2. Neolithisation in Egypt in a wider context

2.1. Geographical and chronological distribution of Early-Middle Holocene cultures in Egypt

Before discussing the origins and early development of Neolithic farming and herding cultures in Egypt, the geographical and chronological range of archaeological cultures in Egypt in the Early-Middle Holocene dealt with in my research should be defined here in more detail.

Egypt refers to a present-day country located at the northeastern corner of Africa (**Fig.2.1**). Egypt abuts the Mediterranean Sea in the north and the Red Sea in the east. Egypt is bordered by Libya in the west and by Sudan in the south. The river Nile runs in the middle of the land from the East African highlands through the Second Cataract near Wadi Halfa and the First Cataract at Aswan in the southern part of Egypt into the Mediterranean Sea in the north, and forms the Nile Delta in the area between Cairo and the Mediterranean coast. Since there is no cataract between Aswan and Cairo, the river is a homogeneous stretch of water with a gentle gradient. The Nile Valley is deeply incised in the Egyptian Limestone Plateau in the northern part and in the Nubian Sandstone Plateau in the southern part, and is bounded by steep cliffs rising up to 300 m. The Nile Valley is very narrow in the sandstone terrain in the south. The floodplain in the Nile Valley widens progressively from the north of the sandstone terrain around Gebel Silsila down to the Nile Delta, but the width of the floodplain is approximately 25 km at most. The region of the upstream of the Nile between the Qena bend and the First Cataract is conventionally called Upper Egypt, whereas the region of the downstream of the Nile to the north of the Fayum is called Lower Egypt, and the region between Upper and Lower Egypt is called Middle Egypt. The region between the First Cataract and the Second Cataract is called Lower Nubia. The rocky mountainous terrain between the eastern cliffs of the Nile Valley and the Red Sea coast is called the Arabian Desert or the Eastern Desert. The relatively flat terrain between the western cliffs of the Nile Valley and the Egyptian-Libyan border is called the Libyan Desert or the Western Desert. This vast terrain is also called the Eastern Sahara. The Western Desert has five major oases including Siwa, Bahariya, Farafra, Dakhleh, and Kharga from the north to the south. These oases are rich in groundwater derived from the Nubian aquifer (Baines and Marek 2000: 12-21; Bard 2007: 47-54).

The Middle-Late Holocene saw the developments of diverse archaeological cultures in different regions of Egypt (**Table 2.1**). In the Egyptian Nile Valley in the late 5th - early 4th

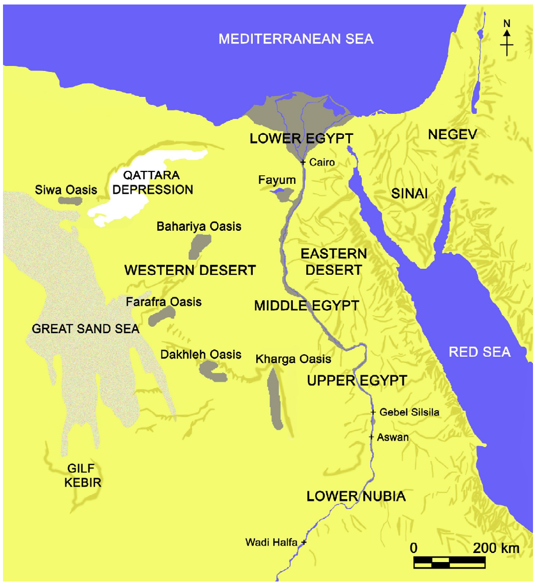

Fig.2.1. Geographical map of Egypt

	Nabta Playa	Dakhleh Oasis	Nile Valley	Fayum	Lower Egypt	Eastern Desert	Negev & Sinai	southern Levant
4000 cal.BC	Bunat El Ansam (Final Ceramic pastoral)	Sheikh Muftah (Ceramic pastoral)	Naqada (Predynastic); Badarian (Predynastic)	Moerian (Predynastic)	Maadi-Buto (Predynastic)			Ghassulian (Chalcolithic)
5000 cal.BC	Ru'at El Baqar (Late Ceramic pastoral)	Bashendi B (Ceramic pastoral)		Fayumian (Neolithic)	Merimde (Neolithic)	Tree Shelter AH 3 & Sodmein Cave (pastoral)	Timnian	Qatifian (Late Pottery Neolithic)
6000 cal.BC	Ru'at El Ghanam (Middle Ceramic pastoral)	Late Bashendi A (Ceramic pastoral); Early Bashendi A (Ceramic pastoral)	? Tarifian ? (Ceramic)				Early Pottery Neolithic	Lodian (Jericho IX); Yarmukian (Early Pottery Neolithic)
7000 cal.BC	El Nabta/Al Jerar (Early Ceremic pastoral); El Ghorab (Early Ceramic pastoral)		Elkabian (Epipalaeolithic)	Qarunian (Epipalaeolithic)		Tree Shelter AH 5 & 4 (Epipalaeolithic)	Tuwailan	PPNC; LPPNB
8000 cal.BC	El Adam (Early Ceramic pastoral)	Masara (Epipalaeolithic)			? Helwan ? (Epipalaeolithic)		Desert PPNB	MPPNB; EPPNB
9000 cal.BC			Arkinian (Epipalaeolithic)				PPNA	PPNA

Table 2.1. Chronology of Egypt and the Near East in the Early-Middle Holocene

millennia cal.BC, the Badarian culture developed in Middle Egypt, and subsequently, the Naqada culture appeared in Middle and Upper Egypt, and the Maadi-Buto culture appeared in Lower Egypt. They are collectively called the Predynastic cultures which mean the predecessors of the Early Dynastic culture and are actually equivalent to the Chalcolithic in more general terms. The Naqada culture eventually spread over Lower Egypt in the second half of the 4th millennium cal.BC, and culminated in the Early Dynastic state in the 3rd millennium cal.BC (Midant-Reynes 2000: 152-250). The cultures before the Predynastic have been given different names depending on technological developments and subsistence activities, as described below, and their spatial distribution is very wide and is not confined in the Nile Valley (**Fig.2.2**).

The floodplain and marginal low desert in the Egyptian Nile Valley have been the major human habitat since early prehistory, but the Nile alluviation and the expansion of modern land use activities have made it difficult to discover the remains of prehistoric human habitation beneath the present surface. Quite a few Early-Middle Holocene cultures have been found and studied. Cultures of the Egyptian Nile Valley in the Early Holocene are represented by the Arkinian and Shamarkian in Lower Nubia, the Elkabian in Upper Egypt, and the Qarunian in the Fayum. They are characterised by microlithic toolkits and are devoid of pottery and domesticates, and thus are designated as the Epipalaeolithic. An ephemeral, enigmatic culture named the Tarifian in Upper Egypt is characterised by the mixture of microlithic and flake industries and the presence of pottery but lacks domesticates, and its precise chronological position is uncertain (Close 1996b; Vermeersch 2002).

The floodplain of the Nile Delta must also have been a human habitat since prehistory, but due to the Nile alluviation and the expansion of modern land use activities, it is extremely difficult to locate the remains of prehistoric human habitation. Prehistoric remains in the alluvial plains are deeply buried and can be located only in exceptional circumstances like uncultivated natural mounds called *geziras* which have been formed between channels, or can be retrieved by deep drill augering. One of such exceptional circumstances has been seen at Sa el-Hagar (Sais) in the central Nile Delta, where surface soils have been removed to a fairly large and deep extent for *sebakh*, and drill augering and excavations yielded lithic artefacts and pottery sherds which could possibly be dated

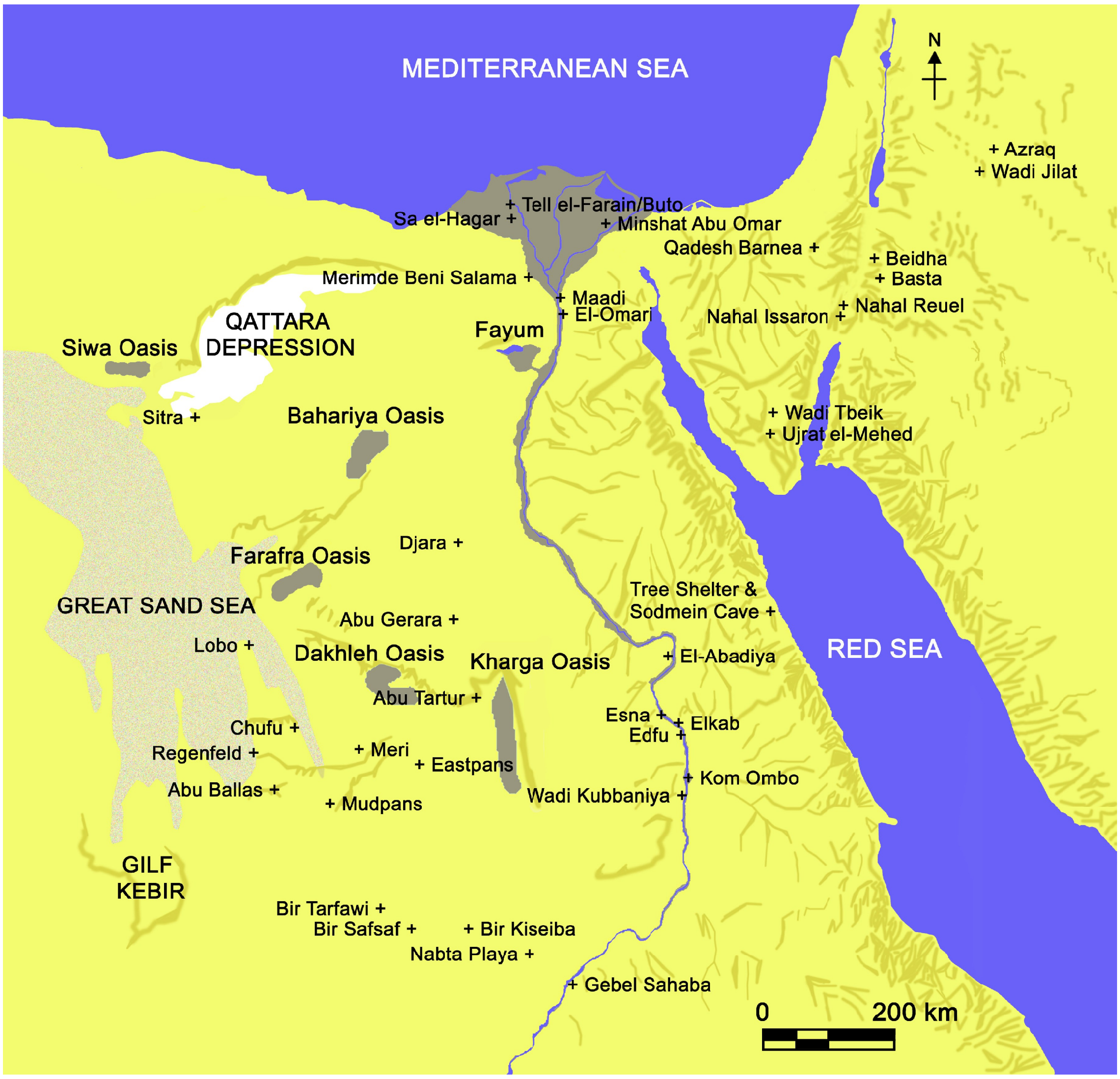

Fig.2.2. Map of the sites mentioned in this chapter

to the 6th-5th millennia cal.BC as well as the Predynastic and much later periods (Wilson 2006; Wilson and Gilbert 2002; 2003). Approximately 7 m deep drill augering at a Predynastic-Early Dynastic site of Minshat Abu Omar in the eastern Nile Delta has also retrieved pottery sherds which could probably be dated to the first half of the 5th millennium cal.BC (Krzyzaniak 1992; 1993). Although many other Predynastic-Early Dynastic sites in the central and eastern Nile Delta have not yielded artefacts which would be dated earlier than the Predynastic, it is likely that the sites in the Nile Delta where Predynastic remains have been found had been occupied before the Predynastic.

