In Search of the Origins of Lower Egyptian Pottery:
A New Approach to Old Data
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# Chapter 1
# Introduction

The oldest Lower Egyptian pottery has been recorded at sites on the northern shore of Lake Qarun in the Fayum Depression and is dated to the middle of the 6$^{th}$ millennium BC. The area was inhabited by groups known in archaeological studies as the Fayumian or Fayum A culture, the first farming and breeding communities in Egypt (see Krzyżaniak, 1977: 57-68; Midant-Reynes, 2000: 100-108; Tassie, 2014: 227-238). During the Neolithic period, clay vessels became common utensils and today constitute an important part of archaeological assemblages from all known Neolithic sites in the areas of the Fayum, Merimde, Sais, and Wadi Hof.

## 1.1. Aims and outline of the study

Theories explaining the emergence of the first pottery in Lower Egypt have been largely affected by its coexistence with the remains of domesticated plants and animals. The concepts of making and using new types of containers were supposed to have been introduced to Lower Egypt from outside, as an element of the Neolithic package. Such a hypothesis matched the classical model of the Neolithic spreading westwards from the Levant. Newcomers from the Near East were supposed to have introduced new subsistence strategies to Lower Egypt, together with other elements of the Neolithic package, such as clay vessels.

Apart from Levantine hypotheses, an assumption pointing to the eastern Sahara as a source of the Neolithic pottery of Lower Egypt has been proposed. This links Lower Egyptian ceramic assemblages to pottery known from the central and northern part of the Western Desert dated to the final stage of the Holocene humid phase.

The introduction of pottery into the northern part of Egypt supposedly followed migrations of hunter-gatherers and herders from the eastern Sahara, caused by its desiccation. Even though the desert hypothesis is only moderately popular and has rather few supporters, in recent years possible Saharan influences on the development of Lower Egyptian communities have been mentioned more and more often.

This study explores the problem of the origins of Lower Egyptian Neolithic pottery and is aimed determining the direction from which pottery was introduced to Lower Egypt. The point of departure of this study are two already-existing hypotheses, assuming either a Levantine or Saharan origin of Lower Egyptian Neolithic pottery (i.e. Childe, 1935: 48-49; Hayes, 1965: 92, 96-97; Arkell, 1975: 13; Smith, 1989: 75; Midant-Reynes, 1992: 107; Hope, 2002: 57; Kuper, 2002: 9; Warfe, 2003; Tassie, 2014: 184-185; Muntoni & Gatto, 2014: 457; Streit, 2017). The investigation will essentially consist of comparative analyses of ceramic assemblages from Lower Egypt, the Egyptian part of the eastern Sahara and the southern Levant. The results of these analyses will be used to verify these hypotheses or to present a new hypothesis on the origin of Lower Egyptian Neolithic pottery. Finally, a model of pottery introduction into Lower Egypt in the middle of the 6$^{th}$ millennium BC will be proposed.

Chapter 1 presents the aims of the study, as well as its geographic, chronological and cultural frameworks. A brief description of the physical geography of Lower Egypt, the Egyptian part of the eastern Sahara and the southern Levant is presented. An overview of the chronology and the cultural backgrounds of the study is also outlined. The climatic conditions of the Early and Middle Holocene periods in each region discussed in the thesis are described concisely as they had a significant impact on human occupation and cultural development.

Chapter 2 contains a short overview of existing theoretical approaches to the problem of the origins of pottery. Moreover, the author discusses her own theoretical approach, as well as the method used in the study.

In Chapter 3, the state of research on the origin of Lower Egyptian Neolithic pottery is presented. The author starts with a short overview of the origins of pottery among prehistoric societies all over the world. Subsequently, the two possible origins of Lower Egyptian pottery (the southern Levant and the Western Desert) are discussed.

Chapter 4 reviews in detail the cultural situation of north-eastern Africa and the southern Levant during the Early and Middle Holocene periods. Different cultural units of Lower Egypt, the Egyptian part of the eastern Sahara and the southern Levant are discussed, while the corresponding state of research is presented.

In Chapter 5, the ceramic assemblages dated to the Early and Middle Holocene periods from Lower Egypt, the Egyptian part of the eastern Sahara and the southern Levant are examined in detail.

Chapter 6 aggregates the data presented in Chapters 4 and 5 in order to compare the ceramic assemblages from Lower Egypt against those from the southern Levant, on the one hand, and those from the eastern Sahara, on the other. Essentially, the author describes different ceramic assemblages using the same pattern, in line with the theoretical approach of the study. In this way, she presents insights into how pottery production was organised in each region, which makes comparative analyses much easier. In the summary, similarities and differences in the pottery assemblages are evaluated.

In Chapter 7, the author proposes a model of the origins of Lower Egyptian pottery on the basis of the results arrived at in Chapter 6.

Chapter 8 summarises the study and outlines the conclusions.

The Appendix at the end of the book contains short descriptions of all Neolithic pottery collections from Lower Egypt studied by the author.

## 1.2. Geographic background

The present study encompasses three regions, namely Lower Egypt, the eastern Sahara and the southern Levant (Map 1). The main study area is Lower Egypt, whereas the other two regions – the eastern Sahara and the southern Levant – constitute an important addition providing some comparative evidence. None of these areas are isolated, while their borders are either adjacent or overlapping. Lower Egypt is separated from the southern Levant by the Sinai Peninsula, which does not constitute a geographical barrier. Likewise, there are no major obstacles between the northern part of Egypt, on the one hand, and the Western and Eastern Deserts, on the other, constituting part of the eastern Sahara, one of the most arid environments on Earth.

Lower Egypt, the Western and Eastern Deserts and the Sinai Peninsula are located in today's Arabic Republic of Egypt in north-eastern Africa. The southern Levant is located in today's Israel, Jordan, Palestinian Autonomous Territories, southern Syria and southern Lebanon in south-western Asia. Both the southern Levant and Egypt are part of the Middle East, a geographical region that encompasses south-western Asia and north-eastern Africa.

### *1.2.1. Lower Egypt*

Lower Egypt stretches southwards from the Mediterranean Sea to the 30$^{th}$ parallel north of the equator. Its constituent parts include the Nile Delta, the northern part of the Western Desert with the Siwa, Qattara, Wadi el-Natrun, Wadi el-Rayan and Fayum Depressions and the northern part of the Eastern Desert. Currently, the Nile Delta occupies an area of 22,000 km$^2$ and stretches from Abu Quir headland at Alexandria in the west, to Port Said in the east (Hamza, 2009: 87). The tip of the Delta is located north of Cairo, where the Nile branches into channels, only two of which currently exist, namely the Rosetta and the Damietta. In the northernmost part of the Delta there are coastal lakes, lagoons and marshes, while the area slopes downwards into the Mediterranean. An important geomorphological feature in the other parts of the Delta are *geziras*, or 'turtle-backs', mounds of sand up to 12 m in height. They are remains of structures originally formed by the activity of ancient channels (Butzer, 1976: 22-25; Midant-Reynes, 2000: 18).

