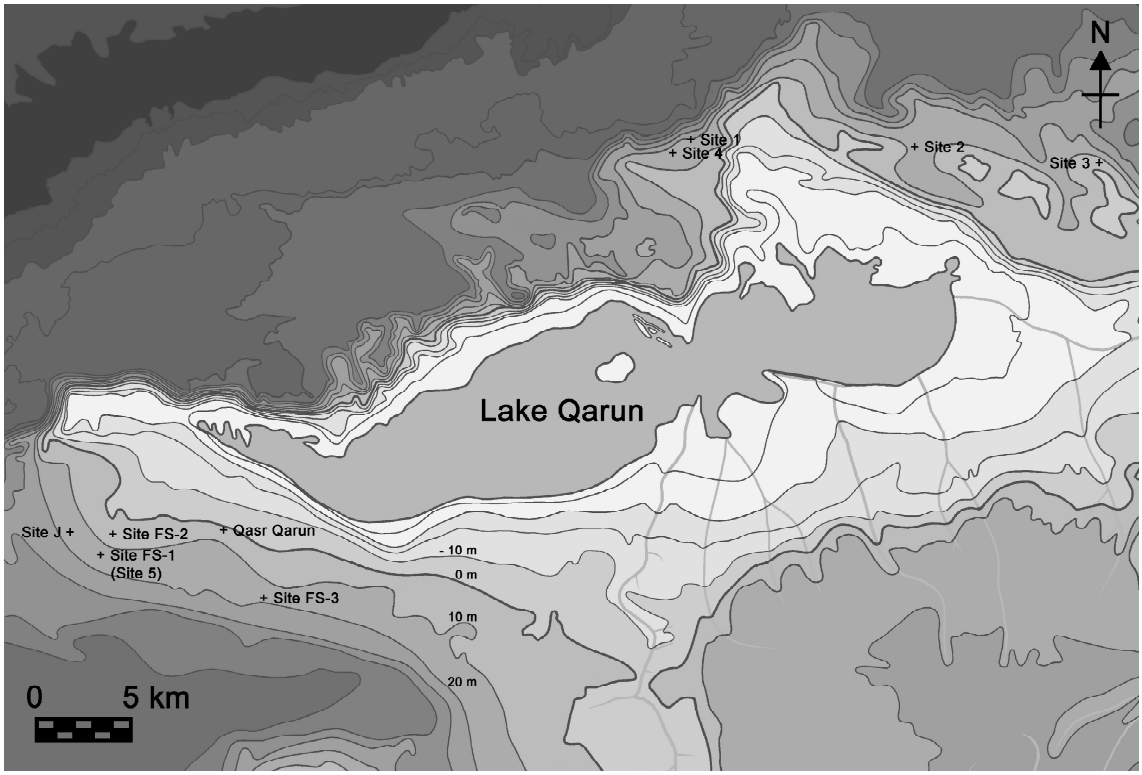


Fig.3.5. Map of Wenke's and Brewer's sites on the northern and southern shores of Lake Qarun

faunal remains and artefacts at Site FS-1, which was dated to the Neolithic, at Site FS-2, which was dated to the Epipalaeolithic, and at Site FS-3, which was dated to the Predynastic (Wenke 1984; Wenke *et al*. 1983) (**Fig.3.5**).

It was reported that in both the Epipalaeolithic and Neolithic periods, massive quantities of fish as well as mammals and waterfowl had been exploited, and that the exploited species had been almost the same in Epipalaeolithic and Neolithic sites. As for the use of domesticates in the Neolithic period, the evidence was scarce. Small quantities of domesticated cattle, sheep and goats indicated that these animals played a minor role in subsistence. Like previous investigations, they also could not find evidence for substantial dwellings in either period. In the end, they reached the same conclusion as their predecessors, that there was no direct cultural relationship between Epipalaeolithic and Neolithic inhabitants of the Fayum, and that it was difficult to trace a gradual change of subsistence besides the sudden addition of domesticates in the Neolithic period. Their theoretically-oriented investigation is remarkable, but their research was suspended, and their final report remains to be published. They did not answer clearly the questions they raised above, even though they discussed several possible reasons for the disruption between the Epipalaeolithic and Neolithic periods, and suggested several possible places of origin of the Fayum Neolithic (Wenke *et al*. 1988; Wenke and Casini 1989; Wenke and Brewer 1992).

Hassan, who was a geoarchaeologist in Wenke's team, published a reconstruction of lake level fluctuations in the Holocene, based mainly on the data obtained from the southwest side of the lake (Hassan 1986b). However, his reconstruction is even more schematic than those by the Combined Prehistoric Expedition and the Polish-German team mentioned earlier. The only agreement between these three different reconstructions is a remarkable drop of lake level

around 6000-5800 cal.BC. Therefore, it is not easy to understand precisely the long-term pattern of lake level fluctuations. Hassan's reconstruction of lake level fluctuations was recently reviewed and visualised through his new research in the Fayum, but there is no considerable modification to his previous reconstruction (Hassan *et al*. 2006).

A field survey which had especially focused on faunal remains on the surface was carried out by the zooarchaeologist Brewer in the late 1980s (Brewer 1989a; 1989b). Prehistoric faunal remains in the Fayum have long been a neglected area of study since Caton-Thompson briefly mentioned the discovery of the bones of pig, sheep or goat, ox, hippopotamus, canine, crocodile, turtle and Nile perch at Kom W (Caton-Thompson and Gardner 1934: 34). Faunal remains were also studied by a zooarchaeologist of the Combined Prehistoric Expedition (Gautier 1976b), but the sample studied was very small, and fish remains were not published. Brewer's research was more comprehensive in terms of the wider area coverage and the study of fish as well as terrestrial animals.

Brewer's survey was conducted independently on the north side of the lake and partially in cooperation with Wenke's team on the southwest side of the lake. Brewer studied five sites named Site 1 to Site 5, including four sites (Site 1 to Site 4) on the north side of the lake and one site (Site 5) on the southwest side of the lake (**Fig.3.5**). Site 4 in the N Basin is identical to Caton-Thompson's Site T which had been investigated by one of Wenke's associates but had not been published. Site 5 is identical to Wenke's Site FS-1 which had already been surface-collected. Therefore, faunal remains from Site 4 and Site 5 were used only in a supportive role. Site 3 at the northern margin of the K Basin yielded a very small sample. On the other hand, Site 1, which is identical to Caton-Thompson's Site R and the Combined Prehistoric Expedition's Site E29G3 at the northern margin of the N Basin and is dated to the Neolithic, and Site 2, which seems to be identical to the southernmost part of Caton-Thompson's Site V and is dated to the Epipalaeolithic, yielded a considerable number of faunal remains for a substantial analysis. Brewer revealed that fishing was the dominant subsistence activity throughout the Fayum Epipalaeolithic and Neolithic periods, and that both Epipalaeolithic and Neolithic people exploited the same species of fish and migratory waterfowl in similar relative abundances, using similar strategies during the same time of year. Considerable differences in lithic technology between the Fayum Epipalaeolithic and Neolithic despite the similar exploitative strategies for wild food resources in these two cultural groups made him agree with the idea suggested by Wendorf and Schild that the Fayum Neolithic represented an immigrant group possessing different cultural affinities than the Fayum Epipalaeolithic inhabitants (Brewer 1989b: 170).

Except for a short survey at three locations in the rocky and gravely terrains of the Fayum Depression for a lithic sourcing study along with an analysis of lithic artefacts which were surface-collected at Wenke's Site FS-1 and Site FS-2 on the southwest side of the lake by one of Wenke's associates in the early 1990s (Cagle 1994), archaeological field research that focuses on the prehistory of the Fayum has not been conducted in the last decade. Some excellent summaries of the prehistory of the Fayum have been published (*e.g*., Hendrickx and Vermeersch 2000; Midant-Reynes 2000; Wetterstrom 1993), but many questions have remained unanswered.

3.4. Holocene chronology and cultures of the Fayum

As mentioned, early investigators had already recognised that bifacial stone tools collected on the desert surface in the Fayum should be dated to the Neolithic period by analogy with the stone tools of the European stone age. However, it was not until the 1960s that radiocarbon dating in combination with stratigraphy was applied to the Fayum materials. Since then, the chronology and cultural development of prehistoric Fayum have been revised.

It must be stressed that Caton-Thompson's definition of the Fayum Neolithic A and B cultures is no longer valid, though still in use in many general books. The sequence of Early-Middle Holocene cultures in the Fayum is presently understood as; 1) the Qarunian (Fayum Epipalaeolithic), 2) the Fayumian (early Fayum Neolithic), and 3) the Moerian (late Fayum Neolithic), and 4) the Fayum Predynastic. It has been argued that the Fayumian should be regarded as the period when the first manifestation of a farming-herding culture appeared in Egypt, and that there was a hiatus between each period and no cultural connection with each other. Therefore, the emergence of each culture has generally been explained as the arrival of a new population caused by environmental amelioration in the Fayum, or desiccation in its surroundings, and the main focus of study has been on the ultimate origin of each culture. In the following, the features and radiocarbon dates of each culture are summarised.

3.4.1. The Qarunian

Qarunian sites have been located on the southwest side of the lake as well as on the north side of the lake. There are relatively many sites which are exclusively attributed to this culture, but some other sites which yielded the artefacts of the Qarunian also yielded the artefacts of later cultures. The elevation of Qarunian sites or the sites which yielded Qarunian artefacts ranges from approximately 5 m asl to 20 m asl. Qarunian sites have generally been reported as surface scatters of artefacts and animal/fish bone fragments, but the spatial extent and density of the artefact scatters are not equal between sites.

Among the sites on the north side of the lake, Site E29H1 in the X Basin exhibits a vast scatter of Epipalaeolithic artefacts on the gently sloping expanse of lacustrine sediments and occupies an elongated oval area of approximately 300 m by 100 m and of 15-17 m asl, overlain by a larger oval area of Neolithic artefact scatters. Site E29H1 seems to be the largest single scatter of Epipalaeolithic artefacts in the Fayum. Within the elongated oval area, Epipalaeolithic artifacts have been excavated *in situ* in small portions named Areas A and C, and surface-collected in Area B (Wendorf and Schild 1976: 182-199).

Site E29G1 (Caton-Thompson's Site ZI) on the east side of Moeris Bay comprises more than six artifact concentrations of around 20 m in diameter, which have been named Areas A to F respectively. The site occupies an area of approximately 700 m long and 120 m wide in total on the east slope of two deflated basins, and its elevation ranges from 10 m to 19 m asl. While Area D at high elevation exhibits a surface scatter of Neolithic artifacts, Epipalaeolithic artifacts have been excavated *in situ* in Areas A, B, E and F. An isolated human burial, which was supposed to be dated to the Epipalaeolithic, has been found near Area C (Henneberg *et al.* 1989; Wendorf and Schild 1976: 162-182). Site E29G3 (Caton-Thompson's Site R) in the N Basin exhibits a scatter of Epipalaeolithic artifacts on an eroded area of approximately 30 m in diameter and 10 m asl surrounded by a rock-capped L-shaped mound, which has been named Area A. Epipalaeolithic artifacts have been excavated *in situ* in Area A (Wendorf and Schild 1976: 199-208).

More sites on the north side of the lake include Site S4 (Caton-Thompson's Site Z) in the north of the Z Basin, Site MOE (Caton-Thompson's Moeris I) in the south of the Z Basin, and Site MB (Caton-Thompson's Site ZI, and Combined Prehistoric Expedition's Site E29G1) on the east side of Moeris Bay. A considerable number of Epipalaeolithic lithic artefacts were surface-collected at these sites (Mussi *et al*. 1984).

In contrast to the situation on the north side of the lake, only one site named Site FS-2 has been known on the southwest side of the lake. Site FS-2 is an area of vast artefact scatter at lower elevations of below 10 m asl on the gentle slope of lakeshore, and is separated from an area of Neolithic artefact scatter named Site FS-1 at higher elevations by a broad beach ridge. Site FS-2 covers the area of 600 m x 1200 m, but the density of surface artefacts and other archaeological remains in this entire area is not

clear from the incomplete publications. According to the publications, the surface of Site FS-2 is less severely deflated and hence better preserved than that of Site FS-1, but no structural remains have been found. An isolated human burial, which was supposed to be dated to the Epipalaeolithic, has been discovered in one excavation square of Site FS-2 (Wenke *et al*. 1983; 1988).

Although poorly published by the Combined Prehistoric Expedition, the lithic artefacts collected at Site E29G1, Site E29G3 and Site E29H1 are characterised by a very high frequency of various backed bladelets. It has been claimed that the lithic artefacts collected by Puglisi at Site S4, Site MOE and Site MB were different from those found at Site E29G1, Site E29G3 and Site E29H1 in terms of the tool type frequency. It has been supposed that the observed differences might reflect a different chronological position or a different range of tool-using activities (Mussi *et al.* 1984: 189). On the other hand, it has been argued that the Qarunian stone tool inventory has many features in common with those of the contemporaneous cultures in the Western Desert of Egypt but there are differences in tool type frequencies. Such differences are said to be because the Qarunian was especially adapted to the exploitation of lacustrine resources (Wenke *et al*. 1988: 37).

It has been revealed that the preferred lithic raw material utilised in Qarunian sites was small, rounded pebbles from the Oligocene conglomerate of the Gebel Qatrani Formation, which was extensively exposed on the plateau above Qasr el-Sagha (Wendorf and Schild 1976: 311). For the people who resided in the N Basin, this source area is certainly within an easy walking distance. However, it is far away from the Z Basin and X Basin, and no convincing evidence for the utilisation of the Gebel Qatrani pebbles by the people who resided at Site E29H1 in the X Basin has been provided. The Qarunian lithic artefacts will be described and discussed in more detail in Chapter 6.

The Qarunian has simple bone projectile points, but has no ground stone tools and no pottery vessels (Wenke *et al*. 1988: 34-38; Wendorf and Schild 1976: 311-319). A considerable amount of faunal remains has been found at Brewer's Site 2 and Wenke's Site FS-2. The faunal data strongly suggest that Qarunian people were mobile hunter-fishers particularly relying on fishing. On the other hand, there is scarce evidence of their exploitation of wild plants (Wetterstrom 1993: 186-191). The ecology and subsistence of the Qarunian will be described below in more detail.

As for the radiocarbon dates of the Qarunian, the following dates have been obtained from several sites. Most of the dated samples are charcoal, except for I-4129 which is said to be burnt shell, and Beta-4180 which is said to be bone. They have been calibrated by using the calibration curve available at that time and published (Hassan 1986b: 487*ff*; 1988: table II; Hendrickx 1999: 34; Pazdur 1983: table 18; Wendorf and Schild 1976: 162-207; Wenke *et al*. 1983: table 1). Based on the dates, the time span of the Qarunian has previously been understood as 7100-6000 cal.BC (Hassan 1988: 142-143 and fig.2). These dates can be re-calibrated by using the latest calibration software OxCal ver.4.0 (Bronk Lamsey 1995; 2001) (**Table 3.1**).

Taking the 95.4 % probability (2 sigma), the possible latest date of the Qarunian is 5749 cal.BC on the sample I-4129. However, as mentioned above, this sample is burnt shell. It is well known that shell is a problematic material for radiocarbon dating, and that it can provide too old radiocarbon ages due to reservoir effects and/or carbon isotope fractionation (Rapp and Hill 1998: 166-168). Therefore, it is highly probable that the calibrated age estimate of the sample I-4129 is wrong. It is safe to take the second latest calibrated date on charcoal (I-4130) and to presume that the time span of the Qarunian is approximately 7530-6090 cal.BC.

3.4.2. The Fayumian

Fayumian sites have also been located on the southwest side of the lake as well as the northeast side of the lake. There are only a few sites which are exclusively attributed to this culture, and

Site E29H1, Area A, Trench 1, layer 2	**8070±115 BP (I-4126)**	7347 cal.BC (95.4%) 6656 cal.BC	OxCal <IntCal04>
Site E29G1, Area A, Trench 1, layer 3	**8100±130 BP (I-4128)**	7382 cal.BC (91.8%) 6684 cal.BC	OxCal <IntCal04>
Site E29G1, Area E, Trench 4, layer 2	**7140±120 BP (I-4129)**	6238 cal.BC (95.4%) 5749 cal.BC	OxCal <IntCal04>
Site E29G3, Area A, Trench 5	**7500±125 BP (I-4130)**	6592 cal.BC (95.4%) 6094 cal.BC	OxCal <IntCal04>
Site QS II/79, Hearth No.2	**7440±60 BP (Bln-2336)**	6438 cal.BC (95.4%) 6213 cal.BC	OxCal <IntCal04>
Site FS-2, TS-8, level 2	**8220±105 BP (Beta-4871)**	7531 cal.BC (95.2%) 7031 cal.BC	OxCal <IntCal04>
Site FS-2, TS-12, level 4	**7720±70 BP (Beta-4872)**	6680 cal.BC (95.4%) 6441 cal.BC	OxCal <IntCal04>
Site FS-2	**7600±70 BP (Beta-4180)**	6600 cal.BC (91.8%) 6352 cal.BC	OxCal <IntCal04>

Table 3.1. Radiocarbon dates of the Qarunian

many other sites which yielded the artefacts of the Fayumian often yielded the artefacts of earlier or later cultures as well. The elevation of Fayumian sites or the sites which yielded Fayumian artefacts ranges from approximately 13 m asl to 20 m asl.

