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Volume dedicated to Prof. Michał Kobusiewicz on his 80th birthday

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Editorial

The current, 58th volume of *Archaeologia Polona* with the special theme – *The Prehistory of North-East Africa* is devoted to Professor Michał Kobusiewicz on the occasion of the 80th anniversary of his birth. Being aware of Michał's many significant research achievements, we would like through this collection of contributions to especially honour the African chapter of his scientific life. Although he has been engaged in activities in several African countries, over most of this period, his main areas of research were Egypt and Sudan. The Polish contribution to research on the prehistory of NE Africa has a long tradition. This goes back at least to the launch and initial projects of the Combined Prehistoric Expedition (CPE) in Egyptian and Sudanese Nubia in the early 1960s (Wendorf 1965). Michał Kobusiewicz was part of the first wave of Polish prehistorians contributing to the work of the CPE, joining the expedition in 1967. Since then, he has taken part in several dozen African missions resulting in abundant publications greatly increasing knowledge about the past of NE Africa. We may for example mention the articles in *Science* (Wendorf *et al.*, 1976; 1984) or the monograph *The Production, Use and Importance of Flint Tools in the Archaic Period and the Old Kingdom of Egypt* (Kobusiewicz 2015). A detailed account of the African activities and publications of Michał Kobusiewicz are given in the initial chapters of this volume, the first by Romuald Schild – *The African Chapter in the Scientific Life of Professor Michał Kobusiewicz* and the second, compiled by Przemysław Bobrowski – *African Research of Michał Kobusiewicz: Calendar and Bibliography*. Judging by this presentation of the geographical and chronological scope of interests and scientific results, it would perhaps not be an exaggeration to suggest that Michał Kobusiewicz, may justifiably be considered as one of the few individuals that could be considered as a colossus of African archaeology. Fred Wendorf, in his *Desert Days*, describing a field school for Egyptian inspectors writes that Michał was: "regarded as a great teacher and knew more about lithic typology than anyone in the camp, except possibly Schild" (Wendorf 2008: 272).

The papers in this volume honouring Michał Kobusiewicz have been written by his friends, colleagues, acquaintances and also by former students and present collaborators. All consider the archaeology of NE Africa with the same broad chronological and thematic scope as the interests of Professor Kobusiewicz.

The first four papers consider the oldest episodes of hominin presence in NE Africa. Mirosław Masojć and colleagues in their paper *Acheulean Bifaces from Khor Shambat, Omdurman (Sudan), Comparative Studies in the Nubian Context* discuss a recently discovered Palaeolithic assemblage from Omdurman and its statistical comparison with several other Acheulean sites. The second paper, *The Middle Palaeolithic Assemblage with Bahari Technique from Site 21b in Deir el-Bahari (Western Thebes), Upper Egypt* by Barbara Drobniewicz and Bolesław Ginter presents interesting knapping technique observed in the Egyptian Palaeolithic assemblage from Deir el-Bahari. Marta Osypińska and colleagues focus on the *The PalaeoAffad Project and the Prehistory of the Middle Nile*. The last article in this group, by Donatella Usai, *The Qadan, the Jebel Sahaba Cemetery and the Lithic Collection*, reassesses the chronology and affiliation of the world-famous Sudanese cemetery with the oldest evidence of warfare.

The second group of contributions consider Mesolithic and Neolithic societies both from Egypt and Sudan in the form of a site reports, geophysical surveys and a synthetic papers. Lenka Varadzinová and Ladislav Varadzin report on *The First Notes on the Second Khartoum Mesolithic Cemetery at Jebel Sabaloka (Sudan)*. Another Mesolithic and Neolithic cemetery from Omdurman, Sudan is presented by Maciej Jórdeczka and colleagues in the next paper, *Neolithic Inhabitants of Khor Shambat 1, Sudan*. The third paper in this group, *Comparison of Different Gouge Collections from Central Sudan* by Katarína Kapustka and Małgorzata Winiarska-Kabacińska, involves technological and functional analysis of Neolithic gouges from Sudanese collections. An important Neolithic sites in the Egyptian Desert is discussed by Jacek Kabaciński and a group of co-authors and by Przemysław Bobrowski and colleagues in the next two papers, *Towards Understanding the Late Neolithic of the Egyptian Western Desert: Gebel Ramlah, Site E-16-02* and *The Early Holocene Archaeological Evidence (Site E-05-1) in Bargat El-Shab (Western Desert Egypt)*. It must be said that geophysical surveys have been very rarely undertaken on prehistoric NE African sites, but one is reported by Fabian Welc and Przemysław Bobrowski from the area of Bargat El-Shab in the paper titled: *Results of Geophysical Survey in Bargat El-Shab in Southern Egypt. Insight into the Early Holocene Settlement Pattern of the El Nabta/Al Jerar Interphase*. The last paper in this group, *Recent Research on Neolithic and Predynastic Development in the Egyptian Nile Valley* by Agnieszka Mączyńska, is an important review of the recent results of studies concerning the origins of the Neolithic in Northeastern Africa.

The next group, of two papers, considers the later prehistory of the area. The first of them, *A few Remarks about Cosmetic Palettes from Tell el-Farkha* by Krzysztof Ciałowicz discusses an aspect of this important site in the Nile delta. The second paper, *Flints from the Road: on the Significance of two Enigmatic Stone Tools Found along the Darb el-Tawil* written by Heiko Riemer and Karin Kindermann, discusses the phenomenon of the interpretation of surface lithic finds and the issue of knapped stone artefacts being produced and used in the period after the Stone Age in Africa.

Rock art, one of the beloved subjects of Michał Kobusiewicz's research, is the theme of the fourth and last group of papers in this volume. Friederike Jesse presents her observations from the Sudanese site Zolat el Hammad in the paper titled: *Rock Art and Archaeology – a Short Visit to Zolat el Hammad, Northern Sudan* and Paweł Lech

Polkowski discusses rock art from Egyptian Dakhleh Oasis: *Animal Hill – a Large Prehistoric Rock Art Site CO178 in the Central Dakhleh Oasis, Egypt*.

We believe that the above listed contributions, in many cases based on or discussing the results of Michał Kobusiewicz's research, represent the range of his scientific involvement with Africa, and thus form a tribute to his work. These fifteen papers have been reviewed and improved by a group of international reviewers to whom we owe our gratitude. In alphabetical order the following reviewers were so kind to contribute to improving this volume: Mirosław Furmanek (Wroclaw), Elena Garcea (Cassino), Maria Gatto (Leicester), Bolesław Ginter (Cracow), Tomasz Herbich (Warsaw), Karla Kroeper (Berlin), Alice Leplongeon (Leuven), Maria Kaczmarek (Poznan), Andrea Manzo (Naples), Arkadiusz Marciniak (Poznan), Henryk Paner (Gdansk), Tomasz Płonka (Wroclaw), Włodzimierz Rączkowski (Poznan), Andrzej Rozwadowski (Poznan), Jiří Svoboda (Brno), Philip Van Peer (Leuven), András Zboray (Budapest).

Finally, the editors would like to express our wish that this volume will reach a broad audience. It was a pleasure to edit and work on the volume to honour the Professor whom we not only respect as a scientist but also admire a lot as a person. On behalf of all the contributors to this volume, the authors and the reviewers, we would like to wish Michał many more successes and achievements in his ongoing work in Africa!

Przemysław Bobrowski
Mirosław Masojć

REFERENCES

Kobusiewicz, M. 2015. *The Production, Use and Importance of Flint Tools in the Archaic Period and the Old Kingdom of Egypt*. Oxford.

Wendorf, F. 1965. *Contributions to the Prehistory of Nubia*. Dallas, Texas, Fort Burgwin Research Center and Southern Methodist University Press.

Wendorf, F. 2008. *Desert Days: My Life As a Field Archaeologist*. Dallas, Texas, Southern Methodist University Press.

Wendorf, F., Schild, R., Close, A. E., Donahue, D. J., Jull, A. J. T., Zabel, T. H., Wieckowska, H., Kobusiewicz, M., Issawi, B. and el Hadidi, N. 1984. New radiocarbon dates on the cereals from Wadi Kubbaniya. *Science* 225(4662): 645–646.

Wendorf, F., Schild, R., Said, R., Haynes, C. V., Gautier, A. and Kobusiewicz, M. 1976. The Prehistory of the Egyptian Sahara. *Science* 193(4248): 105–114.

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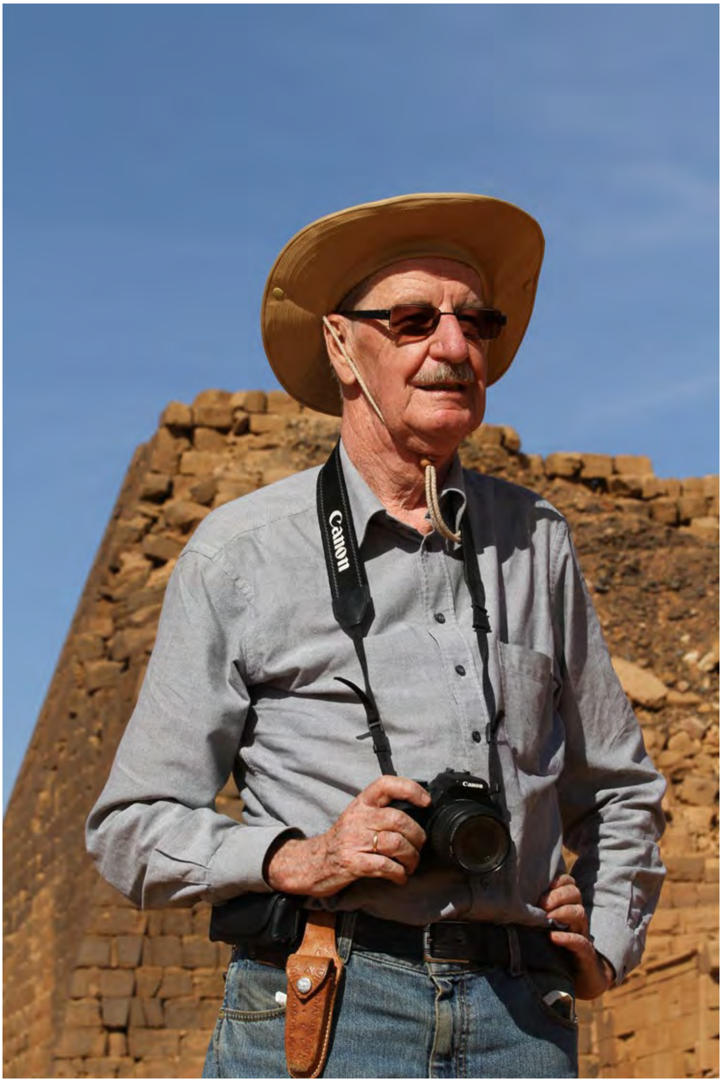

Photo: M. Jórdeczka

Professor Michał Kobusiewicz at Meroe (Sudan, 2012)

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The African Chapter in the Scientific Life of Professor Michał Kobusiewicz

Romuald Schild[a]

PREFACE

I met Michał for the first time in the spring of 1959 while recruiting young archaeologists to work on the excavation of the Final Palaeolithic and Mesolithic camps of Rydno Complex, a Stone Age red ochre quarry and socio-economic centre. A fresh MA in archaeology, I was then working as a field manager for Stefan Krukowski, an unorthodox prehistorian, directing work in the very significant Rydno Project in Central Poland. During the project, young Kobusiewicz turned out to be a competent, eager student and a good field companion. We spent the next field season together on a foot-survey along the Late Glacial left bank Vistula terrace between Włocławek and Płock in Central Poland. We slept in farmers' barns, cooked one-dish meals in a pot that we carried fastened to our backpacks, and duly recorded many, today classic, Mesolithic sandy sites. Since these early years of our acquaintance, our professional, as well as private lives, became closely intertwined. We worked jointly in many Combined Prehistoric Expedition (CPE) missions in Egypt and at several sites in his cherished "prehistoric Arcadia", or the Wojnowo Region in Western Poland.

There are two sizable independent slices of archaeological research carried out by Michał Kobusiewicz: the Prehistory of Northeastern Africa and the Final Palaeolithic and Mesolithic archaeology of the European Plain. Additionally, he has been engaged in comparative studies of Prehistoric foragers in Europe and North America at the end of the Pleistocene.

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THE COMBINED PREHISTORIC EXPEDITION

Let us tackle the first expression of Michał's fascination with human Prehistory. It all began in the winter of 1967 when he, together with Drs Waldemar Chmielewski and Hanna Więckowska joined the Combined Prehistoric Expedition (CPE), in work led by Dr Joel L. Shiner, operating in Central and Eastern Sudan in the Debba and Kashm El Girba areas. The group concentrated on surveys and limited excavations of Palaeolithic and Neolithic settlements and ceased activity in the same year. Two years later, Michał joined another project of the CPE directed by Fred Wendorf in Egypt. The 1969 field season began a long, although intermittent association with the CPE, which ended with his retirement in 2010. The last three years before his retirement, Michał served as the director of the expedition.

While in the field with the CPE, Professor Kobusiewicz took part in several significant projects such as:

1. The Northern Fayum Project, Lower Egypt, 1969 season. The work concentrated on the Quaternary geomorphology, and Stone Age archaeology of the lakeshore dwellers.
2. Bir Sahara and Bir Tarfawi Basins in the Atmur el Kibeish Peneplain (Southwestern Desert of Egypt), 1973, and 1974 seasons. Initial excavations of Final Acheulian and Middle Palaeolithic sites.
3. Nabta Playa Basin (Southwestern Desert), 1975 and 1977 seasons; initial excavation of sites E-75-6 and E-75-8.
4. Bir Kiseiba Project, Southwestern Desert, 1979, and 1980 season. Excavation of the El Gorab complex settlement (site E-79-4).
5. Wadi Kubbaniya Project, north of Assuan, 1978, 1982, and 1983 season. Excavation of several Late Palaeolithic campsites.
6. Gebel Ramlah cemeteries, Southwestern Desert, discovered by Kimball M. Banks and Michał Kobusiewicz in 2000 during a survey along the southern outskirts of the Eocene Plateau, 2001–2003 seasons. The excavations directed by Michał revealed the richness of these first Final Neolithic (Predynastic) cemeteries found in the Western Desert of Egypt, and opened the way to the subsequent essential discoveries in the Gebel Ramlah area.
7. The Central Sinai Salvage Project, 1996 season. The mission excavated several new prehistoric sites ranging in time from Middle Palaeolithic to Bronze Age. Three sites in the Sinai were dug by Michał and published in 1999. Among these was a Middle Palaeolithic Split Rock Shelter whose lithic assemblage falls within the time horizon of the Nubian Levallois method.

The work of the Combined Prehistoric Expedition gave rise to an abundant flow of publications in which Professor Kobusiewicz had a considerable share as an author and co-author of many important papers. Of these, one must mention the reports on site E-79-4 in El Ghorab Playa published in the volume dedicated to the Bir Kiseiba Project in 1984. There are also six reports on the Halfan, Kubaniyan, and Ballanan-Silsilian Late Palaeolithic sites in Wadi Kubbaniya, printed in 1980 and 1989 in the monographs of the Wadi Kubbaniya Project.

Of particular interest is the beautifully printed monograph on the Gebel Ramlah cemeteries by Kobusiewicz *et al.*, published in 2010. It is a detailed account of the physical characteristics of the recovered skeletons, description of the assemblages of grave goods, as well as reports on the chronology, and geomorphologic context of the finds. Apart from the monograph, a series of separate papers discussing particular questions relating to the cemetery have been published in various journals.

Several papers authored by Michał address general questions. Among these is an early paper presenting the Prehistory of Northeastern Africa between 16th and 5th Millennia BCE (in Polish) published in 1976 (and 2006 in French), as well as a lengthy article on new ideas concerning the Neolithisation of Northeastern Africa (in Polish) published in 1981, and an article on the transition from Late Palaeolithic to Neolithic in Northeast Africa (in German) in 1980.

THE KADERO PROJECT

In 1982, Michał joined the Kadero Project run by his close friend, Dr Lech Krzyżaniak. The project operated under the auspices of the Polish Archaeological Mission in Cairo. His main job was to study and describe in detail the chipped stone assemblages and stone processing at this vast and rich key Khartoum Neolithic site located on the east bank of the Nile, close to Khartoum. The job took six field seasons in 1982, 1983, 1989, 1991, 1993, and 2001. It ended with an extended essay on the lithic implements from Kadero published in 2011, and two smaller studies printed in 1996 and 2009.

STUDYING THE ROCK ART IN DAKHLEH

In terms of longevity, perhaps the most extensive field project undertaken by Professor Kobusiewicz was the study of the rock art of Dakhleh. Based in the resthouse of the Dakhleh Oasis Project, then operated by Dr. Anthony Mills, the venture was called the "Dakhleh Oasis Petroglyph Unit". The project, sponsored by the Centre of Mediterranean Archaeology, Warsaw University, was inherited from Professor Lech Krzyżaniak after the latter's premature death in 2004. Michał participated in the venture since 2000 and carried it until 2013 throughout ten field seasons, assisted by Ewa Kucewicz and Eliza Jaroni and later also by Dr Andrzej Rozwadowski and Paweł

Polkowski. Until now, twelve papers on the Dakhleh petroglyphs have been published by the group between 2007 and 2018.

ARCHAIC PERIOD AND OLD KINGDOM FLINT PROCESSING

Invited by Anthony Mills in 2000, Michał began to work on flint assemblages recovered from a Vth Dynasty settlement at Ain El Gazzareen in Dakhleh. The work took ten years and formed the skeleton of a pioneering monograph dealing with knapped flint processing in the Archaic Period and the Old Kingdom of Egypt. The book, published in 2015, presents a detailed typology and technology of the flint knapping during the Archaic and Old Kingdom periods as well as discussing the systems of flint procurement and distribution. It also portrays the social, religious, and prestige roles played by flint tools in the Early Bronze Age societies in Egypt.

THE RED SEA HILLS, BIR NURAYET AND GEBEL MAGARDI

In 2010 Dr Przemysław Bobrowski won a substantial Ministry of Science grant to study a rock art complex in the Red Sea Hills at Bir Nurayet discovered several years before by Krzysztof Pluskota and Arita Baaijens. Michał assumed the role of a consultant of the entire venture. The mission was concluded in 2012, yielding wealthy data on the prehistoric rock art mostly concentrated on scenes portraying cattle, however, also depicting many, probably later, scenes including mounted camels. The rock art complex is closely associated with the nearby Gebel Magardi, a lonely mountain of a phallic shape. A cache of phallic clay figurines dated to the 5th or 6th century BCE found close to the mountain, and petroglyphs depicting the mountain indicate a cult of fertility deeply embedded in the prehistory of the region.

BARGAT EL-SHAB PROJECT

In 2016, the Ministry of Science awarded Professor Kobusiewicz a three-year grant to continue the study, began by the CPE in 2005, of the Stone Age Prehistory of the Bargat El-Shab Playa Basin. The Playa lies in the south-eastern part of the Nubia Shab Pediplain, very close to the Sudanese border. The group, composed of Przemysław Bobrowski, Maciej Jórdeczka, Fabian Welc, Hebatallah A. A. Ibrahim, Maria Lityńska-Zając, Agnieszka Mączyńska, Mirosław Masojć and Paweł Wiktorowicz, excavated in the 2017 and 2018 field seasons the Ru'at El Asnam, Final Neolithic tumuli, and megaliths located around the playa.

THE DELTA OF THE NILE: KOM EL HISN AND MINSHAT ABU OMAR

As a highly recognized expert in Egyptian Stone Age flint processing, Professor Kobusiewicz has very often been invited to consult various Predynastic and Early Dynastic archaeological excavations or to study already recovered assemblages of chipped stones. One of these was the Kom El Hisn Project (1984, 1986, 1988) run by Dr Robert J. Wenke, then a Director of the American Research Centre in Cairo, and Dr Richard Redding. Kom El Hisn, in Western Delta, in the Early Old Kingdom, was the capital of a *nome* and an important economic centre and one of a few Old Kingdom sites excavated in the Delta. The primary target of the project was to learn what kind of relations the Egyptian State had with its provinces and what was the importance of the Delta for the Egyptian State structure (compare Wenke 2009: 110). In this respect, a study of the chipped and ground stone assemblages was a must because of the role played by stone working in the Early Dynastic economy. Prof. Kobusiewicz wrote extensively about the Kom El Hisn lithic material in several publications issued in 1988, 1989, 2015, 2016, and 2018.

In contrast to the Kom El Hisn Mission, there was another, rather short participation of Michał in The Nile Delta Project directed by Dr Dietrich Wildung of the Staatliche Sammlung Ägyptischer Kunst in Munich in 1988 season. This time it was in the study of the Predynastic site of Minshat Abu Omar in the Eastern Delta where Michał's expertise was sought.

SMALL JOBS IN SUDAN

There were also small jobs done on invitations from other expeditions in Sudan. In 1993, a few Stone Age sites were recorded by Michał Kobusiewicz and Jacek Kabaciński near the Temple of Kawa, north of Khartoum, during a mission lead by Dr Derek Welsby of the British Museum, and at El Gaddar, and Hambukol near Old Dongola, dug by Dr Krzysztof Grzymski of the Royal Ontario Museum. A year later, Kobusiewicz and Kabaciński returned to Hambukol and worked on a newly discovered large Middle Palaeolithic site that they labelled Jebel Kobkabba. A decade later, in 2003, a short survey in the Bayuda Desert, associated with the archaeological salvage work in the IV Cataract Area, terminates Michał's work relating to the Nile Valley.

A SURVEY IN BOTSWANA AND THE WORK IN TANZANIA

The survey in Botswana was a hectic assignment. In 1999, Marek Marciniak, a Verbite priest, and an archaeology devotee, invited Professor Kobusiewicz to Botswana for a month-long survey of various archaeological sites. The survey showed the tremendous archaeological potential of the country, including the Stone Age complexes there.

Michał spent the summer field seasons of 2004 and 2005 in Serengeti, Tanzania, working with the late Dr John R. F. Bower, his close friend and co-author of a book on prehistoric foragers in Europe and North America at the end of the Ice Age, published in 2002. They excavated the promising Late Middle Palaeolithic Loyongalani site, most probably associated with *Homo sapiens.* The bankruptcy of the Serengeti Foundation, who sponsored the project, terminated the work at the Loyongalami site.

DYMACZEWO AND THE INTERNATIONAL COMMISSION FOR THE LATER PREHISTORY OF NORTHEASTERN AFRICA

In 1980, shortly before martial law was declared in Poland on December 13th, 1981, Michał Kobusiewicz of the Institute of the History of Material Culture, Polish Academy of Sciences (now the Institute of Archaeology and Ethnology of the Polish Academy of Sciences) and Lech Krzyżaniak of Poznan's Archaeological Museum had initiated the first Dymaczewo Conference at Dymaczewo, a village near Poznan, dedicated to the Prehistory of Northeastern Africa. A few dozen researchers were gathered for the meeting, including several prominent figures in the field as John Alexander, J. Desmond Clark, Fred Wendorf, and Peter Shini. The gathering also instigated The International Commission for the Later Prehistory of Northeastern Africa. It is an intermittent conference meeting every four years, first in Dymaczewo and recently in Poznan in the facilities of the Archaeological Museum. Since the beginning, the conference has become very popular among scholars working in the field. In 2019, the 11th consecutive meeting took place in July 2019 in Poznan. Proceedings of this international symposium are published by Poznan Archaeological Museum in the series titled *Studies in African Archaeology*.

PARTING WORDS

The above personal remarks signal only a portion of Michał's achievements in the domain he practiced leaving apart the work done in Poland. Unquestionably, Michał is *un personnage* in World's Archaeology and a good, humorous storyteller. To those who might doubt these words, one can recommend Michał's memoirs written with general readers in mind, entitled *Moje wspomnienia z archeologią w tle* (*My Memoirs with Archaeology in the Background*).

VERY SELECTED REFERENCES

Kobusiewicz, M. 2019. *Moje wspomnienia z archeologią w tle*. Poznań.
Wenke, R. J. 2009. *The Ancient Egyptian State. The Origins of Egyptian Culture (c. 8000–2000 BC).* Cambridge.

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African Research of Michał Kobusiewicz: Calendar and Bibliography

Przemysław Bobrowski[a]

Abbreviations used in the text:

CPE	Combined Prehistoric Expedition;
PCMA	Center of Mediterranean Archaeology, Warsaw University;
DOP–PU	Dakhleh Oasis Project – Petroglyph Unit;
IAE PAS	Institute of Archaeology and Ethnology Polish Academy of Sciences.

Table 1. Calendar of African study visits of Michał Kobusiewicz.

Year (month)	Country	Site	Chronology / Period	Mission (project manager)
1967	Sudan	Debba, Khashm El Girba Area	Palaeolithic, Neolithic	CPE Joel L. Shiner
1969 Feb., Mar.	Egypt	Fayum Area	Stone Age	CPE Northern Fayum Project Fred Wendorf
1970 Jul., Aug.	Lebanon	Nahr Ibrahim Cave	Palaeolithic	Columbia University Ralph Solecki
1973 Jan.	Egypt	Bir Sahara, Bir Tarfawi (Western Desert)	Palaeolithic	CPE Fred Wendorf and Romuald Schild
1974 Feb., Mar.	Egypt	Bir Sahara, Bir Tarfawi (Western Desert)	Palaeolithic	CPE Fred Wendorf and Romuald Schild
1975 Feb., Mar.	Egypt	Gebel Nabta (Western Desert)	Neolithic	CPE Fred Wendorf and Romuald Schild

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Fig. 1. Gebel Nabta, Egypt, Western Desert (1976). Michał Kobusiewicz with workers, Bedouins from the Maarif clan. Photo: M. Kobusiewicz, private collection.

Fig. 2. Bir Sahara, Egypt, Western Desert (1974). Standing, from the left: Romuald Schild, Peter Jeschofnig, Michał Kobusiewicz, Rushdi Said (Director, Geological Survey of Egypt), Fred Wendorf, Mohammad el Hinnawi (Geological Survey of Egypt).
Kneeling, from left: Achilles Gautier, Michael Wendorf and staff of the Geological Survey of Egypt.
Photo: Vance Haynes (private collection of M. Kobusiewicz).

Year (month)	Country	Site	Chronology / Period	Mission (project manager)
1977 Jan., Feb.	Egypt	Gebel Nabta (Western Desert)	Neolithic	CPE Fred Wendorf and Romuald Schild
1978	Egypt	Wadi Kubbaniya (Nile Valley)	Palaeolithic	CPE Fred Wendorf and Romuald Schild
1979 Jan.–Mar.	Egypt	Bir Kiseiba (Western Desert)	Neolithic	CPE Fred Wendorf and Romuald Schild
1980 Jan.–Mar.	Egypt	Bir Kiseiba (Western Desert)	Neolithic	CPE Fred Wendorf and Romuald Schild
1982 Feb., Mar.	Egypt	Wadi Kubbaniya (Nile Valley)	Palaeolithic	CPE Fred Wendorf and Romuald Schild
1982 Dec.	Sudan	Kadero	Neolithic	PCMA Lech Krzyżaniak
1982/1983	Sudan	Survey along Blue Nile (to Roseires); Sennar, Jebel Moya	Prehistory	PCMA Lech Krzyżaniak
1983 Jan., Feb.	Egypt	Wadi Kubbaniya (Nile Valley)	Palaeolithic	CPE Fred Wendorf and Romuald Schild
1986 Jul.–Sep.	Egypt	Kom El-Hisn (West Delta)	Old Kingdom	University of Washington / American Research Center Robert Wenke
1987 Jan.	Sudan	Kadero	Neolithic	PCMA Lech Krzyżaniak
1988 Apr.–Jun.	Egypt	Kom El-Hisn (West Delta)	Old Kingdom	University of Washington / American Research Center Robert Wenke
1988 Sep.–Nov.	Egypt	Minshat Abu Omar (East Delta)	Predynastic	National Museum of the Egyptian Art, Munich Dietrich Wieldung
1989 Feb., Mar.	Sudan	Kadero	Neolithic	PCMA Lech Krzyżaniak
1991 Nov., Dec.	Sudan	Kadero	Neolithic	PCMA Lech Krzyżaniak
1993 Nov.	Sudan	Kadero	Neolithic	PCMA Lech Krzyżaniak

Fig. 3. Kadero, Sudan (1987). Michał Kobusiewicz with Jacek Kabaciński during an experiment. Photo: L. Krzyżaniak.

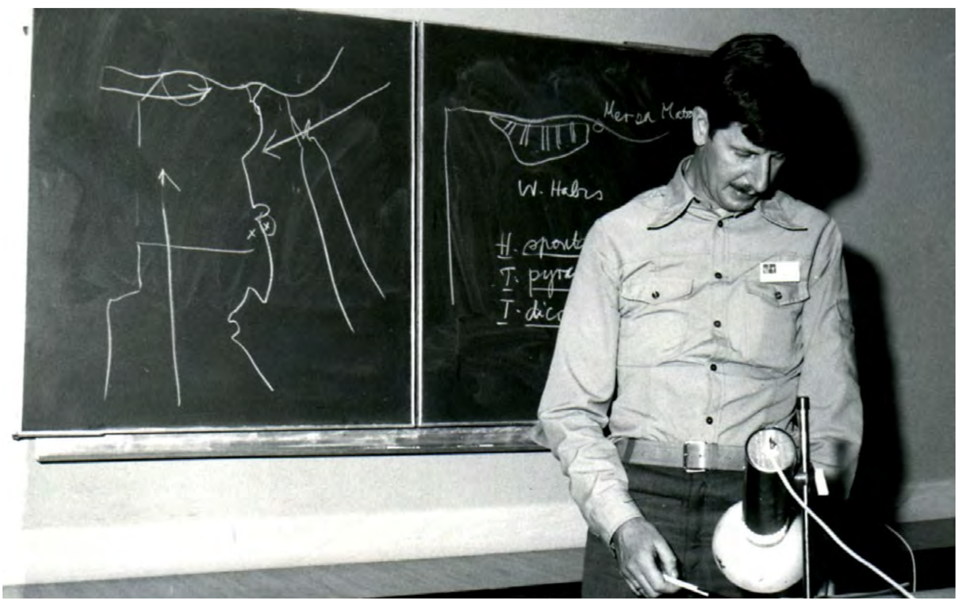

Fig. 4. Dymaczewo near Poznan, Poland (1988). Michał Kobusiewicz presenting a paper at a conference. Photo: M. Kobusiewicz, private collection.

Year (month)	Country	Site	Chronology / Period	Mission (project manager)
1993 Dec.	Sudan	El Gadar	Stone Age	Royal Ontario Museum Canada Chris Grzymski
1993 Dec.	Sudan	Kasura	Stone Age	British Museum Derek Welsby
1994	Sudan	El Gaddar, Hambukol – Gebel Kobkabba (Old Dongola Area)	Palaeolithic	Royal Ontario Museum Canada Chris Grzymski
1996 Aug.– Nov.	Egypt	Sinai	Palaeolithic, Neolithic, Bronze Age	CPE Central Sinai Salvage Project Fred Wendorf and Romuald Schild
1999 Aug., Sep.	Botswana	Study – survey Gabarone, Maun, Okawango Delta, Makadikadi, Palapie	Prehistory	IAE PAS
1999 Nov., Dec.	Sudan	Conference of UISPP Commission – Khartoum, Naga	–	IAE PAS
2000 Jan.– Mar.	Egypt	Gebel Nabta (Western Desert)	Neolithic	CPE Romuald Schild and Fred Wendorf
2000 Nov., Dec.	Egypt	Dakhleh Oasis, Ain El Gazzereen	Rock art, Archaic Old Kingdom	PCMA / DOP–PU Lech Krzyżaniak
2001 Jan.– Mar.	Egypt	Gebel Ramlah (Western Desert)	Neolithic	CPE Romuald Schild and Fred Wendorf
2001 Nov., Dec.	Sudan	Kadero	Neolithic	PCMA Lech Krzyżaniak
2003 Jan., Feb.	Egypt	Gebel Ramlah (Western Desert)	Neolithic	CPE Romuald Schild and Fred Wendorf
2003 Mar.	Egypt	Dakhleh Oasis, Ain El Gazzereen	Rock art, Archaic Old Kingdom	PCMA / DOP–PU Lech Krzyżaniak
2003 Nov.	Sudan	Survey on the IVth Nile Cataract and Bayuda Desert	Prehistory	PCMA / Poznan Archaeological Museum Lech Krzyżaniak
2004 Jul., Aug.	Tanzania	Loyangalani (Serengeti National Park)	Palaeolithic	Serengeti Foundation (US) John R. F. Bower

Fig. 5. SE Sudan near Abu Hugar. Survey along the banks of the Blue Nile. Photo: L. Krzyżaniak.

Fig. 6. Kom El-Hisn in the Western Delta, Egypt (1986). Bottom row from the left: Anthony Cegle, Janet Long, Robert Wenke, Karla Kroeper, Willma Wetterstrom, Lech Krzyżaniak. Upper row from the left: Inspector Samicha and Michał Kobusiewicz. Photo: M. Kobusiewicz, private collection.

Year (month)	Country	Site	Chronology / Period	Mission (project manager)
2005 Feb., Mar.	Egypt	Dakhleh Oasis, Ain El Gazzereen	Rock art, Archaic Old Kingdom	PCMA / DOP–PU Michał Kobusiewicz
2005 Jul., Aug.	Tanzania	Serengeti National Park	Palaeolithic	Serengeti Foundation (US) John R. F. Bower
2006 Feb., Mar.	Egypt	Dakhleh Oasis, Ain El Gazzereen	Rock art, Archaic Old Kingdom	PCMA / DOP–PU Michał Kobusiewicz
2006 Jun.	Egypt	Conference of Dakhleh Oasis Project – Cairo		PCMA / IAE PAS
2007 Feb., Mar.	Egypt	Dakhleh Oasis, Ain El Gazzereen	Rock art, Archaic Old Kingdom	PCMA / DOP–PU Michał Kobusiewicz
2007 Sep.	Egypt	Conference "70 Years of Polish Archaeology in Egypt" – Cairo		PCMA
2008 Jan., Feb.	Egypt	Dakhleh Oasis, Ain El Gazzereen	Rock art, Archaic Old Kingdom	PCMA / DOP–PU Michał Kobusiewicz
2008 Nov., Dec.	Egypt	Dakhleh Oasis, Ain El Gazzereen	Rock art, Archaic Old Kingdom	PCMA / DOP–PU Michał Kobusiewicz
2009 Nov., Dec.	Egypt	Dakhleh Oasis, Ain El Gazzereen Siwa Oasis	Rock art, Archaic Old Kingdom, Prehistory	PCMA / DOP–PU Michał Kobusiewicz
2010 Feb., Mar.	Egypt	Study and Conservation Visit – Aswan (Nubian Museum)	Neolithic	CPE Foundation (US)
2010 Oct.	Egypt	Study Visit – Cairo	Archaic Old Kingdom	IAE PAS
2010 Nov., Dec.	Sudan	Bir Nurayet (Red Sea Hill)	Rock art, Prehistory	IAE PAS Bir Nurayet Project Przemysław Bobrowski
2011 Feb.	Egypt	Dakhleh Oasis, Siwa Oasis	Rock art, Prehistory	PCMA / DOP–PU Michał Kobusiewicz
2011 Mar.	Egypt	Study Visit – Cairo	Archaic Old Kingdom	PCMA

Fig. 7. Minshat Abu Omar, in the Eastern Delta, Egypt (1988). Michał Kobusiewicz during the excavation of a Predynastic grave. Photo: M. Kobusiewicz, private collection.

Fig. 8. Dakhleh Oasis, Egypt (2000). Standing, from the left: Heiko Riemer, Karin Kindermann, a member of the German team, Eliza Jaroni, Michał Kobusiewicz. Sitting: Sofia, a student from Portugal and Ewa Kuciewicz. Photo: M. Kobusiewicz, private collection.

Year (month)	**Country**	**Site**	**Chronology / Period**	**Mission (project manager)**
2011 Mar., Apr.	Sudan	Conference – "Fifty Years of Cooperation between Sudan and Poland in the Field of Archaeology"– Khartoum		PCMA
2011 Nov., Dec.	Sudan	Bir Nurayet Red Sea Hill	Rock art, Prehistory	IAE PAS Bir Nurayet Project Przemysław Bobrowski
2012 Feb.	Egypt	Dakhleh Oasis, Siwa Oasis	Rock art, Prehistory	PCMA / DOP–PU Michał Kobusiewicz
2012 Mar.	Egypt	Study Visit – Cairo	Archaic Old Kingdom	PCMA
2012 Nov., Dec.	Sudan	Bir Nurayet, Gebel Karaiweb (Red Sea Hill)	Rock art, Prehistory	IAE PAS Bir Nurayet Project Przemysław Bobrowski
2013 Feb.	Egypt	Dakhleh Oasis	Rock art, Prehistory	PCMA / DOP–PU Michał Kobusiewicz
2013 Mar.	Egypt	Study Visit – Cairo	Archaic Old Kingdom	PCMA
2016 May	Egypt	Study Visit – Cairo	Neolithic	IAE PAS Bargat El-Shab Project Michał Kobusiewicz and Przemysław Bobrowski
2017 Mar.	Egypt	Study Visit – Cairo, Aswan	Neolithic	IAE PAS Bargat El-Shab Project Michał Kobusiewicz and Przemysław Bobrowski
2018 Apr.	Egypt	Bargat El-Shab (Western Desert)	Neolithic	IAE PAS Bargat El-Shab Project Michał Kobusiewicz and Przemysław Bobrowski

Fig. 9. Atbara, Sudan (2003). Michał Kobusiewicz with his great friend Lech Krzyżaniak waiting to be taken across the Nile. Photo: M. Jórdeczka.

Fig. 10. Serengeti, Tanzania (2005). During an archaeological survey. From the left: Michał Kobusiewicz, Adax Mabulla and John R. F. Bower. Photo: M. Kobusiewicz, private collection.

AFRICAN BIBLIOGRAPHY OF MICHAŁ KOBUSIEWICZ

1972

Preliminary report on the Holocene geology and archaeology of the Northern Fayum Desert. In Playa Lake Symposium. *Icaslas publications* 4: 41–61 [with R. Said, C. Albritton, F. Wendorf and R. Schild].

Remarks on Holocene geology and archaeology of Northern Fayum Desert. *Archeologia Polona* 13: 7–22 [with R. Said, C. Albritton, F. Wendorf and R. Schild].

1976

New prehistoric materials from the region of Old Dongola (Sudan). *Fontes Archaeologici Posnanienses* 25 [1974]: 178–186 [with L. Krzyżaniak].

Pradzieje północno-wschodniej Afryki między 16 a 5 tysiącleciem p.n.e. *Przegląd Archeologiczny* 24: 5–101.

The Prehistory of the Egyptian Sahara. *Science* 193(4248): 105–114 [with F. Wendorf, R. Schild, R. Said, C. V. Haynes and A. Gautier].

1977

Late Pleistocene and recent climatic changes in Egyptian Sahara. *Geographical Journal* 143(2): 211–234 [with F. Wendorf, R. Schild, R. Said, C. V. Haynes, A. Gautier, N. el Hadidi, H. Więckowska and A. Close].

1978

A voice in the discussion connected with the paper by R. Schild and F. Wendorf, Wieloznaczność ekologicznego uwarunkowania, wielkich zmian kulturowych. Dwa przykłady: Niż Europejski u schyłku epoki lodowej i Sahara w początkach holocenu. *Przegląd Antropologiczny* 44(1): 211–212.

1979

Combined Prehistoric Expedition. *Z Otchłani Wieków* 45(1): 2–11.

Use of barley in the Egyptian Late Palaeolithic. *Science* 205(4413): 1341–1347 [with F. Wendorf, R. Schild, N. el Hadidi, A. E. Close, H. Więckowska, B. Issawi and H. Haas].

1980

Badania Combined Prehistoric Expedition w Egipcie i Sudanie. In M. Kobusiewicz and L. Krzyżaniak (eds), *Epoka kamienia nad Nilem: przewodnik po wystawie*, 10–14. Poznań.

Report on Site E-78-2. In F. Wendorf and R. Schild, assemblers, and A. E. Close (ed.), *Loaves and Fishes: The prehistory of Wadi Kubbaniya*, 55–75. Dallas [with K. M. Banks].

Report on Site E-78-9. In F. Wendorf and R. Schild, assemblers, and A. E. Close (ed.), *Loaves and Fishes: The prehistory of Wadi Kubbaniya*, 191–215. Dallas [with W. L. Singleton].

I-er symposium international: Genése et premières phases du développement de la production alimentai dans les cultures préhistoriques du nordest de l'Afrique 9–13 Septembre 1980: Dymaczewo pres de Poznań, Pologne. *L'Antropologie* 84(5): 468–470.

Problemy neolityzacji Afryki północno-wschodniej. *Sprawozdania*: 42(96) [1978] 4–5. Wydział Historii i Nauk Społecznych PTPN.

Der Übergang vom Spätpaläolithikum zum Neolithikum in Nordostafrika. *Allgemeine und Vergleichende Archäologie – Beiträge* 2: 337–350.

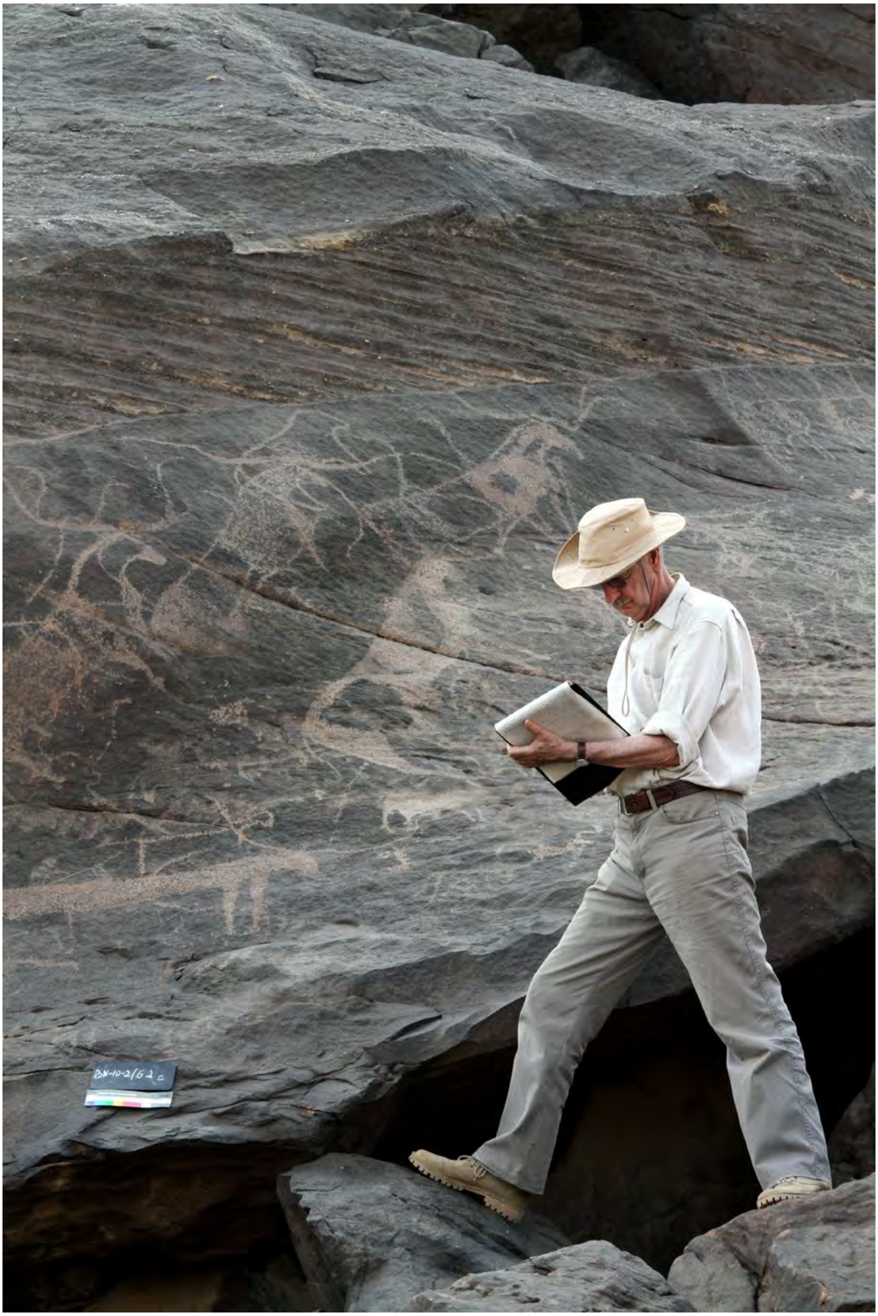

Fig. 11. Bir Nurayet in the mountains by the Red Sea (2010). Documentation of rock art. Photo: M. Jórdeczka.

1981

Nowe poglądy na zagadnienia neolityzacji północno-wschodniej Afryki. *Przegląd Archeologiczny* 28: 177–185.

R. Schild and F. Wendorf, *The Prehistory of an Egyptian Oasis.* Wrocław, Warszawa, Kraków, Gdańsk, Łódź, Zakład Narodowy imienia Ossolińskich, Wydawnictwo Naukowe Polskiej Akademii Nauk [as contributor together with C. V. Haynes, J. Kossakowska-Such, R. Said, T. Wesołowska, O. Henderson and R. Morrison].

1982

Research at Bir Tarfawi: Archaeological and Geological Investigations in the Egyptian Sahara. *Archaeologia Polona* 20 [1981]: 177–198 [with F. Wendorf, R. Schild, R. Said and A. Gautier].

1984

The multicultural Early Holocene site E-79-4 at El Ghorab Playa, Western Desert of Egypt. In L. Krzyżaniak and M. Kobusiewicz (eds), *Orgin and early development of food-producing cultures in North Eastern Africa*, 171–184. Poznań.

Report on Site E-79-4. The archaeology of El Ghorab Playa. In A. E. Close, F. Wendorf and R. Schild (eds), *Cattle-keepers of Eastern Sahara: the Neolithic of Bir Kiseiba,* 135–164. New Delhi.

New radiocarbon dates on the cereals from Wadi Kubbaniya. *Science* 225(4662): 645–646 [with F. Wendorf, R. Schild, A. E. Close, D. J. Donahue, A. J. T. Jull, T. H. Zabel, H. Więckowska, M. Kobusiewicz, B. Issawi and N. el Hadidi].

1987

The Combined Prehistoric Expedition. The first twenty-five years. In A. E. Close (ed.), *Prehistory of arid North Africa. Essays in honor of Fred Wendorf*, 325–344. Dallas.

1989

Report on Site E-78-9: An early Kubbaniyan Site in the Mouth of Wadi Kubbaniya. In F. Wendorf and R. Schild, assemblers, and A. E. Close (ed.), *The Prehistory of Wadi Kubbaniya. Vol. 3: Late Palaeolithic Archaeology*, 643–653. Dallas.

Report on Site E-78-5: A Kubbaniyan Site near the Mouth of Wadi Kubbaniya. In F. Wendorf and R. Schild, assemblers, and A. E. Close (ed.), *The Prehistory of Wadi Kubbaniya. Vol. 3: Late Palaeolithic Archaeology*, 654–665. Dallas.

Report on Site E-78-5e: A Small Ballanan-Silsilian Site near the Mouth of Wadi Kubbaniya. In F. Wendorf and R. Schild, assemblers, and A. E. Close (ed.), *The Prehistory of Wadi Kubbaniya. Vol. 3: Late Palaeolithic Archaeology*, 669–674. Dallas.

Report on Site E-78-5f: An Apparent Single-Occupation Site near the Mouth of Wadi Kubbaniya. In In F. Wendorf and R. Schild, assemblers, and A. E. Close (ed.), *The Prehistory of Wadi Kubbaniya. Vol. 3: Late Palaeolithic Archaeology*, 675–678. Dallas.

Kom el-Hisn: Excavations of Old Kingdom Settlement in Egyptian Delta. *Journal of American Research Center in Egypt* 25 (1988): 5–34 [with R. Wenke, P. Buck, H. Hamroush, K. Kroeper and R. W. Redding].

1992 (1991)

Review of F. Debono and B. Mortensen, A Neolithic settlement and Rother sites in vicinity of Wadi Hof, Helwan, Mainz 1990. *Archeologia* 42: 153.

Review of J. Rizkana and J. Seeher, The Predynastic cemeteries of Maadi and Wadi Digla. Mainz 1990. *Archeologia* 42: 153–154.

Fig. 12. Bir Nurayet in the mountains by the Red Sea (2011).
In the lower row: from the left, NCAM Inspector Tayeb and Paweł Wiktorowicz.
In the middle row: Michał Kobusiewicz, Marek Chłodnicki and Maciej Jórdeczka.
Przemysław Bobrowski sitting on a stone. Photo: M. Jórdeczka (self-timer).

1994

Discovery of Middle Stone Age sites near El Ghaddar (Sudan). *Nyame Akuma* 41: 63–66.

Review of J. Einwanger, Merimde-Benisalam III. Die Funde der jüngeren Merimde-Kultur. Mainz 1992. *Archaeologia* 44 (1993): 131.

1996

Technology, goals and efficiency of quartz exploitation in Khartoum Neolithic: case of Kadero. In L. Krzyżaniak, K. Kroeper and M. Kobusiewicz (eds), *Interregional contacts in the Later Prehistory of Northeastern Africa*, 347–364. Poznań.

Jebbel Kobkabba: a Middle Palaeolithic site in Sudanese Nubia. In L. Krzyżaniak, K. Kroeper and M. Kobusiewicz (eds), *Interregional contacts in the Later Prehistory of Northeastern Africa*, 355–375. Poznań [with J. Kabaciński].

1997

Late Pleistocene settlement in the Mediterranean Littoral of Northeastern Africa after last Pleniglacial. In J. M. Fullola and N. Soler (eds), *El món mediterrani després del Pleniglacial (18.000–12.000 BP)*, 93–97. Série Monogràfica 17.

1998

Trend in stone knapping technology in Late Prehistory of Sudanese Nubia. In *Actes de la VIII^e^ Conférence Internationale des Études Nubiennes Lille 11–17 Septembre 1994. 3 Etudes*, 121–125. Lille. Cahires de Recherches de l'Institut de Papyrologie et d'Egyptologie de Lille No 17.

1999

Excavations at Sinai-10, The Site Romythi Locality. In F. W. Eddy and F. Wendorf (eds), *An Archaeological Investigation of the Central Sinai*, *Egypt*, 173–180. Dallas.

Excavations at Sinai-20, The Split Rock Site, Zarnoq Locality. In F. W. Eddy and F. Wendorf (eds), *An Archaeological Investigation of the Central Sinai*, *Egypt*, 193–207. Dallas.

Excavations at Sinai-73, The Mazeyh Site, Zarnoq Locality. In F. W. Eddy and F. Wendorf (eds), *An Archaeological Investigation of the Central Sinai*, *Egypt*, 274–276. Dallas.

2000

From the Organizers and Editors. In L. Krzyżaniak, K. Kroeper and M. Kobusiewicz (eds), *Reccent Research Into the Stone Age of Northeastern Africa*. Poznań Archaeological Museum. Studies in African Archaeology 7 [with L. Krzyżaniak, K. Kroeper].

2001

Reassessing Chronostratigraphic Position of the Split Rock Site, Sinai. In B. Gehlen, M. Heinen and A. Tillmann (eds), *Zeit Räume. Gedenkschrift für Wolfgang Taute*, 227–236. Archäologische Berichte 14 [with R. Schild, A. Bluszcz and F. Wendorf].

Review of P. Vermeersch (ed.), Palaeolithic Living Sites in Upper and Middle Egypt. Egyptian Prehistory Monographs 2. Leuven University Press. *Bibliotheca Orientalis* 58(5–6): 604.

Afryka, Archeologia. In *Wielka Encyklopedia PWN Tom 1,* 164–166. Warszawa, Wydawnictwo Naukowe PWN SA [with J. Kabaciński].

2002

Gebel Ramlah Playa. In Jennerstrasse 8 (eds), *Tides in the Desert-Gezeiten der Wüste*, 117–123. Köln [with R. Schild, F. Wendorf, J. D. Irish, J. Kabaciński and H. Królik].

Fig. 13. Aswan, Egypt (2012). Reconstruction of the megalithic "calendar" in the Nubian Museum. From the left: museum employee, Romuald Schild, Hebatallah A. A. Ibrahim and Michał Kobusiewicz. Photo: M. Jórdeczka.

Fig. 14. Naga, Sudan (2012). On the road to Bir Nurayet with sponsors of the mission. From the left: Michał Kobusiewicz, Maciej Korobacz and Jacek Jurek. Photo: P. Bobrowski.

2003

Neolithic Tooth Replacement in Two Disturbed Burials from Southern Egypt. *Journal of Archaeological Science* 30: 281–285 [with J. D. Irish, R. Schild and F. Wendorf].

Neolithic wells of the Western Desert of Egypt. In L. Krzyżaniak, K. Kroeper and M. Kobusiewicz (eds), *Cultural Markers in the Later Prehistory of Northeastern Africa and Recent Research*, 95–104. Poznań, Poznań Archaeological Museum. Studies in African Archaeology 8.

2004

An Artificial Human Tooth from the Neolithic Cemetery at Gebel Ramlah, Egypt. *Dental Anthropology* 17(1): 28–31 [with J. D. Irish, P. Bobrowski, J. Kabaciński and R. Schild].

Discovery of the first Neolithic cemetery in Egypt's Western Desert. *Antiquity* 78(301): 566–578 [with J. Kabaciński, R. Schild, J. D. Irish and F. Wendorf].

2005

Short communication: Two additional Egyptian Neolithic burials exhibiting unusual mortuary treatment of teeth. *International Journal of Osteoarchaeology* 15: 136–139 [with J. D. Irish, M. Kobusiewicz, J. Kabaciński and R. Schild].

Prehistoric Herdsmen, *Academia – The magazine of the Polish Academy of Sciences* 3(7): 20–24 [with R. Schild].

Lech Krzyżaniak 1940–2004. *Polish Archaeology in the Mediterranean* 15: 13–14.

Prof. Lech Krzyżaniak (1940–2004). In memoriam. *Archaeologia Polona* 43: 5–13.

Discovery of the Late Neolithic Cemetery in the Western Desert, Egypt. *Gdańsk Archaeological Museum African Reports* 3: 127–129 [with J. Kabaciński, R. Schild and F. Wendorf].

New Important Area of Neolithic Occupation in the Southwestern Desert of Egypt. In B. E. Barich, T. Tillet and K. H. Stidter (eds), *Hunters vs. Pastoralists in the Sahara Material Culture and Symbolic Aspects,* 51–56. British Archaeological Reports International Series 1338 [with R. Schild, F. Wendorf, J. D. Irish, J. Kabaciński, H. Królik and G. A. Calderoni].

2006

Le paléolithique supérieur en Afrique du nord-est. In J. L. Sanchidrián, A. M. Márquez Alcántara and J. M. Fullola Pericot (eds), *La Cuenca Meditteránea durante el Paleolítico Superíor 38.000–10.000 años,* 16–31. Malaga.

Stone knapping tradition in Old Kingom Dakhleh. In K. Kroeper, M. Chłodnicki and M. Kobusiewicz (eds), *Archaeology of Early Northeastern Africa. In Memory of Lech Krzyżaniak*, 449–461. Poznań, Poznań Archaeological Museum. Studies in African Archaeology 9.

2007

The Petroglyph's Code. *Academia – The magazine of the Polish Academy of Sciences* 1(13): 4–8 [with E. Kuciewicz and E. Jaroni].

Dakhleh Oasis Petroglyph Unit. New rock art sites, season 2005. *Polish Archaeology in the Mediterranean* 17: 279–284 [with E. Kuciewicz and E. Jaroni].

2008

Dakhleh Oasis Petroglyph Unit. Rock art research, 2006. *Polish Archaeology in the Mediterranean* 18 (2006): 317–322 [with E. Kuciewicz and E. Jaroni].

Fig. 15. Omduran, Sudan (2012). Michał Kobusiewicz "dancing" with dervishes. Photo: M. Jórdeczka.

Fig. 16. Ostrów Lednicki, Poland (2012). With John R. F. Bower on an excursion during the Dymaczewo Conference. Photo: M. Jórdeczka.

2009

Polskie badania stanowisk prahistorycznych poza Europą. In M. Brzostowicz (ed.), *Archeologia polska i jej czasy*, 61–70. Poznań.

Gauges of Rhyolite in the Khartoum Neolithic. Example from Kadero (Sudan). In J. M. Burdukiewicz, K. Cyrek, P. Dyczek and K. Szymczak (eds), *Understanding the Past. Papers offered to Stefan K. Kozłowski*, 195–198. Warsaw.

2010

Gebel Ramlah. Final Neolithic Cemeteries from the Western Desert of Egypt. Poznań [with J. Kabaciński, R. Schild, J. D. Irish, M. C. Gatto and F. Wendorf].

Archeologa podróże po świecie. Podróże Poznaniaków. *Kronika Miasta Poznania* 2010(3): 342–357.

Oaza kobiet (Women's Oasis). *Archeologia żywa* 1: 26–33 [with E. Kuciewicz].

2011

Preface. In M. Chłodnicki, M. Kobusiewicz and K. Kroeper (eds), *Kadero: The Lech Krzyżaniak excavations in the Sudan,* 7. Poznań. Studies in African Archaeology 10 [with M. Chłodnicki and K. Kroeper].

Lithic implements. In M. Chłodnicki, M. Kobusiewicz and K. Kroeper (eds), *Kadero: The Lech Krzyżaniak excavations in the Sudan*, 267–298. Poznań, Poznań Archaeological Museum. Studies in African Archaeology 10.

Burial practices of the Final Neolithic Pastoralists at Gebel Ramlah, Western Desert of Egipt. In R. F. Friedman and P. N. Fiske (eds), *Egypt at its Origins* 3, 93–212. Leuven–Paris–Walpole MA [with J. Kabaciński, R. Schild, J. D. Irish and F. Wendorf].

Dakhleh Oasis Project: Petroglyph Unit. Rock art research, 2008. *Polish Archaeology in the Mediterranean* 20: 237–244 [with E. Kuciewicz].

2012

Dakhleh Oasis Project. Petroglyph Unit: rock art research, 2009. *Polish Archaeology in the Mediterranean* 21: 279–287 [with E. Kuciewicz].

Nowe odkrycia prahistorycznej sztuki naskalnej w północno-wschodniej Afryce. *Nauka* 3: 155–166.

Loiyangalani: A Cultural isolate in the Middle Stone Age of Northern Tanzania. In J. Kabaciński, M. Chłodnicki and M. Kobusiewicz (eds), *Prehistory of Northeastern Africa. New Ideas and Discoveries,* 479–491. Poznań, Studies in African Archaeology 11 [with J. R. F. Bower, and A. Z. P. Mabulla].

Badania nad sztuką naskalną w oazie Dachla (Pustynia Zachodnia, Egipt). Stanowisko 06/09. *Fontes Archaeologici Posnanienses* 48: 237–241 [with P. Polkowski].

Bir Nurayet – The fertility cult in prehistoric art of the Sudan. In E. Anati (ed.), *The Intellectual and Spiritual Expressions of Non-Literate Peoples*, 51–58. Capo di Ponte [with P. Bobrowski, M. Chłodnicki, M. Jórdeczka and K. Pluskota].

2013

Rock art Research in the Dakhleh Oasis, Western Desert (Egypt). Petroglyph Unit, Dakhleh Oasis Project. *Sahara* 24: 101–118 [with P. Polkowski, E. Kuciewicz and E. Jaroni].

Na styku archeologii z etnologią. In R. Vorbrich and A. Szymoszyn (eds), *Ethnos et potentia. Interdyscyplinarność w polskiej etnologii*, 99–108. Poznań [with P. Bobrowski and M. Jórdeczka].

What forced the prehistoric cattle-keepers to emigrate from the Red Sea Mountains? *Studia Quaternaria* 30(2): 135–142 [with P. Bobrowski, M. Jórdeczka, M. Chłodnicki and J. Kusiak].

Fig. 17. Excursion to Ostrów Lednicki, Poland (2012). In the foreground: Friederike Jesse, Elena Garcea and Michał Kobusiewicz. Photo: M. Jórdeczka.

