Du Big Dry à l'Holocène en Afrique de l'Est et au-delà
From the Big Dry to the Holocene in Eastern Africa and beyond
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A Singular Story between Deserts and the Nile
The Egyptian Path toward Food Production

Une histoire singulière entre déserts et Nil
La trajectoire égyptienne vers l'économie de production

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Abstract: Intensive research in recent decades has shed new light on Holocene Prehistory in northeastern Africa, particularly on the areas of the Nile Valley and adjacent deserts. Located at the northeast of the African continent, at the intersection with the Middle East, Egypt (valley and deserts) has followed a particular path between these two poles, from the end of the Big Dry to the emergence of food production during the 6th millennium and its establishment in the 5th millennium. If the Nile Valley is not very prolific until the end of the 5th millennium, partly for taphonomic reasons, the major surveys carried out in the western desert between the 1980s and the early 2000s made it possible to set up more and more complete regional chrono-cultural sequences and to develop scenarios involving economic and cultural dynamics linked with the dramatic climate changes of that period. The first populations to reoccupy the area that the Big Dry had completely emptied at the end of the Pleistocene, and which became again dwelling areas upon return to wet conditions, are Epipalaeolithic hunter-gatherers, whose economy was based on the exploitation of wild resources. Aurochs, bubals, gazelles, hares and ostriches invested around many water spots, a grassy savannah that substituted the desert thanks to the northward progression of monsoon rains. Plants adapted to this regime grew abundantly on the shores of lakes. As evidenced by the numerous grinding stones found on sites, they respond to the food needs of human groups, which are distributed throughout the African geographical area where the Nile flows. In the north, neither the sea nor the Sinai Peninsula have ever constituted any insuperable hurdles as shown by the occurrence in Heluan and Wadi Araba (eastern desert) of groups of hunters belonging to the PPNA/PPNB traditions. The transition toward new lifestyles, marked by the adoption of food production, took place over a long period of time, against the backdrop of a climate crisis that witnessed the development of Saharan hunter-gatherers within an autonomous economic and social space on one side and the mobility of pastoralists and then farmers from the Levant on the other side.
Keywords: Neolithic, Egypt, food production, domestication, climatic change, Nilotic adaptation.

Résumé : Les recherches intensives menées durant ces dernières décennies ont jeté une lumière nouvelle sur la Préhistoire holocène du nord-est africain, et plus particulièrement sur les espaces constitués par la vallée du Nil et les déserts adjacents. Localisée au nord-est du continent africain, au carrefour avec le Proche-Orient, l'Égypte (vallée et déserts) a suivi, entre ces deux pôles, un parcours particulier depuis la fin du Big Dry jusqu'aux formes nouvelles de production de nourriture, qui s'amorcent dès le VIe millénaire et se mettent en place au ve millénaire. Si la vallée du Nil est peu prolixe jusqu'à la fin du Ve millénaire, pour des raisons en partie taphonomiques, les grands sondages opérés dans le désert occidental entre les années 1980 et le début des années 2000 ont permis la mise en place de séquences chrono-culturelles régionales de plus en plus complètes et l'élaboration de scénarios mettant en jeu des dynamiques économiques et culturelles en lien avec les évolutions climatiques drastiques de cette période. Les premières populations à réoccuper les espaces que le Big Dry de la fin du Pléistocène avait totalement vidés et que le retour des conditions humides a rendu de nouveau habitables sont des chasseurs-cueilleurs épipaléolithiques, dont l'économie est fondée sur l'exploitation des ressources sauvages. Autour de nombreux points d'eau, aurochs, bubales, gazelles, lièvres, autruches investissent une savane herbeuse que la remontée vers le nord des pluies de mousson a substituée au désert. Adaptées à ce régime, des plantes croissent à profusion sur les rivages des lacs, répondant, comme l'atteste l'abondant matériel de broyage retrouvé sur les sites, aux besoins alimentaires de groupes humains, qui se répartissent dans l'espace géographique africain où coule le Nil. Cependant, au nord, ni la mer ni la péninsule du Sinaï

n'ont jamais constitué d'obstacles infranchissables et la présence de groupes de chasseurs levantins du PPNA/PPNB est attestée dans la région d'Hélouan et au Wadi Araba, dans le désert oriental. La transition vers des formes de vie nouvelles, marquées par l'adoption des économies de production, s'opère sur un temps long mettant en jeu et en interaction sur fond de crise climatique le développement des uns, les chasseurs-cueilleurs sahariens, au sein d'un espace autonome économique et social, et la mobilité des autres, pasteurs puis agriculteurs levantins.
Mots-clés : Néolithique, Égypte, économie de production, domestication, changement climatique, adaptation nilotique.