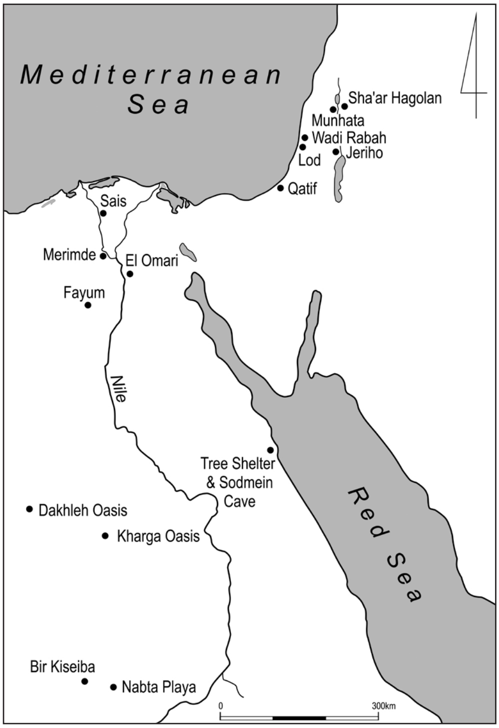
The present study is based on materials from four archaeological sites located within the confines of Lower Egypt (Map 2). Two of them, Merimde Beni Salame and Sais, are located in the Nile Delta, and, specifically, in its western part. Merimde Beni Salame lies on the desert edge at the western side of the Nile Delta, some 2.5 km west of the Rosetta branch of the Nile (Rowland & Bertini, 2016). Sais lies on the eastern bank of the Rosetta, approximately 112 km north-west of Cairo. The el-Omari culture was identified in Ras el-Hof and Wadi Hof in the area west of Helwan, now part of Cairo, at the border between the Nile Delta and the Eastern Desert. The Fayumian sites are located on the northern shore of Lake Qarun in the Fayum Depression, west of the Nile, some 80 km south-west of Cairo.

### *1.2.2. The eastern Sahara*

The part of the eastern Sahara known as the Western Desert represents approximately ⅔ of the entire territory of Egypt. It is a vast and flat limestone plateau, although its landscape is not uniform and features plateaus, depressions, sand dunes, and plains. Except for the south-western part of Gilf Kebir and Jebel Ouenat with altitudes exceeding 1000 m above sea level (asl) at some points, the area is rather low-lying, not exceeding 300-400 m asl. The Western Desert features large depressions, transformed into oases by artesian springs. All oases have similar structures and consist of an escarpment in the north and a floor descending gently southwards, gradually reaching the level of the surrounding desert (Midant-Reynes, 2000: 21-22; Embabi, 2004: 4-5).

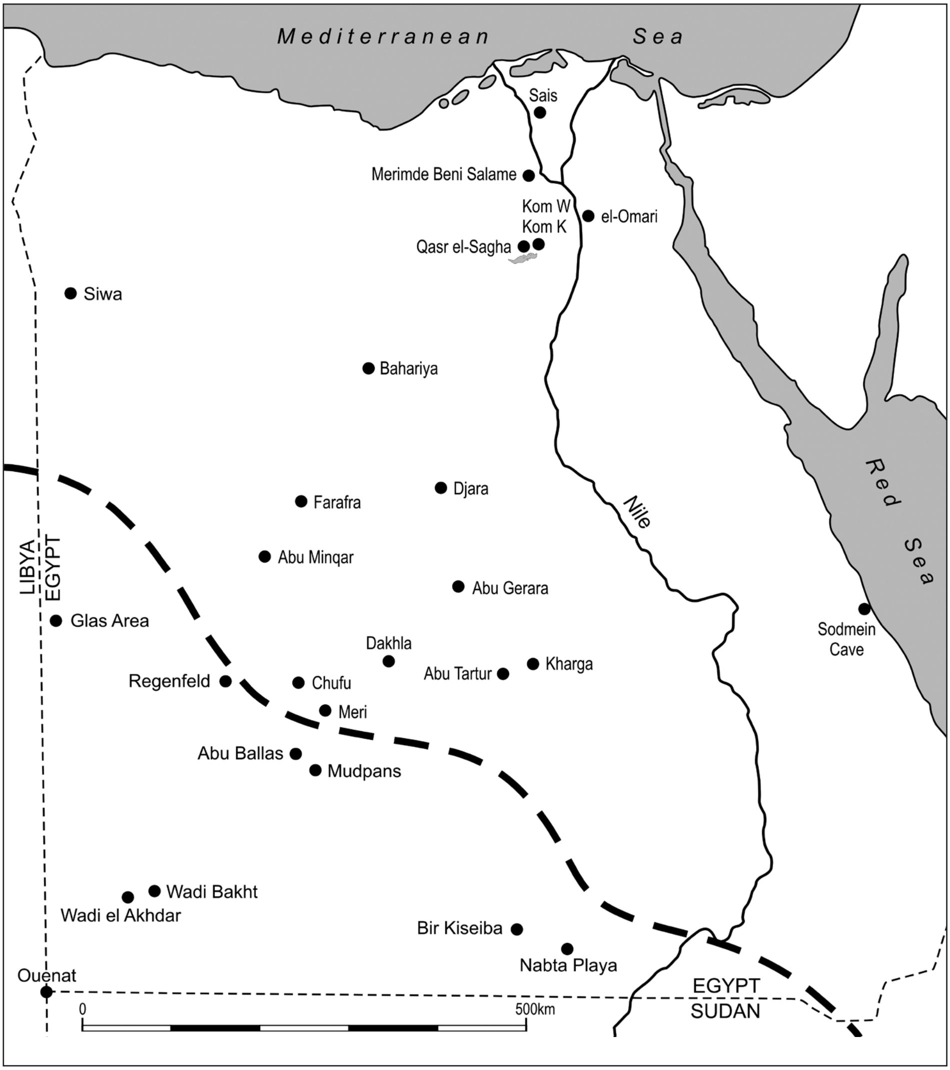
The sites mentioned in this study are spread over a few different locations. Most of them are either near or within the oases of Dakhleh, Kharga, Farafra, Bahariya and Siwa and along a north-south transect of some 1,500 km between Siwa Oasis and the Wadi Howar in Sudan (Map 3). The recorded sites reflect merely the state of research in this very area and it is possible that human activity in the past also extended beyond it.