Fig. 18. Poznan, Poland (2012). Members of the Combined Prehistoric Expedition. From the left, standing: Przemysław Bobrowski, Agnieszka Czekaj-Zastawny, Halina Królik, Fred Wendorf, Hebatallah A. A. Ibrahim, Michał Kobusiewicz, Romuald Schild, Jacek Kobusiewicz. Kneeling: Maciej Jórdeczka. Photo: M. Jórdeczka (self-timer).

2014

Dakhleh Oasis Project, Petroglyph Unit: rock art research, 2011. *Polish Archaeology in Mediterranean* 23(1): 229–243 [with E. Kuciewicz and P. Polkowski].

2015

The Production, Use and Importance of Flint Tools in the Archaic Period and the Old Kingdom of Egypt. Oxford.

Dakhleh Oasis Project, Petroglyph Unit: Seasons 2012 and 2013. *Polish Archaeology in Mediterranean* 24(1): 275–296 [with E. Kuciewicz and P. Polkowski].

2016

Chipped and Ground Stone Assemblages from Kom el-Hisn. In R. J. Wenke, R. W. Redding and A. J. Cagle (eds), *Kom el-Hisn (ca. 2500–1900 BC). An Ancient Settlement in the Nile Delta*, 337–341. Atlanta, Georgia.

2017

Polskie badania sztuki naskalnej w Górach Czerwonomorskich (północno-wschodni Sudan). In A. Rozwadowski (ed.), *Sztuka naskalna. Polskie doświadczenia badawcze*, 261–292. Warszawa–Toruń [with P. Bobrowski, M. Jórdeczka and M. Chłodnicki].

2018

Sztuka naskalna w oazie Dachla w Pustyni Zachodniej w Egipcie. In B. Gediga, A. Grossman and W. Piotrowski (eds), *Inspiracje i funkcje sztuki pradziejowej*, 119–127. Biskupin–Wrocław [with E. Kuciewicz, E. Jaroni and P. Polkowski].

Gebel Karaiweb and Bir Nurayet (Sudan). The Oldest Settlement in the Red Sea Mountains. In J. Kabaciński, M. Chłodnicki, M. Kobusiewicz and M. Winiarska-Kabacińska (eds), *Desert and the Nile. Prehistory of the Nile Basin and the Sahara. Papers in honour of Fred Wendorf*, 483–514. Poznań, Studies in African Archaeology 15 [with P. Bobrowski, M. Jórdeczka and M. Chłodnicki].

Can the study of flint assemblages say something about the political relations in the early history of Egypt? In P. Valde-Nowak, K. Sobczyk, M. Nowak and J. Źrałka (eds), *Multas per gentes et multa per saecula. Amici magistro et collegaue suo Joanni Christopho Kozłowski dedicant*, 555–559. Kraków.

Rola neolitycznych pasterzy sawanny w kształtowaniu się Starożytnego Egiptu. In A. Posern-Zieliński, J. Sawicka, J. Kabaciński, M. Kara and K. Zamelska-Monczak (eds), *Archeologia jako humanistyczna interpretacja przeszłości. Studia dedykowane Profesorowi Henrykowi Mamzerowi*, 207–218. Poznań.

2019

Khashm el-Girba, Sudan. In M. Chłodnicki and P. L. Polkowski (eds), *Gdy Sahara była zielona. Polskie badania archeologiczne nad prahistorią Afryki Północnej (When Sahara was Green. Polish archaeological research on the prehistory of North Africa)*, 67–68. Poznań, Poznań Archaeological Museum [with M. Chłodnicki].

Moje wspomnienia z archeologią w tle. Poznań.

Review of M. Osypińska, Krowie królestwa. Zwierzęta w historii Doliny Środkowego Nilu. Studium archeozoologiczne. *Przegląd Archeologiczny* 67: 333–335.

Fig. 19. Aswan, Egypt (2017). On the road to Bargat el-Shab in the Western Desert. From the left: Fabian Welc, Maria Lityńska-Zając, Patrycja Rutkowska, Paweł Wiktorowicz, Michał Kobusiewicz, Przemysław Bobrowski, Maciej Jórdeczka and Mirosław Masojć. Photo: M. Jórdeczka (self-timer).

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Acheulean Bifaces from Khor Shambat, Omdurman (Sudan), Comparative Studies in the Nubian Context[1]

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This work presents Acheulean material discovered in Khor Shambat (Omdurman, Sudan), situated on the left-bank Nile valley a few km north of Khor Abu Anga and about 7 km from the Nile valley, 10 km to the north-west of the confluence of the Blue and White Nile. The artefacts occur randomly in the channel or in the channel deposit, the latter forms elongated bars composed of fluvial deposits with a low degree of sorting. The assemblage consists of 34 artefacts made from highly eroded Nubian sandstones. The most common shape of the hand-axe from Khor Shambat is the cordiform type with lenticular cross section made on a chunk or cobble. The hand-axes from Khor Shambat were subject to a morphometric analysis together with the assemblage from two other Nubian Acheulean sites. The geometric-morphometric approach to 2D objects attempted to identify differences between the assemblages. The broad chronology of the Acheulean proposed for Khor Abu Anga by Roy L. Carlson might potentially be applicable to the Khor Shambat assemblage, which may fall within the range of 350–200 ka.

KEY-WORDS: Acheulean, hand-axes, Khor Shambat, Dakhla Oasis, EDAR

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INTRODUCTION

In his pioneering work from 1949, A. J. Arkell mentions two Acheulean sites in the vicinity of Omdurman; the first was situated in Khor Abu Anga – a left-bank tributary flowing into the Nile, *c.* 1 km to the north of the confluence of the Blue Nile and White Nile – and the other was situated in Wadi Siru – a left-bank valley joining the Nile *c.* 15 km to the north of their confluence (Arkell 1949).

More recently, extensive research at the Abu Anga site (Carlson 2015, there earlier literature devoted to the site) has revealed much about the context of the site and the material from it. The site is connected with the channel of an intermittent river (wadi, tributary of the Nile) cut through a substratum of Nubian sandstones. The fluvial deposits are predominantly gravel and bank gravel of various sizes connected with periodic, uncontrolled water flows. Trial trenches at the site revealed the changes of the river's channel typical of intermittent rivers, as well as the presence of deposits connected with stagnant water, e.g., a lens of brown silt (381–382 m a.s.l.). According to Carlson (2015), the latter is connected with one of the floodings of the Nile, which reached several km along such shallow channels. On both sides of the high bank of the Abu Anga channel occur younger layers of distinctly laminated silt interleaved with fine-grained gravel (thickness of individual layers 1–40 cm). They are relatively

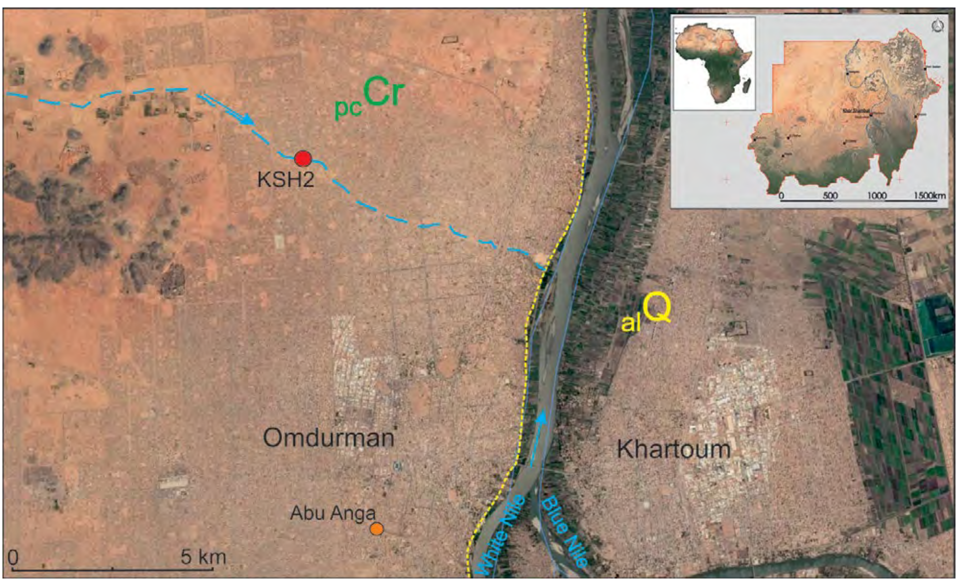

Fig. 1. Khor Shambat in Omdurman. Site no. 2 within the khor, whose course is marked with dotted line; alQ – Holocene alluvia of Nile; pcCr – Cretaceous Nubian Sandstones. Location of the Abu Anga site according to Carlson (2015).

young deposits connected with climatic cycles – dry/wet season in the Nile valley (Carlson 2015).

This paper aims to present the Acheulean material also discovered in Omdurman, in another left-bank valley between the two sites mentioned above. This third site, Khor Shambat, is over 10 km to the north-west of the confluence between the Blue Nile and White Nile and *c.* 7 km from the Nile valley, and it is of similar nature to the above-mentioned Abu Anga site (Fig. 1). The material discussed here has not been discussed in the previous monographic studies of Pleistocene cultures in Sudan published so far (Arkell 1949; Idris 1994).

KHOR SHAMBAT

Several years ago, a collection of Acheulean artefacts from Khor Shambat was handed over to the National Corporation for Antiquities and Museums (NCAM) in Khartoum by an anonymous researcher. There are no precise data about the objects' original location within the stated findspot. Verification field work of the area carried out in 2014 and 2019 confirmed the occurrence of single Acheulean artefacts in fluvial deposits marked as Khor Shambat site 2 (KHS2). In addition, individual artefacts from the Middle Stone Age (MSA) were also found.

Fig. 2. Khor Shambat at the location of site no. 2. Photo: M. Masojć.

The area where Acheulean artefacts occur is close to a Mesolithic and Neolithic site (Khor Shambat site 1) situated at the edge of a seasonal or dry watercourse (khor) at its outlet (Jórdeczka *et al.*, 2020). In the same channel is the area of occurrence of these artefacts, denoted as Khor Shambat 2 (general area 15°43'17.28"N, 32°27'13.63"E). This site is situated within the intermittent river valley (Fig. 2) constituting a left-bank tributary of the Nile. The valley cuts through the spacious surface of a sandstone outcrop known as the Butana plain. The area's substratum is (Cretaceous) Nubian sandstone, which reaches a thickness of 300–500 m (Whiteman 1971) and overlies the Arabian-Nubian shield (Neoproterozoic). According to archival sources (Robertson *et al.*, 1988), the Nubian sandstone is covered by the Ruwaba Formation composed of silty sand and gravel deposits.

Field evidence shows that the Acheulean artefacts occur randomly in the channel or in the deposit, the latter forms elongated bars composed of fluvial deposits with low degree of sorting (Fig. 3, 4). Meandering gently, the channel has mostly a relatively even

Fig. 3. Khor Shmabat, site 2. A – elongated bars composed of fluvial deposits (marked with white dotted line) within which Palaeolithic artefacts occur;
B – Acheulean hand-axe in the fluvial deposit. Photo: M. Masojć.

and flat bottom covered with quartz and sandstone gravel mixed with sandstone chunks with uncoated surface. There is a considerable contribution of coarse-grained sand and silt in the deposits. They also include an accumulation of big sandstone blocks and ferruginous mudstones, fine-grained gravels and silt formations. In several places, a layer of gravels composed of coated grains of quartz, quartzites and quartz sandstones with a high degree of sorting can be clearly distinguished under the big, relatively uncoated sandstone chunks and blocks. These are deposits typical of the alluvial channel fraction and testify to the sudden process of creation, e.g., torrential downpour or flood. They may form as a result of the erosion of sandstone outcrops, *caliche* layers, broken up and subsequently carried by the river. The artefacts found in this deposit (Fig. 3B, 4) come from the drainage area of the intermittent river and were transported by water during flows caused by torrential rain. The transport could have taken place in a few stages caused by increased downpour separated by dry periods or low water levels.

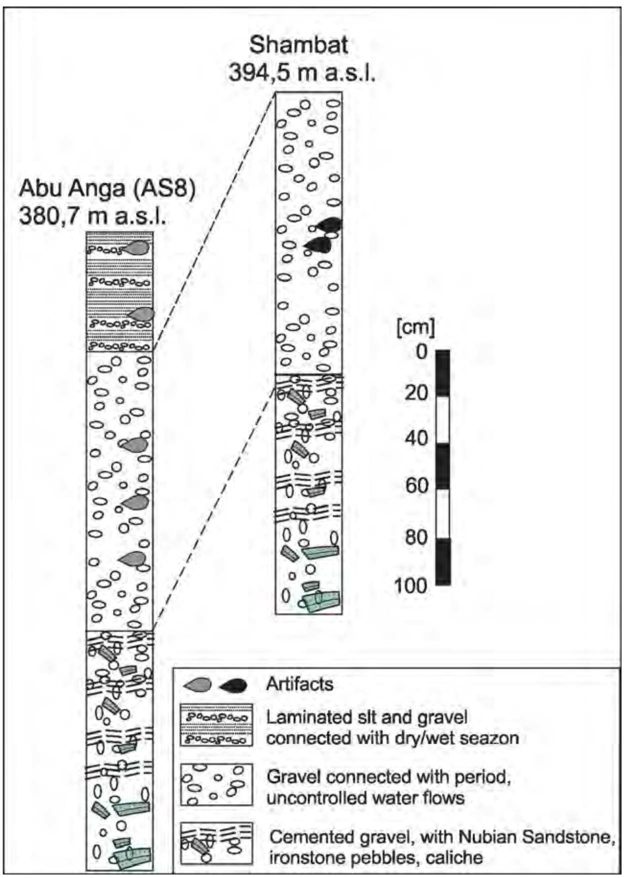

Fig. 4. Lithological sections with the position of occurrence of artefacts. Khor Abu Anga section after Carslon 2015. Drawn: A. Gałaś.

Fig. 5. Khor Shambat, site 2. Hand-axes. Photo: M. Jórdeczka.

Fig. 6. Khor Shambat, site 2. Hand-axes. Photo: M. Jórdeczka.

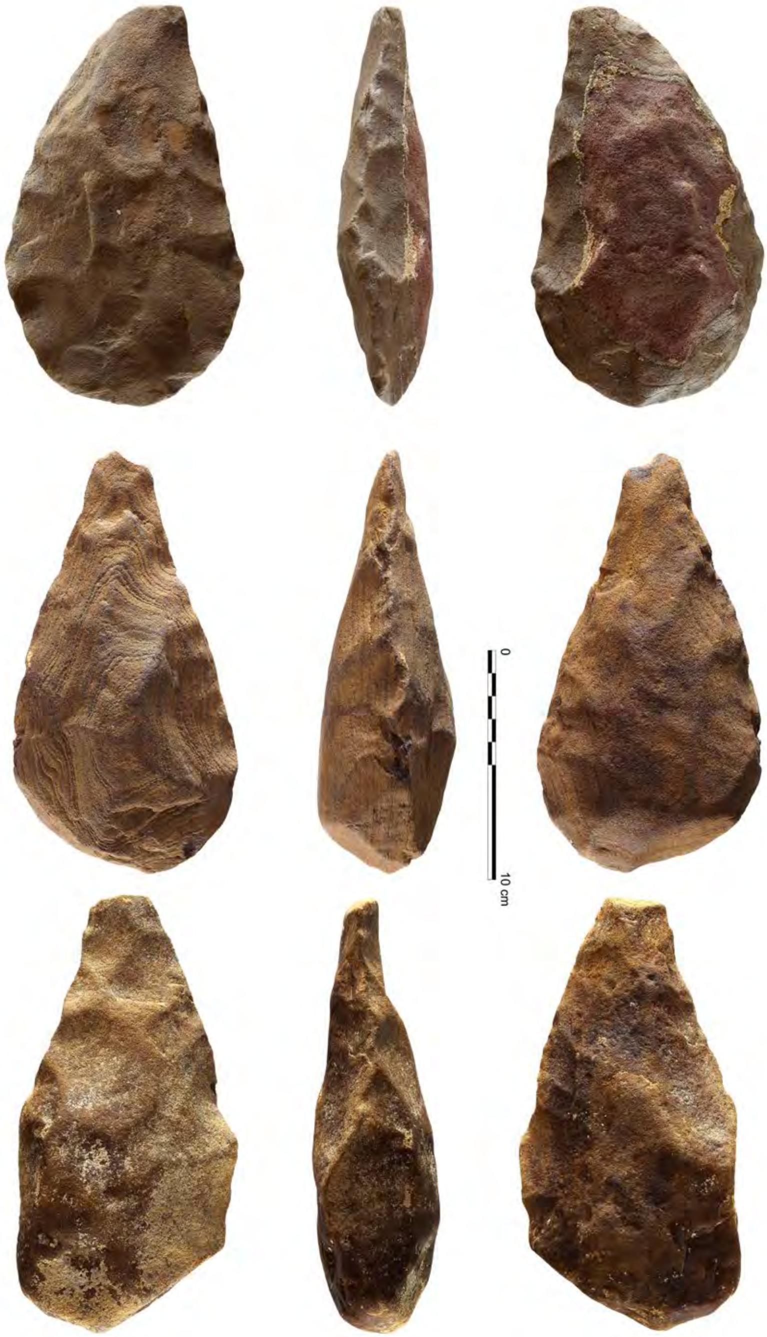

Fig. 7. Khor Shambat, site 2. Hand-axes. Photo: M. Jórdeczka.

Fig. 8. Khor Shambat, site 2. Hand-axes and cleaver. Photo: M. Jórdeczka.

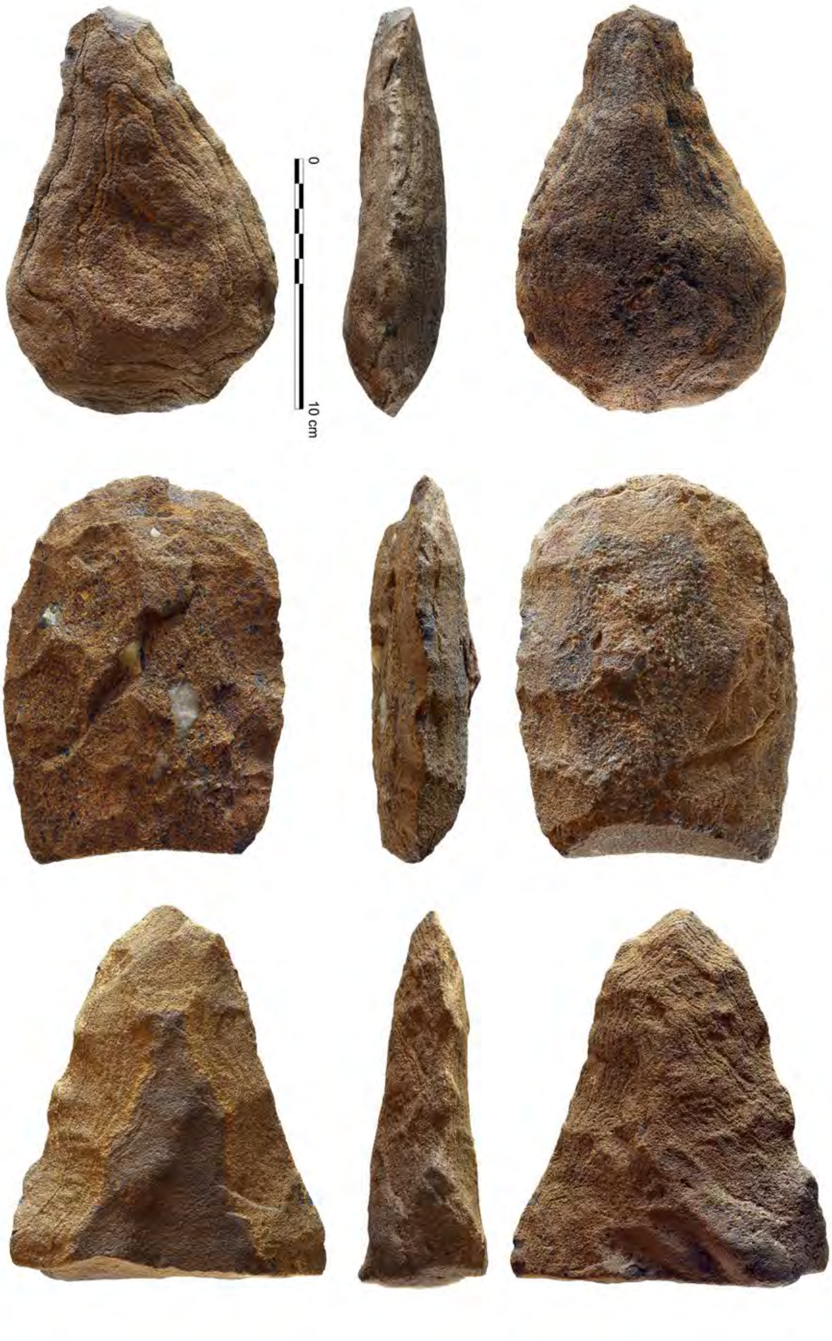

Fig. 9. Khor Shambat, site 2. Hand-axes. Photo: M. Jórdeczka.

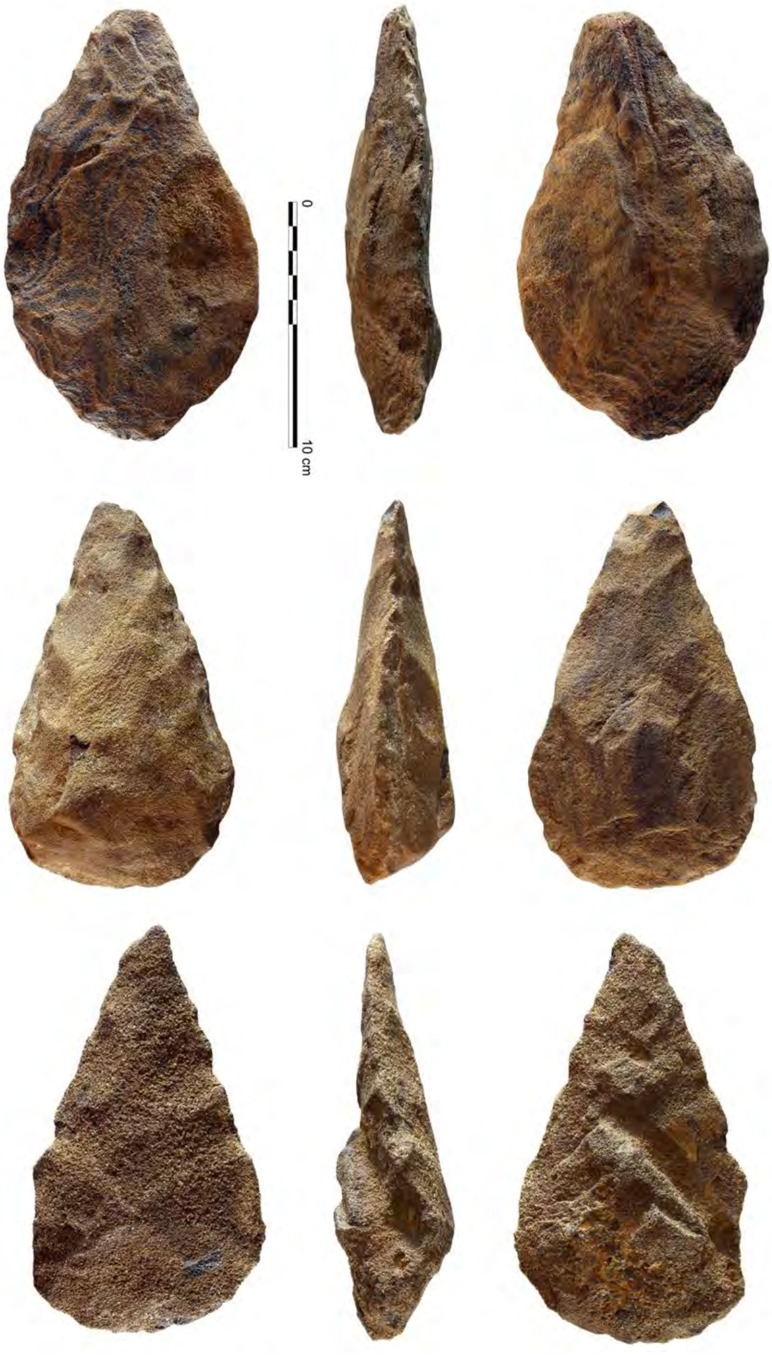

Fig. 10. Khor Shambat, site 2. Hand-axes. Photo M. Jórdeczka.

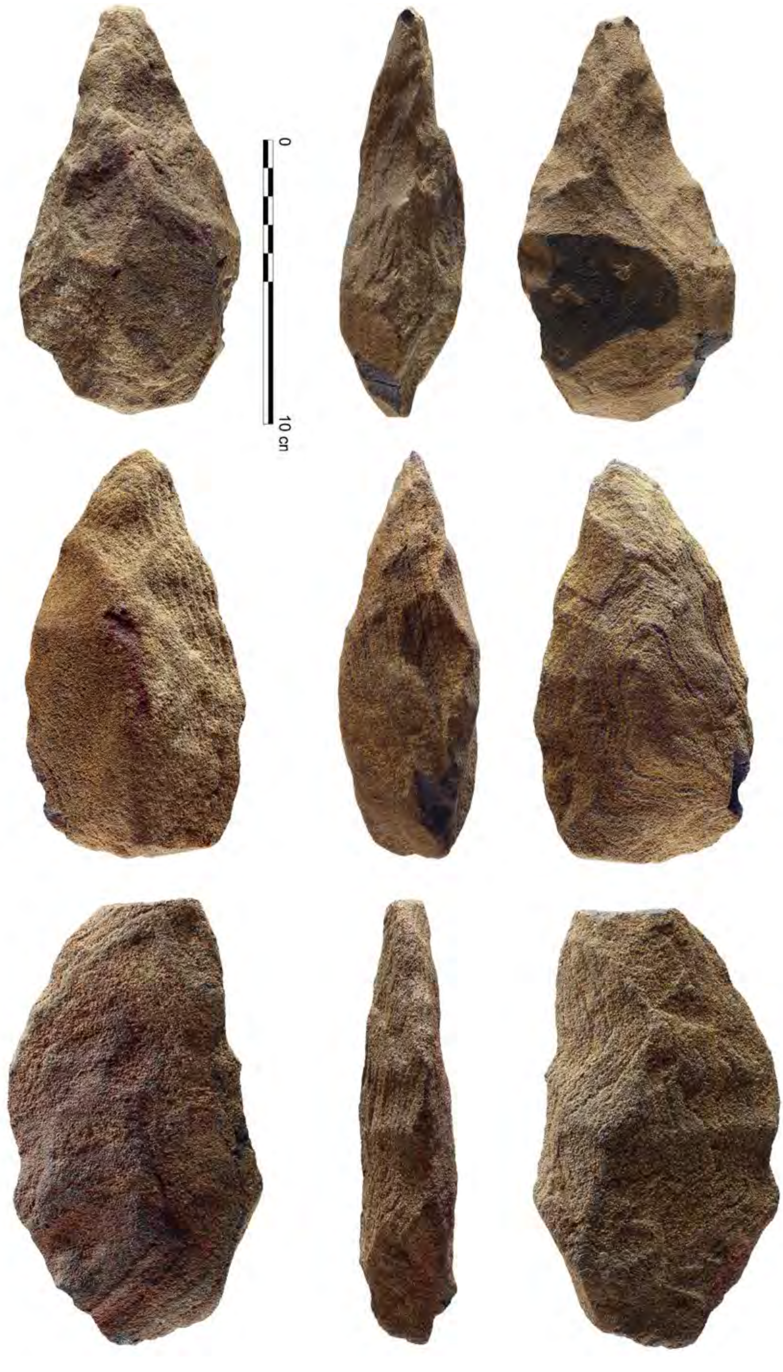

Fig. 11. Khor Shambat, site 2. Hand-axes. Photo: M. Jórdeczka.

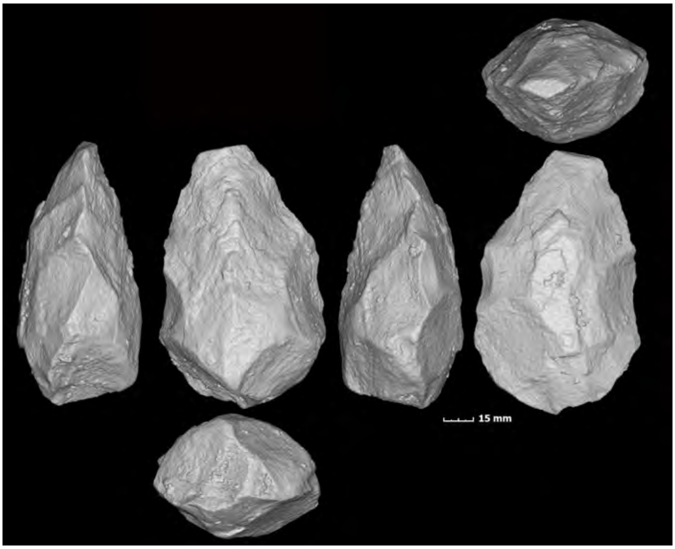

Fig. 12. Khor Shambat, site 2. Hand-axe CT scanned. Scan: G. Ziółkowski.

CHARACTERISTICS OF THE RAW MATERIAL OF THE ARTEFACTS

The sedimentary rocks used for production of tools were recorded in the site's close vicinity. They are solely Nubian sandstones of ferruginous facies and ferruginous mudstones, which may come from the *caliche* layer common in the outcrops in Omdurman. Their predominance in the assemblage suggests that they had been acquired on the spot or in the close vicinity. The Nubian sandstones (Cretaceous) of the ferruginous variety are composed of quartz grains and quartz rocks, e.g., quartzites. The binder is ferruginous-argillaceous, mainly goethetic with the presence of hematite. The ferruginous mudstones only locally had a tendency to fracture producing sharp edges, and there were fewer fragments of this stone displaying evidence of use.

THE BIFACIAL COMPONENT FROM KHOR SHAMBAT

The stone products from Khor Shambat Site 2, were made from eroded Nubian sandstone. The assemblage consists of 34 artefacts, including 27 (79%) Acheulean large cutting tools (LCT): 24 hand-axes (Fig. 5–12), one cleaver (Fig. 8) and two biface preforms. The remaining artefacts were three cores, including two Levallois forms, and a discoidal core, assignable to the Middle Stone Age as well as four blanks in the form of flakes, whose attribution remains undetermined.

The great majority of the bifacial forms (LCT) have been preserved in a whole state (74%); only one hand-axe is broken in the proximal part, while another six have a slightly broken tip. Table 1 presents the sizes and weight of the hand-axes and cleaver from Khor Shambat. The length of complete products falls within the range of 11–22 cm, width 7–12 cm and maximum thickness is 2.8–6.5 cm. Average weight oscillates around 850 grams (Table 1). The total weight of all LCT and 2 preforms: 22424.3 g.

The overwhelming majority of the bifacial components from Khor Shambat had been made on non-flake blanks – 21 out of 24 hand-axes were made on chunks, while only three were probably made on flakes (Fig. 5–11). The only cleaver in the assemblage displays the features of a product made on a flake, while two preforms of hand-axes, similar to most hand-axes, were made on chunks.

For the whole bifacial component, the number of scars on both faces was counted, which testifies to the use of advanced technology in their production. Scars larger than 5 mm in maximal dimension were counted (smaller scars being treated as retouch). Both for the hand-axes and the cleaver the criterion for distinguishing between face 1 and face 2 was the extent of advancement of flaking – the more modified side was labelled face 1 (Goren-Inbar and Saragusti 1996). In the case of face 1, the number of flake scars reaches even 24 and their mean number is 15, which is only slightly more than the number of flake scars in the case of face 2 (Table 2). These values are virtually identical as in the case of the hand-axes from the basalt component in the Acheulean site Gesher Benot Ya'aqov, dated to MIS 18–20 (Goren-Inbar *et al.*, 2018).

Table 1. Dimensions of LCT without biface preforms (mm and g).

	n	Minimum	Maximum	Mean	Std. deviation
Max. length	18	117.3	224.0	167.6	28.2
Max. width	25	71.2	127.4	97.2	13.7
Max. thickness	25	28.5	65.9	44.5	9.9
Weight	25	342.0	1508.0	866.3	317.5

Table 2. Number of scars on both faces of bifacial component.

	n	Minimum	Maximum	Mean	Std. deviation
Face 1 – no. of scars	24	11	24	15.13	3.56
Face 2 – no. of scars	24	2	19	12.46	4.09

In contrast to flake scars bigger than 5 mm, some hand-axes display smaller ones, resulting from modification in the form of retouch. Six specimens display bifacial retouch of the edge (intensive retouch on one or both faces), while in three cases thinning of the edge was observed (few scars restricted to the edge and not extensively covering the surface of the biface).

The number of scars on both faces of bifaces is reflected by the presence of natural surfaces. In the case of face 1, as many as eight out of 24 hand-axes have no natural surface, while another nine examples have up to 25% of their natural surface. Seven specimens display up to 50% of natural surface. The face 2 of bifaces, by definition less modified, displayed the presence of natural surface occupying up to 50% in the case of 14 examples, while in ten hand-axes, the natural surface occupied 51–75% of face 2.

To characterise the morphology of the hand-axes from Khor Shambat, the method of typological classification was used, proposed by Bordes (1961) and consisting of the calculation of ratios of various dimensions. Only complete specimens and those with a slightly broken tip (23 specimens) were measured. As a result of measurements, nearly a half of the hand-axes were classified as cordiform (11 specimens, 48%), the forms of the remaining ones are triangular (four specimens, 17%), subtriangular (three specimens, 13%), subcordiform (two specimens, 8%), limande (two specimens, 8%) and ovate (one specimen, 4%). The distribution of hand-axes from Khor Shambat within the four shape zones of Bordes is presented in Fig. 13. The analyses of the cross sections of the hand-axes and the cleaver indicated that lenticular cross sections (12 specimens, 48%) and plano-convex (six specimens, 24%) ones predominate with individual backed, angular, rhombus and trapeze cross sections.

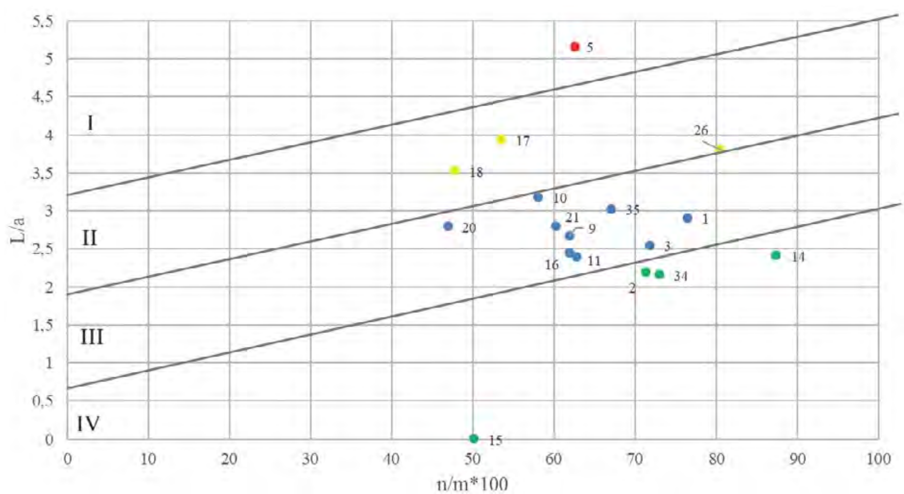

Fig. 13. A scatterplot presenting the distribution of Khor Shambat hand-axes according to Bordes' (1961) shape zones. Graphic design: G. Michalec.

To sum up, the most common shape of the hand-axe from Khor Shambat is cordiform with lenticular cross section made on a stone chunk. The average sizes are *c.* 170 mm in length, 100 mm in width and 40 mm in thickness, while the average weight does not exceed 1 kg. Face 1 and 2 display on average a dozen or so scars and occasional bifacial retouch, while the natural surface does not exceed 50% of face 1 and remains within the range of 25–75% in the case of face 2.

Geometric-morphometric comparative analysis
The hand-axes from Khor Shambat were subject to a morphometric analysis together with the assemblage from two nearby Acheulean sites: the Dakhla Oasis in Egypt (Schild and Wendorf 1977) and EDAR 133 in Sudan (Masojć *et al.*, 2019). The geometric-morphometric approach to 2D objects aimed at determining the differences between the assemblages of Acheulean artefacts. The geometric-morphometric, or morphometric, method has been used in archaeology, e.g., to analyse assemblages of pebble and biface tools from the early and middle Pleistocene (Lycett 2007; 2008; Costa 2010; Serwatka 2014) as well as late-Pleistocene tanged points (Serwatka and Riede 2016; Serwatka 2018). Our analysis implemented a pattern similar to that used by Costa (2010) in the research of middle-Palaeolithic bifacial tools from site Castel di Guido.

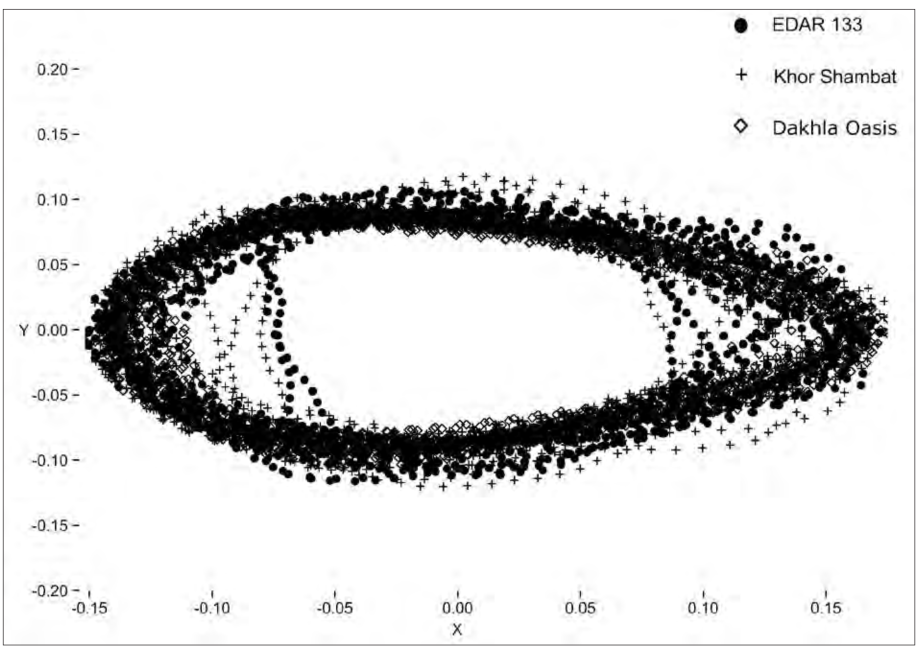

Fig. 14. Results of Procrustes adjusting for 66 hand-axes from the three analysed sites (3 × 22). Graphic design: G. Michalec.

Twenty two hand-axes (completely preserved or with a slightly broken tip) were selected from each site. In the case of the tools from Khor Shambat and EDAR 133, the photographs of the artefacts were made in Sudan and were used to draw their outlines. The drawings of the artefacts from the Dakhla Oasis in Egypt (Schild and Wendorf 1977) were scanned. The orientation of photographs and outlines were made with the use of a vector graphics programme – Inkscape. The hand-axes were oriented along the axis of symmetry going through the tip and the middle of the base (McPherron and Dibble 1999); the outlines of the artefacts were drawn with a tool for drawing a Bézier curve.

The tpsUtil 64 program was used to convert files from the JPG to TPS formats; the tpsDig 2 program with the use the tools of automatic outlining was used to mark 75 landmarks on each object. All the XY coordinates of the landmarks in the Cartesian coordinate system were generated in tabular form for analysis by the PAST 3 (PAleontological STatistics) program. The acquired data were subject to Procrustes superimposition, which aims at generating an average shape of all 2D objects in the central point of the component axis (points 0.0; Fig. 14). All the averaged values were analysed with the use of the principal component analysis (PCA), while MANOVA (Pillai 2014) and PERMANOVA statistical tests (Anderson 2017) were used to examine 25 landmarks proportionately selected from each object. In this way we were able to verify the possibility of occurrence of a significant statistical difference between the assemblages. The use of permutation multivariate analysis of variance (PERMANOVA) to confirm the results of the first test (MANOVA) resulted from the specific character of the former; it does not have to meet the requirement of normality of distribution, it is resistant to homogeneity of variances and it also examines distances between particular units of observation and centroids and not the mean values of individual groups (Anderson 2017).

Results

Principal component analysis (PCA) results reveal that over 95% of variances are described by the first 6 main elements, of which the first 2 reached a value of 39.475 and 32.322 (Table 3). Due to the highest values of the first two components, the results of the analysis were presented with the emphasis on these values.

The analysis of thin-plate deformation shows the diversification of the shape of the artefacts in the examined assemblages. The axis of the main component 1 displays the shapes approximating to classic almond-shaped and irregular forms, while the axis of the main component 2 presents triangular/subtriangular and oval forms (Fig. 15). Most artefacts have a shape approximating to subtriangular and almond-shaped forms, which is especially distinct in the case of the assemblage from the Dakhla Oasis. The remaining two assemblages mainly have a shape approximating to classic almond-shaped, irregular and – in few cases – oval forms. The irregularity of the shape of the artefacts from site EDAR 133 may result mainly from the fact that tips of hand-axes

Table 3. Percentage values of variances described by the first 10 main components.

Principal component	Eigenvalue	% variance	Cumulative % variance
1	0.0109379	39.475	
2	0.00923296	33.322	72.797
3	0.00410937	14.831	87.628
4	0.0011541	4.165	91.793
5	0.000670015	2.418	94.211
6	0.000289021	1.043	95.254
7	0.000259375	0.936	96.191
8	0.000191735	0.692	96.882
9	0.000126516	0.457	97.339
10	9.16525E-05	0.331	97.670

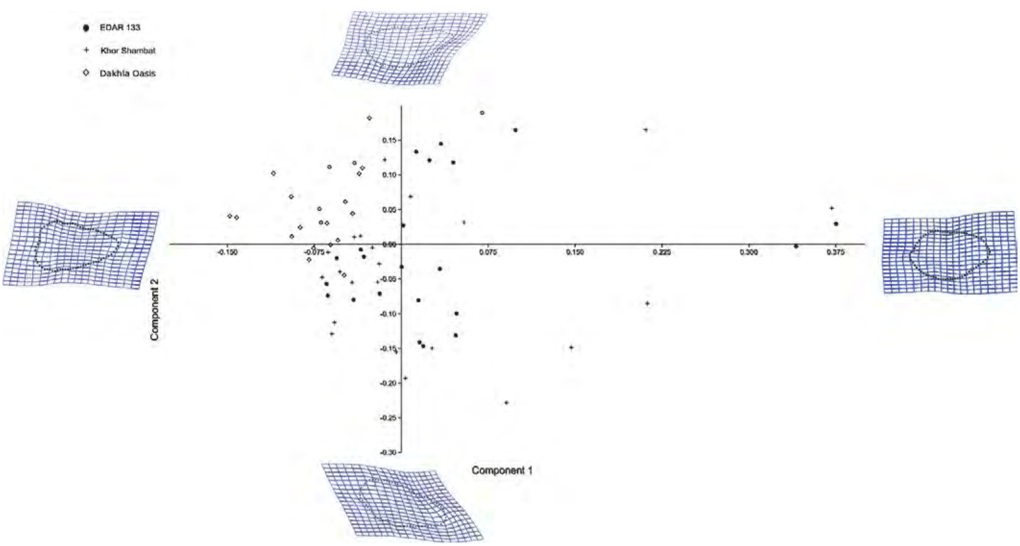

Fig. 15. Plot of the PCA scores for main components 1 and 2 with marked transformations for extreme values of both axes. Graphic design: G. Michalec.

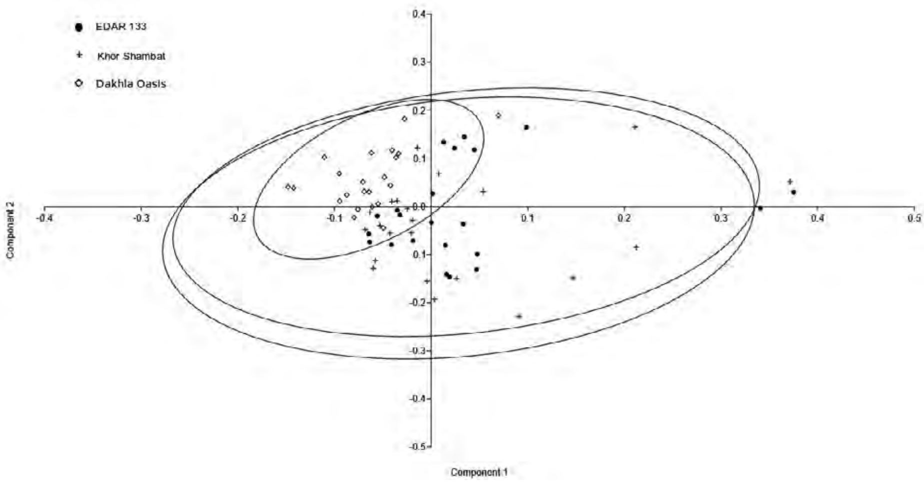

Fig. 16. Range of adjustment of variation 95% for each assemblage of artefacts in PCA.
Graphic design: G. Michalec.

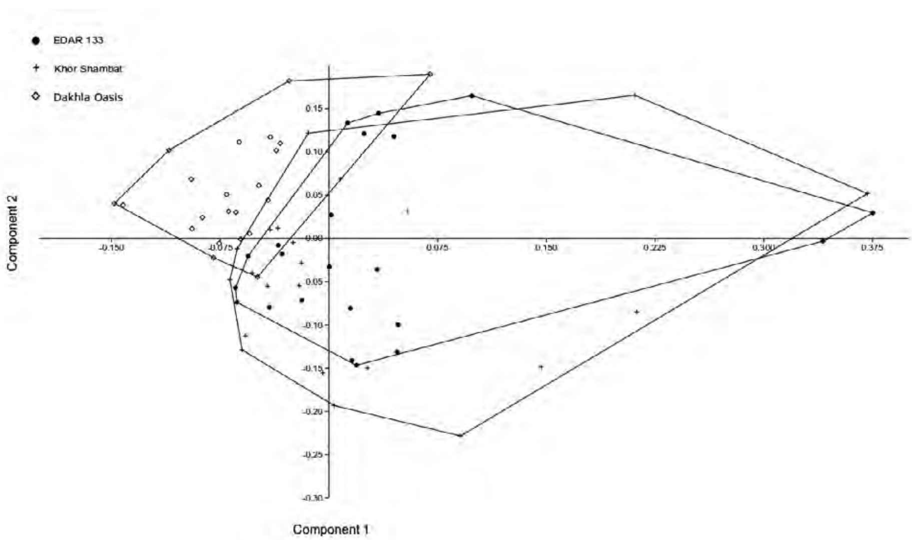

Fig. 17. Plot of the PCA scores with convex outlines for individual groups of artefacts.
Graphic design: G. Michalec.

Table 4. PERMANOVA results with the comparison in pairs of sites: (KHS) Khor Shambat, (ED 133) EDAR 133, (DO) Dakhla Oasis.

	KHS	**ED 133**	**DO**
KHS	–	0.3308	0.0001
ED 133	0.3308	–	0.0001
DO	0.0001	0.0001	–

PERMANOVA	
Permutation N	9999
Total sum of squares	0.5979
Within-group sum of squares	0.4546
F	9.926
p (same)	0.0001

were made with blows forming 1 or 2 opposite notches. Similar forms are known from the early-Acheulean site Olduvai George from Tanzania (de la Torre and Mora 2018).

Most units of observation subject to PCA are in the range of 95%, which testifies to a small number of outliers in the results of the analysis (Fig. 16). The position of units of observation in the assemblages of hand-axes from the Dakhla Oasis is accumulated in the small area of the diagram, which proves the great extent of standardisation of shape of the objects. In the case of tools from EDAR 133 and Khor Shambat, the units of observation are considerably dispersed, while convex outlines show similarities between them (Fig. 17). There is a distinct diversity between the Dakhla Oasis and the two remaining sites.

Manova/Permanova

The results of the Mardia Kurtosis test of normality proved the absence of normality of distribution for all variables ($p = 5.357E\text{-}10$); in this case we had to implement MANOVA with Pillai's trace. The MANOVA revealed a distinct diversity between the groups (Pillai's trace = 1.811, $F = 2.869$, $p = 0.0007774$), which is also visible in the results of PERMANOVA (Table 4). Results of comparison in pairs confirm the similarity of hand-axes between EDAR 133 and Khor Shambat and difference between these two assemblages and the artefacts from the Dakhla Oasis, which is identical with the PCA result.

The implications of the comparative analysis
The results of the analysis prove a considerable similarity between the assemblage from Khor Shambat and the artefacts from site EDAR 133 and a distinct difference from the Dakhla Oasis material. Differences in sizes and shape of the artefacts may result from the exploitation of different local raw material. In the case of Dakhla Oasis, the exploited material was chert, the blocks of which are smaller but their quality is very good. At EDAR site 133 mainly quartz and rhyolite were used, whose naturally occurring blocks reach considerable dimensions, and at site Khor Shambat it was Nubian quartzitic sandstone of worse flaking properties, which might have caused the adaptation of the cultural tradition to the quality of the raw material.

The difference may also result from the different chronologies of the assemblages. The presence of Levallois artefacts and oval-shaped hand-axes approximating to Sangoan ones at the Khor Shambat and EDAR 133 sites may indicate their younger chronology in relation to the Dakhla Oasis.

THE KHOR SHAMBAT ACHEULEAN IN BROADER SUDANO-EGYPTIAN CONTEXT

The presence of Acheulean material in the Nile valley and the desert areas north of the Ethiopian Highlands is confirmed only from the middle Pleistocene. The Acheulean site in Khor Abu Anga, discussed by Arkell (1949), is one of the earliest excavated sites in the Nile valley. Despite considerable erosion, part of the Acheulean material was found there in its original stratigraphic position. The latest monograph has proposed the chronology for Acheulean from this site as between 350–223 ka and for the Sangoan, sub-Saharan industrial complex of equatorial Africa as between 250–150 ka (Carlson 2015: 132–134). It should be noted that this chronology is based on the conclusions concerning the chronology of other dated sites from this part of Africa, and mainly the site from the island of Sai on the Nile in Sudan. A sequence of layers with Acheulean material is known from this island, situated between the second and the third cataracts in Nubia, where late assemblages from that culture were adjacent to layers containing the oldest products from the Middle Stone Age, known as the so-called Sangoan. The horizon with Acheulean material was covered by the deposits dated by OSL to 223±19 ka (Van Peer *et al.*, 2003). Until recently, it was the only dating available for the Acheulean in Sudan. The chronology of the recently discovered Acheulean sites in the Eastern Desert in Sudan is close to those for Acheulean horizons at Sai. At the EDAR 135 site, the upper horizon (Unit IIA) of occurrence of Acheulean artefacts, recorded at a depth of c. 3 m from the contemporary surface, was covered by the deposits dated with OSL to 181±28 ka, while the deposit situated directly underneath was dated to OSL 231±22 ka (Masojć *et al.*, 2019).

Further up the Nile, a number of Acheulean sites have been discovered in the vicinity of the locality of Wadi Halfa (Wendorf ed. 1968) when the Aswan Dam was constructed. One of these is Arkin 8, where a rich concentration of Acheulean material surrounded by younger – possibly functionally diversified – concentrations (Chmielewski 1968) was discovered under fluvial deposits in an ephemeral wadi. None of the remaining Nubian Acheulean sites from the Nile valley (e.g., Nag Ahmed el Khalifa) is situated in its original position (Vermeersch *et al.*, 2000; Vermeersch 2001). A promising area for the research of this culture is al-Jamrab on the White Nile, where Acheulean artefacts have recently been discovered in Pleistocene deposits (Spinapolice *et al.*, 2018). The Atbara river, a tributary of the Nile, is a watercourse along which Acheulean groups migrated. Their numerous remains, accompanied by the remains of Pleistocene megafauna, were discovered in the vicinity of Khasm el Girba mentioned above in the upper part of the river. This is potentially the area of the oldest human settlement in this part of Africa predating the middle Pleistocene (Abbate *et al.*, 2010).

In the deserts surrounding the Nile, Acheulean remains are known from oases, paleolakes and desert sources. Pioneering research in northern Nubia was carried out in the Kharga (Caton-Thompson 1952) and Dakhla (Schild and Wendorf 1981) oases. In Dakhla, Acheulean material came from the vicinity of an artesian source forming a small lake with warm water surrounded by vegetation. Analogous Acheulean evidence was discovered in the Bir Sahara depression, where artesian wells with accompanying Acheulean material occurred at site BS-14 (dated to *c.* 310 ka). The accompanying faunal remains, which included ostrich and donkey or zebra, point to a savannah landscape (Schild and Wendorf 1981; Hill and Schild 2017).

Considering the remarks above, the Acheulean material from Khor Shambat discussed in this work should be connected with the activity of hominines of the middle Pleistocene. Bearing in mind that we are confronted with a non-homogeneous assemblage, the multi-stage nature of Acheulean activity in Khor Shambat cannot be ruled out. The available data are not sufficient to justify suggesting the presence of Sangoan material in Khor Shambat, even though a possible indicator of this is the forms of individual oval hand-axes. This unit, similarly as well as another – Lupemban – is in the authors' view present in neighbouring Khor Abu Anga (Carlson 2015). Their chronology was determined on the basis of the chronology from the island of Sai (Van Peer *et al.*, 2003). In this view, the broad chronology of the Acheulean proposed for Khor Abu Anga by Carlson might potentially be applicable to Khor Shambat, and fall within the range of 350–200 ka.

REFERENCES

Abbate, E., Albianelli, A., Awad, A., Billi, P., Bruni, P., Delfino, P., Ferretti, M. P., Filippi, O., Gallai, G., Ghinassi, M., Lauritzen, S. E., Lo Vetro, D., Martínez-Navarro, B., Martini, F., Napoleone, G., Bedri, O., Papini, M., Rook, L. and Sagri, M. 2010. Pleistocene Environments and Human Presence in the Middle Atbara Valley (Khashm el Girba, Eastern Sudan). *Palaeogeography, Palaeoclimatology, Palaeoecology* 292: 12–34.

Anderson, M. J. 2017. Permutational Multivariate Analysis of Variance (PERMANOVA). *Wiley StatsRef: Statistics Reference Online.* New York, John Wiley & Sons.

Arkell, A. J. 1949. *The Old Stone Age in the Anglo-Egyptian Sudan.* Sudan Antiquities Service Occasional Papers 1. Khartoum.

Bordes, F. 1961. *Typologie du Paléolithique ancien et moyen*. Bordeaux, Imprimeries Delmas.

Carlson, R. L. 2015. *Khor Abu Anga and Magendohli: Stone Age sites at the Sudanese Nile*. Oxford. British Archaeological Reports International Series S2768.

Caton-Thompson, G. 1952. *Kharga Oasis in Prehistory*. Athlone Press.

Chmielewski, W. 1968. Early and Middle Paleolithic Sites near Arkin, Sudan. In F. Wendorf (ed.), *The Prehistory of Nubia v. 1*, 110–47. Fort Burgwin Research Center and Southern Methodist University Press.

Costa, A. G. 2010. A geometric morphometric Aassessment of plan shape in bone and stone Acheulean bifaces from the Middle Pleistocene site of Castel di Guido, Latium, Italy. In S. Lycettand and P. Chauhan (eds), *New Perspectives on Old Stones*, 23–41. New York, Springer.

Goren-Inbar, N., Alperson-Afil, N., Sharon, G. and Herzlinger, G. 2018. *The Acheulian Site of Gesher Benot Ya'aqov Volume IV: The Lithic Assemblages*. Dordrecht, Springer.

Goren-Inbar, N. and Saragusti, I. 1996. An Aheulean biface assemblage from the site of Gesher Benot Ya'aqov, Israel: Indication of African affinities. *Journal of Field Archaeology* 23: 15–30.

Hill, C. L. and Schild, R. 2017. Paleohydrology and Paleoenvironments at Bir Sahara: Pleistocene Lithostratigraphy and Sedimentology in the Southern Egyptian Sahara. *Journal of African Earth Sciences* 136: 201–15.

Idris, G. 1994. *Die Altsteinzeit im Sudan*. Bonn. Archäologische Berichte 4.

Jórdeczka, M., Chłodnicki, M., Sobkowiak-Tabaka, I. and Stanaszek, Ł. M. 2020. Rebirth in the afterlife. Neolithic pot burials from the Khor Shambat, Sudan. *Azania: Archaeological Research in Africa* 55: 1–25. https://doi.org/10.1080/0067270X.2020.1721840

Lycett, S. J. 2007. Is the Soanian Techno-Complex a Mode 1 or Mode 3 phenomenon? A morphometric assessment. *Journal of Archaeological Science* 34(9): 1434–1440.

Lycett, S. J. 2008. Acheulean variation and selection: does handaxe symmetry fit neutral expectations? *Journal of Archaeological Science* 35(9): 2640–2648.

Masojć, M., Nassr A., Kim, J. Y., Krupa-Kurzynowska, J., Sohn, Y. K., Szmit, M., Kim, J. Ch., Kim, J. S., Choi, H. W., Wieczorek, M. and Timmermann, A. 2019. Saharan green corridors and Middle Pleistocene hominin dispersals across the Eastern Desert, Sudan. *Journal of Human Evolution* 130: 141–150. https://doi.org/10.1016/j.jhevol.2019.01.004

McPherron, S. P. and Dibble, H. L. 1999. Stone tool analysis using digitized images: examples from the Lower and Middle Paleolithic. *Lithic Technology* 24(1): 38–52.

Pillai, K. C. S. 2014. Multivariate Analysis of Variance (MANOVA). *Wiley StatsRef: Statistics Reference Online.* New York, John Wiley & Sons.

Robertson Research Group, 1988. *Geological Map of Sudan 1:1 000 000, sheet Khartoum*. Khartoum Research Authority of the Sudan.

Schild, R. and Wendorf, F. 1977. *The Prehistory of Dakhla Oasis and adjacent desert*. Wroclaw, Cracow, Warsaw, Gdansk, Ossolineum, Polish Academy of Sciences.

Schild, R. and Wendorf, F. 1981. *The Prehistory of an Egyptian Oasis. A Report of the Combined Prehistoric Expedition to Bir Sahara, Western Desert, Egypt*. Wroclaw, Cracow, Warsaw, Gdansk, Ossolineum, Polish Academy of Sciences.

Serwatka, K. 2014. Shape variation of Middle Palaeolithic bifacial tools from southern Poland: a geometric morphometric approach to Keilmessergruppen handaxes and backed knives. *Lithics: the Journal of the Lithic Studies Society* 35: 18–32.

Serwatka, K. 2018. What's your point? Flexible projectile weapon system in the Central European Final Palaeolithic. The case of Swiderian points. *Journal of Archaeological Science: Reports* 17: 263–278.

Serwatka, K. and Riede, F. 2016. 2D geometric morphometric analysis casts doubt on the validity of large tanged points as cultural markers in the European Final Palaeolithic. *Journal of Archaeological Science: Reports* 9: 150–159.

Spinapolice, E. E., Zerboni, A., Meyer, M. and Usai, D. 2018. Early Human Occupation at al-Jamrab (White Nile Region, Central Sudan): A Contribution to the Understanding of the MSA of Eastern Africa. *Journal of African Archaeology* 16: 193–209.

de la Torre, I. and Mora, R. 2018. Technological behaviour in the early Acheulean of EFHR (Olduvai Gorge, Tanzania). *Journal of Human Evolution* 120: 329–377.

Van Peer, P., Fullagar, R., Stokes, S., Bailey, R. M., Moeyersons, J., Steenhoudt, F., Geerts A., Vanderbeken T., De Dapper, M. and Geus, F. 2003. The Early to Middle Stone Age transition and the emergence of modern human behaviour at site 8-B-11, Sai Island, Sudan. *Journal of Human Evolution* 45: 187–193.

Vermeersch, P. M. 2001.'Out of Africa' from an Egyptian Point of View. *Quaternary International* 75: 103–112.

Vermeersch, P. M., Paulissen, E., Otte, M. and Gijselings, G. 2000. Acheulean at Nag Ahmed el Khalifa. In P. M. Vermeersch (ed.), *Palaeolithic Living Sites in Upper and Middle Egypt*, 57–74. Leuven University Press.

Wendorf, F. (ed.). 1968. *The Prehistory of Nubia*. Fort Burgwin Research Center and Southern Methodist University Press.