Intensive research in recent decades shed new light on Holocene Prehistory in northeastern Africa. Egypt is a gateway at the crossroad of the African and Asian continents, a geographic position that has been crucial in the transfer of people and ideas in and out of Africa. In this framework, this region has followed a singular path toward food production.

The earliest evidence of plant and animal domestication goes back as far as the 10th millennium in the Near and Middle-East with the "Pre-Pottery Neolithic" (Miller and Wetterstrom, 2000; Zeder, 2011), but the first traces of animal domestication in the deserts bordering the Nile Valley only appear at the very end of the 7th millennium BC (Linseele et al., 2014 and 2016). From 6700 BC onwards, all the near East populations have long adopted a sedentary agropastoral way of life, whereas populations living on the banks of the Nile and in the adjacent deserts conserved a way of life based on fishing, hunting and gathering.

The notion that Egypt was "late" implies that things should have happened at an expected time, as if the prevailing social structures and production modes in South-Western Asian regions in the 7th millennium, which were themselves derived from an evolution spanning several millennia (Vigne, 2011, p. 178), were a reference, and that, in comparison, other populations were in advance, or late, if they could not be in time. The diffusion of the food production economy starting from the innovation core of the Levant has been particularly studied on the islands and the northern shore of the Mediterranean. If one could previously think that the main vector of this "neolithization" was the rapid and continuous physical movement of groups of settlers (Childe, 1949; Ammerman and Cavalli-Sforza, 1984), all recent research tends to show that it was an extremely complex, long-lasting and arrhythmic process (Guilaine, 2000).

The southern shore of the Mediterranean has been less studied, but in the present state of knowledge, it seems that resistance to the diffusion phenomenon was clearly stronger.

One of the reasons advanced to explain this delay is what we called "Nilotic adaptation", with reference to the exceptional ecosystem of the Nile Valley, which formed during Late Palaeolithic (Vermeersch, 2004; Vermeersch and Van Neer, 2015). In spite of climatic variations and the "Wild Nile" crisis around 12000 BP (Butzer, 1998, p. 161-163), life on the banks of the Nile in the Early Holocene may not have been fundamentally different to life at the end of the Palaeolithic (Wetterstrom, 1996a). The only site of Elkab (Vermeersch, 1978) records this period, which is otherwise well documented in the deserts. The annual flood cycle marked out the rhythm of life, prefiguring the three seasons of Ancient Egypt. Fishing was practicable all year round depending on fish behaviour according to the hydrological regime of the river (Van Neer, 2004). The high-water period left time for harvesting the fruits of the Doum palm tree and the acacia. It was propitious to hunting large game (aurochs, hartebeest, etc.) in the grassy savanna of the low desert, when animals approached the river banks for water. The slow withdrawal of the waters provided access to *Cyperus* rhizomes and to a wide range of marsh plants (rushes, asphodels, lotus, reeds, etc.). Populations were mobile in a restricted area, living a semi-sedentary life paced by the eternal rhythm of the river cycles. In this "paradisiac" environment, no seasons or periods of the year brought shortages and suffering; only the irregular rhythm of floods could entail hardships. Prolonged flooding submerged the vegetation, which could not regenerate, whereas short flooding seasons gave rise to terrible droughts. However, overall, the system was sufficiently stable to ensure its sustainability year in year out for nearly eight millennia. At the beginning of the Holocene, the material culture of Egyptian sites was then relatively homogeneous. This lithic industry shows a laminar and lamellar soft stone debitage with large notched blades probably intended for plant work and microlithic tools used for composite hunting projectile points. This type of industry is known in the deserts and the oases where it receives different names according to local variability, among the best known are the cultures of El Adam and El Ghorab in Nabta Playa (Wendorf and Schild, 2001). On the banks of the Nile, a very similar industry dating from the 8th millennium BC has been highlighted on the site of hunter-fisher-gatherers of El Kab (Vermeersch, 1978). Beyond Egypt, laminar debitage and microliths are found throughout North Africa as far as the Maghreb (Tixier, 1963) testifying to a common cultural background from one bank to the other of the continent.