The Eastern Desert represents approximately a quarter of the entire territory of Egypt. It is made of igneous and metamorphic massifs and features mountains, plateaus, and large wadis. There are a number of drainage networks in this area, which drain water towards the Red Sea or the Nile (Embabi, 2004: 7) The topography of the Eastern Desert is different from that of the Western Desert. Together




**Map 1.** Map of north-eastern Africa
and the southern Levant


**Map 2.** Map of Lower Egypt showing the location
of sites mentioned in the text




**Map 3.** Map of the Egyptian part of the eastern Sahara showing the location of sites mentioned in the text (dotted line – boundary between the Bifacial technocomplex and the Khartoum-style technocomplex; Riemer *et al*., 2013: fig. 3)

with the Sinai Peninsula, it forms a single geomorphologic entity (Midant-Reynes, 2000: 20). The sites covered by this study are located in the Red Sea Mountains area and in a small wadi tributary of the Sodmein Valley.

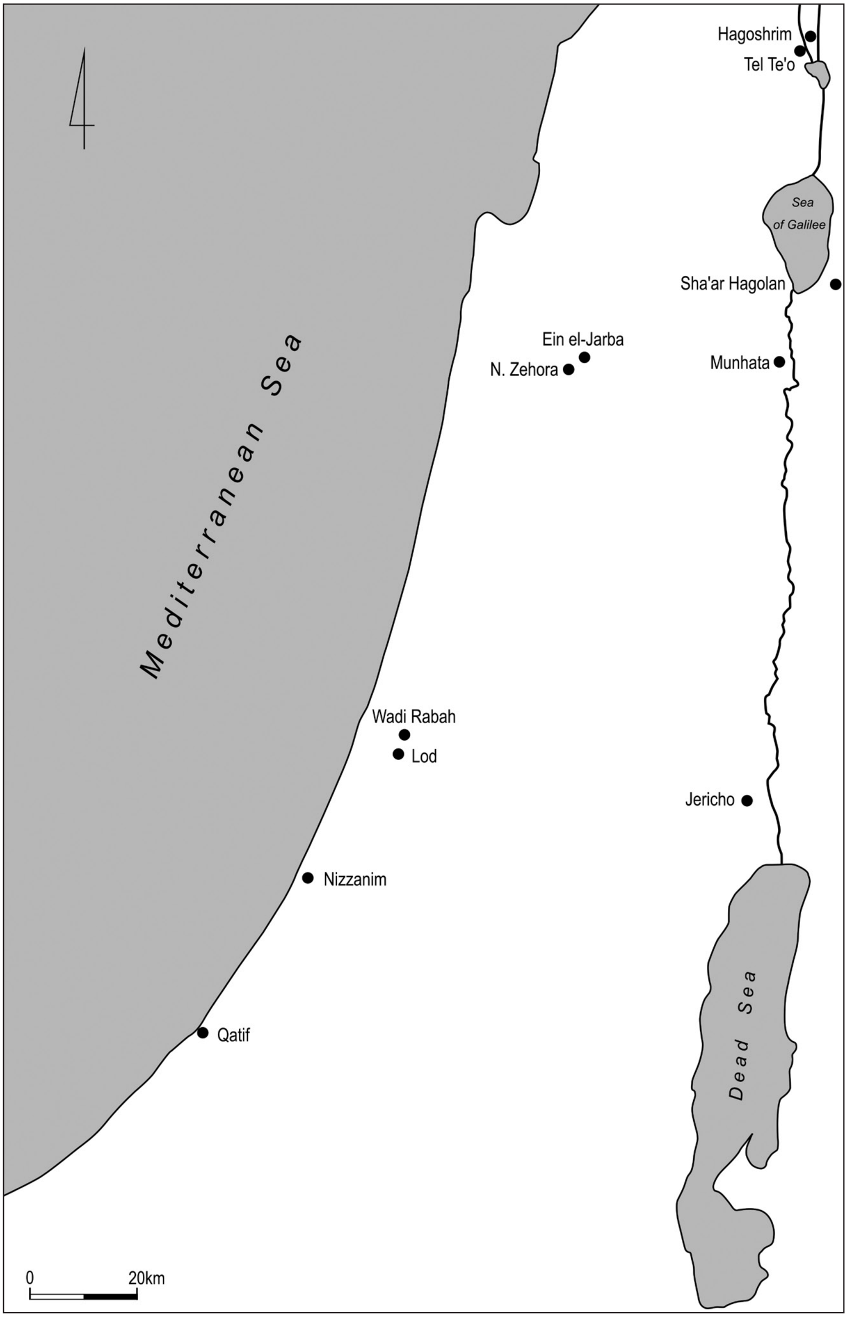
### *1.2.3. The southern Levant*

The southern Levant is split by the northern end of the Great Rift valley, running northwards from the Gulf of Aqaba. The rift formed the Jordan and the Beq'aa valleys and accommodates the Dead Sea and Lake Tiberias. There are a number of different ecological zones in this area, including a coastal region and a hilly zone that rises as high as 100 m. The Dead Sea, the Earth's lowest elevation on land, is located in the Jordan Valley. However, the Transjordan Plateau on the eastern edge of the valley, in the southern part of the region, reaches an elevation of 1700 m, while the Anti-Lebanon Mountains in the north of the valley are even higher. Finally, these two areas slope into the Syrian and Arabian deserts. Some desert areas can also be found in the southernmost Levant in the Negev and the Sinai (Twiss, 2007). Moreover, the Sinai Peninsula is divided into two regions – the high mountains in the south and the great plateau sloping downwards to the Mediterranean in the north.

Sites of the Pottery Neolithic Yarmukian and the Lodian cultures have been recorded in the Mediterranean zone, along the Rift Valley, in the coastal plain, as well as on the edges of major alluvial valleys. Wadi Rabah settlements are located in the Mediterranean zone only, while Qatifian sites have been recorded in the northern Negev (Map 4) (Goring-Morris & Belfer-Cohen, 2014: 161-162). Furthermore, mobile pastoral groups from the period in question operated in the Negev and the Sinai.