In contrast, prehistoric remains on the marginal low desert of the Nile Delta are far more visible, and have been undisturbed until modern land use activities started to expand on that terrain. Extensive survey at the western margin of the Nile Delta has revealed the presence of prehistoric cultures of the Middle Pleistocene and Early-Middle Holocene on the gravelly escarpments and low desert (Junker 1928; Menghin 1933a; 1933b; Schmidt 1980). Merimde Beni Salama is the richest in prehistoric artefacts in this area, and further excavations at the margin of the low desert of Merimde Beni Salama yielded not only numerous lithic artefacts, pottery sherds, and miscellaneous artefacts but also dwellings and tombs, all of which are regarded as the representatives of the Nile Delta culture in the Early-Middle Holocene (Eiwanger 1984; 1988; 1992; Junker 1930; 1931; 1933; 1934; 1935; 1941).

Human activities in the Eastern Desert in the Early-Middle Holocene are still poorly known. The human occupations of caves, rock shelters, wadis, and coastal plains in areas near the Red Sea coast have been revealed (Marinova *et al.* 2008; Moeyersons *et al.* 1999; Vermeersch *et al.* 1994; 1996; 2002; 2005a; 2005b; 2008). According to the data obtained from Sodmein Cave and Tree Shelter near the Red Sea coast, the area has been continually occupied since the end of the 8th millennium cal.BC when the climate became humid. The material culture of Tree Shelter in the 7th millennium cal.BC shows a marked similarity to that of the contemporaneous Elkabian in the Nile Valley, and the material culture of the 6th millennium cal.BC also bears some similarity to those in the contemporaneous Western Desert. However, little information about other parts of the Eastern Desert is available due to the lack of extensive field research, and hence cultural connections within the Eastern Desert and between the Eastern Desert and the rest of Egypt remain to be investigated further.

On the other hand, oases in the Western Desert have been major foci of human habitation in a generally semi-arid to arid environment since prehistory. Thanks to extensive field research covering the entire stretch of the Western Desert in the past decades and relatively undisturbed conditions, many archaeological remains of human activities in the Early-Middle Holocene have been studied not only in the oases but also in other seasonally rain-fed areas. Human occupation loci tend to be found around permanent water springs and rain-fed shallow lakes/ponds called playas.

The chronology of Early-Middle Holocene cultures in the Western Desert has been established on the basis of a growing number of radiocarbon dates obtained from different regions (**Table 2.1**). A particularly long-term continual human occupation sequence since the 9th millennium cal.BC has been obtained from the Nabta-Kiseiba region near the southern border of Egypt and from Dakhleh Oasis (McDonald 2001; Wendorf and Schild 2001). The Early Holocene culture in these two regions is marked by a distinct Epipalaeolithic lithic assemblage named the Masara Complex after the type site in Dakhleh Oasis. Subsequently, a new cultural entity named the El-Ghorab unit after the type site in the Nabta-Kiseiba region has spread not only in other parts of the Western Desert but also in the Nile Valley (McDonald 2003: 53-57; Wendorf and Schild 2001: 654-655; Wendorf *et al.* 1984: 412-413). The early development of pottery production and cattle domestication has been known in the Nabta-Kiseiba region since the 9th millennium cal.BC, but they did not develop in other parts of the

Western Desert until the 6th millennium cal.BC. The early 6th millennium cal.BC also saw the beginning of sheep/goat herding in some regions in the Western Desert. However, the cultures in the Western Desert have gradually vanished after the middle of the 6th millennium cal.BC, and only some have persisted in well-watered regions (Kuper 2007; McDonald 2001; Nicoll 2001).

It was not until the middle 6th millennium cal.BC that a 'typical' Neolithic culture, which is defined by the existence of wheat/barley farming and sheep/goat herding, first appeared in the Fayum. Subsequently, similar but advanced cultures appeared at Merimde Beni Salama and El Omari in Lower Egypt and the Badari region in Middle Egypt in the 5th millennium cal.BC. My research will deal with the sequence of cultural developments in the Early-Middle Holocene up to the emergence of Neolithic cultures in the northern part of Egypt in the 6th millennium cal.BC. The consequence of the development of Neolithic cultures in Egypt like the formation of state society is not the major focus of my research.

2.2. Origins and early development of Neolithic farming and herding cultures in Egypt

It is known that the natural habitat of wild emmer wheat (*Triticum turgidum* ssp. *dicoccoides*) and wild two-rowed barley (*Hordeum vulgare* ssp. *spontaneum*) is the dwarf-shrublands of the Fertile Crescent in the Near East, which has an annual precipitation of at least 300 mm. Wild einkorn wheat (*Triticum monococcum* ssp. *boeoticum*), which requires wetter conditions, does not spread to the southern Levant (van Zeist and Bottema 1991: 31-32, figs.3 and 4; Willcox 2005). There are no wild ancestors of domesticated wheat in northeastern Africa, whereas more drought-resistant and less cold-tolerant wild barley is sparsely spread along the Mediterranean coast of northeastern Africa only in weedy forms (Zohary 1989; Zohary and Hopf 1993: 13-64). This is apparently because the minimal amount of winter/spring rainfall for sustaining the natural growth of wild wheat and barley has hardly been attained in most parts of northeastern Africa. In addition, extensive research in the Near East and northeastern Africa has reached the conclusion that domesticated sheep (*Ovis ammon* f. *aries*) and domesticated goat (*Capra aegagrus* f. *hircus*) dispersed in northeastern Africa were not related to barbary sheep (*Ammotragus lervia*) and Nubian ibex (*Capra ibex nubiana*) that were indigenous to northeastern Africa (Gautier 2002: 201-202; 2007: 82-83; Uerpmann 1987: 113-132). Discussions on when and where in the Near East domesticated wheat, barley, sheep and goats first occurred are still underway, and there are hypotheses of a single event/origin in the upper Euphrates-Tigris basin and multiple events/origins in different regions of the Near East (*e.g.*, Gopher *et al*. 2001; Lev-Yadun *et al*. 2000; Nesbitt 2002; Peters *et al*. 2005; Willcox 2002; 2005). Nonetheless, there is little doubt that the domesticated emmer wheat, barley, sheep and goats found in Egypt originated from the southern Levant and most likely came from Sinai along the Red Sea coast and the Mediterranean coast.

In spite of these facts, the transition to food production through relying on wheat/barley farming and sheep/goat herding in Egypt has seldom been discussed within the framework of Near Eastern archaeology. This is firstly because Egypt is geographically separated from the Levant by the Sinai Peninsula, and secondly because Egyptian archaeology as a discipline has been isolated from Near Eastern archaeology. It seems that many scholars working in Egypt have not been willing to look beyond Egypt at data and ideas obtained from the Levant. Instead, scholars have preferred to emphasise the independent development of food production and culture in Egypt, and have obscured the context of the advent of wheat/barley and sheep/goat.

Although the claim for possible incipient barley farming in the Nile Valley in the Late Palaeolithic period was totally dismissed in the 1980s, research in the Western Desert near the southern border of Egypt during the last decades has revealed that pottery had emerged and incipient attempts at domestication of indigenous aurochs (wild cattle: *Bos primigenius*) might have begun in this region no later than the 8th millennium cal.BC (Close 1995; Close and Wendorf 1992; Gautier 2001; 2002: 198-201; 2007: 77-82; Hassan 2002a: 12-13; 2002b: 62-63, Marshall and Hildebrand 2002: 109; Wendorf and Schild 1994). This pottery-bearing pastoral culture was actually quite widespread from the Sudanese Nile Valley to the Libyan Sahara, and hence has been recognised as a distinct Saharo-Sudanese culture in the Early Holocene (Close 1995; Cremaschi and Di Lernia 1999; Garcia 2004; 2006; Jesse 2003; Mohammed-Ali and Khabir 2003). Because of the early development of pottery production and the subsequent development of cattle domestication, the sequence of this Saharo-Sudanese culture has been understood first as Mesolithic and then as Neolithic. It has been shown that the cultural sequence of the Nabta-Kiseiba region in the Early Holocene also started from the Early Neolithic of the El-Adam and then the El-Ghorab types (Wendorf and Schild 2001: 653*ff*; Wendorf *et al*. 1984: 409*ff*). On the other hand, contemporaneous cultures in other parts of the Egyptian Western Desert and the Egyptian Nile Valley, which shared a similar microlithic tradition with the Saharo-Sudanese culture but lacked pottery and domesticated cattle, have been designated as Epipalaeolithic.

However, there have been discussions in which the use of the term 'Neolithic' in Africa is really problematic because this term is defined so ambiguously in European archaeology that it is not always appropriate to describe the situation in Africa. Careless Neolithic designation has often carried different connotations to different scholars and has caused confusions in understanding the archaeological cultures under consideration (Sinclair *et al*. 1993: 3-8; Smith 2005). Some scholars have advocated that the Saharo-Sudanese pottery-bearing pastoral culture in the Egyptian Western Desert should not be called a 'Neolithic' culture but should simply be called a 'Ceramic' culture through focusing on technological development rather than subsistence, because the term 'Neolithic' carries the connotation of cereal farming (Hendrickx and Vermeersch 2000: 32; Kuper 1995: 125). Therefore, in the following, I rephrase the so-called Neolithic cultures of the Nabta-Kiseiba region as Ceramic pastoral cultures.

In Near Eastern archaeology and European archaeology, the term 'Neolithic Revolution' as first used by Childe has less commonly been used, because the simultaneous appearance of all elements of the so-called Neolithic package like domesticates, pottery, ground/polished stone tools, and sedentary villages, as defined in the arguments of the Neolithic Revolution, was disputed and the overall process of change did not look revolutionary (Barker 2006: 9-26). Instead, the term 'Neolithisation' has recently been preferred. The term 'Neolithisation' refers to the long-term process of the beginning and development of wheat/barley farming and sheep/goat/cattle/pig herding either by means of domestication of existing wild species or by means of adoption of domesticates from elsewhere as well as the associated development of new technologies, artistic or symbolic expressions in material items, complex societies, and unprecedented mortuary/religious cults in the Early-Middle Holocene. The developments of individual features which have conventionally been regarded as elements of the Neolithic package are considered as not necessarily simultaneous and as correlated to each other in more complicated ways. The difficulties of ordering the individual features in relative significance and distinguishing effects from causes are also recognised.

Furthermore, Neolithisation by adoption of the Neolithic package from elsewhere is called 'secondary Neolithisation' (Cauvin 2000a: 1-8). It is argued that the Neolithisation process in Europe, which is a typical example of secondary Neolithisation, took the stages of 1) encounter with available elements of the Neolithic package, 2) initial commitment to incorporating the elements of the package into existing socioeconomic practice, and 3) consolidation of the incorporated elements, and particularly the encounter stage often lasted many centuries or even a millennium, whereas the subsequent stages were much more short-lived (Barker 2006: 325-381; Zvelebil 1986a; 1986b; Zvelebil and Rowley-Conwy 1984). By contrast, archaeology in Egypt has failed to or has been reluctant to use the term 'Neolithisation' when it described the development of a unique Saharo-Sudanese culture in the Early-Middle Holocene as the Neolithic, probably because this development did not lead to a huge and rapid change of socioeconomic circumstances as seen in the Fertile Crescent and Europe but resulted in pastoral nomadic adaptation to harsh desert environments.