However, identifying the specific Egyptian development towards the adoption of a production economy comes up against a cruel absence of data in the Nile Valley for the 6th and 5th millennia, in spite of the huge fields of knowledge opened up by major surveys in the Eastern Sahara over the past decades. For over a century, we have been prone to circular reasoning based on data from three main sites, all located in the northern part of Egypt: Merimde Beni Salâme, west of the Delta, El Omari, near Cairo and Fayum, a huge oasis, formerly linked to the Nile by the Bahr Youssef, an arm of the river. Some new

data have emerged recently from the deltaic area itself (Saïs: Wilson et al., 2014; Samara: Guyot et al., 2022). The reason for this lack of data can probably be explained by the progressive accumulation of the sedimentary deposits that buried the sites below several metres of silts, as a response to climate change and sea level oscillations (Stanley and Warne, 1993).

1. CHANGES AND EXPERIMENTS

Around the 7th millennium BC, a humid oscillation took place within the African Humid Period, a double rain system (winter and summer) reached a large part of Egypt, filling numerous lakes in the Eastern Sahara. The populations of hunter-gatherers could then roam largely in the Eastern Sahara. In the most favorable places, they adopted an increased sedentary lifestyle: settlements were built near the seasonal lakes playas with an internal stratigraphy showing successive phases of abandonment and reoccupation according to the fluctuations of the neighboring lakes. Circular huts of a few square metres made of stone or perishable materials are attested in Farafra, Dakhla and on the plateau bordering Kharga (McDonald, 2009; Barich et al., 2014). Wild african cereals, especially *Sorghum*, were processed thanks to abundant grinding equipment and subject to management like the long-term storage in silos attested in Nabta Playa (Wendorf and Schild, 2002). The pottery, decorated with impression in the autochthonous African tradition begins to be widely in use. However, in the lack of evidence for the essential Neolithic traits as food production or at least a pastoral component, we do not use the term "Neolithic".

2. THE FIRST DOMESTICATED SPECIES IN EGYPT

The first domesticated species to appear in Egypt at the very end of the 7th millennium are animal. The earliest evidence for caprines have been found at Sodmein Cave and at the Hidden Valley site in Farafra, both dated between 6200 and 6000 cal. BC (Linseele et al., 2016). In the Fayum, the western desert (oases and plateaux) and in the eastern desert, bordering the Red Sea (Linseele, 2013), remains have been dated from the beginning of the 6th millennium BC. Our knowledge of what happened at that time in the Delta and the Nile Valley is far from complete. The domesticated animals were mostly caprines (*Ovis aries* and *Capra hircus*), but also some cattle in Fayum and Nabta Playa-Bir Kiseiba, although the question of the time of domestication of African cattle is still controversial (Lesur, 2017, p. 66-78). We must not imagine a surge of domestic animals, as only very small quantities of such remains have been found. At Sodmein Cave, for example, only 13 remains of domestic animals were recovered from a stratigraphic sequence of several metres (Vermeersch et al., 2015).

Therefore, the adoption of domesticates is not an upheaval, but an adjustment, as no fundamental change in lifestyle occurs. Groups of hunter-gatherers who had been crossing the Sahara for several millennia and who were already familiar with pottery (hunter-gatherer-potters) brought several goats and sheep with them to supplement subsistence, by providing stocks of meat, milk, wool and hide. In a semi-arid environment, with wetter periods and a seasonality mainly based on the monsoon system, these groups could travel over long distances depending on water availability. As H. Riemer (2007) asked: Are they really pastoralists? Domestic fauna is derisory compared to wild fauna, and the numerous arrowheads point towards an economy based on hunting and gathering, as showed by the abundant material for grinding. In all these Middle Holocene sites, we note the importance of wild plant species, and in particular of local African cereals, such as sorghum and millet, found in abundance in silos at Nabta Playa (Wendorf and Schild, 2002). G. Lucarini (2014) also highlights the role played by wild African cereals in the oasis of Farafra, at that time.

Where do these first domestic animals come from? Leaving aside the tricky case of cattle (Brass, 2017), sheep and goat have no wild ancestors in Africa, and thus come from elsewhere. The neighbouring Near East, where we find the wild species and where their domestication occurs at an early stage, is obviously an unrivalled candidate (Lesur, 2017, p. 56-61). Considering the sparse proof for this period, it is difficult to define the paths domestication took. Is it even pertinent to define these pathways? Once we know that these animals reached the west, and the same is true for the following period, they may have taken all the available routes: by the Delta, and from there down the valley, along the route of the oases, turning westwards towards the Maghreb or along the Sinai bordering or crossing the Red Sea. The Mediterranean is another possible route, by coastal trade (Zeder, 2018; Broodbank and Lucarini, 2019).