Whiteman, A. J. 1971. *The Geology of the Sudan Republic.* Oxford, Clarendon Press.

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The Middle Palaeolithic Assemblage with Bahari Technique from the Site 21b in Deir el-Bahari (Western Thebes), Upper Egypt

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In the 1970s, the authors of this paper explored the Site 21b, situated in the north-western fringe of the Deir el-Bahari Valley, in the Theban Massif (Upper Egypt). Based on the significant variability in the state of preservation of artefacts' surfaces, six series of artefacts were identified, corresponding to the Middle Palaeolithic and Pre-Dynastic assemblages. The most detailed analysis was performed for the inventory of the series 2, which was ascribed to a previously unknown industry with the Levallois technique and Mousterian discoidal cores. This industry is also characterised by an occurrence of a specific manner of obtaining flakes from globular and thick, flattened, lens-like nodules, abundantly occurring in the local Lower Eocene limestone. This manner of flake production was called the Bahari technique. Due to the occurrence of sidescrapers, Mousterian points, denticulated and notched pieces, the chronology of this series was determined as Middle Palaeolithic.

KEY-WORDS: Theban Hills, Middle Palaeolithic, Bahari technique

INTRODUCTION

In 1975 and 1976, the authors of this paper, at that time active researchers at the Institute of Archaeology, Jagiellonian University in Cracow, conducted an archaeological survey on the fringe of the Deir el-Bahari Valley, in the area of the Theban Gebel (Fig. 1). These studies were carried out within a scholarship granted by the Egyptian Government and were included into the so-called Deir el-Bahari Project executed under the auspices of the Polish Centre of Mediterranean Archaeology, University of

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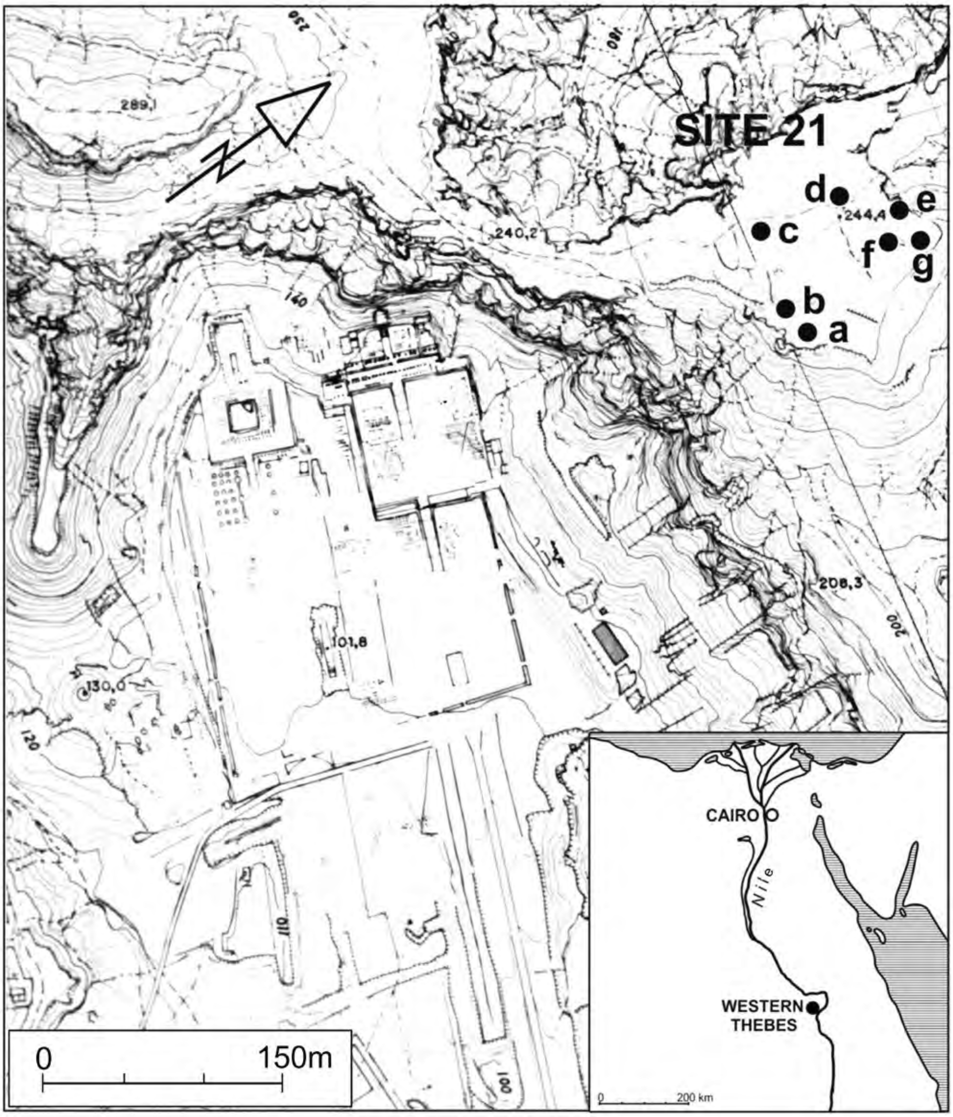

Fig. 1. Topography of the Site 21 in the context of the Deir el-Bahari Valley.
Graphic design: The Egyptian Antiquities Organization with changes by U. Socha.

Warsaw. The Project aimed at tracing the process of inhabiting the valley itself as well as its closest surroundings since the prehistoric times until the Dynastic Period, with particular attention paid to the times preceding the latter. Submitting this paper to be published in the Jubilee Book dedicated to Professor Michał Kobusiewicz should be seen as an expression of our great fellow feeling for our colleague and friend and respect for his outstanding achievements in studies upon the prehistory of North-Eastern Africa.

As we know, an interest in the prehistory of the Western Thebes region has got a long history; since its beginnings reach as far back as to the second half of the 19th century. The first expeditions in search of lithic materials and their interpretations were the work of such scholars as A. Arcelin (Arcelin 1869: 136–407; 1870: 155–189) and A. Pitt-Rivers (Pit-Rivers 1882). Also noteworthy are systematic field studies carried out at the end of the 19th century and beginning of the 20th century by G. Schweinfurth, who, apart from collecting prehistoric assemblages, distinguished and localised a number of archaeological sites, and created a topographic map of them (Schweifurth 1903: 798–838). In the 1930s, R. Cottevieille-Giraudet brought to light the issue of the occurrence of prehistoric sites at various altitudes on the Theban Gebel, connecting this phenomenon with the differentiation of their age. He was also the first researcher who identified the Lower Palaeolithic artefacts from this region (Cottevieille-Giraudet 1933). At the same time K. S. Sandford and W. J. Arkell presented their concept of the occurrence of four major Pleistocene alluvial terraces in this part of the Nile Valley, distinguishing the Middle Palaeolithic artefacts amongst other flint materials (Sandford and Arkell 1933). Studies upon the region under scrutiny became more intense once again in the 1960s, and even more in the 1970s. This was associated with an activity of the French-Egyptian expedition headed by Ch. Desroches-Noblecourt, with the participation of F. Debono, which mostly aimed at searching for graffiti on rocks as well as identification and topographic location of prehistoric sites in the area of the Theban Hills (Debono 1972). A major role in shaping the current viewpoints on the geology and prehistory of this part of Egypt was played by field research conducted within the activity of the Combined Prehistoric Expedition headed by F. Wendorf, R. Said and R. Schild. Their numerous publications addressing the issues of stratigraphy, age and dynamics of the Pleistocene sediments origins, evolution of the Nile Valley, as well as identification of new taxonomic units and development of the Palaeolithic cultures are still current, constituting an excellent point of reference for further studies (Said *et al.*, 1970; Said 1975).

In the winter season of 1973/74, the researchers of the Institute of Archaeology, Jagiellonian University in Cracow, J. K. Kozłowski and J. Śliwa, commenced a field survey which led to the recognition of the geology, stratigraphy and topography of the Deir el-Bahari Valley and its closest surroundings. They also recorded a dozen or so concentrations of flint and stone materials of various ages (Drobniewicz *et al.*, 1976: 11–26).

In the following season, in which the authors of this paper joined the expedition, a few selected sites were explored entirely or partly, and other concentrations of artefacts visible on the ground surface were recognised. Assemblages found within those concentrations varied in terms of chronology and cultural affiliation, and were dated within wide time frames from the Middle Palaeolithic until the Dynastic Period (Heflik and Kozłowski 1977: 7–30).

THE SITE 21

Our particular attention was drawn by the Site 21, situated in the north-western part of the valley fringe, lying at an altitude of *c.* 244 m a.s.l., and *c.* 150 m above the valley bottom. The site embraces a fragment of a widespread structural platform of the Theban limestone of the Lower Eocene age, formed by erosion processes (Drobniewicz and Ginter 2019: 106; Fig. 1). Its surface is covered with a thin layer of silty sands of yellowish colour, beneath which there occurs the limestone bedrock cut through by tectonic and erosive cracks. Within the boundaries of the site a few quite well isolated concentrations of flint artefacts were discovered (Fig. 2), amongst which one, namely the concentration no. 21 b, was entirely explored. This feature was almost oval in shape and had dimensions of *c.* 30 × 20 meters. Artefacts found within it lay exclusively on its surface; therefore, the exploration

Fig. 2. Deir el-Bahari. The Site 21b, view from the west. Photo: B. Ginter.

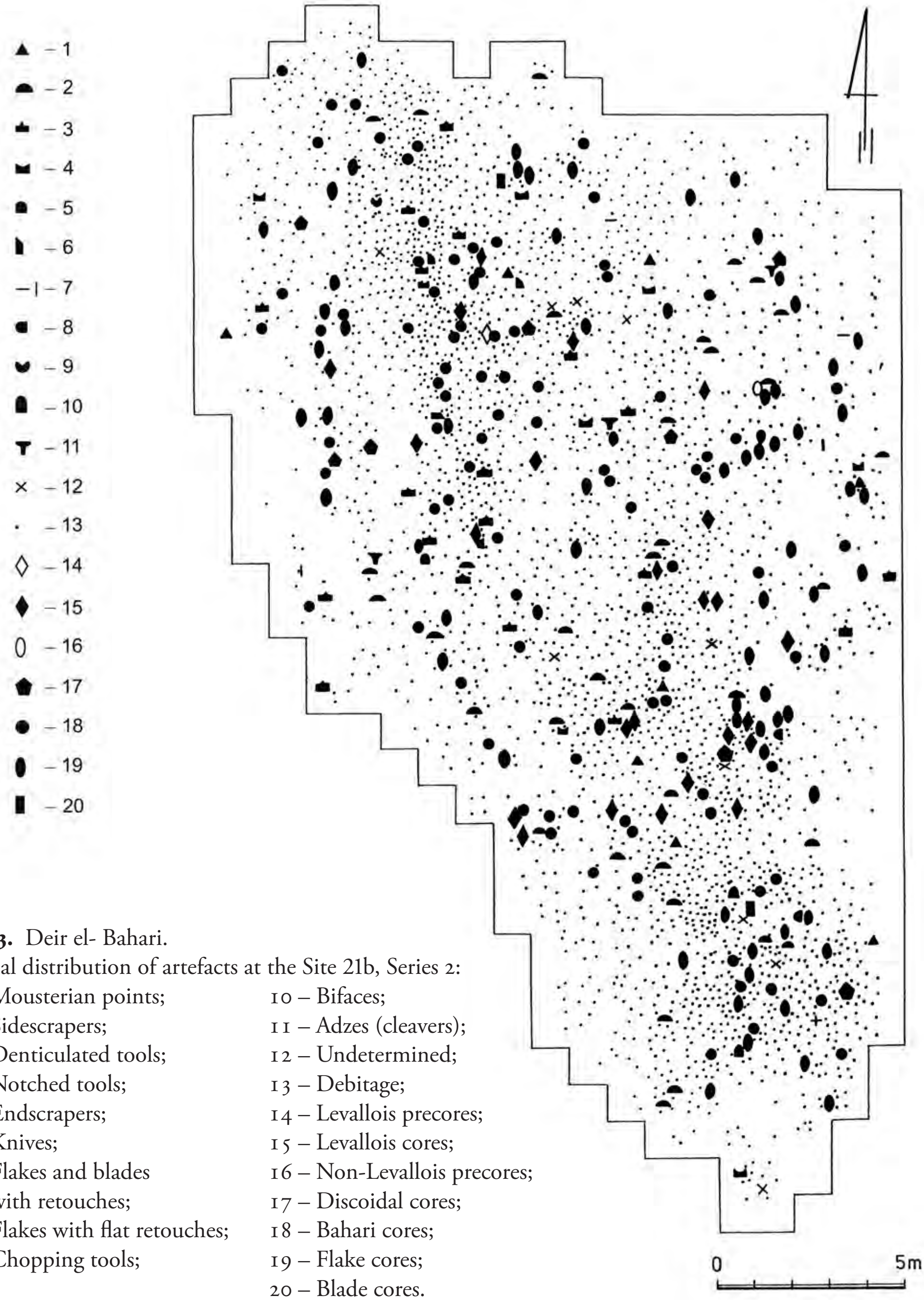

Fig. 3. Deir el- Bahari.
Spatial distribution of artefacts at the Site 21b, Series 2:

1 – Mousterian points;
2 – Sidescrapers;
3 – Denticulated tools;
4 – Notched tools;
5 – Endscrapers;
6 – Knives;
7 – Flakes and blades with retouches;
8 – Flakes with flat retouches;
9 – Chopping tools;
10 – Bifaces;
11 – Adzes (cleavers);
12 – Undetermined;
13 – Debitage;
14 – Levallois precores;
15 – Levallois cores;
16 – Non-Levallois precores;
17 – Discoidal cores;
18 – Bahari cores;
19 – Flake cores;
20 – Blade cores.

Graphic design: U. Socha.

was reduced to gathering them thoroughly, preceded by recording the position of the most important specimens (cores and tools) in a two-dimensional coordinate system, while less significant materials were captured within a network of squares superimposed on the investigated area (Fig. 3).

Amongst the assemblage of over ten thousand of knapped stone artefacts, the investigators at first identified three series of artefacts (Drobniewicz *et al.*, 1976: 24), and after exploration of the further part of this concentration, a total of six series of artefacts were distinguished, corresponding with taxonomic units varied in terms of their chronology and cultural affiliation. With regard to the planigraphy, the individual series of artefacts overlapped one another, which made it impossible to separate them on spatial grounds. Due to this, we decided to perform a selection based on the nature and state of preservation of the artefacts surfaces, taking into consideration their highly variable and relatively distinguishable degree of damage, polishing or patination, as well as the colour of patina and the state of preservation of their edges. Employing a distinctive state of preservation as the major criterion allowed us to distinguish six assemblages significantly differing one from another in terms of both techniques of preparation and exploitation of cores, as well as an occurrence of particular types of tools and their frequencies.

Series 1

Artefacts of the Series 1 are characterised by strongly damaged, weathered surfaces, smoothed edges and a thick layer of patina. Their colour is dark orange to reddish. Amongst cores and debitage the Levallois technique prevails (IL = 32)[1], reduced almost exclusively to production of flakes, and absolutely lacking points. Unretouched Levallois tools are considerably more frequent than retouched ones (ILty = 79), with predominant sidescrapers and an occurrence of an almond-shaped, slightly elongated and asymmetric biface. We believe that this series represents the Middle Palaeolithic phase of the Acheulean Culture with abundantly developed Levallois technique.

Series 2

The Series 2 was identified based on the occurrence of a specific, thick patina, deep red in colour (Fig. 4). This patina was not the only unique element characterising this series. It was also distinguishable from other assemblages due to an extremely interesting technique of core exploitation, named by the authors as the Bahari technique. The spatial distribution of artefacts is illustrated in Fig. 3. The Series 2 is considered the most significant and is the major subject of our paper, and a detailed description will be given below, following the discussion of all the other series.

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1 All indices given in this paper are quoted after Bordes, F. 1953. Essai de Classfication des industries "mousteriennes". *Bulletin de la Société prehistoriqué française*: 50: 457–466.

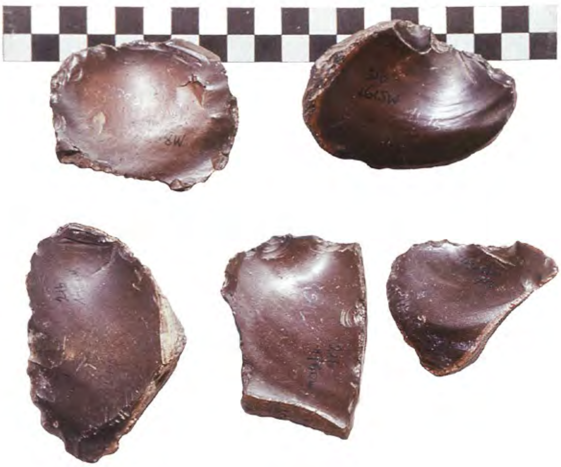

Fig. 4. Deir el-Bahari, the Site 21b. Bahari cores. Photo: B. Ginter.

Series 3 and 4

Surfaces of artefacts of the Series 3 and 4 are smooth, opaque and covered with patina, the layer of which is not very thick. The colour of the patina is various shades of beige (Series 3), or beige-orange changing into gently reddish (Series 4) with visible blackish varnish. Edges of the artefacts are slightly smoothed, so are the ridges between the scars. Both of these series share many common traits, in respect of both toolset as well as flaking techniques. The Levallois index is medium high (IL = 12 and 16, respectively), with a visible predominance of flakes and flake cores, but with a high contribution of points and blades, and a very low frequency of Mousterian discoidal cores and flakes detached from them. A relatively numerous group of artefacts is represented by a specific variant of Levallois cores typical of the so-called Nubian Mousterian distinguished in the Wadi Halfa region (Marks 1968a). With regard to both of the series under discussion, unretouched Levallois tools prevail in number over the retouched ones (ILty = 61 and 78, respectively). The latter are represented mainly by sidescrapers of various types, denticulated and notched pieces, with a small contribution of endscrapers and few burins. Noteworthy is the occurrence of a single biface within the Series 3, which has got its closest analogues in the Mousterian assemblages with Levallois technique related to the above-mentioned Nubian Mousterian from the borderland between Egypt and Sudan.

Series 5

The Series 5 comprises artefacts of smooth and slightly shiny surfaces, covered entirely with thin black desert patina; the edges of the artefacts are very weakly smoothed. The Levallois technique is visible though poorly manifested (IL = 4), whereas, the technique employing the Mousterian discoidal core is very strongly accentuated, which is legible in both cores as well as debitage. The blade technique also played a significant role in this series (Ilam = 17), with a visible predominance of single platform cores over the double platform ones and cores with changed orientation. The flake technique, however, dominated, and was recorded in all its variants. In spite of the low technical index, the Levallois typological index is quite high due to a relatively high contribution of Levallois flakes, blades and points (Ilty = 41). Retouched tools are represented mostly by lateral, transversal and oblique sidescrapers, denticulated and notched pieces, as well as numerous endscrapers and burins of various types. Noteworthy is a relatively high index of the Upper Palaeolithic tools (IPs = 27). While searching for assemblages of similar traits, the authors' attention was drawn by materials discovered in the Wadi Halfa region and described by A. E. Marks, who used them as providing the grounds for distinguishing a new cultural unit, named the Khormusan Culture (Marks 1968b).

Series 6

The Series 6, undoubtedly much later than those discussed above, comprises artefacts with "fresh" surfaces, practically not affected by patina, which in general has not changed the colour of the processed flint concretions. If a patina occurs, its colour is grey-beige and it covers only fragments directly exposed to the activity of atmospheric factors. The edges of these artefacts are sharp, without any traces of smoothing. This series is represented exclusively by flake cores of various types, including cores with changed orientation, as well as quite numerous blade cores, with a small contribution of cores for blades and flakes. A frequent phenomenon was the reutilisation of cores and precores from older series. Tools are not very frequent (3% of all artefacts), with a predominance of denticulated and notched pieces, and a significantly lower contribution of endscrapers and burins. They are rather large and roughly elaborated, which is typical of workshop sites. In terms of their state of preservation and the nature of cores and debitage they mostly resemble the Pre-Dynastic assemblages, especially those of the Naqada Culture, accompanying a great number of sites of this cultural unit in the foothills of the Theban Hills, close to the boundary of the present cultivation zone. The series in question is most likely a relic of a flint workshop of the above-mentioned culture.

Artefacts of the Series 2

In our opinion, the most interesting of these six groups is the above-mentioned series 2. This was distinguished based on the characteristic thick patina of dark deep red colour, sometimes changing into reddish-purple (Fig. 4). Surfaces of the artefacts of this series are very smooth, strongly polished and shiny. The edges are blunt, smooth and rounded. In cavities, traces of black desert varnish are noticeable.

Raw materials used for production of the tools of this series were flint nodules, mostly of large dimensions, abundantly occurring in the local Lower Eocene limestone of the Theban Massif. They were easily accessible, lying in large numbers over the surfaces of erosion planes, as well as within sediments covering the slopes of the Deir

Fig. 5. Deir el-Bahari. Flint nodules in the northern wall of the Valley. Photo: B. Ginter.

el-Bahari Valley. These nodules could have also been easily prised out of the walls of erosion or tectonic cracks, such as those that cut through the ground of the Site 21. Having analysed the vertical diversification of the Theban limestone, the authors noticed certain differences in sizes and shapes of flint nodules. Within the levels above the altitude of 220 m a.s.l. one can encounter large specimens of dimensions ranging from a dozen or so up to more than 20 cm in diameter. They are irregular in shape, massive, sometimes nearly globular or oval-shaped (Fig. 5; Tawfik *et al.*, 2011: 520).

The inventory of the series discussed here comprises 3 064 knapped flint artefacts, including: 4 precores (0.1%), 204 cores (6.7%), 2 575 flakes and chips (84.1%), 64 blades (2.1%), 121 unretouched Levallois tools (3.9%) and 96 retouched tools (3.1%). Such a composition is typical of sites where the entire flint processing cycle took place, starting from the preparation of precore forms, through the exploitation of the cores to obtain blanks, and ending with ultimate shaping of tools.

One of the characteristic traits of this assemblage is a great variability in manners of preparation and exploitation of cores. A significant though not very numerous group is represented by Levallois cores of various types (20 specimens – 10%), with a predominance of classical single platform flake cores. The contribution of discoidal and sub-discoidal cores of the Mousterian type is also very visible (16 specimens – 8%). The most frequent are common flake cores, single and double platform ones, as well as cores with changed orientation (59 specimens – 30%). The percentage of cores for flakes and blades is small (7 specimens – 3.5%), whereas blade cores occur only very sporadically (2 specimens – 1%). All of the groups of cores mentioned above bear clear traces of initial preparation preceding the process of exploitation. The latter was aimed mainly at production of flakes, and sometimes blades though to much smaller extent. Particularly with regard to Levallois cores, the initial treatment was usually very thorough, in some cases even meticulous.

Fig. 6. Flint nodules.
Photo: B. Ginter.

Fig. 7. Exposure of the Theban limestones with protruding chert nodules.
Photo: B. Ginter.

A separate group of cores, the most numerous (91 specimens – 47%), which we have decided to highlight in this paper, is represented by specimens showing no traces of any initial treatment, always made from globular or slightly flattened, usually very regular nodules, sometimes in a shape resembling a very thick lens or a strongly flattened cone (Fig. 6). These would have been found lying loose on a hard substrate constituted by eroded bedrock (Fig. 7) or within the limestone rubble of the slopes surrounding the valley. These cores are varied in shape, with dimensions from slightly exceeding 6 cm up to *c.* 12 cm. In shape they resemble a concave-convex or flat-convex lens, and their flaking surface is usually formed by a single scar of a previously detached flake (Fig. 8: 1–3). The striking platforms, sides and backs of such cores are covered with cortex and they wear no traces of any initial preparation preceding the exploitation. The exploitation always started from detaching a thick, more or less regular flake entirely cortical, using a hard hammer, and struck off at a selected point of the nodule circumference. Then the successive flake was detached, nearly always in the same direction as the previous

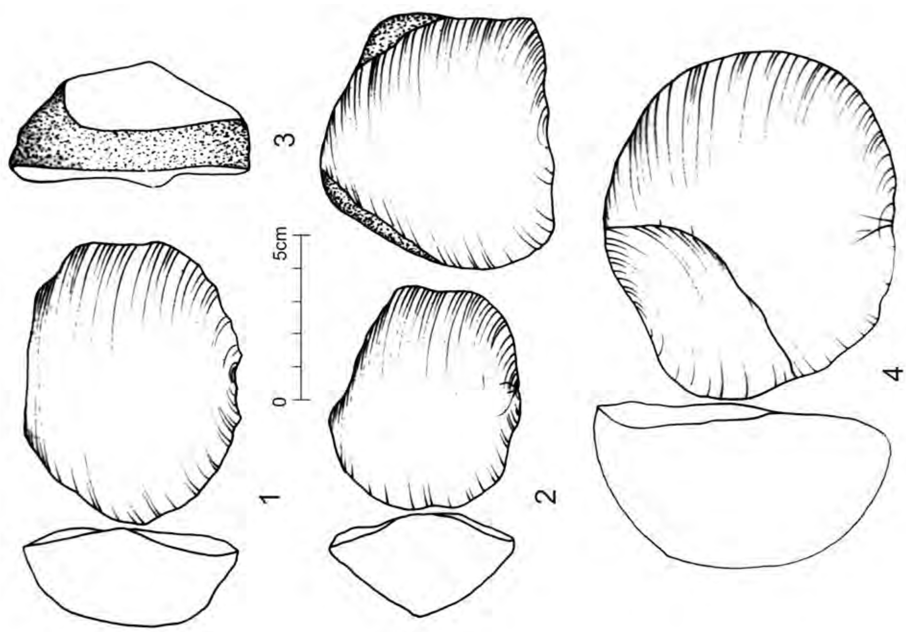

Fig. 8. Deir el-Bahari. Bahari cores. Drawn: B. Drobniewicz.

one. Afterwards one or two, at most, flakes were struck off, usually in the same direction as the former ones. Only sporadically was a different striking point on the nodule circumference selected (Fig. 8: 4). Thus, the technique of core processing was very simple, not to say primitive, and it aimed at obtaining no more than a few massive, thick flakes, rounded or oval-shaped, sometimes semi-circular, from one core. Due to its specific nature and distinctness from other currently identified manners of core processing, we called it the Bahari technique, after the Deir el-Bahari Valley.

There were recorded 2 732 flakes and blades, being the result of preparation, exploitation and rejuvenation of cores. A significant role is played by 121 Levallois flakes, blades and points, with a considerable predominance of the former ones (98 specimens), the number of which is much greater than it could be anticipated based on the number of cores. At least a dozen or so Levallois flake cores were transformed in the course of exploitation or through retouching into specimens of a later series, six in particular, to which they were consequently included. The Levallois technical index is relatively low (IL = 4.4). A further 153 flakes can be linked to the Levallois flint processing technique. They come from the advanced or final phases of forming the flaking surface. Another 123 flakes were detached from discoidal cores of the Mousterian type, supporting a hypothesis of their intense exploitation.

Within the debitage, common flakes prevail (2 078 specimens) over all other groups of waste products coming from all phases of the operational process. Relatively numerous are entirely cortical (472 specimens) or partly cortical flakes (1 442 specimens).

Undoubtedly, this indicates a thorough initial preparation of cores before they were explored, starting from raw nodules processed on the spot, ending with obtaining desirable blanks. The initial treatment was employed less frequently in processing of a few blade cores, since amongst 64 identified blades almost all of them were covered with cortex to a smaller (38 specimens) or greater extent (15 specimens), while only nine blades were entirely cortical.

A separate group is constituted by 193 flakes detached from the above-mentioned Bahari cores. Amongst them, 49 specimens are entirely cortical flakes with usually strongly convex dorsal sides, which results from the type of employed nodules. In general, they are thick and massive, and their thickness sometimes exceeds 3 cm (Fig. 10: 1, 4). A further 13 flakes were transformed into tools, whereas another dozen or so bear traces of tool treatment and are covered with patina, which indicates that they were used in later chronological periods. Most likely another few, possibly more than ten, artefacts were transformed with retouch to such an extent that their identification is impossible at the moment. Flakes bearing scars of previously detached specimens on their dorsal sides are clearly more numerous. There were recorded 144 examples of such artefacts, while a further 13 were transformed into tools, and another 12 have got younger scars of secondary tool treatment. About 90% of these flakes bear on their dorsal sides scars of specimens detached in the same direction (Fig. 9: 1, 2; Fig. 10: 2). With regard to slightly more than 10% of the artefacts, the scars on their dorsal sides are oblique or transverse to their detachment direction (Fig. 10: 3). Usually, they are covered with cortex on their entire circumference (Fig. 9: 1, 2; Fig. 10: 2), sometimes the cortex is present only on ⅔ or ½ of their circumference (Fig. 10: 3). Diameters of flakes range from 6.2 to 11.5 cm, while their thickness is between 2.0 and 2.5 cm, in few cases up to *c.* 3 cm. In total, there were identified 244 flakes of the Bahari type, including those transformed into tools, which gives an approximate number of three flakes per 1 core.

Retouched tools were represented by 96 specimens, which confronted with the number of 121 unretouched Levallois flakes, blades and points gives a relatively high Levallois typological index (Ilty = 55.8). A scarce though significant group of artefacts is represented by Mousterian points (8 specimens), which occurred exclusively in the assemblage of this series. The most numerous are sidescrapers (47 specimens), mostly single ones (33 specimens): oblique, transverse and lateral. Significantly less frequent are bilateral sidescrapers (13 specimens), including convergent specimens of the dejete type. Quite numerous are also denticulated pieces of various types (13 specimens), as well as notched tools (8 specimens), including Clactonian notches formed with single blows. Noteworthy is an occurrence of a single endscraper made from a flake and a single perforator made from an elongated flake. This toolset is complemented by four knife-like tools and four flakes and blades with marginal retouch, as well as two flakes with widespread surface retouch. A separate category is represented by adzes, namely

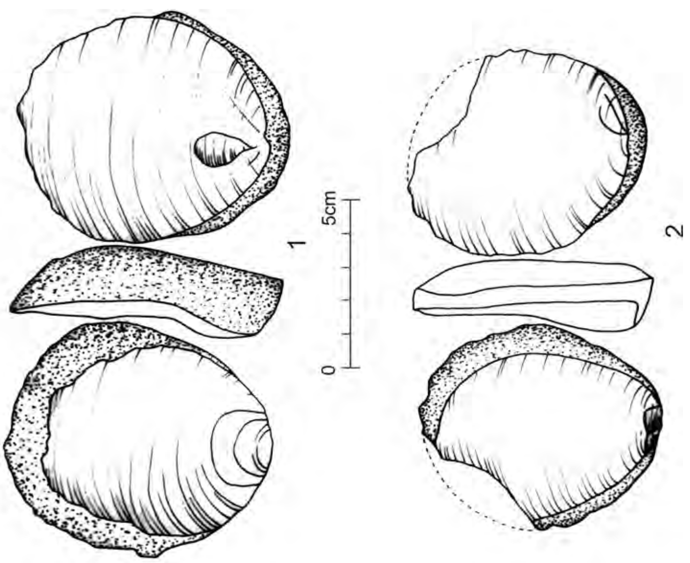

Fig. 9. Deir el-Bahari. Bahari flakes. Drawn: B. Drobniewicz.

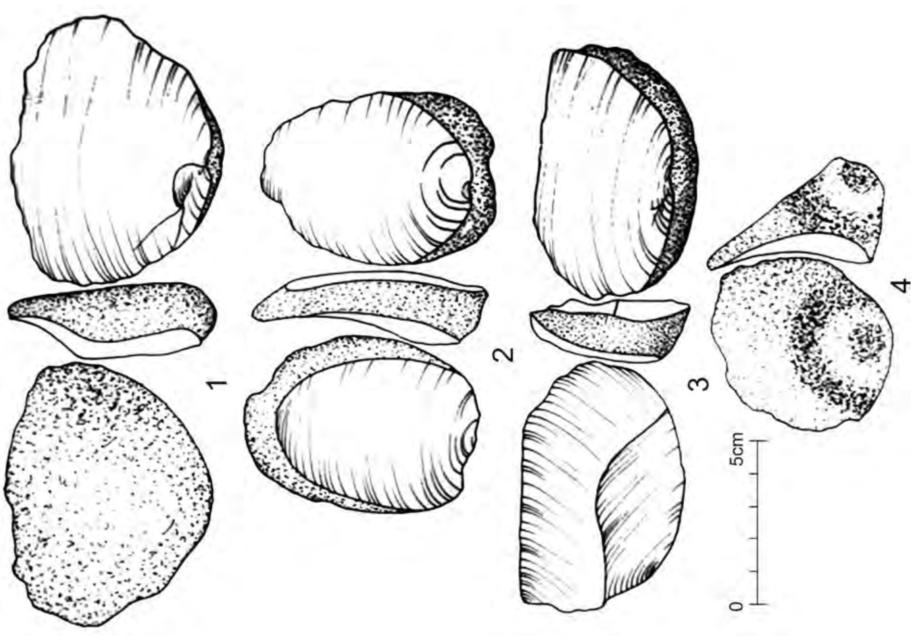

Fig. 10. Deir el-Bahari. Bahari flakes. Drawn: B. Drobniewicz.

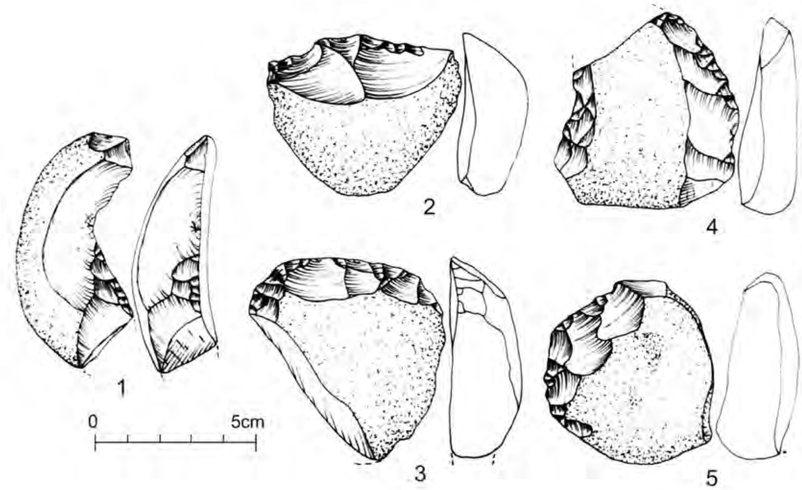

Fig. 11. Deir el-Bahari. Retouched tools made from Bahari flakes. Drawn: B. Drobniewicz.

cleavers, and two small bifaces with unprepared, cortical bases, most likely associated with this series as well. It must be stressed that among the flakes there were no forms coming from bifacial treatment.

About 30% of the retouched tools of this series were made from flakes of the Bahari type. These were mostly sidescrapers (Fig. 11: 3–5), notched (Fig. 11: 1) and denticulated pieces (Fig. 11: 2). Having analysed these three groups of tools, a diversified frequency of the Bahari flakes and their semi products can be noticed. Thus, they were used for production of 70% of all denticulated pieces, 37% of notched tools and 25% of sidescrapers. This indicates various preferences of their makers, the reasons of which remain unknown.

CONCLUSION

The Middle Palaeolithic nature and consequently, chronology of the assemblage of the Series 2 from the Site 21b is indicated unambiguously by several factors. On the one hand these are the technological features (Levallois cores and tools of various types, Mousterian discoidal cores and flakes from their processing), and on the other hand, the typological context of this series (Mousterian points, numerous sidescrapers, denticulated and notched pieces, lack of Upper Palaeolithic tools). This is also confirmed by the relatively older age of this assemblage when compared with those of the series 3 and 4 found at this site and representing Mousterian assemblages with Levallois technique and cores of the Nubian type, which is undoubtedly evidenced by the state of preservation and the order of scars visible on dorsal sides of many artefacts. Until now, there are no unambiguous analogues for our assemblage amongst the Middle Palaeolithic industries from the territory of Egypt.

Elements of the Bahari technique are also encountered, though sporadically, at other sites in the Deir el-Bahari region, always accompanied by the Middle Palaeolithic forms. It is very likely that they occurred in locations where appropriate flint nodules were available. These nodules could have been exploited using the simple though effective technique that was discussed above. Employing such a technique suggests that the flintknappers and users of flint products were very creative and capable of adapting particular flint processing procedures to the available local raw materials.

Translated by Agnieszka Klimek

REFERENCES

Arcelin, A. 1869. Lettre à M. de Mortillet: L'âge de la pierre en Égypte. *Revue Archéologique,* Série 2: 136–407.

Arcelin, A. 1870. L'industrie primitive en Égypte et en Syrie. Mission Scientifique de Ministère de l'Instruction Publique 1868–69. Raport au Ministre. *Mâcon* 9: 155–189.

Cottevieille-Giraudet, R. 1933. L'Égypte avant l'histoire. *Bulletin de l'Institut Français d'Archéologie Orientale*: 3: 1–168.

Debono, F. 1972. Gisements préhistoriques de la Montagne thébaine. *Graffiti de la Montagne thébaine*: 1: 3. Le Caire.

Drobniewicz, B., Ginter, B. and Kozłowski, J. K. 1976. Topographie préhistorique du cirque de Deir el-Bahari. *Deir el-Bahari 1*. Zeszyty Naukowe Uniwersytetu Jagiellońskiego. Prace Archeologiczne 24: 11–26.

Drobniewicz, B. and Ginter, B. 2019. Deir el-Bahari, Upper Egypt. In M. Chłodnicki and P. L. Polkowski (eds), *When the Sahara was green. Polish archaeological research on the prehistory of North Africa*, 105–108. Poznań.

Heflik, W. and Kozłowski, J. K. 1977. Remarques sur la caractéristique géologique, minéralogique et pétrographique des sédements du Nil dans le Cirque de Deir el-Bahari. *Deir el-Bahari 2*. Zeszyty Naukowe Uniwersytetu Jagiellońskiego. Prace Archeologiczne 25: 7–30.

Marks, A. E. 1968a. The Mousterian Industries of Nubia. In F. Wendorf (ed.), *The Prehistory of Nubia* 1: 194–314. Dallas, Texas.

Marks, A. E. 1968b. The Khormusan: An Upper Pleistocene Industry in Sudanese Nubia. In F. Wendorf (ed.), *The Prehistory of Nubia* 1: 315–391. Dallas, Texas.

Pitt Rivers, A. 1882. On the discovery of chert implements in stratified gravel in the Nile Valley near Thebes. *The Journal of the Anthropological Institute of Great Britain and Ireland* 11: 382–400.

Said, R. 1975. The geological evolution of the River Nile. In F. Wendorf and A. E. Marks (eds), *Problems in Prehistory Northern Africa and the Levant*, 1–44. Dallas, Texas.

Said, R., Wendorf, F. and Schild, R. 1970. The Geology and Prehistory of the Nile Valley in Upper Egypt. *Archaeologia Polona* 12: 19–42.

Sanford, K. S. and Arkell, W. J. 1933. Palaeolithic Man in the Nile Valley in Nubia and Upper Egypt. *The University of Chicago Oriental Institute Publications* 17.

Schweinfurth, G. 1903. Steinzeitliche Forschungen in Ober Ägypten. *Zeitschrift für Ethnologie* 35: 798–838.

Tawfik, H. A., Zahran, E. K., Abdel-Hammed, A. T. and Maejima, W. 2011. Mineralogy, petrography, and biostratigraphy of the Lower Eocene succession at Gebel El-Qurn, West Luxor, Southern Egypt. *Arabian Journal of Geosciences* 4: 520.

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The PalaeoAffad Project and the Prehistory of the Middle Nile

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Current work on the PalaeoAffad Project allows us to contribute greatly to the legacy of prehistoric research in the Middle Nile Valley. This paper presents the state of research on Late Pleistocene settlement on both banks of the river. Based on absolute dates obtained in the Affad Basin (since MIS5 up to the 5th millennium BP), the prehistory of the area has become an important reference point for general NE-African studies. We were able to investigate most of the Palaeolithic sites there before the landscape was totally changed by the industrial farms in areas that had been inaccessible for traditional agriculture up to now.

KEY-WORDS: Archaeological heritage, Prehistory, Southern Dongola Reach, Sudan

INTRODUCTION

In taking his first steps in Africa, the Polish archaeologist Michał Kobusiewicz participated in the Combined Prehistoric Expedition (CPE) research project near Debba. At the end of the 1960s, the area was poorly urbanized, and archaeological research was not yet facing the threat of site annihilation. Nevertheless, this expedition, led by Anthony Marks, never returned to the Southern Dongola Reach. The involvement

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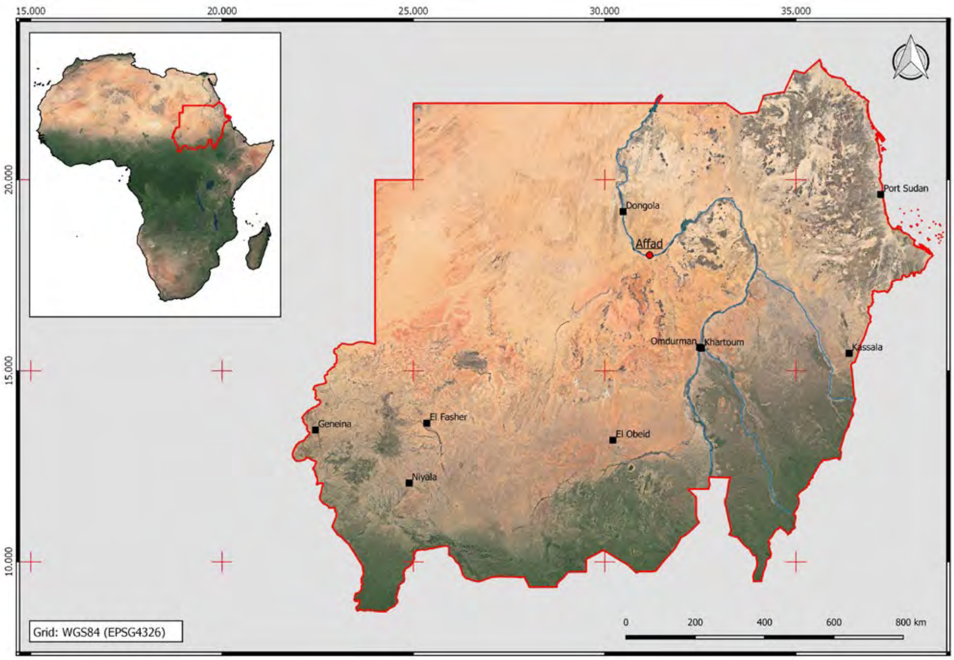

Fig. 1. Location of the Affad Basin (Southern Dongola Reach).
Satellite image: ESRI. Computer graphics: P. Wiktorowicz.

of Professor Kobusiewicz, however, was not forgotten and in the mid-1990s he was invited once again to participate in a Nubian Stone Age research project, this time by the Royal Ontario Museum which conducted a survey on the right bank of the Nile. The prehistoric sites discovered at that time attracted the attention of the project leader, Krzysztof Grzymski, who decided to entrust them to experienced prehistorians from Poznan. According to the account of the professor himself, Jebel Kobkabba – the name of a small rocky hill where the research trench was set up – commemorated the names of Kobusiewicz and Kabaciński.

Until 1997, no comprehensive research had been conducted on the Stone Age in this part of the Nile Valley (Fig. 1). Only one other project, directed by Bogdan Żurawski, marked the beginning of a wide-range, multi-aspect survey of prehistoric settlement remnants on the right bank of the Nile from Old Dongola, to the suburbs of ancient Napata. At that time, 300 locations of Stone Age chronology were recorded in a zone several hundred metres wide in what was then a belt touching the crops and settlement. At that time, Sudan did not differ significantly from what Prof. Kobusiewicz had known from his CPE research. As it seems now, these were to be the last

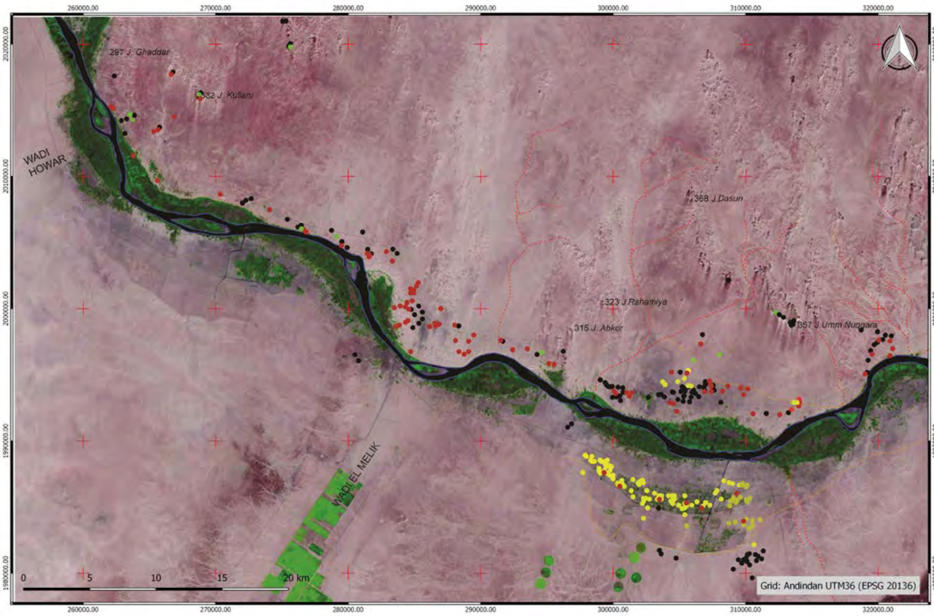

Fig. 2. Location of prehistoric sites in Southern Dongola Reach (all projects described in this text). The background – satellite image (Landsat 7) and modern range of agricultural crops. Chronology of prehistoric sites: green – ESA; black – MSA; red – early Holocene (Mesolithic / Early Neolithic); yellow – middle Holocene (Middle Neolithic). Computer graphics: P. Wiktorowicz and P. Osypiński.

years of such conditions in the middle part of the Nile Valley, namely with electricity provided solely from generators, a sparse telecommunications network and a lack of paved roads and bridges. It was also the most urgent time to record the landscape of the past cultures of this area. Indeed, within just two decades, most archaeological sites discovered by Southern Dongola Reach Survey (SDRS) have ceased to exist.

This essay presents the current state of knowledge about the settlement at Southern Dongola Reach during the Stone Age (Table 1) contributed by the PalaeoAffad Project.[1] Exploration of both banks of the Nile was presented in geographical and historical order addressing the advances in prehistoric archaeology of Africa in general. The example of the Affad Basin micro-region, shows also the scale of irreparable damage to the preserved cultural heritage that has occurred in this region over the last two decades (Fig. 2).

[1] Project financed by a research grant of the National Science Centre, Poland: UMO-2015/18/E/HS3/00416.

Table 1. Summary of the Southern Dongola Reach prehistory. The secondary context of the artefats occurence marked in italics. Chronological estimations based on new dates from the PalaeoAffad Project to be published soon with extensive comments of specialists in the luminescence and electro-spin resonance dating. MIS – Marine Isotope Stage.

MULTAGA	CPE	LEFT BANK	*time flow (ka)*	RIGHT BANK	SDRS – MTC I (Mode 2)	SDRS – MTC II (Mode 3)	SDRS – MTC IV (Mode 5)
				inselbergs	9 loci		
	sec. 3 loci		pre-MIS5	eroded palaeosoil	Afd 115, Afd 118		
MIS5 since 130 ka							
	sec. 4 loci			inselbergs		J. Kobakabba + *c.* 30 loci	
93 (L.3), 97 (L.3), 106, 108 – Nubian Complex	N2 – Sangoa/ Lupemban	reddish-brown silt with concretions	134±13 92.1±7.9 76.5±7.0	reddish sand			
MIS4 since 74 ka							
sec. 93 (L.2), 97 (L.2) – Nubian Complex + tanged tools	N6 – “Khormusan-like”	erosion – gravels, sands	>40 **51.5±4.8** **25.3±2.1**	gravel sheet		*sec. Afd121, Afd119, Afd108*	
MIS3 since 60 ka							
			60.1±8.7	clay, silts			
			57.8±9.6				
			56.8±4.8	sand, silts		Afd23, Afd111	
			46.0±4.8			Afd131, Afd24	
						Afd124, Afd134	
			42.5±6.3	silt		*second. >100 loci*	
MIS2 since 24 ka							
MIS1 since 11 ka							
		Girra formation, eroded palaeosoil	8.8–8.5	eroded palaeosoil			Afd128, Afd121
MTG3 +6 loci	Karmakol - 7 loci		8.4–8.2	eroded palaeosoil			Afd125 + >100 loci
	Tergis - 8 loci						
			7.0–6.8	eroded paleosoil			Afd119
			6.5–6.2	eroded palaeosoil			>10 loci
65 loci	Karat - 19 loci	eroded palaeosoil	6.2–5.9	eroded palaeosoil			Afd130
	el-Melik - 13 loci						

STONE AGE SITES ON THE LEFT BANK OF THE NILE

The Stone Age as revealed by the Combined Prehistoric Expedition

The area between Debba and Korti was chosen in 1966 by researchers from the Southern Methodist University (Marks *et al.*, 1968; de Heinzelin 1968) as suitable for obtaining material referring to finds from Lower Nubia (Wendorf 1968) and expanding our knowledge of the prehistory of sub-Saharan Africa. This area was located far to the south of Batn el-Hajar, a cataract (II) recognized as an eternal border area of cultural zones along the river. It also embraced the mouth of a large ephemeral river channel, Wadi el-Melik, crossing the southern areas up to Kordofan. Geological units (formations) of two stages of river sedimentation revealed the presence of Stone Age settlement remains. Most of the "early-ceramic" sites were recorded on the surface of the Girra alluvial formation terraces, divided into named groups: Early Khartoum Related (Karmakol, according to Hays 1971a), Tergis, Karat and El-Melik (following their chronological position: Hays 1971b; Marks and Ferring 1971; Shiner 1971). In turn, the Goshabi formation had a three-part structure in a normal stratigraphic succession. The base of the formation was made of calcacerous silts, with fluvial sands being deposited above them, while the top was made of gravels. Collections of lithics were recorded *in situ* within the sands, and on the surface of the silt layers. Three assemblages of Palaeolithic artefacts originated from the Goshabi formation: N2 (identified by the presence of bifacial forms as the Sangoa/Lupemban industry), the relatively younger N6 (without bifacial forms – identified as Khormusan-related industry) and the least characteristic and one derived from a secondary context, namely N91.

The next research on the late Pleistocene and Holocene geological development of the Nile valley produced new interpretations of finds from the vicinity of Debba. Fred Wendorf and Romuald Schild (Wendorf and Schild 1992: 45) believed that the Goshabi formation sediments corresponded to late-Middle Palaeolithic valley alluviation and should be dated slightly later than 70 ka (kilo-years ago).

Rescue excavation project related to the resettlement of the Fourth Cataract population

As part of a salvage project related to the construction of a dam on the Fourth Cataract, a survey was carried out in 2003 on several Palaeolithic sites, as well as extensive field research on early-Holocene sites in Multaga (Geus and Lecointe 2003; Garcea 2003). The occurrence of Palaeolithic assemblages was revealed in alluvial terraces (silts, gravels) corresponding to three stages of accumulation (with no reference to the previous findings of the CPE). The oldest stage was determined by the layering of sandy clay of a red-brown colour. Although there were artefacts made of local chert manufactured using Levallois or discoid methods, no bifacial products were recorded. Due to the low number of specimens, this material was described as related to the Nubian technocomplex. The next stage of sedimentation in the studied area was initiated by the erosion of the uppermost parts of older units. The only indication of the absolute chronology of the gravels deposited during this episode is as the result of the radiocarbon dating of shells, which went beyond the method's range, e.g., >40 ka (Williams *et al.*, 2010). These deposits contained collections of lithics of a similar raw material and with Middle Palaeolithic technological characteristics, although tools with shaped tangs appeared among retouched forms. According to the author of the study (Garcea 2003), these last elements testify to the impact of the Aterian technocomplex on the lithic traditions of the Middle Nile Valley. The youngest deposits in this part of the record had surface layers known as Holocene paleosoil remnants. In addition to single Palaeolithic items, numerous Early Holocene artefacts were recorded there.

Additionally, extensive settlements, identified as early Holocene in age, bore traces of advanced erosion – no stratigraphy or cut features were found, despite the seemingly good state of preservation of the artefacts themselves. Attempts at radiocarbon dating of chaff-tempered pottery have produced positive results and allow the time of the functioning of early Neolithic/Mesolithic settlements to be dated to the second half of the 7th millennium BC (*c.* 7500 BP after Gatto 2006 = *c.* 6400 cal BC).

Among nearly a hundred Holocene sites, the vast majority comprised small clusters of archaeological material and small pebbles. In many cases, exploration revealed that these were the remains of Neolithic burials (Geus and Lecointe, 2003; Peressinotto *et al.*, 2004). Their characteristic feature in relation to other Neolithic cemeteries in the Sudanese section of the Nile valley was the scattering of single burials over a large area. The authors of the study interpreted this phenomenon as reflecting the nomadic character of the culture in the Southern Dongola Reach at that time. Numerous finds of ceramic vessels – including caliciform beakers and two 14C dates – allowed one to determine the approximate age of these burials to a period between 4550 and 4250 BC (after Salvatori and Usai 2008: Fig. 13.7).

PREHISTORY OF THE RIGHT BANK OF THE NILE IN THE SOUTHERN DONGOLA REACH

Preliminary studies of Jebel Kobkabba site

The site of Jebel Kobkabba (Kobusiewicz and Kabaciński 1996) was explored in 1994. It was a lithic workshop located on an outcrop of ferruginous sandstone. The large accumulation of artefacts in a relatively small space (100 × 50 m) and its location on the flat top of small hill resulted in the selection. The site was located about 1600 m east of the river, about 25 m above the present-day floodplain. Sediments containing Palaeolithic artefacts were not associated with the river accumulation. In both exposed soil profiles, only two horizons were visible (the upper one about 20 cm thick, yellow-grey in colour; and the bottom one reaching the bedrock at a depth of about 40 cm, reddish in colour), a record of the different conditions for the precipitation of iron oxides. Most of the artefacts lay on the modern surface, although individual artefacts (bearing traces of much less intense erosion) were also recorded in both subsurface horizons. According to the authors, the lithics had remained in an undisturbed position. Among more than 700 artefacts, there were handaxes, tools of a chopper type, numerous discoidal cores and the most numerous artefacts, namely flakes from centripetal reduction. Taxonomically, the assemblage from Jebel Kobkabba was assigned to the Mousterian technocomplex known from CPE studies between the Second and First Cataracts, while the presence of handaxes was an indication of the B variant (after Marks 1968). The nature of the site was defined as a multiple-use workshop located directly on the outcrops of the raw material, namely ferruginous sandstone.

The Southern Dongola Reach Survey

Since 1997, the right-bank section of the valley, from Old Dongola to the suburbs of Karima, became a research area of the Polish Combined Archaeological Expedition to the Middle Nile Valley, led by Bogdan Żurawski (Żurawski 2003). The project known as the Southern Dongola Reach Survey, was aimed at understanding archaeological settlement patterns. Among almost one thousand recorded archaeological sites, there were nine loci with handaxes, 130 locations containing lithic artefacts of the Levallois tradition and 155 sites with correlates of microlithic traditions (Osypiński 2003). Due to the nature of the available data, namely random surface collections, a lack of defined geomorphological contexts and absolute dating, determination of their taxonomic affiliation proved to be extremely difficult. Based on the analysis of morphology and technology of lithics manufacturing, only a general division of assemblages was conducted, indicating four categories (Morpho-Technological Categories – MTC) that corresponded generally to the "modes" as proposed by G. Clark (1969). There was a lack of assemblages corresponding to the oldest, namely pre-Acheulian manufacturing traditions, and pre-Holocene blade traditions (non-microlithic). On the other hand, doubts arose due to microlithic sets that were not accompanied by the finding of ceramic fragments (MTC III). Although they could be interpreted as the remnants of settlement of late-Palaeolithic groups (analogically to Lower Nubia), they could also be highly eroded early-Holocene sites.

While the surface research phase of the project was completed in 2002, its results still need to be verified and refined. They do, however, indicate the great potential of the prehistoric sites in the Southern Dongola Reach, both those appearing on the surface of river sediments, as well as in the contexts preceding the modern hydromorphological regime of the Nile.

The Contribution of the Affad Project

The continuation of the SDRS research project is referred to as the PalaeoAffad project – although it is primarily focused on the exploration of Affad 23, in subsequent stages this includes numerous aspects of prehistoric settlement in the micro-region of the Affad Basin. Its assumption is to use the potential of the Southern Dongola Reach sites, as well as modern research methods, to provide important data for the modelling of the prehistory of the middle section of the Nile Valley.

First of all, surface reconnaissance of the archaeological landscape was supplemented by the penetration of areas adjacent to the land-belt surveyed by the SDRS (Osypińska and Osypiński 2016a). Several dozen new locations have been recorded, revealing, among other things, the legacy of the penetration of the valley surroundings by groups using handaxes, as well as a number of small sepulchral sites dated to the period of late prehistory.

From the very beginning, the project was accompanied by a team of specialists whose task was to reconstruct the paleogeography of the Affad Basin corresponding to the subsequent periods of human settlement (Fig. 3). In addition to the standard methods of stratifigraphic analysis (including granulometry and magnetic susceptibility

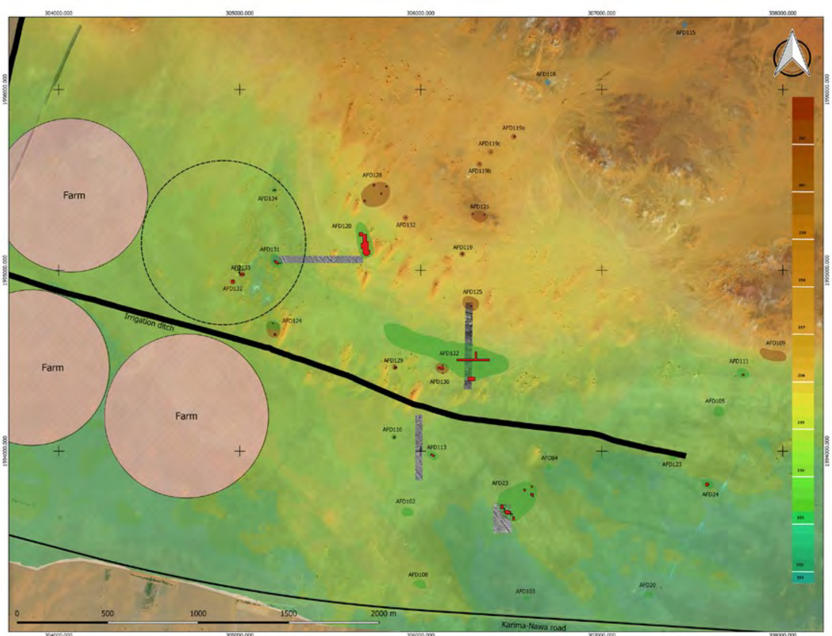

Fig. 3. Compilation of the hipsographic plan, results of magnetometric imaging and satellite image with the location of prehistoric sites at the Affad Basin. Measurements and ESRI image: P. Wiktorowicz and R. Ryndziewicz.

measurements) and a suite of dating methods, a magnetic prospection with a fluxgate gradiometer was used to show shifts in the network of river paleochannels – in the context of settlement in the late Pleistocene. Analyses of the contemporary land relief using high resolution measurements of large spaces compiled with satellite images has enabled studies on the human strategies for changing the exploitation of environmental resources.

First signs of human occupation (until MIS5)

The oldest part of the Affad Basin landscape is the edge of the upland section closing off the research area from the north. Both currently and during the late Pleistocene, sandstone inselbergs of Mesozoic rocks dominated this area and were the source used for obtaining raw material for making stone tools, namely ferruginous and quartzite sandstones.