The largest habitation site of the Fayumian is Kom W, which is a low, oval mound of approximately 90 m by 150 m, and its top elevation is approximately 22 m asl (**Fig.3.6**). Its cultural deposit was 1.5 m thick at most beneath the surface and was not well stratified. Hundreds of fireholes and a variety of artefacts were excavated in high density, but the artefacts were uniform from the top to bottom of the deposit (Caton-Thompson and Gardner 1934: 22-25). A similar habitation site is Kom K, which is also a low, oval mound of approximately 50 m by 80 m, and its top elevation is approximately 20 m asl (**Fig.3.7**). Its cultural deposit was only 30 cm think beneath the surface. Kom K was not thoroughly excavated, and hence only 16 fireholes were found. The artefacts found at Kom K are quite similar to those at Kom W (Caton-Thompson and Gardner 1934: 37-41). No substantial dwellings have been found at these Kom sites, and thus scholars have been reluctant to call them sedentary settlements and have assumed that they were more than just seasonal encampments (Hassan 1988: 149-150; Wenke *et al*. 1988: 44*ff*). It remains uncertain whether Fayumian people were sedentary. In the neighbourhood of Kom K, a cluster of pits containing grains of domesticated wheat and barley at the Upper and Lower K Pits were located, and one pit contained a complete sickle (Caton-Thompson and Gardner 1934: 41-54 and pls.XXIV-XXXI). The grains and the sickle are the most obvious evidence for farming in the Fayum. Grains of domesticated wheat and barley have not been found at any other Fayumian sites so far.

By contrast, most of the other sites on the east side of Moeris Bay have been reported as scatters of stone tools, pottery sherds and animal/fish bone fragments on the deflated plain desert surface and as not exhibiting features like mounds of cultural deposits. However, their spatial extent tends to be comparable to or wider than Kom W. For instance, Caton-Thompson's Site X is located on the west side of a wadi mouth draining to the X Basin and seems to occupy an area of approximately 300 m in diameter at elevations from 15 m to 18 m asl. It was littered with stone tools and grinding stones, but no structural remains like hearths or pits were found (Caton-Thompson and Gardner 1934: 74-75). Caton-Thompson's Site V is located on a peninsula-like natural mound of approximately 17 m asl and seems to occupy an elongated area of approximately 200 m x 400 m. It was strewn with pottery sherds and ostrich eggshell chips, and some sunken pottery vessels *in situ* were found, but no structural remains like hearths were noted (Caton-Thompson and Gardner 1934: 75-76).

The conditions of surface sites seem to be almost the same on the west side of Moeris Bay. Site E29G3 Area B is approximately 80 m to the west of an Epipalaeolithic site named Site E29G3 Area A. The Area B occupies a roughly oval area of approximately 100 m x 60 m at elevations from 13 m to 15 m asl, and exhibits an extensive concentration of Neolithic lithic

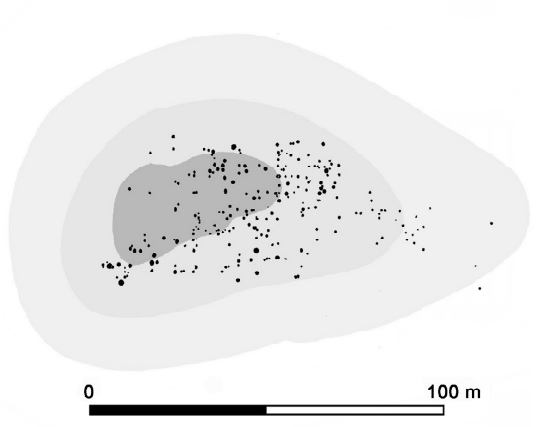


Fig.3.6. Kom W (Black dots indicate fireholes. The vertical interval is 1.8 m)

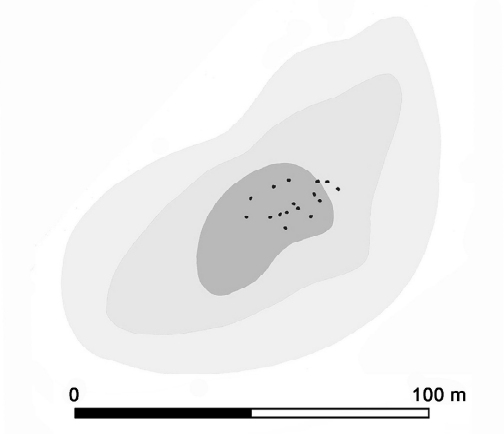


Fig.3.7. Kom K (Black dots indicate fireholes. The vertical interval is 0.6 m)

artefacts, pottery sherds and bone fragments as well as at least 17 hearths in two or three clusters on the deflated surface (Wendorf and Schild 1976: 199-211). Site QS I/79, Site QS V/79, Site QS IX/81, Site QS X/81 and Site QS XI/81 are all located in the neighbourhood of Site E29G3 in the N Basin at the foot of the Qasr el-Sagha escarpment, and their elevation is approximately 14-16 m asl. These sites were exposed in excavation trenches and were marked by the presence of hearths accompanied by lithic artefacts, pottery sherds and animal/fish bones and their fragments, but the spatial extent of individual sites is not clear due to the limited scale of excavations. There is no evidence for farming activities, whereas domesticated sheep and goats were certainly present (Dagnan-Ginter *et al*. 1984; Ginter and Kozlowski 1986: 14-19; Ginter *et al*. 1980; Kozlowski and Ginter 1989: 163*ff*).

Site FS-1 is the sole Neolithic site known on the southwest side of the lake. It was an area of vast artefact scatter at higher elevations of above 14 m asl on the gentle slope of the lakeshore, and was separated from an area of Epipalaeolithic artefact scatter named Site FS-2 at lower elevations by a broad beach ridge. Site FS-1 covers an area of 900 m x 1100 m, and the spatial distribution of surface artefacts like grinding stones, sickle blades, projectile points and pottery sherds in this entire area was made clear by an intensive transect survey. According to the publications, the surface of Site FS-1 was severely deflated. However, in some areas, the surface was littered with tiny, fragile fish bone fragments, and lithic artefacts and stone-built hearths with ash and charcoal were found embedded in diatomaceous lake sediments. Furthermore, the surface exhibited several remarkable artefact concentrations, and these were interpreted as residential areas, cereal processing areas, and hunting areas (Wenke *et al*. 1983; 1988).

The appearance of bifacially-retouched, formal flint tools like axes, serrated sickle blades and concave-based arrowheads is a hallmark of the Fayumian culture. While it has been described by Caton-Thompson that bifacially-retouched, formal flint tools were predominant in the Fayum Neolithic, it has been argued later that such tools were minor components of the Fayum Neolithic lithic assemblage and that the majority of lithic artefacts were actually crude flake tools (Kozlowski and Ginter 1989: 170-173). Nevertheless, bifacially-retouched, formal flint tools are certainly characteristics of the Fayumian culture, and they are quite distinct from the preceding Qarunian lithic artefacts in terms of raw material use, knapping and retouching techniques, and tool size and morphology.

Besides flint tools, bone tools were also used.

In addition to simple bone projectile points, double-pointed ones which seem to be used as bevelled self-barbed projectile points, and bone harpoons with several barbs are included in the findings (Caton-Thompson and Gardner 1934: 22, 33, 78, pls.XII and XLVII). They show a remarkable development from Epipalaeolithic bone tools. It is evident from the tool inventory and faunal assemblages that Fayumian people still relied heavily on hunting and fishing. The ecology and subsistence of the Fayumian will be described below in more detail.

The appearance of pottery vessels is another hallmark of the Fayumian culture. The pottery is made from local clay and shale, and fibre-tempered. It is handmade and is usually very thick. The rims are simple and direct, and the bases are flat or rounded. Hemispherical bowls and tall bag-shaped jars are the most common pottery types at Kom K, Kom W and the K Pits, and flat plates and miniature vessels with pedestals are also noticeable. No pottery with incised or painted decoration has been found, though a limited number of pieces were red-slipped and burnished (Caton-Thompson and Gardner 1934: 35-37, 41, 44-45 and pls.XIII-XX). It is argued that the pottery from Site E29G3 Area B is not identical to that excavated at Kom K and Kom W because the pottery vessels are small and sand-tempered (Wendorf and Schild 1976: 199), whereas another study of pottery sherds collected in the N Basin area revealed that the mineral composition of the fabric and the method and temperature of firing were various though the basic shapes of vessels were similar to those at Kom K, Kom W and the K Pits (Kozlowski and Ginter 1989: 166).

The appearance of grinding stones and grinders is a further hallmark of the Fayumian culture. It has been reported that many of these found at Kom W were made of limestone and grit. There is no detailed description of the morphology of grinding stones, but it seems that one face of a large slab is usually depressed due to heavy use (Caton-Thompson and Gardner 1934: 31-32 and pl.VII). Similar grinding stones and grinders seem to have been found sporadically at surface sites around the Z Basin and in the N Basin on the northern shore, and they were numerous at Site FS-1 on the southwestern shore (Caton-Thompson and Gardner 1934: 71-86; Wenke *et al.*, 1983: 27*ff*; 1988: 39-40). Although grinding stones have not been found in association with any plant remains, grinding stones tend to be associated with cereal processing (Wenke *et al*., 1988: 39).

The appearance of non-local material items is also noticeable in the Fayumian culture. Caton-Thompson has described various material items and their possible sources. Particularly exotic materials include diorite from Nubia, which was used for making axes and palettes, feldspar from the Eastern Desert, which was used for making beads, unworked turquoise pebble from Sinai, and marine shells from the Red Sea and Mediterranean Sea, which were used as ornaments (Caton-Thompson and Gardner 1934: 87-88). They suggest that long distance exchange/trade networks developed in this period. Other raw materials which were commonly used by Fayum Neolithic people and were said to be local by Caton-Thompson include dolerite, flint, grit, petrified wood, limestone, and volcanic ash (Caton-Thompson and Gardner 1934: 87). However, these materials actually occur in the gravelly and rocky terrains in the periphery of the Fayum Depression. Hence it is certain that the Fayum Neolithic people who resided in the sites near former lakeshores had to walk a distance of 10-40 km to procure these materials. The Neolithic people's effort to procure raw materials from distant source areas shows a sharp contrast to the behaviour of Epipalaeolithic people, who did not leave clear evidence for long distance trips and exchange/trade networks.

As for the radiocarbon dates of the Fayumian, the following dates have been obtained from several sites, excluding the dates which contain the uncertainty of more than ±200 radiocarbon years. The dated samples are all charcoal, except for C-550 which is said to be grain. They have been calibrated by using the calibration curve available at that time and published (Hassan 1985: table 1; 1986b: table 1; Hendrickx 1999: 58-59; Pazdur 1983: table 18; Wendorf and

Upper K Pit 59	**6391±180 BP (C-550)**	5666 cal.BC (95.4%) 4935 cal.BC	OxCal <IntCal04>
Site E29H2 (Kom W), Trench 1, layer 4	**5810±115 BP (I-4127)**	4946 cal.BC (93.8%) 4444 cal.BC	OxCal <IntCal04>
Site E29G3, Area B, Trench 4, layer 2	**5860±115 BP (I-4131)**	5006 cal.BC (95.4%) 4457 cal.BC	OxCal <IntCal04>
Site QS I/79, sandy layer 1.45-1.50 m	**5555±60 BP (Bln-2333)**	4520 cal.BC (93.7%) 4325 cal.BC	OxCal <IntCal04>
Site QS I/79, sandy layer 1.70-1.75 m	**5540±70 BP (Gd-1140)**	4526 cal.BC (95.4%) 4258 cal.BC	OxCal <IntCal04>
Site QS I/79, sandy layer 1.75-1.85 m	**5645±55 BP (Bln-2334)**	4606 cal.BC (95.4%) 4355 cal.BC	OxCal <IntCal04>
Site QS V/79, Hearth No.1/AB/47	**5990±60 BP (Gd-693)**	5021 cal.BC (95.4%) 4726 cal.BC	OxCal <IntCal04>
Site QS IX/81, Hearth No.1	**6380±60 BP (Gd-1499)**	5476 cal.BC (88.4%) 5291 cal.BC	OxCal <IntCal04>
Site QS X/81, Hearth No.1	**6320±60 BP (Gd-1497)**	5472 cal.BC (94.1%) 5206 cal.BC	OxCal <IntCal04>
Site QS X/81, Hearth No.2	**6290±100 BP (Gd-979)**	5474 cal.BC (95.4%) 5022 cal.BC	OxCal <IntCal04>
Site QS X/81, Hearth No.5	**6290±110 BP (Gd-980)**	5478 cal.BC (95.4%) 4998 cal.BC	OxCal <IntCal04>
Site QS XI/81, Hearth No.2	**6480±170 BP (Gd-2021)**	5722 cal.BC (95.4%) 5056 cal.BC	OxCal <IntCal04>

Table 3.2. Radiocarbon dates of the Fayumian

Schild 1976: 199-213). Based on these dates, the time span of the Fayumian has been understood as either 5200-4500 cal.BC (Hassan 1985: 105-106; 1988: 141 and fig.2) or 5400-4400 cal.BC (Hendrickx 1999: 18). These dates can be re-calibrated by using the latest calibration software OxCal ver.4.0 (**Table 3.2**).

Taking the 95.4 % probability (2 sigma), the earliest possible date of the Fayumian is 5722 cal.BC on the sample Gd-2021 or 5666 cal.BC on the sample C-550. However, these calibrated dates contain great uncertainty, and thus it may be safe to take the third earliest calibrated date (5478 cal.BC) on the sample of Gd-980 and to assume that the possible time span of the Fayumian is approximately 5480-4260 cal.BC. The sample C-550 is actually the earliest dated evidence for farming in the Fayum, but because of its great uncertainty, exactly when the first attempt at farming started during the possible time span of the Fayumian remains a big question. It may be natural to suppose that farming started at the beginning of the Fayumian occupation in the second half of the 6th millennium cal.BC, but it is also possible that the advent of farming was earlier or later than the beginning of the Fayumian occupation.

3.4.3. The Moerian

The sites which are exclusively attributed to the Moerian have been located mainly around the N Basin at the foot of the Qasr el-Sagha escarpment on the north side of the lake, and are represented by Site QS VID/80, Site QS VIE/80, Site QS VIIA/80, and QS XII/81. Their elevation is approximately 16-18 m asl. Site QS VID/80 and Site QS VIE/80 have only a single stone-built hearth respectively. Site QS VIIA/80 covers an area of 14 m x 8 m, having several hearths and a scatter of postholes that must be the remains of windbreaks, and Site QS XII/81 covers a small, partially damaged area of approximately 2 m x 3 m, having some patches of charcoal and ash and a scatter of lithic artefacts, pottery sherds and fish/animal bone fragments (Dagnan-Ginter *et al*. 1984: 60-65; Ginter and Kozlowski 1983: 38-43). However, there is no evidence of more substantial dwellings in these sites. There is also no evidence of farming and scarce evidence of sheep/goat herding. Faunal remains suggest that fishing was the major subsistence. Therefore, Moerian people are thought to have been mobile hunter-fishers (Ginter and Kozlowski 1986: 19-22; Kozlowski and Ginter 1989: 166-169; Wetterstrom 1993: 211). Apart from the N Basin area, the sporadic occurrence of Moerian artefacts has been claimed at Kom W (Kozlowski and Ginter 1989: 174).

The Moerian has been defined as the later phase of the Fayum Neolithic, based on stratigraphic sequence and radiocarbon dates. The Moerian culture is characterised by the predominance of blade technology. The most numerous are backed blades, micro-retouched blades and bladelets, retouched blades and perforators, whereas there are few scrapers,

Site E29G3	**5160±110 BP (I-3469)**	4242 cal.BC (95.4%) 3708 cal.BC	OxCal <IntCal04>
Site QS VID/80, Hearth No.1	**5410±110 BP (Gd-903)**	4454 cal.BC (92.2%) 4032 cal.BC	OxCal <IntCal04>
Site QS VIE/80, Hearth	**5650±70 BP (Gd-1495)**	4620 cal.BC (90.4%) 4352 cal.BC	OxCal <IntCal04>
Site QS VIIA/80, Hearth No.5	**5070±110 BP (Gd-895)**	4071 cal.BC (93.1%) 3641 cal.BC	OxCal <IntCal04>
Site QS VIIA/80, Hearth No.5	**5160±110 BP (Gd-915)**	4242 cal.BC (95.4%) 3708 cal.BC	OxCal <IntCal04>
Site QS VIIA/80	**5080±110 BP (Gd-916)**	4072 cal.BC (92.1%) 3646 cal.BC	OxCal <IntCal04>
Site QS VIIA/80, locus 6	**5160±110 BP (Gd-917)**	4242 cal.BC (95.4%) 3708 cal.BC	OxCal <IntCal04>
Site QS VIIA/80, locus 6	**5080±110 BP (Gd-918)**	4072 cal.BC (92.1%) 3646 cal.BC	OxCal <IntCal04>
Site QS VIIA/80	**5480±100 BP (Gd-977)**	4504 cal.BC (95.0%) 4050 cal.BC	OxCal <IntCal04>
Site QS VIIA/81	**5000±60 BP (Gd-1496)**	3948 cal.BC (90.8%) 3692 cal.BC	OxCal <IntCal04>
Site QS X/81, Hearth No.6	**5330±100 BP (Gd-978)**	4349 cal.BC (95.4%) 3966 cal.BC	OxCal <IntCal04>

Table 3.3. Radiocarbon dates of the Moerian

notched and denticulated tools, and bifacial tools. On the basis of this lithic assemblage, it has been argued that the Moerian people would have been immigrants who retained the Epipalaeolithic tradition in the Western Desert (Ginter and Kozlowski 1983: 70; Kozlowski and Ginter 1989: 176). However, such a lithic assemblage is common in a contemporaneous Predynastic culture known at Maadi and Buto in Lower Egypt, and hence it seems better to assume that the Moerian also exhibits a similar line of the development of lithic technology, and that the Moerian is included in the Maadi-Buto culture (Schmidt 1993: 273).

