In Search of the Origins of Lower Egyptian Pottery:
A New Approach to Old Data
Studies in African Archaeology 16
Poznań Archaeological Museum 2018

Chapter 4
The cultural situation in north-eastern Africa and the southern Levant during the Early and Middle Holocene periods

4.1. The Neolithic period of Lower Egypt

At the early stage of archaeological research in Egypt, the entire terminology concerning its chronology and periodisation was adapted from Europe. The term Neolithic, originally devised in 19th century Europe, was accepted also for Egypt. At the turn of the 19th and 20th centuries, two terms – Prehistoric/Predynastic and Neolithic – were closely interconnected in Egyptian archaeology. They both generally encompassed all finds dated to the period preceding the emergence of the Pharaonic civilisation. Already towards the end of the 19th century, J. de Morgan considered materials from Predynastic sites (including Naqada and Ballas) as Neolithic (de Morgan, 1896: 67-167). In the opinion of W.M.F. Petrie, the Neolithic encompassed a period below S.D. 60 the highest level of his famous Sequence Dating seriation method (Petrie, 1901: 28–29). Although the Neolithic was officially introduced into the periodisation of Ancient Egypt, it attracted little interest. Archaeological works focused mostly on Upper Egyptian cemeteries while the interest of researchers was directed towards finds and their chronology within the Predynastic period, along with their cultural affinity and classification/typology. At the very beginning of the 20th century, the terms Prehistoric/Predynastic replaced the term Neolithic. It was only thanks to finds directly related to domesticated plants and animals (in the Fayum and Badari) that the term Neolithic returned to Egyptian prehistory.

The history of research on the Lower Egyptian Neolithic began in the 1920s and 1930s, when new sites in the Fayum, Merimde Beni Salame, and Wadi Hof

were discovered and excavated, providing new materials standing out from those known from other sites in Egypt (Map 2). For the first time, archaeological works conducted on the northern shores of Lake Qarun yielded the remains of domesticated animals and grains of domesticated plants, indicating the presence of subsistence strategies other than hunting, gathering, and fishing (Caton-Thompson & Gardner, 1934). The presence of bones of domesticated cattle, sheep, goats and probably pigs and dogs, as well as grains of emmer wheat and hulled six-row barley, began to be quoted in the context of early agriculture in the Nile Valley and the Delta.

Research into the Neolithic period of Lower Egypt has been conducted for the last 100 years. Although our knowledge is now different from that a century ago, it is still the least known period in the whole history of Egyptian civilisation. However, over the last decade, interest in Lower Egyptian farming communities has been growing. New research projects have, on the one hand, focused on the analysis of materials originating from earlier excavations (Shirai, 2010; 2015; 2016a; 2016b; Emmitt, 2011; 2017; Emmitt *et al.*, 2018) while, on the other hand – owing to excavations and new forms of archaeological reconnaissance and the use of new research methods – they have provided new evidence enriching our modest level of knowledge. These projects include the Egypt Exploration Society excavations at Sais, the UCLA-RUG-UOA Fayum project, and the Imbaba Governorate Prehistoric Survey (Wilson *et al.*, 2014; Rowland & Bertini, 2016; Holdaway & Wendrich, 2017).

4.1.1. The Fayumian culture

In the 1920s, on the northern shore of Lake Qarun, G. Caton-Thompson and E. Gardner identified a number of archaeological sites dated from the Palaeolithic to Roman times. These pioneering discoveries contributed to a better understanding of the communities inhabiting this part of Egypt in prehistoric times. However, their importance is caused, first of all, by the fact that they proved human activity had existed in this area before the emergence of the Egyptian state. Among the sites recorded at that time, particular attention should be paid to two Neolithic settlements named Kom K and Kom W and two concentrations of storage pits known as the Lower and Upper K Pits. At these very sites remains of the activities of the earliest farming societies in Egypt were found. Pottery, bifacially retouched flint tools, grains of domesticated plants and bones of domesticated animals provided a basis for Caton-Thompson and Gardner to identify an archaeological culture referred to as the Neolithic A group. Assemblages containing no pottery or domesticates but standing out for microlithic elements were classified as the Neolithic B group. Since both researchers assumed that the water level in the lake had kept on lowering in the Neolithic, they also assumed that the sites'

location indicated their relative chronology. On this basis, they concluded that the Neolithic A group[1] preceded the Neolithic B group[2]. The Neolithic sites were dated to the period before 5,000 BC, and were occupied for approximately 800 years (Caton-Thompson & Gardner, 1934: 93). Although Caton-Thompson and Gardner realised the importance of the discoveries, the mistaken interpretation of water level changes (and thus the incorrect relative chronology of sites and cultures) led to erroneous interpretations. In the opinion of both researchers, the communities who occupied the northern shore of Lake Qarun regressed rather than progressed over time. They considered the Fayumian B groups as more primitive and poorer than their predecessors, the Fayumian A groups.

From the very beginning of research, storage structures and diverse artefacts made of flint, stone, clay and organic materials were remarkably different from finds from other sites known thus far in Egypt. The publication of research results together with the description and analysis of finds in *The Desert Fayum* from 1934 continues to be an important source of information on Neolithic communities in northern Egypt. It introduced the Fayumian sites to a broader discussion on the origins of food-producing societies in Egypt and in the Near East. At that time, the discoveries in the Fayum were commented on by H. Junker, who explored Merimde, another Neolithic site from Lower Egypt. He used the materials from the northern shore of Lake Qarun as a comparative base.

The discoveries in the Fayum initiated research on food producing societies in Egypt. The presence of domesticated plants and animals started to be quoted in the context of early agriculture in Egypt and the Near East (Childe, 1928; 1935). Moreover, the presence of pottery as a typical Neolithic element on the shore of Lake Qarun perfectly matched the Near Eastern farming community model. However, certain features differentiating the groups in the Fayum Depression were visible from the very beginning. Researchers did not record any graves or remains of settlement structures pointing to another important feature of farming communities, i.e. conducting a sedentary way of life. Furthermore, the Fayumian communities relied on abundant food resources offered by the lake and its surrounding areas. Hunting, fishing, and gathering played an important role in food procurement, supplemented by plant cultivation and animal breeding.

After the Second World War, the Fayumian culture took up a permanent position in synthetic studies covering prehistoric Egypt (Hayes, 1965; Arkell, 1975). However, the still-limited availability of data sometimes led to mistaken interpretations. E.J. Baumgartel associated the Fayumian A culture with the Naqada I period on the basis of flint assemblages and saw its origins in the south, even suggesting connections to the Early Khartoum culture (Baumgartel, 1955: 25, 49).

[1] Further referred to as the Fayumian A culture.
[2] Further referred to as the Fayumian B culture.

Until the 1970s, the chronological sequence of the Fayumian A and B cultures was generally accepted, as was the regressed development of farming communities on the shores of Lake Qarun (Hayes, 1965: 98-99).

Archaeologists returned to the Fayumian culture towards the end of the 1960s and in the 1970s. An Italian expedition headed by S.M. Puglisi came first (Puglisi, 1967; Casini, 1984). Having analysed the archaeological assemblages, M. Casini suggested a local origin of the Fayumian A farming societies. In her opinion, the transition from gathering and hunting to food production had resulted from evolution and the specialisation process, allowing for adaptation to new environmental conditions.

However, it was research conducted by the Combined Prehistoric Expedition in the Fayum Depression headed by F. Wendorf that significantly changed our knowledge of the Neolithic period in this region and the chronology of sites. In 1969, a survey along the northern border of the Fayum Depression was carried out, involving test excavations at eight sites dated from the Palaeolithic to the Old Kingdom. On the basis of C14 dates, a detailed examination of site stratigraphy and the geological structure of the Fayum Depression, F. Wendorf and R. Schild proposed a new chronology for the cultures identified by Caton-Thompson and Gardner. In their opinion, the Fayumian B, now named the Qarunian culture, should be dated to the Epipalaeolithic period and predated the Neolithic Fayumian A culture (Wendorf & Schild, 1976: 157-228). The new C14 dates also showed a 1,200-year gap between the Epipalaeolithic and the Neolithic, interpreted as a hiatus in settlement activity caused by a sharp decrease of the lake's water level. Wendorf and Schild suggested the arrival of external farming societies to the Fayum; thus, they did not associate their origins with the Qarunian hunters-gatherers (Wendorf & Schild, 1976: 317-319).

In 1979 and 1980 the sites at Qasr el-Sagha located in the Fayum Depression were explored by Polish scholars from the Jagiellonian University in Kraków. One of the greatest achievements of these explorations was the identification of two phases of Neolithic settlement activity with different origins, namely an older Fayumian and a younger Moerian phase. For the older phase, the researchers suggested the presence of Near Eastern elements, while the younger phase may have been linked to the Saharan tradition (Kozłowski & Ginter, 1989: 176-179). Furthermore, B. Ginter and J.K. Kozłowski verified the Neolithic character of flint assemblages of the Fayumian. The lithics originating from the British research in the early 20th century consisted, first of all, of core and bifacial implements. Meanwhile, the excavations in Qasr el-Sagha showed that the flint industry of the Fayumian was flake-oriented.

In the early 1980s, an expedition from the University of Washington headed by R. Wenke began to explore the Fayum Depression. The researchers focused on

the lesser known south-western side of the lake, and their interests concentrated, first of all, on the issue of the origins of agriculture in Lower Egypt, as well as on the transition from hunting and gathering to farming. On the basis of data collected through surveys and excavations covering both archaeological assemblages and faunal remains, Wenke reached conclusions similar to those of Wendorf and Schild, suggesting the lack of cultural links between the Epipalaeolithic and the Neolithic groups from the Fayum.

Intensive archaeozoological research on materials from sites located on the shores of Lake Qarun was carried out in the 1980s. D. Brewer (1989) attempted to develop a resource exploitation model by analysing faunal remains in association with cultural assemblages of the Epipalaeolithic and the Neolithic. According to Brewer (1989), fishing was the main source of food for the people of both the Qarunian and the Fayumian cultures. People of these cultural groups consumed the same fish species and used the same strategies at the same time of the year. Consequently, fish remains prevail at sites of the Epipalaeolithic and the Neolithic periods. A differentiating feature of the Neolithic sites was the presence of domesticates. Brewer also agreed with the hypothesis of Wendorf and Schild (1976) concerning the lack of affinities between the Qarunian and Fayumian cultures. Markedly profound differences in flint assemblages, despite a lack of change in the resource exploitation models, were considered as indicators of the non-local character of the farming communities from the Fayum.

After a long break, archaeologists returned to the Fayum Depression in 2003. Research carried out by the UCLA-RUG-UOA Fayum project continued until 2013 and contributed to a number of important discoveries that changed our knowledge of the Epipalaeolithic and the Neolithic of the Fayum.[3] Particularly remarkable are the works of N. Shirai, a member of the expedition team (2003-2005), relying on analyses of flint materials from new explorations and on flint implements from the excavations of Caton-Thompson and Gardner (Shirai, 2010; 2015; 2016ab). The research conducted by Shirai (2005; 2006; 2013a; 2013b; 2015a) covered several issues, including the transition between the Epipalaeolithic and the Neolithic periods in the Fayum, the process of adaptation of new subsistence strategies, and their origin. His book *The Archaeology of the First Farmer-Herders in Egypt. New Insights into the Fayum Epipalaeolithic and the Neolithic*, appearing in 2010 as a published version of his doctoral thesis, constitutes a rich source of information on the Neolithic period and the Neolithisation process, not only in Lower Egypt. One of the achievements of this Japanese researcher was the calibration of available C14 dates which made it possible to rearrange

[3] The project was initiated and directed by faculty of the University of California, Los Angeles, USA (UCLA) and the Rijksuniversiteit Groningen, the Netherlands (RUG), partnering with others, such as Auckland University, New Zealand (UOA) and the Vrije Universiteit.

the chronology of the Qarunian, Fayumian, and Moerian cultures, and which eventually contributed to a reduction in the gap between the Epipalaeolithic and the Neolithic from 1,200 to 600 years. Shirai also presented a comparative study of the lithic implements in a broad context, taking into account evidence from both the Levant and the Western Desert (see contra McDonald, 2013). He proposed a model of the Neolithisation process for the Fayum, indicating the Levant as the main source of farming and herding. Shirai also suggested: „a steady flow of technical knowledge, stylistic information and symbolic beliefs from the southern Levant to north-eastern Africa" already from the 8th/7th millenniums BC, i.e. well in advance of the introduction of domesticates into Egypt (Shirai, 2010: 334-335). Moreover, the regular contacts continuing since the Epipalaeolithic contributed to the diffusion of these new subsistence strategies into Egypt in the 6th millennium BC. According to Shirai, the 600-year occupation gap between the Epipalaeolithic and the Neolithic in this region can be explained by both an actual interruption in human occupation in the 6th millennium BC and/or the current state of research. Unlike earlier researchers who concentrated on the transition between the Epipalaeolithic and the Neolithic (e.g. Wendorf & Schild, 1976; Wenke & Casini, 1989), Shirai suggested possible continuity between the two periods. In his opinion, the emergence of a new subsistence strategy was "a result of humans' effort to adapt foreign domesticates to the local environment". Thus, the Fayumians embraced the innovations and adapted them to their local environment (Shirai, 2013a: 215). Shirai found that the flint assemblage had diversified considerably in the Neolithic and many elaborate and innovative tools (bifacially pressure-flaked sickle blades and bifacially flaked axes) had appeared in the Neolithic Fayum (Shirai, 2013a: 225–226; 2016a; 2017). In his opinion, people had invested an unprecedented amount of time and labour in tool-making in order to make farming and herding successful.

The broad scope of the UCLA-RUG-UOA Fayum project included climatic, botanical, faunal, ceramic and lithic evidence. One of the more notable achievements of the expedition involved the identification of links between the successful adaptation of farming and herding in Lower Egypt and local conditions, namely climate and environment. According to R. Phillipps *et al.* (2012), the data from the Fayum indicates a reliance on crops grown in winter. Colder climatic conditions between 6,700-5,800 BC in northern Egypt caused by the high level of the Mediterranean winter cyclonic rainfall made it possible to use domesticates and to cultivate the land. Research also showed that Middle Holocene occupation in the Fayum was not linked to the southward movement of the ITCZ (Phillipps *et al.*, 2012).

An important contribution to the development of knowledge of human activity on the shores of Lake Qarun was made by new radiocarbon determinations obtained as part of the project. They showed that from the Early Holocene period

until 6,000 BP activity was frequent on the northern shore. It also turned out that the gap between the Epipalaeolithic and the Neolithic was attributable to the state of research, and not to an actual occupation hiatus (Wendrich *et al.*, 2010; Holdaway *et al.*, 2016; Holdaway & Wendrich, 2017).

New research from the UCLA-RUG-UOA Fayum project on the faunal remains from the Fayum confirmed earlier observations on the prevalence of fish remains at prehistoric sites in the Epipalaeolithic and the Neolithic periods, indicating the use of the abundant resources of the lake, and thus adaptation to the local environment. Even though the oldest evidence for domesticated ovicaprines is dated to ca. 5,600 cal. BC and research has shown that the emergence of domesticates predates the 5th millennium BC, scholars are of the opinion that the exact timing of domesticates' introduction into the Fayum depression cannot be determined due to the still incomplete picture of human activity in this area (Linseele *et al.*, 2014; 2016). Detailed analyses also showed low numbers of sheep, goat, cattle and pig bones in the Neolithic Fayum, suggesting a minor role was played by domesticated animals (Linseele *et al.*, 2014). According to S. Holdaway *et al.*, and Phillipps *et al.* (2016a; 2016b), this could have been related to environmental and socio-economic processes – i.e. the availability of fish in certain periods, fluctuation of the lake's water level and movement of people in the area where the resources were located (Holdaway *et al.*, 2016: 178; see also Holdaway & Wendrich, 2017).

Researchers from the Fayum project also focused on the settlement pattern and mobility of the early agricultural groups in the Fayum Depression. In the absence of the traditional markers of mobility and sedentary occupations, they decided to analyse the artefact movement as an indication for human mobility and the distribution of artefacts and features (Holdaway *et al.*, 2010; Phillipps & Holdaway, 2016; Phillipps *et al.*, 2016a). In the opinion of Phillipps *et al.*, the occupation of the northern shore of Lake Qarun was "spatially extensive" and characterised by movement (Phillipps *et al.*, 2016a: 288). The dispersed settlement pattern consisting of short-lived features and storage facilities required the movement of human groups across this area (Holdaway *et al.*, 2016: 178). However, Phillipps and Holdaway (2016) suggest a decrease in mobility from the Early to Middle Holocene on the basis of the movement of flint cores. Such a change could reflect socio-economic changes linked to access to wild food resources, the production of pottery and bifacials, or even the introduction of domesticated plants and animals. Holdaway *et al.* is of the opinion that the Fayumian north shore may have been just a part of a spatially more extensive settlement system, additionally encompassing the Delta and the Nile Valley, with human groups moving across it and adapting to local environments as they encountered them (Holdaway *et al.*, 2016: 179). Researchers from the Fayum project claim that the settlement pattern, mobility and use of wild resources bring the Fayumian Neolithic groups closer to

north-eastern African communities than to the farming societies in the southern Levant, commonly accepted as the source of the new subsistence strategies (Holdaway & Phillipps, 2017; contra Shirai, 2017). The UCLA-RUG-UOA Fayum project was summarised in a publication entitled *The Desert Fayum Reinvestigated. The Early to Middle Holocene Landscape Archaeology of the Fayum North Shore, Egypt*, published in 2017 (Holdaway & Wendrich, 2017).

In the context of research carried out by the UCLA-RUG-UOA Fayum project, attention should also be drawn to studies by Joshua J. Emmitt, one of the members of the expedition. His master's thesis on *Investigating ceramics from the Neolithic occupation of Kom W, Fayum, Egypt*, defended in 2011, was aimed at studying the duration of occupation and site use at Kom W on the basis of the ceramic assemblages from the excavations by Caton-Thompson and Gardner (1934), along with those by Wendorf and Schild (1976). In his estimation, the number and variety of ceramics suggest the intensive occupation of Kom W. As the larger vessels and their permanence indicate that the site was used for storage, it could have been either permanently occupied or returned to periodically. This research by Emmitt is consistent with mostly later hypotheses on the settlement pattern and the movement across the northern shore (Holdaway *et al.*, 2010; Phillipps & Holdaway, 2016; Phillipps *et al.*, 2016a; 2016b; Holdaway & Wendrich, 2017). In 2017, Emmitt defended his doctoral thesis entitled *The Neolithic Pottery of Egypt. Investigating settlement pattern in the Middle Holocene northeast Africa with ceramics*. Thus, the character of occupation on the northern shore of Lake Qarun was once again the subject of research on the basis of the ceramic assemblages. The novelty in this research were pottery analyses conducted with the aid of a portable X-ray fluorescence (pXRF) spectrometer. Their results confirmed the movement between the location of the Fayumian groups and their mobile character (see also Emmitt *et al.*, 2018).