Whereas the beginning of attempts at cattle domestication occurred very early in the southernmost part of Egypt, the adoption of Levantine domesticated sheep and goats occurred at a considerably later date in several parts of Egypt, and the adoption of Levantine domesticated wheat and barley did not occur in the Egyptian Western Desert. Previous studies have often focused on the reasons for the late adoption of Levantine domesticates, citing adaptation to local climatic and environmental changes in the Early-Middle Holocene as well as the availability of domesticates in neighbouring regions during the same period. Egyptian civilisation emerged in the Nile Valley on the basis of the Levantine farming-herding way of life, and not solely on the basis of indigenous cattle herding. Therefore, although very late in date, Levantine influence on Egypt should not be underestimated.

However, this does not mean that Neolithisation in Egypt began at the time of the arrival of a Levantine Neolithic package of domesticates. In the light of general Neolithisation arguments (Midant-Reynes 2000: 69*ff*), it must be considered that Neolithisation in Egypt has already begun in the Early Holocene and was nearly completed by the arrival of Levantine domesticates, even though it is not without serious complications to designate the Saharo-Sudanese pottery-bearing pastoral culture in the Egyptian Western Desert as Neolithic. It is certainly important for archaeologists working in Egypt to understand the development of indigenous cultures in the Egyptian Western Desert and Nile Valley in the Early Holocene in their own terms and for their own sake, but it is equally significant to stress that Neolithisation in Egypt has partially been synchronous with Near Eastern Neolithisation and hence can be better understood by putting it in the wider Near Eastern context. In the following, I will elaborate on this idea by referring to supra-regional concepts in Near Eastern Neolithisation.

2.3. The relevance of supra-regional concepts for Egyptian Neolithic research

Currently, supra-regional concepts in Near Eastern Neolithisation are enthusiastically advocated, and a large workshop was recently held in order to discuss the relevance of these concepts for Near Eastern Neolithic research (Rollefson and Gebel 2004; Warburton 2004). Whereas it has been believed that most innovations in the Pre-Pottery Neolithic would have been generated in the southern Levant, early attempts of plant and animal domestication and unique socioeconomic and cultural developments in the northern Levant have also been recognised. This recognition is being increased as a result of recent spectacular discoveries of Pre-Pottery Neolithic sites in the upper Euphrates-Tigris basin and Cyprus. It is certain that these new discoveries cannot be explained by relying solely on the traditional concepts of the dispersal of people, or the diffusion of ideas, technology and items from one specific region. As a consequence, the idea of "a polycentric evolution of different environmentally conditioned socioeconomic developments that show a general tendency over several millennia" in the Near Eastern Neolithic was proposed (Gebel 2002: 314-315; 2004). This is a reasonable consequence of research, and an encouragement to understand regional developments thoroughly before discussing polycentric evolution should be welcome. Although the idea of polycentric evolution itself is obviously not a universal and comprehensive model or theory to explain diverse developments of Neolithisation in the Near East, this is significant in terms of reminding scholars to abandon the thoughts of their own regional 'centrism' or 'primacy'.

Regrettably, Egypt seems to be completely ignored or excluded from the idea of polycentric evolution. Such a tendency is also seen in studies on the dispersal of farming and herding from the Near East. Whereas the dispersal of farming and herding toward Europe has been thoroughly investigated, no mention has been made of the dispersal of farming and herding toward Egypt (*e.g.*, Colledge *et al*. 2004; Zeder 2008). From the viewpoint of archaeologists working in Egypt, this is probably because Near Eastern archaeologists, many of whom are Europeans, are still not free from Near Eastern centrism and tend to look for their own roots in the Near East. I believe that the understanding of the Neolithisation process in Egypt and related socioeconomic connections with the southern Levant, Negev and Sinai, can enrich, strengthen and diversify the idea of polycentric evolution in Near Eastern Neolithisation.

Although the dispersal of some types of Levantine PPNB and Pottery Neolithic lithic artefacts into Lower Egypt has been mentioned by some Near Eastern archaeologists (*e.g.*, Gopher 1994; Schmidt 1996), their reference to Egyptian materials has been geographically limited, and they have not paid enough attention to the Epipalaeolithic and Neolithic lithic assemblages of the Fayum and Merimde Beni Salama, which suggest some cultural relationships with contemporaneous Levantine ones. Even when the Fayum was referred to, a thorough consideration on the nature and chronology of contacts between the southern Levant and Egypt was hampered due to insufficient data (Goring-Morris 1993: 77). There was an attempt by an archaeologist working in Egypt to view the Neolithic cultures in the southern Levant, Lower Egypt and Cyrenaica as one distinct Levantine Early Neolithic culture (Eiwanger 1987: 83-86), but the lack of the presentation of material evidence on a sound chronological basis made the acceptance of this view very difficult. The cultural connection between the Levant and northeastern Africa during the Early-Middle Holocene has been argued by an Africanist archaeologist (Smith 1989; 1996), but his argument has also failed to attract the attention of either archaeologists working in Egypt or Near Eastern archaeologists. Consequently, it has been concluded by Near Eastern archaeologists that there were no extensive and regular socioeconomic connections between the southern Levant and the Nile Valley until the Pottery Neolithic or somewhat later (Kuijt and Goring-Morris 2002: 428).

Bar-Yosef is one of the exceptional Near Eastern archaeologists who have shown a keen interest in Neolithisation in Egypt. His ambitious attempt at reconstructing the socioeconomic entities or 'tribal' boundaries in the Eastern Mediterranean in the transitional period from hunting-gathering to farming-herding, based on a thorough analysis of lithic artefacts and other archaeological features, should be highly appreciated (Bar-Yosef 2001; 2003; 2004; Bar-Yosef and Meadow 1995; Bar-Yosef and Bar-Yosef Mayer 2002). But his understanding of the transition to food production in Egypt seems to be insufficient, partly because he mentions the Merimde Neolithic but does not refer to the Fayum Neolithic, another early farming-herding culture in Egypt (Bar-Yosef 2002a).

However, these omissions are understandable, because one problem is that information about the Egyptian Palaeolithic and Neolithic is not always accessible to Near Eastern archaeologists. For instance, the chronological relationship between the Fayum Neolithic and Merimde Neolithic is still unclear even for archaeologists working in Egypt because of the lack of reliable radiocarbon dates. Merimde Beni Salama is the only site where the development of the Neolithic culture was revealed in a stratigraphic context in northern Egypt, but the radiocarbon date of its earliest Neolithic layer is approximately 4900 cal.BC, which seems to be too young for the material contents of the layer (Eiwanger 1988: 53-54). In the Fayum, there is a long time gap in the archaeological record between the Epipalaeolithic and Neolithic cultures in the 6th millennium cal.BC, and hence exactly when the Fayum Neolithic began is still debatable. There is no definitive conclusion regarding which of the Merimde Neolithic and Fayum Neolithic is actually earlier in date (Eiwanger 1983: 63-65; 1992: 72-75). It may be that archaeologists working in Egypt should be criticised for not having provided information in relevant interdisciplinary meetings and publications, and for not having reacted to the ideas published by Near Eastern archaeologists. Therefore, I feel that archaeologists in Egypt now stand at a fork in the road: either they should keep walking along their own road in splendid isolation, or they could pursue common interests in Near Eastern Neolithic research in cooperation with scholars working in the Near East, thereby eliminating neighbourly ignorance.

Except for a few synthetic studies (*e.g.*, Barker 2003; 2006; Hassan 2002b; Midant-Reynes 2000), previous research in Egypt had a tendency to neglect to argue how Levantine domesticates became available to the inhabitants of Egypt and why the diffusion of the Levantine domesticates into Egypt did not occur earlier than the 6th millennium cal.BC. From the standpoint of archaeologists working in Egypt, the question as to what climatic and environmental conditions in northeastern Africa made the inhabitants of the Nile Valley and the Western Desert reject or adopt Levantine domesticates is an important research subject. Indeed, some scholars have argued that Egypt was so rich in wild food resources that the inhabitants of Egypt did not need foreign domesticates for a long time (*e.g.*, Wenke 1990: 377). Other scholars have argued that despite the overall richness in wild food resources, the inhabitants of Egypt must have occasionally suffered from food shortages, especially around the middle of the 6th millennium cal.BC, and thus they must have needed to introduce domesticates as backup food from the Levant (*e.g.*, Wetterstrom 1993: 225).

On the other hand, whether Egypt was actually outside 'the PPNB interaction sphere' (Bar-Yosef and Belfer-Cohen 1989), and who could become the agents of the diffusion of Levantine domesticates into Egypt, and under what conditions, are intriguing research topics for archaeologists working in Egypt. The idea of the expansion and intensification of a sociocultural interaction sphere with more and more communities being attracted by novel items and 'buying into' the networks regardless of the language barrier or other obstacles (Watkins 2003: 37) deserves consideration in the Neolithisation of Egypt. When the concept of 'the PPNB interaction sphere' was thoroughly re-investigated by a Near Eastern archaeologist recently, Egypt was not mentioned at all (Asouti 2006). It must be significant for Near Eastern archaeologists as well to take Egypt into account, in order to make the concept of 'the PPNB interaction sphere' viable.

It has been argued that the PPNB culture and societies in the southern Levant 'collapsed' around 6900 cal.BC, not only because of human-induced environmental degradation but also due to steady climatic deterioration related to the southward retreat of the Intertropical Convergence Zone (Rollefson and Köhler-Rollefson 1989; Simmons 1997; 2000). It is worth considering how the 'PPNB collapse' triggered a domino effect in neighbouring regions and affected Neolithisation in Egypt. Although a dramatic 'collapse' of local communities is not known in Egypt at the same time, it is evident that Egypt did experience frequent climatic fluctuations after 7600 cal.BC, and that many occupation sites in the Western Desert were temporarily abandoned several times and particularly around 6000 cal.BC (Riemer 2006: 556). Therefore, it is probable that the simultaneous climatic deterioration in northeastern Africa and the Levant in the 7th millennium cal.BC was related to a global climatic event, which is called either 'the 8.6-7.9 kyr cal.BP cooling event' or 'the 8.2 kyr cal.BP event,' or more simply 'the 8 ka cal.BP event' (Rohling *et al.*, 2002: 42-43; Rohling and Pälike 2005). This may have caused the reorganisation of human mobility strategy and territories. It has been argued that the 8.2 kyr cal.BP event would have triggered the spread of early farmer-herders out of the Levant into the Balkan (Weninger *et al*. 2006), but it is also probable that the spread of early farmer-herders occurred in different directions, and the inhabitants of Egypt may have encountered refugees from arid regions of the southern Levant, Negev and Sinai during this period.

Inevitably, research into these topics encourages scholars working in Egypt to reflect on factors which caused the Neolithisation of Egypt in a more organised way and to recognise on what timescale the factors appeared and affected each other. Following the theoretical developments as represented by processual archaeology in the 1960s and 1970s and postprocessual archaeology in the 1970s and 1980s, archaeological studies of initial and secondary Neolithisation in general have shifted their focus from ecological and demographic pressure in the Late and Terminal Pleistocene and Early Holocene, to which foragers adapted, to foragers' economic decision making which must have been subject to cultural needs, social relations and ideologies (Barker 2006: 17-41; Bellwood 2005: 19-25). Consequently, studies in Near Eastern archaeology have recently made clear how the opposed theoretical approaches would be reconciled and which factors must be investigated in further detail (*e.g.*, Hole 2003; Verhoeven 2004; Watkins 2006). What must be done is not merely to highlight the uniqueness or distinctiveness of the pathway which northeastern Africa, including Egypt, followed towards food production and then to express negative opinions about the applicability of Near Eastern models to northeastern Africa (*e.g.*, Garcea 2004), but also to describe how and why such uniqueness or distinctiveness appeared in Africa (*e.g.*, Marshall and Hildebrand 2002), and moreover to consider how archaeologists in Egypt and the Near East can work on common ground. In the following, the most critical factors for Neolithisation in Egypt will be considered.