But the animals did not come alone. They were accompanied by humans who passed them on to the Nilo-Saharan hunter-gatherers with whom they were in contact, probably via the Sinai Peninsula, which would later become "the way of Horus", the overland route between Egypt and Canaan. This arrival coincides with a period of climatic deterioration in the Near East, around 6900-6300 cal. BC (Sanlaville, 1996), which marked the end of the PPNB, although it is not the cause, or at least not the exclusive cause. Neolithic activities then moved towards the edges of the Levantine corridor, to the east or the south, where populations who had become nomadic again were in contact with the Nilo-Saharan hunter-gatherers. Between 5500 and 5000 cal. BC, pastoralism appeared to be well established in the Sinai, based on faunal remains and the presence of enclosure type structures (Goring-Morris, 1993). These contacts between populations continued over a very long period

and provided the opportunity for the Nilo-Saharans to take what they needed without changing their way of life.

This adoption of Asian domesticates is synchronous with radical technological changes in the material culture. The lithic industry is no more based on laminar debitage but on flakes and natural thermoclastic blanks with facial and bifacial retouching. An Asian influence has been hypothesized (Shirai, 2016) but the origin of this technology is not yet determined with certainty due to the lack of reliable dates. It could as well find its source on the Egyptian limestone plateau, where the "bifacial technocomplex" is well established in the Middle Holocene (Riemer, 2007). The ceramic material as well is totally renewed with the appearance of a new type of locally made plain pottery. But things were about to change.

3. THE 5TH MILLENNIUM: THE FIRST PRODUCTION ECONOMIES

After 5300 cal. BC, the retreat of monsoon rains towards the south considerably accentuated aridity (Kuper and Kröpelin, 2006), making it progressively impossible for nomadic Saharan hunter-gatherers to continue their traditional way of life (Riemer, 2007). As a consequence, they moved towards the permanent water zones of oases, the Nile Valley and the mountainous massifs of the Sahara, creating a major population influx in these regions. This is reflected in the emergence of new sites in Egypt, whereas the desert emptied (fig. 1). In Fayum, Neolithic settlement peaked between 4600 and 4300 cal. BC, at a time when sites became rare in the Eastern Sahara (Phillips et al., 2012, fig. 2).

The main event of the 5th millennium BC is the appearance of the first domesticated plants and again, we must turn towards Fayum, where their presence has been confirmed.

3.1. Fayum in the 5th millennium: First domesticated plants

The excavation carried out by G. Caton-Thompson in the 1930s (Caton-Thompson and Gardner, 1934) brought to light two main sites, Kom W and Kom K, on the northern shore of Lake Qarun. These include a series of storage structures, large silo pits lined with basketry, which provided some of the earliest domesticated cereal seeds known in Egypt: wheat (*Triticum turgidum L.* subsp. *dicoccum*), barley (*Hordeum vulgare* subsp. *vulgare*) and seeds of *Polygonum* and *linum*. Bifacial flint sickles were found in association with this first evidence of agriculture (for the flint industry in Fayum, see Shirai, 2010). This silo technology allowed for long-term storage and is compatible with mobility (Dachy, 2014).

Previous faunal studies have shown that faunal samples are predominantly composed of fish and lake-related species. However, cattle, sheep and goats, which were present in low numbers during the previous period, increase in number. A newcomer also joins the party: the pig. It goes on to play an important role in the farming activities of the following periods.

In the early 2000s, a mission organised by the University of California retraced G. Caton-Thompson's steps and undertook new excavations in Fayum North shore (Holdaway and Wendrich, 2017). The renewed studies provided the opportunity to gather more C14 dates, establish a reliable chronological framework and compare the site with the abundant data from the Eastern Sahara (Wendrich et al., 2009; Phillips et al., 2012). The new radiocarbon dates show that the revisited sites were occupied over the period between 4600 and 4300 cal. BC (for a discussion of the radiocarbon dates, see Holdaway and Wendrich, 2017, p. 215-218).

No traces of villages at Fayum point to eastern-type settlement. These first lakeshore Neolithic populations were relatively mobile. They mainly practised fishing, used pottery and hunted, as shown by the abundant bifacial arrowheads (Shirai, 2010). This settlement system has been classified as a "low-level food producers' economy" (Holdaway et al., 2010 and 2015), a multi-component subsistence strategy.