The history of research on the Fayumian culture began in the 1920s. The discoveries by Caton-Thompson and Gardner permanently changed the way of thinking about Egyptian prehistory. Lower Egypt was no longer considered as an uninhabited swampland, while Upper Egypt lost its dominant position in this field of research. Over the last 100 years, the picture of the Neolithic in the Fayum has changed. Each subsequent research project on the shores of Lake Qarun has brought discoveries enriching our knowledge. Improved research methods, including the introduction of radiocarbon dating and new methods of artefact analysis, has also made it possible to reanalyse materials from earlier excavations. The understanding of prehistoric occupation in the Fayum has also been influenced by other research projects and discoveries, both in north-eastern Africa and in the Levant. The importance of discoveries in the Fayum has been appreciated from the very beginning with the Fayumian culture having

been present in all synthetic studies of Egyptian prehistory (Baumgartel, 1955; Hayes, 1965; Krzyżaniak, 1977; Hoffman, 1979; Midnat-Reynes, 1992; 2000; 2003; Ciałowicz, 1999; Wengrow, 2006; Tassie, 2014) and is commonly quoted in the context of the Neolithisation process and the spread of domesticated plants and animals beyond the Near East.

4.1.2. The Merimde culture

Merimde Beni Salame, another important Lower Egyptian site dated to the Neolithic, was also discovered in the 1920s. It was found by H. Junker during a survey of the 'West Delta Expedition' by the Austrian Academy of Science in Vienna. Excavations at Merimde Beni Salame were carried out between 1929-1939. Junker uncovered approximately 6,400 m² of a suggested total area of 200,000 m². His research included both settlement structures and human graves within the settlement area. In certain parts of the site, deposits were nearly 3 m thick. However, the research methods of early 20th century archaeologists differed greatly from those used today. No attention was paid to stratigraphy while artefacts were subjected to a selection process. Towards the final stage of excavations, Junker identified three layers of occupation. The results of his research were published in short reports (Junker, 1929-1940) which currently constitute a limited source of information on pre-war explorations of the site. Junker realised the importance of his discoveries and the difference between Merimde and other Predynastic sites from Upper and Lower Egypt known at the time. However, as he was digging in large vertical units and did not respect horizontal stratigraphy, materials from various levels representing different stages in the development of this huge settlement became intermixed. However, the discoveries of Junker enriched the modest knowledge of early 20th-century archaeologists on the settlement organisation and burial customs of Neolithic societies in Lower Egypt. Drawings of dwellings and other structures discovered during these excavations were published in reports together with layouts and concise interpretations on the organisation of the village. The reports additionally featured brief analyses of artefacts, including pottery, lithics and bone items. A large share of the reports is dedicated to the exploration of graves and burial customs. Junker, taking contemporary knowledge and available research methods into account, tried to explain the prevalence of women and children among the dead, the lack of grave offerings and the presence of graves within the settlement. His research was accompanied by an analysis of a small portion of skeletal, plant and animal remains. Although Junker never published a comprehensive analysis of materials from his research, the inhabitants of Merimde, as presented in his reports, appear to be a typical Neolithic farming community, cultivating crops and breeding animals, making tools and weapons first of all from clay, stone and bone in a typical Neolithic way.

A considerable contribution to understanding the Merimde culture was provided by the works of H. Larsen published in the 1950s, covering the materials from Junker's research from the collection of the Egyptiska Museet in Stockholm. Although Larsen (1957; 1958; 1962) focused, first of all, on pottery analysis, his attention was also drawn to stone and bone items (Larsen, 1959; 1960). He not only analysed typological artefacts, but also tried to put them in a wider archaeological context, looking for analogies with other sites both in Egypt and beyond. Due to the fact that documentation from Junker's research was destroyed during the Second World War, the works of the Swedish researcher are an important resource on objects discovered before the war.

In 1976, Merimde once again attracted archaeologists' attention. First, the site was explored by Z. Hawass on behalf of the Egyptian Department of Antiquities (Hawass *et al.*, 1988). The objective was to verify the site's stratigraphy and chronology. C14 dates and analyses of stratigraphy and finds including pottery, flints as well as faunal and botanical remains made it possible to confirm the site's Neolithic chronology. In the same year, the site began to be explored by archaeologists from the German Archaeological Institute. For five seasons, from 1976 to 1982, research was carried out by J. Eiwanger, in compliance with contemporary standards. Stratigraphy analysis allowed Eiwanger to identify five strata and three settlement phases. Analyses of features and artefacts made it possible to link phase I (the so-called Urschicht phase) to Levantine influences and phase II to Saharan influences. In Eiwanger's estimation, in phase III the settlement was inhabited by a local community contemporaneous with the Fayumian A culture. Eiwanger suggested a settlement hiatus caused by the arid phase of the 6th millennium BC between phase I (Urschicht) and phase II. Despite the use of modern methods, including C14 dates, the chronology of the Merimde site was not easy to establish. Although radiocarbon dates for phase I pointed to the 5th millennium BC, Eiwanger believed that Merimde I was older and should be dated to the 6th millennium BC (Hassan, 1985; Eiwanger, 1988: 54). Consequently, he dated phase II of the site to the period between 5,500-5,400 BC. Radiocarbon dating, however, did not confirm a link between phase III and the Fayumian A culture. Nowadays, the beginnings of the settlement at Merimde Beni Salame are dated to before the beginning of the 5th millennium BC while the demise of the site is estimated at approximately 4,000 cal. BC (Hendrickx, 1999; see also Hendrickx & Huyge, 2014).

This German research project at Merimde revealed the enormity of the settlement and the richness of the Neolithic culture. The detailed publication once again introduced the Merimde culture to the prehistory of Lower Egypt. The long period of the settlement's occupation made it possible to track changes taking place in the society settled at Merimde, both in its social or economic organisation and in its material culture.

An important event in the history of research on the Merimde culture came in 2000 when pottery with a characteristic Merimde herringbone pattern was recorded in Sais, a site located in the western Delta. Remains of Neolithic settlements were deposited below a Chalcolithic settlement layer linked to the Lower Egyptian cultural complex (the Maadi-Buto culture). This newly recorded Neolithic site confirmed archaeologists' assumptions that our knowledge on the Neolithic in Lower Egypt was severely limited and that the sites known thus far represented merely a portion of the actual settlement network from the 6th and 5th millenniums BC. Moreover, P. Wilson *et al.*, suggest that the communities from Merimde and Sais were socially and economically linked (Wilson *et al.*, 2014: 162-163). Sais, as the fish-catching station, could have been a daughter site for the Merimde settlement, providing pasturing for animals and fishing opportunities. The site could also have been a potential location for migrants who had decided to leave the mother site and had travelled along a branch of the Nile in order to find a more hospitable location to live. Thus, the Egypt Exploration Society excavation at Sais, as one of the few ongoing projects investigating Neolithic settlement activity in Lower Egypt, can help us understand human activity in the period and region in question.

Poor understanding of the Neolithic occupation in the western Delta has attracted researchers specialising in the prehistory of this region. In 2013, the Imbaba Governorate Prehistoric Survey began in Meridme Beni Salame with the aim of surveying the western Delta hinterland around the Neolithic settlement (Rowland & Tassie, 2014; Rowland, 2015; Rowland & Bertini, 2016). The activities of the researchers involved in the project aimed at recreating the local environment and determining the role of humans in this environment in its prehistory. The researchers focused on the transition between the Epipalaeolithic and the Neolithic in order to understand the adaptation of farming and herding in Lower Egypt. Even though the project is still underway, they have already managed to collect information about human activity in this area from the Middle Palaeolithic and to extend the area occupied by the Neolithic settlement at Merimde. Attempts at collecting new AMS radiocarbon dates also seem promising, as they can help fine-tune the site's chronology. Particularly remarkable is the fact that, as in the Fayum, the community inhabiting the Merimde settlement was not fully sedentary, and probably utilised the area around the Wadi Gamal and exploited available resources for hunting, food processing and working tools (Rowland, 2015).

4.1.3. The el-Omari culture

The area around Helwan had already attracted researchers' attention in the 19th century as a result of numerous flint findings (Debono & Mortensen, 1990: 8). After 1918, the surroundings of Cairo (including Helwan) were regularly ex-

plored by the French archaeologist, Fr. P. Bovier-Lapierre. In 1924, his protégé Amin el-Omari, a young Egyptian mineralogist, discovered a Neolithic site on a gravel terrace in Wadi Hof near the rocky spur known as the Ras el-Hof, which he subsequently began to explore. After his sudden death, the works were finished in 1925 by Bovier-Lapierre, and the site was named after the young researcher. Although Bovier-Lapierre realised the importance of the discoveries, he only published two brief reports (Bovier-Lapierre, 1926a; 1926b). He rightly noted that for the first time ever "un ensemble complet" had been discovered in the Nile Valley, consisting of a settlement and an accompanying cemetery. In 1936, the French scholar asked F. Debono to explore the area in order to date and define the character of the flint industry. As a result, several small separate camps with non-homogenous flint industries were identified. Debono returned to Helwan during the war when the site was at risk of destruction and, in 1943 and 1944, explored it on behalf of the Egyptian Department of Antiquities. When the war ended, excavations were continued in 1948 and 1951. However, the results of works carried out at this Neolithic settlement were only published in 1990.

The chronology of the el-Omari site was a matter of discussion for years. Finally, thanks to C14 dates, a range of between 4,600-4,400/4,300 BC was proposed for the occupation of the site and the duration of the cultural unit. The el-Omari culture was placed between the Merimde and Maadi units (Table 1) (Debono & Mortensen, 1990: 80-81).

Despite a considerable delay in publishing the excavation results, F. Debono and B. Mortensen (1990) prepared a reputable monograph, analysing not only artefacts but also geology, as well as human, faunal and botanical remains. With such a broad approach, the researchers successfully presented a detailed, albeit very traditional picture of the Neolithic society of the el-Omari culture. For Debono and Mortensen, the inhabitants of the settlement were sedentary and depended on agriculture and domestic animals (Debono & Mortensen, 1990: 78-82). In the researchers' opinion, the settlement's structures denoted adaptation to local environmental conditions. Moreover, pottery, flint assemblages, and other small finds suggested the adaptation of humans to local resources. Debono and Mortensen also proposed the Near Eastern origin of the Egyptian Neolithic on the basis of discernible Levantine influences in the pottery, lithic industry, settlement pattern and burial customs of the el-Omari community. Both researchers also emphasised the strong likelihood of settlement continuity in this region from the Epipalaeolithic to the Neolithic periods.

Unfortunately, further research on Neolithic settlement activity in Wadi Hof/Ras el-Hof is impossible. In 1952, the area was taken over by the Egyptian army and its remains of prehistoric societies were lost to archaeology forever.

4.1.4. The Neolithic societies of Lower Egypt - a summary

In the beginning of the 20th century, when sites with remains of domesticated plants and animals were discovered in Lower Egypt, their interpretation was consistent with the generally accepted picture of Neolithic communities, developed through a culture-historical approach. People who inhabited these sites adopted a sedentary lifestyle in permanent villages, while their main subsistence strategies were the cultivation of crops and breeding of domesticated animals. Furthermore, they were characterised by Neolithic technologies, namely pottery production and stone and flint tool-making. This traditional picture is clearly visible in all early synthetic studies on Egyptian prehistory (e.g. Arkell & Ucko, 1965; Hayes, 1965; Arkell, 1975; Krzyżaniak, 1977; Hoffman, 1979). While the revisiting of Neolithic sites in the 1970s and 1980s with modern research methods revealed more data about the Neolithic in Lower Egypt, it changed little in the way this period was interpreted (e.g. Ciałowicz, 1999; 2001; Midant-Reynes, 2000). Only the recent years, thanks to new projects, re-analyses of the old evidence and new theoretical approaches have seen a change in the way of thinking about the Neolithic societies from northern Egypt (Rowland & Bertini, 2016; Holdaway & Wendrich, 2017).

The latest discoveries in the Fayum indicate that the lack of traditional settlement structures associated with a traditional farming society probably results from the movement of humans and animals across this region. The mobile way of life linked to the exploitation of various resources was not conducive to permanent occupation of the area. Although resources in the lake, including primarily fish, attracted people, their presence was related to the water level in the lake. Sites in the area were probably short-term hunting or fishing stops, consisting of a hearth surrounded by a concentration of lithics and pottery, as well as bigger seasonal base camps with one or two hearths, sometimes lined with stone slabs, lithics, pottery and probably a separate debitage zone for flint knapping. Another part of the mobile pattern were storage facilities used by groups moving across this area (Holdaway & Phillipps, 2017). The lack of graves at Fayumian sites may be attributable to the mobile way of life and to operating over a vast territory. The early Fayumian people were probably pastoralists herding domesticated sheep, goats and cattle. The oldest evidence recorded in the Fayum for domesticated ovicaprines is dated to ca. 5,600 cal. BC (Linseele *et al.*, 2016). These animals, although of Near Eastern origin, could have been introduced to Fayum from the Eastern and Western Deserts, where their presence is unquestionable in the 6th millennium BC (Tassie, 2014: 236; Brass, 2018). Since the flint assemblage of the Fayumian has many common features with materials from the Egyptian Sahara, the Fayum may have been visited by groups of herders travelling across the desert together with animals in search of water and food resources. At a certain point in time, the inhabitants of the northern shore of Lake Qarun adapted domesticated

plants (barley, wheat, flax). Their introduction may have originated from the Delta area, where farming settlements already existed at Merimde Beni Salame and Sais (Tassie, 2014: 236). The earliest cultivated crops found so far in the Fayum are dated to ca. 4,500 cal. BC (Wendrich & Cappers, 2005). However, on the basis of analyses of axes and sickle blades from the Fayum area, Shirai suggested that cereal cultivation appeared there as early as in the beginning or middle of the 6th millennium BC (Shirai, 2016b; 2017). Admittedly, it was of experimental nature and involved the use of small plots, difficult to recognise among archaeological remains (see also Cappers, 2013: 114-118). In the beginning, domesticated plants as food were probably only an addition to the resources offered by the lake, still intensively exploited. This is particularly true with regard to fish constituting 99% of the identified faunal remains (Linseele *et al.*, 2014). It is probable, at that time, that pigs and dogs were introduced in addition to previously existing domesticates (Tassie, 2014: 231). These changes were accompanied by a reduction in the degree of mobility of the Fayumian communities. However, in the context of the most recent research on the Fayum, the movement of people was characteristic for all periods of occupation in the Fayum while "people moved into, out of and across a landscape rather than settling within it" (Holdaway *et al.*, 2017: 222, 224).

In the archaeological assemblages recorded at the sites, two groups of artefacts are particularly noteworthy, namely pottery and flints. The Fayumian people produced and used simple ceramic vessels made of local clays. Although the lithic assemblage includes flake tools, the number of blades and bladelet tools grows over time. It contains elements characteristic for the Western Desert and the Levant (Shirai, 2010: 119; 2016b; 2017). Characteristic features of the Fayumian culture are bifacially-retouched flint tools (axes, serrated sickle blades, concave-based arrowheads), even though they are a minor component of the lithic assemblages (Shirai, 2010: 47).

According to Holdaway *et al.*, many features of the Fayumian community (settlement pattern, grain storage system, mobility, small proportion of domestic animals and use of wild resources) bring this community closer to groups who occupied north-eastern Africa, rather than to the aforementioned Pottery Neolithic Levantine societies (Holdaway *et al.*, 2016; Holdaway & Phillips, 2017).

Another Lower Egyptian location where domesticated plants and animals were recorded is the site at Merimde Beni Salame, interpreted as a place where farmers and herders with some unclear affinities to the Levant settled because of favourable conditions. The semiarid pasture outside the Delta, along with the wadi's plant and animal resources and the Nile must have attracted people. The settlement established around the beginning of the 5th millennium BC was probably occupied for the next 1,000 years. Although the site itself occupies a considerable area of approximately 200,000 m², the occupation was limited to certain areas only while people probably moved within these areas due to changes in the course

of the branch of the Nile. Another site of the Merimde culture was identified at Sais and has been interpreted as a fish midden and a daughter site of the Merimde settlement. It not only offered access to the abundant resources of the river but also to pastures for animals. The distance between Merimde and Sais is not great and probably did not discourage people who were often on the move. Research by Phillipps (2012) on the lithics from Sais confirms that the groups occupying the site were highly mobile. Furthermore, fish species and size indicate that people were present at the site at different seasons. Both sites may have been part of a larger settlement pattern based on using different resources in different periods. Simple settlement roofed structures and community storage pits, typical for phase I at Merimde may have been a result of a mobile way of life. However, one particular feature of the settlement at Merimde, differentiating it from the site at Lake Qarun, is the presence of graves within the settlement. The dead were buried probably in its abandoned part, in oval, shallow pits in the foetal position, usually without any grave offerings.

In terms of the subsistence pattern, the earliest Merimdians resemble people from the Fayum. It seems that they were at least partially mobile and used available food resources, including, in particular, fish from the river (Rowland, 2015). Fish remains are fairly numerous and represent 12.7% of all faunal remains in phase I of Merimde Beni Salame and 96.7% at Sais. Archaeozoological analyses indicate that hunting played a minor role. Wild hunted animals included hippopotamus, hartebeest, gazelle and aurochs. Bones of domesticated animals were recorded at Merimde and Sais. Sheep and goats prevail among the domesticated animals at Merimde, followed by cattle and pigs. At Sais, the predominance of cattle and pigs over ovicaprines was recorded (Linseele *et al.*, 2014). Among domesticated plants, barley and wheat were identified at Merimde. As in the case of the Fayumian culture, domesticated plants and animals were probably adapted into an existing subsistence pattern based on the exploitation of wild resources.

Approximately in 4,850 BC the settlement at Merimde was deserted due to a cold hyper-arid period. People moved to areas offering better conditions, such as Sais, where they continued to rely on the wild resources of the Nile. However, around the middle of the 5th millennium BC, the site was resettled, which was followed by an increase in the permanence and density of occupation with more stable settlement structures. The resettling of Merimde may have been connected with the arrival of people from the Western Desert in this area who were forced to leave the ever more inhospitable Sahara. During phases II and III, the dimensions of the settlement grew, while a variety of stable settlement structures appeared, including circular huts, grouped in compounds. Family storage pits for grains were built near houses. While farming and herding provided the bulk of food products for inhabitants, fishing continued to be an important source of protein-rich food (42.8% of all

remains for Merimde II). Wild game meat became just an addition to the now dominant meat of domesticated animals. In phases II and III of the Merimde, the social and technological transformation is clearly visible in archaeological assemblages. The development of pottery production and bifacial lithic production can be confirmed (Mączyńska, 2017). G. Tassie also suggests that craft activity, specialisation and ideology appeared during this time (Tassie, 2014: 212-216). In his opinion, the finds from the younger phases of Merimde Beni Salame also point to vertical and horizontal social relationships within the community from Merimde.