Extensive lithic workshops on the tops of inselbergs, including both handaxes and the waste of the flake production methods, are known from both the SDRS research project and the current stage of research. The chronology of these assemblages undoubtedly covers an extremely long time, as this raw material was still being used in very recent times for the production of grinding stones. However, these sites were all surface loci, along with the clusters of handaxes at sites Afd115 and Afd118, indicating penetration of the lower parts of the valley by the oldest groups of hominins. The composition of these assemblages, limited to various-sized handaxes, exclusively suggests a strictly defined site function. Undoubtedly, these were remnants of short-term visits related to food supplies, although it is impossible to indicate the time of duration of these episodes. Analogous tools were used in this part of Africa by pre-sapient hominins, whose production is attributed to the global Acheulean tradition, as well as by much later traditions – most likely that of early *Homo sapiens* (Nubian Mousterian variety B, or Sangoan). Due to the presence of only handaxes in these small collections, it is much less plausible to assume their later reutilisation (by analogy to the find at the Afd119 site, where a handaxe was used to fasten a much-later shelter pole). Thus, if one assumes a chronological identity for the creation, utilisation and abandonment of tools from Afd115 and Afd118, it should be noted that the soil in which they were originally deposited has been completely eroded by now. The artefacts were collected from the surface of the sandstone bedrock carved by heavy rains flowing down towards the valley, at least since the Middle Holocene (Fig. 4). In the adjacent area, single finds of lithic artefacts of later date (both late Pleistocene and Holocene) were also found.

Although sites of the Jebel Kobkabba type are not known from the Affad Basin, the presence of single sandstone bifacial points are interpreted as a reflection of the reuse of tools from local Early-Middle Stone Age (MSA) sites. One of these tools was found on the surface at location Afd108 (Osypińska and Osypiński 2016a: Fig. 9a). The products of this type were typical for the Lupemban industry and the early Nubian Complex

Fig. 4. Handaxes from Afd115 at the time of discovery. Photo: M. Osypińska.

(Van Peer 2016) and should generally be dated to the beginnings of MIS5. Nevertheless, the original sites dated to this period have not survived up to today. OSL (Optically Stimulated Luminescence) dating of reddish sands directly below coarse gravels from the northern part of the Affad Basin, indicate an MIS5 chronology. The composition and location of *c.* 1 m thick gravels indicate the high energy of the river flows during formation and reflect the bottom of the valley directly at the beginning of next stage of downcutting. Unfortunately, the OSL dates of gravels themselves seem unreliable (see Table 1 marked in red). Attempts to analyse shells of molluscs taken from gravels by 14C has not helped either – The Early Holocene results most probably reflect just the recrystallization stage of calcite (see also: Dal Sasso *et al.*, 2018). It was only after the occurrence of the incision of the river bed that the sediments of the next stage of aggradation accumulated.

Late MSA occupation scatters

The most important sites of the late-MSA from Affad were recorded in the top parts of the alluvial units dated to 56–46 ka. Although the first series of OSL dates (Kalicki and Olszak 2016) suggested a much younger chronology (*c.* 16 ka), currently available data make it necessary to revise previous estimates. The new series of OSL dates are supported by TL, ESR and, indirectly, radiocarbon dates.

Most of data on the chronology of late-MSA occupation came from site Afd23. Both sediments preceding the settling phase (60.11±8.70; 57.83±9.69), that directly related to it (56.8±4.8; 53.95±8.36) and that even later than the settlement episode (42.53±6.36) were OSL-dated.[2] In addition, the chronology of this settlement phase was determined by TL (Thermoluminescence) dating of the baked alluvium (46.4±4.0). A similar chronology was indicated by OSL dating of a sediment in which Aurochs remains from site Afd124 occurred (41.7±4.8), although a slight rejuvenation of this result should be assumed due to the shallow depth of the collected sample (about 10–20 cm). Additionally, TL dating of a baked substrate at site Afd134 (56.1±6.8) supports the implication of the 14C result of a shell from this location (>48 ka).[3] The dating of 4 teeth samples by the ESR method[4] from sites Afd23 and Afd24 needs more studies and seems to be a methodological challenge, indicating much older age (78±9 ka up to 160±11 ka!). It should be added that the contemporary age of locations Afd23, Afd105 and Afd111 was suggested by the results of previous analyses conducted by a laboratory in Kielce, Poland.

One of the most important assets of the MSA sites from the Affad Basin is their contemporaneity and simultaneous functional differentiation. In addition to the sites where remnants of light wooden constructions and campfires have survived (Afd23 – Osypiński *et al.*, 2016; Afd24 – Fig. 5), there were loci without such elements, though undoubtedly also serving as encampments (an interpretation that the composition of the stone and bone inventories supports) – e.g., sites Afd111, Afd131. In turn, analogous sites located in slightly higher terrain, namely Afd120 and Afd122, have undergone far-reaching erosion. A completely different category of sites was dominated by organic remains that mark temporary sites linked with episodes of food procurement. In addition to the classic examples of killing/butchering sites (Afd124, Afd110, Afd105), loci at which there were exclusively fish remains (Afd113, Afd112) or molluscs shells (Afd134) were also found. Further differences between the late-Pleistocene camp-sites were revealed by the analysis of the composition of the stone and bone finds assemblages. Assemblages dominated by chert artefacts (e.g., Afd23, Afd24) occurred in the zone slightly further from the edge of the valley, in contrast to those in which ferruginous sandstone was dominant (e.g., Afd111, Afd131). Access to pebbles exposed by the river seemed to be the main reason for settling site Afd23. Due to numerous refits, it was found that not only producing tools of this raw material took place, but also the learning of rock processing (Osypiński and Osypińska 2016). The composition of fauna

2 The new series of OSL and TL samples were analysed in UMCS laboratory in Lublin (Dr Karol Standzikowski).

3 AMS 14C datings were performed in the radiocarbon laboratory in Poznan (Prof. Tomasz Goslar).

4 ESR method datings were performed in the Williams College laboratory (Dr Anne Skinner) but still require more studies.

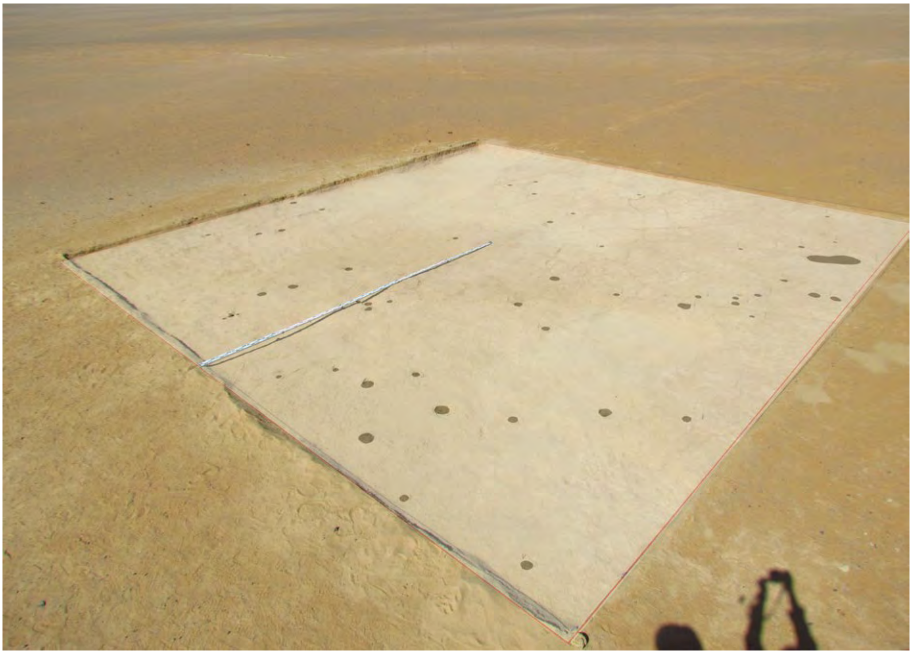

Fig. 5. Postholes (relics of light wooden constructions) unveiled at the Afd24 site. Compilation of photos and drawings: P. Osypiński.

from this site indicated a wide range of hunting preferences including both megafauna: hippopotamus (*Hippopotamus amphibius*); large ruminants, such as aurochs (*Bos primigenius*) or buffalo (*Syncerus caffer*), Kob antelopes (*Kob* sp.), Oribi (*Ourebia ourebi*), bohor reedbuck (*Redunca redunca*); as well as small mammals such as grivets (*Chlorocebus aetiops*), Salt's dik-dik (*Madoqua saltiana*) and the cane rat (*Thryonomys swinderianus*). An analogous composition was also noted at the Afd111 site, although the basic raw material for making stone tools there was sandstone. The list of species that was noted at these sites seems to create a very cohesive whole, in ecological terms. All species recorded there inhabit backwaters, marshes, or at least, the close vicinity of bodies of water. Stratigraphic, geomorphological and archeozoological analyses suggest that the Affad Basin was most likely a seasonal hunting area visited during the dry season. It was a time of grouping antelopes, especially Kob, into large herds around the relatively small watering holes remaining after the rainy season. The clear dominance of the remains of this species suggests a certain specialisation in hunting. Both females, males, as well as offspring of close-to-adult size, were hunted. However, we do not have data on the trapping of small calves. On elevated terrain, the small camps were set up by hunters, while animal carcass (small game) processing zones were organized in the vicinity. Such a model was indicated by two locations identified at site Afd23 (areas NE and S, while area SW was a camp: Osypińska and Osypiński 2016b: Figs. 3, 4, 5).

At loci Afd131 and Afd24, the lists of identified animal species were different. The recorded remains came mainly from mammals and, to a much lesser extent, from fish. An example of well-preserved relationships in terms of spatial and anatomical positioning of remains was site Afd131. In its "central" part, an accumulation of both lithics and numerous clusters of anatomically contiguous skeletal elements were found. These were the remains of a large bovid (most likely aurochs), mainly vertebrae, ribs and fragments of long bones and teeth. The remains of medium-sized antelopes (hartbeest, kob) and gazelles were clearly less frequent. The least numerous remains were those of fish, mainly Claridae being identified. Within a radius of several dozen metres of the zone with the largest concentration of artefacts, smaller clusters or individual bones and teeth were also recorded. They came from animals representing various taxa: rodents equines, giraffes, hippopotamus, ungulates, and canines. Based on the archaeozoological data, it was possible to identify, in the NW part of the Affad Basin, MSA sites with a different hunting model than that already known from the southern and eastern areas. This was indicated by a preference for hunting for large ruminants – mainly aurochs, as well as equines (zebras) and giraffes. At the same time, "less valuable" animals, meaning those more aggressive or very small, were not in the field of hunting interests.

Research in Affad supports the thesis of a high degree of behavioural flexibility among humans during the late Pleistocene. The main factor in shaping their diet, but also selection of raw materials, was their availability – that is, a given group of animals or rocks. The "broad" model present at Affad sites 23 and 111, namely one with a large proportion of medium and small animals, but also with the presence of megafauna, reflects the exploration of a closed environment, such as forest or floodplain. The exploitation of this zone was possible mainly during the dry season (winter), which also suggests free access to chert pebbles. Undoubtedly, the location of site Afd134, where a cluster of baked shells of molluscs was discovered, also had to be exploited at low water levels. The second model corresponds to the exploitation of the environment during the rainy season, at a distance from the flood zone, then inaccessible or too dangerous. Groups of people could then move to areas located a little higher, to the area of the savannah inhabited by large ruminants, namely aurochs, giraffes, larger antelopes. A characteristic feature of the artefacts from these loci was the lack or low use of chert as a raw material for the production of tools. At sites with dominant shares of large ruminant remains, ferruginous sandstone, which was easy to obtain on a plateau approximately 4 km away, was definitely preferred as a raw material. Harvesting fish at site Afd113 also had to take place at the beginning of the rainy season – almost exclusively fish of one species (*Clarias* sp.) was caught there, with a strictly limited size range, most likely during their spawning season.[5]

An undoubtedly important discovery was the remains of aurochs at several sites (Afd124, Afd131, Afd120). Currently, these are the southernmost loci of this extinct species in Africa and direct evidence of the presence of aurochs in the hunting consciousness of members of late-MSA groups in the middle part of the Nile valley.

Early holocene (re-)settlement

The later history of the Affad Basin formation meant a shift to the south of the river bed and the beginning of the ongoing erosion of the upper layers of sites. Although extensive early Holocene sites usually abound in ceramic material, this only appears on the modern surface. Clusters of surface artefacts suggested the original location of larger cut features, namely storage pits, the fills of which had concerntrated artefactual material (Fig. 6). Only at site Afd69 were there still preserved the lower parts of such features (Fig. 7). The remains of fish and wild fauna (the jaws of hyenas), as well as a rich set of stone artefacts (mainly made of quartz) and potsherds, were found in their fills.

Considering the positive results of the radiocarbon dating of potsherds tempered with an organic admixture from Multaga, several fragments of such material from Affad were also selected for analyses. The obtained results (Afd125 = 7460±40 BP: 6416–6241 cal BC [95.4%]; Afd128 = 7880±40 BP: 6842–6636 cal BC [85.3%]; Afd121/1 = 7800±50 BP: 6767–6496 cal BC [95.4%]; Afd121/2 = 7910±50 BP: 6863–6649 cal BC [65.7%]) correlate with those from the opposite bank of the river.

Neolithic nomad remnants

Neolithic burials recorded quite numerously in the Affad Basin area also corresponded to the finds from the opposite bank of the Nile and were characterized by large dispersion. Their state of preservation (exposure of the skeletons originally deposited in pits by erosion of the substrates – Fig. 8) suggests that the original number of burials could have been higher, although it certainly did not match the cemeteries known from the areas adjacent to the north (R12, Kadruka) and located in the upper reaches of the Nile (Kadada, Kadero). Radiocarbon dating of the burial equipment allowed one to date the sepulchral activity of shepherd groups to between 6030±40 BP: 5034–4829 cal BC [94.3%] (Afd119) and 5730±40 BP: 4226–3930 cal BC [95.4%] (Afd130). A unique feature of one of the cemeteries, namely Afd130, was the coexistence of human and animal burials (cattle and small ruminants). Additionally, at site Afd69 (C/VII/51) the occurrence of a series of small clusters of bovine bones in the vicinity of human burials was recorded. They provided unique data on the morphology of domesticated

5 Ichtyological analysis performed by Dr Veerle Linseele.

Fig. 6. Early Holocene potsherds cluster (eroded fill of a cut feature) – Afd125. Photo: P. Osypiński.

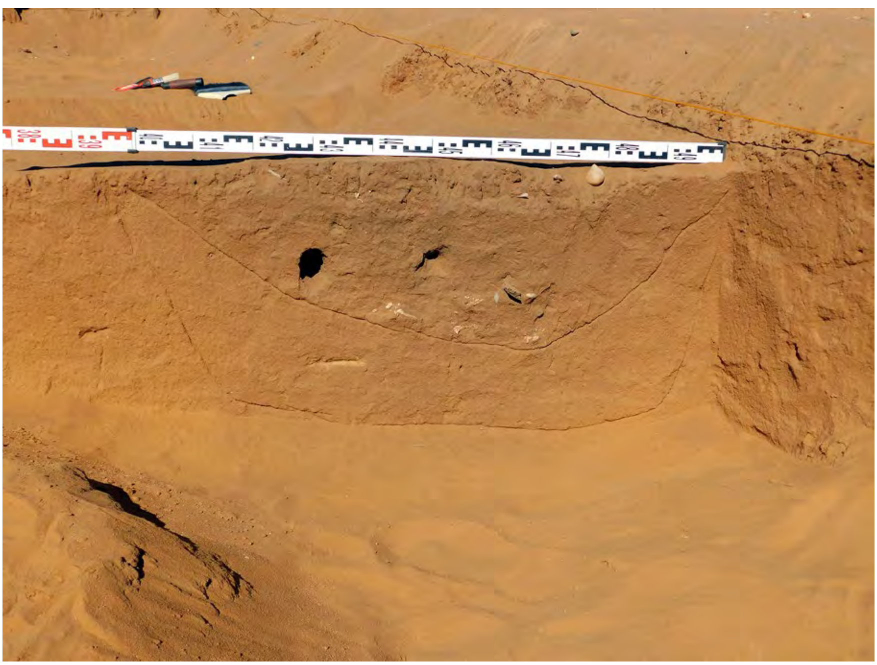

Fig. 7. Section of the early-Holocene storage pit at Afd69 C/VII/91. Photo: P. Osypiński.

Fig. 8. Eroded Neolithic burial recorded on the present day surface – Afd69 B/VIII/52 gr 1 (digital reconstruction of the original position of skeleton in gray). Photo: M. Chłodnicki.

animals from this period. Preliminary results of lipid analyses from Neolithic vessels indicated the dairy use of ruminants[6] (most likely cattle). This indication is also probably supported by the finding of fragments of strainer vessels from Afd69, linked to the production of cheese. Naturally, although this record does not indicate a breeding model oriented solely on the use of non-meat products, it is important proxy data for studies on the evolution of people's adaptation to the changing sub-Saharan Africa environment. Analysis of Strontium isotopes in the dental enamel of both humans and Neolithic animals[7] revealed a wide range of indications, pointing the local values for shepherds' groups that buried their dead in the studied area. On the other hand, the comparison of these data with the indications from Pleistocene samples shows the transformation of the environment (desertification) of the Affad Basin over fifty millennia.

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6 The analysis was performed in the laboratory of the Organic Geochemistry Unit, School of Chemistry, University of Bristol (Dr Julie Dunne).

7 The analysis was performed in the isotopic laboratory of the A. Mickiewicz University in Poznan (Prof. Zdzisław Bełka).

LOSS OF THE PREHISTORIC HERITAGE OF THE MIDDLE PART OF THE NILE VALLEY – THE EXAMPLE OF THE AFFAD BASIN

Just two decades of research in northern Sudan has allowed one to observe the gigantic scale of destruction of prehistoric sites. These unusually discreet elements of the archaeological landscape recorded outside the area of direct interest of the local farming population, have not been threatened for a long time. The situation has changed dramatically since the construction of a dam at the Fourth Cataract and general electrification of the Northern Province (*Shimaliyah*). The rescue operation in Multaga in 2003 preceded the construction of new settlements and fields for the population of the area to be flooded – these sites ceased to exist several months after the completion of archaeological works. In 2009, the construction of the Debba bridge and the road on the right bank of the river between Karima and Nawa, that passes just a few hundred metres south of site Afd23, were completed. The construction process has led to the destruction of at least several sites marked during the SDRS in the Affad district. Finally, in 2016, on the right bank, agricultural projects sponsored by investors from the Persian Gulf led to the destruction of most of the archaeological sites located on the Nile terraces. Using heavy excavators, water supply channels for irrigation devices of several hundred metres in diameter have been created. Directly before the start of cultivation, not only was dune sand removed, but also the top layer of the ground, containing remnants of prehistoric settlement. *Ad hoc* attempts to mark the most important sites of the PalaeoAffad project proved to be pointless. As these prehistoric sites did not contain such permanent and clear elements as architecture, it was extremely difficult to convince the local community of the need to protect them.

It is hard to not to perceive the research conducted in Affad – or even wider – in Southern Dongola Reach, as invaluable for documenting an archaeological landscape which no longer exists. It seems that we are losing more and more opportunities to get answers to many important questions, the importance of which extends beyond the narrow space of the Southern Dongola Reach. These include both the role of the middle section of the Nile valley, considered as a key migration corridor during the period when early members of our species left Africa, and the subject of the extremely late persistence of archaic Levallois lithic traditions until the end of Pleistocene. We are losing also the opportunity to obtain valuable data on the early stages of cattle domestication in Africa, as well as the sources of the mosaic nature of the so-called cattle centred behaviour cultures, whose past we may observe even today in the area of sub-Saharan Africa.

REFERENCES

Clark, G. 1969. *World Prehistory: A New Synthesis*. Cambridge, Cambridge University Press.

Dal Sasso, G., Zerboni, A., Maritan, L., Angelini, I., Compostella, C., Usai, D. and Artioli, G. 2018. Radiocarbon dating reveals the timing of formation and development of pedogenic calcium carbonate concretions in Central Sudan during the Holocene. *Geochimica et Cosmochimica Acta* 238: 16–35.

de Heinzelin, J. 1968. Survey in the Debba-Korti Area. *Kush* 15: 59–69.

Garcea, E. A. 2003. Palaeolithic sites at El-Multaga. *Nyame Akuma* 59: 62–65.

Gatto, M. C. 2006. The Most Ancient Pottery from the Dongola Reach (Northern Sudan): New Data from the SFDAS Survey Related to the Construction of the Merowe Dam. *Archéologie du Nil Moyen* 10: 73–86.

Geus, F. and Lecointe, Y. 2003. Survey and Excavation at el-Multaga, a Resettlement Area Related to the Construction of the Merowe Dam: Preliminary Results. *Sudan & Nubia* 7: 33–40.

Hays, T. R. 1971a. The Karmakol Industry: Part of the "Khartoum Horizon-Style". In J. L. Shiner (ed.), *The Prehistory and Geology of Northern Sudan, vol. 1*, 84–153. Washington. Report of the National Science Foundation GS 1192.

Hays, T. R. 1971b. The Tegris Industry. In J. L. Shiner (ed.), *The Prehistory and Geology of Northern Sudan, vol. 1,* 154–186. Washington, Report of the National Science Foundation GS 1192.

Kalicki, T. and Olszak, I. 2016. Supplementary materials for: Osypiński, P., Morley, M., Osypińska, M. and Kotarba-Morley, A. 2016. Affad 23: settlement structures and palaeoenvironments in the Terminal Pleistocene of the Middle Nile Valley, Sudan. *Antiquity* 90(352), available at: https://static.cambridge.org/content/id/urn:cambridge.org:id:article:S0003598X16001101/resource/name/S0003598X16001101sup001.pdf

Kobusiewicz, M. and Kabaciński, J. 1996. Jebel Kobkabba: a Middle Palaeolithic site in Sudanese Nubia. In L. Krzyżaniak, K. Kroeper and M. Kobusiewicz (eds), *Interregional Contacts in the Latter Prehistory of Northeastern Africa*, 355–375. Poznań, Poznan Archaeological Museum.

Marks, A. E. 1968. The Mousterian Industries of Nubia. In F. Wendorf (ed.), *Prehistory of Nubia*, 194–314. Dallas, Fort Burgwin Research Center and Southern Methodist University Press.

Marks, A. and Ferring, C. R. 1971. The Karat Group: an early Ceramic Occupation of the Dongola Reach, Sudan. In J. L. Shiner (ed.), *The Prehistory and Geology of Northern Sudan, vol. 1*, 187–275. Washington. Report of the National Science Foundation GS 1192.

Marks, A., Hays, T. and de Heinzelin, J. 1968. Preliminary Report of the Southern Methodist University Expedition in the Dongola Reach. *Kush* 15: 165–192.

Osypińska, M. and Osypiński, P. 2016a. Lavallois Tradition Epigones in the Middle Nile Valley: Survey in the Affad Basin. *Polish Archaeology in the Mediterranean* 24(1): 601–626.

Osypinska, M. and Osypinski, P. 2016b. Animal Exploitation and Behaviour of the Latest Middle Stone Age Societies in the Middle Nile Valley: Archaeozoological and Taphonomic Analysis of Late Pleistocene Fauna from the Affad Basin, Sudan. *African Archaeological Review* 33(2): 107–127.

Osypiński, P. 2003. Southern Dongola Reach in Prehistory. In B. T. Żurawski (ed.), *Survey and Excavations between Old Dongola and Ez-Zuma,* 463–467. Warszawa.

Osypiński, P., Morley, M., Osypińska, M. and Kotarba-Morley, A. 2016. Affad 23: settlement structures and palaeoenvironments in the Terminal Pleistocene of the Middle Nile Valley, Sudan. *Antiquity* 90(352): 894–913.

Osypiński, P. and Osypińska, M. 2016. Optimal Adjustment or cultural backwardness? New data on the latest Leallois industries in the Nile Valley. *Quaternary International* 408 (Part B): 90–105.

Peressinotto, D., Schmitt, A., Lecointe, Y., Pouriel, R. and Geus, F. 2004. Neolithic nomads at El Multaga, Upper Nubia, Sudan. *Antiquity* 78(299): 54–60.

Salvatori, S. and Usai, D. (eds). 2008. *A Neolithic Cemetery in the Northern Dongola Reach: Excavation at Site R12*. Oxford, Sudan Archaeological Research Society Publication Number 16. British Archaeological Reports International Series 1814.

Shiner, J. L. 1971. El Melik Group. In J. L. Shiner (ed.), *The Prehistory and Geology of Northern Sudan, vol. 1*, 276–290. Washington, Report of the National Science Foundation GS 1192.

Van Peer, P. 2016. Technological Systems, Population Dynamics, and Historical Process in the MSA of Northern Africa. In S. C. Jones and B. A. Stewart (eds), *Africa from MIS 6-2: Population Dynamics and Paleoenvironments*, 147–159. Dordrecht, Springer Science+Business Media.

Wendorf, F. 1968. *Prehistory of Nubia.* Dallas, Fort Burgwin Research Center and Southern Methodist University Press.

Wendorf, F. and Schild, R. 1992. The Middle Palaeolithic of North Africa: A status Report. In F. Klees and R. Kuper (eds), *New Light on the Northeastern African Past. Current Prehistoric Research*, 39–80. Cologne, Heinrich Barth Institut.

Williams, M. A. J, Williams, F. M., Duller, G. A. T., Munro, R. N., El Tom, O. A. M., Barrows, T. T., Macklin, M., Woodward, J., Talbot, M. R., Haberlah, D. and Fluin, J. 2010. Late Quaternary floods and droughts in the Nile valley, Sudan: new evidence from optically stimulated luminescence and AMS radiocarbon dating. *Quaternary Science Reviews* 29: 1116–1137.

Żurawski, B. T. 2003. *Survey and Excavations between Old Dongola and Ez-Zuma.* Warszawa, Neriton.

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The Qadan, the Jebel Sahaba Cemetery and the Lithic Collection

Donatella Usai[a]

The Late Pleistocene, Early and Middle Holocene Nubian cultural sequence was constructed after the pioneering work done in Nubia in the 1960s (Irwin *et al.*, 1968; Wendorf ed. 1968c; Marks 1970; Nordström ed. 1972). Most of the prehistoric sites located by the expeditions during the Nubian Campaign were surface concentrations and their dating was made on the basis of their location on ancient Nile deposits attested at different levels: the Dibeira-Jer, Ballana, Sahaba, Birbet and Arkin formations (De Heinzelin 1968). Absolute elevation was also considered as relevant to a site's date.

Within this cultural sequence, the Qadan (Shiner 1968a) was usually associated with the Sahaba Formation, whose beginning was more or less established at 16,500 BP (De Heinzelin 1968), and the Jebel Sahaba cemetery (site 117) was attributed to this same cultural phase.

The Qadan sequence has been already discussed by the author (Usai 2008a) in a paper demonstrating that Shiner's hypothesis that the Abkan Neolithic complex originated directly from the Qadan needed revision. This contribution continues this discussion but to suggest that it now appears that the Jebel Sahaba cemetery cannot be possibly associated with the Qadan. In doing so, it notes some possible discrepancies and some important factors.

KEY-WORDS: Sudan, Nubia, Qadan, lithic technology, Jebel Sahaba, cemetery chronology

INTRODUCTION

A re-analysis of the Late Pleistocene, Early and Middle Holocene cultural sequence of the Nubian region (Fig. 1) has recently led to a revaluation of the Qadan and the Abkan lithic industries (Usai 2008a).[1] In particular the position of the Abkan, considered to be

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[1] In fact the Qadan sequence had already been widely criticized by Wendorf himself (1968a: 938) and using similar arguments. In the volume *Prehistory of Nubia*, on page 938, he states that "Study of the tool kits may provide, an indication of what activities characterized each group" adding that "This conclusion also suggests that the Early, Middle and Late stages of the Qadan also have little chronological significance". However Wendorf never raised the question of the link between the Qadan and the Abkan, that of the mixing of assemblages belonging to different cultural phases, and of the relationship of the Qadan with the lithic complexes of the initial phases of the Holocene. For some reasons,

directly linked to the Qadan (Shiner 1968a), a Late Palaeolithic complex, and the relationship of the Qadan with the Ballanan, Arkinian, and the succeding Shamarkian, a Mesolithic complex, and Post-Shamarkian, were considered in this review (Usai 2008a).

An important point in this analysis was that rather than using tool indexes to define the characters of a particular complex, it was considered much better to rely on some of the technological aspects. In fact, the production of a range of tools may be connected to specific activities in a certain area (Binford 1979; 1980; but also Wendorf 1968a: 937) therefore it is here considered deceptive to use similiarities and differences in tool production as a means to evaluate relationships between lithic complexes. An analysis that would consider more the technological aspects of the lithic production would probably result in a less misleading picture, these aspects may act in the same way as the "cifre morelliane" in painting (Lermolieff 1890).

In this analysis, core treatment (platform orientation, number of platform, types of platforms) with its dimensional aspects were taken into account as the most characteristic elements of the assemblages. Other unequivocal stylistic variables regarding stone tool categories were considered afterwards.

The context of discovery (Table 1), was considered of primary importance. This means ascertaining which of the assemblages described for the Qadan and the Abkan really pertained to a single cultural phase and which could be considered a collection resulting from deflation of different non-contemporaneous occupations. Most of the prehistoric sites located by the many expeditions working in the Nubian Campaign were, in fact, surface concentrations, and their dating was made on the basis of their location on ancient Nile deposits attested at different levels partially within, over or under the Ballana and Sahaba formations (Table 1; De Heinzelin 1968).[2]

This re-analysis has led to a complete revision of the Qadan sequence. Therefore, as a first consequence, if this sequence can no longer be regarded as reliable, then the phylogenesis of the Abkan Neolithic directly from the Qadan needs to be reconsidered as well as the relationship of the Abkan with other lithic complexes of the region preceding it (Fig. 2). Secondly, it has opened up the possibility of considering a more "linear" development of Nubian Late Prehistoric cultures (Fig. 2). Finally, as the Jebel

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his opinion on the Qadan sequence never emerged clearly so that, years after, some authors have come to fantasize, for example, about the oldest pottery production in Sudan in the Qadan period (Welsby 1997) or still consider the Abkan a lithic industry directly linked to the Qadan (D'Ercole 2017). Maybe this is partially due to the fact that Wendorf in the same volume (1968b: 990), contradicting himself and, again, following Shiner (1968a) states also that "the Qadan industry is estimated to have begun around 13,000 BC and to have continued until the appearance of pottery around 5000 BC".

2 The sequence of Nilotic events has been completely revisited by Wendorf and Schild (1989) after comparison with the evidence encountered further to the north in Egypt, in the Wadi Kubbaniya area; the Ballana formation is now included in the Late Palaeolithic Alluviation beginning more or less *c*. 20,000 BP (Wendorf and Schild 1989: 777).

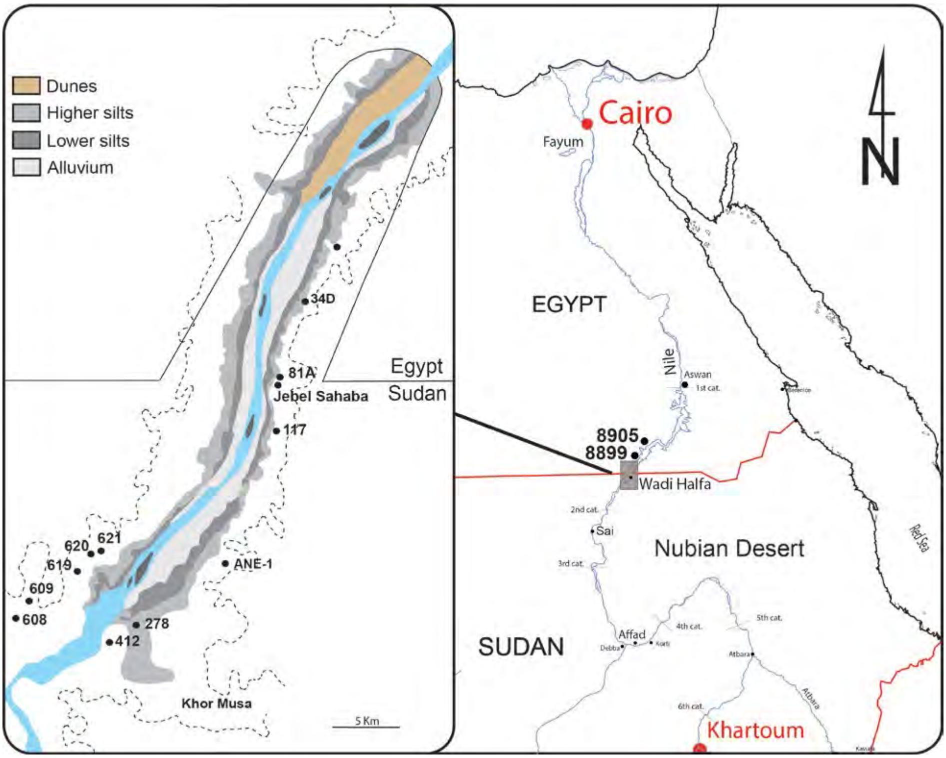

Fig. 1. Map with the location of sites mentioned in the text. Drawn: D. Usai.

Sahaba cemetery has been associated with the Qadan, a few observations can be made on the lithic assemblage recovered at the site and, additionally, on its dating. These lead to the conclusion that this association is debatable.

THE QADAN: THE SEQUENCE AND ITS CHARACTERIZATION

Shiner divided the Qadan into Early, Middle, Late and Final (Shiner 1968a), and considered that the Abkan directly evolved from this lithic industry. Both Wendorf (1968a: 938, 991) and Marks (1970: 21) questioned this partition as they considered it inconsistent.[3] What probably led Shiner to hypothesise a Qadan periodisation was a "myopic" view that hindered him from realising that many Qadan sites are mixed with assemblages of later periods and thus include elements typical of the Abkan or

3 See note 1.

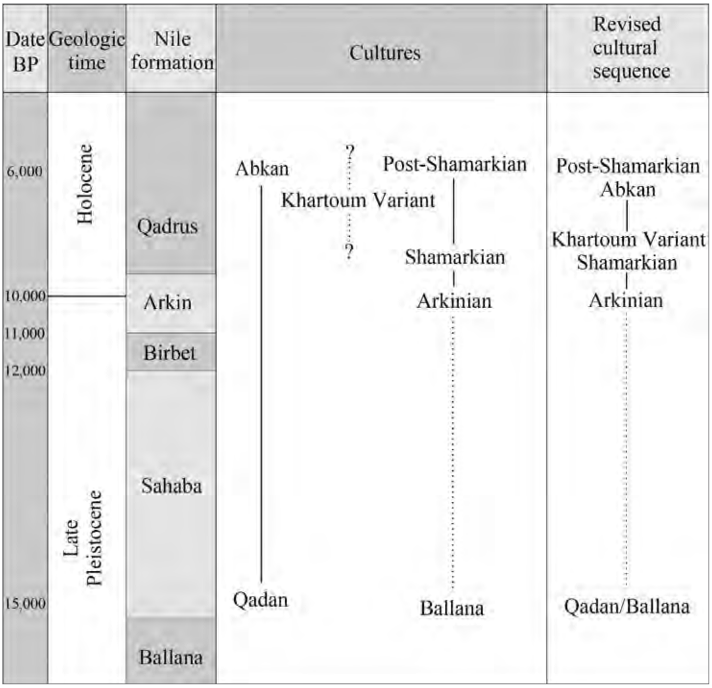

Fig. 2. The geological-cultural-chronological scheme of the Nubian sequence before and after revision. Drawn: D. Usai.

the Khartoum Variant.[4] He instead interpreted these intrusive elements as representing characteristics of a later development within the Qadan itself. The Late and Final Qadan are those that in Shiner's opinion would represent the stages closest to the evolution towards the Abkan.

Except site 608 (Fig. 1; Shiner 1968a), found on the eroded surface of the Dibeira-Jer Formation at an extremely high absolute elevation (155 m a.s.l.), and sites 8899 and 8905 (Fig. 1) that, according to Wendorf (1968a), were resting on the sands of the Ballana Formation and were covered by silts of the Sahaba Formation, most other

4 There are a number of different indications of admixture. A clear one is the presence, in the assemblages formerly assigned to the Qadan, of the Egyptian flint which is very common in Arkinian, Shamarkian (Schild *et al.*, 1968) and Khartoum Variant sites (Shiner 1968b; Usai 2005). Egyptian flint is present at Qadan sites 608, 619, 620, 621, 1023 and 1041 but, curiously, only in one instance, specifically when describing site 34C (Shiner 1968a), did Shiner consider the presence of this raw material as a sign of admixture. For sites 608, 619 and 621 Shiner excluded the possibility of later contamination. Egyptian flint presumably arrived in the Second Cataract region from the Western Desert in the Early Holocene (Usai 2008b). In two other Qadan sites – 605 and 621 – the evidence of admixture is shown by the presence of pottery (Usai 2008a and Table 1.a, in this text). The potsherds found at site 621 are 44 and their descritpion is vaguely reminiscent of the pottery of the Mesolithic period or Khartoum Variant.

Qadan sites, which were all surface concentrations, have been tentatively associated with the Sahaba Formation beginning more or less at 16,500 BP (Table 1; De Heinzelin 1968) sometimes using circular arguments.

The Qadan has been defined as characterised by round or oval scrapers made on primary cortex flakes, Qadan points, burins and lunates, made mainly from blanks produced from single-platform cores, or opposed-platform ones whose striking platform could have been faceted or, secondarily, flat. It is defined as a flake industry but a blade component (Table 2.a and 2.b), sometimes relevant, is present and was used for the production of backed tools.

Apart from the Qadan sites in the Second Cataract region considered by Shiner (1968a), sites 8899 and 8905, located in the Ballana and Tuskha areas explored by Wendorf (Wendorf 1968a), are also more interesting for understanding the chronological position of the Qadan and establishing some criteria for defining the characteristics of this industry.

Indeed at site 8899, where also a stratified Sebilian occupation was found, most of the Qadan material was found on the surface, but a part was found *in situ* on the top of the Ballana sand (never more than 2 or 3 cm into the sand) and under the silt of the Sahaba formation (Wendorf 1968a: 808, 814; Usai 2008a). The assemblage of site 8899 includes 163 artefacts[5] (34 primary flakes, 38 flakes, 2 blades, 17 chips, 39 cores, 33 tools). Five of these, two cores, two tools and one flake, were found under a small patch of Sahaba silt that was still *in situ* over the Ballana sand.[6] Single-platform cores, with a faceted or un-faceted platform prevail. Opposed-platform cores, second in importance, may show faceted platform combined with an unfaceted one or with a cortex one.

Elaborated platforms still had their importance in Qadan core preparation technology. Many burins, backed flakes and blades, lunates, points are included within the tool sample but not a single scraper.

The collection at site 8899 is without doubt a very small one, although not much smaller than other assemblages illustrated by Shiner (1968a; Table 2.a), but the Qadan characteristics recognised in the few illustrated specimens (Wendorf 1968a: 812, Fig. 14)

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5 Not much bigger are those assemblages that were found in the sites of the Second Cataract region (Shiner 1968a).

6 The hypothesis that the lithic industry may be associated with the interval between the Ballana sand and the Sahaba silt aggradation is further supported by Wendorf's (1968a: 809) following statements: "A remnant of the Sahaba silts was still present under a covering of young pediments near the base of the cliff. Silts also covered the northern edge of the dune [see Wendorf 1968a: Fig. 12] and part of the site to a depth of slightly more than a metre. Thin patches of undisturbed silt around 25 cm thick, remnants missed by the quarrying activities, occurred here and there over the dune and gave further proof that one time it had completely covered the Ballana sands" and (1968a: 811) "The succeeding Qadan occupation [site 8899] may have occurred only slightly later, but prior to the time when the surface of the dune was covered by the aggrading Sahaba silts".

Table 1. Summary of contexts of Qadan sites in the Second Cataract region. After: Shiner 1968a.

Phase	Site	Nature of site and position	Height a.s.l.	Height a.f.p.	Formation
Early Qadan	81A	Surface site, incorporated into a beach complex		20 m	Sahaba sands?
	34C	Incorporated into a channel fill of pea gravel	?	?	Sahaba?[1, 2]
	1046	Surface site, on silt deposit	?	?	Sahaba?[3]
	609	Surface site, on silt deposit	?	?	Sahaba silt?
Middle Qadan	2012	Surface site, on sandy-silt deposit	?	?	Sahaba silt?
	1023	Surface site, on silt deposit	?	?	?
	ANE-1	Surface site, on sandstone bedrock or surface sand	105 m (?)		?
	S-320	Surface site, on fluvial sand	135–140 m		?
	608	Surface site, on eroded silts (?)	155 m		Dibeira-Jer
Late Qadan	619	Surface site, on sand (?)	145 m		?
	620	Surface site, on sand	145 m		?
	621	Surface site, on mixed widnblown silt and sand	144–146 m		?
Final Qadan	1041	Surface site, on windblown sand		12	Sahaba
	605[4]	Surface site, on loose sand		8	*post* Sahaba
	2000	Surface site		?	?
	2003	Surface site, on hill of pre-Cambrian rocks		20/30	?
Abkan	2002	Surface site, on silt	145 m		?
	1029	Surface site, on rubble from pre-Cambrian outcrop	?	?	Sahaba?
	604	Surface site, on loose sand	?	?	?
	629	Surface site		3/4	?
	2007	Surface site, on pre-Cambrian rocks		9 m	?
	94[5]	Surface site, on silt		13 m	?
	1001	Surface site, on pre-Cambrian rock		?	?

Height a.p.f. – denotes height of the site above the current level of the floodplain.

[1] channel that contains pea-gravel and was created by high Nile floods, the association with Sahaba is made on comparison to materials from site 81A;

[2] a silt deposition later than pea-gravel incorporating Qadan material was dated 12,550±460 bp (WSU-202);

[3] silt type comparable to that of site 34C and 1028;

[4] date on charcoal 6430±200 bp (WSU-190);

[5] a hearth 60 cm below the surface scattered with Abkan artefacts was dated 7300±250 bp (Lab./no. ND; Shiner 1968a: 622).

Table 2.a. Summary of Qadan sites assemblage composition. Descriptions are not homogenous and complete in Shiner's work (Shiner 1968a) compared to Wendorf's one (see Table 2.b; Wendorf 1968a; 1968b).

Phase	Site	Flakes	Blades	Cores	Tools	Debris	Total	Blade Tool Index
Early Qadan	81A	!	!	?	101	!	101	11.3
	34C	!	!	?	246	!	246	18
	1046	!	!	?	63	!	63	33.3
	609	!	!	?	104	!	104	22
Middle Qadan	2012	!	!	168	101	!	269	15.5
	1023	!	!	?	144	!	144	32
	ANE-1	!	!	?	873	!	873	24.9
	S-320	!	!	47	283	!	330	?
	608	!	!	98	145	!	243	25.4
Late Qadan	619	!	!	?	387	!	387	67.7
	620	!	!	?	173	!	173	70
	621[1]	!	!	>1000	1092	!	>2092	85
Final Qadan	1041	>5000		?	380	!	>5380	32.4
	605[2]	!	!	?	320	!	320	22.4
	2000	!	!	?	144	!	144	11.1
	2003	!	!	82	180	!	262	7.2
Abkan	2002	!	!	85	130	!	215	15.3
	1029	!	!	67	195	!	262	4.4
	604	!	!	?	192	!	192	2.0
	629	!	!	?	123	!	123	?
	2007	!	!	?	110	!	110	2.7
	94	!	!	?	145	!	145	0.9
	1001	!	!	?	97	!	97	4.0

! Data not reported;
? Data expressed only in percentage, absolute value unrecognisable;
[1] site that produced 44 pottery sherds;
[2] site that produced pottery sherds, ostrich eggshell and grinding stones (the presence of grinding stones at this site is mentioned by Shiner when describing site 1041 [1968a:603]).

Table 2.b. Summary of Qadan site 8905 assemblage composition. After F. Wendorf (Wendorf 1968a; 1968b). See Table 2a.

Phase	Site 8905	Flakes	Blades	Cores	Tools	Debris	Total	Blade Tool Index
Group I	Locality A	500	6	235	157	97	995	3.9
	Locality B	712	9	217	198	164	1261	3.5
Group II	Locality C	1095	26	182	342	555	2200	13.9
	Locality D Surf	2273	41	489	717	593	4113	16.1
	Locality E	358	9	178	161	41	747	21.9
	Locality G	518	9	204	116	4	851	14.3
Group III	Locality F	588	6	118	252	97	1061	23.1
	Locality D Exc	978	13	109	286	807	2913	26.5

and the technological aspects are clear and are confirmed by the larger collections at different localities at Tushka site 8905 (Wendorf 1968a). Furthermore Wendorf (1968a: 814) clearly states that "the value of this assemblage lies with the information which it imparts concerning the relationship between the Sahaba silts and an industry of the general technological and typological level represented by this assemblage".

There is at least another locus in the Second Cataract area that has produced material very similar to the Qadan complex which it seems necessary to consider in more depth. This is site 412, where a 3 m-thick deposit of Sahaba silt was covering the sands on which the artefacts were lying or slightly embedded. The lithic industry of this site was attributed to the Gemaian (a very poorly defined complex preceding the Qadan with which it shares many characteristics). The number of Qadan points, a pointed flake obtained from a "Levallois-like" core (see Shiner 1968a: Fig. 21h–m), accompanying the whole tool sample is remarkable[7] (Shiner 1968a; Marks 1970) and apart from this, "the assemblage at 412 has varying frequencies of all the tools represented at 278 [that is a Gemaian-Qadan site] and of all tools of the Qadan industry with the exception of the geometrics" (Shiner 1968a: 561). Apparently, Shiner, by the use of the label "geometrics" intended lunates, and it is worth emphasising that this tool is not as common even in the assemblages of the so-called Early Qadan phase (see site 81A or even site 1046). Site 412 also produced a conspicuous amount of backed bladelets.

7 We wonder whether this is not another case of admixture, a confirmation of which may also be the presence of "proto-gouges" (Shiner 1968a: 561, Fig. 17).

Also at Tuskha, the Qadan evidence in the different parts of site 8905 (Table 2.b) was found resting on the eroded sands of the Ballana Formation (Albritton 1968: 856–864; Wendorf 1968a: 935–940).[8] The area was occupied by a freshwater lake before the deposition of Nile silts of the Sahaba aggradation and was an attraction for groups that left behind assemblages in different locations with definite Qadan affinities (Wendorf 1968a: 935–940).

As a result, it would seem therefore that there is a possibility for the Qadan to be placed in a more specific chronological period, at the end / on top of the Ballana Formation, as Wendorf's sites 8899 and 8905 suggest.

As for the characterization of the Qadan assemblages, cores and debitage were not systematically described in Shiner's reports (1968a; Table 2.a), which concentrated more on the descriptions of the tools. However it can be definitely stated that the Qadan lithic industry made ample use of single-platform cores, usually representing about 50% of a core sample, followed by opposed-platform cores, usually around 35%. Cores reminiscent of the Levallois types, those with which Qadan points production can be associated, may be present and also some bipolar specimens. Multi-platform cores are absent. Qadan cores are small in size (a mean length of 31.44 mm: Shiner 1968a: 573; Fig. 3). Platforms are mainly faceted (and convex in shape) but may otherwise be flat, or, rarely, cortex; the platform angle is mostly acute, ranging between 65° and 75°, in the case of flat or faceted platforms (Usai pers. obs.). The dorsal surface of the core is cortex, apart from platform-faceting scars (Fig. 3).

The Qadan industry is mainly oriented to flake production, but blades are present in various assemblages. According to Shiner, but also to Wendorf (1968a: 853), the occurrence of bladelets is not consistent with the Qadan. However some sites, 609-619-620-621 (Fig. 1), have a significant percentage of backed bladelets (Table 2.a). At site 621, for example, notwithstanding the presence of an intrusive later admixture, a certain amount of blades corresponding to a sample of typical Qadan cores with blade scars, had been produced (Usai 2008a). These blades form around 8% of the debitage sample and backed pieces 42.9% of the whole tool sample. When blades are completely lacking, as in site 81A, it may be either because the site had a specific use or, most probably, because of its state of preservation. When looking at Qadan cores in illustrations, there are clearly some that were used for blade production.[9]

[8] Another site of the Qadan complex that is resting on sand is 81A. These sands were considered pertaining to the Sahaba formation (De Heinzelin 1968: 47; Shiner 1968: 565) but we wonder whether it is possible that the sands from site 81A correspond to the Ballana sands and not to those at Sahaba. Another site resting on sand covering an area of eroded sandstone bedrock is ANE-1. It has an abundant sample of tools. Site S-320 also is on fluviatile sands.

[9] For example Shiner 1968a: Fig. 31: r and s; Fig. 36: a and c.

Fig. 3. A few typical Qadan cores from site 8899. 1 – opposed platform core; 2, 3 – single platform cores. Photo: D. Usai, courtesy British Museum.

Concerning Qadan tool production, if we exclude points and burins, scrapers and lunates,[10] the other most common tool types in these assemblages, should be considered diagnostic only with some caution. These tools, in fact, are also found in the Arkinian, Shamarkian, Post-Shamarkian, Khartoum Variant and Abkan complexes. Since it has been determined that in Qadan sites of the Second Cataract region, there had been an admixture of material pertaining to these complexes (see also Usai 2008a), it would be difficult to distinguish among those that are really Qadan types and those that are not. Indeed scrapers produced in these later lithic industries are mainly made from cortex primary flakes, and the typology of lunates does not vary much throughout the millennia between the Arkinian and Abkan periods. However scrapers typical of the Qadan phase are decidedly smaller than those of later periods.

At this point, it becomes hard to maintain that the Qadan is a lithic industry lasting several thousand years (from around 15,000 to until 6000/5000 BP according to Shiner),[11] divided into four different phases and ending in the Abkan, that is plain Neolithic. This suggests a revision of the cultural sequence of the very Late Pleistocene to / Early to Middle Holocene Nubian lithic industries. This revision includes the re-analysis of the technological aspects of the Ballanan, a lithic industry also located on top of eroded Ballana sands (see site 8956, Wendorf 1968a), which includes core types similar to those of the Qadan (single and opposed platform cores) and new ones, like multi-platform (absent in the Qadan) and bipolar ones (rare but present in the Qadan), with similar size and platform preparation (Fig. 4; for a detailed analysis

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10 Or backed flakes approaching lunates in shape.

11 Dates of the Qadan-Abkan sequence falling in the Holocene period were, as a matter of fact, excluded by Wendorf when pointing out the poor reliability of Shiner's stages. However, rather contradictorily, Wendorf (1968b: 990) in the paragraph "Discussion of artifacts from Jebel Sahaba" states that "…the Qadan industry […] is estimated to have begun around 13,000 B. C. and to have continued until the appearance of pottery around 5,000 B. C." Later on, in a paper co-authored by Schild and Wendorf (2010) the Qadan is delimited to a period between 17,500 and 16,500 cal BP.

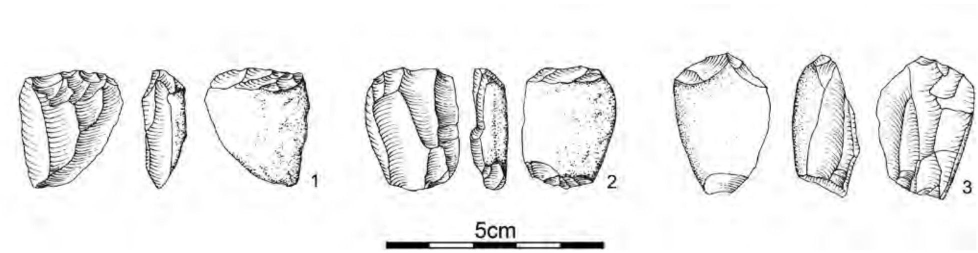

Fig. 4. An example of a Ballanan core. 1 – single platform core; 2, 3 – opposed platform cores. After Wendorf 1968a: Fig. 31.

see Usai 2008a).[12] Looking further at the technological aspects, we can affirm that the evolutionary stage that we see in this industry foretells the characteristics that will develop widely in the Arkinian (Usai 2008a): very high percentages of single-platform-cores, a decrease in importance of opposed-platform ones, coupled by a growth in multi-platform cores and an ample use of the bipolar-on-anvil technique (see also Usai 2008a). This revision led finally to demonstrating the possibility of a local evolution from the Qadan to the Abkan but through the Ballanan, Arkinian, Shamarkian and Post-Shamarkian complexes, based on the assumption that we can recognise, along a time continuum, an oversimplification of core treatment with the appearance of new exploitation techniques, an increase in size and some peculiar stylistic characteristics that are passed from one cultural sphere to the other (Usai 2008a: Fig. 4.17).

THE SMALL JEBEL SAHABA CEMETERY AND THE LITHIC ASSEMBLAGE

The Jebel Sahaba cemetery was discovered in 1962 three kilometres north of Wadi Halfa and not far from an inselberg known as Jebel Sahaba (Wendorf 1968b). It is renowned for representing the first known case of warfare (Wendorf 1968b; Anderson 1968), because four out of the 58 individuals buried at the cemetery had fragments of flint tools embedded in the bones (Wendorf 1968b: 990).[13] Most of the work at the site was done by F. Wendorf in 1965 but A. Marks carried out some additional excavation in 1966, discovering six more skeletons (Wendorf 1968b). The cemetery

[12] Wendorf (1968a: 853) states that the Qadan shares more features with the Ballanan than any other complex.

[13] M. Judd (2006) in her re-analysis of the Jebel Sahaba skeletal material discovered two new embedded lithic chips in the remains from one of the graves.

was dated on the basis of the associated artefacts and uncertain geological evidence to 12,000/10,000 BC (Wendorf 1968b: 954),[14] corresponding more or less to the Qadan phase. A date on collagen was obtained from skeleton 43 (Pta-116 13,740±600 uncal. BP; Wendorf and Schild 1989) but regarded as suspicious because the sample was processed in a period when AMS was not available and extraction procedures were not properly implemented (Antoine *et al.*, 2013). New dates on apatite were more recently obtained for four skeletons that seem to provide a different chronological framework (Table 3; Zazzo 2014), with dates falling more in the Early Holocene than Late Pleistocene.

Near the cemetery it was postulated that there might have been a Qadan site but the occupation "may be concealed beneath the slope wash which hid the graves" (Wendorf 1968b: 955). Most graves were covered by sandstone slabs but some post-depositional re-arrangement may have taken place,[15] part of them were exposed almost on the surface but the majority were found at depths between 35/40 and 60/70 cm (Wendorf 1968b: 957). Skeletons were apparently buried in pits that are said to have been oval in outline even if only in one case (Burial 7) was the pit-shape reported. The graves were very homogeneous in their orientation, east-west with head to the east and facing south, with the bodies in a flexed position and on the left side.

Wendorf (1968) states that 110 artefacts[16] were in direct association with the burials and their position indicated that they had penetrated the bodies as point or barbs. These artefacts were documented in 26 (24 certain, plus 2 doubtful) out of the 58 burials recovered at the site. The total number of artefacts found in the area of the cemetery is 189, 86 were tools or retouched pieces and 97 un-retouched chips and flakes.[17] Of these last ones 25 chips, 22 flakes and two primary flakes are said to have been associated with the burials while the remaining 48 artefacts (30 flakes, 13 primary flakes and 5 chips, mostly of fossil wood; Fig. 5 and 6) were recovered in the fill of the excavated area (Wendorf 1968b: 989). However, Wendorf supposes that they may have an origin similar to a large number of worn and eolized sandstone flakes that were, instead, considered as derived from the Middle Palaeolithic site located on top of an adjoining inselberg. Also in the fill of the excavated area were six cores: one possible Levallois (?), one single platform, one multiplatform in doubtful association

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[14] Reported from Wendorf 1968b: 954; the calibration is that used at that time, subtracting 1950 from the laboratory date.

[15] In one case, burial 47, the skeleton was "on the sandstone slab".

[16] There is a small discrepancy in that Wendorf (1968b) on page 959 mentions a direct association of 110 artefacts while on page 982 he mentions 116 flaked stone artefacts found in direct association with 24 of the burials.

[17] The lithic assemblage recovered by Wendorf at Jebel Sahaba is held in the British Museum, which is here thanked for permission to study it and reproduce photos made by the author.

Table 3. Recent dates from Jebel Sahaba cemetery. After: Zazzo 2014.

Grave number	Material	AMS Lab	Date uncal BP
15	Enamel apatite	UBA-20124	7251±31
15	Dentine apatite	UBA-20132	11660±52
15	Bone apatite	UBA-20125	11049±43
22	Enamel apatite	UBA-20126	8512±40
22	Bone apatite	UBA-20127	11133±50
42	Enamel apatite	UBA-20128	9043±45
42	Bone apatite	UBA-20129	11093±49
103	Enamel apatite	UBA-20130	9687±55
103	Bone apatite	UBA-20131	10032±46

with burial 50–51, an opposed sides and three others. According to Wendorf's report, they were "all found in the excavation fill" (Wendorf 1968b: 990).

While most artefacts are microlithic, a significant number of them cannot be included in this category. Wendorf suggests this material resembles assemblages of the Qadan, even if he notes the scarcity of lunates that are characteristic of this lithic industry. Only one, but doubtful, example was found and not in direct association with any of the burials. He also underlies the similarity between the small Jebel Sahaba sample and that of a "Middle Qadan" site ANE-1 (Shiner 1968a). Wendorf (1968b: 990–991) establishes a date for the cemetery based on the general characteristics of the assemblage and especially on this single doubtful lunate and on the supposed contemporaneity with the burials.

COMMENTS

While there is strong evidence that the cemetery was the result of a single violent event (the number of individual with bone-embedded lithics, the number of simultaneous burials, the quasi perfect iso-orientation of nearly all[18] of them) there are reasons to think that it is not as certain that all the lithic artefacts found in the burials were in "association" with them. Contrary to Wendorf's claim (1968b: 991), it does not sound so unreasonable to think that part of the artefacts found near the skeletons, or even

[18] Only two burials observe a different orientation.

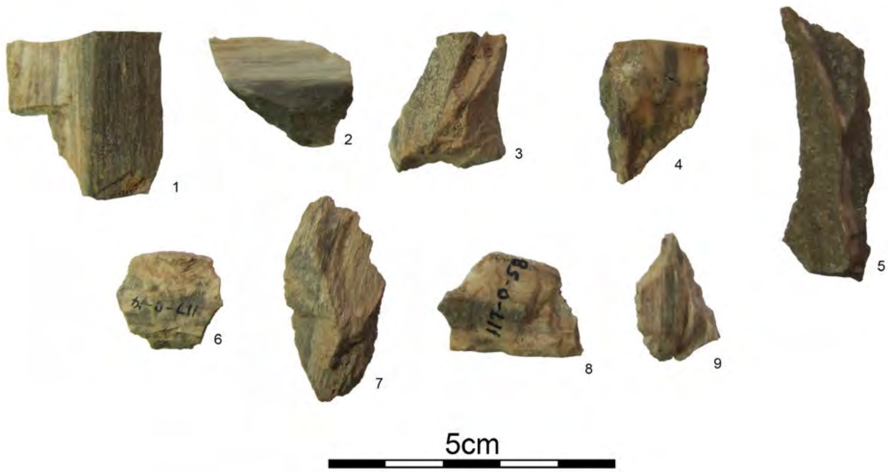

Fig. 5. Fifteen out of the twenty-one unpublished fossil wood flakes from site 117. 1, 4 and 8 – are broken. Photo: D. Usai, courtesy British Museum.