2.4. Factors causing Neolithisation in Egypt

2.4.1. Climate, flora, and fauna

Climatic conditions in northeastern Africa are mainly determined by the locations of low pressure areas which yield rainfall (**Fig.2.3**). In general, rain falls in a belt of low pressure, like the polar front in the high latitudes around N40-60^{o} and the Intertropical Convergence Zone (ITCZ) in the low latitudes around N0-20^{o}. The regions under high pressure in the latitudes around N30^{o}, which are called the horse latitudes or subtropical high, receive little precipitation, but subtropical cyclones occur there on the Mediterranean Sea under a trough of low pressure. Such a trough extends southward onto northeastern Africa in winter, and the meandering westerlies bring rain in cyclonic storms to the latitudes around N25^{o}. The Intertropical Convergence Zone moves north-south seasonally across the equator, following the zenith point of the sun, and shifts northward to the latitudes around N15^{o} in summer, while bringing rain. The polar front shifts southward in winter/spring while spreading rain in the Near East, but does not reach northeastern Africa. Therefore, the amount of rainfall in northeastern Africa is definitely subject to the seasonal and long-term northward-southward shifts of the subtropical trough and particularly the Intertropical Convergence Zone (Nicholson 2000; Said 1993: 82-91). This was also the case in the Pleistocene and Early-Middle Holocene, with different extents of the northward-southward shifts of the subtropical trough and the Intertropical Convergence Zone (Brookes 2003; Close 1996b; Gasse 2000; Hassan 1997a; Haynes 1987; Kuper and Kröpelin 2006; Kuper *et al*. 2007; Nicholson and Flohn 1980; Staubwasser and Weiss 2006; Sultan *et al*. 1997).

As far as the Middle Pleistocene and Early Holocene are concerned, Egypt was not necessarily a gift of the Nile. Archaeological field research and studies of faunal remains in Bir Tarfawi near the southern border of Egypt and Dakhleh Oasis have revealed that the present-day Western Desert was fairly wet enough to sustain the Sudano-Ethiopian fauna including rhinoceros (*Ceratotherium simum*), giraffe (*Giraffa camelopardalis*), buffalo (*Pelorovis antiquus* or *Syncerus caffer*), warthog (*Phacochoerus aethiopicus*), and hippopotamus (*Hippopotamus amphibius*) among others during the Middle Pleistocene but was deserted as late as 70000 years ago due to the advent of hyper-arid climate (Churcher *et al.* 1999; Churcher *et al.* 2008; Gautier 1993a; 1993b). It has been confirmed by well-dated data that the Early Holocene climate of Egypt was characterised by the return of generally wetter conditions, but with recurrent and abrupt arid intervals after a Terminal Pleistocene aridity known as the Younger Dryas (Hassan 1996; 1997; McDonald 2001; Nicoll 2001; 2004; Riemer 2006; Schild and Wendorf 2002).

Studies of marine cores obtained from the Eastern Mediterranean Sea off the shore of the Nile Delta have revealed a significant increase of freshwater inputs to the Eastern Mediterranean Sea in the Early Holocene, which must have been caused by the increase of the Nile water discharge resulting from heavy summer rainfall in the headwaters of the Nile in the Ethiopian Highlands (Ducassou *et al.* 2008; Fontugne *et al.* 1994; Rossignol-Strick 1999). Alluvial sediments observed in different parts of the entire stretch of the Nile also indicate that the Nile was generally much higher in the Early Holocene, though there were some fluctuations (Said 1993: 128-133). Studies of marine cores obtained from the Red Sea have also revealed that a considerable amount of freshwater inputs occurred in the northernmost part of the Red Sea in the late 8th - late 6th millennia cal.BC, suggesting the enhancement of rainfall in this area caused by the southward extension of low pressure areas (Arz *et al.* 2003). These have greatly affected the vegetation in northeastern Africa.

At present, the southern limit of Mediterranean flora is around the latitude of Cairo (N30°), while the northern limit of Sudano-Sahelian steppe shrubs is around the latitude of the Fifth Cataract of the Nile (N15°), and the vast area between these two distinct vegetation zones is absolute desert (Neumann 1989a; 1989b; Nicoll 2004). It has been revealed through botanical and sedimentological studies that in the Early-Middle Holocene the Sudano-Sahelian flora had spread across the Western Desert up to the latitude of Dakhleh-Kharga Oases (N25°-N26°) following the northward shift of the Intertropical Convergence Zone, and that the Mediterranean flora had also been distributed down to the same latitude following the southward expansion of the subtropical trough (Darius and Nussbaum 2007; Haynes 1987; 2001; Neumann 1989a; 1989b). Recent discoveries of both Mediterranean and Sudano-Sahelian plants at the Early-Middle Holocene sites at Djara on the Abu Muhariq Plateau and in Farafra Oasis (N27°) (Hassan *et al.*, 2001; Kindermann *et al.*, 2006) also suggest the convergence of the Intertropical Convergence Zone and the subtropical trough around this

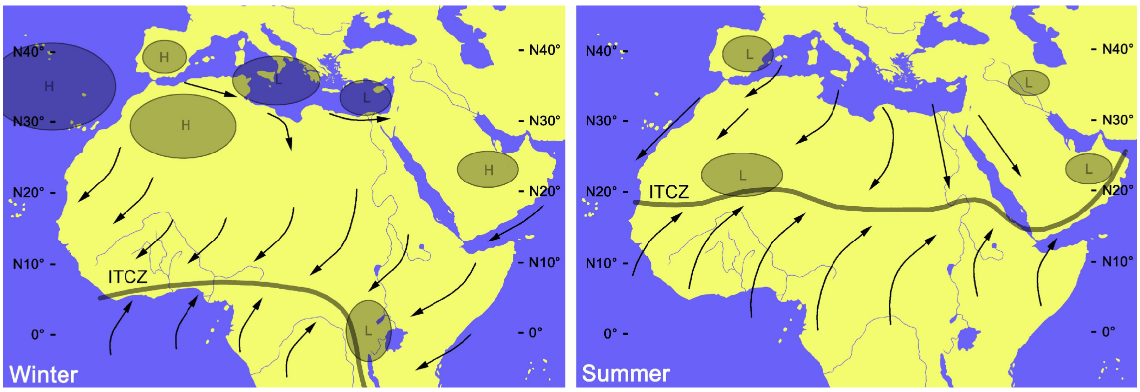

Fig.2.3. Atmospheric circulation in Africa in winter and summer

latitude in that period.

For an understanding of the rise and fall of Levantine Neolithic cultures, the importance of both the northward shift of the Intertropical Convergence Zone which may have reached the southernmost part of the Levant (**Fig.2.4**) and the southward shift of the polar front which may have reached the Negev has already been recognised by Near Eastern archaeologists (Henry 1989: 65*ff*; Simmons 1997: 313-314), but the southward retreat of the Intertropical Convergence Zone in the Middle Holocene is becoming stressed as an important key event in the beginning of the southward diffusion of Levantine winter crops in Sinai, Arabia and northeastern Africa (McCorriston 2006).

Rainfall during wet phases of the Early Holocene created grasslands and shrublands in the present-day Western Desert. This facilitated hunter-gatherers exploiting the 'green desert' as well as the Nile Valley. The most common wood flora identified at human habitation sites in the Western Desert in this period are acacia (*Acacia* sp.) and tamarisk (*Tamarix* sp.) (Neumann 1989a; 1989b; Wasylikowa *et al*. 2001), and the fauna includes oryx (*Oryx dammah*), dama gazelle (*Gazella dama*), dorcas gazelle (*Gazella dorcas*) and hare (*Lepus capensis*) (Gautier 2001; Van Neer and Uerpmann 1989). These flora and fauna indicate that the Western Desert was generally a semi-arid environment in spite of rainfall and hence was not comparable to the situation during the Middle Pleistocene, which was generally wetter. However, even in the Western Desert, regions like Dakhleh Oasis which has permanent groundwater sources have had a wider variety of flora and fauna through the Early-Middle Holocene. They were represented by more water-dependant animals like buffalo (*Pelorovis antiquus* or *Syncerus caffer*), hartebeest (*Alcelaphus buselaphus*) and zebra (*Equus* sp.), as well as desert-adapted animals like dorcas gazelle (Churcher 1999a; 1999b; Churcher *et al*. 2008).

On the other hand, the environmental situation in the contemporaneous Nile Valley is less clear. The Upper and Late Palaeolithic fauna in the Nile Valley in Upper Egypt provides a good sample of the wild animals which were present in a riverine environment under the cool and dry climatic conditions of the Late and Terminal Pleistocene. Six major mammals, including hippopotamus, wild cattle, hartebeest, wild ass (*Equus africanus*), dorcas gazelle, and barbary sheep have occurred at El Abadiya, Edfu, Esna, Kom Ombo and Wadi Kubbaniya, although hippopotamus, wild ass and barbary sheep were rare to absent (Baker and Gautier 1997; Gautier 1976a; Gautier and Van Neer 1989; Peters 1990; Vermeersch *et al*. 2007). They are actually the faunal base on which hunters of the Epipalaeolithic Elkabian culture in the same region in the 8th-7th millennia cal.BC have also depended (Gautier 1978; Vermeersch 1984; 1994; 2002). The Nile water discharge would have increased in this period, but there is little information about how the inhabitants of the Nile Valley reacted to such an increase.

These contrasting environmental situations between the Western Desert and the Nile Valley are the first factor which should be considered in the context of Neolithisation in Egypt. It is not certain which of these situations was more favourable for innovations such as the earliest pottery making and cattle domestication to take place. Presently-available data suggest that the earliest pottery and the earliest domesticated cattle (*Bos primigenius* f. *taurus*) appeared first at Bir Kiseiba and Nabta Playa near the southern border of Egypt between 9000 cal.BC and 7600 cal.BC during one of the Early Holocene wet phases named the El-Adam humid interphase (Schild and Wendorf 2002; Wendorf and Schild 1998; 2001), but this may be because of relatively better preservation of archaeological remains in the Western Desert.