Approximately in the middle of the 5th millennium BC, people appeared in Wadi Hof. The el-Omari site covers an area between 260,000 and 375,000 m², which probably results from the fact that the human habitation zone shifted over time. Initially, the site served merely as a storage zone which subsequently transformed into a habitation zone with stable settlement structures represented by semi-subterranean dwellings dug into wadi deposits, accompanied by light-weight structures and various pits lined with clay and basketry. Graves with poor offerings were located within the abandoned part of the settlement. According to Tassie, the inhabitants of the el-Omari site were initially mobile farmer-herder-foragers who developed into more sedentary farmer-herders (Tassie, 2014: 226). The early stage of farming is clearly visible through the diversity of carbonised grains of several types of wheat recorded at the site and the use of other plants (Midant-Reynes, 2000: 122-123; Cappers, 2013: 114). Archaeozoological analyses indicate that domesticated animals were an important source of food while hunting supplied only approximately 12% of animal proteins. However, due to the site's distance from the Nile, the large quantity of fish among archaeozoological remains found at the site is also surprising, suggesting the importance of this type of food (66.3% of all faunal remains) (Linseele *et al.*, 2014). The recorded evidence clearly shows that the inhabitants of the el-Omari settlement exploited the available resources of their environment, including plants, animals, and fish.

People from el-Omari also used raw materials available nearby, namely local clay to produce pottery and local pebbles to produce lithic tools. Imported flint or Nile clay were also used. Moreover, the ceramic and lithic assemblages changed in a pattern similar to that observed at Merimde.

The limited availability of evidence on the Neolithic communities in Lower Egypt, together with the deeply rooted traditional approach to the period in question, has had a significant effect on the interpretation of the societies in this region. However, the results of the latest studies on the northern shore of Lake Qarun, regularly published in recent years, have shown the Fayumian culture in a completely different and new light. Recent interpretations deviate considerably from the prevailing concepts of early farming-herding groups from Lower Egypt, developed through a cultural-historical approach over the last 100 years. Not only

do they inspire discussion, but they also show a clear need for reconsideration of the views on the entire Neolithic period in Lower Egypt. Certain features of the communities from Merimde Beni Salame, Sais, and the el-Omari site denote their mobility and bring to mind associations with the groups from the Fayum. Intensive exploitation of wild resources from the occupied environments seems to be a common feature of all communities inhabiting Lower Egypt in the 6th/5th millenniums BC. It is becoming likely that the Delta and the Fayum were occupied by mobile groups exploiting local resources, who additionally adapted domesticated plants and animals into their subsistence pattern at a certain point in time, thus supplementing the food resources available to them. The social and economic transformation within these communities resulted in a growth of sedentism, the emergence of a more stable settlement pattern, and an increase in complexity and specialisation during the 5th and 4th millenniums BC.

4.2. The Holocene humid phase in the eastern Sahara

For many years the interest of archaeologists has focused on areas in the vicinity of the Nile or in the Delta. Although it was generally accepted that the Sahara was occupied (i.e. Winkler, 1938; 1939; Caton-Thompson, 1952), the desert had been excluded from comprehensive archaeological research for many years until the 1970s. Only research conducted during the last 40 years has contributed to a better understanding of this region's prehistory. In the 1970s, intensive archaeological explorations of the Western Desert began, including both the desert and its oases. Major expeditions operating in the area began in this period, namely: the Combined Prehistoric Expedition; the Dakhleh Oasis Project; the B.O.S./ACACIA project; and the Italian Archaeological Mission. Archaeologists also explored the area of the Eastern Desert, east of the Nile in the Red Sea Mountains area (Map 3).

4.2.1. The Western Desert

As part of the eastern Sahara, the Western Desert, known also as the Libyan Desert, corresponds to approximately 2/3 of the entire area of Egypt. Today, it is one of the most arid environments on Earth. However, during the Holocene humid phase, rain provided increased surface freshwater pools which attracted people and made their presence in this area possible.

Research in the area of the Egyptian part of the eastern Sahara has concentrated on a few locations. Intensive explorations have been carried out in the region of Nabta Playa-Bir Kiseiba and along a north-south transect of ca. 1,500 km between Siwa Oasis and the Wadi Howar in Sudan. Investigations have also covered the area of the following oases and their surroundings: the Dakhleh; Kharaga; Farafra; Bahariya; and Siwa (Map 3). However, the most intense research has been carried out in centrally located oases.

The Nabta Playa-Bir Kiseiba area

Discovered by chance in 1973, the sites in the palaeolake basin known as Nabta Playa had already begun to be investigated in 1974 by the Combined Prehistoric Expedition (CPE) (i.e. Schild & Wendorf, 2002; Wendorf & Schild, 1980; 1984; 1998; 2001; 2006). The purpose of the CPE's explorations was to understand the cultural development of this area in the Early and Middle Holocene periods. Through a comprehensive approach including artefact analysis, as well as geomorphological, palaeoclimatic, palaeobotanic and archaeozoological studies, Wendorf and Schild proposed certain cultural, geomorphic and climatic development sequences for this part of the Western Desert (Wendorf & Schild, 2001: 648-675).

The discoveries in Nabta Playa showed that from the beginning of the Holocene, the southern part of the Western Desert witnessed intensive settlement activity of hunter and gatherer groups. Although the human presence in the harsh conditions of a desert resembling a dry savannah depended on rainfall and access to drinking water, wild plants and animals, archaeologists observed several modes of adaptation. Sites concentrated around the basin and their location and character were linked to water levels which changed over time in the Early and Middle Holocene periods. The occupation of the Nabta Playa-Bir Kiseiba area also depended on climatic changes in the Holocene humid phase, when periods of humidity were interrupted by arid episodes (Schild & Wendorf, 2013; Welc, 2016).

The oldest Early Holocene remains of human activity in this area are dated to as early as the 9th millennium BC. The Early Neolithic El Adam (9,500-8,700 BP; 8,800-7,700 cal. BC[4]) and El Ghorab people (8,600-8,200 BP; 7,600-7,100 cal. BC) were foragers and cattle-keepers. The sites from this period take the form of lithic concentrations with hearth remains (e.g. site E-06-1). They were occupied seasonally, as they were located in the lower part of the basin and were flooded during summer rains. Some of them may have been reoccupied several times. The El Adam lithics are represented mostly by backed bladelets, geometrics, microburins and endscrapers and are similar to Arkinian lithics. The El Ghorab assemblages stand out for their elongated scalene triangles with small short sides and straight-backed pointed and shouldered bladelets. Items recorded at sites from both phases include grinding equipment, ostrich eggshell bottles and beads, as well as wild plant seeds and remains of animals (wild and domesticated). In the opinion of Wendorf and Schild (2001), these finds indicate a few adaptation strategies (exploitation of wild plants, hunting and cattle keeping), making survival in the desert possible.

The savannah-like environment offered a wide variety of plant resources around seasonal lake shores during the Early Holocene period. From the very beginning of the Holocene humid phase, people began to take advantage of seeds and fruits.

[4] All BP dates for the Nabta Playa-Bir Kiseiba region calibrated by Brass (2018: table 1).

Although plant remains evidence at El Adam sites is scarce, the presence of numerous grinding stones suggests that plants were an important source of food. The availability of wild plants depended on rainfall, which is why their relative importance as food grew significantly towards the end of the Early Neolithic, during a local climatic optimum (Wendorf & Schild, 2001; Schild & Wendorf, 2013).

Another source of food for the inhabitants of the Nabta Playa-Bir Kiseiba region from the El Adam phase were wild mammals, including, first of all, the Dorcas gazelle and the Cape hare. As great numbers of ostrich eggshells were found at these sites, they are believed to have been another important source of food. The lack of ostrich bones indicates that ostrich meat attracted little interest (Jórdeczka *et al.*, 2013). Moreover, the bones of *Bos primigenius* have also been found at Early Holocene sites in the Nabta Playa-Bir Kiseiba area. This discovery sparked a lengthy and still ongoing discussion on the origins of cattle domestication in Africa and the issue of relationships between humans and cattle in the Early Holocene. Researchers exploring the Nabta Playa-Bir Kiseiba area are of the opinion that *Bos primigenius* bones must have come from domesticated cattle as these animals would not have survived in the still-inhospitable Sahara without human support (i.e. Gautier, 1984; Wendorf & Schild, 2001; Jórdeczka *et al.*, 2013; Brass, 2018). As the bones are dated as early as the 9th and 8th millenniums BC, they are the earliest known possible domesticated animal remains from Egypt, as old as (or older than) those in the Near East (Linseele *et al.*, 2014). In the view of Wendorf and Schild, cultural control over cattle must have existed before the Western Desert opened up to settlement activity (Wendorf & Schild, 2001: 657). The Holocene humid phase saw a deepening mutual dependence and relationship between humans and animals (cattle depended on water provided by people, while people depended on cattle secondary products – milk and blood). Already in the El Adam phase, cattle had become one of the key sources of human food in this part of the Western Desert. The hypothesis on the African domestication centre has its supporters and opponents. On the one hand, DNA test results suggest an independent African centre of cattle domestication, while, on the other, they also confirm the existence of one Near Eastern centre of taurine cattle domestication (Hanotte *et al.*, 2002; Edwards *et al.*, 2004; Gifford-Gonzalez & Hanotte, 2011; Jórdeczka *et al.*, 2013: 278-279; Zeder, 2017: 282; Brass, 2018).

Pottery belongs to another important group of artefacts from Early Neolithic sites in the Nabta Playa-Bir Kiseiba area. It is generally accepted that the emergence of pottery in Africa was independent of Near Eastern influences. However, ceramic containers were adopted, rather than invented in this region. The idea of pottery production first appeared in the present-day Sahel-Sudanese belt, from where it was introduced to the central Sahara and then further north (Close, 1995). A small amount of the oldest pottery may suggest that it was used for spe-

cial occasions (Gatto, 2002: 77). It also seems probable that it could have been an inclusion into the toolkit of mobile hunter-gatherers/cattle keepers (Jórdeczka *et al.*, 2011). From the El Ghorab phase on, pottery is believed to have gained a more utilitarian function. In periods of intensive plant gathering, it could have been used for plant processing, although the absence of surface marks disproves its use for cooking purposes (see Dunne *et al.*, 2016).

A major change in the mode of human adaptation in the area of Nabta Playa-Bir Kiseiba is visible during the El Nabta and El Jerar phases (8,100-7,300 BP; 7,060-6,200 cal. BC). According to Wendorf and Schild, different economies and technologies appeared during these phases (Wendorf & Schild, 2001: 658). The El Nabta settlements feature large oval huts, smaller round huts, as well as numerous bell-shaped storage pits and large deep wells (e.g. site E-75-6). As they were located in the lower part of the basin, they may have been inhabited for most of the year, namely autumn, winter and spring. However, people must have abandoned them before floods during summer rains. The lithic assemblage of El Nabta and El Jerar groups featured burins, retouched or notched blades, perforators and geometrics. Items characteristic for El Jerar assemblages also include tanged points. Sites from both phases also yielded pottery in quantities clearly larger than in earlier phases, as well as grinding equipment and ostrich eggshells (containers and beads). In both phases, basic foods included seeds, fruits and tubers and large quantities of their carbonised remains were found at the sites. Numerous grinding stones also confirm the importance of plants in the human diet. Grass seeds, including wild sorghum and two millet varieties, constitute approximately 20% of all discovered seeds. Seeds would have been ground into flour, mixed with water and cooked. Intensive harvesting and gathering are likely to have taken place in autumn and winter and owing to the ability to store surplus plant foods in bell-shaped pits, this type of food was also available in the lean period of late winter and early spring. Based on her own observations, K. Wasilikowa suggests that wild sorghum could have been grown in Nabta Playa (Wasilikowa *et al.*, 2001: 582). She believes that plant food may have been supplemented with the meat of small game animals and with secondary cattle products (milk and blood).

The next phase known as El Ghanam (7,200-6,600 BP; 6,050-5,555 cal. BC) is already part of the Middle Neolithic and differs significantly from the Early Neolithic phases. The number of sites from this period is far lower and includes, first of all, winter camps with wells indicating surface water shortages (e.g. site E-79-6). Their inhabitants were highly mobile and relied on a mixed pastoralist economy based both on cattle and ovicaprines introduced into the Western Desert. Archaeological research indicates that seeds still supplemented the human diet. However, the relative importance of plant food decreased, probably due to the introduction of sheep/goats. Lithic assemblages from the El Ghanam sites

include, first of all, retouched tools on flakes, denticulates, notched pieces, basal truncated flakes and bladelets, small short lunates and segments. The most common examples of bifacial tools that emerged in this area for the first time are arrowheads (leaf or lozenge-shaped, tanged and barbed). Some changes are also observed in pottery, mostly affecting fabrics and decoration patterns.

During the Late Neolithic El Baqar phase (6,500-5,850 BP; 5,480-4,700 cal. BC) aridity grew in the area of Nabta Playa-Bir Kiseiba. However, the settlement pattern indicates that humans adapted to such conditions. The sites are numerous but dispersed, with poorly represented assemblages. Characteristic features include simple houses or shelters, hearths, and wells (e.g. site E-75-8). These remains suggest frequent movement of human groups and their herds in order to avoid overgrazing. The Late Neolithic lithic assemblages are similar to those used in the previous phase with a prevalence of notches, denticulates, retouched blades, lunates, triangles, trapezes and bifacial projectile points. However, Late Neolithic pottery differs from Middle Neolithic pottery in terms of both technology and decoration. Wendorf and Schild (2001) suggest that it is similar to Early Neolithic Badarian pottery from the Nile Valley (see also Nelson & Khalifa, 2010). The question of possible links between both regions requires further research. Almost no plant remains other than charcoal were recovered from El Baqar sites. Nevertheless, even these scarce findings, together with seed imprints on pottery and the presence of grinding equipment, indicate that plants could have continued to be part of food resources.

Late Neolithic groups were probably pastoral, primarily concentrating on cattle and sheep. High frequencies of cattle bones have been recorded at sites from this period, which is interpreted to have resulted from an increase in symbolic activity. Cattle as a symbol of prestige may have been sacrificed or reserved for symbolic feasts. The Final Neolithic phase, known as El Ansam, does not differ greatly from the El Baqar phase. The sites and assemblages are reminiscent of those known from the preceding period, while the subsistence pattern remains unchanged.

The CPE research revealed a unique feature of the societies occupying the desert during the Late and Final Neolithic periods. The tumuli, calendar, stele alignments and megalithic constructions erected by the cattle herders in the area concentrating around the western shores of the lake denote the presence of early complex societies with a religious/political control over human resources for an extended period of time (Schild & Wendorf, 2002: 17-18; Wendorf & Schild, 2001: 674). Moreover, it is also suggested that the herdsmen from Nabta Playa were able to make astronomical observations and use astronomical knowledge during the construction of megaliths, steles, human and cattle burials (McKim Malville *et al.*, 2008).

During the existence of the ceremonial centre in Nabta Playa, the first farming societies appeared in the Nile Valley. The Nabta ceremonial centre may have played

an integrative role between both regions, as their contacts are confirmed by the presence of raw materials and pottery. The Final Neolithic cattle herders were the last inhabitants of the Nabta Playa, except for its short occupation by the C group.

The Nabta Playa and Bir Kiseiba region continues to attract archaeologists. Excavations in the Final Neolithic cemeteries in Gebel Ramlah, located approximately 20 km south of Gebel Nabta, began in 2001 (Kobusiewicz *et al.*, 2010; Czekaj-Zastawny & Kabaciński, 2015). As only a few human burials have been recorded in this part of the Western Desert, the research in Gebel Ramlah allows for a more in-depth understanding of the burial customs of the communities inhabiting the southern part of the Western Desert in the 5th millennium BC. Particular attention should be drawn to the discovery of the earliest newborns' cemetery yet known in this region (Czekaj-Zastawny *et al.*, 2018).

In 2017, another Polish expedition headed by M. Kobusiewicz from the Polish Academy of Sciences began to explore Berget El Sheb in the Nabta Playa-Bir Kiseiba region. Although this area has been researched continuously since the 1970s, many aspects of the communities inhabiting the Western Desert remain unknown and call for further research.

The north-south transect of the eastern Sahara

The environmental and cultural development of the Western Desert in the Early and Middle Holocene periods has also been researched by German archaeologists from the University of Cologne. In 1980, they launched the B.O.S. project (*Besiedlungsgeschichte der Ost-Sahara* [The Settlement History of the Eastern Sahara]), transformed in 1995 into the ACACIA project. It covered 40 research areas in eight geographically different regions along a north-south transect of ca. 1,500km between the Siwa Oasis in Egypt and Wadi Howar in Sudan (Kuper, 2006; Riemer *et al.*, 2013). Data collected in the course of explorations, including more than 400 C14 dates, allowed the researchers to come up with a sequence of eastern Sahara occupation in the Early and Middle Holocene. The discoveries made by the German team showed that although they can be chronologically correlated with CPE discoveries in the Nabta Playa-Bir Kiseiba area, both areas are characterised by a different cultural development. Due to their enormous geomorphological and environmental diversity, the regions investigated as part of the ACACIA project required from their inhabitants more diverse forms of adaptation to local conditions. Each of the investigated regions was also characterised by a distinct and unique regional development sequence (Gehlen *et al.*, 2002).

The works of archaeologists from the University of Cologne concentrated in a few regions of the Egyptian Sahara, namely: the Abu Muhariq Plateau; the Abu Ballas scarp-land; the Great Sand Sea; Gilf Kebir; and Jebel Ouenat (Map 3; i.e. Gehlen *et al.*, 2002; Riemer, 2003; 2009; Kindermann, 2010; Riemer *et al.*, 2013;

2017). Intensive archaeological explorations – excavations and surveys – were accompanied by geomorphological, climatical, palaeobotanical and archaeozoological studies, contributing to our knowledge of human activity in the eastern Sahara in the Holocene humid phase.

On the basis of the ACACIA project research, R. Kuper proposed four main phases of occupation for the Western Desert, namely: reoccupation (8,500-7,000 BC); formation (7,000-5,300 BC); regionalisation (5,300-3,500 BC); and marginalisation (3,500-1,500 BC) (Kuper, 1996; Kröplin & Kuper 2006: 803). The oldest Early Holocene sites, linked to the reoccupation phase, were recorded in the central Great Sand Sea (the Regenfeld area) and are dated to the second half of the 9th millennium BC. Their small dimensions are indicative of short, infrequent hunting-related visits, as hunting was the main subsistence pattern. Groups of hunter-gatherers from this period were characterised by high mobility and spatial flexibility, which reflected a specific way of adaptation to an environment with an unpredictable supply of water and other resources (Riemer, 2000; 2009; Gehlen *et al.*, 2002: 100-103). Unlike in the southern part of the Western Desert, no traces of domesticated cattle in the Early Holocene have been recorded in this region (Riemer, 2009). The small quantity of grinding equipment found at these sites suggests that the gathering of wild cereals was a marginal food source in this period (Gehlen *et al.*, 2002: 100-103).