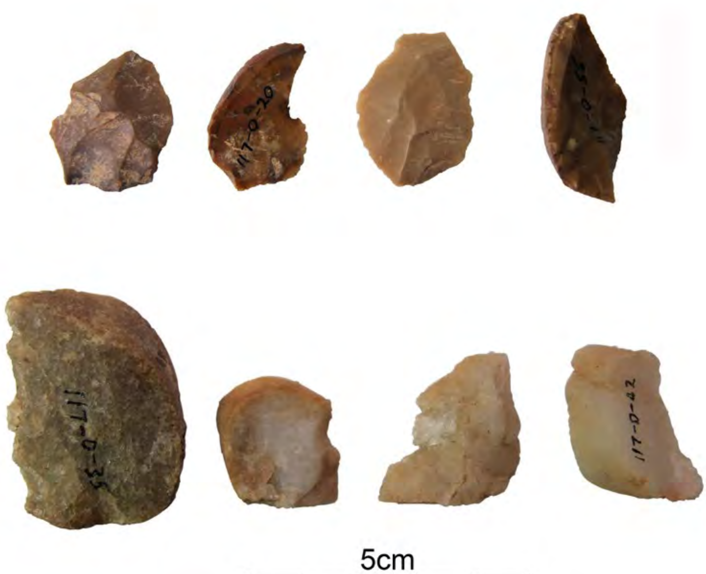

Fig. 6. Unpublished chert and quartzite flakes from site 117, exact location was not reported in the bag containing them. Photo: D. Usai, courtesy British Museum.

inside their skulls, happened to reach that position due to post-depositional factors (especially if no evidence of trauma are present on the bones). Of the four burials where fragmentary flints were found embedded in the bones (Burials 21, 23, 31 and 103) three had a large number of other artefacts around them (Burial 21, 19 artefacts; burial 31, 17 artefacts; and burial 44, 21 artefacts; Fig. 7) and it is almost incredible that all of them result from wounds inflicted on each of these individuals with arrows. They are not furthermore in particular position to consider that they were the results of an intentional deposition. In the case of Burial 44, twenty-one artefacts (Fig. 8; tools and also un-retouched pieces) were considered associated with the skeleton but surprisingly not even one was found embedded in the bones.[19] Three of the artefacts that were found in front of the mandible, inside it and behind it in burial 44 (Fig. 8), have been described as aligned and supposed to be possible "barbs and point on shaft" (Wendorf 1968b: 978). If these tools really had been the remains of a weapon consisting of a shaft with a flint point and barbs, the wound that such a weapon could have produced on the facial bones (especially the maxilla and the mandible) of this individual would have been unmistakable. There is however no mention of this in Wendorf's notes, nor in Anderson's study. There is no photo of this grave but according to the description and the plan (Wendorf 1968b: Fig. 3) the grave was entire with the skull present.[20]

On this same line of reasoning, artefacts found inside skulls of burials 14 and 21 (Fig. 7) may have found their way there transported by any small animal whose traces of disturbances may have disappeared completely, especially as the deposit in which the pit-graves had been excavated is made mostly of sand.[21]

This suggests that there is a possibility that part of the lithic artefacts that were found in the graves of Jebel Sahaba resulted from an admixture created by the digging of the pits for the internment of each individual or group of individuals at points where more ancient levels of occupation were intercepted. After all, this possibility is not denied by Wendorf himself and would explain the cores that were not in direct association with any of the burials, and flakes or chips that are described as "in fill adjacent to skeleton, position unknown" (for example as in burial 44), and the 48 artefacts that were recovered in the fill of the excavated area, most of them made of petrified wood, not similar to the Qadan typologically (Fig. 5 and 6). This would also explain why, among artefacts that were considered associated with the graves, are also present types that cannot so easily be linked to weapons (scrapers, denticulates and some truncations). This means that the lithic assemblage found at Jebel Sahaba may rely to an occupation

19 According to the list of Wendorf 1968a: 990, even if in description of the burial on page 978, one is described as "(a) backed flake, imbedded in right fourth rib, near vertebra (Fig. 31:l)".

20 The skull and mandible were present and are currently in the collection at the British Museum; we wish to thank to Dr D. Antoine for confirmation of this.

21 At the al-Khiday cemetery a Meroitic faience bead was found under the mandible of a pre-Mesolithic skeleton, presumably transported by a tiny rodent tunnelling in that place (pers. observ.).

Fig. 7. Burial 14, 20 and 21 and the distribution of artefacts located in them, none embedded in the skeletons. Re-elaborated from Wendorf 1968a.

pre-dating the use of the area as a cemetery. The dating of this lithic assemblage can therefore be approached only from its typology. Notwithstanding the absence of lunates (as mentioned above, they cannot be considered as reliable indicators of the Qadan), a lot of the other artefacts described in this assemblage can with some certainty be associated with the Qadan lithic industry. Less certain however is the association with this same phase of part of the debitage (especially the fossil wood specimens, and some of the cores, which are not in the same condition of wear, like the wind-blasted and worn sandstone flakes that are assigned to the Middle Palaeolithic).

Several dates for the Qadan lithic industry, which according to this revision (see also Usai 2008a) does not last as long as Shiner (1968a) had suggested,[22] were obtained from the Tuska area (Wendorf 1968a: 940) on charcoal – 14,500±490 uncal BP (WSU-315)[23] – and on carbonates – 10,530±126 uncal BP (WSU-415b), 9730±120 uncal BP (WSU-444)[24] and 11,400±70 uncal BP (WSU-417 combined with WSU-442).[25] Another date on charcoal – 15,100±800 uncal BP (GXO-413) – from Qadan site 6G33 located in an area opposite to Wadi Halfa (Irwin *et al.*, 1968) is similar to that of Tuska.

22 As a reminder, Wendorf (1968b: 990), contradicting himself and, again, following Shiner (1968a) states that "the Qadan industry is estimated to have begun around 13,000 BC and to have continued until the appearance of pottery around 5000 BC".

23 Locality C at the Tushka site.

24 Locality F at the Tushka site.

25 Locality A and C at the Tushka site.

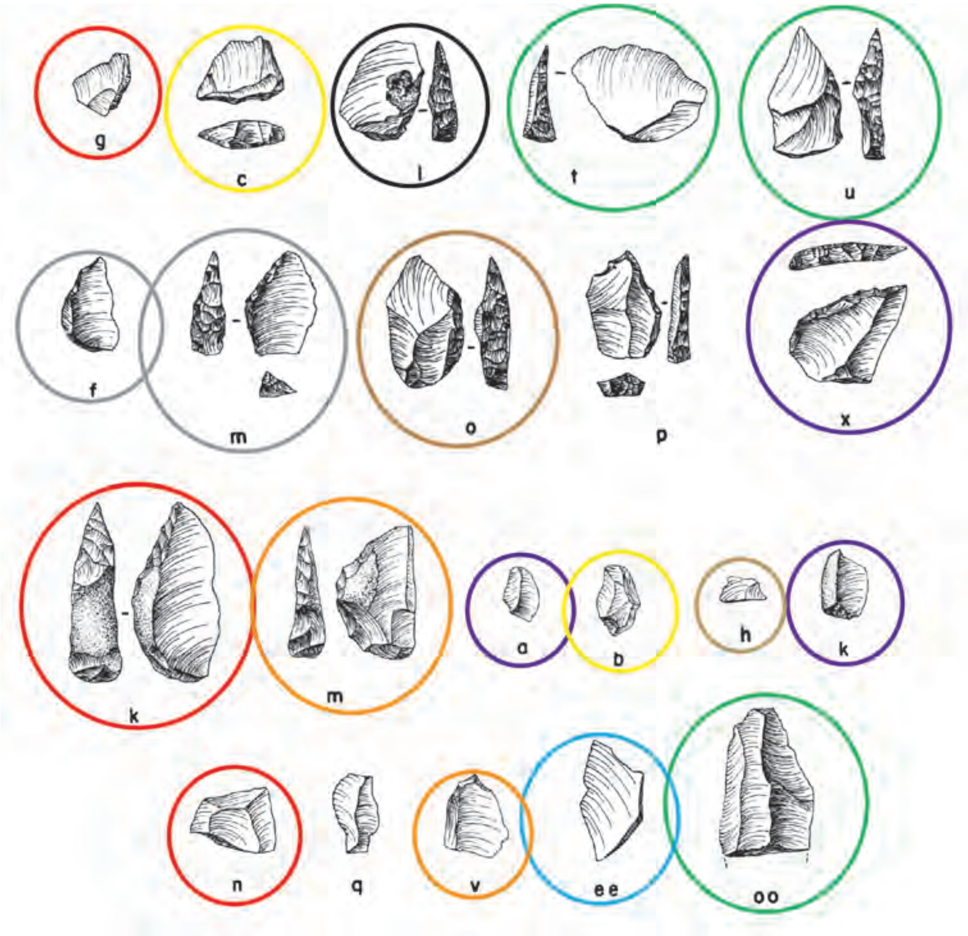

Fig. 8. Artefacts recovered in burial 44 (scale 4:5; reassembled from Wendorf 1968a: Figs 31–34): pieces in red circles were considered "barbs and point on shaft in mouth"; those in green circles were found near the lumbar vertebra; blue ones, at the distal end of the right femur; orange, inside pelvic cavity; pink, inside rib cage; brown, in spinal column; grey, against ventral face of scapula; yellow, against fifth rib, near vertebra; black one, *embedded* in the fourth right rib, near the vertebrae; light brown, proximal end of right humerus; not encircled, pieces in fill adjacent to skeleton but exact position unknown (Wendorf 1968a: 978).

The dates on carbonates may be regarded as unreliable as Wendorf states (1968a; for the problem see also Dal Sasso *et al.*, 2016; 2018). The Qadan assemblage of site 34C, included in a pea-gravel deposit, at higher elevation than usual, is dated before 12,550±460 BP (WSU-202) on the base of a recessional feature regarded as later than the channel itself. Therefore the most probable chronological position of the Qadan industry seems to be ~15,000 BP (or 17,000 cal BP; Schild and Wendorf 2010).

A date on a hearth from site 8896 – 14,000±280 uncal BP (WSU-329) – puts the Ballanan,[26] here considered as contiguous with the Qadan (if not simply a *facies* of the latter; Usai 2008a) in a slightly later period.

Provided that the dates for the Qadan-Ballanan phases are reliable, if the association between the Jebel Sahaba burial and the lithic industry found inside the burials can be questioned, then the cemetery post-dates ~15,000/14,000 BP. If the recent dates obtained on the burials (Table 3; Zazzo 2014) can be accepted, the cemetery would correspond more to the period when the Arkinian lithic industry developed in the region (Schild *et al.*, 1968).[27] However, the recent dates of Jebel Sahaba cemetery should be considered with great caution as it seems that the problem of the dissolution and re-precipitation of calcite that may significantly contaminate the carbon isotope proportions of the bio-apatite may have been underestimated, as documented for other cases in Central Sudan (Dal Sasso *et al.*, 2016; 2018). It is tempting to correlate the carbonate dates obtained for the cemented material from three localities in the Tushka area (WSU-415b, WSU-444 and WSU-417, reported above), ranging between 9730 and 11,400 BP, with those dates produced by dating enamel, dentine and bone apatite of four of the Jebel Sahaba burials. It is worth noting that Wendorf (1968b: 959) reports that:

> "After the burials were filled, a calcified crust developed over the grave pits, and then this crust was covered by slope wash from the adjacent inselberg. … The crust is of some chronological significance for it does not occur over Neolithic or later Historic material in Nubia and, consequently, indicates a pre-Neolithic date for the burials".

Therefore, if we consider the possibility of a correlation between the cemented dated material from Tushka and the formation of this calcified crust, then the skeletal remains of the cemetery of Jebel Sahaba may also have suffered from secondary calcite precipitation, a phenomenon generally occurring during periods of aridity (Dal Sasso *et al.*, 2018). This finally means that, as also suggested by Zazzo (2014), the new Jebel Sahaba dates should be considered as minimum dates.

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26 Similar to it, and most probably the same industry, is what Irwin *et al.*, (1968) has called the Dabarosa complex.

27 However this does not necessarily mean that the population should be assigned to this specific cultural phase as similarly assessed by Wendorf for the Qadan (1968: 990): "the assignment of the artifacts found in the skeletons to the Qadan industry does not necessarily imply that the skeletons were representative of a Qadan population".

CONCLUSIONS

The recovery of the Nubian cultural and geological sequence of the region of the Second Cataract area is the result of the immense effort made by researchers from all over the world during the Nubian Campaign. Many aspects of the sequence have been revisited thanks to the results of research in neighbouring areas and also thanks to the improvement of dating techniques (Schild and Wendorf 2010). Among the lithic complexes of the end of the Late Pleistocene, the Qadan is the one for which there have been more difficulties in establishing a precise chronology. The original four-stage division of the complex proposed by Shiner (1968a) was discussed, already in its time, by Wendorf, but the same was not done for the hypothesis of the Qadan-Abkan relationship. The arguments presented in this paper, although they would require confirmation by new radiometric data, seem plausible and attempt to resolve the question of the Qadan and the Abkan, regarding them as two distinct typologically and chronologically well separated complexes. The eight/nine thousand years considered originally as the chronological time frame within which the two complexes developed, in fact constitutes the time that elapsed between them. Other complexes, Ballanan, Arkinian, Shamarkian (= Khartoum Variant) and Post-Shamarkian (= Abkan; Wendorf 1968c), better fit into this temporal and evolutionary frame.

Like the sites at Tushka (Wendorf 1968a), the Jebel Sahaba cemetery has been dated to the Qadan period, therefore this revision has required also a re-analysis of this important context. The recent dates obtained from the enamel and bone apatite of four of the 58 individuals recovered at the Jebel Sahaba cemetery fall in the temporal gap between the Qadan and the Abkan. A review of the overall Jebel Sahaba context and the associated lithic assemblage suggests that even if it seems established that part of the lithic artefacts can be attributed to the Qadan, there are reasons why the association of these flints with the individuals in the cemetery should be re-examined. Therefore if the cemetery cannot be dated to the Qadan, one wonders which cultural phase it can be associated with. The new dates on the Jebel Sahaba indicate a wide range, between ~11,500 and ~7000 BP, the oldest of which would partially fall within the period of the Arkin formation, with the Nile aggrading probably under better climatic circumstances. Although the evidence is rather weak, it is worth remembering that Judd (2006), in her later study of the Sahaba population remarks, using Schild and Wendorf's (2010) words, that

> "in spite of evident violence and aggression, [the community] was not undernourished or impoverished and was much better off than some of the younger Nilotic societies such as the later Badarian and Dynastic ones (Judd 2006: 160)".

As the new dates on Jebel Sahaba cemetery may be "minimum dates" (see also Zazzo 2014), the suggestion that the population corresponds to the time of the Arkin formation

(= Arkinian lithic complex) may be considered with cautious. Perhaps, however, it can be considered as a useful indication that we should seek to place it in the temporal space between the Qadan and Abkan, at a moment when climate and environment may have been best suited for a hunter-gatherer population to grow "well nourished and not impoverished".

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I would like to thank the editors of the volume for inviting me to contribute at it. I have always been fascinated by the gentle ways of Professor Michał Kobusiewicz, whom I had the pleasure to meet many years ago when I was a young student. During the working experience I had with him, and together with our colleague Jacek Kabacinski, I learned many things and, above all, to be systematic in the study and analysis of lithic assemblages. I am happy to be able to dedicate this little piece of criticism to him, made possible only by the accuracy with which Michał and the late Prof. F. Wendorf always published their works.

Many thanks are also due to the two reviewers whose comments helped me to improve the work.

REFERENCES

Albritton, C. C. Jr. 1968. Geology of the Tushka site: 8905. In F. Wendorf (ed.), *The Prehistory of Nubia Vol. II*, 856–846. Dallas, Southern Methodist University Press.

Anderson, J. E. 1968. Late Paleolithic skeletal remains from Nubia. In F. Wendorf (ed.), *The Prehistory of Nubia Vol. II*, 996–1040. Dallas, Southern Methodist University Press.

Antoine, D., Zazzo, A. and Friedmann, R. 2013. Revisiting Jebel Sahaba: new apatite radiocarbon dates for one of the Nile valley's earliest cemetery. *American Journal of Physical Anthropology, Supplement 56*: 68.

Binford, L. 1979. Organization and formation processes: looking at curated technologies. *Journal of Anthropological Research* 35(3): 251–273.

Binford, L. 1980. Willow smoke and dog tails: hunter-gatherer settlement system and archaeological site formation. *American Antiquity* 45: 1–17.

Dal Sasso, G., Lebon, M., Angelini, I., Maritan, L., Usai, D. and Artioli, G. 2016. Bone diagenesis variability among multiple burial phases at Al Khiday (Sudan) investigated by ATR-FTIR spectroscopy. *Palaeogeography, Palaeoclimatology, Palaeoecology* 463: 168–179.

Dal Sasso, G., Zerboni, A., Maritan, L., Angelini, I., Compostella, C., Usai, D. and Artioli, G. 2018. Radiocarbon dating reveals the timing of formation and development of pedogenic calcium carbonate concretions in Central Sudan during the Holocene. *Geochimica et Cosmochimica Acta* 238: 16–35.

D'Ercole, G. 2017. *Ceramic manufacturing techniques and cultural traditions in Nubia from the 8th to the 3rd millennium BC.* Oxford Archeopress Publishing Ltd. Cambridge Monographs in African Archaeology.

De Heinzelin, J. 1968. Geological history of the Nile valley in Nubia. In F. Wendorf (ed.), *Prehistory of Nubia Vol. I*, 19–55. Dallas, Southern Methodist University Press.

Irwin, H. T., Wheat, J. B. and Irwin, L. F. 1968. *University of Colorado investigations of Palaeolithic and Epipaleolithic sites in the Sudan, Africa.* Salt Lake City, University of Utah. Anthropological Papers 90.

Judd, M. 2006. Jebel Sahaba revisited. In K. Kroeper, M. Chłodnicki and M. Kobusiewicz (eds), *Archaeology of Early Northeastern Africa,* 153–166. Poznań, Poznan Archaeological Museum.

Lermolieff, I. 1890. *Kunstkritische Studien über Italienische Malerei. Die Galerien Borghese und Doria Panfili in Rom.* Leipzig, F. A. Brockhaus.

Marks, A. E. 1970. *Preceramic Sites.* Stockholm, Scandinavian University Books. The Scandinavian Joint Expedition to Sudanese Nubia Publications 2.

Nordström, H. A. (ed.) 1972. *Neolithic and A-Group sites*. Stockholm, Scandinavian joint expedition to Sudanese Nubia 3, Scandinavian University Books.

Schild, R. and Wendorf, F. 2010. Late Palaeolithic Hunter-Gatherers in the Nile Valley of Nubia and Upper Egypt. In E. E. A. Garcea (ed.), *South-Eastern Mediterranean Peoples Between 130,000 and 10,000 Years ago*, 89–125. Oxford and Oakville, Oxbow Books.

Schild, R., Chmielewska, M. and Więckowska, H. 1968. The Arkinian and Shamarkian industries. In F. Wendorf (ed.), *Prehistory of Nubia Vol. II*, 651–767. Dallas, Southern Methodist University Press.

Shiner, J. L. 1968a. The Cataract Tradition. In F. Wendorf (ed.), *Prehistory of Nubia Vol. II,* 535–629. Dallas Southern Methodist University Press.

Shiner, J. L. 1968b. The Khartoum Variant. In F. Wendorf (ed.), *Prehistory of Nubia Vol. II*, 768–798. Dallas, Southern Methodist University Press.

Usai, D. 2005. Early Holocene seasonal movements between the Desert and the Nile Valley. Details from the lithic industry of some Khartoum Variant and some Nabta/Kiseiba sites. *Journal of African Archaeology* 3(1): 103–115.

Usai, D. 2008a. Lunates and micro-lunates, cores and flakes: The lithic industry of R12. In S. Salvatori and D. Usai (eds), *A Neolithic cemetery in the Northern Dongola Reach (Sudan): Excavation at Site R12*, 33–52. London, The Sudan Archaeological Research Society Publications.

Usai, D. 2008b. Tracing the movements of the Western desert dwellers. Site 11-I-13 in Wadi Karagan, Sudanese Nubia, closely akin to El Ghorab or El Nabta. *Journal of African Archaeology* 6(2): 219–232.

Welsby, D. 1997. Early Pottery in the Middle Nile Valley. In I. Freestone and D. Gaimster (eds), *Pottery in the making. World ceramic traditions*, 26–31. London.

Wendorf, F. 1968a. Late Palaeolithic sites in Egyptian Nubia. In F. Wendorf (ed.), *The Prehistory of Nubia Vol. II*, 791–953. Dallas, Southern Methodist University Press.

Wendorf, F. 1968b. Site 117: a Nubian Final Palaeolithic graveyard near Jebel Sahaba. In F. Wendorf (ed.), *The Prehistory of Nubia Vol. II*, 954–995. Dallas, Southern Methodist University Press.

Wendorf, F. (ed.) 1968c. *The Prehistory of Nubia Vol. I, II*. Dallas, Southern Methodist University Press.

Wendorf, F. and Schild, R. 1989. Summary and Synthesis. In A. E. Close (ed.), *The Prehistory of Wadi Kubbaniya. Late Paleolithic Archaeology Volume 3*, 768–824. Dallas, Southern Methodist University.

Zazzo, A. 2014. Bone and enamel carbonate diagenesis: a radiocarbon prospective. *Palaeogeography, Palaeoclimatology, Palaeoecology* 416: 168–178.

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The First Notes on the Second Khartoum Mesolithic Cemetery at Jebel Sabaloka (Sudan)

Lenka Varadzinová[a] and Ladislav Varadzin[a,b]

The site of Fox Hill (SBK.W-20) constitutes the second locality in the Sixth Nile Cataract region where a large communal burial ground of Early Khartoum hunter-gatherers was partially uncovered. In several aspects, this cemetery resembles in its characteristics the Early Khartoum burial ground explored between 2012 and 2015 at the site of Sphinx (SBK.W-60), located some 4 km to the north-east. The co-occurrence of these burial grounds with intensively occupied coeval settlements as well as the characteristics of the burial rite enable us to interpret these complex sites not only as mere places of life and death, but also as centres of collective identity based on social memory.

KEY-WORDS: Communal burial grounds, early Holocene hunter-gatherers, Early Khartoum culture, Sixth Nile Cataract, Sudan

INTRODUCTION

The prehistoric landscape of the western part of Jebel Sabaloka and the Sixth Nile Cataract region consists of more than thirty sites of early to mid-Holocene dating that are mostly set on granite hills that dot the foothill zone of the mountain (Fig. 1a). They are of different types and at an early stage of the field research were organised into a three-level hierarchy (Suková and Varadzin 2012: 126). With core sites that occupied the top of the hierarchy, the presence of human burials was defined as one of the distinguishing features. Between 2012 and 2015, investigation focused on the settlement site of Sphinx (SBK.W-60) located at the western edge of the mountain and attributed to the Early Khartoum culture (or Khartoum Mesolithic; *c.* 9000–5000 BC), where remains of *c.* 51 individuals from *c.* 300 estimated burials were uncovered (Varadzinová

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and Varadzin 2017; Varadzinová *et al.*, in prep.). In 2017 and 2018, we returned to another core site at Fox Hill (SBK.W-20) situated 4 km to the south-west of Sphinx to explore the cemetery detected there in 2011 (Suková and Varadzin 2012: 122–124). In this paper, we present the first characteristics of this recently explored late prehistoric burial ground as can be provided prior to completion of archaeological and anthropological analyses and, at the same time, reflect on its significance for the study of early Holocene hunter-gatherer societies in Central Sudan and beyond.

THE SITE AND EXPLORATION OF ITS BURIALS

Fox Hill is located at an equal distance of 1.2 km to the south-west of the mountain and to the west of the present-day bank of the Nile (Fig. 1a). It occupies a comparatively large granite outcrop with 16 naturally defined elevated platforms and terraces with an occupation area of 11,650 m² in total (Fig. 1b). Previous surveys of these platforms brought to light remains of intensive occupation during the Early Khartoum culture (*c.* 9000–5000 BC) and, unlike the situation at the site of Sphinx, also during the Early Neolithic (*c.* 5000–3800 BC).

The first human burials at the site (B.1 to B.3) were discovered in 2011 in Trench 3 (4.2 m²) explored on Terrace 3 with a view to ascertaining the thickness and character of archaeological deposits (Suková and Varadzin 2012: 123–124, Plate 7; Fig. 1b–d). Other human remains were found in 2012. First, in Trench 5 (2 m²) on Terrace 14, which is of small size, elevated and exposed, but rather peripheral with respect to late prehistoric settlement (Fig. 1b), we found the badly preserved human bones of at least one individual in a flexed position (B.4), with the remains at a depth of *c.* 15 cm below the present-day surface surrounded and underlain by granite cobbles and boulders (Suková and Varadzin 2012: 124). Then, human teeth and fragments of a mandible were found in a secondary position in Trench 9 (8.9 m²) at the eastern edge of Terrace 1 (at the foot of the slope rising up to Terrace 3; Fig. 1b); they were collected at a depth of 5–10 cm below the present-day surface in layer SU2. The first proper exploration targeted at burial activities at Fox Hill was commenced in 2017 with excavation of two trenches on Terrace 3 (Fig. 1c, 1d): Trench 21 (11 m², max. depth 0.75 m), which was situated right next to Trench 3, and Trench 22 (21 m², max depth 0.6–0.75 m) delimited 11 metres or so further to the south; the exploration of the latter trench was completed in 2018.[1] Trenches 3+21 and 22 were found to be located right within the limits of a burial ground used during Holocene prehistory for intensive and apparently long-term burying. To the north of Trenches 3+21, Trenches 17 (1 m²), 23 (2 m²) and 24 (1 m²) were excavated; in these, however, only prehistoric settlement remains were uncovered (Fig. 1c).

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[1] Overviews of fieldwork during these two campaigns can be found in Varadzinová *et al.*, (2018; 2019).

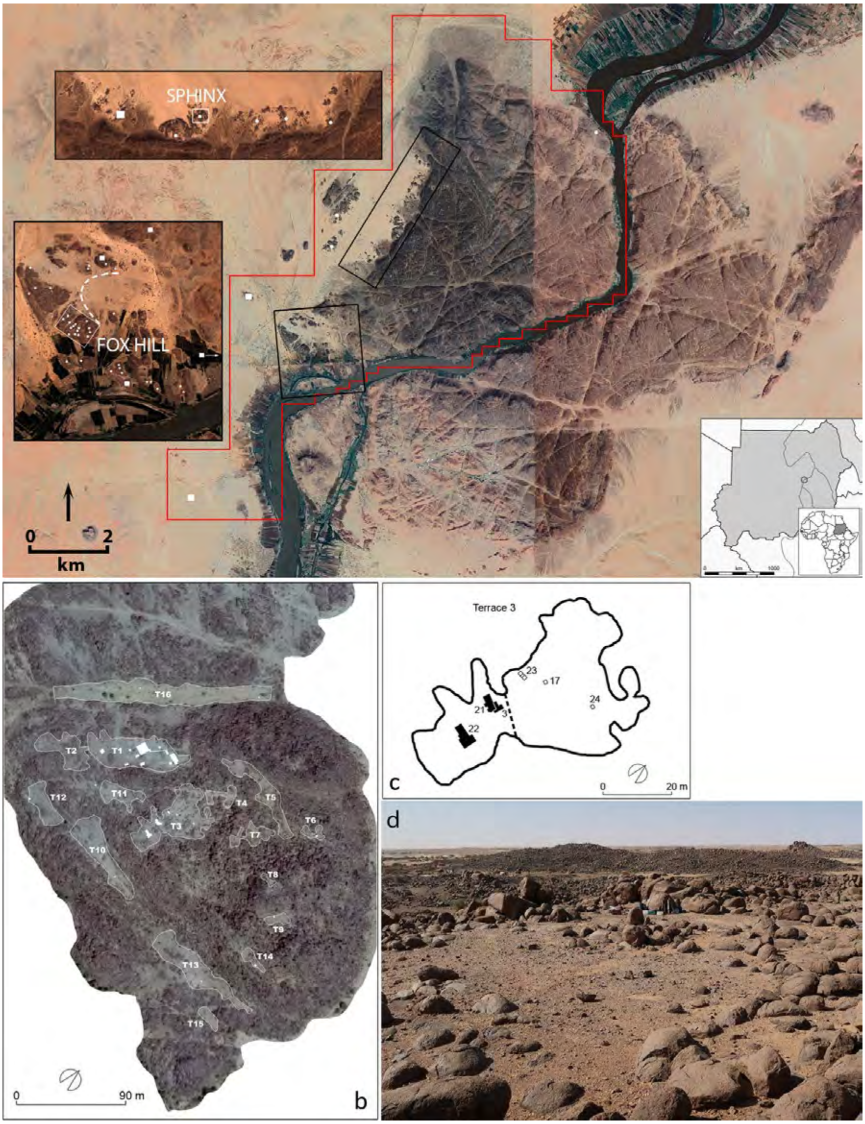

Fig. 1. a – Jebel Sabaloka with the locations of Fox Hill and Sphinx in the research area of the mission of the Charles University in Prague (red line). Background Google Earth 2013, 2019, updated by L. Varadzin;
b – detail view of Fox Hill, with the locations of occupation terraces and excavated trenches. Background Google Earth 2016, updated by L. Varadzin based on Varadzinová *et al.*, 2018; 2019;
c – plan of Terrace 3 at Fox Hill, with trenches containing human burials shown in solid black. Drawn: L. Varadzin based on Varadzinová *et al.*, 2018; 2019;
d – Terrace 3 prior to excavation in 2017 in view from southeast. Photo: L. Varadzinová.

Fig. 2. Human burials (B), groups of loose bones (LB) and features (F) in Trench 22 in 2017:
a – eastern part of Trench 22 (sectors G–L), after excavation of B.15 and prior to exploration of the six stone piles covering human burials;
b – western part of Trench 22 (sectors A, B, M–P), after removal of B.9 and prior to exploration of the uppermost layer of primary inhumations and other displaced or unassigned individuals. Orthophotos derived from a photo 3D model. Authors: K. Paclíková and J. Unger.

Trenches 21 and 22 were excavated in sectors 1 × 1 m or less and, within these, in 5-cm-thick horizontal spits unless stratigraphic units were detected. All the excavated material was dry-sieved using a 4-mm mesh and all finds were recorded according to trench, sector and mechanical/stratigraphic unit or in a greater detail, as the case may be, or according to grave context. When exploring burial relics, we differentiated *burials* (B), e.g., primary inhumations *in situ*, and *loose bones* (LB), which included all the other occurrences of human remains, such as loose redeposited bones (e.g., LB 9/2017), articulated remains (e.g., LB 15/2017), but also the disarticulated remains of an apparently complete individual (LB 12/2017; Fig. 2b). Therefore, it is probable that after completion of anthropological analysis the number of individuals unearthed so far and the information on burial practices will increase and become more diversified. In 2018, the skeletal remains in Trench 22 were excavated and documented together with a physical anthropologist Isabelle Crevecoeur (UMR 5199 PACEA, CNRS, Université de Bordeaux, Pessac Cedex, France) who devoted special attention to taphonomy and burial rite (see Varadzinová *et al.*, 2019). Burials and distinct groups of loose bones were recorded in several levels in the course of gradual uncovering and were located by means of a total station within the established site grid. Beside standard drawn, photographic and textual documentation, selected cases were photographed for the purposes of photographic 3D models. Some situations were sampled for archaeobotanical, sedimentological and geological analyses.

FIND SITUATION IN TRENCHES 3+21 AND 22

The upper part of the trenches under excavation was most often made up of undifferentiated deposits about 20 to 40 cm in thickness intermixed with settlement debris. The first traces of burial pits normally began to appear in the lower parts and became more visible with the increasing depth from the surface. Nevertheless, both fills of the burial pits and the deposits into which they were sunk continued to contain considerable amounts of settlement debris down to the level of bedrock. Together with burials, we uncovered also a number of settlement features (storage pits and post holes, pits of irregular shapes etc.), which we identified at differing elevations or stratigraphic levels; some of them interfered with the existing burials. The stratigraphic situation in Trenches 21 and 22 is well illustrated by the sections on Fig. 3. There one can see settlement deposits that overlay burial pits (both distinguishable and indistinguishable from their fills) and deposits into which the burials had been cut. Whereas the latter seem to contain only artefacts datable to the Early Khartoum culture as the latest, in the upper deposits we also found some artefacts of Early Neolithic dating. Thus, it is obvious that the burial ground had been established on Terrace 3 after some time had lapsed since its very first Early Khartoum occupation and that – after some time

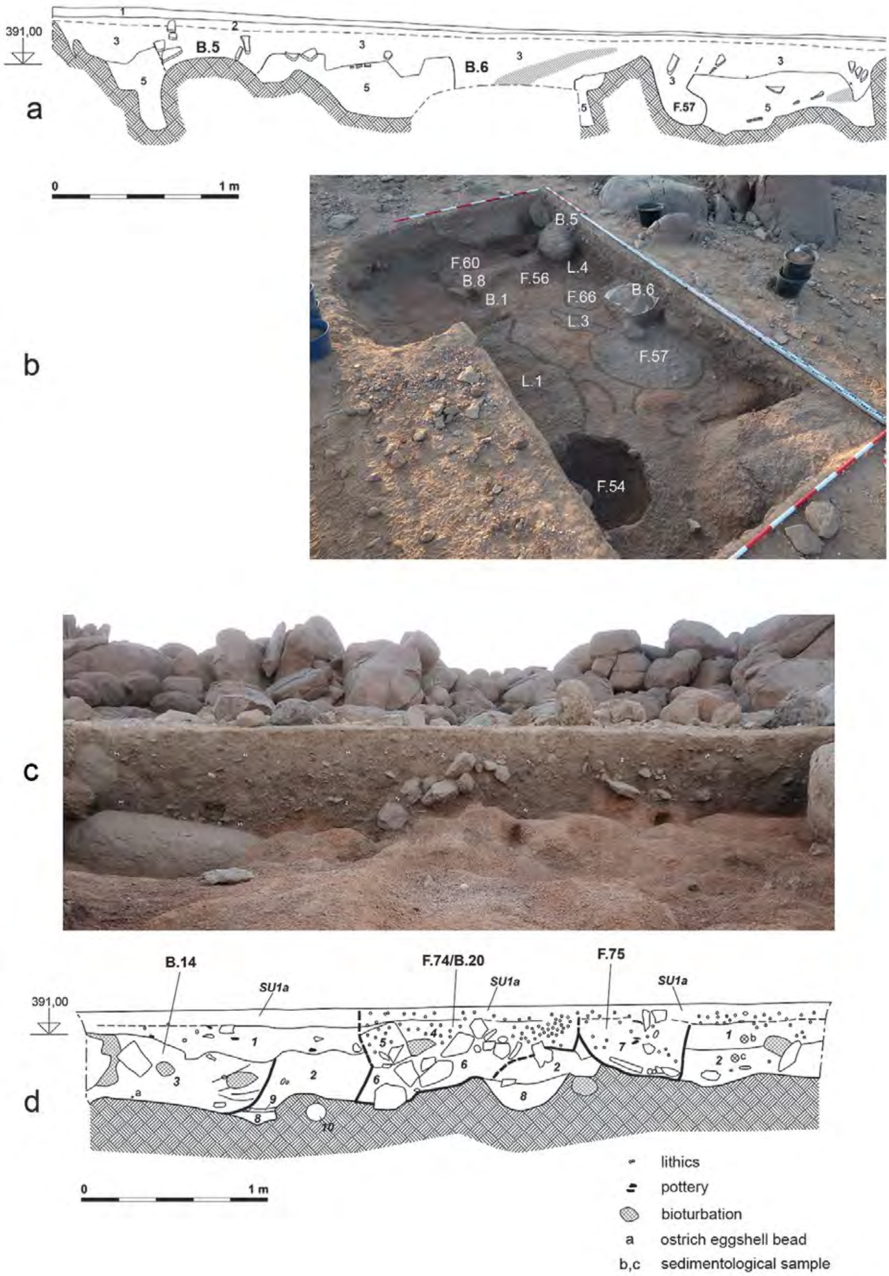

Fig. 3. Stratigraphy in Trenches 21 and 22: a – southern section of Trench 21 prior to excavation of B.5 and B.6; b – lower planum in Trench 21; c–d – eastern section of Trench 22. B = burial; F = feature; L = locus; SU = stratigraphic unit. Author: L. Varadzin.

– the area was re-occupied by Early Khartoum/Early Neolithic settlement. Mainly due to the absence of surface fixtures (such as pavements or floors), it is difficult to determine – only on the basis of the available stratigraphic data – whether the burial activities were contemporaneous with the settlement, or whether the use of the area for burying excluded simultaneous use of the same space for settlement; this issue should become clearer after chronometric cross-dating of the material from settlement and burial contexts.

In total, on Terrace 3 we recorded 26 primary inhumations *in situ* and 21 groups of loose bones since 2011. The state of preservation of the skeletal remains differed markedly. In Trenches 3+21, six burials (B.1–B.3, B.5, B.6 and B.8; Fig. 4a–4d) and two groups of loose bones (LB 1/2017 and LB 4/2017) were found. These finds concentrated in the eastern and southern parts of the trench (Fig. 3b), while the northern and western parts of Trench 21, on the contrary, showed no evidence of human burials at all. Many more remains come from Trench 22, where we recorded 20 burials (B.7, B.9–B.27) and 19 groups of loose bones (LB2, LB3, LB5–LB9, LB11–LB16 in 2017 and LB1–LB6 in 2018; Fig. 2). They occurred unequivocally in the highest densities in the western part of the trench, where superimpositions between burials and groups of loose bones, including frequent cases of interference, were also noted to be most frequent.

BURIAL RITE

Outlines of **burial pits** were clear only when they had been excavated into the eluvium. They were of oval or irregular shape that corresponded to the outer perimeter of the corpses (e.g., Figs. 2a, 4h) and they usually widened towards the terrain surface (Fig. 3a, 3d). The **grave constructions** could be assessed only in cases where rocks had been used (we lack direct evidence for use of organic materials; nevertheless, their presence is indicated by the taphonomical study of skeletons). Grave constructions using rocks (usually small- to medium-sized pieces of local granite, but also pieces of lithic artefacts, in particular cores, and upper and lower grinders) were noted with 16 out of 26 burials (62%) and also with several groups of loose bones. In the present state of knowledge, the following types of grave constructions can be tentatively defined. (1) **Stone lining**, both continuous and discontinuous, running along the perimeter of burial pits, were noted in three burials (12%) – B.10, B.26 and B.27. In two cases (B.26 and B.27), the stones were positioned directly over the peripheral parts of skeletons, which attests to their arrangement after the bodies had been deposited (Fig. 4h). (2) **One more or less compact layer of stones** covering the whole or a part of a burial was ascertained in four cases (15%), with the stones either touching the bones (B.9, B.13), or placed above the burial in a partly refilled burial pit (B.1, B.22; Fig. 4d – right).

Fig. 4. Varied types of burials and grave constructions uncovered in Trenches 21 and 22: a – stone pile over B.5, the arrow points to the fragment of a vessel shown in Fig. 4c; b – B.5 in a tightly contracted position achieved most likely through some kind of bandage; c – fragment of a globular vessel with a rim and Dotted Wavy Line decoration; d – a circular arrangement of granite cobbles, lithic artefacts and fragments of lower grinders above the upper part of B.8 (left) and larger stones covering B.1 (top right); e – B.6 with two shells of Nile bivalve (marked with arrows); f – burial of a child B.19; g – examples of stone beads found with B.19; h – burials B.22 (top), B.27 (centre) and B.26 (bottom) during exploration. Author: L. Varadzin.

(3) A flat **stone positioned directly on the head** was found in B.11; however, as the lower part of the body was disturbed by later burial activities, we cannot rule out that this stone was part of a more extensive cover; for this reason, it is not clear whether we can speak of a separate type of grave construction in this case. (4) A specific and very pronounced type of grave construction is represented by **stone piles**, e.g., elongated heaps consisting of several layers of stones reclining on one another and forming free-standing constructions. They were ascertained in the case of seven burials (27%) in which they rested directly on the skeletons – B.5 (F.67), B.12, B.20 (F.74), B.21 (F.76), B.23 (F.72), B.24 (F.71) and B.25 (F.73; Figs. 2a, 2b, 4a). Feature F.75 protruding from the eastern section of Trench 22 constitutes another example of such a pile (Figs. 2a, 3c, 3d,); for the time being no articulated human remains have been found in association with this feature – nevertheless, these may be located beyond the limits of the trench. (5) A **ring** made of granite cobbles, fragments of lower grinders and lithic artefacts was ascertained above the head and upper part of body of B.8 (Fig. 4d); however, we lack certainty as to whether to include this as a separate type, as it could also constitute the remains of a stone pile partly disturbed upon deposition of B.1 that entirely removed the lower part of B.8 (Fig. 4d).

The **position** of the bodies can be tentatively determined in 24 cases. Only one burial (4%) was in an extended position on its back – this is the case of B.20 which was found beneath stone pile F.74 that protruded from the eastern section of Trench 22 and of which no more than the almost complete lower limbs located within the trench could be recorded (Figs. 2a, 3c, 3d). In all the other cases (96%), the corpses were flexed, with six burials (26%) tightly contracted, e.g., in a position indicating possible use of wrapping or binding (B.2, B.5, B.7, B.13, B.23 and B.25; Figs. 2b, 4b).

The **type of deposition** can be ascertained with 21 individuals: four rested on their side (19%), four with their chest to the ground (19%) and 13 on their back (62%); nevertheless, it is probable that in some cases the latter two positions could have resulted from the secondary collapse of the trunks from a position lying on the side. Burial B.14 was positioned face down (Fig. 2a). Of the 21 ascertainable cases, 12 flexed burials had their legs turned to the left (57%) and nine to the right (43%). The position of the hands varied and ranged from a location in the pelvic area to a position in front of the face; in the case of B.27 (Fig. 4g), the right hand was placed beneath the head. In the **orientation of body** (determined with 27 individuals, including LB 12/2017), the quadrant between south and west clearly predominated (17 cases; 63%), with the segment between east and northeast representing the second most frequent orientation (six cases; 22%); the remaining five eighths of possible orientations were apparently marginal (four burials; 15%).

Apart from the above-mentioned burials, the site yielded also remains of essentially complete, but disarticulated individuals in what can be termed "**bundle burials**". So far, one such bundle of bones was identified in the western part of Trench 22 (LB 12/2017;

Fig. 2b). It was closely related to a primary inhumation (B.7), with which it also shared identical orientation; as there were no traces of interference between them, they may have been deposited into the same burial pit.

GRAVE-GOODS

Grave-goods, ascertained only with primary inhumations, were found with eight out of 26 individuals (31%). B.5 and B.6 were provided with two shells of Nile bivalves each – beneath the chin and on the neck in the case of B.5 (Fig. 4b) and in front of the face and beneath the skull with B.6 (Fig. 4e), and B.14 had one shell beneath the skull. A nearly complete lower grinder was placed with its active (concave) surface directly on the body of B.26 (Fig. 4h). Burial B.27 had one shell of Nile bivalve on the skull and several beads from ostrich eggshell around the head and in the neck area, while the right coxal bone rested on a lithic core, evidently placed into the grave intentionally. With B.16, about half of a large granite lower grinder was placed directly on the remains, again with its concave side downwards (Fig. 2b). Of especial interest is B.24 – in addition to the fact that this burial was one of those covered by stone piles, the individual was provided with a large piece of red ochre sandstone, several pieces of lithic artefacts, one upper grinder and a deposit of several bones of a large wild mammal placed over the burial inside the pit (Fig. 2a). Of importance from chronological point of view is the burial of a child B.19 (stratigraphically above B.27) found with 14 stone beads of red and dark-green colour (of red quartz and amazonite?; Fig. 4f, 4g); of these, one bead was found in the neck area close to the skull and another one by one of the femurs; the other pieces were obtained after sieving of the bottom of the burial pit. In their character, these beads fall likely within the Neolithic (e.g., Arkell 1953: Plate 41, 1–4). In the case of other burials, other artefacts, in particular lithic artefacts, were found in contact with the corpses; however, these were only rarely in positions that would indicate their intentional placement. As the burial ground was situated on the site of an earlier settlement, these artefacts may constitute mere accidental intrusions.

DATING

Chronometric dating of the burials is not available yet. At this moment, we can rely only on stratigraphic observations, grave-goods and some (so far not completely processed) finds in the fills of burial pits. Frequent superimpositions or interferences between burials and groups of loose bones bear witness to long-term use of the burial ground. The stratigraphic position of the burial ground between settlement deposits in the upper and lower parts of the trenches confines the period of its use to the period of the Early Khartoum culture and, at the latest, the Early Neolithic. The use of shells of Nile bivalves as grave-goods finds analogy at the Mesolithic burial ground at el-Barga (Honegger 2004: 28–29). More importantly, in the fill of the burial pit of B.5 (*c.* 25 cm above the skeleton), we found a larger fragment of a vessel decorated with Dotted Wavy Line motif (Fig. 4a, 4c) whose state of preservation (sharp fractures etc.) suggests a rather short interval between the production of the vessel and the burial. In sum, these facts point to the formation of this cemetery during the Early Khartoum period. The singular burial B.19 with stone beads, however, indicates that some burial activities might have taken place in this area also during the Neolithic. Nevertheless, there is no evidence for the presence at Fox Hill of richly equipped Early Neolithic burials such as those known from Kadero, el-Ghaba or Kadruka (e.g., Reinold 2001; Chłodnicki *et al.*, 2011; Salvatori *et al.*, 2016).

DISCUSSION

The above-mentioned findings are of preliminary character and therefore we limit ourselves at this moment only to a few considerations. Although more than one burial area from late prehistory may be situated at Fox Hill (see the burial(s) on Terrace 14), burial activities appear to have concentrated in particular on Terrace 3 that also yielded evidence of the most intensive Early Khartoum occupation within this site. The absence of burials in Trenches 17, 23 and 24 in the central and northern parts of Terrace 3 suggests that the burial ground may have occupied roughly the southern third of the terrace and that it was spatially rather coherent; also with a view to the geomorphology of Terrace 3, we estimate that the area occupied by the burial ground may have been approximately 550 m² (Fig. 1c). The marked density of burials with numerous superimpositions attests to its quite intensive and, at the same time, long-term use. Redeposition of bones from disturbed burials, in some cases along the perimeter of subsequent burials (e.g., B.17), suggests a pious regard towards the disturbed earlier remains; in any case these situations indicate a shared awareness that what had once been buried should stay in the ground. We believe that the common denominator of the comparatively varied types of grave constructions employing rocks (lining, covering, stone piles) was the endeavour to signal presence of burials beneath the level of the terrain (we do not rule out the existence of some kind of above-ground markers, but so far no such features have been ascertained) and thus to avoid destruction of earlier burials by later ones, which in other words means that the survivors anticipated future continuation of burial activities. In sum, these aspects allow us to designate this burial ground as a communal one.

In the burial rite, marked variability can be observed in deposition of the bodies, construction of the graves, and in the presence and character of the grave-goods; at present, a hint of regularity can be traced only in body orientations. Further research should clarify whether this lack of patterning is a sign of inconsistent mortuary customs, or rather a sum of diachronic changes of the burial habits that through gradual superimpositions at one place created what appears today as a somewhat chaotic situation, while in synchronic layers it had much more uniform character. However, in this rather complex situation, given also by the small size of the trenches, one can still observe some indications of inner structure of the burial ground. This is suggested by the existence of less frequented or quite empty tracts that imply division of the burial ground into enclaves of burials, and by the conspicuous accumulation of seven of the eight attested stone piles in the eastern part of Trenches 21 and 22 (Figs. 2a and 4a). The latter has an antipode in the opposite (western) part of Trench 22 which features an accumulation of human remains (also including at least one disarticulated bundle burial) with numerous cases of disturbance, where we recorded, and apparently not incidentally, a much lower frequency of marking of human remains by stones. Assuming that the placing of stones was connected with the protection of corpses, the stone piles then constitute its maximalist form. It was apparently an effective one, as none of the burials secured in this way was disturbed. This, however, necessarily raises the question of why this type of protection was afforded only to some individuals: did they enjoy a special status? Is it a signal of social differentiation within the given community? Only further field and laboratory research will allow this complex question to be addressed properly. Nevertheless, a positive answer is already now suggested by the unique burial B.24 beneath the stone pile F.71 (Fig. 2a).

Fox Hill constitutes one of the most significant sites in the western part of Jebel Sabaloka. With the size of its occupation area around 11,650 m² it surpasses several-fold all the other locations, including the site of Sphinx located only 4 km to the northeast, whose size equates to mere 8% of that of Fox Hill. After Sphinx, field research brought to light the existence of another large Early Khartoum hunter-gatherer burial ground in this area. In a number of respects this burial ground shows many similarities with that at Sphinx which is securely dated within the Early Khartoum culture (Varadzinová *et al.*, in prep.). These similarities include the lack of, at first sight, standardized rules for deposition of the deceased, intercutting of graves with frequent redeposition of bones, some of which bear signs of piety, the presence of clusters of burials separated by empty spaces, as well as several ways of using natural stones and stone artefacts to cover and mark human remains. However, there are clear differences as well, such as the presence of the stone piles at Fox Hill, for which there are no indications at Sphinx (or in published reports from elsewhere in Sudan), and the unequivocal use of grave-goods. Only further research will show to what extent this is the result of the only partial chronological overlap of the two cemeteries. Nevertheless, of greater importance is the fact that, after Sphinx, Fox Hill constitutes the second site where we find apparently very significant co-occurrence of two elements – a long-term and intensive occupation by Early Khartoum hunter-gatherers and, at the same time, an Early Khartoum communal burial ground. The settlements were provided with cemeteries in which an emphasis was put on the relation to ancestors, on intergenerational continuity and – no doubt – on social memory. These must have played a significant role in the formation of collective identity and in the social stabilisation of the respective human groups.

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REFERENCES

Arkell, A. J. 1953. *Shaheinab. An Account of the Excavation of a Neolithic Occupation site carried out for the Sudan Antiquities Service in 1949–50*. London.

Chłodnicki, M., Kobusiewicz, M. and Kroeper, K. (eds). 2011. *Kadero. The Lech Krzyżaniak Excavations in the Sudan*. Poznań. Studies in African Archaeology 10.

Honegger, M. 2004. Settlement and cemeteries of the Mesolithic and Early Neolithic at el-Barga. *Sudan & Nubia* 8: 27–32.

Reinold, J. 2001. Kadruka and the Neolithic in the Northern Dongola Reach. *Sudan & Nubia* 5: 2–10.

Salvatori, S., Usai, D. and Lecointe, Y. (eds). 2016. *Ghaba. An Early Neolithic Cemetery in Central Sudan*. Frankfurt am Main.

Suková, L. and Varadzin, L. 2012. Preliminary report on the exploration of Jebel Sabaloka (West Bank), 2009–2012. *Sudan & Nubia* 16: 118–131.

Varadzinová, L. and Varadzin, L. 2017. Exploration of the site of Sphinx (SBK.W-60): findings of the 2014 and 2015 field seasons. *Sudan & Nubia* 21: 23–33, 48–49.

Varadzinová, L., Varadzin, L., Kapustka, K. and Pacina, J. 2018. Výzkum lokality Liščí kopec (SBK.W-20) v pohoří Sabaloka: poznatky z výzkumné sezóny 2017. *Pražské egyptologické studie* 20: 35–45.

Varadzinová, L., Varadzin, L., Crevecoeur, I., Kapustka, K., McCool, J.-P. and Sůvová, Z. 2019. Výzkum pravěkého osídlení v pohoří Sabaloka v centrálním Súdánu: poznatky z výzkumné sezóny 2018. *Pražské egyptologické studie* 22: 43–53.

Varadzinová, L., Varadzin, L., Ambrose, S. H., Crevecoeur, I., Havelková, P., Juřičková, L., Kapustka, K., Pacina, J., Pokorný, P., Řídký, J. and Wang, H. in prep. The early Holocene funerary behaviour in central Sudan.

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Neolithic Inhabitants of Khor Shambat 1, Sudan

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Ever since Arkell launched research excavation in Shaheinab, many Neolithic sites of varying scientific value have been discovered in Central Sudan. These discoveries included both sites and cemeteries that shed some light not only on the economy, but also on the social structure and beliefs of ancient populations. Sites such as Kadero, el-Geili, el-Ghaba, Shaqadud and el-Kadada have become benchmarks for describing and understanding the Neolithic in Central Sudan. In recent years, another exceptional site has joined this group – Khor Shambat 1 (KSH 1). Research here has revealed a Mesolithic and Neolithic site. The investigation of about 1% of the area of KSH 1 uncovered 66 graves, including about 30 Neolithic ones. Yet this relatively low number of occurrences included burials which shed a very interesting light on the local communities. Especially noteworthy is the extraordinary approach to burials of children and in particular the youngest members of the community, newborns and fetuses; their graves are by far the richest. Some of them were buried in ceramic vessels and equipped with numerous gifts. The most distinctive grave in terms of the wealth of its burial goods is that of a female who died in advanced pregnancy. The chronology of the Neolithic site and cemetery, determined on the basis of a series of radiocarbon dates and ceramics analyses, is generally set in the second half of the 5th millennium BC.

KEY-WORDS: Khor Shambat, Central Sudan, Omdurman, Neolithic, Cemetery, Graves

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INTRODUCTION

The KSH 1 site, situated in Omdurman on the west bank of the Nile (Fig. 1) has been known for only a few years.[1] The first survey excavation was conducted here in December 2012, with a focus on the southern part of the site. The work allowed researchers to assess its potential, especially with regards to Neolithic settlement and the associated cemetery (Bobrowski *et al.*, 2016). Research work was reinstated in 2016 within the scope of the National Science Centre Poland project[2] under Grant number 2015/17/D/HS3/01492.

The research significantly enhanced our knowledge about KSH 1 and brought about the discovery of a sophisticated stratigraphy which extends over 3500 years and goes back as far as the Early Mesolithic. To date, a surface area of around 150 m² has been examined.

KHOR SHAMBAT 1 – THE SITE

Khor Shambat[3] 1 is located on the 384 m a.s.l. contour line (around 5 m above the current maximum overflow level of the river), covers an area of approximately 1.5 ha (Fig. 2) and is bordered to the south and north by two small gorges. The mound-like site is located on a small hill made of limestone; on it lies a layer of heavily eroded iron mudstone, which makes up the natural substrate under the site. This layer is covered in turn by layers made up predominantly of silty sands, probably of aeolian origin, the thickness of which reaches over 1.50 m in the central part of the site. These layers revealed a stratigraphic sequence and consist of Mesolithic (approx. 1.50–0.90 m below the recent surface) and Neolithic (above) cultural layers. All this is covered by a contemporary gravel midden 0.10 to 0.30 m thick, which also contains mixed prehistoric material. Unfortunately, a significant part of the site, mainly the Neolithic deposit, was destroyed by Meroitic and Post-Meroitic disturbances (cemeteries), as well as animal activity. Nearly half of the area of the site has also been destroyed by modern economic and residential activity.

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1 The site was discovered in 2012, during the intervention of the Sudanese National Corporation for Antiquities and Museums (NCAM), conducted by Mahmoud Suleiman al Bashir. The first rescue excavation was conducted by a team from the Institute of Archaeology and Ethnology of the Polish Academy of Sciences. The project was conducted on behalf of the Polish Centre of Mediterranean Archaeology of the University of Warsaw.

2 The project was entitled: *A new perspective on prehistoric societies of the Early and Middle Holocene in Central Sudan in the view of interdisciplinary research studies*.

3 The name of the locality is derived from Khor Shambat – a large wadi stretching from the west to the Nile, around 1.2 km north of the archaeological research site.

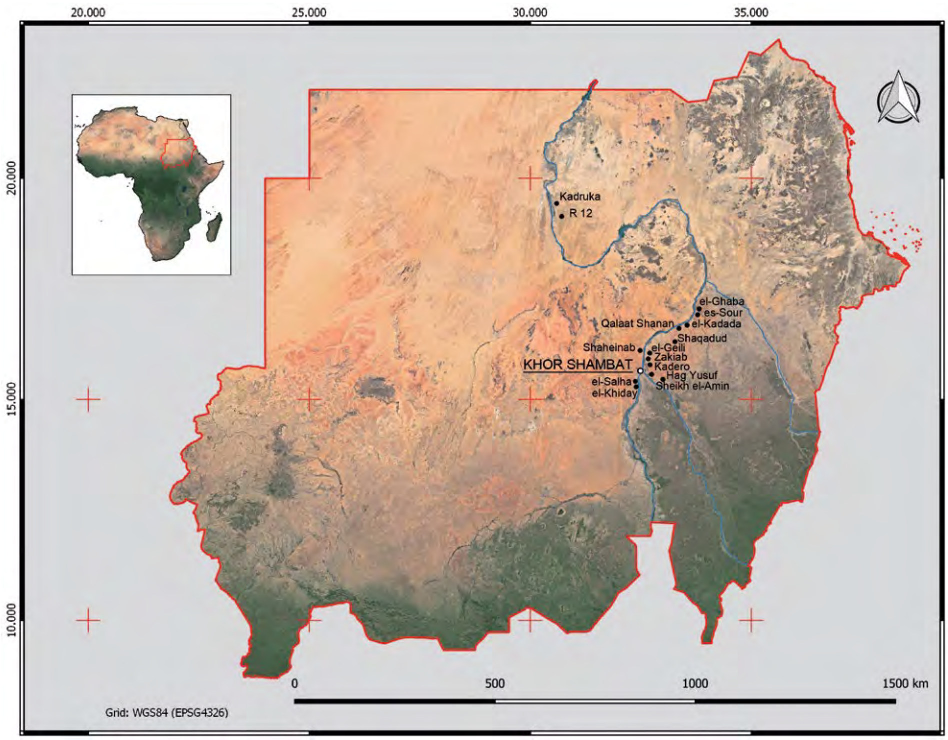

Fig. 1. Map of Sudan featuring Khor Shambat and other sites mentioned in the text. Drawn: P. Wiktorowicz and M. Jórdeczka.

CHRONOLOGY OF THE SITE

The archaeological material collected during the research, the pottery in particular, allowed us to define the chronology of the settlement at KSH 1 in the period between the Early Mesolithic and Late Neolithic. This has been confirmed by a series of radiocarbon dates, which fall within the range of 7000–3200 cal BC.[4] As mentioned above, the site also contains remains left by later (Meroitic and Post-Meroitic) cemeteries, yet there are no traces of settlement from these periods.

Most of the Neolithic ceramics from Khor Shambat share features common for the Early Neolithic in Central Sudan. Only a few fragments found in the upper layers

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4 The oldest Mesolithic date come from the Feature 14 – 7950±40 BP; 7027–6756 cal BC at 1 σ (Poz-103040).

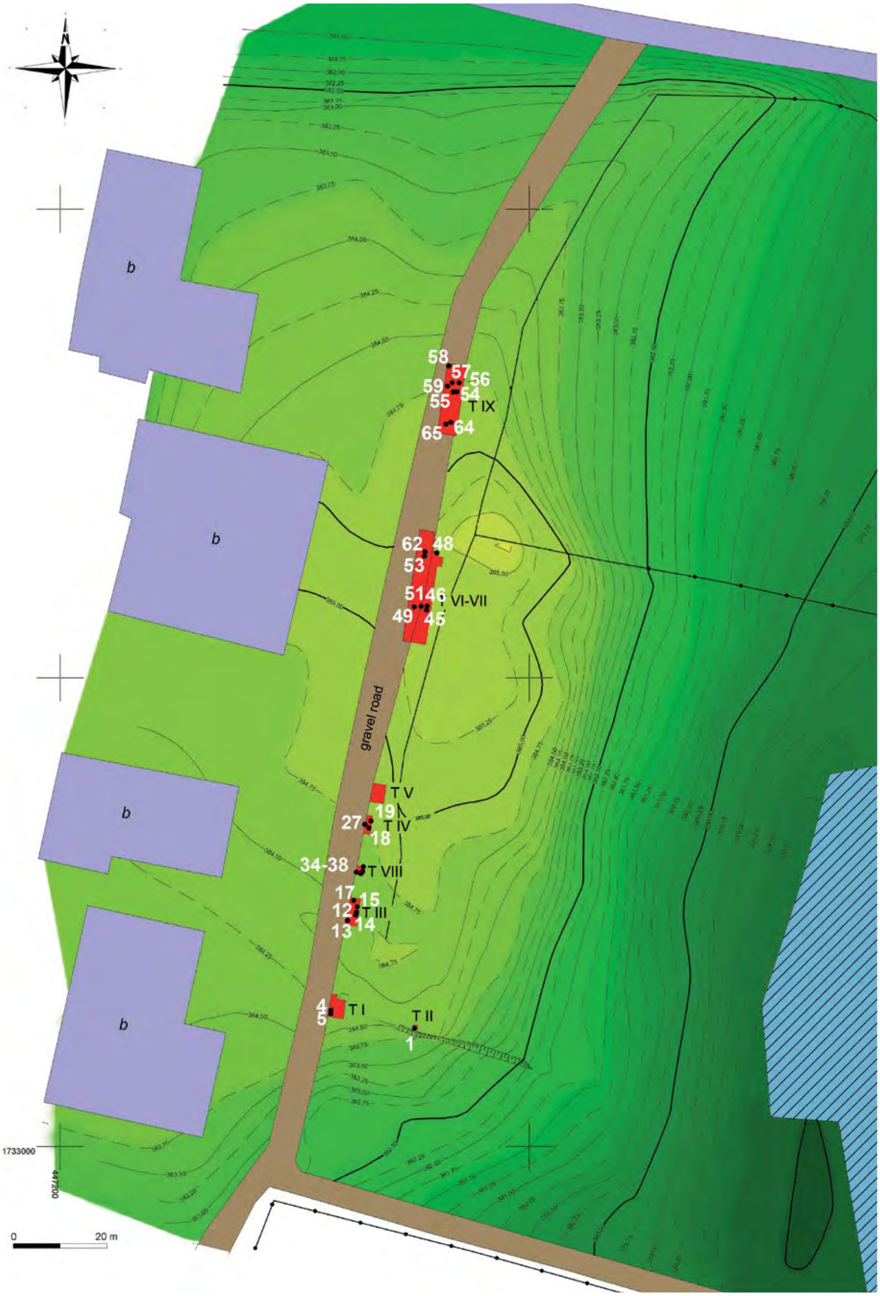

Fig. 2. Map of Khor Shambat showing location of Trench VIII.
Drawn: P. Wiktorowicz and M. Jórdeczka.

of the site are characteristic for the late phase of the Neolithic (burnished pottery, delicately shaped vessel necks, edge shaped into an external lip with a zigzag decoration).