Moerian pottery was made from local clay and shale, and had fibre and sand temper. Pottery vessels are represented by a variety of types including hemispherical bowls with rounded walls, vessels with hemispherical and spherical bellies and everted rims, S-profile vessels, pots with cylindrical necks and everted or thickened rims, deep vessels with rounded bottoms, and vessels with conical bottoms (Ginter and Kozlowski 1983: 53-67; Kozlowski and Ginter 1989: 169).

As for the radiocarbon dates of the Moerian, the following dates have been obtained from several sites, excluding the dates which contain the uncertainty of more than ±200 radiocarbon years. Since Site QS VIIA/80 gave a stratigraphic sequence and provided the richest artefacts and samples for radiocarbon dating, the time span of the Moerian has been based on this site. The dated samples are all charcoal. They have been calibrated by using the latest calibration curve available at that time and published (Hassan 1985: table 1; 1986b: table 1; Hendrickx 1999: 59-60; Pazdur 1983: table 18; Wendorf and Schild 1976: 199-213; Wenke *et al*. 1983: table 1). Based on these dates, the time span of the Moerian has been understood as either 4300-4000 cal.BC (Hassan 1985: 105-106; 1988: 141 and fig.2) or 4500-3800 cal.BC (Hendrickx 1999: 18). These dates can be re-calibrated by using the latest calibration software OxCal ver.4.0 (**Table 3.3**).

Taking the 95.4 % probability (2 sigma), the possible latest date of the Moerian at Site QS VIIA/80 is 3641 cal.BC on the sample of Gd-895, and the possible time span of the Moerian is approximately 4620-3640 cal.BC.

3.4.4. The Fayum Predynastic

Caton-Thompson found that lithic artefacts of the Nile Valley Predynastic type were distributed over the north and southwest sides of the lake, though in fairly small numbers. Sporadic occurrences of Predynastic artefacts have been reported at Kom K, Site L, Site V and Camp II (Caton-Thompson and Gardner 1934: 38 and 73-77). She roughly dated the most substantial lithic and pottery assemblage at Qasr Qarun on the southwest side of the lake to the Predynastic, based on the similarity to the finds from Predynastic sites at Maadi in Lower Egypt and Badari in Middle Egypt (Caton-Thompson and Gardner 1934: 69-71). Sparse scatters of Predynastic artefacts have been recognised by later researchers at sites like Wenke's Site FS-3

Site FS-1	**5160±70 BP (Beta-4181)**	4080 cal.BC (86.6%) 3785 cal.BC	OxCal <IntCal04>
Site FS-3	**4960±160 BP (Beta-4182)**	4070 cal.BC (88.6%) 3484 cal.BC	OxCal <IntCal04>
Site QS VIIG/80, Hearth No.2	**5120±110 BP (Gd-874)**	4175 cal.BC (91.6%) 3694 cal.BC	OxCal <IntCal04>
Site QS VIII/80, Trench 1, 250-255cm	**5010±120 BP (Gd-904)**	4052 cal.BC (92.4%) 3626 cal.BC	OxCal <IntCal04>
Site QS VIIA/81	**4820±100 BP (Gd-976)**	3800 cal.BC (94.8%) 3366 cal.BC	OxCal <IntCal04>
Site QS VIIA/81	**4580±180 BP (Gd-973)**	3711 cal.BC (95.4%) 2878 cal.BC	OxCal <IntCal04>

Table 3.4. Radiocarbon dates of the Fayum Predynastic

on the southwest side of the lake and the Combined Prehistoric Expedition's Site E29G4 in the N Basin on the north side of the lake (Wendorf and Schild 1976: 215-216; Wenke and Brewer 1992). Site QS VIIG/80, Site QS VIII/80 and Site QS VIIA/81 were exposed in excavation trenches in the N Basin, but the artefacts were generally scarce and hence the site function was unclear (Kozlowski 1983).

Due to the scarcity of diagnostic artefacts, the association of the Fayum Predynastic with a specific cultural group in the Nile Valley remains uncertain (Kozlowski 1983: 79). Although Caton-Thompson had initially argued that the pottery vessels of the Fayum Predynastic were comparable to those of the Maadi Predynastic (Caton-Thompson and Gardner 1934: 70-71), it was reconsidered on the basis of differences between the pottery vessels of these two cultures that the Fayum Predynastic might rather be associated with the Naqada culture of Middle and Upper Egypt (Rizkana and Seeher 1987: 61). An U-shaped fishtail flint blade seen in the Qasr Qarun assemblage (Caton-Thompson and Gardner 1934: pl.LIII-34) is a typical item in the Naqada culture (Holmes 1989: 408-412), and its rarity in the Fayum and Maadi suggests that it derived from Middle and Upper Egypt (Schmidt 1993: 272; Watrin 2003: 568). Considering that the Fayum is located in the border between Upper Egypt and Lower Egypt and that the cultural contacts between these two regions gradually increased in the 4th millennium cal.BC (Guyot 2008; Watrin 2003), it is not easy to associate the poor data of the Fayum Predynastic with either the Maadi culture or the Naqada culture. It would suffice to say that people have continually inhabited the Fayum after the Neolithic.

As for the radiocarbon dates of the Fayum Predynastic, only a few dates have been obtained from limited areas of the Fayum. The dated samples are all charcoal. They have been calibrated by using the latest calibration curve available at that time and published (Hassan 1985: table 1; Hendrickx 1999: 59-60; Pazdur 1983: table 18; Wendorf and Schild 1976: 199-213; Wenke *et al*. 1983: table 1). These dates can be re-calibrated by using the latest calibration software OxCal ver.4.0 (**Table 3.4**).

Taking the 95.4 % probability (2 sigma), the possible earliest date of the Fayum Predynastic is 4175 cal.BC on the sample Gd-874. The latest date of the Fayum Predynastic is 2878 cal.BC on the sample of Gd-973. However, this calibrated date contains great uncertainty, and thus it may be safe to take the second latest calibrated date (Gd-976) and to presume that the latest date is 3366 cal.BC. The possible time span of the Fayum Predynastic is thus approximately 4170-3360 cal.BC. It has been suggested that the Moerian and Fayum Predynastic cultures were partially contemporaneous (Kozlowski 1983: 76), but this sounds fairly unlikely. Given a poor understanding of these two cultures, it seems more probable that these two cultures were actually a single culture and different aspects of a single culture were misinterpreted.

Based on the data presented, the Early-Middle Holocene chronology of the Fayum is summarised as follows (**Fig.3.8**);

Qarunian (Fayum Epipalaeolithic):
ca. 7530-6090 cal.BC
Fayumian (Fayum Neolithic):
ca. 5480-4260 cal.BC
Moerian (Fayum Predynastic):
ca. 4170-3360 cal.BC

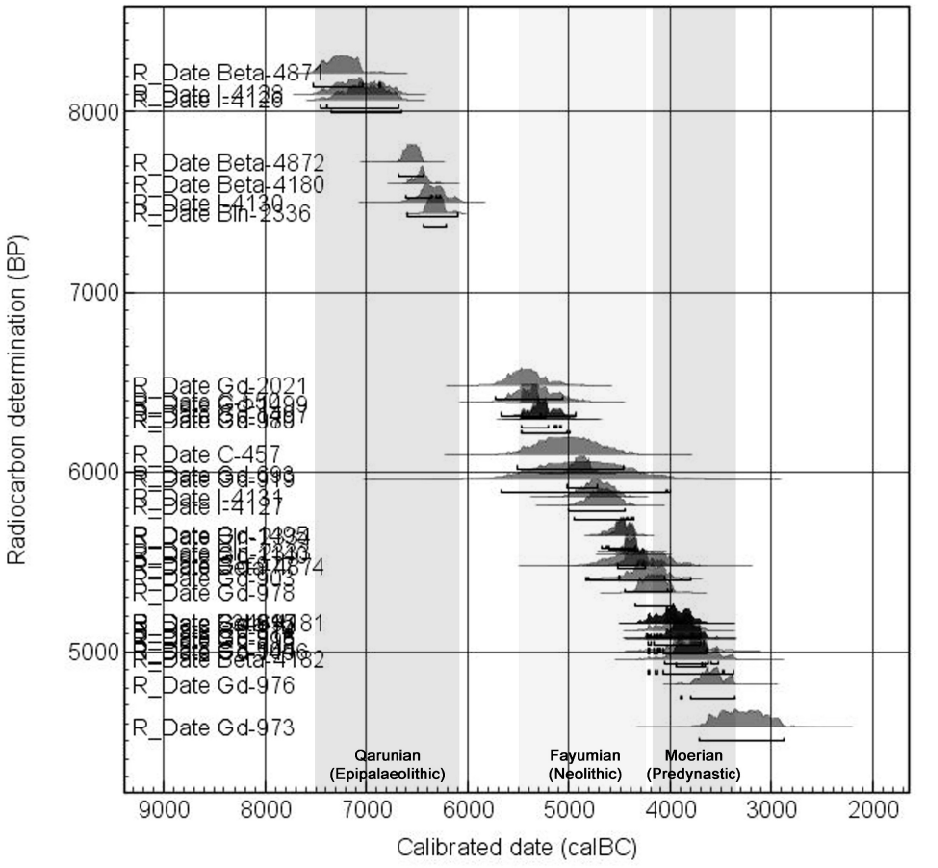


Fig.3.8. Radiocarbon chronology of the Fayum

3.5. Some consideration on the sequence of the Fayum Epipalaeolithic and Neolithic and the controversial time gap between them

As mentioned earlier, the duration of the remarkable drop of lake level between the Fayum Epipalaeolithic and Neolithic periods has been assumed to be either a few hundred years or at least eight hundred years in the 6th millennium cal.BC. Since such a disagreement significantly influences the interpretation about the sequence between these two periods, it must be made clear which presumed duration of the drop of lake level would be more likely. This problem would be considered in terms of 1) climatic and environmental conditions, 2) radiocarbon chronology, and 3) changes in lithic artefacts at the Epipalaeolithic-Neolithic transition.

3.5.1. Climatic and environmental conditions at the Epipalaeolithic-Neolithic transition

The gap between the Fayum Epipalaeolithic and Neolithic periods was argued on the basis of the lack of data on the lake level in the period in question. However, the lack of data does not necessarily mean that the lake dried up for this entire period and people were forced to abandon the Fayum. In order to better understand what may have caused lake level fluctuations and occasionally caused a remarkable drop of lake level, the climatic and environmental conditions of the Fayum in the Early-Middle Holocene have to be reviewed in more detail.

As described in the preceding chapter, the major determinants of Early-Middle Holocene climatic conditions in northeastern Africa were the subtropical trough that came from the north

and spread winter rain, and the Intertropical Convergence Zone that came from the south and deposited summer rain. As for the Fayum, it is located around the latitude of N29°30‘, and this is approximately 300 km to the north of the zone where the subtropical trough and the Intertropical Convergence Zone are presumed to have converged during wet periods in the Early-Middle Holocene.

According to a rough reconstruction of rainfall zones and annual precipitation in Egypt (Kuper and Kröpelin 2006: fig.3; Kuper *et al*. 2007: fig.1), the annual precipitation around the latitude of the Fayum was no more than 150 mm, even during the wettest period between 8500 and 7000 cal.BC. Thereafter it dropped to 50 mm between 7000 and 5300 cal.BC, and dropped further to nearly 0 mm between 5300 and 3500 cal.BC (**Fig.3.9**). Local palaeoclimatic indicators also give some clue to precipitation in the Fayum. According to geomorphological studies on extensive gypsum crusts seen at the eastern and southern ridges of the Fayum Depression, their formation must have occurred under the conditions of several cycles of wetting and drying and an annual precipitation between 50 mm and 250 mm during the Late Pleistocene and Early-Middle Holocene (Aref 2003; Bussemer *et al*. 2006; Mohamed 2003). At present, the average annual precipitation in the Fayum is between 5 mm and 20 mm and the rain falls mostly in the winter months, but there is no rainfall in the summer months (Ball 1939: 225; Bornkamm and Kehl 1990: fig.2; Mohamed 2003: fig.9; Soliman and Koopmans 1992: 5-7). Therefore, while winter rain has surely fallen in the Fayum, it is not certain that the Fayum had summer rain in the Early-Middle Holocene.

However, despite the lack or scarcity of summer rainfall, the Fayum could have greatly benefited from summer rain in the far south, in the form of the influx of overflow water from the Nile into the Fayum lake basin through the Hawara Channel in the Nile-Fayum Divide. The Fayum could have contained considerable amounts of water in the lake basin from summer to autumn, unless the flood water level of the Nile was too low to flow into the lake basin. Since it is known that the record of low Nile floods coincides with the record of reductions in the water level of lakes in Ethiopia and its neighbouring countries in the Equatorial zone (Hassan 1997a: 220*ff*), it is quite probable that the decrease of rainfall in the headwaters of the Nile reduced the amount of floodwater which reached Lower Egypt, and led to the remarkable drop of lake level in the Fayum.

Recent research in the Western Desert and the resultant radiocarbon chronology have indicated that there was apparently a short hiatus of human occupation almost simultaneously around 6000 cal.BC at Djara, Dakhleh Oasis and Nabta Playa (McDonald 2001; Nicoll 2001). There is no doubt that this hiatus was caused by

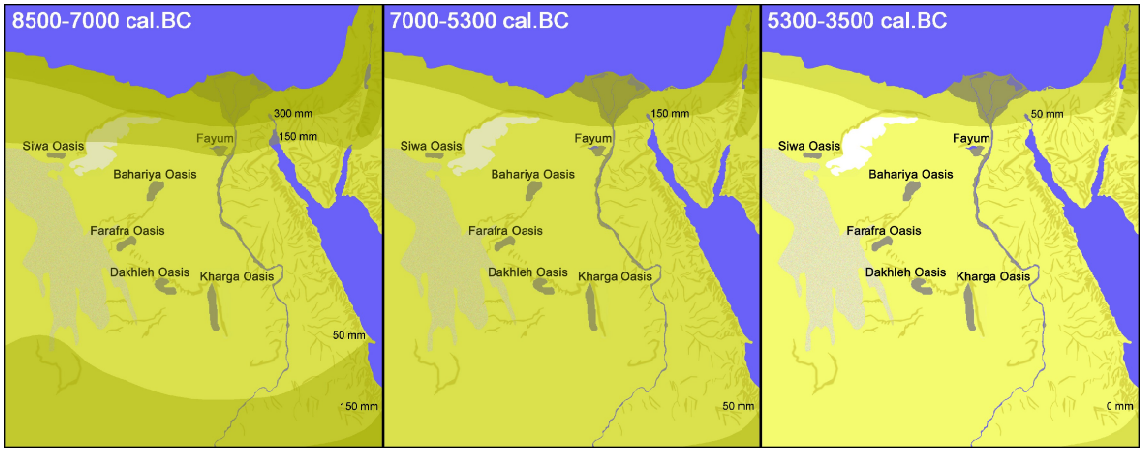


Fig.3.9. Changing rainfall zones in Egypt in the Early-Middle Holocene

a sudden decrease of summer rainfall due to the waning and southward retreat of the Intertropical Convergence Zone. Such a retreat of the Intertropical Convergence Zone may have caused less summer rainfall in the headwaters of the Nile. It has actually been revealed that the water level of many lakes in Ethiopia dropped around 6600-6000 cal.BC (Hassan 1997a: 218-219). However, Djara, Dakhleh Oasis and Nabta Playa were reoccupied around 5800 cal.BC, and this suggests that summer rain came back to these regions immediately after the short hiatus. Considering this phenomenon in the southern half of Egypt, it is difficult to believe that the water supply to Lower Egypt by annual Nile floods remained deficient after 5800 cal.BC and that the Fayum remained very dry and totally uninhabitable until the supposed beginning of the Neolithic occupation around 5480 cal.BC. Although it may be possible that the inflow of the Nile water to the Fayum Depression was blocked due to some local factor in the Hawara Channel during the period in question, it is more likely that the water supply to the Fayum by annual Nile floods resumed after 5800 cal.BC and as a consequence the Fayum gradually became inhabitable.

3.5.2. Radiocarbon chronology of Epipalaeolithic and Neolithic sites

The lack of radiocarbon dates for the archaeological sites which fill the gap between the possibly latest Fayum Epipalaeolithic site and the possibly earliest Fayum Neolithic site has also been argued as evidence for the lack of human occupation in the Fayum and as consistent with the supposed dry-up of the lake (Wendorf and Schild 1976: 222-226 and 317-318). As demonstrated, the calibration of presently-available radiocarbon dates of the sites in the Fayum, by using the latest calibration curve, could not dramatically reduce the gap between the Fayum Epipalaeolithic and Neolithic, and there is still at least a 600 calendar year gap between 6090 cal.BC and 5480 cal.BC. In addition, it has never been considered that previous surveys in the Fayum by different research teams might miss sites that were dated to this blank period in question (Wenke *et al.*1988: 38).

However, it is unimaginable that the entire Fayum has been completely investigated without missing anything. The facts are that many prehistoric sites in the Fayum were surveyed and excavated before the 1950s when the radiocarbon dating technique was invented and improved, and that the sites investigated after the 1960s were quite limited in number and tended to be concentrated in small parts of the Fayum. Indeed, most of the presently-available radiocarbon dates of the Fayum Neolithic came from around the N Basin. Therefore, the presently-available radiocarbon dates of the Fayum Epipalaeolithic and Neolithic must be viewed as merely a small sample and hence potentially biased. It would not be surprising if the undated sites which have been investigated before the 1950s actually represent human occupations in the blank period in question. It is still possible that the re-investigation of Caton-Thompson's undated sites would provide radiocarbon dates which reduce the gap of 600 calendar years between the Epipalaeolithic and Neolithic.