Epipalaeolithic hunter-gatherers of the Early Holocene also appeared in Gilf Kebir, which, due to the presence of deep wadis and barrier dunes, offered favourable conditions for human activities (Linstädter & Kröplin, 2004). Numerous arrowheads and bones of various wild animals, as well as grinding stones, indicate that hunting and gathering were the main subsistence strategies (Gehlen *et al.*, 2002: 108; Linstädter & Kröplin, 2004). The German researchers also managed to record a few traces of Early Holocene occupation in the Djara area (Abu Muhariq Plateau) and the Eastpans area (Abu Ballas scarp-land), suggesting hunter-gatherer activity (Gehlen *et al.*, 2002; Kindermann, 2004; Kindermann & Bubenzer, 2007). The Eastpans 95/1 site is particularly remarkable owing to the presence of lithics made of non-local raw materials (flint and quartz). According to Gehlen *et al.*, the primary raw material sources could be identified some 100 km to the north (flint) and even 400 km in the Desert Glass Area of the western Great Sand Sea (quartz) (Gehlen *et al.*, 2002: 93). These discoveries are evidence of the high degree of mobility of the hunter-gatherers in the Early Holocene.

Despite differences in the intensity of Early Holocene human activity in the area investigated as part of the ACACIA project resulting from environmental and geomorphological variability within this huge region, a few important similarities can also be observed, namely: the prevalence of hunting; the marginal role

of wild plant use; and the highly mobile character of human groups. The resemblance is also visible in lithic assemblages used by hunter-gatherers in this part of the Sahara. Early Holocene sites are characterised by backed elements (points, bladelets, blades), notched and strangulated blades and elongated scalene triangles, although their relative shares in assemblages from each site may have been different (Gehlen *et al.*, 2002).

Changes in the organisation of hunter-gatherers' groups in the ACACIA project area are easily discernible in sites dated to the Middle Holocene period during the formation phase. The most important change was the introduction of domesticated animals, namely ovicaprines and cattle, followed by a gradual shift from hunting to herding. However, the presence of domesticated animals in the desert still depended on the environment; in areas of high aridity and restricted water sources, such as the sites of Mudpans and Regenfield, domesticated animals did not appear at all (Riemer, 2007: 112-112; 2009: 146). In the opinion of H. Riemer, the eastern Saharan hunter-gatherers adopted cattle, sheep, and goats as a minor component of their economy (Riemer, 2007: 134-135). Hunting continued to be an important food supply strategy. The Middle Holocene is also a period of a more intense use of wild plants, manifesting itself in a growing number of grinding elements recorded at given sites, e.g. in the Djara area (Gehlen *et al.*, 2002: 88-91; Kuper & Riemer, 2013: 45-46).

During the Middle Holocene, the settlement pattern of hunter-gatherers was modified. The period in question saw an increase in the number of sites, which indicates longer stays and more intensive exploitation of resources, namely plants and animals (Gehlen *et al.*, 2002: 91). Some regions saw functional differentiation appear at sites, such as specialist hunting or killing sites. They accompanied larger base camps located near playa pools (e.g. the Great Sand Sea) (Riemer, 2009: 150). Analyses of archaeological assemblages also revealed changes in the material culture. In lithics, the blade industry lost its relative importance and was superseded by the flake industry for blank production. The prevalence of facially and laterally retouched arrowheads, transverse arrowheads, edge retouched or notched tools and backed elements is clearly visible. Middle Holocene assemblages are not as homogenous as those from the Epipalaeolithic period. Researchers have also observed regional diversity, probably linked to higher population density. Each region (or even site) is represented by unique toolkits reflecting the local adaptation strategy and exploitation of available resources. The presence of arrowheads confirms the continuing importance of hunting in the food supply, despite the introduction of domesticated animals. Sites where the share of arrowheads exceeds 10% are considered as hunters' sites. It thus seems likely that hunter-gatherers adopted domesticates without changing their general subsistence strategies (Riemer, 2006).

By analyzing lithics from the final part of the Holocene humid phase (6,000-5,300 BC) archaeologists differentiated two major cultural traditions/technocomplexes (Riemer *et al.*, 2013). In the north, the Bifacial technocomplex was distinguished, consisting of sites on the Abu Muhariq Plateau (including the Djara unit) and the oases on the southern fringe of the plateau. In the south, however, researchers differentiated the Microlithic/Khartoum-style complex. This covered the regions of the Abu Ballas scarp-land, the Great Sand Sea, Gilf Kebir and the Nabta Playa-Bir Kiseiba area. According to Riemer *et al.*, differences between both complexes can be seen in flaking, modification techniques and tool types, especially in the production of arrowheads (Riemer *et al.*, 2013: 166). The northern tradition with bifacial modification is characteristic for leaf-shaped and stemmed points with many sub-types made from small flakes. The southern tradition is characterised by the presence of transversal insets (short triangles and trapezes) and segments (lunates) made from blades or elongated flakes using microlithic techniques.

Middle Holocene sites are also characteristic for the presence of clay vessels. As in the case of lithic assemblages, visible differences between pottery originating from the southern and the northern part of the Western Desert may be easily recognized. The pottery of the northern tradition is undecorated, with roughly burnished thin-walled vessels being the most characteristic. Red polished pottery, occasionally with black rims and traces of rippling, has also been recorded. The southern tradition is characterised by pottery with Khartoum-style decoration, namely Packed Dotted Zigzag pottery, sometimes combined with Dotted Wavy Line pottery and Incised Wavy line pottery (in the southern corner of Egypt).

Research carried out by the ACACIA project demonstrated that the two traditions were not isolated in the final part of the Holocene humid phase and were intertwined owing to the mobile way of life of hunter-gatherers. These researchers managed to identify two zones of intensive contact in the Dakhla region and in the Nabta Playa-Bir Kiseiba area, where elements of both traditions were recorded. The crescent formed by the Egyptian oases may have served as a conduit for contacts between north and south. Elements of both traditions were also recorded at sites in the Chufu and Meri areas, located in the Great Sand Sea. Numerous non-local artefacts (lithics and pottery) discovered during the explorations suggest a non-local origin of their creators and users (Riemer, 2006). According to Riemer (2009), people who occupied the sites came from the Dakhleh Oasis located approximately 80-100 km from the site in question and belonged to the northern tradition, although the intrusion of southern elements was also observed in pottery. The presence of hunter-gatherer-herders on the desert margins in the areas of Chufu and Meri was probably linked to seasonal or episodic movement, as these areas benefitted from both summer and winter rains.

Interregional contacts were also recorded in the area of the Abu Muhariq Plateau at the sites of Djara and Abu Gerara. According to Riemer (2003), the Djara site could have served as a stepping stone between the Nile Valley and the desert/oasis. Groups from the Djara area may have stayed at the river for part of the year, and then exploited desert resources after the rainy winter season when conditions in the desert were more favourable to people and animals (Riemer & Kindermann, 2008: 611-613). However, at the site of Abu Gerara people may have had close contact with the Dakhleh-Kharga Oases, which is suggested by the considerable affinity of pottery and lithic assemblages. The sites in the Djara and Abu Gerara area belong to the northern tradition and suggest interregional contacts through the Abu Muhariq Plateau. However, the direction of these contacts varied, as local assemblages indicate. Attention should also be drawn to the sites at Abu Tartur, situated on the Abu Muhariq Plateau, between the oases of Dakhleh and Kharga, on the basis of analyses of materials collected in the 1980s by the mining engineer Siegbert Eickelkamp in this area. H. Riemer and P. Schönfeld (2006) suggest the sites on the Abu Tartur Plateau were used by hunter-gatherers during the Early and Middle Holocene periods.

The German researchers recorded a declining number of C14 dates for a period beginning in 5,300 BC, suggesting a decrease in settlement activity. This change has been linked to the southward withdrawal of monsoonal rains and the onset of desiccation of the Egyptian Sahara. The earliest symptoms of reduced human activity are observed in arid areas with difficult access to water sources, namely the Great Sand Sea, the Abu Ballas region and the Abu Muhariq Plateau (Kuper, 2006: 267; Kröplin & Kuper, 2006; Riemer *et al.*, 2013: 168). Only the Gilf Kebir and Jebel Ouenat areas witnessed long-term occupation until 3,200 BC because of the continued availability of water resources and vegetation. At Gilf Kebir researchers even noted an expansion of the settlement to the plateau during the time of retreating monsoonal rains. According to J. Linstädter and S. Kröplin, Middle Holocene winter rainfall produced more favourable conditions for pastoral groups than that in the Early Holocene, thus making it possible to occupy this region until the final desiccation towards the end of the 4th millennium BC (Linstädter & Kröplin, 2004: 774-775).

According to Kuper, the process of desert desiccation marks the beginning of the regionalisation phase in the cultural sequence of this area (Kuper, 2006: 268). A key change for humans in this period was their adaptation to a fully-fledged pastoral way of life (Riemer, 2007: 134; Kuper & Riemer, 2013). Climatic changes triggered the movement of people and thus caused a migrational shift to the north (the Fayum, the Delta), to the Nile Valley, southern Egypt and northern Sudan. The Bifacial and Microlithic traditions established in the Western Desert in the Middle Holocene began to separate. In the oases, isolated from the influences

from the north and the south, new cultural traditions began to develop. The 'exodus' from the Sahara is also linked to the beginning of settlement activity in the Delta and the Nile Valley. According to Riemer *et al.*, it is possible to identify certain similarities in the assemblages of the bifacial tradition of the desert and the early Neolithic tradition in Lower Egypt (flint technology) and Upper Egypt (pottery) (Riemer *et al.*, 2013: 172). Thus, people from the desert had some influence on the formation of farming culture then emerging in Egypt.

The marginalisation phase is the last phase in the cultural development of the Egyptian Sahara. Only on the southern fringes of the desert have the remains of cattle pastoralist activities been confirmed (Laqiya, Wadi Howar). At the same time, the Egyptian civilisation began to emerge in the Nile Valley. Fully-fledged desert conditions returned to the Egyptian Sahara in ca. 3,500 BC. Cattle herders practised their nomadic way of life in the Sudanese Sahara.

In the period from 2009 to 2011, German archaeologists returned to the Gilf Kebir-Jebel Ouenat region as part of the Wadi Sura project aimed at investigating petroglyphs and their relationship to the landscape. Although rock art is outside the subject-matter of this study, it should be remarked that it was the inhabitants of this region in the Middle Holocene who created rock art, which indicates the existence of an ideology and social structure in these communities (Linstädter, 2007; Riemer & Kuper, 2013; Riemer *et al.*, 2017). It seems that it was thanks to the favourable conditions in this area in the Middle Holocene that the rich culture of cattle keepers could flourish at a time when settlement activity was reduced in other regions (Kuper & Riemer, 2013: 47; 51-54).

Despite intensive research carried out as part of the ACACIA project, and the huge number of findings, our knowledge of the human presence in the eastern Sahara during the Holocene humid phase seems still incomplete. Indeed, the multitude and diversity of adaptation strategies to desert conditions recorded by archaeologists renders it impossible to define them using any rigid framework.

4.2.2. Oases

At this point, a human presence in the eastern Sahara was possible only in oases located west of the Nile, owing to permanent groundwater charge of the Nubian Aquifer (Embabi, 2004: 4). Permanent access to water also made oases an important spot for mobile hunter-gatherers or herders moving across the desert during the Holocene humid phase. Although monsoon rains sustained plant vegetation in the desert and filled temporary reservoirs with water, the occupation of the Western Desert by people was still exposed to considerable risk. The well-watered environment of the oases attracted people in the past. As a result, numerous traces of human occupation have been recorded in the Dakhleh, Kharaga, Farafra, Ba-

hariya and Siwa Oases. In the Middle Holocene period, oases north of Dakhleh found themselves within reach of the Mediterranean rain regime, which made plant vegetation possible nearly all year round. In this period, an increase of sedentism was also observed, manifesting itself in the emergence of settlements suggesting likely permanent occupation, or at least occupation with only very short intervals. In the view of Riemer, the oases may have served as central points/camps where people kept coming back for the presence of water. Such points/camps were also places of contact, or even exchange between groups (Riemer, 2003: 89).

Climatic changes in the second half of the 6th millennium BC caused by the southward withdrawal of the monsoon zone and the northward shift of the Mediterranean rains also had an effect on the human presence in oases, despite the availability of artesian springs. In approximately 5,300 cal. BC, the oases became refuges for some human groups forced to leave the desert due to its desiccation. Owing to their specific conditions and isolation, they became a place where culturally distinct groups were gradually formed, differing from those who settled in the Nile Valley and the Delta. Nevertheless, some of the oases continued to serve as stepping stones for pastoral groups moving between the Nile and the eastern Sahara.

The Dakhleh Oasis

Although late Prehistoric finds in the Dakhleh Oasis had been first reported in the first half of the 20th century, researchers returned to the oasis only in the 1970s, at a time of extensive investigations in the Egyptian part of the Sahara. In 1972, the Dakhleh Oasis attracted the attention of the members of the Combined Prehistoric Expedition conducting archaeological investigations in the southern part of the Western Desert. However, in the absence of any 'exciting' prehistoric remains, the expedition chose not to explore this region any further, concentrating, first of all, on the Nabta Playa-Bir Kiseiba area (Schild & Wendorf, 2002: 11). The year 1978 saw the start of the Dakhleh Oasis Project, headed by A. Miles. This is a long-term regional study of the interaction between environmental changes and human activity in the closed area of the Dakhleh Oasis, including the larger area of the palaeoasis. In 1979, the project was extended to investigate prehistoric settlement activity of the Early and Middle Holocene, which has been subsequently continued by M. McDonald. Since the 1970s, hundreds of archaeological sites have been recorded as part of the Dakhleh Oasis Project, most of which are dated to the prehistoric and Roman period.

People had already appeared in the Dakhleh Oasis in the Early Holocene. The oldest traces of a human presence are dated to 8,300 cal. BC and are linked to the Epipalaeolithic Masara cultural unit, divided by McDonald into three main

groups (A, B and C), based on archaeological assemblages and site types (McDonald, 2009: 8; 2013; 2016: 185).[5]

Masara A sites are scattered across the oasis and atop the plateau. These were short-term camps with hearths, lithics and grinding stones. They were left by mobile hunter-gatherers who relied on local food resources (wild animals and plants), similar to those living in other parts of the Western Desert at the same time. Lithics were made of good quality nodular chert imported from outside the oasis. Recorded tools include denticulates, scrapers, perforators, microliths, and stemmed points made from blades (McDonald, 1993: 199).

Masara C sites are located in the south-eastern part of the oasis. In most sites, some stone structures have been recorded, consisting of clusters of stone rings, oval or round (crescent-shaped in some cases), with diameters ranging from 2 to 4 m. Surface remains were usually made of a single tier of vertical sandstone slabs. Pits and storage bins were discovered during their exploration (McDonald, 2009: 11-14; 2015: 276-277). According to McDonald, most of them are remains of semi-subterranean structures (McDonald, 2009: 20; 2016: 185). Unlike in the Masara A unit, lithics were made of local chert. Typical tools are thick-section endscrapers, nibbled notches and denticulates, concave-sided triangles and trapezoids, and Harif points. Palaeobotanical and faunal remains suggest a broad spectrum hunting-gathering adaptation to the local, well-watered environment (McDonald, 2015: 276).

The Masara A and C cultural units (8,300-6,500 cal. BC) are treated as contemporaneous while the differences recorded between them probably reflect different ways of life. Stone structures, heavy grinding equipment, the use of local chert, the core reduction sequence, some manufacturing activities (eggshell beads, arrowheads) typical for the Masara C are interpreted to have resulted from increased sedentism in the Early Holocene period in the Dakhleh Oasis (McDonald, 1991; 2009; 2016). According to McDonald, the Masara C sites were not permanent camps but may have served as long-term base camps of hunter-gatherers or semi-sedentary groups, who exploited rich local resources offered by the marshy conditions of the oasis (McDonald, 2009: 21).

In the Middle Holocene (6,400 cal. BC), Bashendi groups appeared in the oasis area (Table 1). However, research completed so far has not shown any continuity between the Masara C and Bashendi cultural units. The Early Bashendi A people were mobile hunter-gatherers with traces of their activity including sites

[5] Originally, M. McDonald distinguished three phases of the Masara cultural unit (A, B and C) on the basis of site location, site features, lithics and other artefacts (McDonald, 1991: 11). However, since she interpreted the Masara B remains as locations occupied briefly for only a few hours, she treated them as a specialised component of the more widespread Masara A (McDonald, 2003: 43). In 2009, she focused on only two main groups (A and C) distinguished on the basis of artefacts and site types (McDonald, 2009: 8).

consisting of scattered hearths and artefacts. At the subsequent stage of development of the communities inhabiting the Dakhleh Oasis, namely Late Bashendi A (6,100-5,650 cal. BC), adaptation to local conditions changed. Archaeologists have recorded an enormous increase in the number, size, and diversity of sites. In the opinion of McDonald, thanks to the bimodal rainfall pattern (winter-summer) the conditions in the oasis were more humid and thus favourable for human occupation (McDonald, 2015: 277). One characteristic feature of this period are slab structures, found in numerous clusters, indicating some form of social organisation. In the view of McDonald, such slab structures suggest a certain degree of sedentism among the Late Bashendi A groups (McDonald, 2009: 26). Indeed, Locality 270, where 200 such slabs were recorded, is being interpreted as a home base regularly occupied in different seasons of the year. Because the Late Bashendi A sites are located in the southeast basin area, plentiful wild food resources in this region may have significantly influenced the human presence in, and returns to this area. McDonald also points to possible advancements in social complexity in this period, as evidenced by the number, size, and organisation of sites, as well as by archaeological assemblages (the emergence of prestige technologies) (McDonald, 2009: 27).

Items recorded at the Late Bashendi A sites include lithic assemblages made of flakes with numerous bifacial arrowheads, knife- and foliate-shaped bifaces, ostrich eggshell beads, labrets, grinding equipment and a few pieces of ceramics (undecorated and decorated). In McDonald's estimation, the people of this period intensively exploited wild resources (e.g. sorghum, millet, animals), but also herded cattle and sheep/goats which had appeared in the eastern Sahara by this time (McDonald, 2016: 186).