3.2. Merimde Beni-Salâme, El Omari, the delta

Merimde Beni-Salâme and El Omari are currently the two oldest known Neolithic villages in Egypt. And this state of affairs may not be ready to change as no site of similar scope has been discovered since their excavation. They are situated in the northern part of the country, one west of the delta, the other at its southern extremity, near the present-day town of Cairo.

Merimde Beni-Salâme was discovered and excavated by H. Junker at the beginning of the 20th century, then the study was resumed in the 1980s (Eiwanger, 1984, 1988 and 1992) and investigations restarted recently (Rowland and Bertini, 2016). The site is located on a desertic plateau, west of the delta, and extends over nearly 24 ha, with several settlement phases from around 5000 to 4100 cal. BC, over a 2.5 m-thick stratigraphy. It is easy to imagine how difficult it is to understand such a site and the extent to which early excavations deteriorated the potential for site interpretation. During the early phase, the *Urschicht* (Eiwanger, 1984), the first cultivated plants appeared in the Nile Valley: emmer wheat, six-row barley, lentils and peas, and in smaller quantities, vetches and flax (Wetterstrom, 1993 and 1996b; Cappers, 2013). The faunal spectrum is dominated by wild species (fish, antelopes, hippopotami, crocodiles, molluscs, etc.), but also comprises goats, sheep and cattle, as well as pigs (Lesur, 2013). However, there are no traces of sedentarism or storage. The domestic structures consist of large shallow pits. Domesticated species only play a limited role in an economy still rooted in ancestral Nilotic adaptation. In the following levels, populations became increasingly sedentary, as shown by increased investment in developing storage structures and a rise in the proportion of