3.5.3. Lithic artefacts at the Epipalaeolithic-Neolithic transition

A comparative study of lithic artefacts may also demonstrate that the gap between the Fayum Epipalaeolithic and Neolithic is not very large, and the transition between them may have been gradual. Previous studies on Fayum lithic artefacts did not have enough data for comparisons outside the Fayum, and tended to focus on extremely different tool classes like Epipalaeolithic backed bladelets on the one hand and Neolithic bifacially-retouched knives on the other, and to argue that there was no cultural relationship between them (Wenke and Casini 1989; Wenke *et al*. 1988: 38). At present, however, more lithic artefacts of contemporaneous periods are being found in the surrounding regions of the Fayum, and they are quite comparable to the Fayum artefacts.

Therefore, a thorough re-study of Caton-Thompson's Fayum tool classes is worthwhile.

Caton-Thompson roughly classified all Fayum prehistoric tools into 25 classes (Caton-Thompson and Gardner 1934: 19-22). Except for rare tool classes, examples of Caton-Thompson's tool collection presently housed in the Egyptian Museum in Cairo are presented in **Fig.3.10**-**Fig.3.27**. Although the names and sequence of her tool classes are definitely not logical, they are presented here without change. Her tool classes are;

1) ground and polished axes
2) polished and flaked axes
3) flaked axes
4) adzes
5) gouges
6) planes
7) knife blades
8) daggers, spears, or javelin heads
9) halberds
10) chisels
11) ground points
12) triangular or slightly hollow-based arrowheads
13) concave-based arrowheads
14) sickle blades
15) leaf-shaped points
16) partially retouched, leaf-shaped points
17) pebble-butted points/knives
18) pebble-backed knives/scrapers
19) side-blow flakes
20) celtiforms
21) scrapers
22) backed blades
23) trihedral rods
24) tanged arrowheads
25) leaf-shaped arrowheads

A meticulous study on the vertical distribution of tools at many surface sites and the excavations of *in situ* tools at Kom K and Kom W allowed Caton-Thompson to understand which tool classes were distributed at which elevations and to recognise two distinct groups of tool classes according to elevations. For instance, axes and sickle blades occurred only at higher elevations, and their occurrence at a high elevation was confirmed at Kom K and Kom W. The number of backed blades gradually decreased as the elevation rose. Pebble-butted or backed tools were most numerous at middle elevations though they were sparsely seen at lower and higher elevations. Based on such observations, one group of tool classes frequently found at higher elevation was named 'the Neolithic A group', and another group of tool classes at lower elevation was named 'the Neolithic B group', and the co-occurrence of several A group tool classes and B group tool classes at middle elevations was also observed. Since Caton-Thompson assumed that the lake level kept lowering through the Neolithic period, she related the vertical distribution pattern of the A group and B group tools to the lowering lake level, and concluded that cultural changes were at work on the slope of the lakeshore, and that elaborate A group tools degenerated into crude B group tools (Caton-Thompson and Gardner 1934: 55-67).

According to her, 1) ground and polished axes, 2) polished and flaked axes, 4) adzes, 7) knife blades, 8) daggers, spears, or javelin heads, 9) halberds, 10) chisels, 11) ground points, 12) triangular or slightly hollow-based arrowheads, 13) concave-based arrowheads, 14) sickle blades, certainly belong to the A group, whereas 22) backed blades exclusively belong to the B group, and 24) tanged arrowheads are likely to belong to the B group. She speculated that 3) flaked axes, 5) gouges, 6) planes, 15) leaf-shaped points, 16) partially retouched, leaf-shaped points, 17) pebble-butted points/knives, 18) pebble-backed knives/scrapers, 19) side-blow flakes, 20) celtiforms, 23) trihedral rods might probably belong to both A and B groups, because they have been found at middle elevations. She also suggested that some of 21) scrapers and some of 25) leaf-shaped arrowheads might be dated to the post-Neolithic. On the other hand, she left the date of the majority of 24) tanged arrowheads and 25) leaf-shaped arrowheads uncertain (Caton-Thompson and Gardner 1934: 19-22).

As described earlier, Caton-Thompson's B



Fig.3.10. Ground and polished axe (JE49735 from Site L)



Fig.3.11. Polished and flaked axe (JE52299 from Lower K Pit 87)



Fig.3.12. Flaked axe (JE49745 from Camp II)



Fig.3.13. Plane (JE49747 from the Camp II Basin)



Fig.3.14. Knife blade (JE49120 from Kom W)



Fig.3.15. Triangular or slightly hollow-based arrowhead (JE52320 from Site ZI)

group should be dated to the Epipalaeolithic and is renamed as the Qarunian, and the A group could definitely be dated to the Neolithic and is renamed as the Fayumian. It has been argued that the Fayum Epipalaeolithic assemblage falls within the general Nilotic and North African microlithic tradition, and that there was a considerable chronological and technological hiatus between the Fayum Epipalaeolithic and Neolithic cultures (Wendorf and Schild 1976: 317*ff*). If this argument is true, it must be considered that some of the tool classes which



Fig.3.16. Concave-based arrowhead (JE49703 from Camp II)



Fig.3.17. Concave-based arrowhead (JE49719 from Site N)



Fig.3.18. Sickle blade (JE49733 from Camp II)



Fig.3.19. Leaf-shaped point (JE49764 from Camp II)



Fig.3.20. Pebble-butted point (JE49133 from Site V)



Fig.3.21. Pebble-butted knife (JE49759 from Camp II)

were assumed by Caton-Thompson to belong to both the A group and B group must belong to either the Qarunian or Fayumian. The tool classes which have not been found in the Qarunian assemblages through excavations by the Combined Prehistoric Expedition should belong to the Fayumian, or later cultures. Alternatively, the tool classes which were assumed by Caton-Thompson to belong to both the A group and B group may possibly belong to the transitional period between the Qarunian and the Fayumian.

Many new data about lithic assemblages in Egypt in the Early Holocene have been published



Fig.3.22. Pebble-backed scraper (JE49760 from the Z Basin)



Fig.3.23. Side-blow flake (JE49771 from Camp II)



Fig.3.24. Celtiform (JE49761 from Camp II)

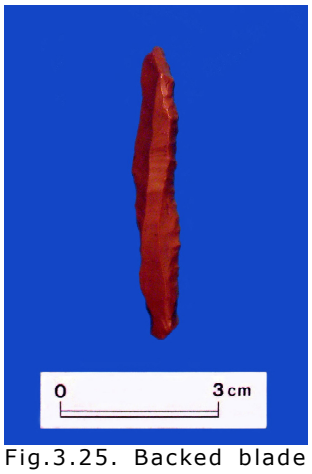


Fig.3.25. Backed blade (JE49714 from Camp II)

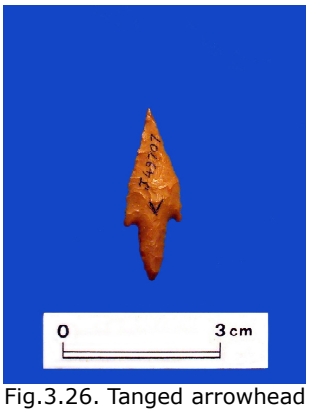


Fig.3.26. Tanged arrowhead (JE49707 from Site V)



Fig.3.27. Leaf-shaped arrowhead (JE49705 from Site V)

in the past decades, and some synthetic studies on the Early Holocene lithic assemblages in Egypt have also been attempted (Kobusiewicz 1996; Vermeersch 1992). For example, comparable materials like the Elkabian assemblage in the Nile Valley of Upper Egypt (Vermeersch 1978), the Shamarkian assemblage in the Nile Valley of Lower Nubia (Schild *et al.* 1968), the Siwan assemblage in the Siwa Oasis region close to the western border of Egypt (Cziesla 1989; Hassan and Gross 1987), the Lobo assemblage in the east of the Great Sand Sea (Klees 1989), the 'Bedouin Microlithic' assemblage and other Epipalaeolithic assemblage in Kharga Oasis of the Egyptian Western Desert (Caton-Thompson 1952; Wendorf and Schild 1980), and the Early Ceramic El Nabta/Al Jerar assemblage in the Nabta-Kiseiba region close to the southern border of Egypt (Wendorf and Schild 2001; Wendorf *et al.* 1984) became available after the publication of Caton-Thompson's report on her Fayum research. Therefore, comparisons of Fayum artefacts with contemporary lithic

assemblages from all over Egypt, while referring to the Tixier typology of Epipalaeolithic tools in North Africa (Tixier 1963), would be useful to determine the attribution of several undated Fayum tool classes to the Qarunian. Furthermore, the comprehensive catalogues of Neolithic lithic artefacts from Merimde Beni Salama and El Omari, which are contemporaneous with the second half of the Fayum Neolithic according to radiocarbon dates, were recently published (Debono and Mortensen 1990; Eiwanger 1984; 1988; 1992; Hendrickx 1999: 18-19 and 60-61). In particular, Merimde Beni Salama provides a sequence of technological development of Neolithic lithic artefacts obtained from a stratigraphic context. Therefore, they provide good comparable examples to determine the attribution of several undated Fayum tool classes to the Fayumian.

It may be said that 23) trihedral rods would be dated to the Qarunian and somewhat later, because they look identical to Tixier's Type 16, and indeed this type of tools often appears in the Epipalaeolithic assemblages mentioned above. The latest example of trihedral rods has been found in the earliest level (*Urschicht*) of Merimde Beni Salama, which still bears the microlithic tradition and would be dated to the early-middle 6th millennium cal.BC, but they disappeared in the subsequent level (*Schicht II*) which was dated to the first half of the 5th millennium cal.BC (Eiwanger 1984; 1988).

Other tool classes under consideration are not easy to date because of the limited number of good comparable examples. It is doubtful that 3) flaked axes, 5) gouges, 6) planes, 15) leaf-shaped points, 16) partially retouched, leaf-shaped points, 19) side-blow flakes, 20) celtiforms, and 21) scrapers were present in the Qarunian. As far as we know, these tool classes first appeared in the northern half of the Egyptian Western Desert including Kharga, Dakhleh, Farafra Oases and Djara around 5800-5400 cal.BC (Barich and Hassan 1987; Caton-Thompson 1952; Gehlen *et al*. 2002; Kindermann 2003; 2004; McDonald 1991a; Riemer 2003), which is precisely the transitional period between the Qarunian and the Fayumian, and they have never appeared in the prior period which is contemporaneous with the Qarunian. Furthermore, 1) ground and polished axes are also sporadically included in the same assemblage of this region (Gehlen *et al*. 2002; Riemer 2003). If 'the 5300 cal.BC exodus event' in Djara (Kindermann 2004: 39) did actually take place, these tools would probably have come to the Fayum at the onset of the depopulation of the Western Desert, and hence, it is likely that they are dated to the second half of the 6th millennium cal.BC. Alternatively, it is possible that these tools had already been dispersed into the Fayum around 5800-5400 cal.BC without delay.

As for 24) tanged arrowheads and 25) leaf-shaped arrowheads, Caton-Thompson could not make clear their date. Such arrowheads have scarcely been found in any stratigraphic levels of the Merimde Neolithic (Eiwanger 1984; 1988; 1992) as well as in the Maadi Predynastic (Rizkana and Seeher 1988). In the Fayum, these classes of arrowheads are quite abundant at such sites as Site V, Camp II, and the Z Basin slopes but are extremely rare at Kom K and Kom W (Caton-Thompson and Gardner 1934: 22, 75-79 and pl.LI). The Fayum tanged arrowheads and leaf-shaped arrowheads are unifacially or bifacially retouched, and they are fairly similar not only to those from Djara, Lobo, Farafra Oasis, Dakhleh Oasis and their vicinities which are well dated (Barich and Hassan 1987: figs.15 and 17; Barich and Lucarini 2002: fig.7; Barich and Lucarini 2005: fig.8; Barich *et al*. 1996: fig.2; Kindermann 2004: fig.11; Klees 1989: figs. 2 and 4; Kuper 1996: fig.3; McDonald 1991a: fig.3; McDonald 1996: fig.2; Riemer 2003: fig.8; Riemer 2007a: fig.9) but also to those from Siwa and Kharga Oases which are roughly dated (Caton-Thompson 1952: pl.100; Hassan and Gross 1987: fig.5.4). Most of these Western Desert examples surely fall in the first half of the 6th millennium cal.BC and some may be dated back to the late 7th millennium cal.BC. In addition, the tanged arrowheads and leaf-shaped arrowheads similar to the Fayum examples are well-known in the Pottery Neolithic culture of the southern Levant in the

late 7th-early 6th millennia cal.BC (Gopher 1994: 41). It has also been known that the production of bifacially-retouched, tanged arrowheads started in Cyrenaica as represented by the site of Haua Fteah in the first half of the 6th millennium cal.BC, though it is not certain whether it derived from Egypt or the Maghreb (McBurney 1967: 295*ff*). It has recently been proposed that unifacially/bifacially retouched, tanged or leaf-shaped small arrowheads in the northern half of the Egyptian Western Desert in the late 7th - early 6th millennia cal.BC should be collectively called the '(bi)facial techno-complex' (Riemer 2007a; 2007b), but the appearance of such arrowheads was actually a quite widespread phenomenon from the southern Levant to North Africa along the Mediterranean coast in the late 7th-early 6th millennia cal.BC. Therefore, it is strongly suggested that most of 24) tanged arrowheads and 25) leaf-shaped arrowheads in the Fayum can be attributed to either the later half of the Qarunian, or, more likely, the transitional period between the Qarunian and the Fayumian.

Caton-Thompson described that 17) pebble-butted points/knives and 18) pebble-backed knives/scrapers were made on rounded and weathered flat pebbles, and were the most various and numerous classes. It is not certain whether they really existed in the Qarunian. Some tools in these classes seem to be identical to Tixier's Type 15 and 106, and thus it is no wonder if they existed in the Qarunian. However, tools of these classes are not well known in other Epipalaeolithic assemblages of the 9th-7th millennia cal.BC in Egypt. Some pebble-butted/backed knives or scrapers seen in Siwa Oasis (Hassan and Gross 1987: fig.5.2-i and fig.5.3-c) are similar to Fayum examples, and seem to be dated to the Early-Middle Holocene. Moreover, pebble-butted/backed knives and scrapers are numerous in the earliest level (*Urschicht*) of Merimde Beni Salama, which would probably be dated to the early-middle 6th millennium cal.BC, but they decreased in later levels (*Schichten II-V*) which were dated to the first half of the 5th millennium cal.BC (Eiwanger 1984; 1988; 1992). Therefore, it may be said that these tool classes do not belong to the 'typical' Early Holocene North African technological tradition, but rather appeared in the northern half of the Egyptian Western Desert in the Early-Middle Holocene.

Even apparently Neolithic tool classes like 13) concave-based arrowheads may have appeared earlier. It has been suggested that the first appearance of concave-based arrowheads in Dakhleh Oasis would be dated back to the Bashendi A period, which is dated to the late 7th-early 6th millennia cal.BC and hence is contemporaneous with the transitional period between the Qarunian and the Fayumian. A supposedly primitive form of concave-based arrowheads in Dakhleh Oasis has no pointed barbs but has square-ended barbs (McDonald 1991a: fig.3-a). Therefore, it is no wonder if such a primitive form of this tool class already appeared in the Fayum in the transitional period between the Qarunian and the Fayumian. Indeed, such concave-based arrowheads have been found among Caton-Thompson's B group assemblages at Site G and Site H in the Fayum (Caton-Thompson and Gardner 1934: 62, 67 and pl.L), though she suggested that those concave-based arrowheads might be stray items (Caton-Thompson and Gardner 1934: 21). In addition, Caton-Thompson found concave-based arrowheads along with backed blades in an excavated context at Site Z, and considered them to be attributable to the intermediate A-B group (Caton-Thompson and Gardner 1934: 59-60). Therefore, it is possible that even in the Fayum, concave-based arrowheads appeared prior to the Fayumian.

There is no doubt that concave-based arrowheads evolved dramatically and flourished during the Fayumian. Without any chronological considerations, it has been said that there was a virtually infinite variety of concave-based arrowheads in the Fayum (Holmes 1989: 416). However, the Neolithic lithic assemblages found in a stratigraphic context at Merimde Beni Salama show that concave-based arrowheads with square-ended barbs appeared first and predominated in earlier levels (*Schichten II-IV*) whereas concave-based arrowheads with pointed

		culture	Epipalaeolithic							transitional	Neolithic									
		cal.BC	8000				7000				6000				5000					4000
1	ground and polished axes																			
2	polished and flaked axes																			
3	flaked axes																			
4	adzes																			
5	gouges																			
6	planes																			
7	knife blades																			
8	daggers, spears, or javelin heads																			
9	halberds																			
10	chisels																			
11	ground points																			
12	triangular or slightly hollow-based arrow heads																			
13	concave-based arrow heads																			
14	sickle blades																			
15	leaf-shaped points																			
16	partially retouched, leaf-shaped points																			
17	pebble-butted points/knives																			
18	pebble-backed knives/scrapers																			
19	side-blow flakes																			
20	celtiforms																			
21	scrapers																			
22	backed blades																			
23	trihedral rods																			
24	tanged arrow heads																			
25	leaf-shaped arrow heads																			

Table 3.5. Chronological reconsideration of Caton-Thompson's Fayum tool classes

barbs appeared only in later levels (*Schichten IV-V*) (Eiwanger 1983: 64-65; 1992: 44-45, pls.50 and 51). Given this observation, it is probable that the appearance of concave-based arrowheads with pointed barbs in the Fayum was also later in date in the Fayumian.