In the middle of the 6th millennium BC, probably due to climatic changes and the southward shift of the ITCZ, the people inhabiting the oasis left their settlements and reverted to a mobile way of life. The Bashendi B people (5,600-3,800 cal. BC) were mobile herder-foragers who relied on resources available in the oasis but also crossed the Western Desert during the rainy season with cattle and ovicaprines (their remains have been recorded at Abu Muhariq Plateau, Meri, Chufu, Nabta Playa, and the Farafra Oasis). Sites from this period take the form of camps with clusters of hearths and assemblages – lithics (small bifacial arrowheads, knives, tranchets, and scrapers), stones (small polished axes or celts, palettes, toggles, beads) and undecorated pottery.

Despite climatic changes, artesian springs available in the Dakhleh Oasis enabled a human presence in this area after 5,300 cal. BC. The oasis probably became a refuge for local groups, thus quickly becoming over-populated. Despite access to water, people who stayed in the oasis had to adapt. Some of them formed pastoral groups, left the oasis and followed the monsoon belts moving

towards the south. Some groups moved to the Nile Valley and probably took part in the emergence of the Predynastic civilisation. Others stayed on in the oasis (pastoral Sheikh Muftah groups), exploited locally available resources and probably also hunted in the areas located to the north and to the west of the oasis. Indeed, the Dakhleh Oasis was occupied by pastoral groups until the arrival of Ancient Egyptians from the Nile Valley in the Old Kingdom period (McDonald, 2016: 189).

Research conducted on the Dakhleh Oasis has made it also possible to discover petroglyphs created by people who occupied and visited the oasis from prehistoric to modern times (Kobusiewicz & Kuciewicz, 2015). It is generally believed that the Masara and Bashendi people created a large amount of rock art specimens. Most drawings depict typical desert or savannah animals, as well as abstract elements. Indeed, the petroglyphs may be evidence of a sophisticated world of symbolic meanings of Early and Middle Holocene hunter-gatherers and herders (Polkowski, 2016; 2018).

The Kharga Oasis

Unlike the Dakhleh Oasis, the Kharga Oasis had already attracted archaeologists' attention by the 1930s, when Caton-Thompson and Gardner discovered many prehistoric sites and established a geoarchaeological and palaeoenvironmental sequence for this area (Caton-Thompson, 1952). In 1976, researchers from the Combined Prehistoric Expedition recorded a number of Early and Middle Holocene sites in the Kharga Oasis. Since then the area has been regularly investigated by various archaeological missions (for details, see McDonald, 2009: 8). The Kharga Oasis Prehistoric Project, whose concession corresponds to the area explored by Caton-Thompson and Gardner in 1931-1933, began in 2000. Its objective was to reassess the original cultural and environmental development sequence using previously unavailable methods (Kleindienst *et al.*, 2006; McDonald, 2006: 479).[6]

Research carried out on the escarpment along the eastern edge of the oasis lead to the discovery of Early and Middle Holocene sites in two main locations, namely atop the plateau and in two embayments within the escarpment at Midauwara and Refuf (McDonald, 2006; 2015). Analyses of the remains showed that the cultural sequence originally developed for the Dakhleh Oasis could also be ap-

[6] In September 2018 the results of research of IFAO in the Kharga Oasis were published online (Dachy *et al.*, 2018). On the basis of radiocarbon dates and archaeological evidence a new regional sequence for the oasis was proposed . Four phases, labelled as Kharga A, B, C and D, were proposed. Since the results were published at a time when the study was actually completed, it was not possible to take them into account. However, the author is aware of their great importance for understanding human presence on the Western Desert in the Middle Holocene period.

plied to the Kharga Oasis. According to McDonald, both oases (connected via the plateau escarpment) constituted a single cultural entity throughout much of the Early and Middle Holocene periods (McDonald, 2006; 2009: 10).

At Midauwara, two cultural units were distinguished on the basis of artefacts and site types, namely the Epipalaeolithic Midauwara for the Early Holocene and the Baris for the Middle Holocene. For the Epipalaeolithic, three site types were recorded, namely: sites with slab structures; sites with clusters of fire-cracked rock and artefacts; and blade-knapping stations (McDonald, 2006: 481; 2009: 28-29). In terms of form, they resemble sites belonging to the Masara C unit, known from the Dakhleh Oasis. Moreover, flint assemblages from these sites are similar to those known from the neighbouring oasis (i.e. Harif points, microliths, denticulates). In the view of McDonald, part of the Midauwara sites may be contemporaneous with the Masara C unit. Nevertheless, the relative dating of artefacts suggests that some of these sites may have been occupied during a gap recorded at the Dakhleh Oasis between two sedentism episodes of the Masara C and Late Bashedni A cultural units (McDonald, 2009: 32).

The Middle Holocene remains were divided by McDonald into two phases, namely Early (6,300-5,600 cal. BC) and Late Baris (5,200-3,800 cal. BC) (Table 1). Early Baris sites are characterised by the presence of scatters of large mound hearths, slab structures and artefacts – lithics, grinding equipment, ostrich eggshell beads and a few pottery sherds. The assemblages are similar to those of the Dakhleh Late Bashendi A. Sites MD-18 and MD-24 are similar in terms of form and finds to Locality 270 from the Dakhleh Oasis (McDonald, 2006). At the younger Late Baris sites, hearth mounds and a few slab structures were found. Moreover, in this period slabs were also used for erecting other structures, e.g. special hearths in the form of platforms. Among artefacts found at the Middle Holocene sites, lithics, grinding stones and pottery are similar to those known from the Bashendi B and early Sheikh Muftah cultures of the Dakhleh Oasis. Some ceramic imports from the Nile Valley were also collected, e.g. Badarian ripple ware (McDonald, 2006: 491). Late Baris sites also were recorded beyond Wadi El-Midauwara, on the edge and atop of the plateau.

Slab structures were confirmed, not only in both oases but also in other locations in the central part of the Western Desert at Abu Ballas, Regenfeld, Meri and the Farafra Oasis. However, so far they have not been recorded north-east of the oases, namely in the Abu Gerara and Djara regions, although in both of them traces of interregional contacts between people of the Abu Muhariq Plateau and the Dakhleh Oasis were found.

In the estimation of McDonald (2009), as in the case of the Dakhleh Oasis, the structures discovered in the Kharga Oasis suggest a prolonged episode of sedentism spanning a period of about two and a half millennia. In the case of the Kharga Oasis, however, one is dealing with a longer and probably more continuous peri-

od of sedentism as some sites are dated to the gap identified at the Dakhleh Oasis after 6,500 cal. BC. However, the issue of sedentism is still poorly understood and requires further research.

Climatic changes that began in the second half of the 6th millennium BC forced groups occupying the eastern Sahara to change their way of life. The Kharga Oasis, not unlike the Dakhleh Oasis, also became a refuge for people searching for more hospitable living conditions. As in other regions of the desert, people reverted to a mobile way of life. Late Baris groups became mobile herder-hunter-gatherers. The end of Late Baris sedentism in the Kharga Oasis took place in the early 5th millennium BC when a civilisation based on the model adopted from the Near East developed in the Nile Valley. However, the particular location of the oasis, halfway between the eastern Sahara and the Nile Valley, as well as the presence of artesian springs, made it a useful place for groups moving between the life-giving river and the desert. Traces of occupation associated with fossilised springs were discovered by French archaeologists from the IFAO at the stratified site known as KS043, where hearths, pits, querns, pottery, numerous ovicaprine and cattle bones, as well as palaeobotanical remains were discovered (Briois & Midant-Reynes, 2010; Briois *et al.*, 2012). As access to drinking water from the springs was important, when the spring activity decreased and eventually disappeared, people made the effort necessary to drill an artesian head and then turn it into a well. The site was used by pastoral groups moving across the desert together with animals. Apart from products offered by domesticated animals, their sources of food included plant seeds and fruits available in the oasis. Very small quantities of emmer grains were also recorded at the site. They probably originated from the Nile Valley and were brought to the oasis by people. Another aspect linking groups visiting the oasis with the Nile Valley groups is the pottery recorded at the site in great amounts. In the opinion of F. Briois *et al.*, based on vessel forms and its characteristic decoration, the pottery was identified as diagnostic of the Tasa culture (Briois *et al.*, 2012: 188). In the opinion of these French researchers, Tasa groups constitute an important cultural link between the Nile Valley and the eastern Sahara. A similar view was expressed by D. Darnell (2002), who suggested – on the basis of discoveries in the Tasa burial cave in the Wadi el-Hôl in the Qena Band region – that the Tasa culture originated from the Western Desert. Since the cave is located on a route leading to and from the Western Desert, the Tasians are regarded as an important link between the Nile and the desert area.

The area to the north of the Kharga Oasis has also been subjected to geoarchaeological research. As a result, Pleistocene and Holocene sites have been recorded along the Libyan Plateau, thus indicating that prehistoric sites are not only restricted to the oases near fossil springs on the floor of the Kharga Depression.

Earlier observations suggesting that the human presence in both the Pleistocene and the Holocene depended on water strongly tied to pans were confirmed (Mandel & Simmons, 2002).

As in Dakhleh, petroglyphs were also recorded in the Kharga Oasis. In the northern part of the oasis, researchers discovered numerous rock art specimens, most of which depict animals. S. Ikram dated them from the Prehistoric to the Dynastic period (Ikram, 2009a; 2009b; 2018). It seems that not unlike in other places in the Western Desert, the Early and Middle Holocene hunter-gatherers and herders also left traces of their presence and evidence of a sophisticated symbolic culture in the Kharga Oasis.

The Farafra Oasis

Exploration of the Farafra Oasis by the Italian Archaeological Mission began in 1987. The project's objective was to reconstruct a broad archaeological and palaeoenvironmental landscape of an area almost completely unknown to archaeologists. Research has shown that although people had been present in the oasis area from the final phase of the Pleistocene, the most important discoveries were dated to the Middle Holocene. Remains of human activity in the Holocene humid phase were discovered not far from Qasr Farafra and in the Wadi el-Obeiyid/el Bahr region (Barich, 2014a). The Italian researchers successfully located camps of Early Holocene hunter-gatherers in three main areas of the Wadi el-Obeiyid, namely Bir el-Obeiyid Playa, the nearby Sheikh el-Obeiyid and the part of the Northern Plateau which overlooks the Hidden Valley. Moreover, sites dated to the same period were recorded in the surroundings of Qasr Farafra (Ain e-Raml and Abu Kasseb) (Barich & Lucarini, 2014: 468). According to B. Barich, the size of the sites and lithic assemblages (high blade index, the presence of backed bladelets, burin spalls) suggest sporadic and short-term visits (Barich, 2014a: 47). The highly mobile way of life of groups that appeared in the Early Holocene in the Farafra Oasis was linked to limited access to water, namely lakes and pools that refilled seasonally (Barich & Lucarini, 2014).

An important climatic change affecting people inhabiting the region took place in the Middle Holocene period. Areas north of the Dakhleh Oasis experienced the Mediterranean rain regime, which moved southwards at that time. Water sources became more stable, and winter and summer rains ensured access to diverse plants nearly all year round. Middle Holocene occupation was recorded around temporary lakes at the Hidden Valley, el-Bahr, and Bir el-Obeiyid Playas or within the Northern Plateau at Sheik el-Obeiyid and the Hidden Valley Plateau. Taking into account the pace and character of sedentism in the Farafra Oasis, Barich proposed a three-phase cultural sequence for the Middle Holocene, namely: Wadi el-Obeiyid A (6,600-5,700 cal. BC) linked to the beginning of sedentism

in this period and its stabilisation in places with access to water and food recources; Wadi el-Obeiyid B (5,600-5,200 cal. BC), characterised by the so-called *Steinplätze*, considered to be places of seasonal occupation; and Wadi el-Obeiyid C (5,200-2,500 cal. BC), linked to the southward shift of the monsoon belt and the desiccation of the desert, which forced people to revert to a mobile way of life and to adopt pastoralism (Table 1) (Barich & Lucarini, 2014).

At the el Bahr/Wadi el-Obeiyid playa, researchers discovered concentrations of lithic artefacts, widely scattered without any stone structures, workshops or hearths and a stone slab structure, all belonging to Wadi el-Obeiyid phase A. From the perspective of changes that took place between the Early and Middle Holocene periods, particularly important are the discoveries from site BH-88-2A, dated to the Early Middle Holocene. The flint assemblage from this site indicates a technological shift between both periods. The reduction and gradual disappearance of microliths is accompanied by an increase of macro-tools – scrapers and denticulates used for scarping and cutting. These changes could be related to the transition from a mobile way of life to a more stable model linked to the exploitation of abundant plant resources available in the playa area. In all concentrations dated to the Middle Holocene, scrapers and denticulates made up more than 40-50% of all recorded tools, used probably for plant and vegetable material processing. Together with perforators/borers, which were another significant tool type, they were made on the spot, as and when needed. Furthermore, lithic assemblages also included carefully made high-quality tools, such as tranchet axes, gouges, and knives, probably made outside this area and used for longer periods. B. Barich interprets these sites as the remains of open-air occupation linked to the exploitation of resources of a lacustrine environment, available for a limited period of time (Barich, 2014b: 101-102).

Important discoveries linked to the Middle Holocene occupation (Wadi el-Obeiyid phase A) were also made in the Hidden Valley area, where a large village located on the fringe of a playa was recorded. Although the site consists of remains from several repeated occupation episodes, it is treated by Barich as a stable settlement because of its very close intervals between occupation phases (Barich, 2014c: 203). The first settlers came to the Hidden Valley area in the middle of the 7th millennium cal. BC. Although remains from this period include hearth pits, during subsequent phases more stable settlement structures were confirmed. Encouraged by a more favourable climate, people invested more effort and energy into the settlement. Human activities (domestic and manufacturing) concentrated around hearths made of stone. Superstructures were erected as well. In the opinion of Barich, people lived in this area on a seasonal basis (Barich, 2014c: 207). Settlement activity in this region still depended on the water level in the playa and, consequently, on available food resources. However, despite inter-

vals in the settlement activity determined by access to water, human groups kept coming back to this area throughout the Middle Holocene until the complete desiccation of the lake in the second half of the 5th millennium BC.

The reason why the Hidden Valley attracted people was access to food resources. Researchers recorded a large palaeobotanical sample with 30 different taxa identified. For the entire period of its occupation, the Hidden Valley had a savannah habitat with a combination of grasses, aquatic plant species, as well as acacia and tamarisk trees. Sorghum was the most common of grasses which may have grown around the playa. A considerable quantity of grass remains found inside cooking pits combined with grinding equipment suggests that these plants were intentionally used as food (Fahmy, 2014; Lucarini, 2014). Furthermore, archaeologists researching the Hidden Valley also recorded tamarisk and acacia wood in large quantities, which may have been used as fuel, as a material for building hut superstructures or for manufacturing various types of utensils. Research by G. Lucarini (2014) indicates that lithic assemblages from the village may have been used for cutting down wild plants and for wood working.

Unlike plant remains, the faunal sample from the Hidden Valley is rather homogenous. According to A. Gautier, people from the Hidden Valley hunted large game (mainly gazelles, Barbary sheep) and also herded sheep and goats, which appeared quite early in the Farafra Oasis, probably before their introduction to the southern part of the Western Desert (Gautier, 2014: 373). An important part of food consumed in this area were ostrich eggs, which have a high nutritional value and additionally provide shells, used in the Farafra Oasis as containers for liquids and as a material for bead making (Cristiani, 2014).

Remains of human activity in the Farafra Oasis during the Middle Holocene were also recorded in nearby Sheikh el-Obeiyid (Wadi el-Obeiyid A phase). Researchers found clusters of 30 oval or circular stone slab structures with diameters ranging from 3 to 7 m, reminiscent of slab structures known from the Dakhleh and Kharga Oases. The Italian researchers interpreted them as places occupied by herders with a broad-spectrum exploitation of this area and link them with growing settlement stability resulting from favourable climatic conditions and plentiful food resources (Barich & Lucarini, 2014: 476). The researchers' attention was also drawn by two other structures, namely circular tumuli containing two cist structures with an elongated rectangular plan, interpreted as primitive cenotaphs or symbolic burials. Moreover, painted and carved images (i.e. animal figures, hands) recorded inside Wadi el-Obeiyid Cave 1 were created in this period. They are believed to have symbolic meaning (Barich & Lucarini, 2014: 477).

The Wadi el-Obeiyid phase B is connected with the emergence of more elaborate hut structures with stone foundation circles in the Hidden Valley village. Furthermore, this period is also characterised by the presence of the *Steinplätze* –

hearths appearing on the surface as scattered pebbles or fragments of fire-cracked rocks partially covered by Aeolian sand, forming small mounds. Together with dwellings in the base-camp, the *Steinplätze* probably formed a settlement system connected with increased mobility. Adaptation to a pastoral way of life forced the movement of human groups, and thus short and repeated stays in one location (Barich & Lucarini, 2014). The *Steinplätze* were recorded in a few areas in the Farafra Oasis – in the Hidden Valley, el-Bahr, Bir el-Obeiyid Playa, Sheikh el-Obeiyid (Barich *et al.*, 2012). Apart from flint assemblages typical for the period, containing bifacial knives, spear points, gouges, arrowheads as well as side-scrapers, notches and denticulates, some pieces of pottery were recorded at the Hidden Valley 2 site and at Sheikh el-Obeiyid.

During the Wadi el-Obeiyid phase C, settlement activity in the Farafra Oasis was significantly reduced due to climatic changes and the resulting limitations in access to water. Not unlike in other areas of the Western Desert, the number of C14 dates after 5,300 cal. BC decreased significantly, suggesting a reduction in human activity. The pastoral way of life required movement in search of water and food sources. However, the Farafra Oasis witnessed a new wet phase around 4,500 cal. BC, becoming once again a place of human activity in a period when civilisation was being formed in the Nile Valley. At that time, occupation shifted towards peripheral areas and the plateau, probably situated along routes leading to more favourable areas in the Nile Valley or to the south. The oasis became an important point of contact and exchange between groups from the desert and the river (at Sheikh el-Obeiyid and at Rajih/Bir Murr) (Barich *et al.*, 2012; Barich & Lucarini, 2014).

The Bahariya Oasis

The first archaeological reconnaissance in the Bahariya Oasis area took place between 1938 and 1945. Its result in the form of descriptions and plans of the most important sites and monuments from this area were published by A. Fakhry. In the 1970s, F. Hassan (1979) conducted a small-scale survey which revealed some prehistoric finds. The sites discovered in the southern part of depression were dated probably to the Middle Holocene. Characteristic findings from these sites include endscrapers, burins, notches, denticulates, bifacial tools and unifacial arrowheads. Other items recorded at these sites include grinding equipment and ostrich eggshells. A Middle Holocene chronology is confirmed by the date of 7,000 BP for the Ain Khoman site.

In 2003, an expedition from the Czech Institute of Egyptology of Charles University in Prague began to explore the oasis. Its concession covered the entire el-Hayz Oasis in the northern part of the depression. Detailed investigation allowed the Czech researchers to identify sites dated to prehistoric times and then over to

Pharaonic, Ptolemaic, Roman/Byzantine periods, and even to the Middle Ages (Dospěl & Suková, 2013; Bárta & Brůna, 2013).