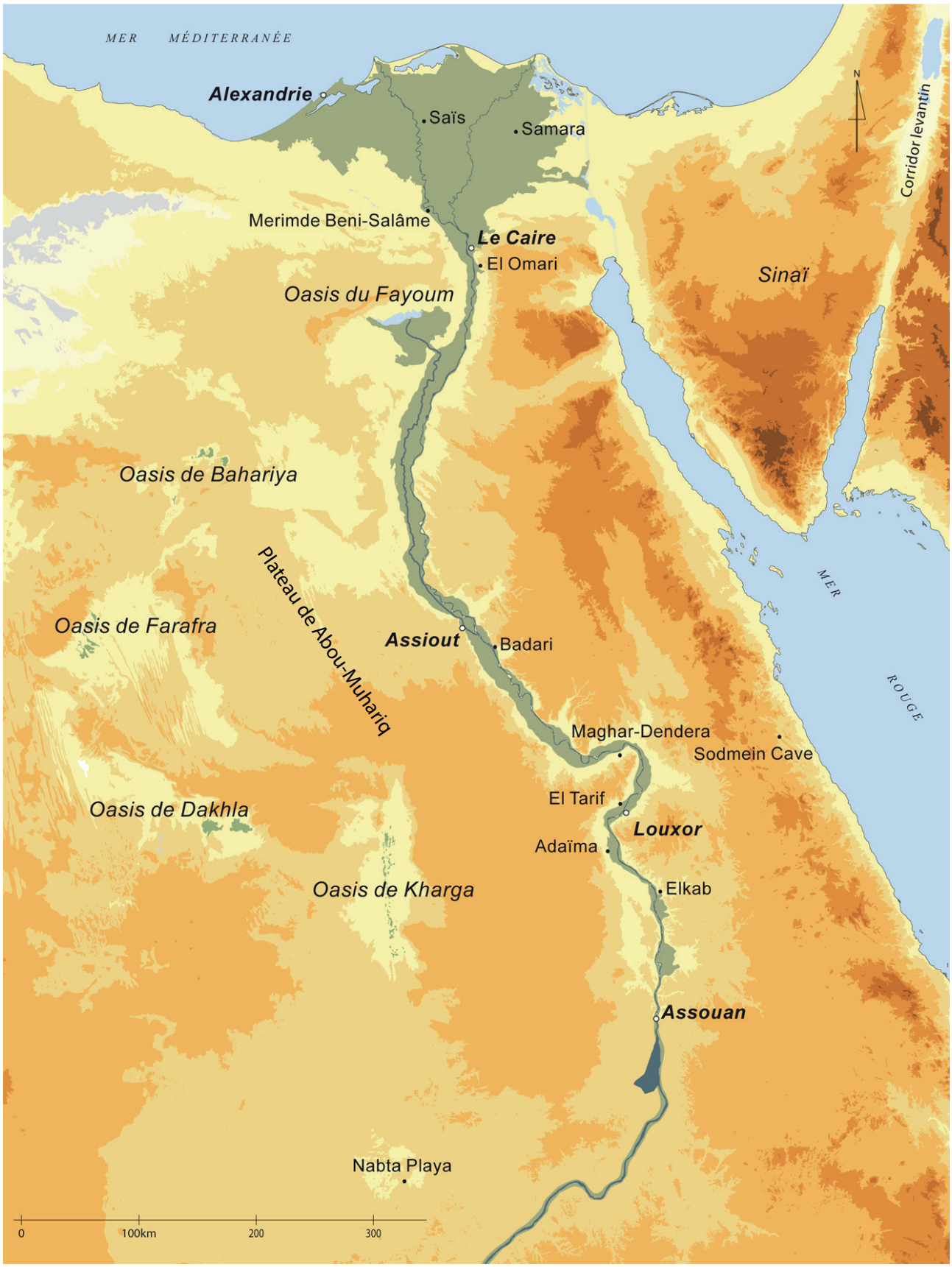

Fig. 1 – Localization of mentioned areas.
***Fig. 1** – Localisation des lieux mentionnés.*

pigs. In the last level (level V), oval dwellings in raw earth, associated with silos, constitute the first Neolithic village in Egypt.

El Omari consists of several localities spaced out along the edge of a terrace overlooking the Wadi Hof, near Helouan. Only two out of seven localities were excavated (Debono and Mortensen, 1990). Like at Merimde, the evolution of the settlement shows the transition from mobile Neolithic groups, where domestic species (plants and animals) only play a secondary role, to a sedentary community where subsistence relies more heavily on agriculture and livestock (Wetterstrom, 1996b).

In the delta, this first Neolithic is in all probability present everywhere, although almost invisible. It is only revealed when opportunities arise, in very deep test pits cutting through the deposited silts. It is important to point out that the delta is a recent geological formation and its current morphology only formed during the 6th millennium (Stanley and Warne, 1993; Butzer, 2002), when the rising sea level reduced the slope of the rivers and favoured the accumulation of silts over an average thickness of 11 m. All that was left of the former topography were small sandy mounds called "Gezira", which were flooded a little more each year by annual flows. Neolithic populations settled on the edges of these mounds and found refuge on top of them during flooding. The Neolithic levels of the pharaonic site of Saïs (Wilson et al., 2014) were unexpectedly discovered, in a 5 x 5 m test pit, down to the water table, where the deepest levels were clearly sealed by a sandy layer that could correspond to a phase of abandonment. The numerous pottery sherds point to contemporaneity with the final phases of Merimde Beni-Salâme. No domestic structure was identified. However, carbonised remains of fauna and flora show that the occupant of this settlement practised husbandry and farming. The faunal spectrum is dominated by pigs. We also find cattle, goats and sheep, as well as the donkey, which may have been used as a pack animal (for the domestication of the donkey in Africa, see Rossel et al., 2008).

There are thus few sites, and they are all in the northern part of the country; the southernmost site is located at the point of the delta. All show a progressive transition towards a production economy similar to the eastern model. The populations geographically nearest the Levantine corridor, in direct connection with the Sinai Peninsula, progressively incorporated domestic species into their semi-sedentary way of life. For millennia, they became accustomed to juggling with the complementary resources offered by an ecosystem blessed by the gods. First of all, as a supplement, then as an essential component, until domestic species became their economic staple.

However, the diffusion of farming in the Nile Valley had to respond to more complex adaptation processes. Indeed, we observe that the occupation of Neolithic settlements in the Fayum ceased suddenly around 4300 cal. BC, suggesting that cereal cultivation was only possible during the Neolithic under certain conditions (Holdaway and Wendrich, 2017, p. 220). Among the hypotheses advanced, recent data converge towards what we will call the Mediterranean option, namely, that the plants cultivated at Fayum were winter crops dependent on rains from November to April. The retreat of Mediterranean rains towards the northern latitude marked the end of Neolithic farming at Fayum (Phillips et al., 2012). But agriculture continued successfully in the valley. In order to do so, it had to make drastic changes to adapt to a totally new environment: the rising and receding of the river in a hyper arid environment. The adaptation of eastern crops to flood-recession agriculture constituted considerable progress and undoubtedly steered Egypt towards an unexpected destiny in the following millennium.