A remarkable change in subsistence in the Western Desert in the Early-Middle Holocene is the beginning of intensive exploitation of wild grasses including sorghum (*Sorghum bicolor*) by hunter-gatherers at such sites as Nabta Playa, Eastpans of the Abu Ballas scarp land, Dakhleh Oasis, and Farafra Oasis (Barakat 2002; Barakat and Fahmi 1999; Barich and Lucarini 2002; 2005; 2008; Barich and Hassan 2000; Hassan

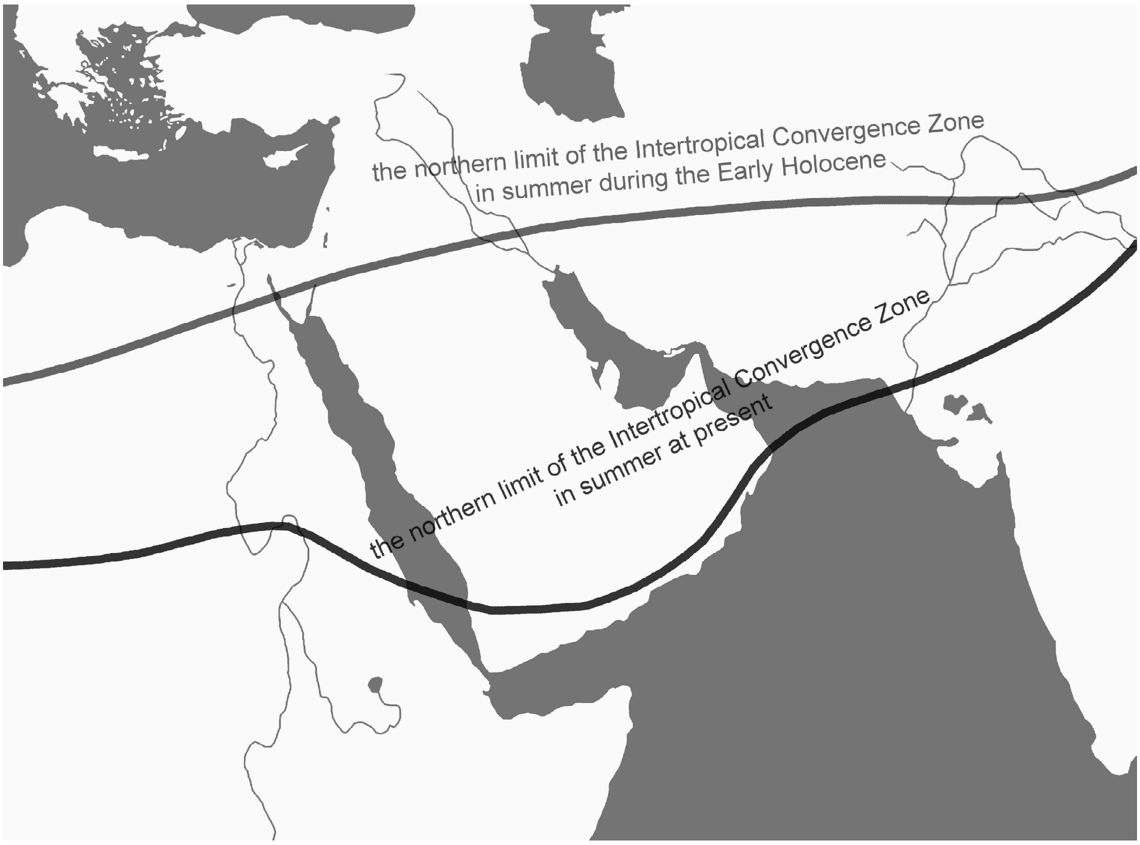

Fig.2.4. Shifting position of the Intertropical Convergence Zone on East Africa and the Near East

et al. 2001; Lucarini 2007; McDonald 2008; Wasylikowa *et al*. 1993; 1997; 1999; 2001). Although there are no botanical remains, the exploitation of wild grasses is suggested by the appearance and increase of grinding stones at Regenfeld in the Great Sand Sea, Chufu and Meri in the Abu Ballas scarp land, and Djara (Gehlen *et al*. 2002; Riemer 2007a). Another remarkable change is the beginning of cattle herding at such sites as Nabta Playa, Bir Kiseiba and Dakhleh Oasis (Close and Wendorf 1992; Gautier 2001; McDonald 1998; Wendorf *et al*. 1984; Wendorf and Schild 1994; 2001), and the beginning of sheep/goat herding at such sites as Nabta Playa, Dakhleh Oasis, Farafra Oasis and Djara (Barich and Lucarini 2002; 2005; 2008; Barich and Hassan 2000; Churcher 1999a; 1999b; Churcher *et al*. 2008; Gautier 2001; Kindermann *et al*. 2006).

One question here is why domestication of indigenous animals like buffalo did not begin under the wet conditions of the Middle Pleistocene elsewhere in Egypt and why the domestication of wild cattle developed in the Early Holocene in a semi-arid environment of the Western Desert, which was not the natural habitat of wild cattle. The natural habitat of wild cattle must have been the Nile Valley, and there seems to have been no ecological corridor linking the Nile Valley and the Nabta-Kiseiba region in the middle of the Western Desert (Gautier 2002: 198-201; 2007: 77-82). Hence, it is assumed that amelioration of desert environments in the Early Holocene due to the return of humidity may not have been the sole sufficient precondition for the autonomous development of cattle domestication.

Recent palaeoclimatological studies have revealed that Pleistocene wet phases were totally different from Holocene wet phases in terms of temperature, density of carbon dioxide in the atmosphere, and degree of fluctuations, all of which greatly affected the growth and spread of plants, and it has been argued that agriculture was impossible under Pleistocene conditions (Richerson *et al*. 2001). It has been argued that Holocene plants were more productive, nutrient-rich, and cold/drought tolerant than Pleistocene plants due to the improvement of the atmosphere for plant growth, and hence it was almost inevitable for Holocene hunter-gatherers to become increasingly dependent on plant food (Bettinger 2001: 148-149). The beginning of intensive plant exploitation in the Egyptian Western Desert in the Early Holocene is a quite reasonable phenomenon. Therefore, it can be presumed that the beginning of intensive exploitation of wild grasses by hunter-gatherers in Nabta Playa around 7000 cal.BC (Barakat and Fahmy 1999) was related to the spread of new vegetation caused by the advent of the Early Holocene climatic optimum called the El Nabta/Al Jerar humid interphase (Schild and Wendorf 2002; Wendorf and Schild 1998; 2001), and would not have been realised in the Pleistocene. In addition, wild grasses in the Western Desert must not only have attracted wild game animals but also have become good fodder plants for livestock (Wasylikowa *et al*. 1997: 940; 2001: 561-562). It was not until hunter-gatherers became aware of the economic importance of wild grasses that they could use the wild grasses for feeding animals. This may be an important environmental reason why the domestication of cattle in an environment which was not the natural habitat of cattle occurred in the Early Holocene.

The second question here is why domesticated wheat/barley and sheep/goats did not diffuse from the southern Levant to Egypt under favourable Early Holocene climatic conditions. The Middle PPNB period in the Levant was the time of great farming dispersal under Early Holocene wet conditions, and domesticated wheat/barley did diffuse beyond the fertile Levantine Corridor to semi-arid regions. However, it was not until the Middle Holocene arid intervals that domesticated sheep/goats and wheat/barley reached the Red Sea coast and the Fayum in Egypt respectively. Therefore, the direct reason for the delay of the diffusion of Levantine domesticates to Egypt may be something other than wet climatic conditions, though it seems probable that the desiccation at the onset of the Middle Holocene was the initial driving force behind the diffusion.

It has been argued that domesticated sheep/goats came from the Sinai Peninsula to the mountainous terrain of the Egyptian Eastern Desert near the Red Sea coast in the early 6th millennium cal.BC, and then diffused from the Eastern Desert to the Western Desert across the Nile Valley (Close 2002b; Riemer 2007b). The arrival of Levantine sheep/goats in the Egyptian Western Desert is a consequence of the southward dispersal of sheep/goat herding in the southern Levant which started no later than the PPNC period, but this description of the diffusion process does not explain how and why the Levantine domesticates were adopted in Egypt when they became available to the inhabitants of Egypt. This question must be answered by asking whether any other unprecedented things were happening in Egypt at that time, and will be discussed in more detail below.

2.4.2. Population aggregation and sedentism

Although the Western Desert of Egypt became inhabitable in the Early Holocene wet phases, not all parts of the Western Desert have been equally occupied. For instance, vast areas like the inner Great Sand Sea have not yielded evidence of human occupations. There is no doubt that people had to aggregate around permanent water sources like oases and ephemeral lakes/ponds fed by rainfall, while moving radially from a water source or moving between water sources. Even though the people could dig wells and they actually did in the Nabta-Kiseiba region (Kobusiewicz 2003), groundwater could not be found everywhere in the Western Desert (Riemer 2005: fig.4). Field research in combination with the studies of satellite images, digital elevation data and geological maps has illustrated that archaeological sites of the Early-Middle Holocene in the southern part of the Western Desert were related to depressions in the foreland of escarpments and palaeodrainage systems with intermediate/terminal pans or dune barriers (Bolten and Bubenzer 2007; Bubenzer and Riemer 2007). It is apparent that the availability of sufficient surface water was the essential condition for the choice of habitation location.

A degree of sedentism must have been a necessary solution to maintain a close link to water sources and accompanying food resources, and the necessity of sedentism must have been recognised more seriously by the inhabitants of the Western Desert than it had been by those who inhabited the Nile Valley, because the number of water sources was limited in the Western Desert. Even in the Nile Valley, many human bodies which show the evidence of violent death at Late Palaeolithic sites of Wadi Kubbaniya and Gebel Sahaba (Wendorf 1968; Wendorf and Schild 1986) suggest that fierce conflicts between human groups were not uncommon in the Late and Terminal Pleistocene. It seems likely that such conflicts were caused by claims for access to essential resources. It may be said that stressful situations and some degree of conflict between different human groups were features of life during the Late and Terminal Pleistocene. Improvement of climate and resultant resource abundance in the Early Holocene may not immediately have led to human population increase, but must have increased its chances. No evidence of violence in the Early-Middle Holocene Western Desert may suggest the appearance of a new set of social relationships which reduced bloody conflicts.

A tendency toward a certain degree of sedentism has been inferred in Nabta Playa and Dakhleh Oasis as early as the Early Holocene on the basis of lithic assemblages, site distribution, and the existence of water wells and storage pits for harvested wild grass seeds (Kobusiewicz 2003; McDonald 1991b; 1998; Wendorf and Schild 1998; 2001; 2002b; 2003). According to arguments about the emergence of territoriality (Rosenberg 1990; 1998), as more people aggregated around a limited number of water sources perennially or seasonally, the right to the water sources and accompanying food resources may have become more specific and rigid, and the notion of territoriality may have been generated. In such circumstances, freedom of movement for food quests must have become gradually hampered, even though the right to visit each other's territory was ensured by socioeconomic ties like reciprocity and exogamy. Consequently, stressful situations or conflicts within and between territories must have occasionally occurred. In the case of the Western Desert in the Early-Middle Holocene, recurrent arid intervals could be another cause of stressful situations, and population/resource imbalances must have continually taken place in the short term. It has been argued that in such circumstances much labour may have become increasingly invested to ensure sufficient yield from one's own territory, because it might be burdensome to visit and exploit another's territory. Procuring and storing as many food resources as possible while they were abundantly available would become key subsistence strategies, no matter how time-consuming and labour-intensive the foraging and processing of the food resources were (Bettinger 2001). It has also been argued that such an intensification of food procurement in circumscribed habitats had the potential to lead to the beginning of food production, especially if predictable, relocatable and tameable food resources were available and if technological innovations which would permit efficient utilisation of the resources occurred (Rosenberg 1990; 1998). It would be possible that such moderately stressful situations over the procurement of water and food took place at particularly favourable regions for human occupation in the Western Desert like Nabta Playa and Dakhleh Oasis. Digging water wells and storing surplus food would have been viable solutions to stay in one's own territory as long as possible and to avoid unnecessary conflicts with people inhabiting neighbouring areas.

It has been suggested that the beginning of intensive exploitation of wild sorghum in Nabta

Playa would probably be an indication that the inhabitants attempted to augment the amount of food resources in circumscribed habitats by harvesting previously less-exploited plants (Wendorf and Schild 2002). Nabta Playa was completely abandoned around 6000 cal.BC due to a short hyper-arid interval known as the Post-Al Jerar arid phase (Schild and Wendorf 2002; Wendorf and Schild 1998; 2001), but when people returned there to settle down again after 5900 cal.BC, they brought domesticated goats with them. Domesticated goats were rapidly diffused to other places such as Dakhleh Oasis, Farafra Oasis, and Djara in the same period (Riemer 2007b). The exploitation of wild sorghum also became common, as evidenced by botanical remains and grinding implements in Farafra Oasis, Dakhleh Oasis, and Eastpans of the Abu Ballas scarp land (Barakat and Fahmy 1999; McDonald 2008). There appears evidence for increasingly sedentary occupation as well as exploitation of sorghum and domesticated goats at some particular localities of Farafra Oasis and Dakhleh Oasis in the early 6th millennium cal.BC (Barich and Lucarini 2002; 2005; 2008; Hassan *et al*., 2001; Lucarini 2007; McDonald 2008). It can be suggested that domesticated goats were another solution to augment the amount of available food resources, thereby adjusting population/resource imbalances in circumscribed habitats.