## 1.3. Chronological and cultural background

The Lower Egyptian, Saharan or Levantine pottery investigated as part of this research is dated to the 6$^{th}$ and 5$^{th}$ millenniums BC (Table 1). Although each of the regions addressed in the study is characterised by a different pace of cultural change, a single term, namely the Neolithic, is used to describe the period in question in all these areas. Currently, the term continues to be one of the most commonly debated issues among archaeologists. The Neolithic can take on different meanings, referring to chronology, culture, technology, economy, population, social structure and even conceptual systems (Whittle, 1996). According to J. Thomas, it may encompass "a chronological horizon, a stage in an evolutionary scheme, a form of economy, a set of social relations or a cultural phenomenon" (Thomas, 1999: 13). In the case of Lower Egypt and the southern Levant, the term is used in the traditional sense and refers to the period when the first farming and animal breeding societies appeared. However, the use of the term Neolithic




**Map 4.** Map of the southern Levant showing the location of sites mentioned in the text

with reference to the Western or Eastern Desert has been debated for many years (i.e. Garcea, 2004; Smith, 2013a; Barich, 2016). The herders from the eastern Sahara hardly fit into this concept with their unique subsistence strategies encompassing mobility, domesticated animals, the use of wild plants and pottery production. As a result, two different 'schools of thought' concerning the use of the term Neolithic seem to exist among researchers working with desert materials. Some researchers use the term Neolithic with regard to the Early and Middle Holocene occupation in north-eastern Africa but extend its meaning beyond the traditional definition so as to address the different, unique character of African food producers (Wendorf & Schild, 2001; Barich, 2016). Members of the other group, however, avoid the term and prefer to use a more general chronological concept, namely the Holocene epoch and its phases. This approach is particularly clearly visible in the works of the German researchers of the ACACIA (Arid Climate, Adaptation and Cultural Innovation in Africa) project, who additionally use the term 'Epipalaeolithic' when referring to the Early Holocene period (e.g. Gehlen *et al.*, 2002; Kuper & Kröplin, 2006; Riemer, 2009; Kuper & Riemer, 2013; Riemer *et al.*, 2013). In this study, the term Neolithic will not be used with regard to evidence from the eastern Sahara.

### *1.3.1. Lower Egypt*

It is generally agreed that the first communities with domesticated plants and animals emerged in Lower Egypt approximately in the middle of the 6$^{th}$ millennium BC. Their appearance is believed to mark the end of an occupation gap of some 600 years that followed the activity of the Qarunian culture in the Fayum. A new form of subsistence, the introduction of pottery and a sedentary lifestyle have been named as the main features distinguishing this period from the preceding Epipalaeolithic. Eventually, the term Neolithic appeared in the archaeology of Lower Egypt to encompass this period. On the basis of discoveries, three cultural units were identified and are currently known as the Fayumian, the Merimde, and the el-Omari cultures. Lower Egyptian Neolithic units were located in different parts of Lower Egypt and overlapped only in certain periods. It is generally agreed that domesticated plants and animals, together with other parts of the Neolithic package, were introduced into Lower Egypt from the southern Levant. The first farmers and herders from this region are associated with migrants from the east. The issue of Western Desert influences on the Lower Egyptian Neolithic has been discussed in Lower Egyptian archaeology very rarely.

The timing of the discoveries of Neolithic sites in Lower Egypt (early 20$^{th}$ century) had a major effect on today's idea of the prehistoric communities who occupied this region in the period in question. The culture-historical approach, widely accepted at the time of the discoveries, resulted in dissecting the Neolithic occupation of Lower Egypt into three isolated cultural units characterised by a limited quantity of available data. Meanwhile, the author's studies on Neolithic pottery from Lower Egypt suggest the existence of a single, region-wide, cultural tradition constituting an underlying foundation for all distinguished cultural units. This cultural tradition evolved, underwent changes and was probably influenced by external sources. Therefore, this division into archaeological cultures does not really reflect the actual divisions of the past and should be treated as an artificial system created for the purpose of archaeology (Mączyńska, 2017).

The chronology of the Lower Egyptian Neolithic has not been clear since the very beginning of research in this area. According to O.F.A. Menghin, the oldest Neolithic culture was the Merimde culture (Menghin, 1961/63: 144). For Menghin, the Fayumian culture was contemporaneous with Merimde III, while the settlement el-Omari, established around 4,000 BC, was contemporaneous with the Upper Egyptian Badarian and Naqada I cultures. Even W. Kaiser considered the Fayumian culture as contemporaneous with the later phases of the Merimde site (Kaiser, 1985: Abb. 10). J. Eiwanger, who explored the Merimde site, also struggled with determining the chronology, despite C14 dates (Eiwanger, 1988: 74). In his opinion, C14 dates for the Urschicht phase were too late and phase I of the Merimde site was older than the Fayumian culture (ca. 5,500 BC). Additionally, he noticed some flint analogies between the younger phases of the Merimde and the Fayumian cultures (Eiwanger, 1992: 62, 74).

The chronological position of the el-Omari site and its relationship to the Fayumian and Merimde cultures were not obvious for many years. Strikingly, the site was sometimes dated to the Early Dynastic or Naqada I or II periods (for details, see Hoffman, 1979: 194-195). Finally, its researchers positioned it between the Merimde and Maadi cultures (Debono & Mortensen, 1990: 80-81). According to B. Mortensen, in terms of absolute chronology, el-Omari was contemporaneous with the Merimde levels IV-V and with the youngest Fayum Neolithic (Mortensen, 1992: 173). However, she also observed some similarities between el-Omari materials and earlier levels of the Merimde site. In terms of relative chronology, el-Omari was treated by B. Mortensen as contemporaneous with the Koms K and W sites in the Fayum and Merimde II cultures (Mortensen, 1992: 173). Moreover, the site's excavators acknowledged a gap between the disappearance of the el-Omari site and the younger site at Maadi.

Currently, it is the prevailing view among researchers to consider the Fayumian culture as the oldest Neolithic unit in Lower Egypt (see Wendorf & Schild, 1976; Ginter *et al.*, 1980; Ginter & Kozłowski, 1983; Kozłowski & Ginter, 1989). Until recently, the C14 datings from the Fayum region indicated that the Neolithic in Lower Egypt began in the middle or the second half of the 6$^{th}$ millennium BC (Table 1). In the opinion of S. Hendrickx (1999), the Fayumian culture could be dated to between 5,400 and 4.400 cal. BC. N. Shirai suggests 5,480-4,260 cal. BC as a possible time span of the Fayumian culture (Shirai, 2010: 49). Based on Bayesian modelling of the sequences of radiocarbon dates from Qasr el-Sagha (QS I/79, QS X/81), K. Streit suggests that the earliest occupation of the site can be calculated to 5,436–5,241 cal. BC at 68.2%, and to 5,772–5,125 cal. BC at 95.4% (Streit, 2017: 408-411). The newest study results from the Fayum have not only made it possible to determine a more detailed chronology for the Fayumian culture but have additionally demonstrated human activity on the shore of Lake Qarun during the occupation gap between the Epipalaeolithic and the Neolithic periods. A number of age determinations from the later part of the Early Holocene period indicates frequent human activity across the northern shore of Lake Qarun from approximately 8,500-7,500 until 6,000 cal. BP (Holdaway *et al.*, 2016: 176-177). The above-mentioned issue calls for further research, particularly in the context of the results of lake sediment analyses implying that the lake dried out during the 8.2 kiloyear BP cold event (Welc, 2016).