3.3. The 5th millennium in the Eastern Sahara: around the oases

During the 6th millennium BC, the projectors were directed towards the deserts and the whole valley was left in the shade. It sprung back to life during the 5th millennium, when desert populations fleeing aridity settled in the oases spread out like an arc, to the west, in parallel to the Nile Valley: Baharia, Farafra (Barich et al., 2014), Dakhla (McDonald, 2008 and 2013), Kharga (Dachy et al., 2018). Nomadic pastors moved around, but also beyond, sources and artesian wells, in a territory delimited by water supplies, as shown by the presence of exogeneous products in the archaeological material. Domestic fauna constitutes a significant part of the assemblages. We find abundant goats, sheep and cattle, whereas the pig is restricted to wet and marshy zones. Do the emmer wheat seeds found at the site of KS43, in the south of the Douch Basin indicate contacts with cultivators from the valley (Briois et al., 2012), the seasonal movement of these valley peasants in the oases or autochtonous farming practices rendered possible on an occasional basis by exceptional rains (Barnard and Wendrich, 2008, p. 514)?

3.4. Upper Egypt: Badari

Apart from the site of El Tarif, with lithic material probably dating to the beginning of the 5th millennium (Ginter et al., 1979), the oldest 5th millennium human settlement in the valley, outside the delta, is in Middle Egypt, south of the present-day town of Asyut, in the region of Badari. It is there, to the north of Upper Egypt, that about a hundred cemeteries and settlement sites were found at the beginning of the 20th century (Brunton and Caton-Thompson, 1928), spread out over nearly 30 km along the eastern bank of the river. In this zone, the very narrow valley is dominated by the steep slopes of limestone massifs. The remains of the first Neolithic culture of Upper Egypt, the Badarian, were found on the edges of deep wadis. The culture is better illustrated by cemeteries than settlements as archaeologists were mainly interested in the former. A tomb is more attractive to archaeologists in that it constitutes an enclosed complex, that can be interpreted at first glance, with intact or well-preserved funerary material, in contrast with dwelling zones with fragmented material, almost always brutally reworked by

subsequent settlement. In this way, the region of Badari was settled until the end of the predynastic period and for more than a millennium, the original occupations were trampled by the following generations. In spite of good archaeological practices for that time, the dwelling areas did not receive the same attention as cemeteries. Only G. Caton-Thompson excavated El Hemamieh in stratigraphy (Brunton and Caton-Thompson, 1928, p. 69-78) and confirmed the pertinence of the succession of main phases determined by F. Petrie. In her Memoirs, she wrote: "Brunton's style of excavation with a large labour force […] was not geared to humdrum digs of predynastic villages or encampments" (cited by Holmes, 1989, vol. 1, p. 95). Due to the lack of attention paid to the excavation of dwellings, we have very few data on domesticated species. Prospections carried out by D. Holmes and R. Friedman in the 1980s did not bring any new elements in this regard (Holmes and Friedman, 1994). We have to go further south, to the site of Maghar-Dendera, where a rescue excavation was carried out in 1987, to obtain the first faunal spectrum of a Badarian settlement site (Hendrickx et al., 2001, p. 91-102). The occupants were installed on a plateau above the Nile flood level and lived mainly from fishing, to a lesser extent from husbandry and the collection of molluscs. We have no indications on the flora. In his book, *The Badarian Civilisation*, G. Brunton evokes the presence of cereals, but with no further details (Brunton and Caton-Thompson, 1928, p. 40). W. Wetterstrom (1993) highlights the problematic nature of the botanical record (see also Cappers and Hamdy, 2007). Among the main elements of the lithic assemblage, the bifacial sickle blade and bifacial arrowheads are similar to those found at Fayum (Holmes, 1989, p. 106; Shirai, 2010, p. 307). From a chronological point of view, there are few radiometric dates. They place the Badarian at the very end of the 5th millennium, between 4400 and 4000 cal. BC (Hendrickx, 1999; Hendrickx et al., 2001, p. 89-90). The recent new assessment program of radiometric dates (Shortland and Bronk Ramsey, 2013) extends that timescale to the beginning of the 4th millennium, between 4400 and 3800 cal. BC (Dee et al., 2013).

The origin of these first farmers of Upper Egypt is a debate beyond the scope of this paper. Our focus naturally turns towards the west and south, towards regions from where mobile pottery-using people mainly came after the arid episode of the end of the 7th millennium (see Wengrow et al., 2014). Indeed, the material from the valley tombs presents clear similarities with goods from the cemeteries of final Neolithic desert populations, discovered in particular at Gebel Ramlah (Kobusiewicz et al., 2010), and dated between 4500 and 4400 cal. BC.