In general, the set of vessel decorations observed at Khor Shambat does not significantly differ from the decoration known from other Neolithic sites in Central Sudan (horizontal parallel incised lines, concentric incised semicircles, dotted zigzag, rocker stamp with uneven edge). We mainly see differences in the proportions of the occurrence of individual decorative motifs or the percentage of undecorated ceramics. We can find analogies at sites such as Sheikh el-Amin on the Blue Nile (Fernandez *et al.*, 2003), Kadero (Krzyżaniak 1984), El-Geili (Caneva 1988), esh-Shaheinab (Arkell 1953), el-Ghaba (Lecointe 1997; Salvatori *et al.*, 2016) or es-Sour (Sadig 2008). It seems that the ceramics at Khor Shambat represent all the phases of the Neolithic. Further separation of data according the layers will make possible to estimate the frequency of each type of pottery. Yet this could prove to be a difficult task for the Neolithic at Khor Shambat, due to the many post-deposit disruptions (Mesolithic layers are better preserved here).

It was only in five Neolithic graves that we were able to record ceramics that were without a doubt a part of the burial goods and thus could be a basis for the definition of the chronology. Dating based on ceramics is not, of course, very accurate, but with all probability, the site's chronology falls within the period between 4400 and 4100 BC. The determination quoted above regarding the chronology of the Neolithic settlement and cemetery is reflected in eight radiocarbon dates (Fig. 3). They originate from Feature 1 and graves 6, 13, 38, 46, 51 and 62. Unfortunately, due to the lack of collagen, we were not able to perform dating directly from human bones. They samples dated were mostly obtained from charcoal found in the burial pits (in the case of grave 51, it was found in a vessel); in two cases (graves 13 and 38), these were *Chambardia rubens* shells which constituted the burial goods. The issue here lays in the fact that the reservoir effect needs to be considered and as a result, the determination of the age of the sample is heavily burdened by a margin of error which may reach several hundred years (see Moreton *et al.*, 2004; Kabaciński 2011; Philippsen 2013; Stein *et al.*, 2013; Jórdeczka *et al.*, 2020).

THE CEMETERY

The Neolithic inhabitants of Khor Shambat buried their dead within the site (Fig. 2). Although the state of research does not allow us to fully assess the spatial organization and the extent of the cemetery, especially in the eastern and western part of the site (damaged and built over by contemporary buildings), along the N–S line we can find graves extending across the entire area of the Neolithic site.

To date, we have investigated 66 graves of varied chronology – the oldest two are associated with Mesolithic settlement, and the latest with the Post-Meroitic activity. Looking at the overall numbers, nearly half of the graves are probable and certain Neolithic burials (within which we can define five of them as such with a certain degree of probability). An issue here is the lack of burial goods and the state of preservation of part of the burials, which have been destroyed as a result of the effects of post-deposit processes.

It is true that a large part of the Neolithic site and cemetery had been affected by heavy erosion, yet the greatest damage, aside from the modern activity mentioned earlier, was done by Post-Meroitic communities, who had chosen the hill in Khor Shambat as the place where they would bury their dead. This commonly encountered practice of building tumulus graves on culminations has led to substantial damage at many prehistoric sites situated on such terrain (see Salvatori 2012: 406–408). Therefore, finding a stratified site dated in the Early or Middle Holocene in Central Sudan is very difficult.

Part of the graves have already been presented in a report describing the research conducted in 2012 (Bobrowski *et al.*, 2016), while four pot burials appeared in a separate detailed publication (Jórdeczka *et al.*, 2020) along with the burial of male who had a trepanation of the skull performed.

Neolithic graves appear on different levels, anywhere from 20–30 cm below the current surface (in the southern part of the site) to depths exceeding 1.5 m in the middle section. Best preserved were the burials at greater depths, often set in sterile earth of eroded iron-rich sandstone. In these cases, we can clearly observe an oval pit, with a diameter within the range of 0.6 m to 1.0 m (Fig. 4). It is much more difficult to distinguish the shape of grave pits set only in silty-sand cultural layers. In this case, we are dealing with relatively shallow oval pits with diameters of 0.7 m to 1.1 m.

It is difficult to assess whether there is an association between the depth of graves and their chronology, mainly due to the small number of radiocarbon dates and burials with grave offerings. We can only assume that the graves buried in the cultural layers are later than the layers themselves.

The deceased were buried in a flexed position, on the right (17) or left side (7), with the head directed most often W (10), rarely NW or SW, S or E (Fig. 4; Table 1). In one case (GR 13), the position of the skeleton may suggest that the deceased was buried in an undefined organic package (shroud).

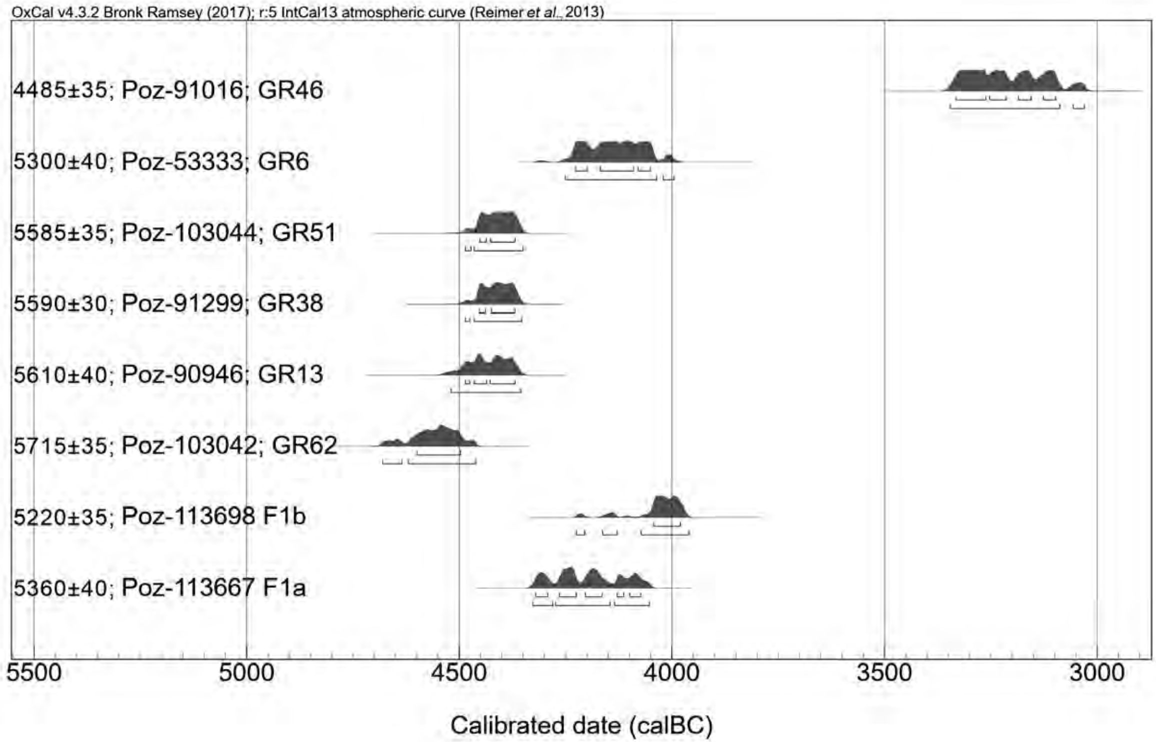

Fig. 3. Khor Shambat. Results of calibration of 14C dates related to the Neolithic graves and Feature 1 (Poznan Radiocarbon Laboratory).

Table 1. Khor Shambat 1. List of Neolithic graves.

No	Gr. no	Sex	Age	Type and orientation of grave / position	Pathologies / other observations	Class of furnishing and burial goods
1	1	M	*Adultus*	Grave pit: oval, shallow. Position: flexed, on right? side, Orientation: head towards S?	Signs of degenerative disease were observed in the cervical and upper thoracic spine as well as on the left first metatarsal. No non-metric traits could be observed in this individual.	I
2	4	M	*Adultus*	Grave pit: oval, partially destroyed by GR 5; Position: flexed, on left side; Orientation: NW–ES, head towards NW	The orbital displays strong vessel impressions potentially indicating an infectious process in the eye. Osteoarthritis was observed in the carpals of the right hand, the mandibular joint as well as the feet. The tibiae and ulnae display very strong muscle attachment sites. No non-metric traits could be observed in this individual.	I
3	5	M	*Adultus* (20–35)	Grave pit: oval, shallow (70 × 100 cm); Position: flexed, on right side, Ge; Orientation: W–E, head towards W	The second right metatarsal possibly displays a healed fracture. Squatting facets were observed on the right tibia.	II Barrel-shaped zeolite bead
4	6	–	*Infans* I (1–2)	Grave pit: Unidentifiable; Position: Flexed, on left side, Ge; Orientation: W–E, head towards W	–	I
5	12	F	*Adultus* (17–25)	Grave pit: oval, deep, around 70–100 cm. Position: Flexed, on right side Ge; Orientation: W–E, head towards W	Slight osteophyte formation is observed in the thoracic bodies and costal facets, but no signs of osteoarthritis. All other joints are in good condition. Squatting facets are present on the right talus and distal tibia. Slight dental calculus is present on the front teeth. The premolars display dental enamel hypoplasia.	II So-called lip plug made of rhyolite

No	Gr. no	Sex	Age	Type and orientation of grave / position	Pathologies / other observations	Class of furnishing and burial goods
6	13	M	*Senilis* (55–65)	Grave pit: oval, deep. Position: Flexed, on right side. Orientation: E–W, head towards W. Arrangement of the skeleton suggests that it has been deposited in an unspecified organic package (shroud)	Depressed alveolar process of mandible (paradontosis); dental caries within the molars; degenerative changes (senile) – bone infiltrations and defects, roughness; strong degenerative and overload changes within the vertebral column (osteophytes, Schmorl's nodes, flattening and bone defects in vertebral bodies, blocked L1-L5); degenerative-distorting lesions within the articular surfaces of phalanges and metacarpus (rheumatism?) The skull trepanation occurred on the left parietal bone near the central part of the sagittal suture.	II Shell of Nile mollusc *Chambardia spp.* placed on the temple, body covered with ochre
7	14	–	*Infans* I (4–5)	Grave pit: oval? Position: Flexed, on right side Ge. Orientation: W–E, head towards W	–	
8	15	M?	*Infans* II (7–8)	Grave pit: oval? Position: Flexed, on right side Ge. Orientation: W–E, head towards W, facing E	–	II 2 ostrich eggshell containers; 1 big fragment of pottery sherd
9	17	F	*Iuvenis* (16–18)	Grave pit: oval. Position: Flexed, on right side Ge. Orientation: NW–SE, head towards NW, facing S	–	I
10	18		*Infans* I (2–3)	Grave pit: oval. Position: Flexed, on right side Ge. Orientation: NE–SW, head towards S, facing E	On the parietal bone near the anterior fontanelle, an irregular bone defect with obliterated edges	III Ivory bracelet, 7 rock crystal beads, 1 amethyst bead, lamp of ochre

No	Gr. no	Sex	Age	Type and orientation of grave / position	Pathologies / other observations	Class of furnishing and burial goods
11	19	M	*Maturus* (40–50)	Grave pit: oval. Position: Flexed, on right side, Ge. Orientation: NW–SE, head towards NW, facing NE	Dental calculus (molar teeth); rectangular hole on the right parietal bone near the sagittal suture (injury?); round hole from the endocranium side on the left parietal bone near the sagittal suture (disease perforation?)	II Lamp of ochre
12	27		*Infans* II (6–7)	Grave pit: –. Position: Flexed, Ge?. Orientation: ?	–	I
13	34		*Phetus*	Pot burial	–	IV 5 ceramic bowls
14	35		*Phetus*	Pot burial	–	III 2 ceramic bowls
15	37		*Phetus*	Pot burial	–	IV Fragments of 6 ceramic bowls, 1 miniature vessel
16	38		*Infans* I (0–0,5)	Pot burial	–	IV 2 ceramic bowls, fragment (½) of ceramic vessel, necklace (10 bone beads, 15 eggshell beads), 4 Nile mollusc shells *Chambardia spp.*
17	45	M?	*Infans* II (7–9)	Grave pit: –. Position: Flexed, on left side, Ge?. Orientation: ?	–	I

No	Gr. no	Sex	Age	Type and orientation of grave / position	Pathologies / other observations	Class of furnishing and burial goods
18	48	F	*Maturus*	Grave pit: oval. Position: Flexed, on right side Ge. Orientation: NE–SW, head towards S, facing E	Distal phalanges of hands – changes on joint surfaces	I
19	49	F	*Maturus*	Grave pit: oval. Position: Flexed, on left side Ge. Orientation: ?	Dental calculus	I
20	51	F	*Maturus* (40–45)	Grave pit: oval. Position: Flexed, on right side Ge. Orientation: NE–SW, head towards S, facing E Fragments of a child's remains were identified near the pelvis, including 2 petrous parts of the temporal bone (late *fetus,* 7–9 months)	Lack of osteophytes on the vertebrae; distal phalanges of foot – distorted join surfaces; dental calculus.	IV 3 vessels, 2 Nile mollusc shells, shell pendant, ostrich eggshell beads, bone chisel
21	53		*Infans* I (2–3)	Grave pit: –. Position: –. Orientation: –	–	I
22	54	M	*Maturus* (35–45)	Grave pit: oval. Position: Flexed, on left side Ge. Orientation: N–S, head towards N, facing E	–	I
23	55	M	*Maturus* (40–50)	Grave pit: oval. Position: Flexed, on right side Ge. Orientation: E–W, head towards E, facing NW	*Cribra orbitalia*; bathrocephaly crosswise impacted mandibular tooth (M3, left); phalanges of hands – degenerative changes; dental calculus	I
24	56	?	*Infans* II (6–7)	Grave pit: oval. Position: Flexed, on left side Ge. Orientation: E–W, head towards W, facing N–W	–	I
25	57	F	*Maturus* (35–45)	Grave pit: oval. Position: Flexed, on right side Ge. Orientation: N–S, head towards N, facing S–W	gracile skeleton, small, ossified; dental calculus	I

No	Gr. no	Sex	Age	Type and orientation of grave / position	Pathologies / other observations	Class of furnishing and burial goods
26	58	?	*Adultus*/ *Maturus*	Grave pit: –. Position: Flexed, on right side G?. Orientation: E–W?, head towards W, facing ?	–	I
27	59	M	Early *Maturus*	Grave pit: –. Position: Flexed, on right side G?. Orientation: E–W?, head towards W, facing ?	on the left femoral shaft near the *linea aspera*, two hole marks	I
28	62		*Infans* I/II (6–7)	Grave pit: –. Position: Flexed, on right side G?. Orientation: E–W?, head towards W, facing S	–	I
29	64	M	*Adultus*	Grave pit: oval. Position: Flexed, on left side G?. Orientation: NW–ES head towards N, facing E?	Skeleton quite massive; lesions on the joint surfaces of the right and left kneecap	I
30	65	M?	*Adultus*/ *Maturus* (30–35)	Grave pit: oval. Position: Flexed, on right side Ge. Orientation: W–E; head towards W, facing SE	gracile skeleton, small; dental calculus	I
Late/Final Neolithic (?)						
31	46		*Infans* I (0–0,5)	Grave pit: –. Position: bones do not lie in the anatomical system. Orientation: ?	–	III 2 Nile mollusc shell, 139 ostrich eggshell beads

ANTHROPOLOGICAL ANALYSIS

The primary purpose of anthropological analysis was to estimate the number, sex and age of the deceased, reconstruct the *in vivo* height of the body, as well as macroscopically record any anatomical pathological changes that leave visible marks on the bones.[5] The skeletons were analyzed using generally accepted methods and anatomical descriptions of bone structure (cf. Ubelaker 1978; Bochenek and Reicher 1990; Buikstra and Ubelaker 1994; Bass 1995; Piontek 1999; Brickley and McKinley eds 2004; White and Folkens 2005). More detailed analysis was hindered by the generally poor condition of the material:

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5 The age at the time of death was determined based on a comprehensive (multi-feature) analysis of changes occurring in the formation of individual morphological features of the bone structure and teeth. Attention was paid in particular to the degree of obliteration of the skull sutures and the condition of the occlusal surfaces of the tooth crowns, while in the case of non-adult individuals, focus was placed on the order of eruption of individual teeth, the degree of bud formation, as well as the formation of the roots. Skeletal ossification, any degenerative changes in the skeletal system, the density of cancellous bone, the wall thickness of marrow cavity in the proximal epiphysis of long bones (*femur*, *humerus*) and changes occurring on the surface of the pubic symphysis and auricular surfaces (cf. Acsádi and Nemeskéri 1970; Lovejoy *et al.*, 1985; Brooks and Suchey 1990; Buikstra and Ubelaker 1994; Piontek 1999).

When determining the sex of the deceased, special attention was paid to metric and descriptive differential features in which dimorphism manifests itself to the greatest extent (referring above all to the bearing features of the skull and pelvis bones), in combination with the so-called general morphological impression (cf. Strzałko and Henneberg 1975; Malinowski and Wolański 1988; Buikstra and Ubelaker 1994). At times researchers made use of metric measurements of the thickness and/or diameter of individual bones of the postcranial skeleton and skull, as well as analysed their mass.

All metric measurements were conducted directly at the site (*in situ*) due to the generally poor condition of the bones, which in did not allow for the same activities to be repeated later. After excavation, the material was strongly fragmented in most cases, which made even the clear identification of individual bones difficult. The presence of an anthropologist at the Khor Shambat site therefore seems indispensable.

A few measurements of metric traits of skeletons were conducted in accordance with the principles of the so-called Martin's technique (Martin and Saller 1957). However, the selection was limited by the condition of the material and the current research needs. Particular focus was placed on the registration of certain craniometric features, as well as on measurements useful for estimating body height. A few non-metric (epigenetic) traits were distinguished using diagrams proposed by A. Czarnetzki (1972).

Reconstruction of the live body height of the bodies of the dead was based on diagrams using comprehensive long bone length measurements (Trotter and Gleser 1952), whereas in the case of incomplete (fragmented) materials, the relationship between the size of the pedicles of certain long bones (*femur*) and their length was considered, using conversion diagrams developed for this purpose by anthropologists from Poznan (cf. Strzałko *et al.,* 1972: 285).

The analysis of pathological changes was difficult due to the poor condition of the skeletons (abundant *post mortem* damage, poor degree of fossilization and missing bone parts). The classification of individual diseases and injuries was based on the experiments and diagrams of numerous researchers (Gładykowska-Rzeczycka 1976; 1989; 1994; Ortner and Putschar 1981; Buikstra and Ubelaker 1994; Bass 1995; Ortner 2003).

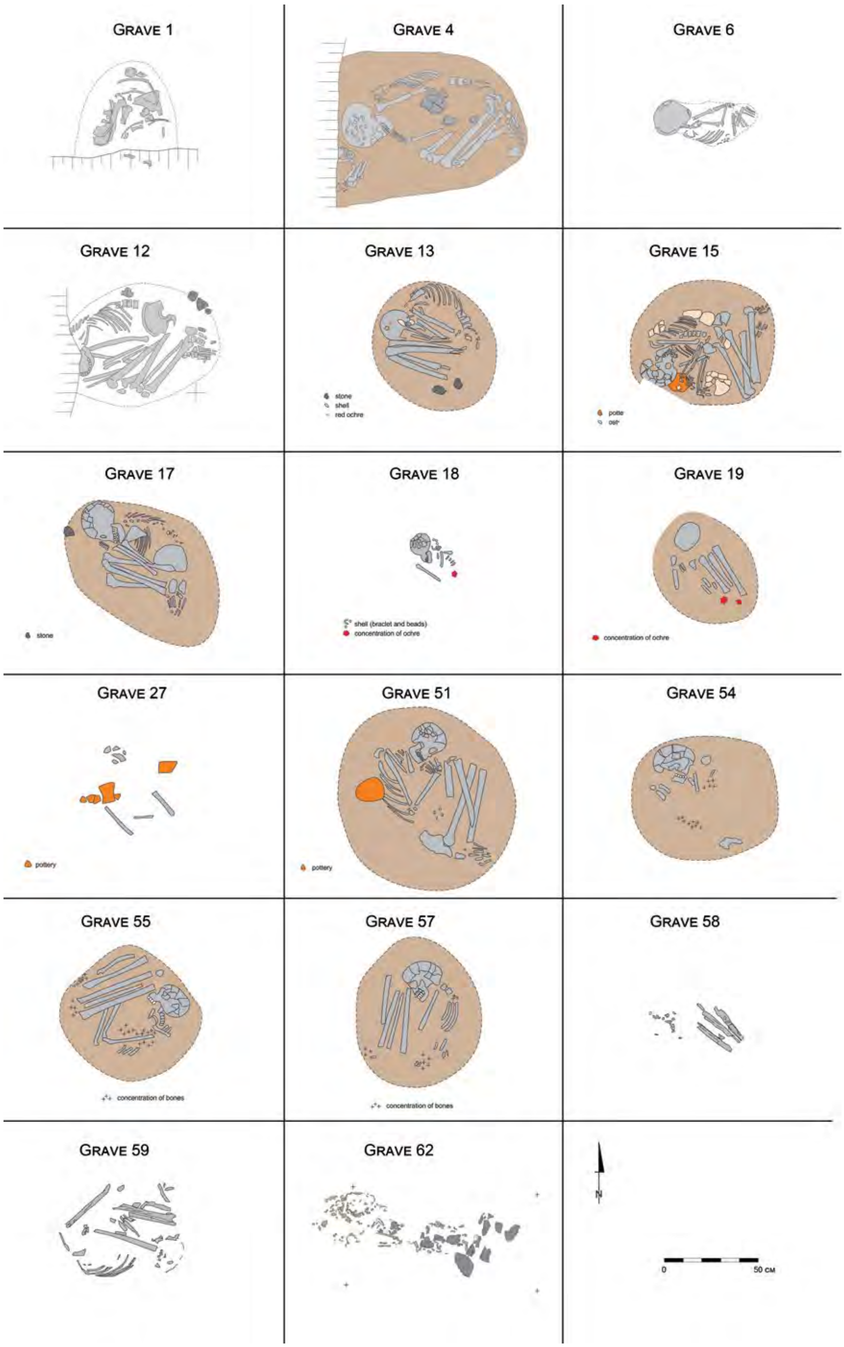

Fig. 4. Examples of Neolithic graves. Drawn: M. Jórdeczka and K. Mugaj.

fragmentation, missing bones, high fragility associated with a generally poor degree of fossilization and contact with the sun and air during exploration.

In the total number of 30 graves associated with high certainty with the early Neolithic, 17 are graves of adults (*Adultus*, *Maturus* and *Senilis*) including 5 female and 10 male, while in two of the cases it was not possible to determine the sex. The oldest individual was a male buried in Grave 13, who lived to around the age of approx. 55–65 years. One of the women died at the age of *Iuvenis* (16–18). Children's burials constituted over 43% of the graves examined (13), whereby three of the graves were burials of fetuses in vessels (Jórdeczka *et al.*, 2020); children at the age of *Infans* I (no older than 6 years) were buried in 5 graves (including one pot grave – Jórdeczka *et al.*, 2020), and the following 5 are burials of children aged *Infans* II (older than 6 years).

The poor condition of the skeletons hinders the observation of pathological changes (details in Table 1), and consequently makes it difficult to draw more detailed conclusions on matters concerning health or living conditions. However, it is worth noting a few of them, such as the discovery of osteoarthritis in the joints of the spine and postcranial skeleton which manifests itself through pitting and eburnation on the joints (Rogers and Waldron 1995) and provides important information on the activity of the studied population. One of the most frequently observed pathologies in adult skeletons is *cribra orbitalia.* Porotic hyperostosis is a pathological condition that affects bones of the cranial vault, and is characterized by localized areas of spongy or porous bone tissue. It can be a determinant of many diseases associated with iron-deficiency anemia (Stuart-Macadam 1991), as well as a deficiency of a specific ingredient in the diet (e.g., vitamins B9 and B12; Zarifa *et al.*, 2016). Lesions in the orbital roof may have been caused by an eye infection (Wapler *et al.*, 2004). *Cribra orbitalia* could also be the result of malaria (Fairgrieve and Molto 2000; Smith-Guzmán 2015).

In a few cases, researchers were able to observe rheumatic (degenerative) changes in the joint surfaces of the phalanges of the feet and hands (e.g., GR 51, 55) or patella (GR 64), as well as diseases of the spine associated with the degenerative process that would have developed with age. Overload pathologies (flattening of vertebral bodies, Schmorl's nodes) were also observed.

Dental analyses also provide valuable information on eating habits, occupational habits, as well as general hygiene and health. Calculus was often detected on the teeth of the deceased buried in Khor Shambat. Analyses of dental plaque were performed at the Prehistory Department of the Autonomous University of Barcelona. The dental calculus results indicate the consumption of grasses, including panicoids that were also noted in the groundstone assemblages, in addition to other plant foods such as edible wild fruits that were presumably consumed as well (additional information will be provided in a separate article to be published in 2020).

Among the burials of adults, the grave of a male in the age of *senilis* (GR 13) is of particular importance. On his skull, researchers observed one of the oldest cases of therapeutic or magical trepanation in North East Africa. Special photographic documentation (macroscopic observation), binocular as well as X-ray (RTG) photographs were made for specialist studies related to craniotomy surgery, facilitating the qualitative assessment and interpretation of the find (under study). The skull trepanation occurred on the left parietal bone near the central part of the sagittal suture. On the bone margin of the trepanation hole, slight traces of healing were visible which suggests that the operation could have been unsuccessful. A shell of a Nile mussel was placed on his temple, and the body was covered with ochre.

A case observed in grave 51 was an exceptional discovery (Fig. 5); here a mature female (40–45 years) was buried with her unborn child (the fetus was about 7–9 months old) in the womb (fragments of the child's remains were identified in the pelvic area, including 2 petrous parts of the temporal bones).[6] Death during childbirth was probably a common case in the past,[7] but one very rarely documented by archaeologists. Only about 20 such cases have been published in literature to date (e.g., Hawkes and Wells 1975; Wells 1978; Owsley and Bradtmiller 1983; Pounder *et al.*, 1983; Persson and Persson 1984; Malgosa *et al.*, 2004; Rascon Perez *et al.*, 2007; Cruz and Codinha 2010; Willis and Oxenham 2013), and one of the oldest is the grave at the Lokomotiv cemetery in southern Siberia; its age is estimated at 7000 to 8000 years (Liverse *et al.*, 2015), while the majority of known cases are much younger. A lack of osteophytes on the vertebrae, distorted join surfaces on the distal phalanges of foot, as well as dental calculus was observed on the skeleton of the mother. This grave was also among the best furnished at the Neolithic cemetery (more details follow below).

Genetic testing samples were also taken from all skeletons for which this was possible based on their condition of preservation. Efforts were made to take samples of undamaged teeth, or when that was not possible, fragments of long bone shafts and petrous parts of the temporal bones. These efforts were limited each time by the condition of bone material and teeth which was not always satisfactory. Unfortunately, researchers were unable to obtain any good nuclear DNA from any sample; however in a few cases attempts will be made to obtain mitochondrial genomes.

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6 The burial of a female in advanced pregnancy is also known from recent research in Kom Ombo, but it is dated at around 3700 years (https://www.nationalgeographic.com/culture/2018/11/ancient-egypt-pregnant-woman-burial-archaeology/).

7 An example is the study of pre-Columbian female mummies from Chile, which showed that about 14% of women of childbearing age died due to perinatal complications, while only 17% were not able to bear children at all (Arriaza *et al.*, 1988; Liverse *et al.*, 2015).

Fig. 5. Grave 51. Photo: M. Jórdeczka.

BURIAL GOODS

The quality of burial goods in Neolithic graves in Khor Shambat is worth noting. At the burial site of Khor Shambat, 40% of all Neolithic inhumations contained offerings. However, if we consider only the graves of adults, this proportion falls to less than 30%, with the majority being single grave gifts (Class II).[8]

The adult female in GR 2 was buried with a rhyolite stud/lip plug which has a rarely seen hourglass-shaped longitudinal section (Bobrowski *et al.*, 2016: 461). The adult male burial from GR 5 was provided with a small (15 × 8 mm) barrel-shape bead made of zeolite (Bobrowski *et al.*, 2016: 461) and Nile molluscs shell *Chambardia spp*. was found on the temple of the skull of a *senilis* male from GR 13 (his body was covered with ochre; Fig. 6). This type of shell had arguably been of exceptional meaning to communities at the time and were observed at many Neolithic sites as well and not only in the territory of Sudan and Egypt (Bar-Yosef 2002; Krzyżaniak 2011; Gautier and Van Neer 2011; van den Brink *et al.*, 2015). A single lamp of ochre was found in a *maturus* male grave (GR 19).

The above-mentioned burial of a female who died in advanced pregnancy (GR 51; Fig. 5) had an exceptional group of burial equipment. Her grave contained three ceramic vessels: an egg-shaped, deep bowl with a straight edge, red slip burnished vertically outside; a fragment of an undecorated bowl with a simple edge, burnished, originally covered with a red slip; and fragments of an almost complete, large bowl with a simple edge. In the latter case, the outer surface was brown, covered with a dense zigzag dashed line, the fracture was dark brown with a grey core. Fragments of this vessel, found on the top of the grave pit, were used as a digger to dig the burial pit, as indicated by the smoothing on the edges of the fractures. In addition to the vessels, the grave also contained two Nile mussel shells, ostrich egg beads, a shell pendant and a bone chisel.[9] These exceptional burial goods may be related to the particularly special treatment of fetuses/children by the early Neolithic communities in Khor Shambat.

In the burials researched to date, 46% of the children, and 100% of fetuses have burial goods, and in every case these gifts are very rich (Class III and IV). The burials of fetuses from Khor Shambat are moreover in line with the tradition of burials in ceramic pots, known only from three other sites in Sudan in the Shendi Reach: es-Sour (Sadig 2008; 2012; 2014), el-Kadada (Geus 1984b; Reinold 2007) and Qalaat Shanan (Hamd 2012; 2015; Ahmed and Bakry 2017). This is one of the most widespread and at

8 Classification of graves on the basis of equipment: Class I – no furnishing; Class II – single offering; Class III – up to 3 offerings (pottery vessels of fine and/or utility ware, beads forming a necklace, bracelet, a sandstone palette, small lumps of ochre); Class IV – 3 and more pottery vessels, personal adornments and associated implements, tools (based on Krzyżaniak 2011).

9 Material under study. Additional information will be provided in a separate article to be published in 2020.

Fig. 6. Grave 13. Photo: M. Jórdeczka.

the same time, most intriguing funeral practices in prehistory, with its oldest examples dated to the end of the 7th and early 6th millennia BC (Streit 2016: 172) we can find this in the northern Levant (Bacvarov 2008). In Egypt, this tradition appeared much later, somewhere around 3500 BC (Power and Tristant 2016: 1476). Examples of burials in vessels known from Central Sudan are also older, reaching the second half of 5th millennium BC, which may indicate that either this burial practice emerged on a local level or that it had spread from the Levant on a route other than Egyptian. The pot burials in Khor Shambat (Gr 34, 35, 37, 38 – Fig. 7) were found next to a post-Meroitic grave in a trench with an area of 4 m² (Jórdeczka *et al.*, 2020). The vessel type ceramics as well as the radiocarbon date suggest a date of around 4400–4100 BC.

Also worth noting is the burial of a child aged 1–2 years (GR 18; Fig. 8), in which an irregular bone defect with obliterated edges was observed on the parietal bone, near the anterior fontanelle. Placed beneath his body was an ivory bracelet, about 67–72 mm in diameter, 29–31 mm wide and 3–4 mm thick. The burial goods of the grave also

Fig. 7. Trench VIII. Neolithic pot burials (and examples of the offering) and Post-Meroitic grave. Drawn and photo: M. Jórdeczka (see Jórdeczka *et al.*, 2020).

included seven very well-made beads made of rock crystal and 1 made of amethyst, all with fully polished surfaces. The diameters of the beads ranged from 5.27 to 5.72 mm and their height from 1.81 to 3.06 mm (amethyst). Holes drilled on both sides had a diameter of 1.56 to 1.84 mm.

On the other hand, two undecorated vessels made from ostrich egg shells were placed in the grave (GR 15; Fig. 9) of a child (probably a boy) aged *Infans* II (7–8 years

Fig. 8. Grave 18. Photo: M. Jórdeczka.

old). One of them was found between the thighs and forearms, while the other, broken, was near the child's back. Placed under the head was a large fragment of a vessel spout, which came from an open mould with a spout diameter of about 23 cm. The thickness of the walls was 6 mm. The spout was decorated with a grid pattern, while the belly did not have any traces of decoration.

As far as burial goods are concerned, the burial of a child (GR 46) who died at the age of *Infans* I (0–0.5 years) also deserves our attention. Unfortunately, it was badly damaged, and the bones were not found in anatomical order. In the poorly outlined small pit were found two Nile mussel shells *Chambardia spp.* and 139 beads from ostrich egg shells of varying diameter, ranging from 4.5 to 9.5 mm in diameter (Fig. 10). The date obtained from charcoal found in the pit suggests a later, Late Neolithic chronology, but the condition of the grave does not allow the determination of the connection of the charcoal with the burial (Fig. 3).

Fig. 9. Grave 15. Photo: M. Jórdeczka.

Fig. 10. Grave 46 – burial goods. Photo: M. Jórdeczka.

KHOR SHAMBAT IN CONTEXT

Studies of the Neolithic in Central Sudan already have a long tradition. Since the discoveries in Shaheinab (Arkell 1953), many Neolithic sites have been studied, although initially in the 1960s, the key activities of archaeologists were associated with the area affected by the construction of Aswan High Dam and directed to the north of Sudan, into the area of the Second Cataract (Shiner 1968a; 1968b; Nordström 1972). Once those studies were completed, some of the prehistorians moved south and started work in the Southern Dongola Reach area (Hays 1971; 1976; Marks and Ferring 1971; Marks *et al.*, 1986), as well as the Upper Atbara (Shiner ed. 1971) or in the east of Sudan (Fattovich and Piperno 1981). Archaeologists did not return to Central Sudan until the 1970s, which is when they discovered the first Neolithic cemeteries.

In 1972, L. Krzyżaniak began research on the Neolithic settlement and cemetery in Kadero situated on the east bank of the Nile. This cemetery, located about 13.5 km away from Khor Shambat in a straight line, is a perfect reference here. During excavations carried out systematically for nearly 30 years, 248 graves were examined, including 218 Neolithic ones (Krzyżaniak 1975; Chłodnicki *et al.*, eds 2011; Chłodnicki 2018). Based on radiocarbon dates, the chronology of the Neolithic groups are estimated to be in the range from 4600 cal BC (northern midden) and 3800 cal BC (southern midden; Chłodnicki and Kabaciński 2015). Only six dates originate directly from the graves. The oldest, Early Neolithic date 5565±35 BP – 4410±40 cal BC (Poz-4014; Kabaciński 2011: 418) was obtained from *Aspatharia* Sp. shells found in a rich grave of a child (GR 220) deceased at age *Infans* I (Krzyżaniak 2011: 181–182), while the youngest, associated with Terminal Neolithic, is 4150±30 BP – 2760±80 cal BC and originates from grave 243 (Kabaciński 2011: 417–418). At the cemetery in Kadero, 40.7% of graves contained burial goods, while the large amount of data enabled researchers to conduct a series of observations and distinguish four classes of burial goods. Observations made included the relationship between the type and number of burial goods, and the sex and age of those buried. The burial goods in women's graves were less diverse and more modest. On the other hand, the graves of men and babies (*Infans* I), though diversified (48% of men's graves had no burial goods), in general had considerably richer and more diverse burial goods. In addition to ceramics and beads (being the main group of burial goods in women's graves), these graves had mace heads, palettes, stone tools or bracelets made of ivory and hippopotamus bones. Worth noting, however, are two graves in which mother and child were buried (GR 97 and 113), and which also had very rich burial goods (Krzyżaniak 2011: 126–129). What is interesting is that the offerings observed in the graves of older children (*Infans* II) were not rich, while the graves of juveniles did not have any offerings at all. Based on this information, L. Krzyżaniak proposed theories about the possible social diversity of the population living in the Neolithic settlement in Kadero, and emphasized that the richest graves are located in the central part of the site, regardless of chronology (both in the Early Neolithic and the beginning of the Late Neolithic – Krzyżaniak 1992).

Interesting observations were made at the cemetery in el-Ghaba (Geus 1984a; 1984b) discovered in 1977, where a total of 265 Neolithic graves were studied during three excavation seasons (1980, 1985 and 1986). Unfortunately, the lack of a physical anthropologist during the research resulted in the loss of some information, especially regarding the age, sex and live body condition of the buried (Salvatori *et al.*, 2016: 6), which is crucial when trying to reconstruct the spatial distribution of graves and social aspects of the studied populations. Fortunately, it was possible to observe stratigraphic relationships between individual groups of graves. Undoubtedly, this cemetery provided some very important information which proved useful for the reconstruction of the Neolithic process in Central Sudan. Along with data from the R12 site, a new image was obtained showing the utilization of Near Eastern cultigens (emmer wheat and barley) and the collection and/or cultivation of millet already in the second half of the 6th millennium BC (Salvatori and Usai 2016: 121).

Khor Shambat 1 gives us the rare opportunity to observe changes occurring between Mesolithic and Neolithic communities. Alongside economic changes, the Neolithic brought many major ideological changes that are reflected in funeral practices. What is also important is that we are probably dealing with nearly continuous occupation at KSH 1 lasting from the beginning of the 7th millennium BC up to the mid-4th millennium BC. This gives us the opportunity to learn about the changes that took place at the end of the Mesolithic period, e.g., at the turn of the 6th and 5th millennium BC. Data originating from sites such as Sarurab I (Mohamed-Ali and Khabir 2003: 41), El Qala'a and Kabbashi A (Caneva *et al.*, 1993) and more recently 10-W-4 on the White Nile (Salvatori *et al.*, 2011) shows that hunter/fisher/gatherer communities still lived in Central Sudan at the end of the 6th millennium BC, and in the Khartoum region also during first half of the 5th millennium BC.

In contrast to northern Sudan, where the process of Neolithization occurred earlier and probably lasted nearly 2000 years, in Central Sudan we are dealing with a rather sudden change. The question is how did this happen? Is this related to the migration of the Neolithic population to the south and eviction of Mesolithic people (Fernandez *et al.*, 2003), and a gradual expansion along the Nile associated with climate change? But was assimilation and the adoption of a new type of economy by hunter-gatherers possible? There is also the unanswered question of why in the area of el Barga (Honneger 2004; 2005) are we seeing a hiatus spanning more than 500 years that separates Mesolithic and Neolithic settlement. Studies on oral bacterial divergence performed at the el-Khiday cemetery (Salvatori and Usai 2016: 124) showed that the Neolithic population was associated with the Mesolithic diet. On the other hand, studies of plaque showed that they consumed domesticated plants (Buckley *et al.*, 2014), which is confirmed by the preliminary results of research carried out by K. Hardy on Neolithic samples from Khor Shambat. This however, still does not provide us with an answer regarding the mechanisms of these changes. Perhaps wide-ranging strontium isotope analysis and genetic testing would help, though in the latter case, it is unlikely that DNA could be extracted from bone, as the tests done at Khor Shambat have shown.

Given how large, expansive (in terms of a new economy, ceramics, decorations, bone and stone tools, ideological changes…) and rapid this change was, we can assume that it was associated with migration. As suggested by Salvatori and Usai (2016), the Neolithization of Central Sudan was the result of a diffusion that transferred the entire Neolithic package at the same time. Yet there is still one question that we do not yet know the answer to: what happened to the Mesolithic population?

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REFERENCES

Acsádi, G. and Nemeskéri, J. 1970. *History of Human Life Span and Mortality*. Budapest, Akadémiai Kiadó.

Ahmed, M. A. M. and Bakry, A. 2017. Prehistoric Child Burials in Sudan. *Der Antike Sudan. Mitteilungen der Sudanarchäologischen Gesellschaft zu Berlin e. V* 28: 47–68.

Arkell, A. J. 1953. *Shaheinab. An account of the excavation of a Neolithic occupation site carried out for the Sudan Antiquities Service in 1949–50*. Oxford University Press.

Arriaza, B., Allison, M. and Gerszten, E. 1988. Maternal mortality in pre-Columbian Indians of Arica, Chile. *American Journal of Physical Anthropology* 77: 35–41.

Bacvarov, K. 2008. A long way to the West: earliest jar burials in southeast Europe and the Near East. In K. Bacvarov (ed.), *Babies Reborn: Infant/Child Burials in Pre- and Protohistory, Proceedings of WS26 at the XVth UISPP Congress in Lisbon, September 2006*, 61–70. Oxford, Archaeopress. British Archaeological Research International Series 1832.

Bar-Yosef, D. E. 2002. Egyptian-Canaanite Interaction during the fourth and third Millennia B. C.: The shell connection. In E. C. M. van den Brink and T. E. Levy (eds), *Egypt and the Levant: Interrelations from the 4th through the Early 3rd Millennium B. C. E.*, 129–135. Continuum, London.

Bass, W. M. 1995. *Human osteology: a laboratory and field manual*. Missouri Archeological Society.

Bobrowski, P., Jórdeczka, M., Sobkowiak-Tabaka, I. and Binder M. 2016. Khor Shambat 1: New Neolithic site and cemetery in Omdurman (Sudan). *Polish Archaeology in the Mediterranean* 25: 447–478.

Bochenek, A. and Reicher, M. 1990. *Anatomia człowieka, t. 1*. Warszawa, PZWL Wydawnictwo Lekarskie.

Brickley, M., and McKinley, J. I. (eds). 2004. *Guidelines to the standards for recording human remains.* Institute of Field Archaeologists Paper Number 7.

Brooks, S. and Suchey, J. M. 1990. Skeletal age determination based on the os pubis: a comparison of the Acsádi-Nemeskéri and Suchey-Brooks methods. *Human Evolution* 5: 227–238.

Buckley, S., Usai, D., Jakob, T., Radini, A. and Hardy, K. 2014. Dental calculus reveals unique insights into food items, cooking and plant processing in prehistoric Central Sudan. *PLoS ONE* 9(7): e100808. https://doi.org/10.1371/journal.pone.0100808

Buikstra, J. E. and Ubelaker, D. H. 1994. *Standards for data collection from human skeletal remains. Proceedings of a seminar at the Field Museum of Natural History*. Fayetteville Ark. Arkansas Archeological Survey, Research Series 44.

Caneva, I. 1988. *El Geili. The history of a middle Nile environment 7000 B.C.–A.D. 1500*. Oxford, Archaeopress. British Archaeological Research International Series 424.

Caneva, I., Garcea, E. A. A., Gautier, A. and Van Neer, W. 1993. Prepastoral cultures along the Central Sudanese Nile. *Quaternaria Nova* 3: 177–252.

Chłodnicki, M. 2018. Stratigraphy of the Kadero Neolithic cemetery. In M. Honegger (ed.), *Nubian archaeology in the XXIst century. Proceedings of the XIII International Conference of Nubian Studies, Neuchâtel, 1st–6th September 2014*, 215–222. Leuven-Paris-Bristol. Orientalia Lovaniensia Analecta 273.

Chłodnicki, M., Kobusiewicz, M. and Kroeper, K. (eds). 2011. *Kadero*. Poznań. Studies in African Archaeology 10.

Chłodnicki, M. and Kabaciński, J. 2015. Radiocarbon dates from Kadero revised. In J. Kabaciński, M. Chłodnicki and M. Kobusiewicz (eds), *Hunter-Garterers and Early Food Producing Societies in Northern Africa*, 195–217. Poznań. Studies in African Archaeology 14.

Cruz, C. B. and Codinha S. 2010. Death of mother and child due to dystocia in 19th century Portugal. *International Journal of Osteoarchaeology* 20: 491–96.

Czarnetzki, A. 1972. Epigenetische Skelettmerkmale im Populationsvergleich. II. Frequezunterschiede zwichen den Geschechtern. *Zeitschrift für Morphologie und Anthropologie* 63: 341–350.

Fairgrieve, S. I. and Molto, J. E. 2000. Cribra orbitalia in two temporally disjunct population samples from the Dakhleh Oasis, Egypt. *American Journal of Physical Anthropology* 111: 319–331.

Fattovich, R. and Piperno, M. 1981. Survey of the Gash Delta – November 1980. *Nyame Akuma* 19: 26–30.

Fernandez, V. M., Jumeno, A. and Menéndez, M. 2003. Archaeological excavations in prehistoric sites of the Blue Nile area, Central Sudan. *Complutum* 14: 273–374.

Gautier, A. and Van Neer, W. 2011. The fauna of Kadero and the arrival of pastoralism in the Nile Valley of Central Sudan. In M. Chłodnicki, M. Kobusiewicz and K. Kroeper (eds), *Kadero*, 375–408. Poznań. Studies in African Archaeology 10.

Geus, F. 1984a. *Rescuing Sudan Ancient Cultures*. Khartoum.

Geus, F. 1984b. Excavations at El Kadada and the Neolithic of the Central Sudan. In L. Krzyżaniak and M. Kobusiewicz (eds), *Origin and early development of food-producing cultures in North-Eastern Africa*, 361–372. Poznań, Poznan Archaeological Museum.

Gładykowska-Rzeczycka, J. J. 1976. Zmiany w układzie kostnym ludności ze średniowiecznych cmentarzysk. *Badania populacji ludzkich na materiałach współczesnych i historycznych. Seria Antropologia* 4: 85–102.

Gładykowska-Rzeczycka, J. J. 1989. *Schorzenia ludności prahistorycznej na ziemiach polskich*. Gdańsk, Muzeum Archeologiczne w Gdańsku.

Gładykowska-Rzeczycka, J. J. 1994. Problems of estimating age and determining the profession when analyzing prehistoric skeletons. *Anthropologie* 32(1): 85–92.

Hamd, A. H. N. 2012. Qalaat Shanan: a large Neolithic site in Shendi town. *Sudan and Nubia* 16: 8–12.

Hamd, A. H. N. 2015. The Late Neolithic at Qalaat Shanan site within Shendi Reach. In J. Kabaciński, M. Chłodnicki and M. Kobusiewicz (eds), *Hunter-Gatherers and Early food Producing Societies in northeaster Africa*, 159–176. Poznań. Studies in African Archaeology 14.

Hawke, S. C. and Wells, C. 1975. An Anglo-Saxon obstetric calamity from Kingsworthy, Hampshire. *Medical and Biological Illustration* 25(1): 47–51.

Hays, T. R. 1971. The Karmakol industry: Part of the Khartoum Horizon-Style. In J. L. Shiner (ed.), *The prehistory and geology of Northern Sudan. Report to National Science Foundation*, 84–153. Arlington, Va: National Science Foundation.

Hays, T. R. 1976. An examination of the Sudanese Neolithic. In B. Abebe, J. Chavaillon and J. E. G. Sutton (eds), *Proceedings of the Panafrican Congress of Prehistory and Quaternary Studies, VII Session, Addis Abeba 1971*, 85–92. Addis Abeba, Ministry of Culture.

Honneger, M. 2004. Settlement and cemeteries of the Mesolithic and Early Neolithic at el-Barga (Kerma region). *Sudan and Nubia* 8: 1–6.

Honneger, M. 2005. El-Barga: un site elé pour la comprehension du Mésolithique et du début du Néolithique en Nubie. *Revue de Paléobiologie* 10: 95–104.

Jórdeczka, M., Chłodnicki, M., Sobkowiak-Tabaka, I. and Stanaszek, Ł. M. 2020. Rebirth in the afterlife: Neolithic pot burials from Khor Shambat, Sudan. *AZANIA: Archaeological Research in Africa* 55(1): 1–25.

Kabaciński, J. 2011. Comments on radiocarbon dates. In M. Chłodnicki, M. Kobusiewicz and K. Kroeper (eds), *Kadero*, 411–420. Poznań. Studies in African Archaeology 10.

Krzyżaniak, L. 1975. Kadero (first season, 1972). *Ètudes et Travaux* 8: 361–366.

Krzyżaniak, L. 1984. The Neolithic Habitation at Kadero (Central Sudan). In L. Krzyżaniak and M. Kobusiewicz (eds), *Origin and Early Development of Food-producing Cultures in North-Eastern Africa,* 309–316. Poznań.

Krzyżaniak, L. 1992. *Schyłek pradziejów w środkowym Sudanie*. Poznań. Studies in African Archaeology 3.

Krzyżaniak, A. 2011. Neolithic cemetery. In M. Chłodnicki, M. Kobusiewicz and K. Kroeper (eds), *Kadero*, 215–266. Poznań. Studies in African Archaeology 10.

Lecointe, Y. 1997. Le site néolithique d'el Ghaba: deux années d'activité (1985–1986). *Archéologie du Nil Moyen* 2: 69–87.

Lieverse, A. R., Bazaliiskii, V. I. and Weber, A. W. 2015. Death by twins: a remarkable case of dystocic childbirth in Early Neolithic Siberia. *Antiquity* 89: 23–38.

Lovejoy, C. O., Meindl, R. S, Pryzbeck, T. R. and Mensforth, R. P. 1985. Chronological metamorphosis of the auricular surface of the ilium: A new method for the determination of age at death. *American Journal of Physical Anthropology* 68(1): 15–28.

Malgosa, A., Alesan, A., Safont, S., Ballbé, M. and Ayala, M. M. 2004. A dystocic childbirth in the Spanish Bronze Age. *International Journal of Osteoarchaeology* 14: 98–103.

Malinowski, A. and Wolański, N. 1988. *Metody badań w biologii człowieka. Wybór metod antropologicznych*. Warszawa, Państwowe Wydawnictwo Naukowe.

Marks, A. E. and Ferring, C. R. 1971. The Karat group: An early ceramic bearing occupation of the Dongola Reach. In J. L. Shiner (ed.), *The Prehistory and Geology of Northern Sudan, Report to National Science Foundation*, 187–275. Arlington, Va: National Science Foundation.

Marks, A. E., Hays, T. R. and De Heinzelin, J. 1986. Preliminary report of the Southern Methodist University Expedition in the Dongola Reach. *KUSH* 15: 165–192.

Martin, R. and Saller, K. 1957. *Lehrbuch der Anthropologie in systematischer Dartstellung*. Stuttgart, Fischer.

Mohammed-Ali, A. S. and Khabir, A. M. 2003. The Wavy Line and Dotted Wavy Line pottery in the prehistory of the Central Nile and the Sahara-Sahel belt. *African Archaeological Review* 20(1): 25–58.

Moreton, S. G., Rosqvist, G. C., Davies, S. J. and Bentley, M. J. 2004. Radiocarbon reservoir ages from freshwater lakes, South Georgia, Sub-Antarctic: modern analogues from particulate organic matter and surface sediments. *Radiocarbon* 46: 621–626.

Nordström, H. Å. 1972. *Neolithic and A-Group sites. The Scandinavian Joint Expedition to Sudanese Nubia* III. Stockholm, Scandinavian University Press.

Ortner, D. J. 2003. *Identification of pathological conditions in human skeletal remains*. San Diego, London, Elsevier.

Ortner, D. J. and Putschar, W. G. J. 1981. *Identification of pathological conditions in human skeletal remains*. Washington. Smithsonian Contribution to Anthropology 28.

Owsley, D. W. and Bradtmiller, B. 1983. Mortality of pregnant females in Arikara villages: osteological evidence. *American Journal of Physical Anthropology* 61: 331–336.

Persson, O. and Persson, E. 1984. *Anthropological report on the Mesolithic graves from Skateholm, southern Sweden. I: excavation seasons 1980–82*. Lund, Institute of Archaeology, University of Lund.

Philippsen, B. 2013. The freshwater reservoir effect in radiocarbon dating. *Heritage Science* 1: 24.

Piontek, J. 1999. *Biologia populacji pradziejowych. Zarys metodyczny*. Poznań, Wydawnictwo Naukowe UAM.

Pounder, D., Prokopec, M. and Pretty, G. 1983. A probable case of euthanasia amongst prehistoric Aborigines at Roonka, South Australia. *Forensic Science International* 23: 99–108.

Power, R. K. and Tristant, Y. 2016. From refuse to rebirth: repositioning the pot burial in the Egyptian archaeological record. *Antiquity* 90(354): 1474–1488.

Rascón Pérez, J., Cambra-Moo, O. and González Martín, A. 2007. A multidisciplinary approach reveals an extraordinary double inhumation in the osteoarchaeological record. *Journal of Taphonomy* 5: 91–101.

Reinold, J. 2007. *La nécropoloe néolithique d' el-Kadada au Soudan central. Les cimetières A et B (NE-36-O/3-V-2 et NE-36-O/3-V-3) du kôm principal.* Paris.

Rogers, J. and Waldron, T. 1995. *A field guide to joint disease in archaeology*. Wiley-Blackwell.

Sadig, A. M. 2008. Es-Sour: a Neolithic site near Meroe, Sudan. *Antiquity Project Gallery* 82(316). http://www.antiquity.ac.uk/projgall/sadig316/

Sadig, A. M. 2012. Individuals and families: traditions of burials in the Sudanese Neolithic 5000–3000 BC. *Journal of Harran University Medical Faculty* 29(1): 58–93.

Sadig, A. M. 2014. Individuals and families: traditions of burials in the Sudanese Neolithic 5000–3000 BC (Correction and update). *ADAB. Journal of Faculty of Arts. University of Khartoum* 32: 115–118.

Salvatori, S. 2012. Disclosing archaeological complexity of the Khartoum Mesolithic: New data at the site and regional level. *African Archaeological Review* 29: 399–472.

Salvatori, S., Usai, D. and Zerboni, A. 2011. Mesolithic site formation and palaeoenvironment along the White Nile (Central Sudan). *African Archaeological Review* 28: 177–211.

Salvatori, S. and Usai, D. 2016. Ghaba in Context. In S. Salvatori, D. Usai, and Y. Lecointe (eds), *Ghaba. An early Neolithic cemetery in Central Sudan. Vol. 1,* 121–147. Frankfurt, Germany.

Salvatori, S., Usai, D. and Lecointe, Y. (eds). 2016. *Ghaba. An early Neolithic cemetery in Central Sudan. Vol. 1.* Frankfurt, Germany.

Shiner, J. L. 1968a. The Khartoum variant industry. In F. Wendorf (ed.), *The Prehistory of Nubia*, 768–790. Dallas, Texas, Southern Methodist University Press.

Shiner, J. L. 1968b. The cataract tradition. In F. Wendorf (ed.), *The Prehistory of Nubia*, 535–629. Dallas, Texas, Southern Methodist University Press.

Shiner, J. L. (ed.) 1971. *The prehistory and geology of northern Sudan, Report to National Science Foundation*. Arlington, Va: National Science Foundation.

Smith-Guzmán, N. E. 2015. Cribra orbitalia in the ancient Nile Valley and its connection to malaria. *International Journal of Paleopathology* 10: 1–12.

Stein, M., Lazar, B. and Goldstein, S. L. 2013. Radiocarbon reservoir ages as freshwater-brine monitors in Lake Lisan, Dead Sea system. *Radiocarbon* 55: 1050–1057.

Streit, K. 2016. Protohistoric infant jar burials of the Southern Levant in context: Tracing cultural influences in the late sixth and fifth Millennia BCE. In S. Ganor, I. Kreimerman, K. Streit and M. Mumcuoglu (eds), *From Sha'ar Hagolan to Shaaraim. Essays in honour of Prof. Yosef Garfinkel*, 171–186. Jerusalem, Israel Exploration Society.

Strzałko, J., Piontek, J. and Malinowski, A. 1972. Problem rekonstrukcji wzrostu na podstawie kości zachowanych we fragmentach lub spalonych. *Przegląd Antropologiczny* 38(2): 277–287.

Strzałko, J. and Henneberg, M. 1975. Określanie płci na podstawie morfologii szkieletu. *Przegląd Antropologiczny* 41(1): 105–126.

Stuart-Macadam, P. 1991. Anaemia in Roman Britain. In H. Bush and M. Zvelebil (eds), *Health in past societies: Biocultural interpretations of human skeletal remains in archaeological contexts*, 101–113. Oxford. British Archaeological Reports International Series 567.

Trotter, M. and Gleser, G. C. 1952. Estimation of stature from long bones of American Whites and Negroes. *American Journal of Physical Anthropology* 10: 463–514.

Ubelaker, D. H. 1978. *Human skeletal remains. Excavation, analysis, interpretation*. Chicago.

Van den Brink, E. C. M., Horwitz, L. K., Kool, R., Liphschitz, N., Mienis, H. K. and Zbenovich, V. 2015. Excavations at Tel Lod: Remains from the Pottery Neolithic A, Chalcolithic, Early Bronze Age I, Middle Bronze Age I and Byzantine Periods. *'Atiqot* 82: 141–218.

Wapler, U., Crubézy, E. and Schultz, M. 2004. Is cribra orbitalia synonymous with anemia? Analysis and interpretation of cranial pathology in Sudan. *American Journal of Physical Anthropology* 123(4): 333–339.

Wells, C. 1978. A medieval burial of a pregnant woman. *The Practitioner* 221: 442–444.

White, T. D. and Folkens, P. A. 2005. *The human bone manual.* San Diego, Academic Press.

Willis, A. and Oxenham, M. F. 2013. A case of maternal and perinatal death in Neolithic southern Vietnam, c. 2100–1050 BCE. *International Journal of Osteoarchaeology* 23: 676–684.

Zarifa G., Sholts, S. B., Tichinin, A., Rudovica, V., Vīksna, A., Engīzere, A., Muižnieks, V., Bartelink, E. J. and Wärmländer, S. K. T. S. 2016. Cribra orbitalia as a potential indicator of childhood stress: Evidence from paleopathology, stable C, N, and O isotopes, and trace element concentrations in children from a 17th–18th century cemetery in Jēkabpils, Latvia. *Journal of Trace Elements in Medicine and Biology* 38: 131–137.

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Comparison of Different Gouge Collections from Central Sudan

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This article represents a basic comparison of gouge collections from three different sites (Esh Shaheinab, Fox Hill and Kadero). These sites have revealed important collections of lithics from the Early Neolithic period in Central Sudan. Gouges were chosen as an important marker of various activities, and these were studied on the basis of examining this type of artefact. This paper presents basic observations on the technology and function of these artefacts.

KEY-WORDS: Nile valley, Central Sudan, Neolithic, lithic technology, use wear

INTRODUCTION

Gouges are one of the iconic artefacts of African prehistory and are present on most Neolithic sites in Central Sudan. There are many smaller collections, consisting of a few or few dozen pieces, yet there are some remarkable collections that include hundreds of pieces and we propose comparing the basic characteristics of the items in these collections.

Despite advances in their study, the first definitions of this artefact type are still valid today:

> "Artefact conical in outline. The dorsal face is either polished or polished and flaked. The ventral face is flaked only. The cross-section is a thin pointed oval. The working hollow edge is obtained by oblique flaking from the polished side" (Caton-Thompson and Gardner 1934: 20).

There have been several typologies established (Tixier 1962; Magid 1989) but they do not fit our material very well. As we understand gouges, they are usually of one main type, with some exceptions and any differences in their appearance are usually caused by reworking and repairs.

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The function of gouges has been discussed since the beginning of study of them and most scholars associate their use with woodworking (Arkel 1953; Tixier 1962), but no use wear analysis has been done on them yet. We have begun to prepare material for a detailed use wear analysis and technological study of this type of artefact, although this work is not yet finished. But here we would like to present some preliminary observations on this topic.