The beginnings of the settlement at Merimde Beni Salame are dated to before the 5$^{th}$ millennium BC, during the occupation of the sites on the shore of Lake Qarun (Table 1). Radiocarbon evidence covers the late 6$^{th}$ and most of the 5$^{th}$ millenniums cal. BC (e.g. Hendrickx & Vermeersch, 2000; Tristant, 2005; Köhler, 2010; 2011; Mączyńska, 2013). The end date of the site is estimated at approximately 4,000 cal. BC (Hendrickx, 1999).

Regarding the el-Omari culture, a time range of between 4,600 and 4,400/4,300 cal. BC has been proposed on the basis of radiocarbon determinations (Table 1) (Debono & Mortensen, 1990: 80-81; Hendrickx, 1999). However, unlike the case of the Fayumian and Merimde cultures, it is currently impossible to verify this chronology as the sites are inaccessible and may have been destroyed.

The cultural map of Lower Egypt from the period in question is full of blank spots while all known Neolithic sites probably represent only a small proportion of the actual Neolithic presence in Lower Egypt. Fortunately, the Neolithic period in Lower Egypt has once again become a popular research subject and our knowledge is likely to be enriched with new contributions.

### *1.3.2. The eastern Sahara*

Human occupation of the desert at the beginning of the Holocene epoch was determined by climatic changes. In the Early Holocene period (approx. 9,000 cal. BC), the desert changed into a dry savannah, as a result of an abrupt northward shift of the tropical rainfall belt. Despite milder conditions, the human presence in this area still depended on a few important elements, such as water, vegetation, and animals. Since they were not equally accessible across the entire desert during the Holocene humid phase, human groups with a lifestyle based on hunting-gathering developed various strategies for adaptation to environmental and climatic conditions, characterised by a highly variable mobility pattern. The Middle Holocene period began in the 7th millennium BC. The most important change was the introduction of domesticated animals (ovicaprines and cattle), followed by a gradual shift from hunting to herding. However, hunting continued to be an important food supply strategy, while cattle, sheep, and goats were a minor component of these groups' economy. The Middle Holocene was also a period of a more intensive use of wild plants (Gehlen *et al.*, 2002: 88-91; Kuper & Riemer, 2013: 45-46).

The 6th millennium BC saw the final part of the Holocene humid phase. Two major cultural traditions/technocomplexes were distinguished in the Western Desert in this period (Riemer *et al.*, 2013). In the north, the Bifacial technocomplex emerged, consisting of sites on the Abu Muhariq Plateau and oases on its southern fringe. The activity of herders representing this complex has also been recorded in the Eastern Desert (Sodmein Cave, the Tree Shelter). In the south, researchers have differentiated the Microlithic/Khartoum-style complex, which covered the regions of Abu Ballas scarp-land, the Great Sand Sea, Gilf Kebir, Nabta Playa and Bir Kiseiba.

The present study covers only the Bifacial technocomplex. Its constituent groups shared a common cultural background, manifesting itself in certain common features, such as lithic or ceramic technology, occupational structures or subsistence strategies. Undoubtedly, constant mobility in search of water and food in this period prevented herder groups from isolation. Studies in the central and northern part of the Western Desert show that the area in question was regularly travelled by hunter-gatherers and herders. Particularly important were oases, as they offered reliable access to water, which made them perfect stop-over points allowing for interactions between different groups. Seasonal or episodic movements were conducive to inter-group contacts and to the exchange of goods or ideas. The activity of groups representing the Bifacial technocomplex extended beyond the Western Desert, as their traces have also been recorded in the Eastern Desert.

In the archaeology of this region, local herder groups have been labelled in a variety of ways. Groups belonging to the Djara B people (5,900-5,300 BC) operated on the Abu Muhariq Plateau. The Dakhleh Oasis in the 6th and 5th millenniums BC has been linked to the activities of the Late Bashendi A (6,100-5,650 cal. BC) and Bashendi B people (5,400-3,800 cal. BC). The Kharga Oasis was occupied by herders known as the Early (6,300-5,600 cal. BC) and Late Baris (5,200-3,800 cal. BC) (McDonald, 2009; 2013; 2016; Riemer & Schönfeld, 2010; Tassie, 2014). With regard to the Farafra Oasis, B. Barich proposed a three-phase cultural sequence for the Middle Holocene period, namely: Wadi el Obeiyid A, B and C (6,600-2,500 cal. BC), of which late A, B, and very early C coincide with the 6th and 5th millenniums BC (Barich & Lucarini, 2014: 470-481).

From around 5,300 BC, a declining number of C14 datings from the Western Desert have been recorded, suggesting a decline in settlement activity (Riemer *et al.*, 2013). This change has been linked to the southward withdrawal of monsoonal rains and the onset of desiccation of the Egyptian Sahara. The climatic changes triggered the movement of people and thus caused a migrational shift to the north (the Fayum, the Delta), to the Nile Valley, to southern Egypt, and to northern Sudan. The Bifacial and Microlithic traditions established in the Western Desert in the Middle Holocene began to separate. In the oases, isolated from northern and southern influences, new cultural traditions began to develop (e.g. Sheikh Muftah). Moreover, the area between the Nile and the desert was criss-crossed by pastoral groups who stopped over in locations ensuring easy access to water and pastures in the Nile Valley or in oases (e.g. Tasa groups in the Kharga Oasis). The disappearance of settlement activity in the eastern Sahara in the second half of the 6$^{th}$ millennium BC coincided with the beginning of this activity in the Delta and in the Nile Valley.

### *1.3.3. The southern Levant*

Domesticated animals and plants appeared in this region approximately 10,000 cal. BC, although not all elements of the Neolithic package emerged all at once. A sedentary, or a partly sedentary way of life, was known to have existed at the end of the Epipalaeolithic. Moreover, pottery was neither produced nor used by the first farmers and herders. The Neolithisation in the southern Levant should be viewed as a multi-linear process that had already begun during the Epipalaeolithic and had involved not only subsistence strategies but also other elements, such as the management of fire, water, plastic materials, and even ritual or social activities (Goring-Morris & Belfer-Cohen, 2014).

The Neolithic period in the southern Levant was divided into two main phases. The first is referred to as the Aceramic Neolithic, Pre-Pottery Neolithic or Early Neolithic. The other phase also has a few labels, namely Ceramic Neolithic, Pottery Neolithic or Late Neolithic. The author has chosen to use the term Pre-Pottery Neolithic (PPN) in reference to the first phase of this period and Pottery Neolithic (PN) when referring the other.