2.4.3. Population movements and expansion of sociocultural and socioeconomic networks

Long distance population movements between the Western Desert and the Nile Valley, and between the southern Levant and the Nile Valley via the Negev and Sinai, should not be ignored as a factor that enabled access to domesticates, even though a certain degree of sedentism in circumscribed habitats seems to have been one reason why domesticates were introduced.

As evidenced by recurrent abandonment and reoccupation of sites in the Western Desert in the Early-Middle Holocene, population movements were not uncommon. The appearance and disappearance of settlements were not always coincident between oases and other occasionally well-watered regions such as the Fayum, Siwa Oasis, Farafra Oasis, Djara, Kharga Oasis, Dakhleh Oasis, Abu Ballas, Nabta Playa, and the Gilf Kebir (Gehlen *et al*. 2002; Kuper 1995; 2002; McDonald 2001; Nicoll 2001). Therefore, it is supposed that an entire population sometimes moved long distances from water source to water source within the Western Desert, probably following the northward-southward shifts of the Intertropical Convergence Zone or the subtropical trough. 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, and thus one of the origins of the Fayum Neolithic culture must have been located far to the south of the Fayum (Kindermann 2003; 2004; McDonald 1991a; 1996; Warfe 2003). The coincidence of the reoccupation of the Fayum with the temporary abandonment and subsequent reoccupation of Dakhleh Oasis and with the final abandonment of Djara around the middle of the 6th millennium cal.BC suggests that a certain number of people moved from this region to the Fayum.

In contrast to the north-south population movements, the east-west population movements are less clear. Especially at the time of unexpected, long-lasting aridity, movements of an entire population toward permanent water sources like the Nile must have been the ultimate solution. However, it is difficult to trace precisely the immigration of people into the Nile Valley from different directions and the outflow of people from the Nile Valley, because there is little information about the situation in the Nile Valley in the Early-Middle Holocene due to the problems of site preservation (Close 1996b; Vermeersch 2002).

As mentioned earlier, only a few Epipalaeolithic cultures of the Early Holocene are known in the Nile Valley. It seems certain that around the 9th-8th millennia cal.BC, people of the El-Adam Early Ceramic pastoral culture in the Nabta-Kiseiba region had contacts with the Nile Valley, as evidenced by the presence of

Nilotic freshwater bivalves at El-Adam sites and the similarity in lithic assemblages to the Epipalaeolithic Arkinian culture near the Second Cataract of the Nile Valley (Schild *et al.* 1968; Wendorf and Schild 2001). Based on the fact that there are many similarities in lithic assemblages between the Epipalaeolithic Elkabian culture in the Nile Valley and the El-Ghorab Early Ceramic pastoral culture in the Western Desert, it has been assumed that around the 8th-7th millennia cal.BC, people of the Elkabian culture were moving seasonally between the Nile Valley and the Western Desert (Vermeersch 1984). However, it turned out recently that the El-Ghorab culture is earlier in radiocarbon date than the Elkabian culture, and thus it seems better to consider that people of the El-Ghorab culture may have migrated to the Nile Valley at the onset of the Post El-Ghorab arid phase in the Western Desert around 7200-7100 cal.BC. On the other hand, many similarities in lithic assemblages are observed between the Epipalaeolithic Elkabian culture in the Nile Valley and its variant at Tree Shelter on the Red Sea coast, and their contemporaneity is demonstrated by radiocarbon dates. A Nilotic freshwater bivalve was also found at Tree Shelter. Therefore, it is argued that in the 7th millennium cal.BC, people of the Elkabian culture were moving seasonally between the Nile Valley and the Red Sea coast (Vermeersch 2002: 36; 2008: 89-94; Vermeersch *et al.* 2002).

As for the cultures of the Middle Holocene, few archaeological sites are known in the Nile Valley, and only some material items like Nilotic freshwater bivalves found at sites in the Western Desert have been used as evidence for contacts between the Nile Valley and the Western Desert (Kindermann and Bubenzer 2007; Kindermann *et al.* 2006; Riemer and Kindermann 2008). The earliest domesticated sheep/goats in Egypt were found in Sodmein Cave near the Red Sea coast and were dated to around 6200-5300 cal.BC, and the presence of domesticated goats that are dated to around 5600 cal.BC are confirmed at the nearby site of Tree Shelter (Vermeersch *et al.* 1994; 1996; 2002; 2008). The second earliest domesticated sheep/goats were found in Djara and Farafra Oasis and were dated to around 5900-5500 cal.BC (**Fig.2.5**). Sheep/goats identified in Nabta Playa also fall in this time range. Therefore, it seems that domesticated sheep/goats were diffused to the Western Desert immediately after their first arrival at Sodmein Cave (Close 2002b: 459-461 and 467-468; Riemer 2007b: 107-113). It can be supposed that there were constant movements of people between the Red Sea coast and the Western Desert behind the diffusion of domesticated sheep/goats.

In addition to population movements, the expansion of exchange networks within Egypt must have been a critical factor for the Neolithisation in Egypt. Some similarities in material culture across different parts of the Western Desert can probably be explained by the expansion of exchange networks as well. But what seems more important for the Neolithisation of Egypt is a further expansion of the exchange networks beyond Egypt with the Near East. Remarkably wide distributions of peculiar types of projectile points in the Near East in the Pre-Pottery Neolithic are well known, and they are presumed to be the results of extensive exchange/sharing of finished items as well as the expansion of local production facilitated by the diffusion of technical knowledge. As mentioned earlier, some types of Levantine PPNB and Pottery Neolithic projectile points actually appeared in Lower Egypt, though they were small in number and their raw materials are not certain. Thus the reasons for and the context of the appearance of these projectile points must be explained. Since large scale migration of Levantine people in these periods has not been attested archaeologically and linguistically (Barker 2003; Bar-Yosef 2003; Bellwood 2005: 207-210; Hassan 2003), it is more probable that the Levantine projectile points were accepted and thereafter imitated as novel and prestigious items in Egypt through socioeconomic networks. This manner of acceptance may also be the case with Levantine wheat/barley and sheep/goats.

Moreover, the spread of minor items must not be overlooked. The spread of stone bead making has a curious coincidence with the beginning of food production and sedentary life in the southern Levant (Wright and Garrard 2003). This is worth examining in the Egyptian context in terms of the development of social identities and boundaries on the one hand and the development of exchange networks regarding the demand and supply of raw materials and finished items on the other, because similar stone beads are known in Egypt as well. The spread of Red Sea shell ornaments in the southern Levant in the Middle-Late PPNB is also noteworthy. This suggest that there were some exchange networks between farmers in the southern Levant and hunter-gatherers who wandered around the Red Sea coasts of southern Sinai (Bar-Yosef Mayer 1997). The late diffusion of Levantine domesticates to Egypt must have something to do with the development of such socioeconomic networks.

2.4.4. Dispersal of farming and herding in the Levant and the availability of domesticated wheat/barley and sheep/goats for Egypt

In addition to the development of extensive socioeconomic networks across the Near East and Egypt, another reason for the late diffusion of wheat/barley farming and sheep/goat herding to Egypt may possibly be the late advent of domesticated sheep and goats in the southern Levant. Since the first wheat/barley farming culture in the Fayum was accompanied by sheep/goat herding from the beginning, it is reasonable to presume that the diffusion of wheat/barley farming to Egypt was closely tied to the advent of sheep/goat herding.

The domestication of goats seems to have been attempted elsewhere in the Near East. Whereas the earliest attempt of goat domestication would have started in the Zagros Mountains, Beidha in the southern Levant is supposed to be the southernmost place where goat domestication was attempted in the Middle PPNB period. On the other hand, the domestication of sheep was evidently achieved in the Anti-Taurus Mountains and the upper Euphrates-Tigris basin, and then domesticated sheep was introduced into the southern Levant no earlier than the Late PPNB period (Horwitz *et al*. 2000; Horwitz 2003; Martin 2000; Peters *et al*. 2000; 2005; Zeder 2000; 2005; 2008).

Before discussing further the context of the diffusion of Levantine domesticates into Egypt, it is important to look at the beginning of the dispersal of farming in the marginal areas of the fertile Levantine Corridor or outside the Levantine Corridor (**Fig.2.5**). The spread of farming had occurred in the Jilat-Azraq Basin of Transjordan no later than the Middle PPNB period. People in this area still relied heavily on hunting, but as game animals like equids went extinct and small animals like hares had to be hunted, a farming-hunting way of life was first enhanced by the adoption of goat herding for meat around the Late PPNB period. The farming-herding way of life was further enhanced by the introduction of sheep in the PPNC period (Betts 2008; Byrd 1992: 54*ff*; Garrard 1998; Garrard *et al*. 1996: 218*ff*; Martin 2000).

While similar adaptations seem to have occurred in the southernmost part of the Levantine Corridor as evidenced by the Middle PPNB site at Beidha and the Late PPNB site at Basta in southern Jordan, most of the contemporary or slightly later sites in the Negev and Sinai, such as Nahal Reuel, Nahal Issaron, Wadi Tbeik and Ujrat el Mehed suggest that hunting of wild animals and collecting of wild plants were still the dominant subsistence activities in these areas (Bar-Yosef 1984; Dayan *et al*. 1986; Goring-Morris 1993; Goring-Morris and Gopher 1983; Ronen *et al*. 2001; Tchernov and Bar-Yosef 1982). For this reason, the culture in the Negev and Sinai in this period is called the Desert PPNB, and it has been argued that the Negev and Sinai were the autonomous territories of mobile hunter-gatherers (Rosen 2002), even though they may have had contact with farmer-herders in more fertile areas of the southern Levant and may have possibly obtained wheat/barley and sheep/goat in exchange for other resources or goods like Red Sea shells (Bar-Yosef 2001; Bar-Yosef Mayer 1997;