The earliest human presence in the Bahariya Oasis is connected with the Acheulian culture. However, human occupation reached its maximum in the Middle Stone Age. After a hiatus caused by an arid period, the oasis was resettled at the beginning of the Holocene epoch. Sites dated to 7,000-6,000 cal. BC are linked to fossil lakes and playas (e.g. at Umm el-Okhbayn, the 'Under the tooth' playa and the GPS playa). Epipalaeolithic remains were either scattered or clustered. The archaeological assemblage included lithics, grindstones, and fragments of ostrich eggshells. The most characteristic lithics are elongated microlithic triangles, blades, and microblades, retouched or backed. Grinding stones found on the Epipalaeolithic sites at lake shorelines were isolated from other remains. According to J. Svoboda, they may have been placed in special activity zones linked to seed grinding or other types of plant food processing (Svoboda, 2013: 54). The presence of ostrich eggshells may be indicative of the use of eggs as food and eggshells as containers. Apart from camps linked to stays of hunter-gatherers, the Czech archaeologists also discovered a specialised blade and microblade making workshop near a chert outcrop located at the edge of the escarpment of Gabalat el-Gharbi. The same chert was identified at other Epipalaeolithic sites in this area. Thus far, the Czech archaeologists have not found any remains of the Middle Holocene occupation. No ovicaprine bones and no traces of sedentism were recorded. According to Svoboda, subsequent settlement activity in the Bahariya Oasis is not impossible, and its remains may have been obliterated either naturally or as a result of intense human activity in later periods (Svoboda, 2013: 58). One possible hint may be a tanged point found at the Bir 'Ayn Naga', interpreted as Middle Holocene and considered by Svoboda to be a Neolithic intrusion (Svoboda, 2013: 50).

Undoubtedly, the human presence in the oasis during the Holocene humid phase was influenced by climatic changes in the second half of the 6th millennium BC. The northward shift of the Mediterranean rain zone and the southward shift of the monsoon belt reduced vegetation and access to water sources. People returned to the oasis only in the Old Kingdom period (Bárta & Brůna, 2013: 23).

The Siwa Oasis and other northern depressions

The Siwa Oasis seems today to be the least understood oasis of the Western Desert. In the period preceding the Second World War, it was explored by a few researchers-collectors (e.g. H.W. Seton-Karr) (Fakhry, 1973). Proper archaeological investigation of the oasis began only in the 1970s. In 1975 and 1977 during surveys of the Siwa Oasis and the Gara Oasis on the western border of the desert, F. Hassan (1976; 1978) recorded 35 sites dated to the Epipalaeolithic and the Neolithic (Tassie *et al.*, 2008). Thanks to C14 dates obtained during the survey, two phases of occupation dated to 9,000-8,000 BP and 6,800-5,000 BP were

distinguished (Hassan & Gross, 1987). The Epipalaeolithic flint assemblage included, first of all, burins, double burins, microburins, Krukowski microburins, backed bladelets, blades, denticulates, endscrapers, side scrapers, notched pieces, leaf and stemmed points and bifacial elements (Hassan, 1976; Tassie *et al.*, 2008). According to Hassan (1976; 1978), this resembles the 'Libyco-Capsian' tradition and the Qarunian tradition of the Fayum. Other items recovered from these sites included grinding stones, ostrich eggshells and probably pottery (at two sites) (Tassie *et al.*, 2008). Researchers also discovered two fire-places and a stone circle. According to F. Hassan and G.T. Gross, all of these remains indicated the presence of mobile hunter-gatherers in this area (Hassan & Gross, 1987: 91). No pottery was recorded at the Neolithic sites, while the flint assemblage featured primarily bifacial tools, endscrapers, composite tools and raclettes.

In the 1970s, the northern part of the Qattara depression was explored by the Combined Prehistoric Expedition (Cziesla, 1989: 206). However, its research confirmed that remains of human activity in this region were scarce, which is attributable to the still active sedimentation and the expanding dunes of the Great Sand Sea.

In 1983 and 1985, the Qattara-Siwa area was investigated by German archaeologists from the University of Cologne as part of the B.O.S. project (Cziesla, 1989; 1993). These researchers then recorded a few sites in the area of Sitra Lake. Particularly remarkable is an extensive settlement area marked as Sites 83/11 and 83/12. In the opinion of E. Cziesla, all of these remains point to the existence of a permanent or recurring settlement with *Steinplätze*, flake middens and areas of different tool assemblages (Cziesla, 1989: 212). In the northern part of Site 83/11 predominantly bifacial tools, probably made for a special task, were recorded. In the southern part of the site, however, tools were poorly represented. According to Cziesla, the site should be interpreted as a 'production area', where dark-grey hornstone was intensively processed (Cziesla, 1989: 208). Site 83/12 requires particular attention because of its very high number of burins, representing 45% of all modified artefacts. C14 dates obtained for this level indicated a date of ca. 5,000±350 BC. A high percentage of burins at sites dated to this period is infrequent and was recorded in Haua Fteah (the upper half of the VIII layer) (McBurney, 1967), at Site 75/31 recorded in the Siwa Oasis by Hassan (Hassan, 1976: 20), and at two other sites explored by the B.O.S. project (81/55 and 81/61) beyond the Siwa Oasis.

Interesting observations were also made at another site (85/05), where four clusters of lithics were found on the edge of a natural depression. Probably, they were leftovers from a workshop of stone-knapping specialist(s) where blades were manufactured using a core rejuvenating technique (Cziesla, 1993: 194).

The German archaeologists also managed to obtain C14 dates for *Steinplätze* (Sites 86/06 and 85/14) indicating that they were used mostly between 6,800-6,400 BP. No remains of *Steinplätze* younger than 6,000 BP were found. Undoubtedly,

climatic changes affected the water level in and around the oasis, thus influencing the human presence after 5,300 cal. BC. According to Hassan, the oasis was again occupied between 4,000 and 3,000 BP, which, in his opinion, is suggested by the hearths recorded on dune tops (Hassan, 1976: 29).

4.2.3. The Eastern Desert

The Eastern Desert occupies approximately a quarter of the entire territory of Egypt. It is a region of mountains, plateaus, and large wadis. There are a number of drainage networks in this area, which drain towards the Red Sea or the Nile (Emadi, 2004: 7). Compared with the Western Desert situated west of the Nile, our knowledge of human activity in the Early and Middle Holocene periods in this area is very poor. It seems, however, that natural conditions in this territory during the Holocene humid phase were similar to those in the Western Desert. Areas situated near the Red Sea Mountains additionally benefitted from torrential rains occurring in this region.

The Tree Shelter and Sodmein Cave

The Belgian Middle Egypt Prehistoric Project of Leuven University operating in the Red Sea Mountains area in the 1990s discovered two archaeological sites, namely the Tree Shelter and Sodmein Cave, with traces of a human presence dated to the Holocene humid phase. The first of these two sites is located in a small wadi tributary of the Sodmein Valley. The other is in the Red Sea Mountains, 3 km south of the Tree Shelter (Map 3).

Remains of human occupation at the Tree Shelter are visible in the form of a large number of hearths and dense horizontal scatter of lithics, as well as botanical and faunal remains. Two out of the five levels at the Tree Shelter are linked to the Middle Holocene (6,800-4,900 BC). Visits of mobile stock-keepers to Sodmein Cave are dated between 6,200 to 4,300 cal. BC. Due to the nature of the site, a greater thickness of deposits was recorded, with a clear stratigraphic sequence. Remains of human occupation included hearths and lithics, and botanical and faunal remains. The flint assemblage is flake-oriented and dominated by simple tools – retouched flakes, denticulates and notched flakes. A large share of the assemblage is constituted by arrowheads, including Ounan points. In levels dated to the second half of the 5th millennium BC, pottery fragments were also recorded.

Both sites are contemporaneous with the Middle and Late Neolithic in the Nabta Playa-Bir Kiseiba area (Marinova *et al.*, 2008; Linseele *et al.*, 2010). Since the depopulation of the Eastern Desert caused by climatic changes began later (probably due to the proximity of the Red Sea Mountains with frequent rainfall), the end of the Tree Shelter occupation is dated to 3,700 cal. BC (Vermeersch *et al.*, 2015).

One of the more important discoveries at both sites were ovicaprine bones recorded in levels dated to the 7th millennium BC. While researchers struggle with their precise analysis and only goats were certainly present, these bones seem to be the oldest known ovicaprine remains in all of Africa. Apart from bones, accumulations of animal droppings deposited by the domestic goats and/or sheep were found at both sites. Indeed, the vast amount of dung indicates that the herd size must have been far larger than suggested by the faunal remains. The Belgian expedition did not record any cattle bones. The researchers are of the opinion that their absence was due to the fact that there were no playas in the area and access to surface water sources was difficult. Environmental conditions may have also contributed to the prevalence of goats, as this species is better adapted to arid conditions than sheep.

Remains found at the Tree Shelter and Sodmein Cave sites indicate that both of them were repeatedly visited for short stays by people and animals. Human groups using both sites were mobile and probably visited the area near the site because of vegetation appearing after rains, which allowed them to feed their herds. The large number of undigested seeds and fruits in dung pellets and macrobotanical evidence suggest well-developed herb vegetation in this area. It is likely that domesticated animals themselves were not an important food source, which is suggested by the small number of their bones. Instead, people relied on meat and other products obtained through hunting. While the presence of arrowheads may suggest the importance of hunting, it is not confirmed by the number of wild animal bones found at the sites (Marinova *et al.*, 2008; Linseele *et al.*, 2010; Vermeersch *et al.*, 2015).

The Tree Shelter and Sodmein Cave are very often quoted in the context of the dispersal of ovicaprines in the African continent. As ovicaprines are not endemic species and their wild ancestors never lived in Africa, their introduction through the corridor into Egypt from the southern Levant through the Eastern and then the Western Desert could be one possible explanation of a goat presence at these sites. However, this question calls for more investigation as the data we currently possess is insufficient for identifying the exact route (Wengrow, 2006: 25; Muigai & Hanotte, 2013; Tassie, 2014: 157; Vermeersch *et al.*, 2015: 497).

Wadi Atulla

A human presence in the Eastern Desert is also testified by discoveries dated to the first half of the 5th millennium BC in Wadi Atulla, where a grave with offerings typical for the Tasa culture was recorded (Friedman & Hobbs, 2002). Tasian materials are known from other localities in the Western Desert, e.g. at Gebel Ramlah, Wadi el-Hol, the Kharga Oasis. On the one hand, all these finds indicate a high degree of mobility of the pastoral Tasa people, while, on the other, they suggest links with the desert traditions developed during the Holocene humid phase, rather than with the Nile Valley.

4.2.4. Early and Middle Holocene hunter-gatherers and herders of the eastern Sahara – a summary

The multidisciplinary character of investigations in the Egyptian part of the eastern Sahara, covering not only the remains of human occupation but also the environment and climate, has enabled a much better understanding of human activity in this area in the Holocene humid phase. In the Early Holocene, the desert changed into a dry savannah, as a result of an abrupt northward shift of the tropical rainfall belt. Despite milder environmental conditions, maintaining a human presence still involved considerable risks and depended on rain and access to drinking water sources, vegetation and animals. Groups of hunter-gatherers inhabiting various locations within the desert developed different strategies of adaptation to environmental and climatic conditions with a highly variable mobility pattern. The environmental diversity of the desert translated into differences in access to water, thus affecting human adaptation strategies. People stayed for longer in places where water sources were available. However, if the water was scarce, the human presence became shorter and involved searching for its sources. Consequently, human adaptation models in the desert were not uniform. On the one hand, each region explored by researchers is a source of a unique set of archaeological remains, which is attributable to unique environmental conditions. On the other hand, however, hunter-gatherers or herders of the Holocene humid phase do have certain common features (lithics or ceramics, occupation structures) implying a common cultural background resulting from constant mobility in search of food and water, and thus from a lack of isolation.

In the archaeology of the eastern Sahara, the hunter-gatherers and herder groups whose traces dated to the Early and Middle Holocene were recorded in the desert, have been labelled in a variety of ways (e.g. Masara, Djara, Bashendi A and B, Baris, Gilf Kebir), depending on the chronology and location. However, all these labels denote desert groups moving over considerable distances. Therefore, the various labels proposed by researchers may, in fact, refer to groups with a shared cultural background, periodically crisscrossing the desert.

The Early Holocene in the Western Desert is linked to the activity of hunter-gatherer groups, whose traces (remains of short-stay camps) have been found near water sources, such as playas, pans or springs. Hunting was their basic subsistence strategy, and the role of wild plants depended on their availability, gradually increasing in the course of the Holocene humid phase. Early Holocene sites are characterised by backed elements (points, bladelets, blades), notched and strangulated blades and elongated scalene triangles, although their relative proportions in assemblages from each site may have been different. The presence of pottery vessels, however, has only been confirmed in the southern part of the Western Desert.

A special place during the Early Holocene was the Nabta Playa-Bir Kiseiba area. Its specific environmental and climatic conditions had a significant impact on the trajectory of the development of human groups which occupied this area. This is where the oldest traces of domesticated cattle and intensive exploitation of wild plants were found. The special relationship between humans and animals, as well as the possibility of collecting and storing wild plant grains, allowed people to survive in the harsh conditions of the savannah. It was here that the oldest, richly decorated Egyptian ceramics of African origin appeared and it is from here that it probably was adapted to other parts of the Egyptian Sahara.

The Middle Holocene saw an improvement of climatic conditions and, consequently, an intensification of human activity in the eastern Sahara, with a growing number of sites across the entire region in places with access to water. Traces of an extended human presence were recorded as well, interpreted as an episode of sedentism (e.g. Dakhleh Oasis, Farafra Oasis). However, mobility continued to guarantee survival, and people travelled in search of water, animals, and plants over long distances. During this period the importance of wild plants increased and traces of their intensive exploitation can be observed in the archaeological assemblages. Undoubtedly, an important event was the emergence of domesticated animals – ovicaprines and cattle. Their importance was initially insignificant while hunting still provided a large part of the food. However, people started to move not only in search of water and food but also in search of pastures for animals. Not only the Western Desert but also the Eastern Desert was within distances normally travelled by these groups. The relationship between humans and animals, which began at the time, led to the development of a pastoral economy at the end of the Holocene humid phase.

During the Middle Holocene period, in lithics, the blade industry lost its relative importance and was superseded by the flake industry for blank production. The prevalence of facially and laterally retouched arrowheads, transverse arrowheads, edge retouched or notched tools and backed elements is clearly visible. The presence of arrowheads confirms the continuing importance of hunting. During the Middle Holocene, there is also a visible spread of the pottery technology to the north of the eastern Sahara. Although in this period clay vessels continue to account for a small part of the inventory, the technology as such was successfully adapted in different areas. In the 6th millennium BC, in the area of the Dakhleh Oasis, thin-walled undecorated pottery appeared next to Khartoum-style decorated pottery. According to K. Kindermann and H. Riemer (in press), this new pottery tradition developed locally from the decorated ceramics tradition.

During the final part of the Holocene humid phase, there is a clear division of the eastern Sahara into two cultural traditions distinguishable by their lithics and ceramics. In the southern part of the desert, the so-called Microlithic/

Khartoum-style technocomplex was identified, as opposed to the Bifacial technocomplex in the north. The presence of transversal insets and segments made on blades or elongated flakes using microlithic techniques and the Khartoum-style decorated pottery were characteristic for the southern tradition. Bifacial modifications on leaf-shaped and stemmed points, as well as thin-walled undecorated pottery, were the typical features of the northern tradition. Both complexes were not isolated, and cyclical movements of mobile herder groups made them intertwined. The separation of the two traditions did not take place until the end of the 6th millennium BC when climatic change triggered the desiccation process in the Sahara. Archaeologists recorded in the Western Desert a declining number of C14 dates in approximately 5,300 cal. BC, which indicates that herder groups became less active. Reduced access to water forced them to move in search of survival sites. The adaptation of pastoral strategies by desert groups at that time was also a response to the worsening climatic conditions. Towards the end of the 4th millennium BC, the human presence was confined to ecological niches, guaranteeing access to water (e.g. Gilf Kebir). However, the desert conditions known today returned to the eastern Sahara in around 3,500 BC, thus expelling people from the area.

4.3. The Pottery Neolithic of the southern Levant

4.3.1. Pre-Pottery Neolithic / Pottery Neolithic transition

For many years, the Pottery Neolithic in the southern Levant attracted relatively little attention from researchers. The remains of human occupation from this period were scarce, poorly preserved and – compared with remains from other periods – not very attractive. Another reason for the lack of interest was the generally accepted hypothesis concerning the collapse of Pre-Pottery Neolithic B societies attributable to social fragmentation, segmentation and depopulation. Most researchers agreed with the theory proposing a hiatus in the southern Levant continuing for a millennium or even more after the PPNB (De Vaux, 1966; Perrot, 1968; Moore, 1973; Kenyon, 1970). A number of reasons for this have been pointed out, such as climatic changes and degradation of the natural environment caused by population growth, intensive exploitation and stress related to overcrowding (i.e. Gopher & Gophna, 1993; Banning, 1998: 229-230; 2012: 406; Kuijt, 2000: 95; Verhoeven, 2002: 10; 2004: 259; Bar-Yosef, 2009; Rosen & Rosen, 2017). However, the discoveries of the last 20 years have forced researchers to reassess their views on the nature of the changes that took place between the Pre-Pottery Neolithic and Pottery Neolithic periods. Undoubtedly, a transformation was caused by multiple social and cultural factors (Verhoeven, 2002: 10; 2004: 259; Goring-Morris *at al.*, 2009: 217). Although many settlements were deserted (including, in particular, those to the west of the River Jordan), human communi-

ties in the southern Levant did not disappear altogether, while their social, economic and even symbolic organisation underwent considerable changes. It is now indisputable that there is no clear-cut border between the Pre-Pottery Neolithic and the Pottery Neolithic. In some cases, it is even possible to notice that some PPNB traits continued into the Pottery Neolithic (Verhoeven, 2004: 259-260).

The gap between the PPNB and the Yarmukian culture was filled with the discoveries at the site of 'Ain Ghazal in Jordan. Researchers identified a new cultural unit referred to as the Pre-Pottery Neolithic C, believed to have been a result of human adaptation to changes that took place towards the end of the PPNB (Rollefson *et al.*, 1992). According to E. Banning, the PPNC should be treated as part of the Pottery Neolithic due to the lack of continuity between the final PPNB and the PPNC, whether in burial practices, lithic assemblages, or even in economic features (Banning, 2012: 406). Furthermore, such a chronological position seemed to be confirmed by visible convergences of the PPNC and the Yarmukian culture, including, in particular, the emergence of pottery at PPNC sites. Importantly, however, the character of PPNC communities in the southern Levant has not been fully explained and requires further research.