For many years, it was the presence of clay vessels that served as a criterion for determining site chronology. As no pottery was thought to have been manufactured in the first phase of the Neolithic period, it has been treated as a hallmark of Pottery Neolithic sites. Recent research has shown that people had already mastered pottery making skills towards the end of the Pre-Pottery Neolithic. Furthermore, pottery was probably linked to plaster production, which was well known and practiced in the PPN.

It used to be generally accepted that between both phases of the Neolithic an occupation gap of approximately one millennium (or even more) had existed.

However, the discoveries of the last three decades disprove the collapse of PPN communities and seem to suggest their transformation caused by multiple social and cultural factors (Verhoeven, 2002: 10; 2004: 259; 2011; Goring-Morris *et al.*, 2009: 216-217). While many settlements were indeed deserted (in particular those west of the River Jordan), people did not disappear altogether from the southern Levant, although their social, economic and even symbolic organisation evolved greatly.

The 7$^{th}$, 6$^{th}$ and 5$^{th}$ millenniums BC have been linked to the Pottery Neolithic in the southern Levant, and three main archaeological cultures identified in that period, namely: the Yarmukian, the Jericho IX/Lodian and the Wadi Rabah, as well as two smaller ones – the Nizzanim and the Qatifian (Table 1). Unfortunately, researchers investigating this period have failed to agree on the chronology of the Pottery Neolithic units and their mutual relations. According to Y. Garfinkel, the Yarmukian and Jericho IX cultures were contemporaneous with each other (Garfinkel, 1993: 130). They were located in separate geographic regions – the Yarmukian culture in the north and centre of Israel and the Jericho IX culture in its southern part. However, in the opinion of A. Gopher and R. Gophna, the Lodian/Jericho IX culture is an independent younger phenomenon, filling a gap between the Yarmukian and the Wadi Rabah cultures (Gopher & Gophna, 1993: 324-326; see also Rowan & Golden, 2009; Gopher, 2012c: 1530). Similarly, the Nizzanim culture is a matter of debate. For Garfinkel it is an independent pottery tradition that coexisted with the Yarmukian and the Lodian cultures (Garfinkel, 1999: 97). In their turn, Gopher and Gophna suggest that it belonged to, and was a variant of the Lodian culture (Gopher & Gophna, 1993: 317-318; Gopher, 2012c: 1539). In addition, the chronological position of the distinguished units is rather unclear. Garfinkel (1999) suggests that the Wadi Rabah culture is not really a Pottery Neolithic entity, as, in his opinion, it belongs to the Chalcolithic culture (see also Bourke, 2007). According to him, the Qatifian culture postdates the Wadi Rabah culture and should be treated as a Middle Chalcolithic unit (Garfinkel, 1999: 189; Streit & Garfinkel, 2015: 865). In the opinion of Gopher, the Qatifian culture was contemporaneous with the later phase of the Wadi Rabah culture (Gopher, 2012c: 1533). The determination of the respective chronologies of each cultural unit has been affected equally by disputes among researchers and by the small number of C14 dates. In this book, however, the Wadi Rabah and Qatifian cultures are treated as those of the Pottery Neolithic.

The Yarmukian and the Lodian cultures began in the second part of the 7$^{th}$ millennium BC and lasted for ca. 500-400 years. Various date ranges have been suggested so far. According to Gopher, the Yarmukian culture can be dated to between 8,500/8,400 and 7,800 cal. BP and could have lasted even some 500-600 years (Gopher, 2012c: 1532). In his opinion, the Lodian culture appeared after the Yarmukian culture, which existed for approximately 200-300 years and can be dated to between 7,900/7,800 and 7,700/7,600 cal. BP. In 2007, E. Banning proposed a new chronology for Pottery Neolithic entities on the basis of Bayesian analyses of available radiocarbon evidence. In his opinion, the Yarmukian culture began around 6,527-6,376 cal. BC and ended around 5,988-5,762 cal. BC. It thus lasted for anything between 441 and 724 years and overlapped with the PPNC and the Wadi Rabah. The same researcher put forward a date of 5,985/5,832 cal. BC as the beginning of the Lodian culture, assuming that it preceded the Yarmukian culture. The end of the Lodian culture supposedly occurred around 5,654-5,450 cal. BC, assuming a small overlap between the end of the Lodian culture and the beginning of the Wadi Rabah culture.

At archaeological sites, Wadi Rabah layers are positioned above those of the Yarmukian and/or Lodian cultures. In the opinion of Gopher, the Wadi Rabah lasted for some 700-900 years, i.e. from around 7,600-7,500 cal. BP to 6,800 cal. BP (Gopher, 2012c: 1533). However, E. Banning sees the beginning of the Wadi Rabah as occuring between 5,746 and 5,578 cal. BC and its end between 5,288-5,118 cal. BC (Banning, 2007: 88-89).

In this study, the chronology of the Pottery Neolithic cultures as proposed by Streit is followed and which suggests a range of approximately 6,350–5,800 cal. BC for the Yarmukian culture and 6,200–5,800 cal. BC for the Lodian culture (Streit, 2016; 2017). As for the Wadi Rabah culture, this has been placed in the 6$^{th}$ and 5$^{th}$ millenniums BC, while its duration has been estimated at anything between 200 and even 800 years. According to Streit (2017), it should be dated to between 5,700 and 5,200 cal. BC (see also Garfinkel, 1999: 307–308; Rowan & Golden, 2009: table 1; Gopher, 2012c: 1533).

## 1.4. Climatic background

The environment and climate are the most frequently mentioned factors among those with the greatest effect on human activity in prehistoric times. All three regions analysed in this study saw major climatic changes affecting the character of human activities before and during the 6$^{th}$ and the 5$^{th}$ millenniums BC.

### *1.4.1. Lower Egypt*

The emergence of the Neolithic occupation of Lower Egypt is linked to two main climatic changes which occurred in north-eastern Africa and the eastern Mediterranean, namely the onset of the drying trend in the Sahara around 5,300 BC (Kuper & Kröplin, 2006; Riemer, 2009: 128-131), and the southward movement of the Mediterranean winter rains during the Early and Middle Holocene periods (Phillipps *et al.*, 2012; Holdaway & Phillipps, 2017). Moreover, in the case of the Fayum, the water level of Lake Qarun should also be seen as a factor influencing human activity. Because of the lake's connection with the Nile, its water level changed in line with the changes to the river flow, which in its turn was related to climatic changes in the southern part of Egypt (Hassan *et al.*, 2011; Marks *et al.*, 2016; 2017 Welc, 2016; Zalat *et al.*, 2017).