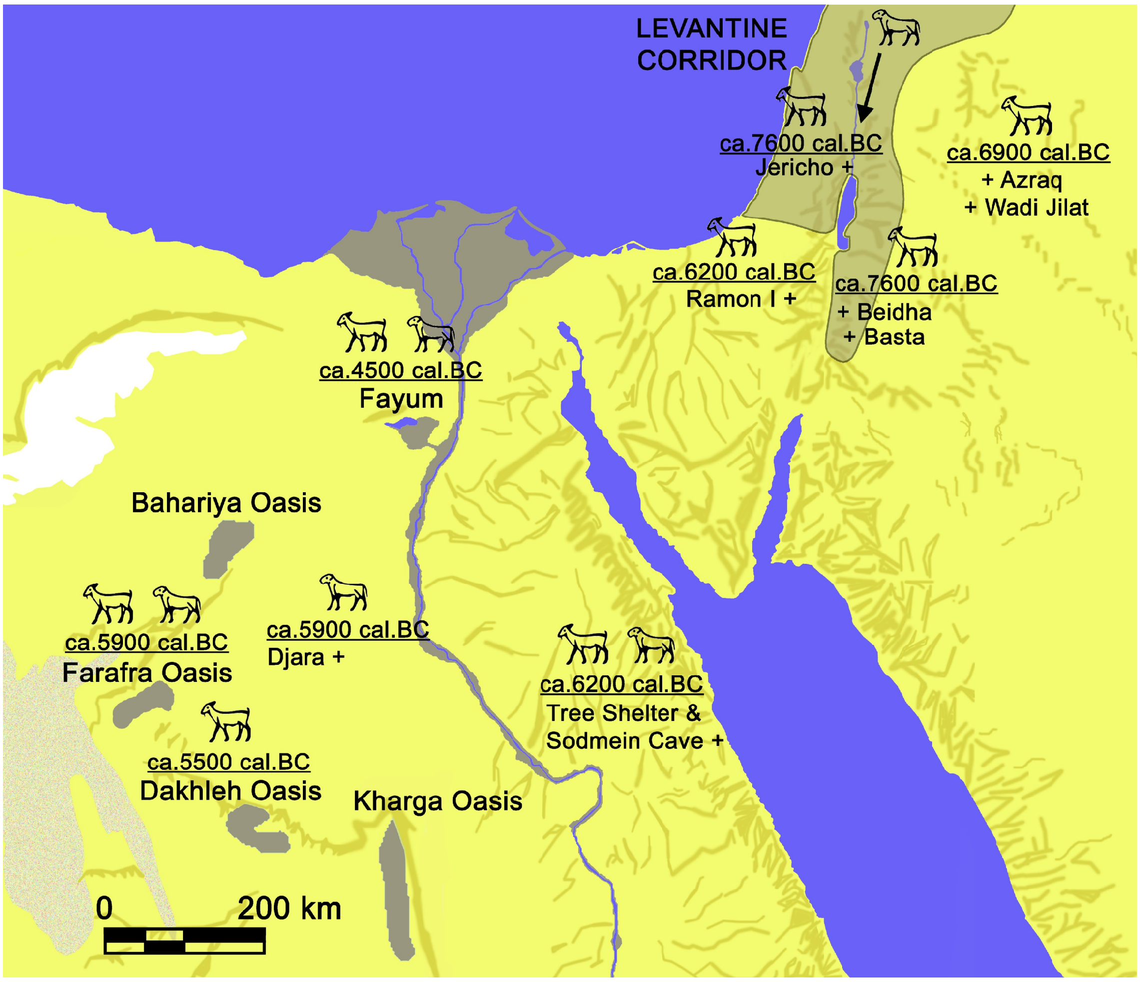

Fig.2.5. The earliest dates of domesticated sheep/goats in Egypt, the Negev and southern Levant

Hassan 2002b). This argument is supported by the fact that Late PPNB people in southern Sinai were morphologically unique and different from contemporaneous Levantine and North African people (Hershkovitz *et al*. 1994). Therefore, it seems unlikely that southern Levantine farmer-herders infiltrated into southern Sinai while establishing new settlements in the Late PPNB period, eventually moving on into Egypt.

Even though direct colonisation of Sinai by southern Levantine people is unlikely, one question is why farming did not diffuse across the Negev and Sinai into Egypt in the Middle PPNB period. As mentioned above, farming did diffuse outside the fertile areas onto the arid Jordanian Plateau in the same period. In other words, the question is why the diffusion of farming to Egypt had to wait until the Pottery Neolithic period. Thus it is necessary to consider what prevented the spread of farming from the southern Levant to Egypt in the Middle PPNB period. Physical distance between the southern Levant and Egypt may be one reason why the diffusion of farming was prevented and retarded. However, it has been argued that the distance between the two regions could have been easily traversed in a matter of days (Kuijt and Goring-Morris 2002: 428), though the mountainous terrain of Sinai could be a considerable geographic barrier. It may be concluded that the distance of approximately 500 km between the southern Levant and Lower Egypt was not a serious problem for the diffusion of farming. Therefore, it must be made clear whether the present lack of evidence for the diffusion of farming to Egypt in the Middle PPNB reflects the past reality.

As suggested by submerged PPNC and Pottery Neolithic sites along the Carmel coast of Israel, the Eastern Mediterranean coastline in the Early-Middle Holocene was positioned around 10-15 m below the present sea level and a few hundred metres off the present coast, and the sea level was even lower in the Middle PPNB period (Galili *et al*. 1988; 2005). Furthermore, large parts of the northwestern Negev and northern Sinai are presently covered by huge dunes and alluvial deposits (Goldberg 1995: 46-50; Goring-Morris and Goldberg 1990; Stanley 2002: 104-114). Therefore, even if contacts between the southern Levant and Lower Egypt in the Early-Middle Holocene took place on the Mediterranean coastal plain (Goring-Morris 1993: 77), it is possible that their archaeological remains are submerged or covered, and hence invisible.

There is another possibility that the contacts were realised through seafaring off the coast of northern Sinai and the Nile Delta (Bar-Yosef 2002a: 54-55; Bar-Yosef 2003: figs.10.3 and 4; Bar-Yosef and Bar-Yosef Mayer 2002: fig.8), but convincing evidence to support such a possibility has not been obtained. It has been suggested by the sum of various studies that the prominent current flow along the coast of the southern Levant, northern Sinai and the Nile Delta in the Early Holocene was clockwise from the east and northeast to the west and southwest, but this became counter-clockwise from the west to the east and northeast in the Middle Holocene due to changes in climate and atmospheric circulation (Stanley 2002: 98-100). Such a change in the current flow along the coast may have made the navigation from the Levant to Egypt difficult. Therefore, it may be said that the seafaring diffusion of farming from the southern Levant to Egypt would have been much easier in the Middle PPNB than that in later periods.

If the present lack of evidence for the diffusion of farming to Egypt in the Middle PPNB reflects the past reality, climatic conditions in the Negev and Sinai may be more likely reason why the diffusion of farming to Egypt had been interrupted. It has been argued that the advent of the Early Holocene climatic optimum and the following northward shift of the polar front caused desiccation in the southern Levant in the Middle to Late PPNB periods. This may have in turn resulted in an earlier decrease of rainfall in the Negev and Sinai, and made rain-fed farming impossible. This seems to be a reasonable explanation. However, if climatic conditions in the Negev and Sinai were actually the major reason why the diffusion of farming to Egypt had been interrupted, the question is whether a subsequent climatic amelioration in the Negev and Sinai is the reason why the diffusion of farming to Egypt became possible. Some scholars argued that such dramatic improvement of the climate has not been well attested in the Negev and Sinai in the 7th and 6th millennia cal.BC (Tchernov 1998; *cf*. Rossignol-Strick 2002). On the basis of the study of land snails, other scholars insist that precipitation in the Negev might have generally increased in the Middle Holocene and particularly around 5500-5000 cal.BC (Goodfriend 1990; 1999). The sedimentary record of the Dead Sea also demonstrate that the water level of the Dead Sea dropped rapidly around 6700 cal.BC, and after temporal recoveries, it dropped rapidly again around 6200 cal.BC and remained the lowest in the Early-Middle Holocene until it started to rise around 5600 cal.BC. This suggests that there was almost no precipitation in this region during this period (Migowski *et al*. 2006). Therefore, the reason for the diffusion of farming to Egypt must be looked for not only in possible changes in climatic conditions but also in changes in human adaptation to such conditions.

One dramatic change in subsistence activities in the Negev and Sinai is the possible introduction of sheep/goat herding around the PPNC or Tuwailan period, though the transition from the PPNB to Pottery Neolithic and Chalcolithic periods in the Negev and Sinai is not well known because of the paucity of archaeological data (Goring-Morris 1993; Rosen 2002). The initial introduction of sheep/goat herding into the Negev and Sinai has not yet been demonstrated by faunal remains, but merely suggested by changes in the lithic assemblage and the appearance of stone structures which look like animal pens (Goring-Morris 1993: 77*ff*). The penning of domesticated sheep/goats by using rock shelters, as suggested by concentrations of dung, was present at Ramon I in the Negev no later than 6000 cal.BC (Rosen *et al*. 2005) (**Fig.2.5**).

As exemplified by the emergence of a farming-herding way of life in Transjordan after the Late PPNB period, farming in arid areas outside the fertile Levantine Corridor had to be complemented by hunting and sheep/goat herding as a buffer against the risks of bad harvests (Garrard 1998: 145-146; Garrard *et al*. 1996). One reason why farming did not diffuse to Egypt across the Negev and Sinai in the Middle PPNB period may be because domesticated sheep and goats were not yet available in the Negev and Sinai and thus intensive exploitation of arid regions with the aid of farming alone was a risky business. Consequently, extensive exploitation of wild plants and animals based on seasonal movement remained the most successful subsistence in the Negev and Sinai until the Pottery Neolithic period.

The possibility that wheat/barley farming diffused to the Negev and Sinai well in advance of sheep/goat herding cannot be ruled out, but there is no evidence for farming in the Negev and Sinai in the Middle PPNB period (Rosen 1988; 2002). If farming actually did not diffuse to the Negev and Sinai in the Middle PPNB period, another reason may be because of different climatic regimes rather than the total amount of rainfall per year. Palynological records and other paleoclimatological data suggest that the amount of summer rainfall increased in the Arabian Peninsula and the southernmost part of the Fertile Crescent during the Early Holocene, due to the northward shift of the Intertropical Convergence Zone and weakening of the subtropical ridge which brought drought over these regions (El-Moslimany 1994; Staubwasser and Weiss 2006). This means that the Negev and Sinai were included in the Intertropical Convergence Zone in the Early Holocene (**Fig.2.4**), and thus Levantine wheat and barley, which had grown with winter/spring rainfall and relied on long daylight hours through spring and summer, could not grow under the monsoonal climatic regime of high spring-summer humidity and temperature (McCorriston 2006). In other words, it can be considered that as long as the monsoonal climate predominated in the Negev and Sinai, wheat and barley could not spread into this region. It may not have been until the Intertropical Convergence Zone retreated to the south that the southwestward diffusion of wheat and barley across the Negev and Sinai became possible.

Secure establishment of sheep/goat herding in combination with wheat/barley farming in the southern Levant in the Pottery Neolithic period could have made possible a more intensive exploitation of the Negev and Sinai. A farming-herding way of life is well attested in the southern Levant after the PPNC period, and sedentary farming and herding communities started to be segregated into a sedentary farming part and a mobile herding part, in order to keep the herds of sheep and goats away from farmland and to exploit nearby steppes and deserts which are unsuitable for farming (Gopher and Gophna 1993; Rollefson and Köhler-Rollefson 1993). It is in this context that peculiar small projectile points of the Pottery Neolithic appeared. These peculiar Pottery Neolithic projectile points have been found in some sites in the Negev as well, like Qadesh Barnea and Nahal Issaron, and it is supposed that these sites were hunter-herders' seasonal camps (Gopher 1994; Gopher *et al*. 1994). It is not clear whether these hunter-herders in the Negev were special task groups coming from sedentary farming settlements in the Mediterranean coastal plain of the southern Levant, or autonomous nomadic people who inhabited the steppes and deserts of the Negev and Sinai and had regular or occasional contact with farmers. However, the latter is more likely, because they gradually developed a distinct nomadic pastoral culture named the Timnian since the middle 6th millennium cal.BC (Rosen 2008a; 2008b). No matter what their identity, it is assumed that the diffusion of domesticated wheat/barley and sheep/goats to Egypt became possible in this context.

As mentioned, the earliest domesticated sheep/goats in Egypt were found at Sodmein Cave in the Red Sea Mountains and are dated to the early 6th millennium cal.BC, and there is little doubt that they came from Sinai. The reason why the southwestward diffusion of sheep/goats to Egypt was slightly earlier than that of wheat/barley is because sheep/goats were not affected by the difference in the climatic regime and could easily be adapted to the rocky mountainous environment of the coastal area of the Egyptian Eastern Desert, which might be similar to their homeland in the Negev and Sinai. It is likely that herders from Sinai infiltrated into the coastal area of the Egyptian Eastern Desert to some extent. Due to insufficient information about socioeconomic circumstances, however, it is difficult to say exactly at which point sheep/goats were passed on to the people who were indigenous to this area and why the indigenous people adopted sheep/goats. Moreover, although the first domesticated sheep/goats were not accompanied by domesticated wheat/barley, the role of sheep/goat herders, who carried with them a limited amount of grain, as the possible agents of the diffusion of wheat/barley farming to the northern part of Egypt at a later date must be considered (Hassan 2002b: 61).