A tentative chronological reconsideration of Caton-Thompson's tool classes is summarised in **Table 3.5**.

Although in very general term, a comparison with other tool assemblages outside the Fayum suggests that a number of the Fayum tool classes may be relatively dated to the period which has been believed to be a hiatus of human habitation in the first half of the 6th millennium cal.BC. However, it must be kept in mind that this tool-class-based chronology still contains many ambiguities. A remaining problem is how to prove this suggestion within the Fayum context itself. It is hoped that new artefacts and radiocarbon dates obtained from well-preserved, stratified sites in the Fayum by future fieldwork would fill the hiatus, thereby substantiating the gradual transition from the Epipalaeolithic to Neolithic cultures without a considerable break.

3.6. The Epipalaeolithic-Neolithic transition and the beginning of farming and herding in the Fayum

The significance of the Fayum as a centre of incipient food production was first recognised by Childe, who advocated the Oasis Hypothesis in the first half of the 20th century, but after the 1950s, the Fayum lost its primary position as the place of origin of food production, because food producing cultures far earlier in date than the Fayum Neolithic were unearthed in rapid succession in the Near East. Since then, early

food production in the Fayum has been regarded as relatively late in emergence and foreign in origin, and thus not relevant to the study of the ultimate origin of food production. As a consequence, the Fayum data have rarely been taken into consideration in most studies formulating general explanations of the origins of food production. Even in studies of the diffusion of food production from the Near East, the diffusion to northeastern Africa has been neglected, while the diffusion to Europe has been very popular.

Some scholars have noted that Neolithic culture in Egypt would have originated from the southern Levant. However, they have not made it clear whether food production had begun in Egypt from the adoption of domesticates and knowledge by indigenous people or from the intrusion of Levantine farmer-herders, though adoption by indigenous people has been implicitly mentioned. They have explained that extremely rich natural resources in the Nile Valley would have prevented the inhabitants from adopting foreign domesticates for a long time and that this would be the reason for the late beginning of food production in Egypt, without saying why the inhabitants of the Nile Valley nevertheless adopted domesticates at long last (*e.g.*, Butzer 1976: 10-11; Hassan 1984a: 222).

As described before, previous research in the Fayum has argued that there might be a hiatus of human habitation between the Epipalaeolithic and Neolithic periods, on the basis of the problematic reconstruction of lake level fluctuations and the superficial or insufficient comparisons of material culture. Since domesticates and new material items like pottery vessels seem to have appeared suddenly in the Fayum at the beginning of the Neolithic occupation in the second half of the 6th millennium cal.BC, it has also been argued that the Neolithic inhabitants of the Fayum must have migrated from the Nile Delta and the Nile Valley, where farming must have first arrived from the southern Levant and must have been established many centuries before it appeared in the Fayum (Wenke *et al*. 1988: 38 and 47). It has further been asserted that in addition to the Neolithic site of Merimde Beni Salama in the western Nile Delta which might be slightly later in date than the Fayum Neolithic, archaeological evidence for earlier Neolithic cultures would be buried under the alluvium in both the Nile Delta and the Nile Valley, and hence the Fayum Neolithic culture could be understood as a later marginal adaptation (Midant-Reynes 2000: 106-108; Wetterstrom 1993: 201*ff*).

However, as demonstrated, it is highly probable that the duration of climatic and environmental deterioration in the Fayum in the blank period in question is shorter than previously argued, and there seems to be continuity in the development of lithic technology. It is clear that fishing was still the dominant subsistence activity during the Fayum Neolithic as this activity is well attested archaeologically, and it has been revealed that both the Epipalaeolithic and Neolithic peoples exploited the same species of fish and migratory waterfowl in similar relative abundances, using similar strategies during the same time of year (Brewer 1989a; 1989b). As mentioned in the preceding chapter, new evidence obtained from the Western Desert of Egypt indicates that cattle domestication and pottery production developed in southern Egypt as early as the 9th millennium cal.BC. Even sheep and goats that had been domesticated first in the Near East arrived in the Western Desert as well as on the Red Sea coast in the first half of the 6th millennium cal.BC. It is no wonder if all of them were available to the inhabitants of the Fayum in the same period, and it is rather difficult to explain why it was not until the supposed beginning of the Neolithic occupation in the second half of the 6th millennium cal.BC that all of them were surely attested in the Fayum. It seems more likely that domesticates and new material cultures continually diffused into the Fayum from different directions without delay, and enabled gradual transition in subsistence and material culture through the Epipalaeolithic and Neolithic periods.

It is very easy to explain the appearance of the Fayum Neolithic culture as the complete

replacement of the preceding culture caused by the arrival of a new population. However, such an explanation lacks the viewpoint of adaptation and avoids investigations into human motivation and adaptive behaviour. A possibility of sudden invasion or colonisation of the Fayum by the Nile Valley settlers who already became farmer-herders cannot totally be denied. However, it is fair to consider another possibility of gradual transition to food production by indigenous Fayum people, who attempted to adapt to the natural resources in and around the lake and to adapt the lake and its vicinity to their needs by introducing not only domesticates like cattle and new material items like pottery vessels from the Western Desert but also domesticates like wheat and barley from the Nile Valley. If so, the reasons for, and the processes of, the incorporation of farming and herding into local subsistence require explanations within a unique Fayum context. Questions must be raised as to why domesticates were needed by the Fayum inhabitants in spite of a seemingly successful way of life based on hunting and fishing, and how Neolithic people adapted these new subsistence activities to the annual resource scheduling.

Even though Egypt is not the place of origin of food production, as far as the Fayum is concerned, its significance as the place of incipient food producing experiments, or as an intriguing middle-ground society with low-level reliance on food production (Smith 2001), is still not lost. More importantly, it is apparent that all human life in the Fayum has directly relied on the lake, and this bounded and relatively undisturbed depression offers an ideal place to study human adaptation through time. The Fayum data have the potential to contribute to formulating general explanations about the adoption of food production. In the following, local factors which may have caused, affected or conditioned the transition from foraging to farming and herding in the Fayum are overviewed.

3.7. Local factors for the transition to food production in the Fayum

3.7.1. Flora

Very few data on the Fayum flora in the Early-Middle Holocene have been recovered from archaeological sites in the Fayum, and some archaeobotanical data obtained from a Fayum Epipalaeolithic site named FS-2 remain to be better published (Wetterstrom 1993: 189-190). However, given the location of the Fayum, it can be logically presumed that the Fayum flora has generally consisted of annual and perennial plants of the Mediterranean flora, that needed low temperatures and water in winter for germination and flowered and bore seeds under long daylight hour conditions in spring and early summer, as well as the Saharo-Arabian trees/shrubs that were also resistant to low temperatures in winter. Even in Farafra Oasis and Djara which are approximately 300 km to the south of the latitude of the Fayum, some plant remains of the Mediterranean flora, which were dated to the Early-Middle Holocene, have been recovered (Fahmy 2001: table 5; Kindermann *et al.* 2006: table 3), and hence there is little doubt that the climatic conditions in the Fayum in this period were much better for the spread of the Mediterranean flora. Therefore, for a tentative reconstruction of the Early-Middle Holocene Fayum flora, it may be useful to refer to the studies on archaeobotanical remains collected at a Neolithic site in El Omari (Barakat 1990) and a Predynastic site in Maadi (van Zeist and de Roller 1993; van Zeist *et al*. 2003) along the Nile approximately 60 km to the northeast of the Fayum, as well as the data on the present-day and recent-past Fayum flora (Boulos 1992; Cappers 2006; Zahran and Willis 1992: 78*ff*) and the present-day flora and their ethnobotanical accounts in Siwa Oasis and its surroundings (Bornkamm and Kehl 1990; Hassan and Gross 1987; Zahran and Willis 1992: 69-78), which is on the same latitude as the Fayum but is located approximately 500 km to its west.

A large part of the present-day Fayum flora is not in an original state. The original vegetation

in arable areas of the Fayum Depression has been modified not only by the introduction of crops, fruit trees and associated weeds from outside but also by the expansion of water channels. The original vegetation along the lakeshore has been changed due to increasing salinity of lake water. However, the marginal arid areas which have not been affected by agricultural developments still retain natural vegetation that adapts to dry environments. Therefore, the present distribution and variability of wild plants can be viewed as an analogy of the situation in prehistory at least to some extent and with due caution.

According to the present-day ecological zonation of Egypt, the Fayum is included in 'extreme desert 1', which stretches between the latitude N28° and N30° and is characterised by drought-tolerant, contracted vegetation (Bornkamm and Kehl 1990: fig.20, 222-223). However, the Fayum flora is apparently much richer due to the presence of a large body of water in Lake Qarun. Since the Fayum Depression is close to the Nile Valley and there has been a water supply to Lake Qarun by the Nile, the Fayum has been considered as a part of the Nile region, and its flora has also been considered as that of the Nile region (Zahran and Willis 1992: 307*ff*).

The present-day Fayum flora can be divided into aquatic flora and terrestrial flora, and the terrestrial flora can be subdivided according to their habitats. Sedges like nutgrass (*Cyperus rotundus*), bulrush (*Typha domingensis*) and clubrush (*Scirpus tuberosus*) are quite common plants in the swampy habitat along the lakeshore and water channels. Trees/shrubs like date palm (*Phoenix dactylifera*) and willow (*Salix subserrata*), and grasses/herbs like common reed (*Phragmites australis*), ryegrass (*Lolium temulentum*), lesser canary grass (*Phalaris minor*), halfa grass (*Desmostachya bipinnata*), common vetch (*Vicia sativa*), hairy vetchling (*Lathyrus hirsutus*), fat hen (*Chenopodium album*), dented dock (*Rumex dentatus*) and prichly douch (*Emex spinosus*) flourish in relatively moist areas like the banks of water channels. Common reed has a particularly wide range of habitats from deep water swamp to channel banks, due to its deep rooting and its tolerance to a high salt concentration in soil and water. Trees/shrubs like Nile acacia (*Acacia nilotica*), tamarisk (*Tamarix nilotica*), lotus tree (*Nitraria retusa*), cocklebur (*Zygophyllum album*) and camel's thorn (*Alhagi maurorum*) are better adapted to dry and saline environments due to their deep root system, and thrive in semi-arid areas between moist areas and barren desert. In particular, lotus tree can tolerate and stabilise drift sand, building sand hummocks (Boulos 1992: tables 8-12; Zahran and Willis 1992: 321*ff*).

The occurrence of edible wild plants at archaeological sites is not necessarily evidence of their harvest. Therefore, seeds of clubrush, fat hen and dented dock found through the flotation of soil samples collected at an Epipalaeolithic site FS-2 in the Fayum (Wetterstrom 1993: 189-190) simply indicate that they were available in the area. However, seeds of a sedge species (*Cyperus conglomeratus*) and an unidentified species of knotweed (*Polygonum* sp.) found in Neolithic granary pits at the Upper K Pits (Caton-Thompson and Gardner 1934: 49; Wetterstrom 1993: 208-209) do indicate that Fayum Neolithic people have harvested them for seeds. The lack of edible wild plants at archaeological sites is also not necessarily the proof of their absence or the evidence that they have not been harvested, because plant remains are not always preserved in the archaeological record, and even if preserved, they are not always in identifiable form. Therefore, referring to ecological data about the availability of wild plants in a specific environment as well as ethnographic data about the plant food preferences among hunter-gatherers living in similar environments is vital (Hillman 1989: 218*ff*).

Carbohydrate-rich tubers of nutgrass and clubrush have been abundantly collected, and ground or pounded on grinding stones for consumption by people at the Late Palaeolithic sites of Wadi Kubbaniya in Upper Egypt (Hillman 1989). It has also been reported that nutgrass tubers were collected at a Predynastic site of Hierakonpolis approximately 50 km to

the north of Wadi Kubbaniya not only for consumption but also for their use as perfume (Fahmy 2005). Nutgrass and clubrush have been recovered at a Predynastic site of Maadi (van Zeist and de Roller 1993; van Zeist *et al*. 2003), and hence it is certain that they thrived in Lower Egypt as well. It is known in ethnographic accounts that the seeds of clubrush have been eaten after roasting (Hillman *et al*. 1989: 196). Starchy rhizomes of bulrush and common reed can be eaten while still young after baking, steaming and roasting (Hillman 1989: 219; Hillman *et al*. 1989).

Seeds of dented dock and prichly douch have been found in El Omari (Barakat 1990: 112) and Maadi (van Zeist *et al*. 2003: 180), and hence it is certain that dented dock and prichly douch were common in Lower Egypt in prehistory. Leaves and rhizomes of prichly douch are known to be edible (Barakat 1990: 112). Young shoots and seeds of fat hen and dented dock are also known to have been eaten in ethnographic accounts (Wetterstrom 1993: 189). The presence of ryegrass and vetch has been reported at Maadi (van Zeist *et al*. 2003: 178), and abundantly at El Omari in particular (Barakat 1990: 111-112). Ryegrass and vetch are known as good pasture plants, and it has been suggested that they might have been cultivated as fodder in El Omari (Barakat 1990: 110-111), but it is also probable that their seeds were collected for human consumption. Fruits of date palm and sycamore fig (*Ficus sycomorus*) have been reported in El Omari (Greiss 1955: 229; 1957: 107; Täckholm 1990: 116) and Maadi (van Zeist *et al*. 2003: 173), but it is not certain whether these plants grew locally, and it is probable that only the fruits were brought there from elsewhere.

If the edible wild plants described above actually thrived in the Fayum in the Early-Middle Holocene, it may be that they were harvested and eaten by the Fayum inhabitants. Moreover, it is also probable that the Fayum Neolithic people who harvested unidentified sedges and herbs for seeds recognised the value of the leaves, rhizomes and tubers of these plants.

As for the seasonality of harvesting wild plants, the stands of marsh plants like nutgrass, bulrush and clubrush would have partially been inundated due to high lake water caused by the influx of the annual Nile flood water in summer, and hence would have become inaccessible. However, it is known that the starch content of the tubers of nutgrass and clubrush and the rhizomes of bulrush and common reed increases through autumn to winter, and that some of the sedges start to produce edible seeds in winter. As the high lake water receded in autumn, harvesting these plants would have become possible (Hillman 1989: 230*ff*). When these plants grew in extensive stands, uprooting or digging tubers and rhizomes from moist soils would not have required too much labour, and hence it must have been a worthwhile and profitable subsistence activity. An excessive amount of tubers could have been stored for later consumption (Wetterstrom 1993: 178-179). On the other hand, after spring, the tubers and rhizomes of sedges become old and woody, and hence are unpalatable or inedible. Annual wild grasses/herbs of the Mediterranean flora finish their growth cycle before summer (Wetterstrom 1993: 195-196). Therefore, it can be said that harvesting various parts of wild plants has mainly been done from autumn to early spring, and that late spring and early summer are the most unproductive seasons.

As for the reliability of harvesting wild plants, it has been noted that nutgrass was particularly stimulated into more active tuber production by soil disturbance like digging, and hence heavy annual harvesting of tubers guaranteed an equally heavy harvest of freshly-formed tubers in each ensuing year, and that the same phenomena were also seen in other wild plants which produced tubers (Hillman 1989: 226-227; Hillman *et al*. 1989: 180-181). Tolerance to exploitation is definitely an asset of tuber-producing sedges as a reliable source of carbohydrate. Therefore, if sedges had actually been harvested by Fayum Epipalaeolithic and Neolithic people, they would probably have been dietary staples. There are no positive data about the tolerance of annual and perennial wild grasses/herbs to exploitation, but it is obvious that wild grasses/herbs are vulnerable to drought

in early/late spring and may die before harvest, and thus it is unlikely that their reliability is greater than that of sedges which are supposed to have been harvested earlier in the year.

In addition to their value as food items, other economic advantages of wild plants should not be overlooked. Trees/shrubs must have provided timber and firewood for the Fayum inhabitants, and leaves and culms of sedges could have provided materials for roofing and fencing, and fibres of grasses could have been used for making ropes, mats and baskets. All of the wood charcoal collected at a Fayum Epipalaeolithic site has actually been identified as tamarisk (Wetterstrom 1993: 187), and wooden sticks and shafts found in Neolithic granary pits at the Upper K Pits are all made of tamarisk (Caton-Thompson and Gardner 1934: 45-46). The lining of granary pits at the Upper K Pits is made of reed (Caton-Thompson and Gardner 1934: 88). A study on ropes and mats from El Omari has revealed that ropes were made from halfa grass, and mats were made from common reed (Greiss 1955: 227-230; 1957: 106-107).

As mentioned above, since very few data on the Fayum flora in the Early-Middle Holocene have been recovered from archaeological sites in the Fayum, it is impossible to say whether there was a dramatic disappearance of some local plant taxa caused by climatic and environmental changes or human overexploitation. Therefore, the only recognisable vegetation change at the beginning of the Neolithic in the Fayum is the appearance of wheat, barley, and flax.