It has been suggested that the northern part of Egypt was not influenced by the Intertropical Convergence Zone (ITCZ), the northern limits of which did not reach this area during the wettest phase of the Holocene (Phillipps *et al.*, 2012). However, changes in the Sahara that began around 5,300 cal. BC influenced not only the life of desert herders but, probably indirectly, the human occupation of Lower Egypt as well. The southward withdrawal of monsoonal rains triggered the desiccation process of the Egyptian Sahara. As a result, climatic changes reduced the accessibility of water, plants, and animals in the desert and forced people to move to areas offering more favourable conditions. This migrational shift was probably directed to the north (the Fayum, the Delta), to the Nile Valley, to southern Egypt and to northern Sudan. As a matter of consequence, the onset of settlement activity in the Delta and in the Nile Valley in the second part of the 6th millennium BC may be attributable to the exodus from the desert, even though the climatic changes in the southern part of Egypt did not have a direct influence on human activity in that area.

During the Early and Middle Holocene periods, the northern part of Egypt, including the Fayum, received more winter rainfall. According to R. Phillipps *et al.* the change was caused by the Arctic oscillation, affecting the global climate (winds, temperature and winter precipitation), which pushed the winter cyclonic rainfalls of the eastern Mediterranean further south (Phillipps *et al.*, 2012: 72; see also Artz *et al.*, 2003; Holdaway & Phillipps, 2017; Holdaway *et al.*, 2017: 219-220). In the opinion of Phillipps *et al.*, cereal cultivation in the Neolithic Fayum was made possible by the Mediterranean rains (Phillipps *et al.*, 2012; Phillipps *et al.*, 2016b: 9). As domesticated grains from the Levant were winter crops, their cultivation depended on water availability from November to April (see also Marshall & Hildebrand, 2002: 122). The climatic changes also made it possible to introduce domesticated plants and animals in the middle of the 6th millennium BC.

The Neolithic Fayum should be analysed in the context of Lake Qarun. Since the lake was connected with the Nile, its water level depended on the river flow. Fluctuations of the Nile were affected by global climatic changes, including, in particular, the movement of the ITCZ (Hassan *et al.*, 2011; Welc, 2016). While the water level in the lake during the Early Holocene did fluctuate, it was nevertheless higher, with the lake's surface having been far greater than today. The lake was fed both by rainfall and water from the Nile. The shoreline was vast, with shallow depressions (basins) in the north which, when flooded, formed rich ecological niches (Welc, 2016: 186; 221). A dramatic decrease in the water level of the lake (or perhaps its complete disappearance) was recorded around 8.2 kiloyears BP, which is attributable to its disconnection from the Nile. In the opinion of F. Welc, the change should be linked to the global climate episode of 8.2 kiloyears BP (Welc, 2016: 187; 224). Between 8 and 7.2 kiloyears cal. BP, the connection with the Nile was restored and the depth and surface area of Lake Qarun was greater than ever. Towards the end of the period in question, despite more intensive rainfall, the lake gradually became more and more shallow as a result of a reduced influx of river water (Welc, 2016: 189). Around 6 kiloyears cal. BP, the water level in the Nile decreased and the connection with the lake was cut off. Undoubtedly, both river and lake water level fluctuations had an effect on the presence of aquatic and terrestrial plants and animals, and thus on human activity in this region. The arid and probably cold 8.2 kiloyear BP event may have limited the activity of Qarunian hunters and gatherers in the region. Although the high water level and vast shoreline between 8 and 7.2 kiloyears cal. BP were favourable to the activity of Fayumian groups, the reduced water level in the lake from 6,000 BP on probably led to the disappearance of settlements on its northern shore.

Water level changes in the lake have been commonly associated with the exposure of land suitable for cultivation and the access to rich aquatic resources (Hassan, 1984b; 1997; Williams, 2009). Particularly interesting are recent topographic analyses of the northern basins of Lake Qarun. They show that relatively small changes in lake water levels may have exposed or inundated the lake's northern shore. Depressions (basins) located in this part of the lake offered both easy access to lake resources and space for farming. Water came mostly from the Nile inundations, as well as from winter rains. The western basins were deeper and offered an environment more suitable for fish, especially those typical for well-oxygenated water (Nile Perch). The shallow eastern basins were probably more suitable for cultivation, as their gentle sloping gradient allowed sufficient annual exposure of moist sediments (Phillipps *et al.*, 2016b: 8-9). The eastern basins could constitute a habitat only for shallow water fish (catfish and tilapia) while the Nile connection was active, since during other periods fish would not have survived in such a deoxygenated environment. The foregoing assumption has been confirmed by archaeozoological studies indicating late summer as the main fishing period. The behaviour and abundance of fish in the lake were also influenced by the salinity levels, linked to the status of the Nile connection and the river flow (Phillipps *et al.*, 2016b: 8; Holdaway & Phillipps, 2017).

To conclude, the Neolithic occupation in the northern part of Egypt coincided with climatic changes that affected the nature of that occupation. Moisture and cooler conditions caused by the southward shift of the Mediterranean winter rains probably allowed for the successful introduction of domesticated plants and animals into Egypt. Although the movement of the ITCZ did not have a direct effect on the Neolithic communities in Lower Egypt, it indirectly influenced water flow in the Nile, and thus water levels in Lake Qarun. This rich ecological niche became a place where a new subsistence strategy developed, combining wild resources (mostly fish) with newly domesticated plants and animals.

### *1.4.2. The eastern Sahara*

Around 12,000 years ago the Holocene humid phase began, during which the Sahara, today the largest hot desert in the world, turned into a green savannah-like environment, habitable for plants, animals, and people. In the classical approach, the Holocene humid phase has been linked to increased northward penetration of the ITCZ during the northern hemisphere's summer monsoon season caused by orbitally forced summer heating (Holmes & Hoelzmann, 2017). The northward movement of the tropical rainfall belts brought more intensive rainfall to the Sahara, with precipitation increasing from less than 10 mm to a maximum of 50-100 mm per year. Importantly, the climatic conditions during the Early and Middle Holocene in the desert area were not fully stable, and the period was interrupted by colder episodes (such as the 8.2 kiloyear cal. BP cold event) of increased aridity, affecting human activity in this area (Brookfield, 2010; Welc, 2016: 224).

With increased surface runoff, numerous reservoirs (lakes and playas) were formed in depressions in the escarpment foreland. Pans appeared within, or at the end of the palaeodrainage system. Dune barriers made water accumulation possible within wadis, while water stored in Pleistocene megadunes could supply episodic or periodic shallow ponds (Kuper & Kröplin, 2006; Bubenzer & Riemer, 2007).

The onset of a humid period caused a reoccupation of the Western Desert around 9,000 cal. BC. Despite milder conditions in the desert, the human presence still involved some risk and depended on access to water, plants and animals. People had to adopt a flexible way of life, characterised by mobility and movement in search of the resources necessary to survive in such an environment.