The social, economic and symbolic transformation between the Pre-Pottery Neolithic and Pottery Neolithic led to the formation of communities of a unique character, settling in the southern Levant throughout the 7th and 6th millenniums BC. On the one hand, the traces left by these societies show a continuity of certain elements, while, on the other hand, they point to new characteristic features attributable only to Pottery Neolithic groups.

So far, the Yarmukian and the Wadi Rabah have been the most thoroughly researched of all the Pottery Neolithic cultural units identified in the southern Levant. However, some researchers consider the latter as an entity that belongs to the Chalcolithic (e.g. Garfinkel, 1999; 2014; Bourke, 2007). Moreover, the character of the other cultures of this period, namely the Jericho IX/Lodian, Qatifian and particularly the Nizzanim culture, is also debatable.

4.3.2. The Yarmukian culture

Although the first Yarmukian pottery and lithics were excavated at Megiddo in the 1930s, this cultural unit was defined only in the 1950s by M. Stekelis at the site at Sha'ar Hagolan (Stekelis, 1951; 1972). He dated it to the Pottery Neolithic period and treated as contemporaneous with Jericho IX and the 'Néolithic ancient' of Byblos. In his opinion, Yarmukian pottery was the earliest known in the southern Levant. Although initially, researchers tended to disagree with the proposed chronology, after Yarmukian remains were discovered at more sites (e.g. Habashan street in Tel Aviv, Munhata, Hamadiya, 'Ain Ghazal), the position of this cultural unit in the relative chronology of the southern Levant was eventu-

ally established. Yarmukian layers are present under all remains of other Pottery Neolithic cultures and above the remains of Pre-Pottery Neolithic occupations – the PPNC (e.g. 'Ain Ghazal) or the gap after PPNB (e.g. Munhata). However, the debate continues on the cultural position of the Yarmukian and other Pottery Neolithic cultures. According to Garfinkel, the Yarmukian and Jericho IX/Lodian were contemporaneous entities situated in separate geographic regions – the Yarmukian in the north and centre of Israel and the Jericho IX in its southern part (Garfinkel, 1993: 130). However, in the opinion of Gopher and Gophna, Jericho IX is an independent younger phenomenon, filling the gap between the Yarmukian and the Wadi Rabah cultures (Gopher & Gophna, 1993: 324-326; Rowan & Golden, 2009; Gopher, 2012c: 1530). Recent discoveries have shown that the sites of both cultures extend beyond the territory outlined by Garfinkel and appear concurrently in several regions, namely the Jordan Valley, the Jezreel Valley, Israel's Coastal Plain and the Shephela. Furthermore, remains of both cultures were recorded at Nahal Zehora II. Despite these new discoveries, researchers fail to agree on the relationship between the two Pottery Neolithic units. This situation also affects attempts at determining their absolute chronology. Limited radiocarbon determinations are not helpful either. According to Gopher, the Yarmukian can be dated between ca. 8,500/8,400-7,800 cal. BP and may have lasted even some 500-600 years (Gopher, 2012c: 1532). In 2007, Banning proposed a new chronology for the Pottery Neolithic entities on the basis of Bayesian analyses of available radiocarbon evidence. In his opinion, the Yarmukian culture began in approximately 6,527-6,376 cal. BC and ended in around 5,988-5,762 cal. BC. If these dates are correct, the culture continued for roughly 441-724 years and overlapped the PPNC and the Wadi Rabah culture. Although in Banning's estimation the Yarmukian and Jericho IX cultural units were contemporaneous, the beginning of the Jericho IX culture cannot be clearly determined due to the scarcity of C14 dates. Recently K. Streit (2017) has suggested a range of approximately 6,350–5,800 cal. BC for the Yarmukian culture (Table 1).

Yarmukian sites have been found along the east-west axis of the central parts of the southern Levant in the Mediterranean coast, in the area from Akko Plain in the north to Tel Aviv in the south, in the mountainous ridge, the Jordan Rift Valley from Lake Tiberias and in the Lower Galilee valleys down to the Dead Sea in the south, as well as in the Transjordanian Plateau. Among the sites discovered so far, particular attention should be paid to Sha'ar Hagolan and Munhata, both of which have contributed significantly to a better understanding of the Yarmukian culture. They also stand out for their remarkable structures and rich assemblages. Another important site is Nahal Zehora II, explored in the 1980s and 1990s by Gopher. The presence of Lodian and Wadi Rabah remains alongside those of the Yarmukian culture makes this site special (Map 4).

Yarmukian sites feature both simple pit-houses and more elaborate structures. Circular or oval stone-founded buildings are fairly common. They have been recorded, for instance, in Munhata or ʻAin Ghazal. However, excavations at the site of Sha'ar Hagolan revealed a much more sophisticated spatial organisation of the settlement. Particularly remarkable are building complexes incorporating numerous rooms arranged around courtyards of a surface area ranging from 225 to 700 m², separated by alleys and streets. According to Garfinkel, the structure of the Sha'ar Hagolan settlement may point to a three-tier social hierarchy, consisting of the nuclear family, the extended family and the community at the top (Garfinkel, 2002; Garfinkel *et al.*, 2002b; Garfinkel & Ben-Shlomo, 2002; 2009). Each nuclear family probably occupied a single dwelling room with an accompanying storage room. A few such units were clustered around a courtyard where a variety of activities could take place. Indeed, such compounds may have been inhabited by extended families (Banning, 2010: 73-74; Gibbs & Banning, 2013: 365-357). Moreover, in the opinion of Banning, each compound could have served as a single decision-making unit in the community (Banning, 2010: 73). Similar structures are known from ʻAin Ghazal, although building complexes at that site were not as dense as in Sha'ar Hagolan. One's attention is drawn to an apsidal structure constructed on a previously existing PPNC plaster floor. On the basis of a large stone (orthostat) placed at the centre of the apse and the presence of exclusively fine pottery in the fill of the room, this apsidal structure has been interpreted as a cultic building (Banning, 1998: 224; 2010: 54-55).

Burials have been found within Yarmukian settlements at ʻAin Ghazal, Jericho and Sha'ar Hagolan, including a child burial encircled by stones, tightly flexed adults with or without skulls and secondary adult burials (Banning, 2012: 408). Their small number may suggest the existence of a burial practice that has escaped the attention of archaeologists.

The characteristic pottery and lithic assemblages of the Yarmukian culture provided the basis on which the culture was identified. Although in some places in the southern Levant people had already learned how to make pottery in the PPN, it became commonly used only in the PN. Vessels were hand-made of a local raw material. There was a great diversity of forms, including jars, bowls, cups of different sizes. Characteristic Yarmukian decorations feature triangular, red-painted fields separated by bands delimited by two incised lines with an incised herringbone pattern between them. Pottery with painted decoration only and undecorated pottery has also been found (Gopher & Gophna, 1993: 311; Garfinkel, 1999: 16-17).

Lithic assemblages are dominated by flakes. Unretouched flakes were used as basic tools. Blades were used, first of all, to produce sickles, drills and projectile points (Gopher & Gophna, 1993: 308; Banning, 1998). Typical Yarmukian

sickle blades have a coarse denticulation on the edges, fashioned with pressure flaking. Among projectile points, new types called Haparsa and Herzliya are present alongside subtypes of Byblos and Amuq arrowheads (Garfinkel, 1993: 121-123; Gopher & Gophna, 1993: 308-311). Lithic tools were made first and foremost of local raw materials. Moreover, the Yarmukian lithic assemblage from Sha'ar Hagolan features 38 artefacts made of obsidian originating from southern Cappadocia and eastern Anatolia (Carter *et al.*, 2017). The presence of non-local raw materials implies that the community of this site was involved in a broader exchange system, although it is unclear whether the connections were direct or mediated.

Yarmukian sites also yielded a fairly large quantity of stone tools such as grinding slabs, mortars, grinding stones, pestles and hammers, used for processing grains and other seed crops. Despite the high popularity of pottery, limestone bowls were still in use (Garfinkel, 1993: 123-126; Gopher & Gophna, 1993: 314).

Particularly remarkable are anthropomorphic stone and clay figurines of the Yarmukian culture believed to have a symbolic meaning. Garfinkel identified four basic types of figurines, namely: anthropomorphic clay figurines with 'coffee-bean' eyes; male cylindrical figurines; anthropomorphic pebble figurines; and incised pebbles (Garfinkel, 1993: 124-126).

Thus far, the best evidence for figurines comes from Sha'ar Hagolan and Munhata sites and the Nahal Qanah cave. A number of interpretations have been proposed to explain their occurrence. Figurines have been associated with fertility, magic, a female deity, a deified ancestor, a 'matron' (Gibbs & Banning, 2012: 359-360; Gopher, 2012c: 1562-1567). A. Gopher and E. Orelle (1996) linked figurines with 'coffee bean' eyes to the relationships between the sexes and the mutability of gender. Moreover, they consider pebbles to be a means of defining different stages of female physical development. The multitude of interpretations, however, does not bring us any closer to understanding the role of figurines in Yarmukian societies. However, their association with symbolism indirectly confirms the unique character of the first communities of the Pottery Neolithic in the southern Levant.

4.3.3. The Lodian (Jericho IX) culture

The Jericho IX cultural unit was first defined by J. Garstang on the basis of his research in Jericho in the 1930s (Garstang *et al.*, 1935; 1936). When excavations in Jericho were resumed by K. Kenyon (1957; 1960), she discovered a layer parallel to Garstang's Jericho IX, which she called the Pottery Neolithic A. The name Lodian was eventually proposed by Gopher in order to avoid the use of the "limiting stratigraphic term 'Jericho IX'" after his excavations in Lod. Today, all three names are often used in reference to the same culture.

The origin of the Lodian cultural unit is not fully clear. It is believed that it may have derived from the Yarmukian culture. However, as already mentioned, researchers fail to agree on the mutual relationship between the two cultures. The disagreement on the relationship between the Yarmukian and the Lodian cultures results, first of all, from the immense degree of similarity between the two cultures. The origin of the Lodian culture, closely connected with the Yarmukian culture, may explain the cultural convergences of the two units. For Garfinkel, the similarities, including, in particular, those in pottery and lithics, are the strongest arguments speaking in favour of the contemporaneous existence of both cultures, while the differences between them result from their geographic diversity (Garfinkel, 1999: 101). However, Gopher claims that the differences visible in the *chaîne opératoire* of pottery and lithics, in the burial customs, architecture and symbolic items are sufficient enough to treat the Yarmukian and the Lodian as two separate cultures (Gopher, 2012c: 1541).

In the view of Gopher, the Lodian appeared after the Yarmukian culture, continued for around 200-300 years and can be dated to between 7,900/7,800-7,700/7,600 cal. BP (Gopher, 2012c: 1532). However, determining the absolute chronology of the Lodian culture is rather challenging. Banning has pointed to the meagre radiocarbon evidence of the Lodian culture as the reason why arriving at satisfactory results was difficult in Bayesian analyses (Banning, 2007: 88). Although he proposed a date of 5,985/5,832 cal. BC as the beginning of the Lodian culture (assuming that it began after the Yarmukian), he simultaneously noted that this was not a realistic estimate. According to Banning, the demise of the Lodian culture took place approximately in 5,654-5,450 cal. BC, assuming a small overlap between the end of the Lodian and the beginning of the Wadi Rabah culture. According to Streit (2017), the available radiocarbon dates indicate a range stretching from approximately 6,200 to 5,800 cal. BC (Table 1).

So far, Gopher has identified 22 Lodian sites across the entire southern Levant (Gopher, 2012c: 1547; fig. 1549). In his opinion, the geographic range of the Lodian culture was greater than that of the Yarmukian culture and covered the territory up the Hula Valley in the north, parts of the Dead Sea area and the southern parts of the coastal plain in the south (Map 4). He also considered sites identified as the Nizzanim variant to be Lodian (Bar-Yosef & Garfinkel, 2008: 169-170).

In terms of location and structures, Lodian sites do not differ from those of Yarmukian settlements. Typical features are numerous pits. More sophisticated structures have been recorded at Jericho, where straight and curvilinear walls built of stones and bun-shaped mudbrick were recorded in Stage XXIX. They are the remains of a compound consisting of a few rooms and a courtyard (Banning, 2010: 57). At Lod, a circular pit house dug into a sand dune was found. It had a diameter of 2-3 m and was lined with mudbricks. Furthermore, researchers

also identified a variety of domestic facilities, including a hearth or an oven (Gopher & Blockman, 2004: 44; Banning, 2010: 57). Although at Nahal Zehora II no clear house plans were identified in the Lodian layers, researchers found two large complexes consisting of open spaces and many walls, probably constituting parts of houses (Gopher, 2012a: 278-279). In the estimation of Gopher, the houses were rectangular and had stone walls. Compared with Yarmukian architecture, the walls were narrower and made of smaller stones with faces finished in a more meticulous manner.

As in the case of the Yarmukian culture, only a small number of Lodian burials have been discovered. Although Garstang and Kenyon did not find any graves in Jericho's layer IX, Lodian graves are known from the sites in Nizzanim, Teluliyot Batashi, Lod, Tel Te'o (strata X and IX), Abu Gosh, Ha-Gosherin in the Hula Valley and Nahal Zehora II. The dead were buried within settlements, sometimes under house floors. Their bodies were placed in pits, in the foetal position. In a few cases, burials were covered with stones or pebbles. One case of an infant jar burial and a few burials covered with pottery sherds are known from Tel Te'o, where graves containing bodies without skulls have also been found. However, burial offerings are absent in the Lodian culture (Gopher & Eshed, 2012: 1405-1406).

The subsistence strategies of the Lodian culture were based on farming and herding. The reduction of the economic importance of hunting that began at the beginning of the Pottery Neolithic continued into the Lodian period. The sites of this culture contain far fewer remains of wild animals, while some of them do not contain such remains at all. Although arrowheads are still present in lithic assemblages, their quantity decreases. They still include Naparsa, Nizzanim and Herzliya points, some transversal points and also less numerous subtypes of Amuq and Byblos points. Among sickle blades, narrow denticulated forms disappear, while new, relatively short and wide forms emerge. Blade production faced further limitations in the Lodian culture, while flakes were used even as projectile points or sickle blades. Intensive use of the pressure-flaking technique is still clearly visible. Lodian assemblages contain a fair share of massive bifacial tools – axes, adzes, chisels (Gopher & Gophna, 1993: 318-319; Gopher & Barkai, 2012: 1112; 1125).

The use of crops by the Lodian people is also reflected in the presence of numerous tools used for crop processing, such as grinding slabs, mortars, grinding stones, pestles, and hammers. In the stone assemblages, limestone and bowls and pedestaled bowls are still present (Gopher & Blockman, 2004: 42; Gopher, 2012b: 1035-1100).

Although in many ways the pottery of the Lodian culture resembles that of the Yarmukian, it has many distinctive features as well. Vessel types used by the Yarmukian and Lodian cultures are the same, although in the latter new forms ap-

peared (Garfinkel, 1999: 75). According to Garfinkel, the most characteristic feature of Lodian pottery is decoration, including painted and burnished narrow or wide red/brown lines applied on top of creamy/whitish slip (Garfinkel, 1999: 68). However, Gopher believes that the differences between Yarmukian and Lodian pottery are far deeper than that suggested by Garfinkel. Thus, they are visible not only in their decoration but also in the choice of raw materials and in the introduction of new forms (Gopher & Gophna, 1993: 324; Gopher & Eyal, 2012c: 727-728). In the estimation of A. Gopher and N. Blockman, Lodian pottery "has lost certain «archaic» elements" (Gopher & Blockman, 2004: 45).

The number of figurines and other imagery items found at Lodian sites is clearly lower than at Yarmukian sites. In the opinion of A. Gopher and R. Eyal, the Lodian imagery assemblage is characteristic for its lack of a unique character (Gopher & Eyal, 2012d: 1238). Although various figurines and objects were recorded e.g. at Jericho or Lod, their number and character may imply that symbolic expression was shifted to some other media. Moreover, K. Gibbs links the decline in the number of figurines and other forms of human representation evident at Lodian sites to a general shift to more ambiguous symbolism (Gibbs, 2013: 77).

4.3.4. The Wadi Rabah culture

The Wadi Rabah was defined as an independent culture by J. Kaplan in the late 1950s and 1960s on the basis of his research in the Tel Aviv area (Wadi Rabah, Teluliyot Batashi, Lod, Habashan Street, Kefar Gil'adi, and Ein el-Jarba). He classified the Wadi Rabah as a Chalcolithic culture (see also Garfinkel, 1999: 104-109; Bourke, 2007; Streit, 2016), although today most researchers see this cultural unit in the Pottery Neolithic period (Banning, 2007; Gopher, 2012c: 1542-1543; Gibbs & Banning, 2013). The difference of opinions on the culture's affiliation with one period or the other does not really affect its character, and it is indirectly linked to views on the nature of the relationships between the Wadi Rabah culture and the later communities of the Ghassulian period. Those who would rather see this culture as Pottery Neolithic stress its strong ties with the Yarmukian and the Lodian cultures. In the opinion of Gopher and Gophna, the Wadi Rabah culture is the result of the development of the rural agriculture system that emerged in the southern Levant at the beginning of the Pottery Neolithic (Gopher & Gophna, 1993: 346).

In relation to other cultures found at archaeological sites, the Wadi Rabah layers are positioned above Yarmukian and/or Lodian layers. In the view of Gopher, the Wadi Rabah culture began around 7,600-7,500 cal. BP and ended approximately in 6,800 cal. BP, which means that it lasted for some 700-900 years (Gopher, 2012c: 1533). Banning, however, has pointed to the existence of a small overlap between the Lodian and the Wadi Rabah cultures, continuing for 67 to 255

years (Banning, 2007: 88-89). On the basis of Bayesian analyses of available radiocarbon determinations, he also suggested that the Wadi Rabah culture began between 5,746 and 5,578 cal. BC and ended around 5,288-5,118 cal. BC. Recently, Streit proposed an approximate date range for this culture of between 5,700 and 5,200 cal. BC (Table 1) (Streit, 2016: 213).

The area of the Wadi Rabah spread from Upper Galilee through the northern valleys, the coastal plain and the Shephela down to the Soreq Valley (Map 4). A total of 53 sites of the Wadi Rabah culture have been identified, 44 of which have been excavated and nine of which have been surveyed (Streit, 2016: tab. 6.2). Gopher and Gophna divided the Wadi Rabah into normative and variant groups, with the latter being different from the former, particularly in terms of ceramic assemblages (Gopher & Gophna, 1993: 334-341). Furthermore, normative sites are present only in a limited area, namely in the Jezreel Valley, the Soreq Valley, the Upper Galilee and the Huleh Valley. Compared with the Yarmukian and Lodian cultures, the Wadi Rabah cultural unit is characteristic for its greater diversity and spatial segregation.