The wheat and barley found in Neolithic granary pits of the Upper K Pits are all domesticated forms, and include emmer wheat (*Triticum turgidum* ssp. *dicoccon*), two-rowed barley (*Hordeum vulgare* ssp. *distichon*), and six-rowed barley (*Hordeum vulgare* ssp. *vulgare*) (Caton-Thompson and Gardner 1934: 46-49; Schepers *et al*. 2006). As mentioned in the preceding chapter, the absence of wild wheat and the rarity of wild barley in northeastern Africa are apparently because the minimal amount of winter rainfall for sustaining their natural growth has hardly been attained in most regions. There is little doubt that the domesticated wheat and barley found in the Fayum originated from the southern Levant. It can be said that although necessary conditions for the growth of domesticated wheat and barley like low temperatures in winter and long daylight hour and less severe heat conditions in spring and summer were met in the Fayum, an adequate supply of water in winter was the sole critical requirement for the introduction of domesticated wheat and barley from the southern Levant into the Fayum. It was probably not difficult for those who had once learned sowing or transplanting wherever moist soils were available to fulfil this requirement. This may be the reason why it took much more time for the southward diffusion of domesticated wheat and barley to occur along the Nile to Middle and Upper Egypt, where climatic conditions were rather different from those of the original habitat of wheat and barley.

Questions about wheat/barley farming in the Fayum are concerned with the seasons of sowing and the location of farmland. In Pharaonic times, farming in the Nile Valley was fed by annual floods of the Nile. The floodplain of the Nile Valley was entirely inundated in late summer, and then the water receded in middle/late autumn. Sowing was done on moist soils after the recession of flood water, and harvesting was done in late spring before the summer heat and flood came. This annual cycle is essentially the case with present-day farming in the Nile Valley, though the Nile flood is replaced by irrigation. If flood-fed farming was the case in the Fayum Neolithic, farmland would have been located on the receding lakeshore where moist soils were exposed, but this may not be the case.

Farming was essentially fed by rain in the original habitat of wheat and barley in the southern Levant. The present-day Bedouins in southern Jordan are occasionally cultivating drought-resistant, saline soil-tolerant barley in the stony desert valley areas of less than 100 mm annual precipitation (Cordova 2007: 90-92). Rain-fed farming in Egypt is presently restricted to the winter and spring months, and is confined to a narrow strip of land that runs parallel to the Mediterranean coast and has approximately 100 mm annual precipitation (Zahran and Willis

1992: 337). In the Fayum in the Neolithic period, however, there seems to have been more winter rainfall than at present, as mentioned earlier. Therefore, when farming was introduced to Egypt from the southern Levant via the Negev and Sinai, Egyptian people may have learned the idea of rain-fed farming in the first place, and then managed to adapt the farming to the unique environment of Egypt. If the first farming experiment in the Fayum was rain-fed farming, it may be that farmland was not necessarily located on the lakeshore, and that sowing was attempted in desert wadis, when winter rain started to fall and the wadi bed became wet due to surface runoff water.

The appearance of flax (*Linum usitatissimum*) in the Fayum Neolithic can also be argued in the same context of the appearance of domesticated wheat and barley. Seeds of flax were found in a granary pit of the Upper K Pits (Caton-Thompson and Gardner 1934: 49). Since no wild ancestors of flax have been known in northeastern Africa, there is little doubt that the flax of the Fayum Neolithic came from the southern Levant as a part of the Levantine domesticates package or in a weedy form.

It seems that the influx of the Nile flood water into the Fayum lake basin and the resultant high ground moisture content through summer and autumn had the potential to sustain the growth of African summer crops like wild sorghum (*Sorghum bicolor*), which was abundantly found in Farafra Oasis, Abu Ballas and Nabta Playa in the Early-Middle Holocene (Barakat and Fahmy 1999), but such plant remains have never been reported in Lower Egypt in prehistory (Wetterstrom 1998). Therefore, it may be said that even if there was enough ground moisture in summer and autumn in the Fayum and even though sorghum is fairly drought-tolerant due to its deep rooting system, the gradually lowering temperature and decreasing daylight hours from summer to autumn in the Fayum did not meet the conditions of high light intensity and high temperature which are ideal for the C4 photosynthesis of sorghum, and it was impossible to meet these conditions in any way.

3.7.2. Fauna

The Fayum fauna in the Early-Middle Holocene has been studied on the basis of faunal remains collected at many surface sites and some excavated sites, and a considerable number of species has been identified (**Table 3.6**). The mammalian fauna adapted to the dry semi-desert environment extending from the Sahara through the Levant into northwestern India is called the Saharo-Sindian fauna, and the Fayum mammalian fauna definitely belongs to the Saharo-Sindian one (Brewer 1989b: 91*ff*). Since the northward-southward shift of the Intertropical Convergence Zone appears to correspond to the spread of the Sudano-Ethiopian fauna including giraffe (*Giraffa camelopardalis*) and elephant (*Loxodonta africana*), it is reasonable that these large mammals were spread in the southern half of Egypt but were absent in the Fayum in the Early-Middle Holocene (Van Neer and Uerpmann 1989: 320-321), though an alleged elephant has been reported at a Neolithic site in the Fayum (Caton-Thompson and Gardner 1934: 72 and pl.II).

Major medium to large-sized mammals which were surely the prey of the Fayum Epipalaeolithic and Neolithic inhabitants include hippopotamus (*Hippopotamus amphibius*), aurochs (*Bos primigenius*), hartebeest (*Alcelaphus buselaphus*), and dorcas gazelle (*Gazella dorcas*) (Brewer 1989b: table 4; Gautier 1976b: table I-7; von den Driesch 1986: table 1; Wenke *et al*. 1998: table 1). The habitat, food requirements, and behavioural patterns of these mammals give indirect information about the local environment in these periods.

It seems that dorcas gazelle were predominant through the Fayum Epipalaeolithic and Neolithic periods. Dorcas gazelle live in small herds and inhabit sand dunes and stony terrains, and wander quite widely. They can survive without drinking water, though they drink water wherever available, and do not feed on grasses but on leaves, flowers, pods and seeds of trees like acacia, and leaves and fruits of shrubs like the lotus tree, both of which are usually seen in

species	live weight (kg)	habitat requirement	feeding behaviour	food	herd	move
gerbil *Gerbillus gerbillus*	up to 0.025	sandy desert	herbivorous	seeds, fruits and leaves	live solitarily or in pairs	wander around own burrows
hedgehog *Hemiechinus auritus*	up to 0.5	semi-desert	omnivorous	insects, small rodents, bird's eggs and fruits	live solitarily	wander around own burrows
mongoose *Herpestes ichneumon*	up to 4	savannas near water	carnivorous	birds, small animals, and fish	live solitarily or in pairs	wander around own burrows
hare *Lepus capensis*	up to 5	open grassy flats with scattered scrub	herbivorous	seeds, fruits and leaves	live solitarily or in pairs	wander in a small range
wild cat *Felis silvestris*	up to 6	savannas	carnivorous	birds, small animals and insects	live solitarily	wander in a small range
red fox *Vulpes vulpes*	up to 5	stony desert	carnivorous	small animals and insects	live in small family parties	wander around several dens
jackal *Canis aureus*	up to 10	savannas	omnivorous	small animals, insects and fruits. Scavenge carcasses	live solitarily or in pairs	wander in a small range
striped hyena *Hyaena hyaena*	up to 55	arid savannas	omnivorous	small animals, insects and fruits. Scavenge carcasses	live solitarily or in pairs	wander long distances
wild boar *Sus scrofa*	up tp 90	thick undergrowth	omnivorous	grasses, leaves, tubers and fruits. Small animals and insects	live in small family parties	wander in a small range
barbary sheep *Ammotragus lervia*	up to 110	rocky mountains and broken country	herbivorous	grasses, acacia leaves and pods, and succulents	live in herds of 3-6 head	wander in a small range
dorcas gazelle *Gazella dorcas*	up to 22	sandy and stony desert	herbivorous	acacia leaves and pods	live in herds up to 20 head	wander long distances
addax *Addax nasomaculatus*	up to 120	sandy and stony desert	herbivorous	grasses, acacia leaves and pods, and succulents	live in herds up to 20 head	wander long distances
oryx *Oryx dammah*	up to 200	semi-desert	herbivorous	grasses, acacia leaves and pods, and succulents	live in herds up to 12 head	wander long distances
hartebeest *Alcelaphus buselaphus*	up to 200	open country and light bush	herbivorous	grasses	live in herds of 4-15 head	wander in a small range
aurochs *Bos primigenius*	up to 500	open country and light bush	herbivorous	grasses		
hippopotamus *Hippopotamus amphibius*	up to 2500	streams and lakes with permanent water	herbivorous	grasses and aquatic plants	live in herds of 5-15 head	wander in a small range
soft-shelled turtle *Trionyx triunguis*	up to 10	streams and lakes with permanent water	omnivorous	crustaceans, insects, worms, and aquatic plants		wander in a small range
crocodile *Crocodylus niloticus*	up to 500	streams and lakes with permanent water	carnivorous	fish and almost any animals	live in herds	wander in a small range

Table 3.6. Biology of major Fayum animals

the semi-desert (Dorst and Dandelot 1970: 239-242). Hartebeest are the second most commonly hunted mammals through the Fayum Epipalaeolithic and Neolithic periods, but the behaviour of hartebeest is different from that of dorcas gazelle. Hartebeest are social animals living in large herds, and inhabit open grassland, and feed entirely on grasses/herbs, and like to drink water regularly, though they can survive without drinking for long periods. Where water and pastures are adequate, hartebeest are the most sedentary of all major antelopes (Dorst and Dandelot 1970: 218-221). Their presence is a good indication of the occurrence of short to tall grassland and permanent water in the Fayum in the Early-Middle Holocene. Aurochs were also common in the Fayum Epipalaeolithic, and those which were found at Neolithic sites may have been domesticated. Little is known about the food requirements and behavioural patterns of aurochs because they are extinct. However, since aurochs are known to occur consistently with hartebeest in the Nile Valley in the prehistoric archaeological record, it is suggested that aurochs were tolerant herd animals and had the same food requirements as those of hartebeest (Gautier and Van Neer 1989: 135-136).

The locations of, and strategies for, hunting dorcas gazelle must have been totally different from those for hunting hartebeest and aurochs, but such differences have not been attested in the archaeological record of the Fayum. The ease of hunting dorcas gazelle and hartebeest by means of spears or traps, or even by hand without any weapons has been described elsewhere (Hassan and Gross 1987: 97; Wetterstrom 1993: 172-173), and thus it is understandable that they became the major prey of the Fayum Epipalaeolithic and Neolithic hunters. However, it is not certain whether dorcas gazelle, hartebeest and aurochs were a reliable source of meat for Fayum people, because the carrying capacity of the circumscribed lake environment of the Fayum is apparently not very high, and thus their herds could have easily been depleted if there was no hunting control.

Although not numerous, the presence of hippopotamus in the Fayum Epipalaeolithic and Neolithic faunal assemblages also indicates the occurrence of open stretches of permanent water with submerged, gently sloping sandy banks surrounded by open grassland. Hippopotamus is gregarious and sedentary, and usually stays in pools during the daytime but feeds preferentially on terrestrial grasses rather than aquatic plants and wanders on land for grasses widely at night (Dorst and Dandelot 1970: 171-172). Hippopotamus is very aggressive and is definitely not easy prey, and it has been described in ethnographic accounts that successful hippopotamus hunting is an extraordinary occurrence (Gifford-Gonzalez *et al*. 1999: 402).

Medium to large-sized mammals which have scarcely appeared in the archaeological record in the Fayum but are reported to have recently gone extinct in the Fayum include oryx (*Oryx dammah*), addax (*Addax nasomaculatus*), wild boar (*Sus scrofa*), barbary sheep (*Ammotragus lervia*) and striped hyena (*Hyaena hyaena*) (Atta and Verheugt 1992: table 14; Wenke *et al*. 1998: table 1). Other smaller mammals which have not surely been hunted and eaten by the Fayum inhabitants but have certainly existed in the Early-Middle Holocene and still exist at present in the Fayum include jackal (*Canis aureus*), red fox (*Vulpes vulpes*), wild cat (*Felis silvestris*), hare (*Lepus capensis*), mongoose (*Herpestes ichneumon*), hedgehog (*Hemiechinus auritus*), and gerbil (*Gerbillus gerbillus*) amongst others (Atta and Verheugt 1992: table 13; Brewer 1989b: table 4; Gautier 1976b: table I-7; von den Driesch 1986: table 1; Wenke *et al*. 1988: table 1).

Hare was the most commonly hunted game animal in Nabta Playa in the Early-Middle Holocene, and particularly when Nabta Playa became increasingly dry and other desert-adapted animals like dorcas gazelle were vanishing (Gautier 2001). There is an ethnographic account that jackals, foxes and gerbils have been caught by trapping and eaten by local people in Siwa Oasis (Hassan and Gross 1987: 93). It is also known that hedgehogs have been captured and used for tomb offerings in Pharaonic times, though it is not certain whether they were eaten (Osborn 1998: 21-23).

Therefore, the presence of these small mammals as potential food resources in the Fayum Epipalaeolithic and Neolithic diet should not be ignored.

In general, mammals are active throughout the entire year. It has been assumed in the Nile Valley that medium to large-sized terrestrial mammals dispersed more widely during high water in late summer and early autumn, and aggregated around the Nile during dry months in late spring and early summer, and that hunting of the mammals may have been easier in dry months when they were highly aggregated around water (Gautier 1988: 24-25; Van Neer 2004: 265). Such a behavioural pattern of the mammals may have generally been the case in the Fayum, and the Fayum mammals may have remained dispersed also during the rainy months in winter in order to look for pastures and other edible plants in semi-desert areas.

As for reptiles, several species of desert-adapted, terrestrial lizards and snakes are presently known in the Fayum (Atta and Verheugt 1992: 30-31), but it is not clear whether they were caught and eaten by Fayum inhabitants in prehistory. Aquatic reptiles which were surely the prey of the Fayum Epipalaeolithic and Neolithic inhabitants include soft-shelled turtle (*Trionyx triunguis*) and crocodile (*Crocodylus niloticus*) (von den Driesch 1986: table 1; Wenke *et al*. 1998: table 1). The presence of these aquatic reptiles suggests that there were open sand bars on the lakeshore suitable for their basking. In general, cold-blooded reptiles become less active when the temperature is low, and therefore, it may have been easier for people to catch them in winter.

It is very difficult to know from the published faunal assemblages of the Fayum Epipalaeolithic and Neolithic whether there were changes in the relative abundance of wild mammals and reptiles between these two periods. However, according to the data obtained on the southwest side of the lake (Wenke *et al*. 1988: table 1), it looks as if hippopotamus and crocodile did not exist in the Epipalaeolithic but appeared in the Neolithic and Predynastic. Although the data are very poor, a slight increase of hippopotamus and crocodile through the Epipalaeolithic and Neolithic periods is observed on the north side of the lake (Gautier 1976b: table I-7). In addition, although not in the Fayum, a similar increasing trend of the abundance of hippopotamus and crocodile in the faunal assemblages has been observed through the early to late Neolithic period in Merimde Beni Salama (von den Driesch and Boessneck 1985: tables 15, 43, 51 and 52). Since it is unlikely that large populations of hippopotamus and crocodile migrated to the Fayum for the first time in Fayum history after the rise of the Neolithic Moeris Lake, it can be inferred that hippopotamus and crocodile were not usually exploited in the Epipalaeolithic even though they did exist. Rather, the tactics or technologies of hunting these dangerous animals improved after the Neolithic, and consequently, their remains were included in the archaeological record more frequently in later periods.

Apart from hippopotamus and crocodile, the most recognisable change at the beginning of the Neolithic in the Fayum is the appearance of sheep and goat. The sheep and goat found in the Fayum Neolithic are all domesticated forms, and they have often been described as *Ovis/Capra*, because it is difficult to distinguish sheep from goat (Boessneck 1969; Brewer 1989b: 101-102). As mentioned in the preceding chapter, since there were no wild ancestors of domesticated sheep and goat in northeastern Africa, there is little doubt that the domesticated sheep and goat found in the Fayum originated from the southern Levant. Since these animals are more tolerant to different climates and environments than plants, the introduction of domesticated sheep and goat to the Fayum must have been easier than the introduction of domesticated wheat and barley. The appearance of domesticated sheep and goat and the simultaneous increase of hippopotamus and crocodile in the Fayum Neolithic faunal assemblages stand in contrast with the situation in the contemporaneous Central Sudanese Nile Valley, where not only hippopotamus and crocodile but also other terrestrial wild mammals seem to have decreased as domesticated sheep and goat increased in the faunal assemblages (Gautier 1989: table 1).

It is known that varieties of migratory waterfowl visit the Fayum in winter and inhabit the shallow water of the lake fringed with vegetation (Brewer 1989b: 86-91). Those that have been found abundantly in Epipalaeolithic and Neolithic faunal assemblages include grebe (*Podiceps cristatus*), duck (*Anas acuta/clypeata/penelope/strepera*) and coot (*Fulica atra*) (Brewer 1989b: table 6). Therefore, it is certain that fowling was essentially a winter activity. Another important bird that appeared in the archaeological record in the Fayum is ostrich (*Struthio camelus*) (Brewer 1989b: 87-88). It is not certain whether it was hunted by the Fayum Epipalaeolithic and Neolithic inhabitants for meat or feathers, but ostrich eggshell fragments have been used for making beads in the Fayum, and thus the Fayum people would have stolen eggs from their nests in their breeding season between spring and summer.

The ichthyofauna comprises the largest group in the Early-Middle Holocene faunal assemblages at all sites in the Fayum. The Fayum is included in the Nilo-Sudan ichthyofaunal province, which is affected by the annual rise and fall of the Nile water level due to rainfall in the headwaters of the Ethiopian Highlands in summer. Approximately 70 fish species have been known in the Lower Nile, but the diversity of fish exploited in prehistory in the Fayum and other parts of the Lower Nile is very limited (Brewer 1989b: 68*ff*; Van Neer 2004: 252*ff*).