DESCRIPTION OF THE COLLECTIONS

The three most numerous collections of gouges from Central Sudan were chosen for this study (Fig. 1). These sites contained both settlement and funerary features. The collection from Esh Shaheinab contains mostly finished gouge pieces, so we focused mainly on them in our comparative analysis, not regarding production waste, because it is not present in the museum collection in all its stages. Production waste is well known from the Kadero site and even better from the site of Fox Hill. The collections of gouges from all three sites are easily comparable, although there are some differences.

At all sites, the size of pieces present were recorded, as well as raw materials and polish on the pieces. To compare technological observations, pieces were sorted into categories representing different stages in the life of the artefact and therefore reflect the differences between various activities that were taking place at the site (categories are described in detail in Kapustka *et al.*, 2019).

Esh Shaheinab

The collection from Esh Shaheinab comes from the excavation of A. J. Arkell, conducted during 1949–1950 (Arkell 1953). The finds are stored in the National Museum of Sudan in Khartoum, where 642 pieces were accessible in total. Detailed locations within the excavated area are not accessible at the moment, so these pieces were treated similarly to the surface finds from the Sabaloka region.

The gouges from Esh Shaheinab were studied during the autumn of 2017 and spring of 2018. The collection mostly consists of red rhyolite, but there are examples of the use of grey rhyolite. For the pieces which were made from other raw materials than rhyolite it is not clear if they could be properly associated with gouges. Within this collection is the greatest span in sizes, it includes very small and very big pieces. It is difficult to compare the length of pieces because the objects were often reworked after use or breaking the piece, so the length often changed even for functional pieces. We see the width and thickness of pieces as better markers, as they usually do not change a lot, even when the object was repaired. It is here that size differences can be better observed in all studied collections. However, the majority of pieces in all studied collections (more than 95%), belong to the same size group.

The gouges considered to be in the small category were those with width under 30 mm, they represent 3% of all pieces. Those regarded as big pieces had a width over 55 mm and they represent 1% of all pieces. The maximum width that was recorded was 67 mm. The ratios between width and thickness were stable, although length changed according to the repairs of some pieces.

The raw materials from which these pieces were produced was rhyolite, 95% were made from red rhyolite and 5% from grey. The most probable source of this raw material is seen as the area of Sabaloka, on the Sixth Nile Cataract. The Esh Shaheinab pieces were 75% polished, the majority of them (91%) on one (convex) face. On the one hand we observe that at this site there are quite big pieces compared to other collections and on the other, there was really economic raw material use, where even broken gouges sometimes served as source of raw material for crescent production.

Fig. 1. Map of sites mentioned in text. Drawn: J. Kędelska.

Fox Hill

Sabaloka (West) is the area where the best-known sources and outcrops of red rhyolites that were used for local gouge production are found. The material analysed in our research are from expeditions by the Czech Egyptological Institute and conducted by Lenka Varadzinová during 2011–2018 (Varadzinová *et al.*, 2018). There were 5 sites identified with the presence of gouges and these are so far all the known sites with gouges from the Western part of Jebel Sabaloka.

Fox Hill is the most significant site, with numerous records of prehistoric occupation. More sites within this region exist with a presence of gouges such as the Donkey Site, Grove Site, Lake Basin, Rhyolite Site and Tabya Hassaniya. All these sites also have remains of occupation during the Mesolithic and earlier and/or later periods. The studied collection consists mostly from surface finds. The total number of studied gouges and gouge-like artefacts is 360 items. Of these, 321 came from Fox Hill and the rest from the other 5 sites. Fox Hill has therefore been chosen for our comparative analysis because it has a similar number of gouge finds to Kadero.

The finds from the Fox Hill site were mostly collected during systematic surveys. Only three of the Fox Hill finds come from the excavated trenches. No gouges found were in burials or any other type of context, where primary position is assured. For these reasons, the gouges from excavations are treated in the same way as the pieces from surface surveys. The sizes of the specimens from Sabaloka were recorded in a very detailed way, although the results are similar to what we recorded in the Esh Shaheinab assemblage.

Small and large size artefacts are present only in very low numbers. The collection is dominated by medium size pieces with widths from 35 to 50 mm. Large pieces of width more than 55 mm represent only 1% of all pieces and small pieces with width up to 30 mm represent 3% of the collection. The raw material from which these pieces were produced was rhyolite (88% red and 12% grey) and the most probable source of this raw material is the area of Sabaloka, on the Sixth Nile Cataract.

Fox Hill is the only site where less than half (28%) of all pieces were polished, compared to other sites. The majority of these (93%) were polished from the convex side only.

Kadero

The Kadero site is located several kilometres north of Khartoum and was excavated and studied by Lech Krzyżniak in 1972–2003 (Chłodnicki *et al.*, 2011; see more references there). The settlement discovered on the site is dated to the Early Khartoum and Khartoum Neolithic, while the accompanying cemetery functioned mainly during the Khartoum Neolithic and partially also later, in Meroitic and Post-Meroitic times.

The gouges analyzed, 234 specimens in total, were mostly found in cultural layers of the settlement, sometimes from the site surface and only single pieces from burials.

The collection, stored in the Poznan Archaeological Museum, was analysed by Michał Kobusiewicz (Kobusiewicz 2011).

Because gouges from the Sabaloka area were studied with the use of a different methodology regarding technological aspects, for comparative reasons the collection from Kadero was re-analyzed using this new methodology, different from M. Kobusiewicz's study.

Part of the Kadero collection was measured, although not in such a detailed way as the gouges from other sites. The collection is far more fragmented than the previous two, although most of the pieces fit well into the medium category where the width of piece varies between 35 to 50 mm. The raw material from which the pieces were produced was rhyolite, 80% red and 20% grey. The most probable source of this raw material is the area of Sabaloka, the Sixth Nile Cataract. At Kadero, most of the pieces (85%) were polished, the majority (89%) on the convex face.

PRELIMINARY OBSERVATIONS OF FUNCTION (USE WEAR ANALYSIS)

The function of gouges has been studied by numerous archaeologists carrying out excavations of Sudanese Neolithic sites over the past few decades (Arkel 1953; Haaland 1981; Caneva 1988; Krzyżaniak 1992). However, interpretations of how and what they were used for have never been based on microwear studies. This method, combining observations of original artefacts and experimental pieces, allows the observation and documentation of manufacturing and utilization traces. Therefore an attempt was made to apply microwear analysis in order to establish the function of gouges. During the first stage of research, the type of traces that appeared in the course of its production were observed, whether complete pieces from archaeological collections were used or only stored for future activities. Observations were done with the help of stereoscopic and metallographic microscopes with magnifications ranging from 6.3 to 500 times.

For comparative studies, an experimental specimen was made by Petr Zítka using hard and soft mineral hammers on material (red rhyolite) from outcrops located by the Nile Sixth Cataract. That unpolished specimen has both its transversal edge and sides sharpened (Fig. 2). There were no traces observed caused by a hard hammer, while particles of mineral raw material were found on the specimen edges coming from the soft hammer as a result of percussion into the gouge edge (Fig. 2). A bone pressure tool also left organic remains on the edge during final edge retouching (Fig. 2).

The archaeological finds that were analysed originated from the Sabaloka and Kadero sites. Complete gouges from Sabaloka were not polished or smoothed and carry damage on the edges produced during their use (Fig. 3). The edges are blunt and side edges

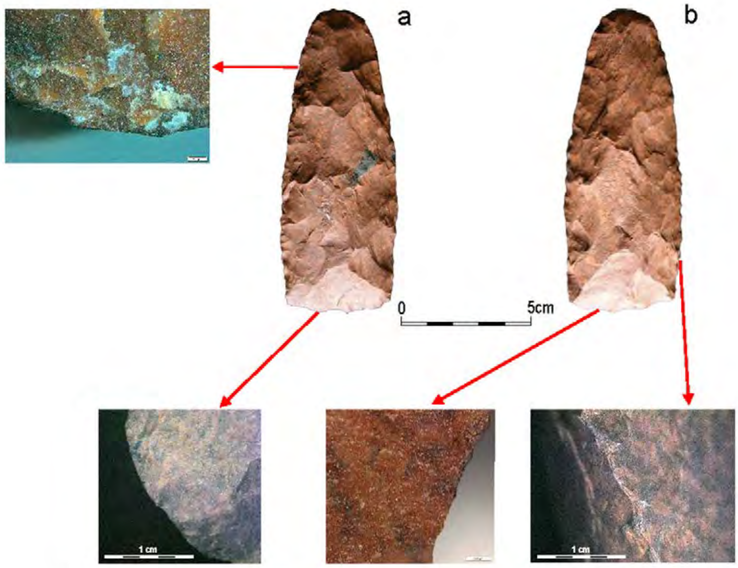


Fig. 2. Experimental gouge: a – flat face, organic remains, cutting edge;
b – convex face, cutting edge, edge of side.
Photo and computer graphics: J. Kędelska and M. Winiarska-Kabacińska.

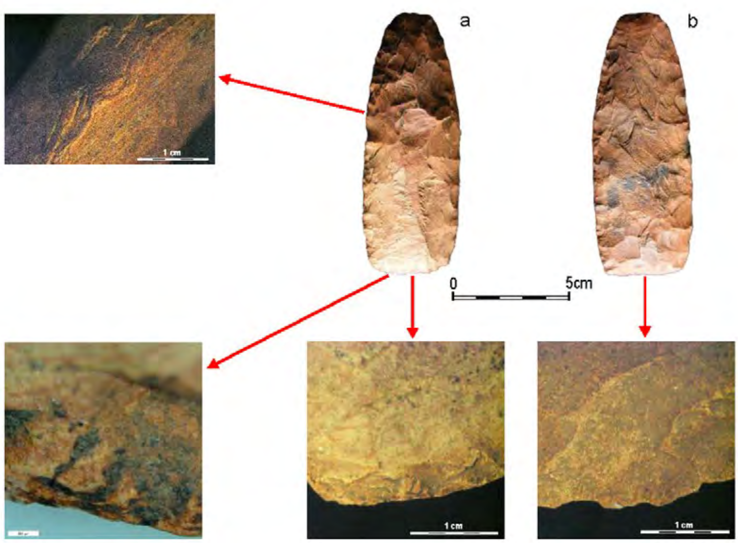


Fig. 3. Sabaloka, whole gouge: a – convex face, edge of side, cutting edge; b – flat face, cutting edge.
Photo and computer graphics: J. Kędelska and M. Winiarska-Kabacińska.

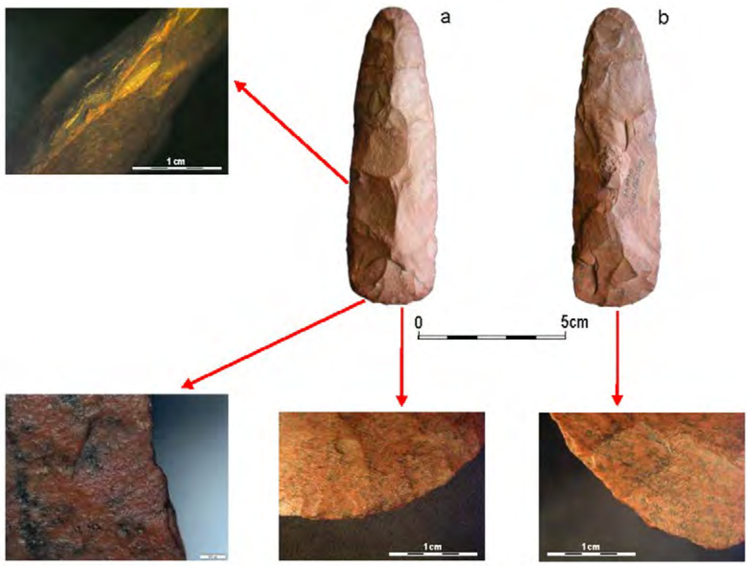


Fig. 4. Kadero, whole gouge; convex face: a – edge of side, cutting edge; b – flat face: cutting edge. Photo and computer graphics: J. Kędelska and M. Winiarska-Kabacińska.

and butts blunt and polished. There are no evident traces of hafting recorded. Similar traces are also found in the case of Kadero (Fig. 4).

After that initial research, one may say that complete, unpolished gouges carry traces of use but not traces of manufacturing, perhaps "erased" during exploitation. It is still an open question remains over what the gouges were used for. Certainly these were not tools used like mattocks to soften the ground on sorgo plantations (Haaland 1981). Perhaps they were used for wood-working (the very hard wood of the acacia tree), processing of plants or tree fruits (Doom palm – *Hyphaena thebaica*) as traces of use observed on working edges are very abrasive. On the other hand, bones and especially antlers and horns are usually much softer materials that don't cause such intensive damage.

Experimental works and microwear observations of archaeological finds from Sabaloka and Kadero will be continued, concentrating on studies of other types of gouges.

TECHNOLOGICAL OBSERVATIONS

Technological approaches are not very common within African lithic studies. However they reveal important observations that help us to more clearly understand the basic principles of production and the consumption processes. Within this rather limited representation of all three sites, we will mention the most important points of our study:

1. Gouges were produced in highly standardized ways and basic standards are similar for all studied sites. This can be seen thanks to level of symmetry, standardized shape of back and identical proportions at all sites.
2. Gouges were produced in a highly professional way, they were not produced by everybody, their production was done by specialists who were able to predict the results of their actions in their production. This can be seen thanks to the parallel negatives and pieces with mostly no serious production mistakes.
3. The preferred raw material was red rhyolite and colour was more important than quality, there are often visible heterogeneities in the raw material, but only in the red variety. When other types of raw material (including different colour variants of rhyolite) were used, it was usually of perfect quality and this happened only exceptionally.
4. Production was conducted not only in the surroundings of raw material sources but at more distant places (e.g., Shaheinab), as may be confirmed by object categories present on these sites and also production waste. But the further the site is from the source of the raw material, the more professional the production process is and less visible are traces of the learning process. It seems that the further the findspot was from the source, the more professional pieces had been exported.
5. There are differences within the economy of these pieces. At sites near the source, they are not repaired so much, but further from the source, specimens were abandoned only in a more exhausted way, so it seems their value had risen the further it was being used from the source.
6. Polish was done by hand without any special devices and is easily visible thanks to the fact that lines are not parallel. Another important point is that polish is connected to the re-working and repairing of the pieces, as it can be seen that reworked pieces are more often polished than other products. It can be seen that the ratio of polish also rises the further the findspot is from the raw material sources.

COMPARATIVE ANALYSIS

All collections have initially been presented in quite a detailed way: Esh Shaheinab (Arkell 1953), Fox Hill (Kapustka *et al.*, 2019) and Kadero (Kobusiewicz 2011). So our main aim is not to describe these collections in detail here. We see our contribution to the topic of gouges as comparative analysis and microwear observations.

Comparison of collections of this size is not often done. Usually it is difficult to present large collections in a clear and comprehensive way and comparing them is often very difficult. For comparative analysis we used the analytical categories proposed in an earlier work (Kapustka *et al.*, 2019). These categories document various phases in the life of the artefact, from its production to its discard. Material from all sites was sorted according to these categories and this was used as a basis for comparative analysis (Table 1). Their comparative ratios show differences between collections themselves, especially within the production process and economy of raw material use.

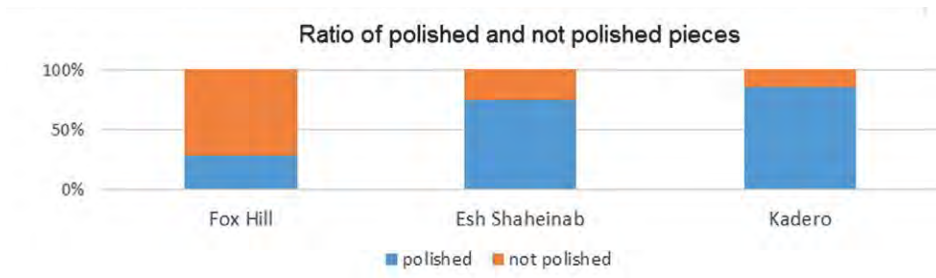
First of all, the pieces were divided into polished and not polished gouges. Polish is connected to the repair and reworking of the artefact. Its percentage is much lower in surroundings close to the raw material source and higher in more distant sites as Esh Shaheinab and Kadero (see Fig. 5). Basically we see polished items as repaired/reworked pieces. But there are also reworked/repaired pieces within the unpolished ones, especially at the site of Fox Hill.

Unpolished pieces typically offer a wider variety of categories (Fig. 5). Pieces also document the production and learning processes. The production processes of the material of Fox Hill are especially well shown and an important number of pre-forms which were not finished are also present. The situation is similar when we look at the Esh Shaheinab material, where unfinished pieces are present as well, but in a much lower percentage. It is interesting that the number of pieces apparently knapped by novices is quite high in the Esh Shaheinab assemblage. So it seems that the material that was transported to Esh Shaheinab and Kadero was different.

Whereas in Esh Shaheinab, there were signs that production was taking place on site, in Kadero we have no signs of primary production, so it seems that pieces were transported there in finished form. The number of pieces intentionally broken does not correlate with this production process. So it seems that this voluntary breaking could be a result of unsatisfied craftsmen, but for the material from Kadero it also had some different causes. Selection of raw material, regarding pieces chosen for export was quite careful, because there are no pieces broken due to natural causes outside the raw material sources area.

Within the category of polished pieces (see Fig. 6) in all collections most numerous are the reworked rear parts of original pieces. This category is connected to the polishing process, as it can make reworking considerably easier. In the Kadero collection, it is important to note how high, compared to other collections, the category of pieces broken during use is. At Kadero, it seems this was main reason pieces were abandoned. In Esh Shaheinab and Fox Hill, even pieces that were still useful were often abandoned. In the material from these two sites, it seems that the production process was ongoing, while in Kadero it seems that only consumption was at play.

Basically we can see that from a techno-economic point of view there are clear differences between the sites presented. In Fox Hill, variability is highest, the site is the nearest to the raw material sources. At the Esh Shaheinab site, there was also production taking place, but the variety of categories is considerably lower and it seems that use of raw material and control over its consumption was much higher. In Kadero it seems that pieces were received in a finished condition and were only repaired at the site.



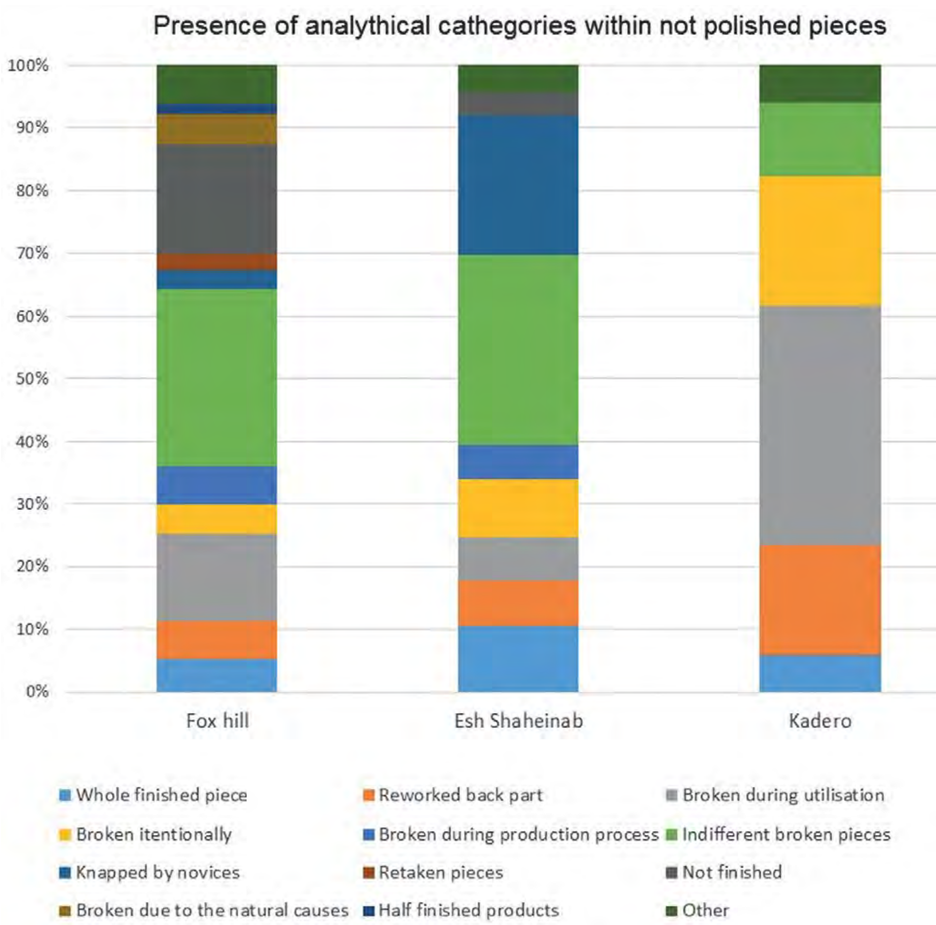
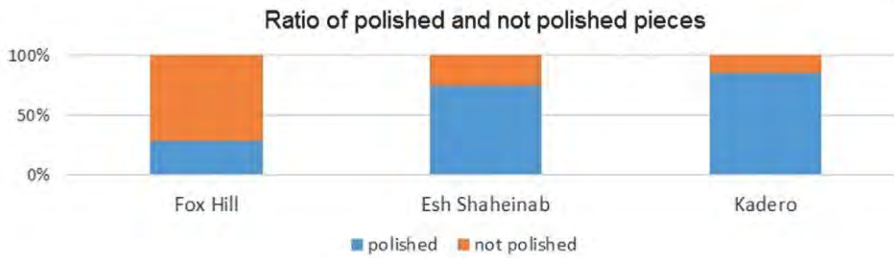


Fig. 5. Graph of ratio of different descriptive categories within presented sites (not polished pieces). Computer graphics: K. Kapustka.



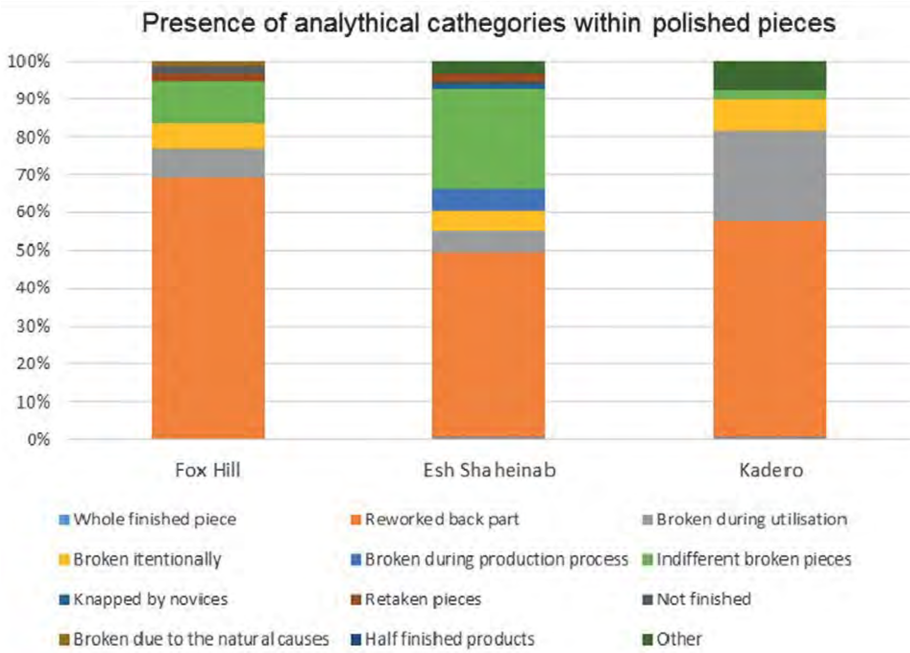


Fig. 6. Graph of ratio of different descriptive categories within presented sites (polished pieces). Computer graphics: K. Kapustka.

Table 1. Comparative table with categories present at different studied sites.

SITE	**Fox Hill**			**Esh Shaheinab**			**Kadero**			**Total**		
Polish	not polished	polished	total	not polished	polished	total	not polished	polished	total	not polished	polished	**total**
Whole finished piece	12	0	12	17	3	20	2	1	3	31	4	**35**
Reworked back part	14	63	77	12	234	246	6	115	121	32	412	**444**
Broken during utilisation	32	7	39	11	27	38	13	47	60	56	81	**137**
Broken itentionally	11	6	17	15	26	41	7	17	24	33	49	**82**
Broken during production process	14	0	14	9	27	36	0	0	0	23	27	**50**
Indifferent broken pieces	65	10	75	49	128	177	4	5	9	118	143	**261**
Knapped by novices	7	0	7	36	7	43	0	0	0	43	7	**50**
Retaken pieces	6	2	8	0	11	11	0	0	0	6	13	**19**
Not finished	40	2	42	6	1	7	0	0	0	46	3	**49**
Broken due to the natural causes	11	1	12	0	0	0	0	0	0	11	1	**12**
Half finished products	4	0	4	0	0	0	0	0	0	4	0	**4**
Other	14	0	14	7	16	23	2	15	17	23	31	**54**
Total	**230**	**91**	**321**	**162**	**480**	**642**	**34**	**200**	**234**	**426**	**771**	**1197**

CONCLUSION

This article is meant as a preliminary account of our research, which introduces elements of technological, use wear and experimental approaches to the study of gouges. However, even this preliminary study has revealed new information that widens our view on the problem of gouges.

It is our opinion that the path of research outlined here is most promising for confirming the use of gouges, which is often discussed but usually not studied by appropriate techniques. Preliminary results of use/wear analysis have helped us distinguish production traces from working traces and led us to the preliminary conclusion that gouges were used for woodworking, as has often been suggested before (Arkel 1953; Tixier 1962).

Our objective in future is to make series of experiments in tree cutting, wood working and working of other materials as well (e.g., bone, soil) to obtain use traces on the experimental pieces. By comparative study of these experimentally used pieces and their archaeological counterparts, we hope to specify the possible use of gouges in Sudanese prehistory in the case of the examples from the sites at Fox Hill and Kadero.

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REFERENCES

Arkel, A. J. 1953. *Shaheinab. An account of the excavation of a Neolithic occupation site carried out for the Sudan Antiquities Service in 1949–50*. London

Caneva, I. 1988. *El Geili. The history of a Middle Nile Environment 7000 BC – 1500 AD*. Oxford. Cambridge Monographs in African Archaeology 29. British Archaeological Reports International Series 424.

Caton-Thompson, G. and Gardner, E. W. 1934. *The Desert Fayum*. London.

Chłodnicki, M., Kobusiewicz, M. and Kroeper, K. (eds). 2011. *Kadero: The Lech Krzyżaniak excavations in the Sudan*. Poznań.

Haaland, R. 1981. *Migratory herdsmen and cultivating women. The structure of Neolithic seasonal adaptation in the Khartoum Nile environment*. Bergen.

Kapustka, K., Lisá, L., Bajer, A., Buriánek, D., Varadzin, L. and Varadzinová, L. 2019. Gouges: Towards the Understanding of an Iconic Artefact of the Early Neolithic Period in Central Sudan. *African Archaeological Review* 36: 505–534.

Kobusiewicz, M. 2011. Lithic implements. In M. Chłodnicki, M. Kobusiewicz and K. Kroeper (eds), *Kadero: The Lech Krzyżaniak excavations in the Sudan*, 267–297. Poznań.

Krzyżaniak, L. 1992. *Schyłek pradziejów w środkowym Sudanie*. Poznań. Studies in African Archaeology 3.

Magid, A. A. 1989. *Plant Domestication in the Middle Nile Basin. An Archaeoethnobotanical Case Study*. Oxford. Cambridge Monographs in African Archaeology 35. British Archaeological Reports 523.

Tixier, J. 1962. Le "Ténéréen" de l'Adrar Bous III. In H. J. Hugot (ed.), *Missions Berliet Ténéré-Tchad*, 333–348. Paris, AMG.

Varadzinová, L., Varadzin, L., Kapustka, K. and Pacina, J. 2018. Výzkum lokality Liščí kopec (SBK.W-20) v pohoří Sabaloka: poznatky z výzkumné sezóny 2017. *Pražské egyptologické studie* 20: 35–45.

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Towards Understanding the Late Neolithic of the Egyptian Western Desert: Gebel Ramlah, Site E-16-02

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The research around the palaeo-lake of Gebel Ramlah has revealed the presence of numerous remains of Late Neolithic occupation. One such site – E-16-02 – was excavated in 2018 and delivered unique evidence pointing to the specific style of life of human groups here in the later Neolithic. In the light of the available evidence, it seems that the occupation was seasonal and the site was visited several times. Its main feature was an oven, carefully designed and regularly cleaned as it served for cooking food during subsequent visits to the place. The remaining features were occasionally constructed during each stay. The distribution of flint artefacts, chaotic, unpatterned, without visible places of flint processing and lacking clear links with features and remains of pottery vessels also indicate multiple visits to the site. This pattern is obviously different to that recognized during the Holocene climatic optimum when the extent of the settlements was substantially larger accompanied by a diversity of features indicating a stable, long-lasting occupation (Al Jerar Unit).

KEY-WORDS: Prehistoric Egypt, Western Desert, Late Neolithic, pottery, flint industry, settlement pattern

INTRODUCTION

The beginning of the Holocene brought to NE Africa, as elsewhere in the Northern Hemisphere (Alley *et al.*, 1993; Lowe *et al.*, 2008), a radical improvement of climatic conditions (Kuper and Kröpelin 2006). From the beginning of the Holocene,

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c. 9550 BC, the area of today's Sahara, being in the Upper Pleistocene a vast deserted territory, witnessed seasonal rains allowing the development of a savanna environment. That obviously attracted different fauna species and, in consequence, also humans.

A typical landscape feature of the Egyptian Southwestern Desert at that time, an area located in the eastern part of the Sahara, was the presence of temporary lakes – *playas* – that were fed by rain waters in a yearly cycle. Around those lakes during the early and middle Holocene numerous human groups settled, leaving differentiated traces of occupation dated from *c.* 9300 (Schild and Wendorf 2013) to the mid third millennium BC at the latest when the Sahara was a severe desert again (Applegate and Zedeño 2001).

Fig. 1. Location of Gebel Ramlah. Computer graphics: I. Jordan.

One such an area is located *c.* 150 km west of the Nile Valley near the pronounced mountain called Gebel Ramlah (Fig. 1). The lonely mountain, with its top elevated at *c.* 250 m a.s.l., rises *c.* 100 m above the surrounding desert. Beneath its southern slopes a lake extended during the large part of the Holocene that, according to results of our current investigations, filled partially the basin that carried waters already in the Middle Pleistocene (Fig. 2).

Research in Gebel Ramlah begun in 2000 when M. Kobusiewicz and K. Banks discovered the first cemeteries there (Kobusiewicz *et al.*, 2004; 2010) and has continued till today within new projects. In the years 2009–2015, the main research effort concentrated on burial practices while since 2016 a dominating goal was the recognition of settlement patterns in the context of numerous occupation traces recorded around the palaeo-lake (Czekaj-Zastawny and Kabaciński 2015; Czekaj-Zastawny *et al.*, 2018a; 2018b; Kabaciński *et al.*, 2018; 2019).

Based on current knowledge, the earliest traces of human presence in this region are perhaps related to the so-called El Adam Unit but the first evident occupation is linked with the Early Holocene El Ghorab Unit (Schild and Wendorf 2013). The first unquestionable sedentary populations appeared here during the climatic optimum of the Holocene – the Al Jerar Unit around 6500–6000 BC, followed by the pastoral Middle, Late and Final Neolithic groups. The end of human occupation is placed at

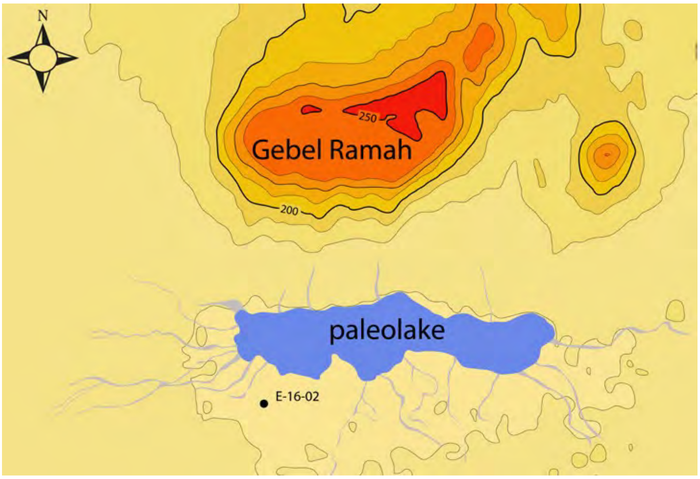

Fig. 2. Gebel Ramlah. Approximate extent of the Holocene lake and site E-16-02. Computer graphics: J. Kabaciński.

c. 4300 BC and is related with the last of the above-mentioned chronostratigraphic units. The diverse traces of hunter-gatherer and pastoral societies preserved along the shores of the palaeo-lake as well as the *wadis* feeding the lake basin with rain waters, including numerous remains of stable and shortly used settlements, traces of short-lived camps and other activities as well as burials. The characteristic feature of the Final Neolithic were the cemeteries dated to 4500–4300 BC (Kobusiewicz *et al.*, 2010; Czekaj-Zastawny *et al.*, 2018a; Kabaciński *et al.*, 2018; 2019).

The present paper discuss the evidence from the later part of the settlement sequence recorded at Gebel Ramlah, namely a small but distinct settlement of the Late Neolithic period. It produced unique evidence pointing to the specific style of life of human groups at that time. The first evidence of the Late Neolithic occupation was indicated by radiocarbon dates made on charcoal from hearths recorded on sites E-01-01 and E-01-02 CAMP (Bobrowski *et al.*, 2006; Schild and Wendorf 2010). This was supported later by several Late Neolithic burials (Kabaciński *et al.*, 2019). The site discussed here is the first extensively excavated settlement of that period.

SITE E-16-02

The site was discovered in 2016 during the field prospection of the southeastern shores of the paleolake. It is located on a small hillock on the western edge of a small wadi running north to the lake (Fig. 2 and 3). The site is approximately 50 m in diameter. On the surface, concentrations of archaeological material were recorded consisting of

Fig. 3. Gebel Ramlah. View of the E-16-02 site from the south. Photo: A. Czekaj-Zastawny.

Fig. 4. Gebel Ramlah, site E-16-02. Concentration of archaeological material on the surface. Photo: A. Czekaj-Zastawny.

traces of stone structures, pottery fragments, animal bones and lithics (Fig. 4). In 2018, a trench of 250 sq. m was excavated producing several features including six pits and a few small fireplaces marked by red-burnt silt. In total, 1373 pottery fragments, 2840 chert artefacts, 3452 animal bone fragments (cattle and sheep/goat), 124 fragments of stone tools (small fragments of hand grinders and grinding stones) and 250 fragments of ostrich egg shells were recorded. Only 158 artefacts were found in the pits. Detailed analysis of the find material was done for all the pits and material from an area of 100 sq. m (sq. no. 5) where the density of artefacts was the highest.

Features

Three types of features were recorded on the site: oven, charring pit and a short-used hearth.

Oven

One feature of this kind was recorded (feature no. 1; Fig. 5). On the surface it was visible as an oval concentration of stones measuring *c.* 90 × 45 cm, including 7 fragments of one grinding stone and 3 handstones (Fig. 6A). In the profile it appeared as a depression paved with flat stones laying close one to another. It looked like a stone open bowl (Fig. 6B). Between and below these stones numerous charcoal fragments were found as well as red-burnt silt. The feature was filled with consolidated sand lacking charcoal and artefacts. The only artefacts were found in the topmost layer on edges of the feature and seem to be post-consumption remains. These are mainly animal bones (*c.* 100 fragments). Therefore it is probable the feature was systematically cleaned out after each use.

Charring pit

Five such features were found, distributed at a distance of several metres around the oven, except on the western side, each measuring *c.* 100 cm along longer axis (Fig. 5). The most characteristic element of this category of feature is the presence of a regular rectangular or oval depression made of red-burned silt. The fills of the majority of these features consisted of consolidated sand with rare pieces of charcoal and single stones (Fig. 7). Most probably these features were used for charring wild plants (seeds?).

Short-used hearth

Five hearths of this type were present within the excavated area, usually circular, very small, up to 40 cm in diameter and shallow (to 5 cm). No stone construction is connected with them. They were preserved in the field in the form of spots of a red-burnt silt without charcoal and artefacts. All but one were situated on the western side of the oven (Fig. 5).

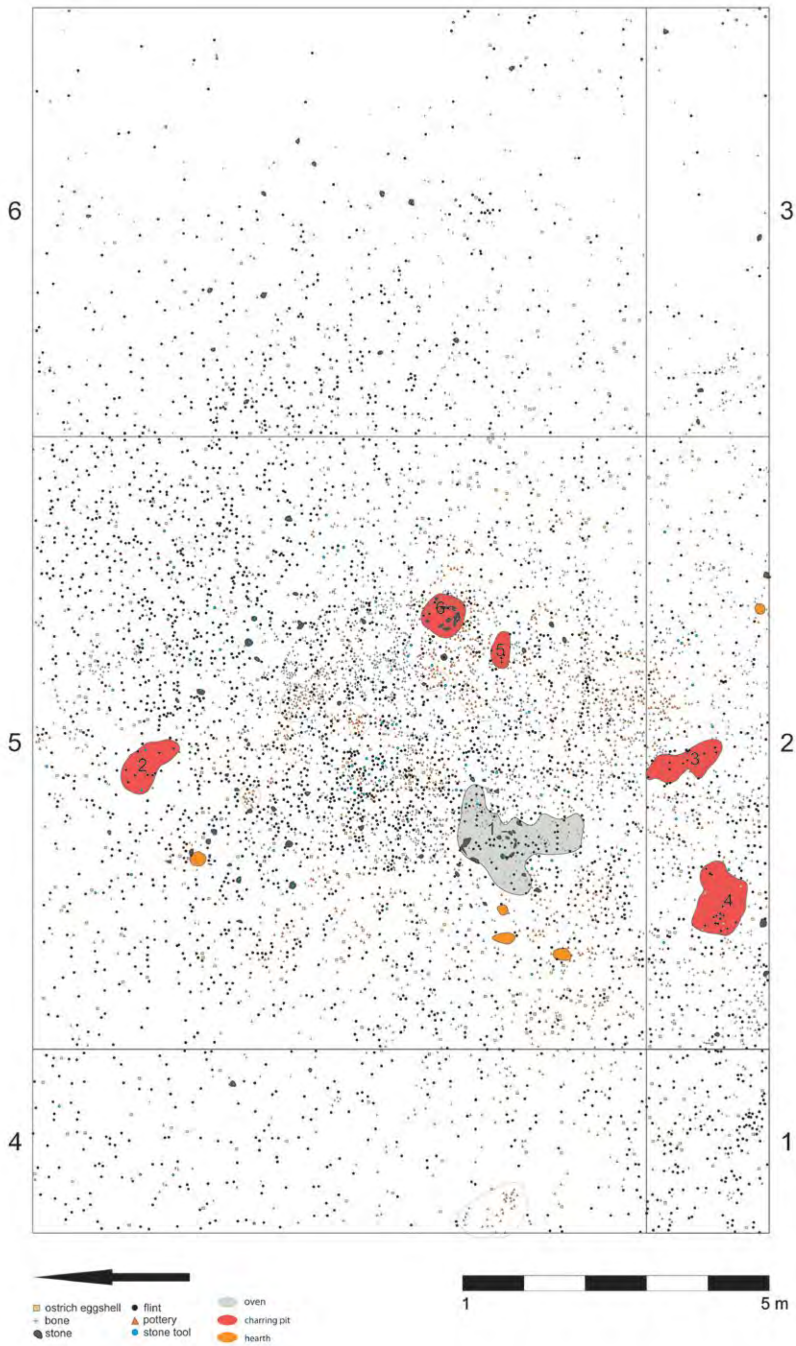

Fig. 5. Gebel Ramlah, site E-16-02. Distribution of features and archaeological artefacts. Drawn: J. Mugaj.

Pottery

Among the 860 pottery sherds analyzed, 13 rims and 847 morphologically non-characteristic fragments were distinguished. Only 23 pieces come from features: 11 fragments from feature no. 1 and 12 fragments from feature no. 2. The remaining sherds come from the area between features. Some fragments are well preserved and they allow a comprehensive description of the analysed assemblage. Several fragments from around the hearths are secondarily burnt.

Among the ceramic assemblage all the fragments were identified as *smoothed red* and *brown wares*, according to the typology of M. Gatto (Gatto 1998; 1999; 2010). This type of pottery is characteristic of the Late Neolithic in the Western Desert.

Only eight vessel shapes could be identified. Most of them (five examples) were spherical bowls (one from feature no. 1), two were small bowls and one sherd appeared to be a fragment of a wide-open bowl (Fig. 8). All the vessels are undecorated, with rounded rims. One of the fragments has a hole (*c.* 4 mm in diameter), made after firing. This probably indicates an attempt to repair the broken vessel.

The wall surfaces are usually brown in colour and smoothed, usually matte, sometimes burnished. The thickness varied between 4–9 mm, but mostly 4–6 mm. A few fragments with a thickness of 8–9 mm seem to belong to larger pots.

The fabric of the vessels was very well prepared, e.g., thoroughly mixed, with fine grained admixture. Pottery is mostly tempered with fine sand and sometimes with a very small amount of plant admixture. When it comes to sand, thin-sections of pottery can only explain whether it is a natural inclusion (from the use of sources of clay with natural sand) or an intentional admixture. According to M. Gatto (1998; 1999; 2010), the intentional organic admixture was used only from the Late Neolithic on (in earlier periods vegetable inclusions came from the use of clay from the lake shore with natural plant fractions).

Lithics

A total number of 2840 lithics were analysed. Almost all of them were registered on the surface and do not form any concentrations but were scattered rather evenly not revealing particular spatial structures. Only twelve non-diagnostic lithic artefacts were found within the features.

The raw material used for lithic production was mostly chert that dominates over the less frequent quartz, agate, petrified wood and sandstone.

The lithic technology was a simple unidirectional flaking technology based on the exploitation of single and multi-platform cores. The preparation and rejuvenation of the cores was very limited. Within the group of 20 cores found, the multi-platform type dominated over single and opposed platform ones. Only two cores can be identified as used for blade production. The clear flake character of the technology is also indicated by the structure of debitage. A total number of 354 flakes were registered (mostly detached from single platform cores) while only 10 specimens are blades.

The assemblage from square 5 produced 184 retouched tools (Fig. 9). Almost half of the tools are retouched flakes. The second most numerous group are denticulate pieces. Two chisel-like bifacial tools and two knife-like blades also occurred. Another category of tools are specimens made mostly on blades such as diverse non-standardized perforators, borers and truncations. The assemblage contains single examples of microliths: two

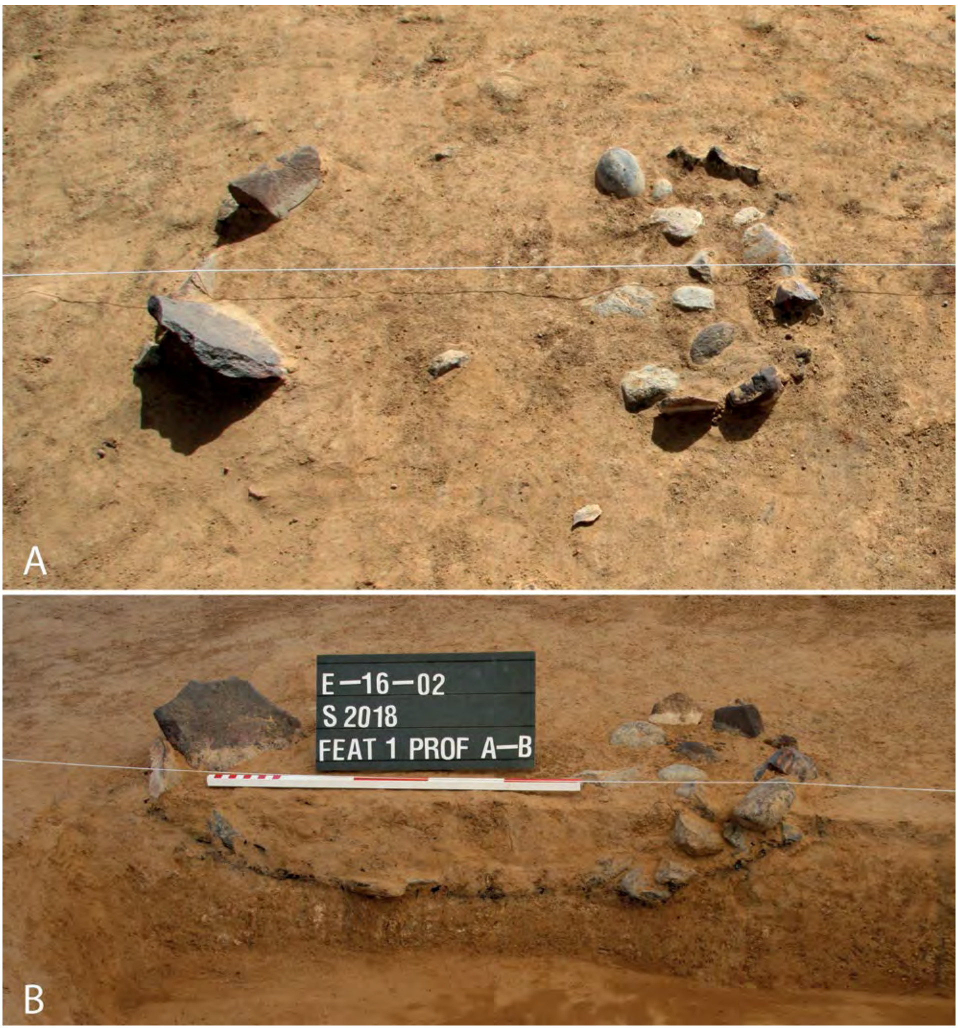

Fig. 6. Gebel Ramlah, site E-16-02. Feature 1. Photo: A. Czekaj-Zastawny.

arched backed pieces, a backed piece, a triangle and two lunates. A single microburin was recorded as well.

The analyzed lithics are typical of the Late Neolithic. This is indicated by the simplified technology based on unipolar reduction and often change of core orientation in the last stage of processing. The lithic technology was concentrated on the production of short, wide flakes that were processed into non-characteristic denticulate tools or retouched flakes. Single bifacial tools and lunates appear as well.

SITE CHRONOLOGY

The studied pottery assemblage indicates human presence on the site in the late stage of the Neolithic. The "smoothed red" and "brown" ceramic wares, without ornamentation, are characteristic for this period (Gatto 1998; 1999; 2010). That is in accordance with the nature of the lithic assemblage dominated by production of flakes with characteristic denticulated and bifacial tools and segments.

According to the basic chrono-stratigraphic units of the later Neolithic occupation of the Western Desert correlated with climatic fluctuations (Schild and Wendorf 2013), the Late Neolithic Humid Interphase is dated to *c.* 5500–4650 BC (6500–5800 uncalibrated BP), and the Final Neolithic Humid Interphase to *c.* 4600–3600 BC (5750–4800 uncalibrated BP).

The radiocarbon measurement made of cattle bone gave the result 5650±40 bp (POZ-90397) which (after calibration – 4484±43 BC)[1] places the settlement at the beginning of the Final Neolithic. However, as the analysis was made of a carbonate, the date should be considered a minimal one, therefore the settlement was most probably in use at the very end of the Late Neolithic. On the other hand, the latest radiocarbon AMS determinations made on materials from a secure context suggest a human presence within a dry period between the Late and Final Neolithic (Kabaciński *et al.*, 2019), which raises basic questions on the correlations between human settlement and the climatic phases distinguished for the Nabta-Kesiba region (Schild and Wendorf 2013).

DISCUSSION

In the course of the excavations, it appeared that concentrations of finds visible on the surface do not correspond to with distribution pattern recorded below the surface. This is the result of various activities undertaken on the site and directly related to the discovered features. Concentrations of pottery are in most cases numerous fragments

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[1] Calibrated with CalPal2007_HULU; http://www.calpal-online.de

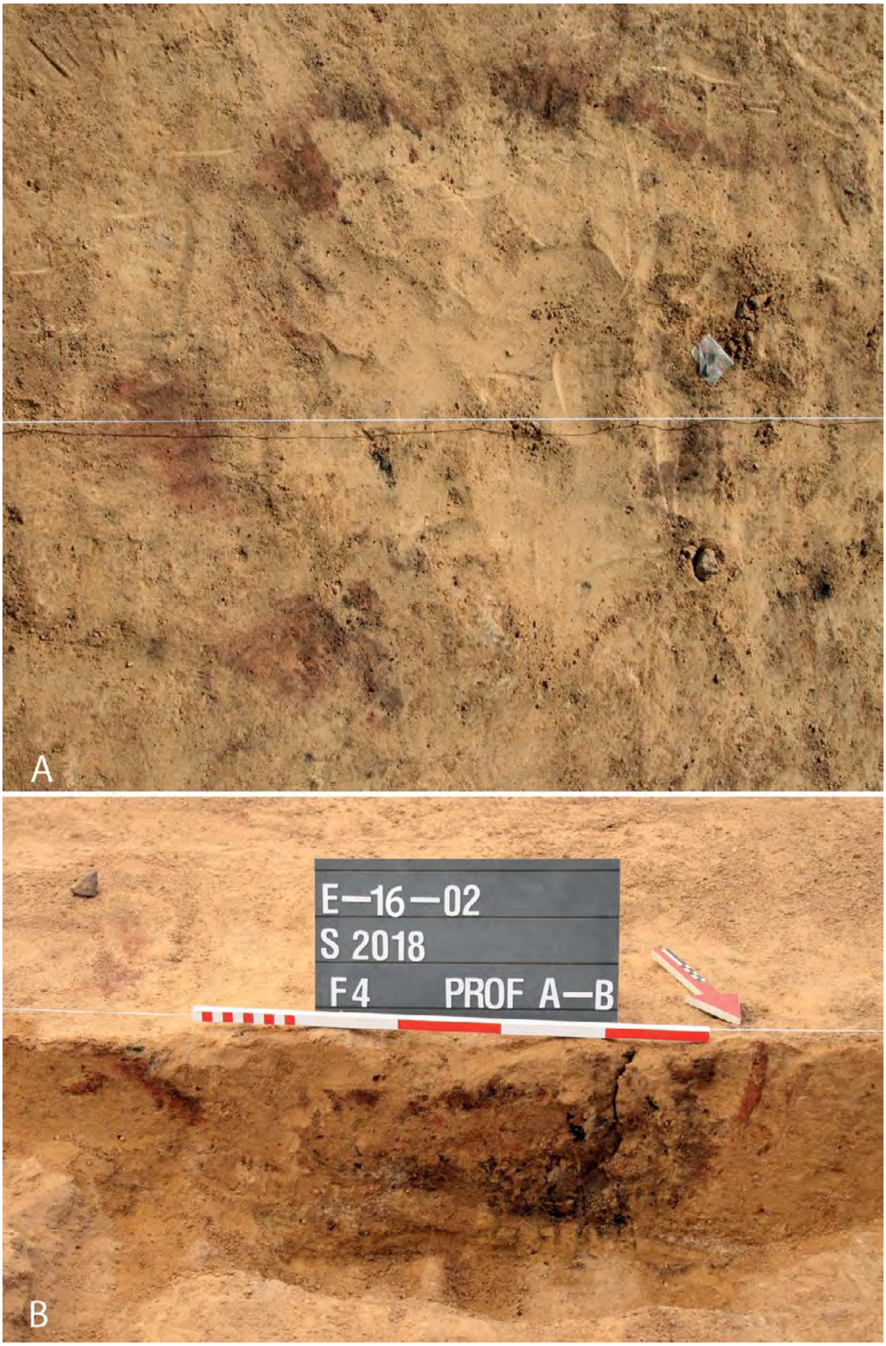

Fig. 7. Gebel Ramlah, site E-16-02. Feature 4. Photo: A. Czekaj-Zastawny.

of one and the same vessel and, together with the animal bones can be localized and linked with everyday life at the settlement. However, we cannot say the same in respect to the chert artefacts. The horizontal distribution of lithics (Fig. 5) does not show any clear pattern (also in functional sense) and as such reflects deposition and dispersal during multiple visits to the site. This is also confirmed by the presence of several features of the same type used for the same purpose in close proximity to each other.

In the light of above evidence, it seems that the occupation was a seasonal and the present state of the site was a result of it being visited several times. Its main feature was an oven, carefully designed and regularly cleaned as it served for cooking food during subsequent visits to the place. The remaining features were periodically created during each stay. The distribution of the flint artefacts, chaotic, unpatterned, without visible places of flint processing and lacking clear links with features and the remains of the pottery vessels indicates multiple visits to the site.

According to current research, the Late Neolithic settlements were limited in size and located along the *wadis* reaching the lake from the south. That is a different pattern from that known from the climatic optimum of the Holocene. At that time – the Al Jerar Unit – settlements were much larger, with clearly visible and developed system of spatial distribution of various features and constructions. In the Late Neolithic settlements, in turn, the diversity of features is limited to the basic categories necessary to short-time occupation.

CONCLUSIONS

The research at site E-16-02 revealed the presence of short-lived seasonal settlement where the economic activities undertaken were limited in scale. The place was visited several times, during the wet season at the end of the Late Neolithic. It was placed, as were the majority of other such occupation sites, on the banks of a small *wadi*. We still don't know exactly what kind of food was processed in the features that were found. What is confirmed without doubt is the presence of cattle. We may only assume that wild grasses/sorghum might have been heat-treated in the charring pits as in earlier times (Wasylikowa *et al.*, 2001). That will hopefully be clarified in the nearest future.

The seasonality of the settlements is also confirmed by the presence of single burials scattered within the larger area and located at a substantial distance from the settlement zones. It seems this was a specific pattern of all the Late Neolithic settlement of the Gebel Ramah area, based on seasonal, short-lived camps rather than large and stabile occupation sites. This had most probably caused by the progressing desertification of the region due to major climatic changes (Schild and Wendorf 2013).

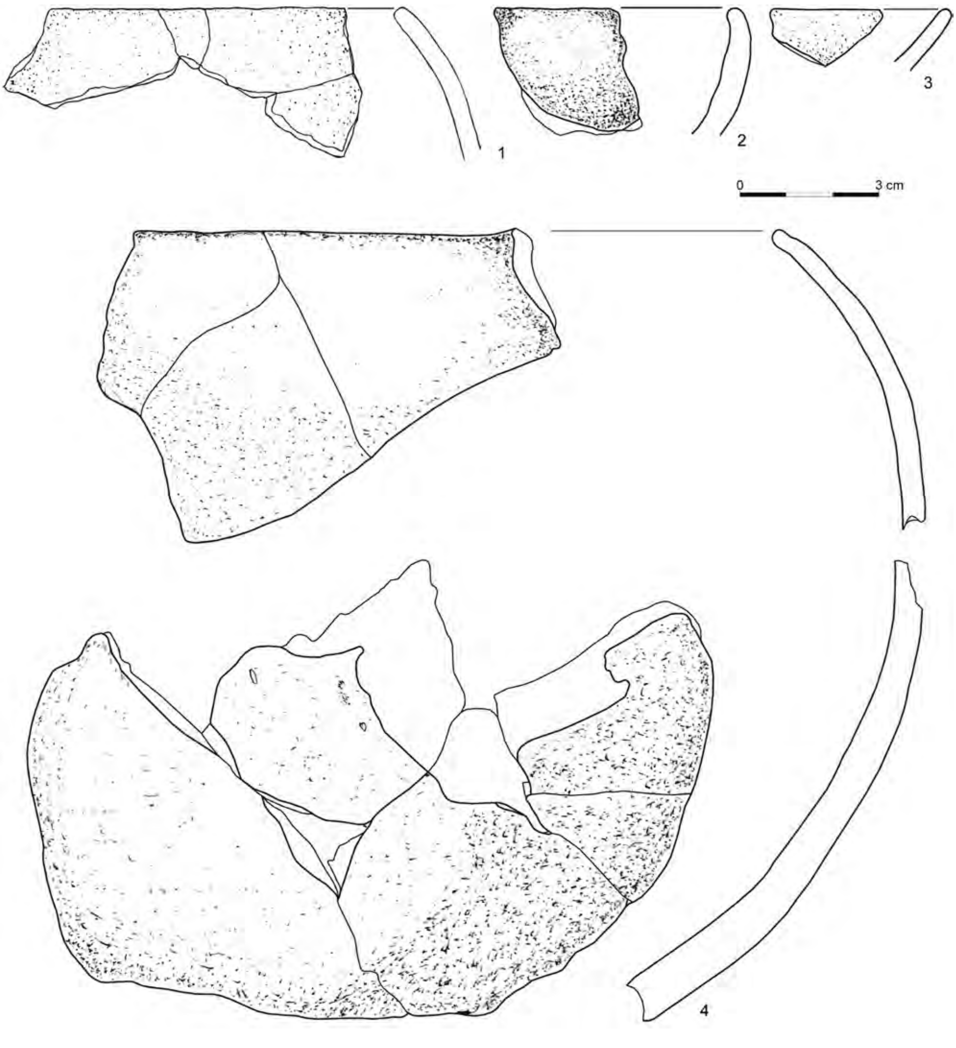

Fig. 8. Gebel Ramlah, site E-16-02. Selection of pottery. 1, 4 – spherical bowls; 2, 3 – open bowls. Drawn: J. Jędrysik.

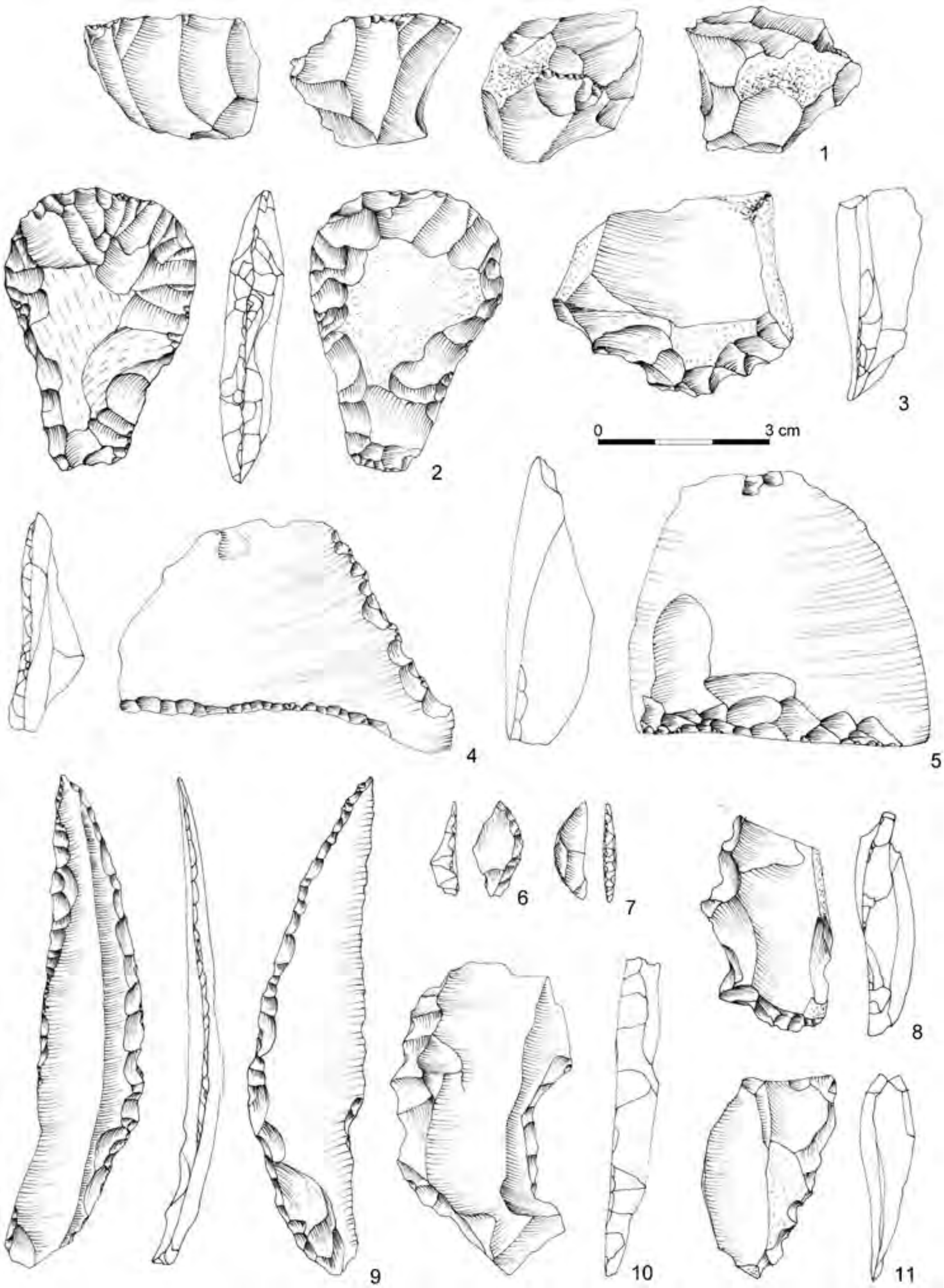

Fig. 9. Gebel Ramlah, site E-16-02. Selection of lithic artefacts. 1 – core with changed orientation; 2 – chisel-like bifacial tool; 3, 8, 10, 11 – denticulated flakes; 4, 5 – retouched flakes; 6, 7 – lunates; 9 – knife-like tool. Drawn: J. Mugaj.