As the amount of available evidence is limited, little is known about the settlement organisation of the Wadi Rabah cultural unit. Its sites are dominated by rectilinear structures, two types of which have been identified, namely free-standing broad room houses and long houses consisting of a few adjacent rooms (Banning, 2010; Gibbs & Banning, 2013: 357; Streit, 2016: 222). Small rounded houses are still present, although they are the exception rather than the rule. House walls were made of stone and probably served as a basis for mudbrick superstructures. In the opinion of Gibbs and Banning, a decline in the use of common spaces and the segregation of domestic activities is visible in the settlements (Gibbs & Banning, 2013: 358).

As in the case of the other Pottery Neolithic cultures, the Wadi Rabah people buried their dead within their settlements. So far, only 14 graves have been discovered, among which pit burials, cist burials in stone-built box-shaped graves, as well as group burials were identified. Infant jar burials constitute a new practice found at a few settlement sites, either outside structures or between them. Grave offerings are present, albeit rarely. Only in one grave, the skull was missing, which could be probably connected with a symbolic practice known from the PPNB and additionally recorded in some cases in the Yarmukian and Lodian cultures (Streit, 2016: 250-255).

The communities of the Wadi Rabah were fully agricultural. Cereal cultivation and animal husbandry were rarely supplemented with wild food resources. Sheep, goats, cattle, and pigs were already fully domesticated (Streit, 2016: 257). The main cereal was emmer wheat followed by barley. In the opinion of Gopher, it was during the Wadi Rabah period that the final stage of the second Neolithic revolution took

place, involving adaptation of the full agricultural package (Gopher, 2012c: 1577). Wadi Rabah groups also reached beyond the basic food products offered by domesticated plants and animals. According to Gopher and Gopna, the churn prototype from Nahal Zehora I may suggest that dairy products were already being used in this period (Gopher & Gophna, 1993: 334). Moreover, intensive use of olives may have begun on the coastal plain (Gopher, 2012c: 1517; Streit, 2016: 258).

The changes in the production of some tools that began in the initial phase of the Pottery Neolithic are even more explicit in the case of the Wadi Rabah culture. Flakes are the dominant component of all assemblages, while the pressure-flaking technique is no longer used. Blade production became uncommon, supplying wide and thick specimens. Arrowheads of the Harpasa, Nizzanim, and Herzliya types, as well as transverse arrowheads, have rarely been recorded at these sites. Changes also affected the production of sickle blades. Typical Yarmukian and Lodian specimens were replaced with backed, rectangular sickle blades, truncated on both ends with a finely denticulated cutting edge. Bifacials include adzes, axes, and chisels. Adzes with the maximum width at the centre, a thick cross-section, and a rather narrow working edge are typical for the Wadi Rabah culture (Gopher & Barkai, 2012: 1112-1113; Streit, 2016: 241-242).

Compared with the Yarmukian or the Lodian cultures, the pottery assemblage of the Wadi Rabah culture is clearly different in terms of raw material choices, shaping techniques, surface treatments, forms, and decoration. On the basis of studies at the site of Nahal Zehora II, Gopher suggests there was the development of pottery technology and an improvement in potters' skills (Gopher, 2012c: 1557). In his opinion, Wadi Rabah pottery marked the peak of the Pottery Neolithic technology. The use of locally available and easily manipulated raw materials allowed potters to use the time and energy previously consumed by paste preparation for other stages of pottery production. An analysis of the pottery of the Wadi Rabah culture shows great attention to vessel forming and surface treatment. Elaborate red or black slip and burnishing are also very common and imply full control of the kiln firing process (Garfinkel, 1999: 108-109). Forms already known from the Yarmukian and Lodian cultures are accompanied by new ones (Gopher & Eyal, 2012c: 728-729). However, the greatest changes are visible in the decoration of Wadi Rabah pottery, made using a variety of techniques (Garfinkel, 1999: 147; Gopher & Eyal, 2012c: 729; Streit, 2016: 232-233).

Various stone tools have been recorded at Wadi Rabah sites. Among other things, they include grinding slabs, mortars, grinding stones, pestles and hammers, and bowls. In terms of form, they do not differ from those known from Yarmukian and Lodian sites (Streit, 2016: 245-248).

Figurines and other objects linked to symbolic behaviours are an important element of all Pottery Neolithic assemblages. In case of the Wadi Rabah culture,

a decline in their quantity and changes in their form are visible (Streit, 2018: 17). Typical anthropomorphic figurines are very rare. Traditional clay or stone figurines are accompanied by newly introduced forms, namely stone trapezoids and lozenges, as well as patinated figurines. So-called Yarmukian pebbles are still present at Wadi Rabah sites. Anthropomorphic figurines are accompanied at Wadi Rabah sites by zoomorphic figurines – backed clay objects and stone-carved horned figurines (Gopher & Eyal, 2012d: 1238-1239; Streit, 2016: 260-265). The available evidence may indicate that the symbolism of the Wadi Rabah culture underwent a transformation and shifted towards more ambiguous concepts (Gibbs, 2013; Gibbs & Banning, 2013: 361). Moreover, Streit argues this change "reflects an institutionalization of gender inequalities" and, in her opinion, a shift to stylised female figurines should be viewed in the context of "a canonization of gender perception" (Streit, 2018: 21).

According to Streit (2015ab), the Wadi Rabah culture shows many traces of interregional connections. Although the exchange of raw materials had already been observed during the Yarmukian period, it was probably only in the second part of the Pottery Neolithic that contacts and exchange intensified. The presence of obsidian imported from Anatolia and Cappadocia found at Nahal Zehora II, the discoveries of 22 Halaf seals at the site of Hagoshrim, as well as chlorite vessels (also from Hagoshrim), all point to intensive contacts between the southern Levant, on the one hand, and the northern Levant and Anatolia, on the other. These contacts resulted in the exchange of both goods and ideas. Thus, foreign northern influences are visible in lithics, figurine and pendant designs as well as in pottery (Rosenberg *et al.*, 2010). Streit (2015b) goes as far as to suggest influences from the eastern Mediterranean on the basis of the decoration on a hole-mouth jar from the site at Ein el-Jarba.

4.3.5. Nizzanim variant/phase/ware

Apart from the three cultural units described above, another frequently discussed cultural unit is the Nizzanim variant/phase/ware. This is very poorly defined on the basis of pottery recorded at merely three sites on the southern coastal plain, namely: Nizzanim (Map 4) (Yeivin & Olami, 1979); Giva't Haparsa (Olami *et al.*, 1977); and Ziqmim (Garfinkel *et al.*, 2002). Researchers fail to agree on its interpretation and chronology. For Garfinkel, the Nizzanim was an independent pottery tradition that coexisted with the Yarmukian and the Lodian cultures (Garfinkel, 1999: 97). However, Gopher and Gophna believe it belonged to the Lodian culture as its variant (Gopher & Gophna, 1993: 317-318; Gopher, 2012c: 1539). According to Streit (2017), the only date from the Nizzanim (Hv-8509: 6,790±90 BP; 5,767-5,619 cal. BC at 68.2 % or 5,878–5,541 cal. BC at 95.4%), derived from tests conducted on a short-lived bone sample before being calibrated, indicates a

position parallel to the Wadi Rabah culture, which, in Streit's estimation, is contradicted by the lithic assemblage. The relative and absolute chronology of the Nizzanim, not unlike its relationship with the other cultural entities of the Pottery Neolithic, undoubtedly requires further research.

According to Garfinkel, the pottery of the Nizzanim culture is simple in terms of technology and typology, with a low proportion of decoration (Garfinkel, 1999: 97; Garfinkel *et al.*, 2002: 88). J. Golden points out the presence of traits that were later found in the Early Chalcolithic, namely hole-mouth-type rims, ledges, as well as knob handles and pierced lug handles (Golden, 2016: 13). According to Streit (2017), the stone assemblage of the Nizzanim is characteristic for its great number of arrowheads, sickle blades (Yarmukian and Lodian types) and perforators, with considerable affinity to the PPNC tradition. Notwithstanding, in the opinion of Golden, the character of the lithics is "post-Yarmukian" (Golden, 2016: 13).

4.3.6. The Qatifian culture

This culture was distinguished on the basis of materials excavated at the site of Qatif (Map 4). Although C. Epstein, its first excavator, suggested a Pottery Neolithic chronology, it was only I. Gilead who defined this cultural unit and dated it to the later part of the Pottery Neolithic (Epstein, 1984: 218; Gilead, 1990; 2007; Gilead & Alon, 1988). The relationship of this culture with that of the Wadi Rabah is still not fully clear. According to Garfinkel, the Qatifian postdates the Wadi Rabah culture and should thus be treated as a Middle Chalcolithic cultural unit (Garfinkel, 1999: 189; see also Streit & Garfinkel, 2015: 865). However, Gopher suggests that the Qatifian was contemporaneous with the later phase of the Wadi Rabah culture (Gopher, 2012c: 1533). Furthermore, Gopher and Gophna believe that the Qatifian culture (together with another culture known as the Besorian) fills in the gap between the Pottery Neolithic and the Early Chalcolithic period (Gopher & Gophna, 1993: 337).

According to Gilead, the Qatifian culture covers a time span of approximately 5,400 to 5,000/4,900 cal. BC (Gilead, 2009: 339). In 2007, Banning, on the basis of his Bayesian models, proposed a later date for the beginning of the Qatifian culture (approx. 5,034 cal. BC) and an earlier date for its demise (approx. 4,781 cal. BC) (Banning, 2007: 89). Thus, the relative and absolute chronology of the Qatifian culture is still poorly defined while our knowledge of this cultural unit is rather scanty.

Qatifian sites are ranged over a fairly vast area, namely at Nahal Besor Herzliya, Teluliyot Batashi, Tell Wadi Feinan and ʿAin Waida (Gilead & Alon, 1988; Najjar *et al.*, 1990; Kujit & Chesson, 2002; Streit, 2017). Y. Goren (1990) remarks that Qatifian sites are located mainly in the arid southern regions of Israel and Jordan. However, he also suggests a wide distribution including the core area of the later

Ghassulian culture, although this particular view has been challenged by other researchers (Gilead, 2009: 339; Golden, 2016: 14).

The low number of sites does not make it any easier to understand the nature of the Qatifian culture. Pits, hearths, paved areas and postholes are known from the sites. At ʻAin Waida, rectilinear architectural remains were unearthed (Gopher & Gophna, 1993: 337; Streit, 2017). A large percentage of domesticated animal bones (of sheep, goats, cattle, and pigs) found at the sites may indicate that animal husbandry played an important role among the Qatifian people (Golden, 2016: 14).

Nonetheless, it was the archaeological assemblages of the Qatifian culture (pottery and lithics) that served as a basis for distinguishing it as an independent cultural unit. The pottery is coarse and crudely shaped. One of the characteristic features is a dark core resulting from poor firing and high content of organic temper. Vessel surfaces were probably grass-smoothed. In some cases, burnishing on red or reddish-brown slip occurs. Most vessels are not decorated, although plastic motifs were recorded in a few cases. Vessel forms include, first of all, jars with slightly everted necks, hole-mouth jars with loop handles and thick bases, bowls with straight walls (Goren, 1990: 101*; Gopher & Gophna, 1993: 337; Garfinkel, 1999: 189-199; Gilead, 2009: 338-339; Golden, 2016: 14). The lithic assemblage is dominated by flakes. Tools include broad and flat sickle blades (similar to those known from the Wadi Rabah culture), notches, denticulates, burins, and scrapers. A few bifacial axes and adzes have also been found at Qatifian sites (Gopher & Gophna, 1993: 337).

4.3.7. The Pottery Neolithic of the southern Levant – a summary

At the beginning of the Pottery Neolithic, southern Levantine societies entered a new stage of development. Although in the light of the latest discoveries the word ‘collapse’ must no longer be used in reference to the transition between the Pre-Pottery Neolithic and the Pottery Neolithic, the changes that took place at this time had an immense influence on the overall shape of all Pottery Neolithic societies. Despite some links between the Pre-Pottery Neolithic and the Pottery Neolithic, the groups that emerged in this area in the 7th millennium BC developed a new way of adapting to local conditions. This transformation encompassed all the cultural systems of past societies – social, economic and symbolic. Furthermore, all of the cultures distinguished by archaeologists evolved throughout their respective time spans and underwent changes. As rightly pointed out by Gopher, the cultures of the Pottery Neolithic lasted for centuries: 500 years in the case of the Yarmukian culture, 200-300 years for the Lodian culture and 900 years for the Wadi Rabah culture (Gopher, 2012c: 1537-1538). Thus, as a matter of consequence, they could not have remained unchanged.

Moreover, Gopher believes that the differences between the PPNB and the PN are most visible in subsistence strategies and social organisation (Gopher, 1998: 223). The Pottery Neolithic society included both pastoralists in desert and steppe areas and farmers in river valleys and around lakes (Simmons, 2007: 224-225). Pottery Neolithic farming groups relied on domesticated grains and pulses, as well as on the secondary products of domesticated or tamed sheep, goats, pigs, and cattle. It has been suggested that the economic importance of goats increased (Gibbs & Banning, 2013: 359). The presence of a "churn" from the later part of the Pottery Neolithic may be indicative of dairy production. Furthermore, numerous spindle whorls found at sites suggest textile production relying on goat and sheep hair. Olives were probably also used during this period. A small quantity of wild animal bones, accompanied by a gradual decrease in the number of arrowheads in archaeological assemblages (as compared with the PPN), has been interpreted as a symptom of the reduced importance of hunting. In the view of Orrelle and Gopher, the Pottery Neolithic saw the final stage of the important process of transition to total food production that had begun in the PPN (Orrelle & Gopher, 2000: 236).

Compared with the Pre-Pottery Neolithic, the sites of the Pottery Neolithic (with a few exceptions, such as 'Ain Ghazal, Sha'ar Hagolan, Jericho) are small and transitory. The most common remains are pits and pit-houses (Simmons, 2007: 224). Although they were built in various settings, all of them ensured access to water, farmland, and pasture. Settlements may have been inhabited permanently or seasonally, while the differences in size denote a kind of hierarchy in the settlement system with small farmsteads, larger villages and mega sites (Gopher, 2012c: 1552). Most structures recorded in the settlements are rectilinear or subrectangular, and are both single or multi-roomed. A few Pottery Neolithic settlements at 'Ain Ghazal and Sha'ar Hagolan or Jericho imply a sophisticated internal spatial organisation (Banning, 2010; Gibbs & Banning, 2013: 365-357).

Information on Pottery Neolithic burial customs is rather scarce due to the small number of graves. It may be assumed that people were also buried outside settlements. The dead were interred in a flexed position with their skulls intact. Graves were located inside settlements, between or within houses or other structures. Although offerings are either non-existent or scarce, their quantity grows over time (Simmons, 2007: 217; Banning, 2012: 407; Gibbs & Banning, 2013: 361-362).

The evidence for rituals and symbols from PN sites seems poor when compared with that from PPN sites. One's attention is drawn to figurines found at Pottery Neolithic sites, usually associated with fertility, magic or female deities (Gopher & Orelle, 1996; Garfinkel *et al.*, 2010; Gibbs, 2013). Decorated pottery is also believed to have some symbolic meaning (Orelle & Gopher, 2000; Gibbs & Banning, 2013: 361).

The changes that took place between the PPN and the PN are clearly visible in the material culture. Pottery Neolithic lithics are dominated by tools linked to agricultural activities. Some changes are also visible in the types and frequencies of projectile points as the importance of hunting decreased. Lithics became less standardised and most tools were formed rapidly. Debitage was dominated by flakes and there is a visible decline in the number of blades in the assemblages (Banning, 1998: 203-204; 2012: 407). However, simple tools were still accompanied by specimens made by highly skilled knappers (e.g. invasively pressure-flaked projectiles, knives, polished axes, and adzes).

Pottery is treated as a hallmark of Pottery Neolithic groups. For a long time, researchers were of the opinion that it was in the Pottery Neolithic that pottery first emerged. Even though pottery was also known from PPNB and PPNC sites of Transjordan, it was identified mostly as part of large installations (ovens, silos). The latest discoveries at the site of Kfar HaHoresh showed that pottery containers may have been known and used earlier. However, it was in the Pottery Neolithic period that ceramic vessels began to be used commonly. The only exceptions are areas in the southern desert: pastoral groups operating there did not make ceramic containers at all (Goring-Morris & Belfer-Cohen, 2014: 161-162; see also Goring-Morris, 1993).

Improvements in pottery production are visible throughout the Pottery Neolithic, as the choice of raw materials, forming techniques, surface treatments, vessel forms, and decoration continued to change. Technological developments and the related refinement of potters' skills were probably the driving force behind these changes. Other important aspects included social and symbolic factors difficult or even impossible to record in assemblages (symbolism, function, preference, fashion). According to Gopher (2012c), pottery technology reached the peak of its development in the later part of the Pottery Neolithic.

Stone tools found at the above-mentioned sites were probably used for processing agricultural products. Unlike pottery or lithics, they did not change much throughout the Pottery Neolithic, which was probably linked to their long-life span and utilitarian character.

The Pottery Neolithic societies of the southern Levant were not isolated. A connection with Egypt in this period and the introduction of the Neolithic package into the Nile Valley from the Levant during the 6th millennium BC is often suggested by many scholars. Some evidence also suggests ties with areas in the north. The presence of obsidian at Yarmukian and Wadi Rabah sites may be attributable to the involvement of Pottery Neolithic communities in interregional contacts. Incised stamps and tokens known from Wadi Rabah sites also point to an interregional exchange system (Goring-Morris & Belfer-Cohen, 2014: 163; Streit, 2015b; Carter *et al.*, 2017). Indeed, Streit suggests that the Wadi Rabah culture together

with the Halaf culture and the Amuq C occupation phase took part in a regular exchange of raw materials, finished products, and even ideas, which manifests itself in similarities in the material culture (Streit, 2015a: 339 2015b).

The archaeology of the Pottery Neolithic in the southern Levant has been dominated by the culture-historical approach. The traditional view on this period assumes the existence of several archaeological units, distinguished on the basis of their material culture, mostly including pottery and lithics. However, such an approach sheds little light on the cultural situation in the 7th and 6th millenniums BC in this area. Researchers who investigate this period rarely agree on the relative chronology of individual cultures and the mutual relationships between them. The limited availability of C14 dates is another limiting factor, as it renders the determination of the absolute chronology difficult. As a result, the Pottery Neolithic has been dissected into a few segments which are purely artificial and have little in common with the actual cultural situation in the past. In this approach, cultures become independent monolithic units, defined solely from the perspective of features visible in the material culture, combined with their place of origin and chronology. Furthermore, their absolute position on the time axis and their relative position among other cultures are not permanent and may change depending on researchers' views.