2.4.5. Human cognitive development and human agency

While external reasons such as climatic and environmental changes and population/resource imbalances for the beginning and development of Neolithisation have long been argued in Near Eastern archaeology, internal reasons such as human mentality and decision making for the Neolithisation have recently been emphasised. From a general evolutionary point of view, Mithen has elaborated an idea that the development of the complex cognitive abilities of behaviourally modern humans played a significant role in the beginning of food production. He has argued that the development of human cognitive abilities to establish 'social' relations with wild plants and animals, to manipulate their lives, and to use the plants and animals not merely as food resources but also as tools for socioeconomic negotiation and competition was essential for the development of domestication. Modern humans had already exhibited complex cognitive and symbolising abilities as exemplified by rock art, bone/ivory sculptures, and personal ornaments like beads made in the Late Pleistocene, but it was not until the Terminal Pleistocene that modern humans seemed to have acquired the ability to think about controlling nature by domesticating wild plants and animals, and not necessarily for subsistence, as evidenced by the domestication of dog in the Natufian in the Levant. Food production must have been impossible before the development of such a cognitive ability (Mithen 1996).

It follows from this argument that the complex cognitive ability of modern humans which was ultimately critical for the beginning of food production has developed earlier regardless of ecological and demographic pressure at the transition between the Pleistocene and Holocene (Cauvin 2000a; 2000b; Watkins 2006). In the Near East, the remarkable appearance of various artistic or symbolic items and remains of symbolic behaviour, which is called the 'revolution of symbols' by Cauvin, started around the transition between the Upper Palaeolithic and Epipalaeolithic in the Terminal Pleistocene. Since the Neolithisation in the Near East ultimately derived from this 'revolution of symbols' particularly in the Natufian, Neolithisation can be considered as essentially a restructuring of human mentality rather than of subsistence, in order to cope with changing demands in the symbolic realm (Cauvin 2000a; 2000b; Goring-Morris and Belfer-Cohen 2002; Watkins 2006).

In contrast, artistic or symbolic items are poor in Egypt in the Late and Terminal Pleistocene and Early Holocene. No personal ornaments have been offered to Late Palaeolithic burials in Upper Egypt and Lower Nubia (Wendorf 1968; Wendorf and Schild 1986). The date of some rock art in Upper Egypt is not yet certain but is probably no earlier than the Late Palaeolithic (*ca.*15000 BP). Various animal motifs of the rock art certainly reflect people's view of wildlife and particularly their special concern with wild cattle, but the interpretation of abstract motifs and strange depictions of animals is still debatable (Huyge 1998; 2002; Huyge *et al.* 2001; 2007). Decorated pottery vessels in the Saharo-Sudanese culture are examples in which the artistic or symbolising skills of makers in the Early Holocene were exhibited. But the meanings of various wavy line patterns are unclear, and the variety of the decoration patterns may simply be regarded as a regional marker (Close 1995; Jesse 2003; Mohammed-Ali and Khabir 2003). Despite the early development of pottery making in the Western Desert, it was not until the Merimde Neolithic that clay figurines became common (Eiwanger 1992: 59*ff*). Apart from tiny ostrich eggshell beads and incised fragments, decorative carved bone or stone items are rare to absent in Early Holocene cultures in the Nile Valley and the Western Desert. Such items flourished well after the Early Holocene, as represented by those of the Bashendi culture in Dakhleh Oasis in the 6th millennium cal.BC (McDonald 2008). The appearance of cattle burials and associated megalithic complex in the Nabta-Kiseiba region was in the Late Ceramic pastoral culture in the Middle Holocene, which is much later than the initial attempts of cattle domestication (Wendorf and Schild 2001).

Therefore, it is hard to imagine through looking at these things the mentality or cognition in general and the ambition or intention in particular of the people who first attempted food production in Egypt. Nonetheless, it seems that the 'revolution of symbols' should be a factor which deserves serious consideration in future Neolithic research in Egypt. Ongoing arguments concerning symbolic aspects of Near Eastern Neolithisation would be of great help for such a consideration. For instance, as has been argued in Near Eastern Neolithic research (*e.g.*, Goring-Morris and Belfer-Cohen 2001), the symbolic aspects of seemingly utilitarian material culture like stone tools should not be ignored for a better understanding of the dynamics of prehistoric societies. This topic will be discussed further in Chapter 4.

Human agency should also be considered in the sociocultural/socioeconomic networks between the southern Levant, Negev, Sinai, and Egypt. The reasons why a very limited number of Levantine Neolithic items, such as specific projectile points, reached Egypt and why nothing seems to have gone out of Egypt in return, must be related to intentional choices of the people involved, and may probably be explained by a sort of prestige economy in which ambitious individuals tried to obtain novel items for status display. A social model for the origins of food production suggests that ambitious individuals in complex forager societies would have been under pressure to maintain prestige among their followers and may have been attracted to food production as a way of securing exotic and high-status food or increasing surplus food to sustain their competitive activities (Hayden 1990; 1992; 1995). The introduction of domesticated wheat/barley and sheep/goats into Egypt may also be in part attributed to such ambitious individuals' eagerness for raising their status through the distribution of novel food. This topic will also be discussed in more detail in Chapter 4.

2.5. Areas of cooperative research

An overview of factors causing Neolithisation in Egypt reveals more differences than similarities between the Near East and Egypt. Nevertheless, I insist that cooperative research between archaeologists working in Egypt and Near Eastern archaeologists is essential.

As for the similarities in cultural, economic and social development in the Levantine PPNB interaction sphere, if Near Eastern archaeologists agree that more attention should be paid to such topics as the colonisation of the isolated island of Cyprus for a better understanding of unprecedented human territorial behaviours which may have caused the similarities in different regions (*e.g.*, Kuijt 2004; Peltenburg 2004), there seems to be no reason to ignore Egypt which is connected to the Levant by the land bridge of Sinai and must have been more easily accessible. Given that Neolithic people had fewer physical difficulties in moving across seas and deserts than previously believed, demographic trends across the Near East in the Early-Middle Holocene should be reconsidered not only by Near Eastern archaeologists (*e.g.*, Bar-Yosef 2003; Bar-Yosef and Bar-Yosef Mayer 2002; Kuijt 2000) but also by archaeologists in Egypt. Special attention must be paid to the population expansion into arid regions like the Negev and Sinai, in which sedentary farming-herding adaptations did not become prevalent despite a certain degree of similarity in material culture. In particular, social crowding and subsequent social fragmentation in the south-central Levant around the end of the Late PPNB period (Kuijt 2002) must have made a considerable impact on the Negev and Sinai, and this may have eventually affected Neolithisation in Egypt. What seems most interesting is that the Negev and Sinai can be studied not only in terms of the heartland-hinterland or heartland-periphery relationship with the Levant (Rosen 1988: 503; 2002: 24), but also in terms of the mediator of cultural transmission between the Levant and Egypt. The expansion of exchange networks between the Near East and Egypt over time can be re-examined through exchanges of information between archaeologists working in the Near East and Egypt.

As for the differences in cultural, economic and social development, Egypt definitely provides extreme examples. In order to develop a new explanatory framework that is applicable to the entire Near East including Egypt, one has to take into account the fact that cattle herding and pottery making were quite normal in the Egyptian Western Desert before crop farming. Archaeologists working in Egypt are responsible for explaining these contrasting phenomena in terms not only of the distribution of resources but also of the medium-term developments of technology and demographic changes that are unique to northeastern Africa. Compared with the core area of the Near East, more frequent population expansion/contraction phenomena and more sparsely distributed resources were characteristics of northeastern Africa except for the Nile Valley, and these characteristics are obviously related to the pace of developments of different technologies, subsistence practices and social organisation in the Western Desert.

2.6. Structural history of Neolithisation

Finally, the argument so far can also be considered in terms of Structural History, an Annaliste mode of thought which explicitly focuses on multiple processes of events which mutually interact on different timescale (Bintliff 1991; 2004). There is no doubt that the Neolithisation process in the Near East and Egypt went on during the long-term climatic trend of reaction to and recovery from the Younger Dryas cooling and drying event and subsequent increasing aridity between 10000 cal.BC and 5000 cal.BC. This climatic trend gave possibilities and constraints for the Neolithisation process in terms of the selection of human habitats, the timing of domestication and the selection of potential domesticates (Bar-Yosef 2002b; Bar-Yosef and Belfer-Cohen 2002; Bar-Yosef and Meadow 1995; McCorriston and Hole 1991; Moore and Hillman 1992; Rossignol-Strick 2002; Wright 1993). In addition, the development of the complex cognitive ability of behaviourally modern humans, which can also be regarded as a part of long-term human evolution since the emergence of anatomically modern humans more than one hundred thousand years ago, must also have given great possibilities for the Neolithisation process elsewhere. Therefore, it seems quite reasonable to conclude from the long-term perspective that the beginning of food production in the Early Holocene is a contingent event at the conjuncture of rare climatic changes and the steady evolution of human cognition (Layton 1999; Sherratt 1997), even though the exact timing of climatic changes varied by latitude and elevation.

The above-mentioned idea of polycentric

evolution in Near Eastern Neolithisation seems to focus solely on the medium-term developments of culture, economy and society in different environments and to argue the reasons for regional differences as well as similarities, without making clear the long-term climatic trends and human evolutionary trends behind developments and short-term events that are constrained and enabled by these medium-term developments. It is necessary to distinguish long-term trends from medium-term events and to recognise on what timescale the trends and events under consideration occurred and how they converged or diverged at a certain point of time, for a more comprehensive understanding of Neolithisation in the entire Near East including Egypt.

The emergence of knowledgeable and ambitious individuals who have the potential to change things on the short timescale within the medium-term developments of societies or sociocultural networks is the most unpredictable factor in the Neolithisation process. According to structuration theory and complexity theory, individuals cannot be freed from the existing cultural, economic and social structure which is unique to each region and constrains individual behaviour, but they can create subtle changes in the structure. Although the role of active individuals should not be overestimated (Bintliff 2003), such a series of subtle changes may radically alter the trajectory of the developments of entire cultural, economic and social structure ultimately (Layton 2003). Therefore, archaeologists must be careful when looking at subtle changes in material culture that do not necessarily seem to be adaptive or functional while exploring the socioeconomic context in which such changes appeared. Subtle changes in material culture or the appearance of new features in material culture may be clues to recognise the emergence of socially-prominent individuals. In the case of Egypt, the late emergence of bifacial technology within the traditional lithic technology in the 7th-6th millennia cal.BC may be interpreted as a sign of the appearance of such individuals, who eventually adopted foreign domesticates. This topic will be discussed in more detail in Chapter 4.

In short, the Neolithisation process in Egypt can probably be explained as the convergence of 1) long-term Holocene climatic changes and human cognitive development, 2) medium-term demographic changes and the accompanying unprecedented expansion and intensification of sociocultural/socioeconomic networks, and 3) the unpredictable emergence of socially-prominent individuals on a short-term basis.

2.7. Summary

As demonstrated in this chapter, the theoretical framework concerning the Neolithisation process remains under construction, while many critical elements including the timescale are under the research focus. What seems clear is that archaeologists in Egypt and Near Eastern archaeologists can work on a common ground and provide information to each other for mutual benefits. Further discussions about supra-regional concepts in Near Eastern Neolithisation will trigger a change in relations between Egyptian archaeology and Near Eastern archaeology, thereby eliminating neighbourly ignorance.

Following this research orientation, the next chapter will focus on the Fayum where the supposedly earliest evidence for wheat/barley farming in combination with sheep/goat herding in Egypt was found, and will examine the Neolithisation process on a more local level.