The fish that have been identified in the Fayum Epipalaeolithic and Neolithic assemblages include a few species of catfish (*Clarias* sp., *Bagrus* sp., and *Synodontis* sp.), tilapia (Tilapiini), cyprinid (*Barbus bynni*), and Nile perch (*Lates niloticus*), among others (Brewer 1989b: 68-85; von den Driesch 1986: table 1; Wenke *et al*. 1988: table 1). These six species have been most commonly found in the Fayum. They can be divided into two ecological groups. The shallow water dwellers are those that preferentially inhabit shallow water and spawn there, and are tolerant to fluctuations in water and salinity level and oxygen concentration. Clariid catfish, tilapia and cyprinid are included in this group. The deep water dwellers are those that spend most of their life in open, deep, oxygenated water and spawn there. Bagrid catfish, synodontis catfish, and Nile perch are included in this group (Van Neer 1989: 49-52; 2004: 252-256). Clariid catfish predominated among these six species in the Fayum (Brewer 1989b: 113-116). The predominance of clariid catfish in the Fayum ichthyofaunal assemblages clearly indicates a Fayum physical environment with shallow water, long sandy beaches and submerged plants on the water margin, all of which are suitable for them. The presence of Nile puffer (*Tetraodon fahaka*) has been reported elsewhere in the Fayum Epipalaeolithic and Neolithic ichthyofaunal assemblages, but puffer is poisonous, and hence its presence may not be considered as the evidence of consumption (Brewer 1989b: 85 and 106) and may perhaps be the evidence of netting or angling for non-selective catching. However, if the Fayum fishers knew how to remove the poisonous liver of puffer, it is probable that puffer was eaten.

For an understanding of the seasonality of fishing in the Fayum, growth increment studies on fish remains as well as ecological data on the behaviour of fish have served. A study on the growth rings of the pectoral fin spines of clariid catfish as well as the ecological data has revealed that this fish might have been caught during two seasons of a year throughout the Fayum Epipalaeolithic and Neolithic periods. The first fishing season was late summer, when the lake level started to rise due to the influx of annual Nile flood water. It is known that at the beginning of annual flood, large adult clariid catfish rush to shallow marginal areas of rising water in the floodplain for spawning, and congregate there in great masses, and then migrate back to deeper parts of the water as the floodwater starts to lower. Therefore, large adult clariid catfish on beaches during their spawning could have been easily caught with spears or even by hand. The second fishing season was late spring, when the lake reached its lowest level due to gradual evaporation. It was suggested that clariid catfish were caught when they aggregated in large numbers during late spring to take advantage of

some prey species which spawned at this time. Accordingly, it is probable that the Fayum Epipalaeolithic and Neolithic people stayed near the lake during at least these two possible fishing seasons (Brewer 1989b: 119-144 and 166-169).

However, it has been pointed out that pectoral fin spines are less reliable as indicators of the seasonality of capture than otoliths and vertebrae, and it is argued that a comprehensive understanding of the general behavioural patterns of the fish species under study and the ratio of adult fish and juvenile fish in the assemblages, which would indicate the seasons of their capture, as well as osteological analyses, are vital (Van Neer 2004; Gautier and Van Neer 1989: 141-153; Van Neer *et al*. 1999; 2000: 282-285). It is known that small juvenile clariid catfish that grow up in the floodplain are trapped in residual pools after the flood water receded, and hence are easily caught. It is also known that tilapia and cyprinid have behavioural patterns similar to those of clariid catfish, though tilapia continues to spawn for a longer period in shallow, inshore nests, and hence they would also have been easy prey (Van Neer 1989: 52-54; 2004: 252*ff*). The ratio of adult fish and juvenile fish in the Fayum Epipalaeolithic and Neolithic ichthyofaunal assemblages has not been studied, but a future study of the age distribution of fish across different sites would elucidate the seasons of their capture more clearly.

Moreover, this easy manner of shallow water fishing must have yielded more fish than those could be consumed immediately. Thus it is probable that an excessive amount of fish have been processed and sun-dried or smoked for later consumption, as is known in African ethnography and also has been attested at Late Palaeolithic sites in the Nile Valley (Van Neer *et al*. 2000). However, sun-dried or smoked fish would not have lasted very long due to the problem of insect infestation (Gautier and Van Neer 1989: 151-152). If such fish preservation was actually practised in the Fayum, sun-dried or smoked fish enabled people to stay in the Fayum during lean seasons.

On the other hand, deep water fish do not migrate to shallow water for spawning. Their spawning takes place near the banks of open water, and the fry migrate toward shallow water and spend their first growth period there, and then return to deeper water (Van Neer 1989: 52; 2004: 256). There is no direct clue to know the seasons for fishing deep water dwellers in the Fayum, but it is clear from this general behavioural pattern that only juveniles of deep water fish could be caught in shallow water during the annual high water season. It is probable that adult deep water fish were caught in late spring when the water reached its lowest level and was less turbulent (Van Neer 1989: 54; 2004: 256 and 266; Wetterstrom 1993: 196).

As for the reliability of fishing, it can be said that fish are generally tolerant to exploitation, and are not easily depleted. Furthermore, as described above, the habitat and behavioural pattern of shallow water fish show clear seasonality, and hence they are predictable and make the fish easy prey. Therefore, shallow water fishing would have been a quite reliable subsistence activity, and shallow water fish must have been the most essential source of meat.

Freshwater shellfish collecting was not uncommon in the Nile Valley since the Late Palaeolithic period, and it has been argued that some shellfish like Nile oyster (*Etheria elliptica*) that inhabits the main Nile were most likely collected when the water level of the Nile was at its lowest in spring and early summer (Van Neer 2004: 265). There is much information about the availability and possible use of lacustrine shellfish in the Fayum in the Early-Middle Holocene (Alexandrowicz 1986; Gardner 1932). It has been reported by Gardner that whereas Nile oyster was rare, large bivalves of around 10 cm wide like *Aspatharia rubens* (*Spatha cailliaudi*) and *Mutela nilotica* (*Mutela dubia*), which inhabit sandy areas and can survive in the floodplain even after water recession, occurred plentifully in the sandy deposits of the Neolithic lake, and were found also at Kom K and Kom W (Caton-Thompson and Gardner 1934: 34 and 40; Gardner 1932: 53-58 and 80-84). However, the remains of mass disposal of shells after consumption, which should be called shell middens, have never been

seen in the Fayum, and hence there is no evidence of intensive mass collecting of shellfish.

At Kom W, several *Aspatharia* shells were found with fish bones and splintered animal bones in a firehole and in pottery vessels. These bivalves may have been cooked and eaten. In another case, a single *Aspatharia* shell and hippopotamus tusks lay in a pottery vessel and the shell seems to have been used as a soup ladle or scoop. Apart from these, *Aspatharia* shells with serrated edges were also found, and such examples indicate that they were probably used for scaling fish (Caton-Thompson and Gardner 1934: 34 and 40). Furthermore, several unmodified *Aspatharia* shells have been found in the Upper and Lower K Pits, though the reason for such deposits is unclear (Caton-Thompson and Gardner 1934: 46 and 53). Therefore, even though not numerous, it is certain that shellfish were collected in the Fayum Neolithic not only as food items but also as raw materials for making tools like scrapers and smootheners.

3.7.3. Climatic and environmental fluctuations and resource scheduling

Reconstructions of the resource scheduling in the Nile Valley in prehistory have been attempted elsewhere (Gautier 1988: fig.1; Hassan 1974: fig.60; 1984b: fig.3; Peters 1996: fig.3; Van Neer 2004: figs.10 and 11; Wendorf and Schild 1989: fig.44.8). It is possible to consider the resource scheduling in the Fayum in the Epipalaeolithic (**Table 3.7**) and the Neolithic (**Table 3.8**) on the basis of these reconstructions with some modification, because the variability and predictability of available wild food resources in the Fayum were generally the same as those in the Nile Valley. Since the seasonality of several subsistence activities in the Fayum has been revealed archaeologically or inferred logically on the basis of ecological data, it seems possible that early autumn, in which high lake water reached its peak and prevented many activities, was a lean season in the Fayum, as long as the Fayum people relied on wild food resources only and also pursued an immediate return type of resource exploitation without preserving and storing spare food resources.

As mentioned earlier, however, tubers and seeds of wild plants can be stored for a short while after harvest. Moreover, it has been suggested that sun-dried or smoked fish would most likely have been consumed in early autumn, which was the intermediate period between the first and second fishing seasons (Van Neer 2004: 264). If such possible practices are taken into consideration, it seems that there was no severe lean season in the subsistence calendar in the Fayum throughout the Epipalaeolithic and Neolithic periods, under stable climatic and environmental conditions.

In reality, however, it is known from historical records that the onset, duration and vertical/horizontal extent of annual Nile floods, which were the most important factors enabling plants and animals in the Nile Valley to grow and flourish, have fluctuated considerably from year to year and in the longer term (Butzer 1984; 1998; Hassan 1997b). The delay of the rise of water would have retarded the start of the first fishing season, and have also retarded the growth of wild plants that relied on ground moisture supplied by rising water. Extremely low flood water would have reduced the extent of submerged areas, and this would have led to the decrease of the stands of wild plants that relied on ground moisture after the recession of water in autumn (Wetterstrom 1993: 193*ff*).

Therefore, even though the growth cycle of various wild plants and the behavioural patterns of different animals are generally predictable, when a flood comes, how much water arrives and how long it lasts would be totally unpredictable. If people stayed at the same location all the year around, it must have been necessary for them to buffer the risk of food shortages through early/late summer and autumn caused by unusual floods. If unusual floods lasted over many years or decades, the annual resource scheduling which was established under stable climatic and environmental conditions would have no longer been viable, and it would have had to be reorganised and optimised.

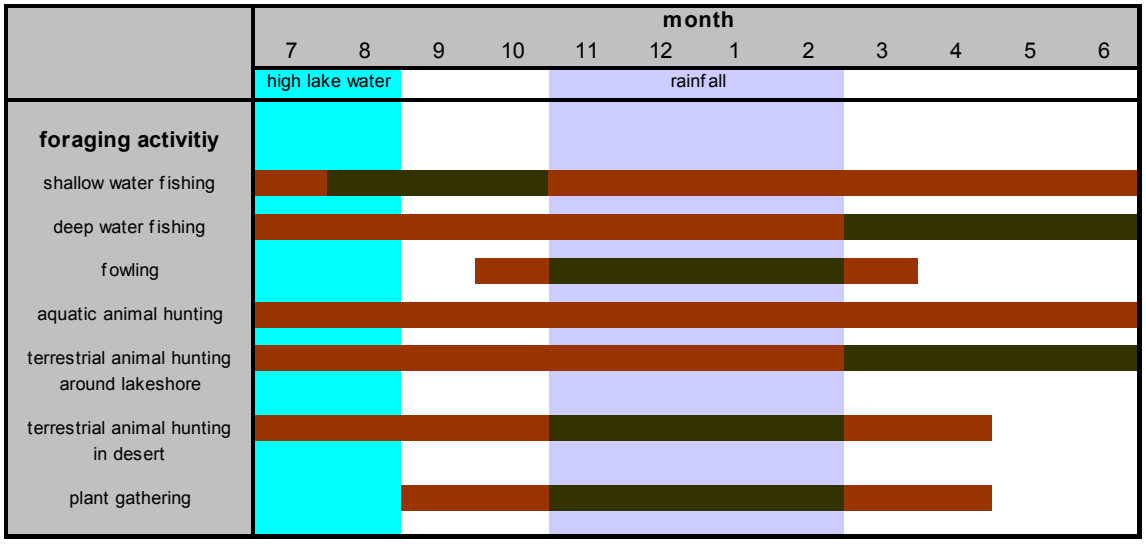


Table 3.7. Resource scheduling in the Fayum Epipalaeolithic

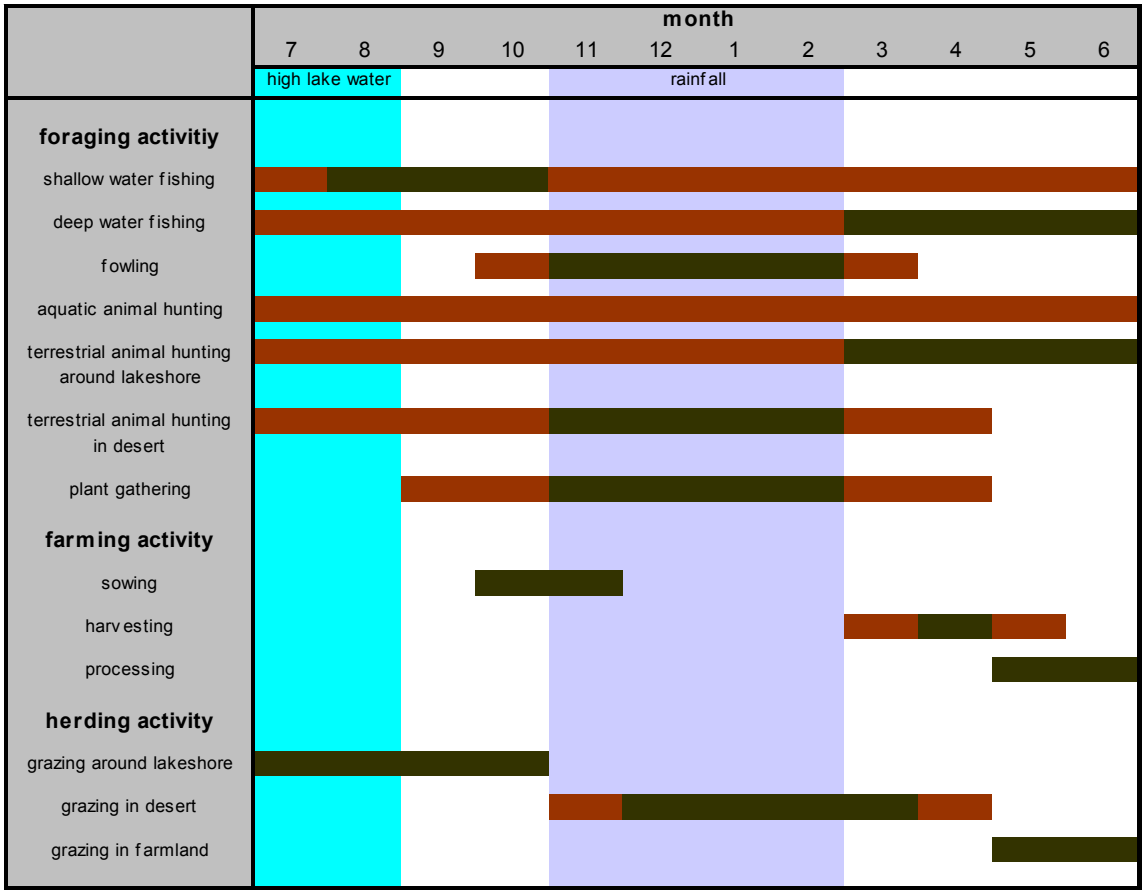


Table 3.8. Resource scheduling in the Fayum Neolithic

In the Fayum, the fluctuations in annual Nile floods have directly affected the water level of the lake, and the water supply to the Fayum lake basin may have been cut off during particularly low Nile floods (Hassan 1986b: 494). Therefore, the situation in the Fayum would have tended to be worse than that in the Nile Valley floodplain. There is little doubt that the Epipalaeolithic and Neolithic inhabitants of the Fayum have almost constantly been forced to react and adapt to changing situations by adjusting different subsistence and mobility strategies. As described earlier, some reconstructions of long-term lake level fluctuations have been attempted, and even though there are disagreements at many points between these reconstructions, some general trends have been understood. Whereas the Fayum Epipalaeolithic corresponded to the Premoeris and Protomoeris Lake stages and hence the period of generally low water level, the Fayum Neolithic corresponded to the Moeris Lake stage and hence the period of generally high water level, although the lake level may have dropped for a considerable length of time between the Protomoeris Lake and Moeris Lake stages, or only around 6000-5800 cal.BC. Therefore, it is essential to take these general trends into consideration, when assessing the productivity of fishing and the availability of wild plants that grow in the moist soils of lakeshore and the animals that feed on them in the Fayum.

Furthermore, although there are no year-to-year data regarding the amount of winter rainfall in the Fayum in the Early-Middle Holocene, it must also have fluctuated from year to year despite a generally decreasing trend in the long term. It is highly probable that fluctuations in the amount of winter rainfall greatly affected the life of some or many species of annual plants that grew in winter and spring, and consequently affected the life of animals that fed on the plants. Therefore, as is the case with Nile flood fluctuations, even though the growth cycle of annual wild plants that rely on winter rainfall and the behavioural patterns of wild animals that feed on winter plants are generally predictable, when rain starts to fall, how much rain falls, and how long it lasts would be totally unpredictable. It must have been necessary for people to buffer the risk of bad harvest and poor catch of animals through winter and spring caused by few or no rainfall.

It has been revealed on the basis of various palaeoclimatic data in the Eastern Mediterranean that there was a remarkable cooling and drying event in the Levant between 6700 cal.BC and 5900 cal.BC centring around 6200 cal.BC (Robinson *et al.* 2006; Rohling *et al*. 2002; Rohling and Pälike 2005; Rossignol-Strick 1999), and that precipitation in the Negev also seems to have decreased around this period (Goodfriend 1991). It can be interpreted that the polar front which spread winter rain in the entire Levant and the subtropical trough which spread winter rain in northern Egypt might have waned and have retreated northwards during this period. The effects of this climatic event have been well recognised in the archaeological record as the 'collapse' and restructuring of Neolithic communities in the entire Levant and particularly in the southern Levent (Bar-Yosef 2003: 120*ff*). Such dramatic changes in the size and distribution of occupation sites have not clearly been seen in the archaeological record in northern Egypt in this period, probably because most sites in northern Egypt were not as large and not as sedentary as the Levantine ones.