During the Middle Holocene (7,000-5,300 cal. BC), the maximum humid conditions in the Western Desert stabilised, resulting in its more intensive occupation (Riemer *et al.*, 2013: 160). Furthermore, the northern and central parts of the eastern Sahara found themselves within reach of eastern Mediterranean winter cyclonic rainfalls. Winter rains, together with summer monsoon rains, made plant vegetation possible nearly all year round in areas north of the Dakhleh Oasis. In the period in question, the central oases, namely Dakhleh, Kharga, and Farafra, saw an increase in sedentism manifesting itself in the emergence of settlements suggesting a probably permanent occupation, or at least occupations with only very short intervals (Bubenzer & Riemer, 2007: 610).

Climatic changes associated with the Holocene humid phase are also visible in the Eastern Desert in the Red Sea Mountains. Between 7,500 and 6,100 cal. BC precipitation and freshwater runoff increased in this region. However, in the opinion of P. Vermeersch *et al.*, the local climate was unstable (Vermeersch *et al.*, 2015: 496-499). Between 6,500-6,200 cal. BC the conditions became too dry and inhospitable for humans which, according to Vermeersch, is attributable to the cold and dry global 8.2 kiloyear BP cold event. Subsequently, favourable conditions in the Red Sea Mountains area were restored, thus making the presence of humans and animals possible again. In addition, the period in question saw the activity of ovicaprine herders at the Tree Shelter and Sodmein Cave.

What made the Eastern Desert different from the Western Desert was the lack of playas, and thus the absence of surface water sources around which humans and animals could concentrate. Detailed analyses of seeds and fruits in ovicaprine dung pellets recorded at the sites of the Tree Shelter and Sodmein Cave indicate the presence of well-developed herbaceous vegetation in this area, which probably appeared after winter rains and made this area attractive for herders with animals that were more resistant to drought and limited water resources. Although the savannah-like landscape offered pasture for animal herds, limited accessibility to water probably affected human activity in this region. According to E. Marinova *et al.* (2008), the lack of cattle remains accompanied by the presence of ovicaprine remains can be explained by water shortages.

The earliest signs indicating the return of drier conditions in the eastern Sahara are visible around 5,300 cal. BC. Aridification followed the southward retreat of the monsoonal summer rain belt. In this period, archaeologists have noted a drop in C14 dates from excavations, interpreted as a symptom of reduced human occupation in the desert caused by the onset of arid conditions. Areas located far away from permanent water resources (e.g. the Great Sand Sea) were deserted first (Kuper & Kröplin, 2006; Riemer *et al.*, 2013: 160). People moved to more favourable areas with access to water, namely the oases, the Nile Valley, the Nile Delta or southern Egypt and northern Sudan. The only exception was Gilf Kebir, where a rich ecological niche was formed thanks to rainfalls in the final stage of the Holocene humid phase. Thus, the conditions it offered for human occupation were more favourable than in the Early Holocene period. In the Eastern Desert, the Holocene humid phase also lasted longer as the region enjoyed heavy rains, mostly in the Red Sea Mountains area.

The drying process of the eastern Sahara was rather uneven. Humid conditions returned between the 5$^{th}$ and 3$^{rd}$ millenniums cal. BC. However, after 3,500 cal. BC, rains ceased in the Western Desert and the area became depopulated (Kuper & Kröplin, 2006; Riemer *et al.*, 2013: 160-165). In the Eastern Desert, very dry conditions returned in approximately 4,200 cal. BC, while the level of aridity known today had begun by 3,600 cal. BC (Vermeersch *et al.*, 2015: 496).

### *1.4.3. The southern Levant*

The Holocene began in the southern Levant with temperatures and rainfall levels roughly similar to today's levels in this area and progressed steadily to warmer and more humid conditions until reaching a long-term optimum beginning around 9,000 cal. BC (Rosen & Rivera-Collazo, 2012). Moist and warm conditions with increased precipitation in the Early Holocene are clearly demonstrated by higher water tables, terrace aggradation and the accumulation of colluvial, alluvial and spring deposits through the southern Levant (Maher *et al.*, 2011). Grasslands reached their greatest extent while the boundary of the Negev Desert moved southwards (Borrell *et al.*, 2015). Indeed, an increase in Pistacia pollen recorded at that time prompted M. Rossingnol-Strick (1995; 2002) to label the period as the Pistacia phase. After 7,000 cal. BP, the climatic conditions became more arid, similar to those seen today (Rosen & Rosen, 2017).

The wetter and warmer conditions have been treated as factors exerting a major influence on the economic and socio-cultural transformations during the Neolithic period in the southern Levant, namely an increase in sedentism, as well as the emergence and spread of new subsistence strategies reliant on domesticated plants and animals.

Despite the general long-term trends, the climate of the eastern Mediterranean was unstable and was being disrupted by global cold-dry events. Recently, one of the most often discussed events of this kind is the 8.2 kiloyear BP cold event, dated to between 8,250 and 8,000 cal. BP, which also influenced temperature and precipitation rates in the eastern Mediterranean (Flohr *et al.*, 2015). The 8.2 kiloyear BP cold event in the southern Levant supposedly caused drier and cooler conditions, with temperatures dropping by as much as 1 degree Celsius (Maher *et al.*, 2011: 8). However, the effect of this climatic change on human activity in the southern Levant is debatable. Some archaeologists are of the opinion that the 8.2 kiloyear BP cold event with its dry and cool conditions affected the Middle\Late PPNB/PPNC societies in the southern Levant (e.g. Weniger *et al.*, 2006; Bar-Yosef, 2009; see also Roffet-Salque *et al.*, 2018). Recently, however, arguments claiming the lack of any relationship between the Neolithic occupation in the area and this cold event have been presented (Maher *et al.*, 2011; Flohr *et al.*, 2015). According to P. Flohr *et al.*, (2015), there is no clear evidence for the collapse or abandonment of sites, or for large-scale migration, or for any uniform regional or local cultural change during the 8.2 kiloyear BP cold event. Such a situation may have had a few underlying reasons. Climatic changes may not have been severe enough to influence human activity. Moreover, people, plants, and animals may have already been adapted to a more adverse climatic condition. Finally, the flexibility of early farming groups may have neutralised the impact of climatic conditions on their life. The 8.2 kiloyear BP cold event, with its cool and dry conditions, has also been linked to migrations from the southern Levant to Egypt and the introduction of domesticated plants and animals to the African continent (Eiwanger, 1984: 61-63; Rossignol-Strick, 2002: 165; Bar-Yosef, 2013: 242-243). However, no clear evidence for any movement of people between the two areas from the period in question has been recorded. Thus, the issue of the presence of Levantine migrants in Egypt still remains unanswered, despite the confirmed Levantine origin of domesticated plants and animals.