CONCLUSION

The socio-economic transformations in Southwest Asia which led to the emergence of farming lasted for at least four or five millennia. Rather than a revolution, it was a slow innovation process which took place at different times in different ecosystems (Zeder, 2011). North Africa and Egypt in particular followed another path. At the beginning of the Holocene, nomadic hunter-gatherers, who already used pottery, followed the movement of monsoon rains towards the north. For several millennia, these communities of African origin crossed the Eastern Sahara and undoubtedly entered the Nile Valley. There, they were in contact with populations with the same lifestyle based on the intensive exploitation of wild resources in a contained territory, but also with the same vision of social life and relationships between individuals. During this long period of time, local plants, including sorghum, were intensively used, and early experiments with animal husbandry very probably took place. We must keep in mind that everywhere in the world, the birth of domestication does not start when changes in bone morphologies are visible, but results from a long process involving the intensification of relationships between animals, plants and human societies (Vigne, 2011).

Things changed after the arid phase of the end of the 7th millennium when the spotlight focused on the Levant. The deltaic plain, at the crossroads between Africa and the East, became an actor in the anthropization of the landscape. The history of the first livestock in Egypt very probably lies under several meters of Delta silt.

Saharan hunter-gatherer-foragers added a few goats, sheep and cattle to their way of life, which followed them in their seasonal displacements. This new form of subsistence cannot be classified under the dualistic model of hunter-fisher-foragers *vs* agriculturalists-pastoralists. It gave way to the concept of "middle ground" or "low-level-food producing society" that developed around the Mediterranean during the Mid-Holocene (Smith, 2001; Phillips et al., 2012). This means that, although the domesticated species do indeed originate in South-Western Asia, the process of domestication as part of the technical, social and symbolic system (Vigne, 2011) is local, parallel but independent of the East.

The 5th millennium witnessed the widespread adoption of domesticated livestock and the gradual evolution of herding societies. The shift in the monsoonal summer rain belt towards the south entailed the aridification of the Sahara and the retreat of populations towards permanent water zones. From that time onwards, the saga was played out on different stages. In Egypt, the major change came from the introduction of domesticated plants in areas with a Mediterranean rainfall regime. For Fayum, it was a one-way story. Whereas, in the valley, the adaptation of these plants of Mediterranean origin to receding-water agriculture constituted the starting point of a new adventure. The adoption of a farming-based economy, which was the case in the 5th millennium and in particular after 3500 cal. BC, is not a mere technical adjustment, however intelligent it is. It indicates profound underlying social and spiritual transformations, some of which undoubtedly predated it (Cauvin, 2000). Egyptian civilisation is probably at an embryonic stage somewhere between these two main trends, which are different from a biological, technical, social and cultural

point of view; one formed according to an eastern model, the other immersed in the African universe of nomadic pastors. Is it a coincidence that the oldest known crops in the Nile Valley are situated to the north of Upper Egypt, at the junction of the north-south east-west routes?

In this respect, we need to address a final point, namely the role played by demography. Did successive waves of Saharan nomads boost Nilotic demography and contribute to the adoption and the development of agriculture? Or, on the contrary, was the transition to farming responsible for the demographic explosion recorded everywhere in the world when agriculture was adopted? This phenomenon has been called Neolithic Demographic Transition (NDT; Bocquet-Appel and Bar-Yosef, 2008).

The succession of arid episodes during the course of the Holocene engendered a concentration of the population around permanent water zones and, consequently, a demographic increase in these places. But we cannot speak of an influx. It is more of a progressive infusion that did not fundamentally destabilize ways of life. On the other hand, the transition towards agriculture, and the accompanying sedentarism, gave rise to a multiplication of sites corresponding to the NDT model. Recent studies (Boquet-Appel, 2008) have shown the major role played by sedentarism *vs* mobility in the increase in female fertility, and list the demographic increase as a consequence and not as one of the causes of the transition to agriculture. The return to a homeostatic balance, that is when the mortality rate counterbalances the natality rate, occurs in a second stage by the emergence of new pathogens linked to domestication and their diffusion in denser village units (Boquet-Appel, 2005, p. 18). The tuberculosis peak in the children's cemetery of the Predynastic site of Adaïma, in upper Egypt, is undoubtedly an illustration of this (Crubezy, 2017 and 2018). But we are already in the antechamber of pharaonic history.

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