It has also been argued that precipitation in the Negev might have generally increased in the Middle Holocene (Goodfriend 1990; 1999) and that a particular increase around 5500-5000 cal.BC might have been caused by the northward shift of the Intertropical Convergence Zone (Goodfriend 1991). However, considering a recent study that illustrates the rapid southward shift of the Intertropical Convergence Zone after 5300 cal.BC as suggested by the southward shifting of the depopulation trend of the Western Desert (Kuper 2007; Kuper and Kröpelin 2006: figs.1 and 2), it is unlikely that the increase of rainfall in the Negev was caused by the effect of the Intertropical Convergence Zone. It is more likely that the return of the polar front near the Negev caused such a phenomenon. Since it is difficult to explain the relatively higher water

level of the Neolithic Moeris Lake in the Fayum by assuming the increased discharge of the Nile water alone, it is probable that the increased winter rainfall contributed to the recharge of the groundwater table and the maintenance of the high lake level.

This probability seems to contradict the assumed constant decrease of annual precipitation from the Early to Middle Holocene in the Fayum as mentioned before. However, it is possible that whereas the annual precipitation of 50 mm between 7000 and 5300 cal.BC had mainly been supplied by the African monsoonal rain because of the waning of the subtropical trough, the rapid decrease of summer rainfall due to the southward retreat of the Intertropical Convergence Zone offset the increase of winter rainfall due to the re-occurrence of the subtropical trough, leading to the overall decrease of the annual precipitation after 5300 cal.BC.

On the whole, it can be said that the estimation of the constant decrease of annual precipitation from the Early to Middle Holocene in the Fayum is rather simplistic. Instead, it may be presumed that whereas the Fayum Epipalaeolithic corresponded to the period of temporal recovery from sudden decrease of winter rainfall around 6700 cal.BC, the earlier half of the Fayum Neolithic corresponded to the period of increased winter rainfall and the later half of the Fayum Neolithic corresponded to the period of another cooling and drying event in the Eastern Mediterranean which started around 4900 cal.BC (Rohling *et al*. 2002). The effects of the waning or shifting of the subtropical trough on the general habitation pattern of people in the Fayum may have been small, but slight increases or decreases in precipitation may have made some or great differences in vegetation in the Fayum, and have affected the subsistence activities of the Fayum inhabitants. Therefore, it is important to take these possible climatic trends into consideration when the availability of annual wild plants that grow in winter and the animals that feed on them in the Fayum is assessed.

3.7.4. Population aggregation and the emergence of sedentism

All Epipalaeolithic sites found on the north and southwest sides of the lake are nothing more than surface concentrations of faunal remains and lithic artefacts, and hearths have not been reported at sites on the north side of the lake, whereas they have been reported at a site on the southwest side of the lake. As a consequence, it has been argued that these sites were the remains of several overlapping encampments that had been used perhaps seasonally over a long period of time (Hassan 1986b: 496; Wetterstrom 1993: 187). It has also been speculated that people might have spent several months of the year away from the lake, when lakeshore resources became scarce or when the lakeshore became inaccessible (Wetterstrom 1993: 191), and that there must have been other types of sites occupied by the same people in different places, which represented different subsistence activities (Wendorf and Schild 1976: 317).

Concerning the evidence for the life of the Fayum Neolithic people on the northern shore of the lake, previous field research has found three distinct types of archaeological sites. They are: (1) extraordinary concentrations of fireholes and artefacts on two natural mounds named Kom W and Kom K, the latter of which seems to be associated with granary pits at the Lower K Pits and Upper K Pits in the neighbourhood, (2) dense and extensive surface concentrations of artefacts accompanied by grinding stones and remains of butchering at lower elevations near the lake, (3) numerous sparse scatters of artefacts which sometimes accompany hearths. On the basis of these observations, it has been argued that different types of sites represented different subsistence activities, and that Kom K and Kom W must have been associated with farming and herding and were occupied all the year round and particularly when the lake level was high, whereas sparse scatters of artefacts must have been left by single persons or smaller components of the larger group that split up and visited there for hunting, fishing or plant gathering for one or a few days during dry

seasons when resources were scarce (Kozlowski and Ginter 1989: 177; Wetterstrom 1993: 209-210).

The interpretation of Kom K and Kom W must be the key to understand the residential patterns of Neolithic people. Apart from many fireholes dug into the ground, no trace of floors, postholes, or any other structural remains has so far been found at these sites. However, according to publications, the number and variety of artefacts are enormous at these two sites and particularly at Kom W. Such a wide variety of numerous artefacts suggests that a greater diversity of activities took place there. Faunal remains are also rich at Kom W, and they include sheep and goats, but the dung of sheep and goats has not been found there (Caton-Thompson and Gardner 1934: 34 and 89). Therefore, it seems probable that these sites were densely inhabited for a length of time or occupied repeatedly in the long-term, but it is difficult to say on this basis only that these sites were occupied all the year round. As mentioned earlier, some scholars' argument that Kom K and Kom W must have had more than just short-term occupations (Hassan 1998: 149-150; Wenke *et al*. 1998: 44*ff*) would not be wrong, but such an argument is not sufficient to understand the situation.

In order to better describe this situation, it is useful first to mention the distinction between site sedentariness and permanence, and the definition of sedentism, because these terms mean different things to different scholars. Sedentariness refers to the number of months per year people stay at one habitation, whereas permanence refers to the geographic stability of habitation sites from year to year as well as the persistence of a specific mobility strategy from year to year. The most widely agreed definitions of sedentism are that human groups reduce their mobility to the point where they remain residentially stationary year-round, or that at least part of the population stays at the same location all the year around. Sedentism is a relative difference rather than a static condition, and hence a term like 'sedentary settlement systems' merely implies less mobile than previously, or becoming increasingly sedentary over time (Chatters 1987: 347-348; Kelly 1995: 148-149; Rafferty 1985: 113-116).

Kom K and Kom W were located on lakeshores which have transgressed and regressed seasonally and also over years. Previous research has found traces of inundation in the stratigraphy of Kom W (Wendorf and Schild 1976: 212). Even if the inhabitants could be sedentary in one year, they needed to displace an entire residential system in another year of unusually high or low lake water. This unpredictable nature of lake level fluctuations may be one reason why the inhabitants dispensed with substantial dwelling structures. Nonetheless, the inhabitants' obsession with Kom W is evident from the cultural deposit whose time span seems to be a few hundred years, despite the difficulty of continuous sedentary habitation. It can be assumed that Kom W was a geographically and strategically advantageous site over other locations in the surroundings and hence has been inhabited as a permanent residential base. Another reason for the lack of substantial structural remains may simply be because durable building materials like rocks are not abundantly available in a generally sandy lakeshore environment of the Fayum and hence people had to be satisfied with perishable wooden materials.

One problem of previous arguments about the residential patterns of the Fayum inhabitants is that they have implicitly and explicitly suggested population aggregation in resource-rich seasons and dispersal or migration in resource-poor seasons, but have never mentioned the band composition of the local population, and have rarely estimated the size, density, and growth of the population on the whole. Therefore, a question arises as to how many people actually lived in the Fayum in these periods. Since no cemetery has been found, there is no direct evidence for the size and sex composition of the population. The health and life expectancy of individuals have been known only from two isolated burials of the Epipalaeolithic period (Henneberg *et al*. 1989; Wenke *et al*. 1983). Other circumstantial evidence has to be utilised

to estimate the population size and density.

Carrying capacity is a fundamental notion in the study of prehistoric populations, and it refers to the maximum population that can be supported by available food resources in a given area under given conditions. The relation between human population and the carrying capacity of a given area is not static. Carrying capacity is increased or decreased as the yield changes due to natural causes, or as people change the conditions by new technology, labour force and management. It also depends on the rates of resource consumption by people (Hassan 1999: 679-680).

There has been an attempt to estimate the human population density of Siwa Oasis in the Early Holocene from the estimates of precipitation and biomass of herbivores (Hassan and Gross 1987: 99). Since the precipitation and biomass of herbivores in Siwa Oasis in the Early Holocene are assumed to be similar to those of the Fayum in the same period, the estimate of human population density of Siwa Oasis as 0.05 persons per km^2 would be applicable to the Fayum as a baseline. However, considering the far larger body of water in the lake and the great abundance of aquatic resources there in the Fayum, the carrying capacity of the Fayum must have been much larger under the same climatic condition, and the maximum potential population density of the Fayum would have been much higher than 0.05 persons per km^2. Therefore, the estimate of human population density of the Nile Valley in the Terminal Pleistocene as 0.11-0.27 persons per km^2 (Hassan 1981: 37) would be much closer to the situation in the Fayum. But again, this figure assumes a population that depends on terrestrial mammal hunting only and does not consider fishing, fowling and wild plant harvesting. Hence the population density estimate must become much higher when the exploitation of aquatic and plant resources is taken into account.

Assuming that terrestrial wild food resources in the Fayum would have been distributed no more than 5 km away from the lakeshore and that the total usable land on the northern shore of the present lake was approximately 175 km^2 and using the population density estimate of 0.11-0.27 persons per km^2, it can be estimated that the human population of the northern shore of the present lake in the Fayum before the beginning of food production in the Neolithic was approximately 19-47 persons. However, this number is not large enough for the people to find mates and to maintain their population within the Fayum only, and hence this number should be taken as a very minimal estimate.

Based on the data of granary pits found at the Upper K Pits in the neighbourhood of Kom K, it has been calculated how many kilograms of wheat/barley grains could be stored in those pits in total, and how large farmland was needed for the production of the grains (Caton-Thompson and Gardner 1934: 48-49). Furthermore, comparing with the diet of present-day farmers and considering other factors, there has been an attempt to estimate how many people could live on the calculated amount of grain storage (Hassan 1988: 148-149). However, this attempt had to be based on the unsubstantiated assumptions that one granary pit belonged to one family and grains were stored for a year, and that the Neolithic people's dependence on grains might have been less than that of present-day farmers and would have been 40 % of all diet. Therefore, the resultant estimate that the size of the group that lived on the stored grains at the Upper K Pits would be approximately 200 persons sounds fairly large against a nearby habitation site of Kom K which is approximately 50 m by 80 m in area and had only 16 sunken fireholes without any other traces of dwellings. But this estimate certainly shows the potential of farming to increase the carrying capacity of the Fayum lakeshore habitat and to sustain larger population.

3.7.5. Mobility

Another problem with previous arguments about the residential patterns of the Fayum inhabitants is that their mobility patterns have not clearly been explained, despite the likelihood that they not only moved short distances within the Fayum Depression but also travelled very long distances

out of the Fayum Depression in a group as well as individually. The expansion of sociocultural/ socioeconomic networks made by individual moves and group moves between the Fayum and the rest of the Western Desert, between the Fayum and the Nile Valley, and between the Fayum and the southern Levant via the Negev and Sinai, should not be ignored as a factor that enabled access to domesticates and novel material items, even though a certain degree of sedentism in the circumscribed lake basin seems to have been one reason why domesticates were introduced to the Fayum.

As for long distance individual and group moves beyond the Fayum, the presence of similar material culture and subsistence in Lower Egypt suggests some contacts. The Epipalaeolithic sites at Helwan are located only 60 km to the northeast of the Fayum across the Nile, and it is no wonder that there were regular sociocultural/ socioeconomic contacts between Helwan and the Fayum, though the Helwan Epipalaeolithic is not well dated. The Neolithic sites of El Omari are located in the vicinity of Helwan, and the Neolithic sites of Merimde Beni Salama are located approximately 100 km to the north of the Fayum, but these Neolithic sites are contemporaneous with the second half of the Fayum Neolithic. Thus it is unlikely that contacts with the Nile Valley inhabitants and Nile Delta inhabitants gave an incentive to the Fayum inhabitants and initiated the Neolithisation of the Fayum. It is more likely that this situation reflects the almost simultaneous developments of Neolithisation in Lower Egypt through mutual influence.

As for very long distance individual and group moves, it has been pointed out that lithic artefacts of the Fayum Neolithic culture were very similar to those of the Bashendi A and B cultures in Dakhleh Oasis and those of the Djara B culture in Djara, which are located approximately 450 km and 250 km respectively to the south of the Fayum. The coincidence of the supposed beginning of the Fayum Neolithic with the temporary abandonment of Dakhleh Oasis and the final abandonment of Djara around 5300 cal.BC may perhaps suggest that the similarities in material culture occurred not only by exchange/trade between these regions but also by the movements of entire populations to the Fayum. As mentioned earlier, since exotic items like marine shells from the Red Sea and Mediterranean Sea are seen in the Neolithic finds at Kom K and Kom W (Caton-Thompson and Gardner 1934: 34, 40 and 87-88), there is no doubt that very long distance exchange/trade networks of a 300-400 km radius had surely been established in the Fayum Neolithic. In addition, some similarities between the material culture of the Fayum and that of the Siwa Oasis region in the Early Holocene have been pointed out (Hassan and Gross 1987), and Nubian diorite is seen in the Neolithic finds at Kom W (Caton-Thompson and Gardner 1934: 87-88). These suggest that there were contacts between the Fayum and remote places across a distance of more than 500 km. Therefore, it is not surprising that the exchange/trade networks had expanded further beyond Egypt with Sinai, the Negev and the southern Levant.

3.8. Strategies for new research

It is suggested that early autumn, in which rising lake water reached its peak and prevented many activities, and late spring and early summer, in which receding lake water reached its lowest level, would have been lean seasons in the Fayum subsistence calendar before the beginning of food production, though preserved food items like tubers and sun-dried or smoked fish may have been consumed in such lean seasons. Therefore, it is probable that storable food items provided by farming and herding were favourably adopted to fill gaps in the annual food supply, and that farming and herding were not intended to replace foraging. However, the explanation that Fayum Neolithic people had a wider resource base than Fayum Epipalaeolithic people in order to better adapt to the unpredictable environment of the Fayum (Brewer 1989b: 171; Wetterstrom 1993: 225-226) does not sound satisfactory, because the Epipalaeolithic people did not practise farming and herding in spite of similar or even slightly

worse environmental and climatic conditions. Therefore, the timing, process and causality of adaptation must be examined in more detail, and the word 'adaptation' must be defined more clearly on a sound theoretical basis.

Enigmatic granary sites named the Lower K Pits and Upper K Pits have been found on a desert ridge to the north of Kom K, but the implications for the subsistence and mobility strategies of Neolithic people have yet to be well understood. One question is to what extent the Neolithic people actually relied on the stored grains. In other words, the question is whether the stored grains were an indispensable part of Neolithic diet for the survival of the Fayum inhabitants. These granary sites are separated from habitation sites, and there is no trace of habitation on the ridge where these granary pits were located. The nearest habitation site is approximately 1 km away. Thus it is unclear that these granaries were closely associated with everyday life and were taken care of as a part of household activities. The fact that Kom K was equipped with granaries whereas Kom W was not equipped with similar granaries also gives rise to the question as to whether stored grains really helped people to secure a stable supply of food and to survive lean seasons, and to abandon foraging. Therefore, it is worthwhile to look at the practice of food production in the Fayum not only from a purely economic point of view but also from a social point of view, and to consider the possibility that stored grains and livestock were surplus food that could be used for special occasions like feasting or trade.

Given the history of plundering and scholarly research in the Fayum in the past hundred years, a problem is whether the Fayum still deserves intensive field research in order to answer the remaining questions. It is evident that much important archaeological data have been lost from the field, and any future field research is likely to be scavenging what has been neglected or overlooked by previous visitors. Remaining artefacts in the field provide biased information about artefact assemblages. On the other hand, thousands of artefacts taken out of the Fayum are presently housed in museums around the world, although many of them are bifacially-retouched beautiful stone tools of the Neolithic period and lack the information about the context of discovery. Therefore, any study of them has no other choice but to focus on purely technological aspects of individual artefacts.

In these difficult circumstances, possible strategies of new research are two-fold. Firstly, internal reasons for the adoption of domesticates at the transition from the Epipalaeolithic to the Neolithic and the changes in residential patterns and subsistence technologies at this transition in the Fayum will be studied through fieldwork in the Fayum, while following several lines of explanatory and predictive models. The fieldwork will focus on the topics which were neglected by previous culture-historically-oriented research, and will attempt to understand land use patterns by Epipalaeolithic and Neolithic people. One principal model employed is the adaptive model, and another is the socioeconomic model, which will be described in detail in the next chapter.

Secondly, external reasons for the transition from the Epipalaeolithic to the Neolithic and the adoption of domesticates at this transition in the Fayum will be studied, while surveying the published data regarding the southern Levant and the Egyptian Western Desert. The origins of Fayum Neolithic material culture are still unclear. As mentioned, parallels with typical Fayum lithic artefacts have been abundantly found in the Western Desert but are poorly known in the southern Levant, and thus it is not an easy task to determine the origins of the Fayum lithic artefacts. Even though Levantine subsistence practices are attested in the Fayum, given the differences in material culture, it seems unlikely that Levantine people colonised the Fayum directly, bringing their domesticates with them. A further study of the distribution of characteristic artefacts throughout northeastern Africa and the southern Levant is needed in order to make clearer their possible origins. This topic will be dealt with in Chapter 8.