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REFERENCES

Alley, R. B., Meese, D. A., Shyman, C. A., Gow, A. J., Taylor, K. C., Grootes, P. M., White, J. W. C., Ram, M., Paddington, E. D., Mayewski, P. A. and Zieliński, G. A. 1993. Abrupt increase in Greenland snow accumulation at the end of Younger Dryas event. *Nature* 362: 527–529.

Applegate, A. and Zedeño, N. 2001. Site E-92-8: A late prehistoric C-group component at Nabta Playa. In F. Wendorf, R. Schild and Associates (eds), *Holocene Settlement of the Egyptian Sahara, vol. 1. The Archaeology of Nabta Playa*, 529–533. New York, Boston Dordrecht, London, Moscow.

Bobrowski, P., Schild, R. and Calderonii, G. 2006. Late Neolithic Settlements (E-01-2 "CAMP") from the Gebel Ramlah Playa Basin, South-Western Desert of Egypt (Preliminary Report). In K. Kroeper, M. Chłodnicki and M. Kobusiewicz (eds), *Archaeology of Early Northeastern Africa. In Memory of Lech Krzyżaniak*, 213–222. Poznań. Studies in African Archaeology 9.

Czekaj-Zastawny, A. and Kabaciński, J. 2015. New Final Neolithic cemetery E-09-4, Gebel Ramlah Playa, Western Desert of Egypt. In J. Kabaciński, M. Chłodnicki and M. Kobusiewicz (eds), *Hunter-gatherers and early food producing societies in the Northeastern Africa*, 375–384. Poznań. Studies in African Archaeology 14.

Czekaj-Zastawny, A., Goslar, T., Irish, J. D. and Kabaciński, J. 2018a. Gebel Ramlah – a Unique Newborns' Cemetery of the Neolithic Sahara. *African Archaeological Review*. https://doi.org/10.1007/s10437-018-9307-1.

Czekaj-Zastawny, A., Irish, J., Kabaciński, J. and Mugaj, J. 2018b. The Neolithic settlements by a paleolake of Gebel Ramlah, Western Desert of Egypt. In J. Kabaciński, M. Chłodnicki, M. Kobusiewicz and M. Winiarska-Kabacińska (eds), *Desert and the Nile Prehistory of the Nile Basin and the Sahara. Papers in honour of Fred Wendorf*, 515–538. Poznań. Studies in African Archaeology 15.

Gatto, M. C. 1998. *The Late Neolithic pottery decorations from Nabta Playa. CPE Interim Report for the Egyptian Supreme Council of Antiquities.* Unpublished manuscript, Archive of the Combined Prehistoric Expedition.

Gatto, M. C. 1999. *The Late Neolithic pottery decorations from Nabta Playa. CPE Interim Report for the Egyptian Supreme Council of Antiquities.* Unpublished manuscript, Archive of the Combined Prehistoric Expedition.

Gatto, M. C. 2010. Pottery from Gebel Ramla. In M. Kobusiewicz, J. Kabaciński, R. Schild, J. Irish, M. Gatto and F. Wendorf, *Gebel Ramlah. Final Neolithic Cemeteries from the Western Desert of Egypt*, 123–158. Poznań.

Kabaciński, J., Czekaj-Zastawny, A. and Irish, J. D. 2018. The Neolithic Infant Cemetery at Gebel Ramlah in Egypt's Western Desert. In S. Han, T. K. Betsinger and A. B. Scott (eds), *The anthropology of the fetus. Biology, Culture, and Society*, 132–145. New York-Oxford.

Kabaciński, J., Czekaj-Zastawny, A. and Irish, J. D. 2019. *The Neolithic of Gebel Ramlah, vol. 1. Cemetery for Newborns*. Poznań.

Kobusiewicz, M., Kabaciński, J., Schild, R., Irish, J. D. and Wendorf, F. 2004. Discovery of the first Neolithic cemetery in Egypt's Western Desert. *Antiquity* 78(301): 566–579.

Kobusiewicz, M., Kabaciński, J., Schild, R., Irish, J. D., Gatto, M. and Wendorf, F. 2010. *Gebel Ramlah. Final Neolithic cemeteries from the Western Desert of Egypt*. Poznań.

Kuper, R., and Kröpelin, S. 2006. Climate-controlled Holocene occupation in the Sahara: motor of Africa's evolution. *Science* 313: 803–807.

Lowe, J. J., Rasmussen, S. O., Björck, S., Hoek, W. Z., Steffensen, J. P., Walker, M. J. C., Yu, Z. C. and the INTIMATE group. 2008. Synchronisation of palaeoenvironmental events in the North Atlantic region during the Last Termination: a revised protocol recommended by the INTIMATE group. *Quaternary Science Reviews* 27: 6–17.

Schild, R. and Wendorf, F. 2010. Geomorphology, lithostratigraphic environment and paleoecology of Neolithic camps and cemeteries at Gebel Ramlah Playa. In M. Kobusiewicz, J. Kabaciński, R. Schild, J. D. Irish, M. Gatto and F. Wendorf, *Gebel Ramlah. Final Neolithic Cemeteries from the Western Desert of Egypt*, 159–186. Poznań.

Schild, R. and Wendorf, F. 2013. Early and middle Holocene paleoclimates in south western desert of Egypt – the World before unification. *Studia Quaternaria* 30(2): 125–133.

Wasylikowa, K., Barakat, H. N. and Lityńska-Zając, M. 2001. Seeds and Fruits. In F. Wendorf, R. Schild and Associates (eds), *Holocene Settlement of the Egyptian Sahara, vol. 1. The Archaeology of Nabta Playa*, 605–606. New York, Boston, Dordrecht, London, Moscow.

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The Early Holocene Archaeological Evidence (Site E-05-1) in Bargat El-Shab (Western Desert Egypt)

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Bargat El-Shab, situated in the southern part of the Western Desert in Egypt, is one of those places which have been drawing people's attention from the beginning of the Holocene. Numerous traces of human settlement have been registered on the eastern shore of a small palaeolake-playa, including a site dated to the climatic optimum of the Holocene. Features discovered during research initiated by the CPE at the beginning of the century, which include storage pits and hearths, held not only an abundance of stone artefacts and to a lesser extent ceramic artefacts in its fills, but also had exceptionally rich archaeological and archaeobotanical material. All this provided new and valuable information about the lives of hunter-gatherer communities / or Neolithic pastoral communities, representing the so-called El Nabta / Al Jerar variant of settlement in the Western Desert.

KEY-WORDS: Early Holocene, Western Desert, settlement, lithics, archaeobotany, archaeozoology

INTRODUCTION

The Bargat El-Shab Playa Basin is situated in the southern part of the Egyptian Western Desert (22°24'19"N, 30°37'44"E). This small playa is located around 150 km west of the Nile Valley (in the area of Abu Simbel), around 20 km south of Gebel Nabta.

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The desert road from Toshka to Uweinat passes around 15 km north of the location (Fig. 1). Bargat El-Shab (Mountain of shining stones) is the name of a mountain, or rather a small massif made of Nubian sandstone, which is a very distinctive landmark in this part of the desert. To the north of it lies a deflation basin trough, which in the past would have been filled by seasonal lakes – playa – during the humid periods of the Holocene. The site was discovered during one of the surveys organized by CPE at the end of the 20th century. Registered at the east edge of the basin at Bargat El-Shab Plata were the remains of rich Early and Middle Holocene settlement. Regular research was launched here in 2005 and has been ongoing at intervals to this day. The research was initially associated with the search for the oldest early Holocene settlement in the Western Desert, the so-called El Adam phase. In this article, we wish to present the results of the research conducted in the 2005–2006 and 2011–2012 time frame by the authors of this text within the scope of CPE at site E-05-1, which had only been referenced in literature earlier (Bobrowski *et al.*, 2010: 25–26).

SITE E-05-1

The Bargat El-Shab E-05-1 site is situated on the eastern edge of the basin, on a small elevated monadnock of Nubian sandstone and tertiary limestone covered with a layer of Pleistocene sands and winnowed Holocene Aeolian sediments. Traces of prehistoric settlement have been observed on a surface of around 3 ha, concentrated above all on two distinct summits of the above-mentioned monadnock. During the first season of research, two trenches labelled E-05-01/1 and E-05-01/2 were set up. Both are located in areas of the heaviest concentration of artefact material on the surface of the site. In addition, a small trench encompassing a well discovered near the excavation was set up and designated as E-05-1/Well 1 (Fig. 2). The results of the research conducted within trench 2, where the stratigraphy of the site was partially preserved, proved to be especially interesting. The features registered there were covered with a layer of heavily consolidated slope deposits in the form of sandy silts of a brown colour. Trench E-05-1/2, dimensions of 10 × 10 m (oriented along the NS axis), was situated on the northern summit of the above-mentioned monadnock.

The artefact material registered on the surface of the excavation (including the lithic assemblage and small bone fragments, ostrich egg shells, beads) was not evenly distributed on the surface of the excavation (Fig. 3). Materials obtained from the surface of the trench and the layers below, having a thickness of about 20 cm, were not homogeneous. The fact that artefacts representing various phases were found both on and directly below the site surface within a homogeneous layer of silty sand was the result of their having become intermixed due to the deflation of later occupation deposits.

Fig. 1. Map of Western Desert Egypt with location of Bargat El-Shab. Drawn: P. Wiktorowicz.

Features

On the surface, near the southern wall of the trench, the remains of only one hearth were observed in the form of a slightly elevated concentration of stones which were overheated and cracked as a result of fire (Hearth 1). Also registered were minor traces of burnt matter in the form of small fragments of charcoal and ash found further below under a layer of stones and scattered on a circular-like surface (with a diameter of about 300 cm). The hearth had a more compact shape in the basal section at around 5 cm below the surface of the site. As a result of the exploration of the SW part of the trench (Fig. 4), clear outlines of several features were observed at a level of about 15/25 cm below the surface, below the layer of heavily consolidated slope deposits mentioned earlier. In the central and northern parts of the researched area, the outline of two large storage pits was registered – Pit 1 and Pit 4 (fully excavated), and fragments of yet more pits – Pit 2, Pit 3 and Pit 5 (partially excavated) were discovered. Under Pit 1, we observed what was undoubtedly an older Hearth 3 (Fig. 5). A slightly more

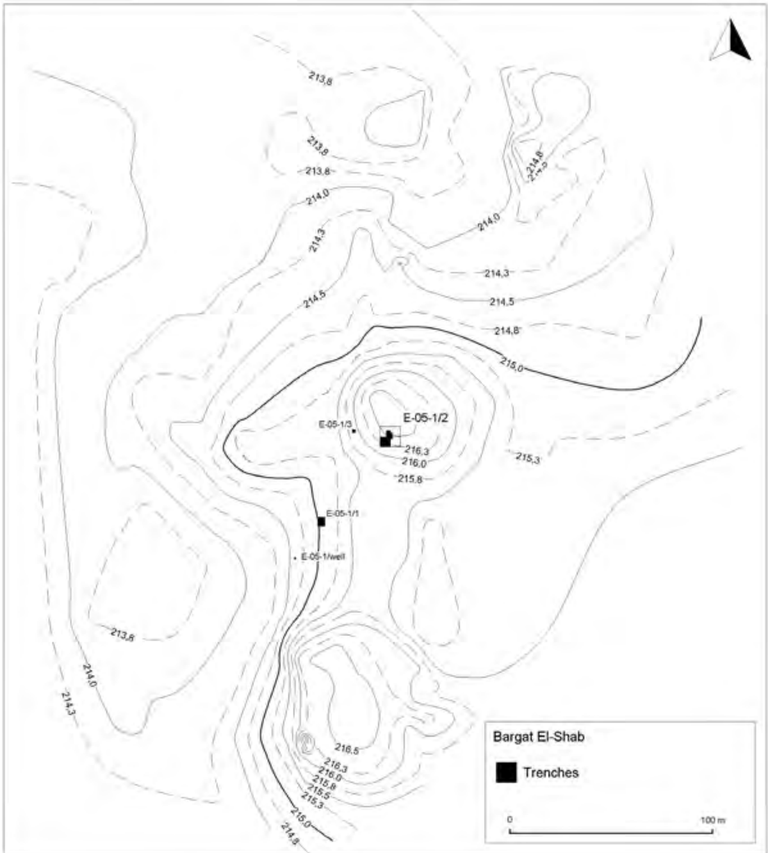

Fig. 2. Bargat El-Shab. Map of eastern edge of deflation basin of playa and location of site E-05-1. Drawn: P. Wiktorowicz.

complex layout was observed near Pit 4, where two hearths – Hearth 2 and Hearth 4 were located to the south, of which the latter clearly intersected the pit. Pit 4 was intersected by the pit of grave 1 (containing a child burial[1]) to the west, and this in turn was intersected from the west by Pit 5 (Fig. 6). The pits which had been fully excavated had an oval-shaped outline in plan and dimensions of 150 × 200 cm (Pit 1) and 250 × 160 cm (Pit 4). Both pits clearly expanded in the bottom section and had a bell-shaped vertical cross-section. Most likely only the base section of these features was preserved, and their depth in cross section currently reached 40 cm. Homogeneous fills consisted of slightly compacted grey-brownish sand with a mix of burnt matter and

1 This feature was not explored at that time due to the lack of an anthropologist at the site.

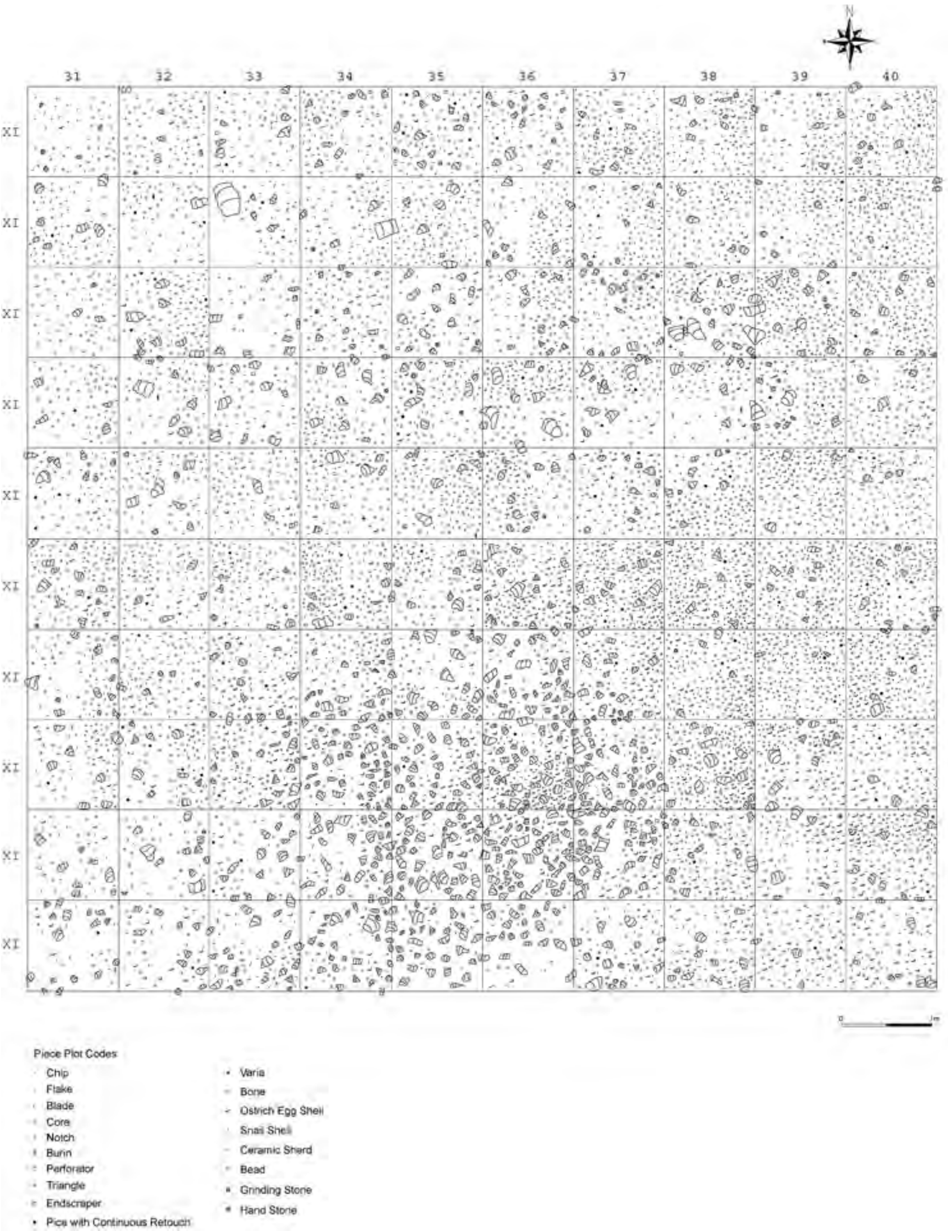

Fig. 3. Bargat El-Shab. Site E-05-1/2. Scatter Pattern of surface collection of studied area in 2005. Drawn: P. Bobrowski and P. Szejnoga.

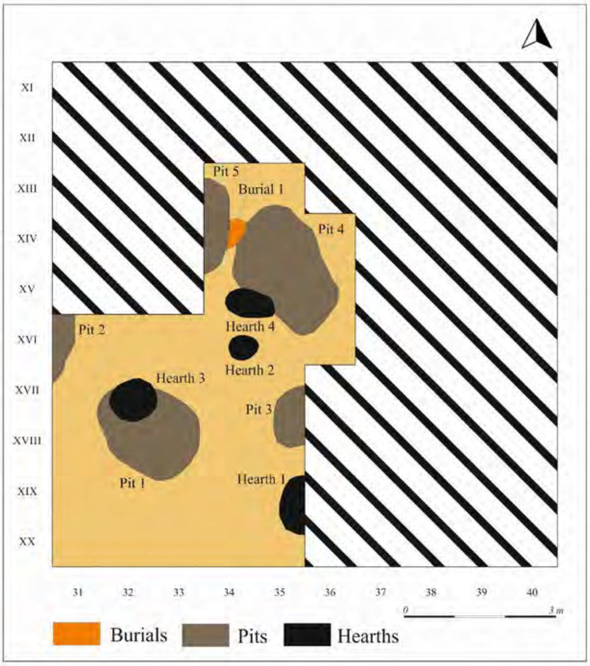

Fig. 4. Bargat El-Shab. Map of south western part of site E-05-1/2, studied in 2006 and 2011–2012. Drawn: P. Bobrowski and P. Wiktorowicz.

charred plant macro particles. The partially excavated pits: Pit 2, Pit 3[2] and Pit 5, had analogous cross-sections and fills (Fig. 5). The hearths were mostly circular or oval in shape and ranged from 50 cm in diameter (Hearth 2) to over 100 cm (Hearth 4). They all had a trough-like vertical cross-section, while their depth reached 20 cm. The hearth fills consisted of strongly consolidated dark grey sand mixed with ash and charcoal. Red-brown layers of highly consolidated calcinated sand mixed with charcoal were observed within Hearths 2 and 4.

Artefacts

The registered features had an unusually rich set of stone artefacts, macroscopic plant remains, animal bones and bone artefacts.

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2 In Pit no. 3, an interbedding was observed in the profile in form of a thin layer of light grey sand with a thickness of 6 cm, which may indicate a minimum of two phases of use of this feature.

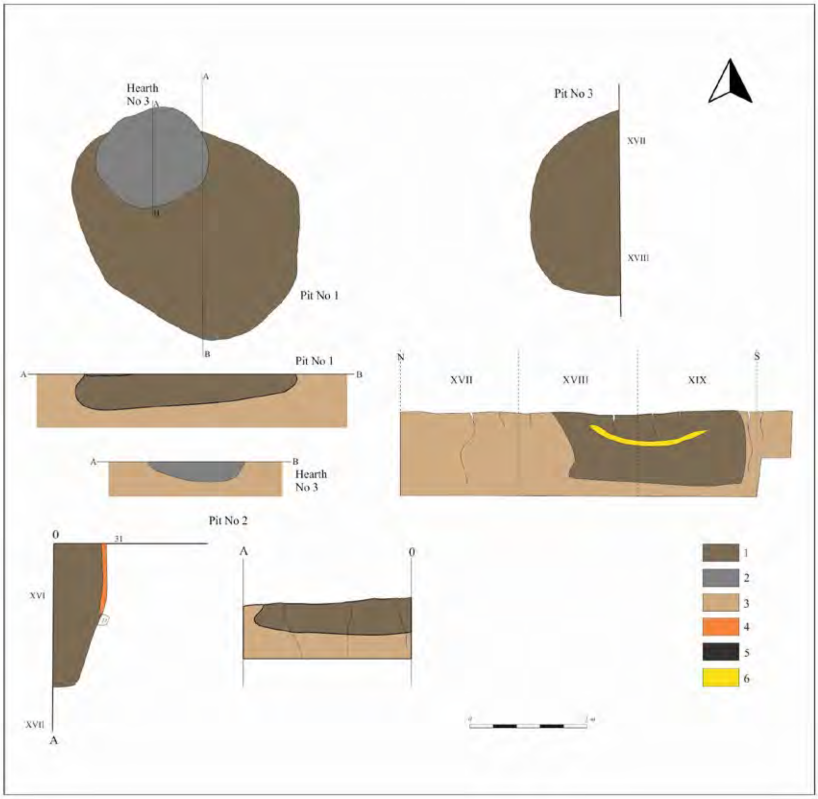

Fig. 5. Bargat El-Shab. Plans and profiles of pits 1, 2, 3 and hearth 3. Key: 1 – grey-brownish sand with mix burnt matter and charred macroscopic plant remains; 2 – strongly consolidated dark grey sand mixed with ash and charcoal; 3 – heavily cemented sediment-brown sandy silt; 4 – red brown heavily consolidated calcinated sand with charcoal; 5 – charcoals; 6 – light grey sand. Drawn: P. Bobrowski. Computer graphics: P. Wiktorowicz.

Lithics

Stone materials constitute the most numerous group of artefacts. In total, over 16,000 artefacts made of stone raw materials were registered within the E-05-1/2 trench. The largest number of artefacts was collected on the surface of the trench from an area spanning 100 m^2. These included 218 tools, 83 cores and 8638 debitage pieces (Fig. 3). In the section of the trench where excavation work was conducted, there were 39 tools, 13 cores and 4524 debitage pieces, while a total of 3176 stone artefacts, including 30 cores and 28 tools, were obtained from the fills of the features.

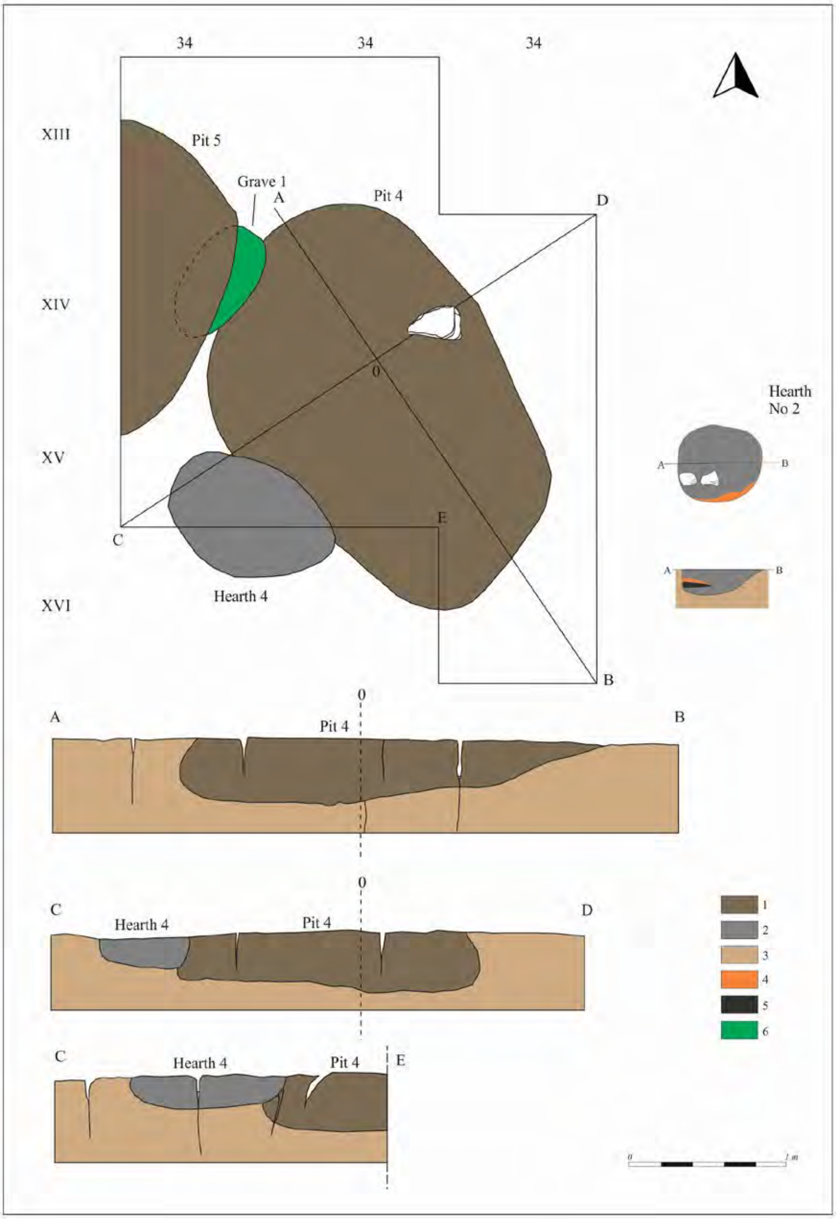

Fig. 6. Bargat El-Shab. Plans and profiles of pits 4, 5 and hearths 2, 4.
Key: 1 – grey-brownish sand with mix burnt matter and charred plant macroremains; 2 – strongly consolidated dark grey sand mixed with ash and charcoal; 3 – heavily cemented sediment-brown sandy silt; 4 – red brown heavily consolidated calcinated sand with charcoal; 5 – charcoals; 6 – pit of grave 1.
Drawn: P. Bobrowski. Computer graphics: P. Wiktorowicz.

The assemblage from the surface presents a large degree of variation in terms of the stone raw materials that were recorded (quartz, Egyptian flint, chert, quartzitic sandstone, petrified wood and ferruginous sandstone) along with another six varieties of stone used only occasionally (chalcedony, sandstone, agate, granite calcite and basalt). A relatively uniform technology appears to have been used in the production of blanks within each raw material category. A single platform core was prevalent primarily for flakes and less often blades. The group of tools recorded was also varied and included both older-type tools (el Adam phase), such as endscrapers on flakes, notches and denticulate made of sandstone and quartzitic sandstone as well as later-type tools, such as perforators made primarily from blade blanks of Egyptian flint, chert, fossilized wood, as well as a significant number of microlithic tools, primarily triangles made of flint and chert (Fig. 7).

The most homogenous material was recovered from the excavated features (Table 1). The most representative group are artefacts found in the largest Pit 1 (Fig. 8) and Pit 4 (Figs. 9–10) as well as the partially investigated Pit 3 (Figs. 11–12). These artefacts essentially duplicate the list of stone raw materials recorded on the surface. Quartz and Egyptian flint were the dominant raw materials in all of them. The percentage of quartz in individual clusters ranged from about 52% (Pit 1) to 88% (Pit 4), while the percentage of flint ranged from nearly 9% (Pit 4) to over 35% (Pit 1). The percentage of raw materials such as chert or petrified wood is less significant and even more marginal in the case of other materials.

Table 1. Bargat El-Shab. Site E-05-1/2. Frequencies of different categories of stone artefacts in excavated features.

Feature	**Cores**	**Tools**	**Debitage**	**Total**
Pit 1	–	3	265	**268**
Pit 2	–	–	5	**5**
Pit 3	5	7	682	**694**
Pit 4	25	16	2114	**2155**
Pit 5	–	3	140	**143**
Hearth 2	–	1	7	**8**
Hearth 3	–	–	32	**32**
Hearth 4	–	1	13	**14**
Total	**30**	**28**	**3118**	**3176**

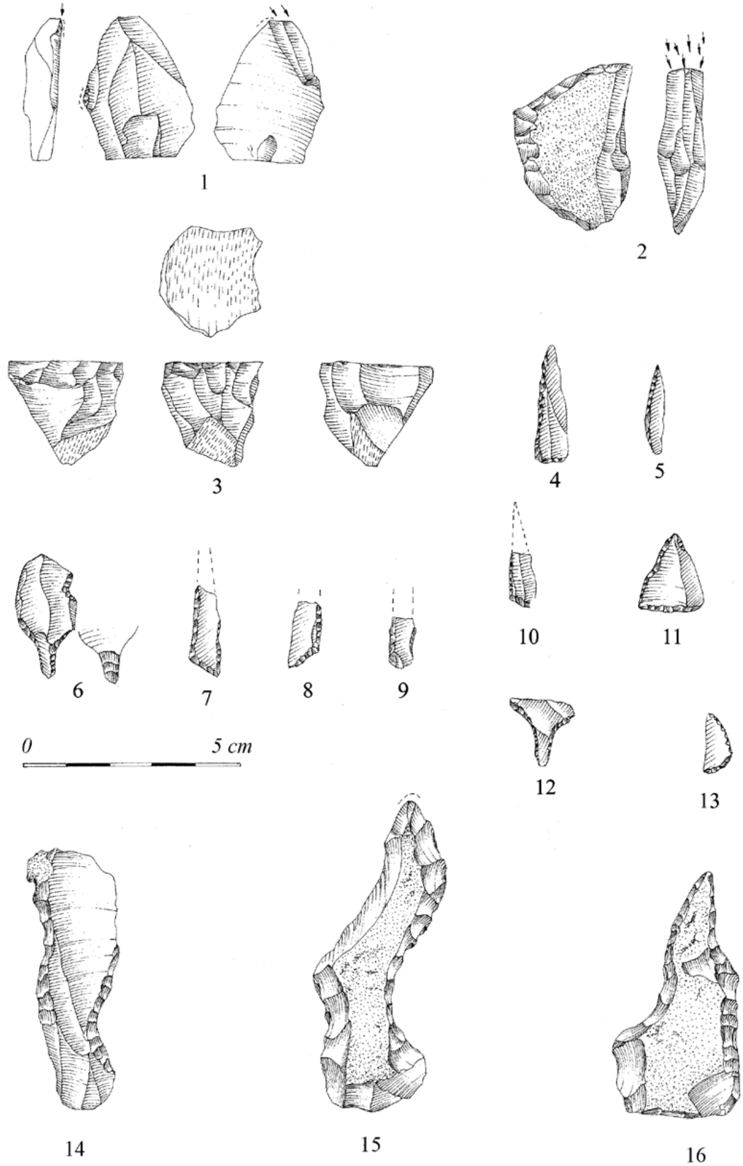

Fig. 7. Bargat El-Shab. Site E-05-1/2. Core and retouched tools from surface collection. 1, 2 – burins; 3 – core; 4, 7, 8, 9, 10, 11– triangles; 5, 13 – arch-backed piece; 6 – point; 12 – trapeze; 14 – notched piece; 15, 16 – notched piece + perforator. Drawn: P. Bobrowski and M. Puszkarski. Computer graphics: P. Rutkowska.

Regardless of the type of raw material, stone artefacts were usually small, and their maximum size did not exceed 50 mm. In terms of quartz exploitation in the three above mentioned features, small pieces of core exploitation, such as chips or chunks and unspecified forms of cores, flakes and blades were prevalent. Among the specified specimens, the most numerous were flakes originating from single platform cores and primary flakes.[3] Blades and flakes from double platform multi-platform cores were of incidental frequency. Non-oriented forms and waste were also prevalent among the flint pieces found in Pit 1, Pit 3 and Pit 4. The majority of oriented debitage comprised flakes separated from single platform cores.[4] Individual pieces of small blades (not exceeding 30 mm in length) originating from single platform cores were recorded in all pits. Flakes from reoriented cores were also found only occasionally. A few debitage pieces of other raw materials were also separated from the single platform cores. An small number of cores were recorded in the features, with the vast majority of them in fragmented state or having non-oriented forms.

The basic raw material in tool manufacture was Egyptian flint.[5] The most numerous and typologically diverse set of tools was found within Pit 4 (Table 2). An endscraper with a symmetrically circular, slightly denticulate scraping blade (Fig. 9:11), two notched blades and a combined tool – perforator + notched blade were recorded (Fig. 9:9–10, 12). Inserts included a segment with retouch and an obtuse triangle measuring 20 × 5 × 4 mm (Fig. 9:13–14). The most numerous category in the group of tools were retouched blades and flakes (Fig 9:5, 7–8). A varied set of tools was also recorded in Pit 3 (Table 2; Fig. 11), including a combined tool made of a blade from a double platform core and a double endscraper. A single segment was also recorded within Pit 1 (Fig. 8:2), while an obtuse triangle was found in Hearth 2 (Fig. 8:10).

Stone implements

Within the examined area of trench 2, several dozen fragments of macrolithic tools were found both on the surface and within the layers, constituting mainly the lower or upper fragments of grinding stones. Thirteen pieces were recorded in the fills of the features. Prevalent here were fragments of oval discoidal pestles with rounded

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3 The largest collection of flakes from single platform cores with similar metric values was recorded in Pits 3 and 4. Their size ranges from 16 × 20 × 4 mm to 32 × 28 × 9 mm, with an average length of 23 mm, a width of 19 mm and a thickness of 6 mm (Pit 4). Primary flakes were slightly larger in size.

4 The pieces found in Pit 3 and Pit 4 were for the most part short with their width wider than the length, which is reflected in the average dimensions: length 19 mm, width 24 mm and thickness 5 mm. The dimensions of the smallest flake found in Pit 4 were 10 × 21 × 5 mm, while the largest was 25 × 30 × 5 mm. Most of the pieces had lisse buts.

5 Out of the 31 tools found within all examined features, 25 were made of flint, 2 of quartz (fragment of segment – Pit 1 and retouched flake – Pit 4) and 1 of petrified wood (double back perforator – Pit 3), chert (segment – Pit 4), chalcedony (perforator – Pit 5) and quarzitic sandstone (notch – Pit 5).

edges on both sides and on both working surfaces (Figs. 10:1; 12:3). Lower fragments of querns were less common (Pit 4 and Pit 5). In addition, two oval-shaped polishing stones featuring a single highly polished surface were found (Pit 5). Almost all the tools were made of fine-grained sandstone in various colours. Exceptions included a grinder with a pestle made of quartzitic sandstone found in Pit 3. A piece measuring 82 × 87 × 56 mm had traces of heavy smoothing on a single flat surface and fractures on the edges and on the flat surface. Remains of ochre were observed on its surface (Fig. 13). Two small lumps of ochre were also found in the same feature. In addition, small lumps of limonite or limonite tablets were found in the features in Pit 1 (1) and in Pit 4 (3), as well as talc in Pit 4. Two extremely interesting macrolithic tools were found within the layer adjacent to the pits (Pit 4 and Pit 5), made of petrified wood and flint. Both were probably used as shovels for digging pits (Fig. 14:A, B).

Table 2. Bargat El-Shab. Site E-05-1/2. Frequencies of different types of retouched tools in excavated features.

	Feature					
Type of Tool	**Pit 1**	**Pit 3**	**Pit 4**	**Pit 5**	**Hearth 2**	**Hearth 4**
End scraper	–	1	1	–	–	–
Notch	–	–	2	1	–	–
Borer	–	1	–	1	–	–
Perforator	–	1	–	1	–	–
Denticulate	–	1	–	–	–	–
Segment	1	–	1	–	–	–
Triangle	–	–	1	–	1	–
Retouched Flake	1	–	3	–	–	1
Retouched Blade	1	2	6	–	–	–
Combined tool	–	1	1	–	–	–
Fragments of tool	–	–	1	–	–	–
Total	**3**	**7**	**16**	**3**	**1**	**1**

Pottery

Only a few fragments of ceramic vessels were registered within the surveyed part of site. Within the layers, three not very characteristic vessel fragments were found, and five more were discovered within the features. All had polished surfaces, were brown (in various shades) or red in colour, and had admixtures of various-sized granite/grano-diorite pieces in the ceramic fabric. In Pit 4, three fragments of vessels were found, including one rather uncharacteristic fragment of a rim (Fig. 10:2), and two decorated body fragments (Fig. 10:4–5). Both had the Rocker Stamp motif with very regular impressions relating to R1 according to (Nelson *et al.*, 2002: 27; Gatto 2002: 69–70). A single sherd with a Stem and Leaf motif – type R5 (Nelson *et al.*, 2002: 27; Gatto 2002: 69–70; Fig. 12:1) was found. A small fragment of a vessel without an ornament was also recovered from Pit 5.

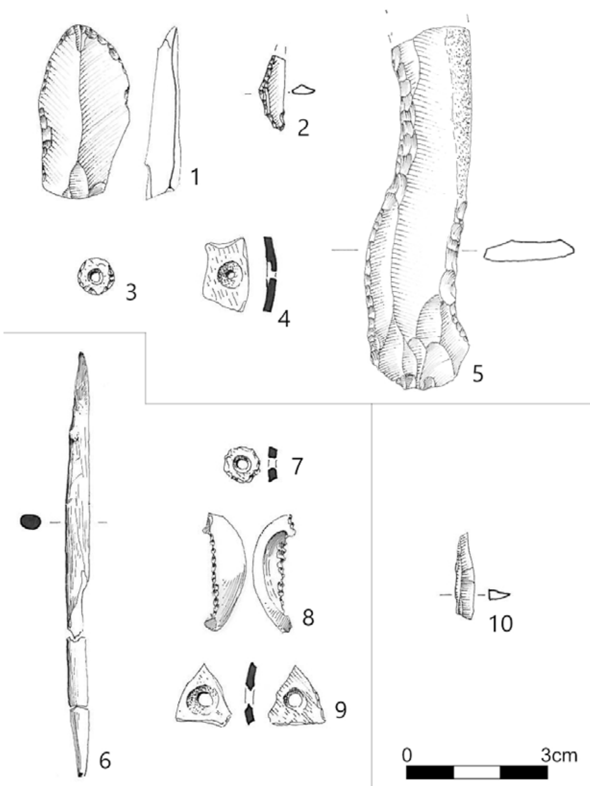

Fig. 8. Bargat el Shab. Site E-05-1/2. Retouched tools and bone and shell implements from pit 1 and hearth 2, 3. Pit 1: 1– retouched piece; 2 – segment; 5 – notched piece; 3 – ostrich egg shell bead; 4 – bead preform. Hearth 3: 6 – bone point, 7, 9 – egg shell bead and preform; 8 – cowry shell fragment. Hearth 2: 10 – triangle.
Drawn: P. Bobrowski and M. Puszkarski. Computer graphics: P. Rutkowska.

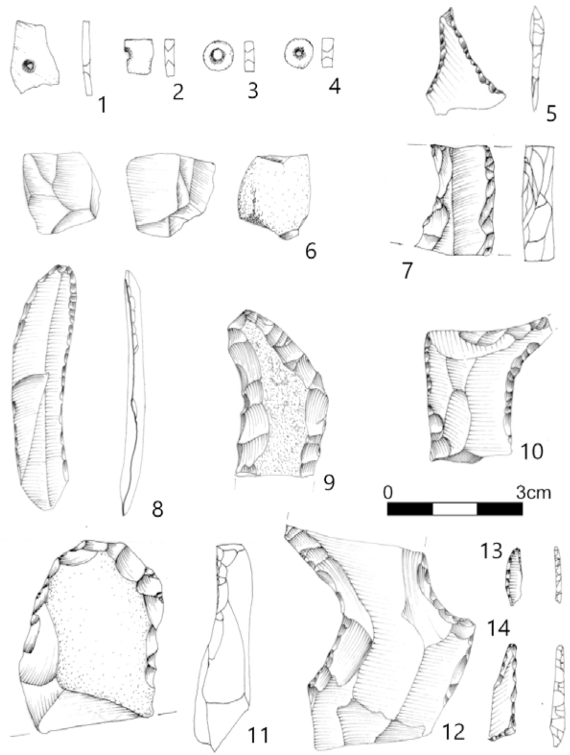

Fig. 9. Bargat El-Shab. Site E-05-1/2. Retouched tools and shell implements from pit 4. 1–4 – ostrich egg shell bead and performs; 5 – trapeze; 6 – core; 7, 12 – fragment of notched piece; 8, 9 – retouched piece; 10 – perforator; 11– end-scraper; 13 – segment; 14 – triangle. Drawn: P. Bobrowski and M. Puszkarski. Computer graphics: P. Rutkowska.

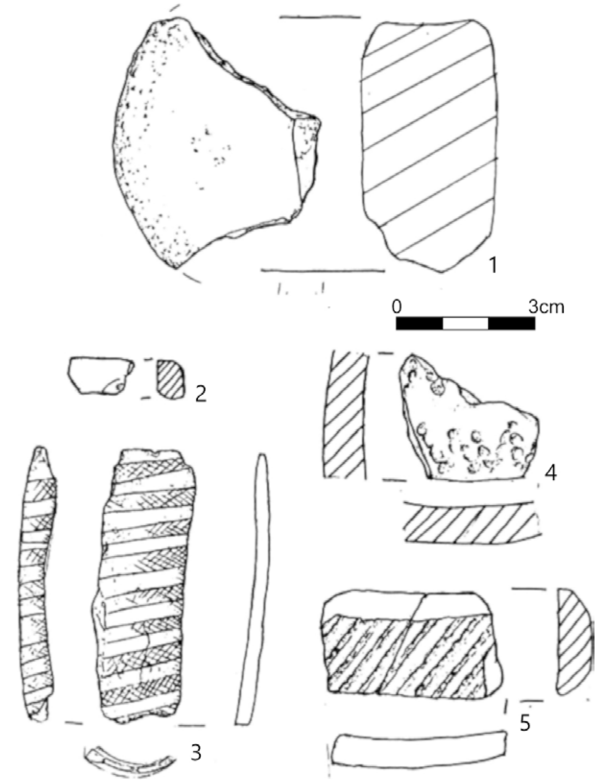

Fig. 10. Bargat El-Shab. Site E-05-1/2. Lithic tool, pottery and bone implement from pit 4. 1 – fragment of grinding stone; 2, 4, 5 – pottery; 3 – decorated bone object. Drawn: P. Rutkowska and M. Jórdeczka. Computer graphics: P. Rutkowska.

Personal adornments

One of the most common categories of artefacts found during the survey work were fragments of ostrich eggs, semi-finished products and ready-made beads. Within the excavated features, a total of 36 finished beads (Hearth 3, Pit 1, Pit 3, Pit 4) and 22 semi-finished products were distinguished (Figs. 8:3–4, 7, 9; 9:1–4; 11:3).[6] In the immediate vicinity of the excavation on the surface, a calibrator[7] probably used to manufacture beeds from ostrich was found.

Bone and shell implements

Found within the Hearth 3 was a bone point (spindle-shaped), sharpened on both ends, 105 mm long and maximum 4 mm in diameter. It was probably made from a bone of a large ruminant (Fig. 8:6).

An exceptional find is a small fragment of a richly decorated object, probably made from a bone of a small ruminant, perhaps an antelope. It is probably a type of plaque, pendant or other object with a rectangular shape and an curved section, measuring 66 × 20 × 4 mm. The ornament has alternating parallel, slightly diagonal stripes, with a smooth surface or a diagonal chequered hatching. Along one of the edges, the hatching pattern also passes into smooth stripes. The object most likely also had a drilled hole in its lower (damaged) part (Figs. 10:3; 14:C). A damaged fragment of a cowrie shell with traces of treatment (Fig. 8:8) and of a Nile oyster was found in the fill of Hearth 3.

Animal remains

A total of 1154 remains of animal origin were found within the E-05-1/2 trench. They were spread over the surface of the site as well as in its layers and in features. Osteological remains were almost completely mineralised and light in colour (ranging from beige to white and grey). Their high fragility and brittleness indicated a significant loss of organic components – collagen. Their poor state of preservation was reflected by the low percentage of identified remains (Table 3).[8]

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6 Most were found within Pit 4: 25 beads and 10 semi-finished products. 7 beads and 6 semi-finished products were found in Pit 3. Individual pieces were also found within Hearth 3, as well as Pit 1 and Pit 5. The smallest piece was 5 mm in diameter with a 2 mm diameter hole, while the largest was 8 mm in diameter with a 3 mm diameter hole. However, the vast majority (especially the pieces found in Pit 4) had standardized dimensions of 6 mm and 3 mm respectively, and were drilled on one side. Pieces drilled from both sides were the exception. There were also very few beads with rough denticulate edges.

7 See: Connor 1984: 239; Jórdeczka *et al.*, 2013: 275–276.

8 Animal remains are preserved much longer on the surface in a desert environment than in a more humid climate. The skeleton of a large mammal ultimately decomposes in the course of 25 years (Denys 2002). Fractures usually appear in long bones, parallel to the long axis on the shaft (diaphysis), forming an irregular mosaic on the epiphysis. The surface of the bone is flaky. These type of fractures were noted in bone material from the Bargat site. Most of the remains from the "unidentified" category were in the form of long "splinters", being a result of the fracturing of the long bone shaft. Yet it was the next taphonomic stage – the deposit of the remains in silt – that had a decisive influence on the preservation of the osteological material.

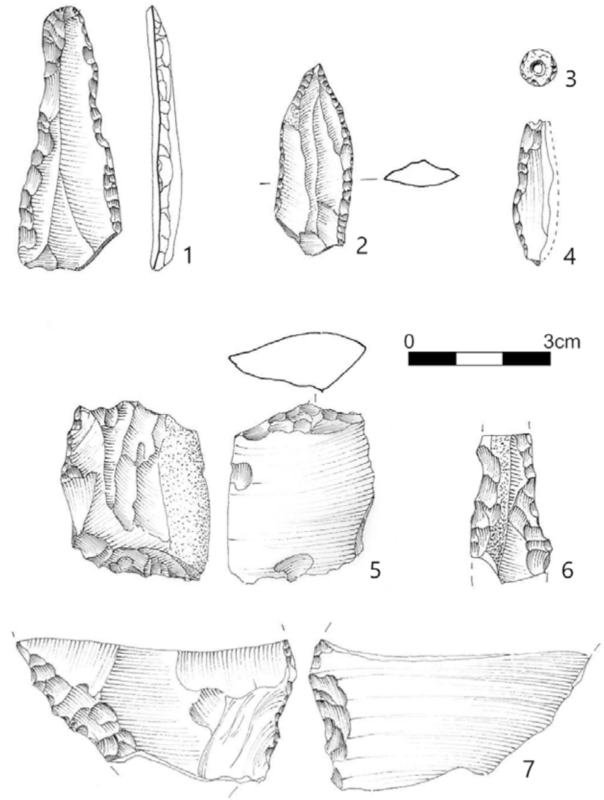

Fig. 11. Bargat El-Shab. Site E-05-1/2. Retouched tools and bone and shell implements from pit 3: 1 – endscraper + denticulated blade; 2 – perforator; 3 – ostrich egg shell bead; 4 – fragment of doubleback perforator; 5 – endscraper; 6 – fragment of denticulated blade; 7 – denticulated flake. Drawn: P. Bobrowski and M. Puszkarski. Computer graphics: P. Rutkowska.

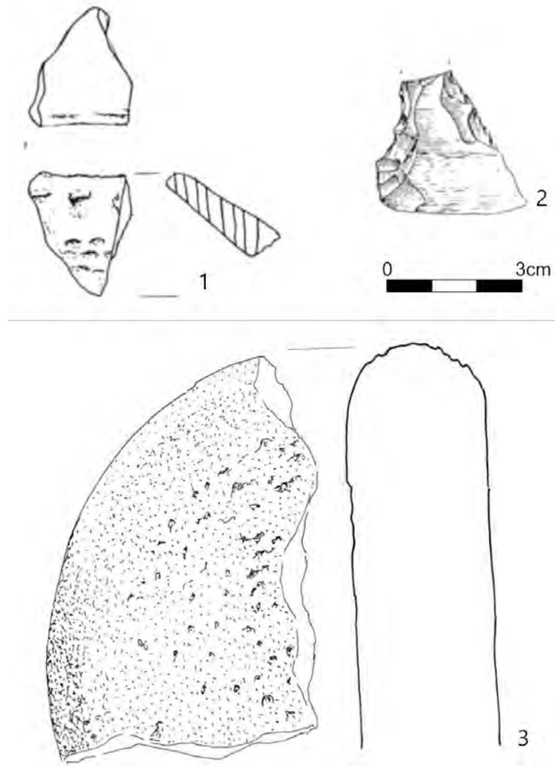

Fig. 12. Bargat El-Shab. Site E-05-1/2. Retouched tools and bone and shell implements from hearth 4 and pit 3. Harth 4: 1 – pottery; 2 – retouched piece; Pit 3: 3 – fragment of grinding stone. Drawn: P. Rutkowska and M. Jórdeczka. Computer graphics: P. Rutkowska.

Table 3. Bargat El-Shab. Site E-05-1/2. Species distribution of animal remains.
A – from surfaces and layers; B – from excavated features.

SURFACE AND LAYERS		
Taxa	**n**	**%**
Bos spp. (domestica cattle?)	48	16.5
Gazela dorkas	94	32.3
Gazela dama	0	–
Ovis/Capra	3	1.0
Lepus capensis	19	6.5
Ostrich eggshell	114	39.2
Zoothecus	13	4.4
NISP	291	100/31.6
Unidentified	629	68.4
Total	**920**	**100**

FEATURES							
		Pit			**Hearth**		
Taxa	**n**	**1**	**3**	**4**	**2**	**3**	**%**
Bos spp. (domesticated cattle?)	12	12	–	–	–	–	15.2
Gazela dorkas	36	24	4	3	2	3	45.5
Gazela dama	2	–	2	–	–	–	2.5
Ovis/Capra	0	–	–	–	–	–	-
Lepus capensis	27	19	2	–	6	–	34.2
Ostrich eggshell	–	–	–	–	–	–	-
Zoothecus	2	2	–	–	–	–	2.5
NISP	79	–	–	–	–	–	100/33.8
Unidentified	155	122	9	8	3	13	66,2
Total	**234**	**179**	**17**	**11**	**11**	**16**	**100**

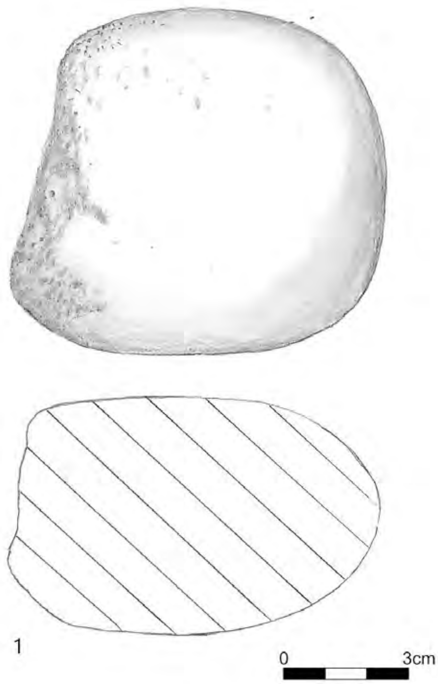

Fig. 13. Bargat El-Shab. Site E-05-1/2. Pit 3: Grinding stone and pestle of quartzitic sandstone. Drawn: M. Jórdeczka.

Fig. 14. Bargat El-Shab. Site E-05-1/2. Retouched tools and bone implement from layers and pit 4. Layers: A–B – macrolithic tools made of petrified wood and flint; Pit 4: C – decorated bone object. Photo: M. Jórdeczka.

Mammal (*Mammalia*) skeletal elements predominated in the faunal material from the area of the Bargat site. Apart from that, fragments of eggshell of the common ostrich (*Struthio camelus*) as well as fragments and entire shells of land snails (*Zoothecus* sp.) were noted.

During archaeozoological analysis, the collections of remains originating from the site surface and from the fills of features were examined separately. Both in the layers and in the features (Table 3), the dorcas gazelle (*Gazella dorcas*) was the most frequently occurring species. The second most numerous group of remains on the surface of the site and in the layers consisted of fragments of ostrich eggs, while the second largest group in the fills of features was made up of fragments of cape hare skeletons (*Lepus capensis*). Interestingly, in both collections the bone remains of the *Bos* species, or cattle, appeared in similar proportion. The high level of destruction of the remains did not allow for their unambiguous identification as to whether they were remains of a wild species or of domesticated cattle. Only a few fragments of the skeletons of domesticated small ruminants – sheep and goats – were noted in the layers and on the surface. Also, a few bone fragments of the dama gazelle were noted though only in the features (*Gazella dama*). Snail shells were more numerous on the surface and in layers than in feature fills.

Although the anatomical distribution of the most represented species was influenced by many taphonomic factors, the obtained data clearly indicate the post-consumption nature of the mammalian remains. This is evidenced by the high proportion of remains from the most attractive (in terms of consumption) parts of the carcass (trunk, proximal parts of the limbs). The high percentage of "head" remains was affected by the teeth, as elements which are well-preserved and relatively easy to identify. The presence of phalanges (digital bones) in the anatomical distribution of the individual species should be emphasized here. Their presence proves that at all stages, the division of the carcass was carried out within the site. This was the case with small animals like the dorcas gazelle and the hare. Yet we observe a different situation in the case of cattle. The lack of digital bones suggests that the initial stages of division, such as skinning, were carried out outside the surveyed area, most likely at the animal slaughter site. Yet the imbalance of remains between the thoracic and pelvic limb indicates that the most abundant and most caloric parts of the large animal carcass were brought to the site.

Comparing the species distribution of remains from surfaces and underground features, we can hypothesize that the material on the surface is a set derived from eroded layers. The main part of the osteological assemblage originated from one settlement phase. This is indicated not only by very similar taxonomic lists but also by the proportions in which individual species were recorded. It is likely that only the remains of sheep and goats are from the later phase of settlement of this area.

Plant remains

Samples designated for archaeobotanical research were collected primarily from explored pits and hearths.[9] The diaspores and wood remains present in the examined material appeared in charred form and were for the most part relatively well-preserved, which allowed their taxonomic identification. Some of the specimens showed traces of secondary mechanical damage and deformation on the surface, probably caused by high temperatures (Lityńska-Zając and Wasylikowa 2005: 208). Individual diaspores were crushed and appeared in fragments. Charcoal pieces usually had a well-preserved anatomical structure, although there were also signs of damage on the surface. The few uncharred specimens that look fresh, such as straw fragments of Poaceae indet. and the fruit of the *Taraxacum* sp. with the remains of pappus, are most likely modern-day impurities, probably resulting from the transport of diaspores by the wind.

Based on the preserved plant remains, wild sorghum kernels *Sorghum bicolor* subsp. *arundinaceum* were determined, as well as fruit and seeds of *Capparis decidua, Schouwia* sp., *Ziziphus* sp., *Echinochloa colona*, *Astragalus vogelli* and *Astragalus* type and undermined speciemes from the families: Cyperaceae indet., Poaceae indet. and Fabaceae indet. In terms of quantity, the remains of *Capparis* and *Ziziphus* were predominant in the examined material. Charcoal fragments showed relatively little diversification in terms of taxonomy. Found here were wood from the tamarisk *Tamarix* sp., acacia *Acacia* sp. and jujube *Ziziphus spina-christi* (Table 4).

In addition to paleoecological data, plant materials provide information on human activity. This includes the definition of the strategy applied by prehistoric communities to meet their basic needs to obtain food, among other things (Van der Veen 2006; López-Dóriga 2012). Based on the data collected in Bargat El-Shab and numerous sites near Nabta Playa, we can assume that some of the plants mentioned were seasonally gathered by the inhabitants of the former site. Some of these plants were collected and stored as food reserves, such the seeds of various species from the grasses family *Poaceae*. Wild grasses have relatively large and farinaceous caryopses which contain large amounts of starch, as well as carbohydrates, protein, fat and fibre. Other foods, such as the ripe fruit of the *Ziziphus* may be consumed raw. Similarly, the fruit of the *Capparis* could be eaten raw without any special preparation needed (El Hadidi 1985; Wasylikowa 1997; Fahmy 2014; Lucarini 2014; Lucarini and Radini 2015; Lityńska-Zając and Wasylikowa 2018). Most of the charcoal found probably constitutes the remains of fuel (Asouti and Austin 2005) used by the inhabitants of the sites. We can assume that wood was gathered in the direct vicinity of human settlements.

9 The laboratory analyses and identification of macroscopic plant remains extracted in the field laboratory were carried out in accordance with the procedures used in archeobotany (e.g., Wasylikowa 1997; Lityńska-Zając 2010).

Table 4. Bargat El-Shab. Site E-05-1/2. List of macroscopic plant remains and their distribution in excavated features.

		Hearth			Pit			
Taxa name	**Kind of remains**	**2**	**3**	**4**	**3**	**4**	**5**	**Total**
Astragalus vogelli	seed	–	–	–	–	1		**1**
Capparis decidua	seed	–	–	2	–	7	4	**13**
Echinochloa colona	grain	–	–	2	–	1	1	**4**
Schouwia purpurea	seed	–	–	–	2	1	1	**4**
Sorghum bicolor subsp. *arundinaceum*	grain	–	–	–	1	–	1	**2**
Astragalus typ	fruit	–	–	–	1	–	–	**1**
Ziziphus sp.	seed	–	–	–	–	2	–	**2**
Cyperaceae indet.	grain	–	–	–	–	3	1	**4**
Fabaceae indet.	seed	–	–	–	–	1	–	**1**
Poaceae indet.	grain	–	–	–	–	2	–	**2**
Ziziphus sp.	fruit	–	–	–	2	34	–	**36**
Ziziphus spina-christi	charcoal	1	–	7	–	4	–	**12**
Acacia sp.	charcoal	1	–	8	–	21	22	**52**
Tamarix sp.	charcoal	11	9	108	–	209	–	**337**
Unidentified	seed	–	5	1	–	2	–	**8**
Unidentified	bark	4	–	–	–	1	–	**5**
Unidentified	thorn	–	–	–	–	1	–	**1**
Unidentified	charcoal	12	21	75	1196	6948	400	**8652**
Total		**29**	**35**	**203**	**1202**	**7238**	**430**	**9137**

ABSOLUTE CHRONOLOGY

The analysis of charcoal and plant macroremains registered in most of the features investigated enabled us to obtain a series of carbon dates, which in turn helped to determine their absolute chronology. Hearth 3 – 7940±50 BP (Poz-43808); Pit 3 – 7880±40 BP (Poz-43809); Pit 1 – 7860±40 BP (Poz-43806); Hearth 2 – 7790±40 BP (Poz-43807); Pit 4 – 7760±40 BP (Poz-54709); Pit 5 – 7435±35 BP (Poz-54708). Calibration of the dates allows us to place the settlement mainly in the first half of the seventh millennium cal BC, therefore during the Holocene climate optimum in the region. The features can thus be associated with the final settlement of the Early Holocene of the El Nabta / Al Jerar variant (Fig. 15).

THE SITE IN CONTEXT

The remains of the site recorded at site E-05-1 within trench 2, dated based both on the comparative method and absolute chronology, perfectly fits the image of Early Holocene settlement of the El Nabta/Al Jerar settlement phase in the Nabta – Kiseiba region. The specific architecture of the site with the remains of numerous pits and hearths, as well as the artefacts (lithic assemblage, vessel ceramics, bone products) and the specific structure of archeozoological and archeobotanical remains has numerous analogies in

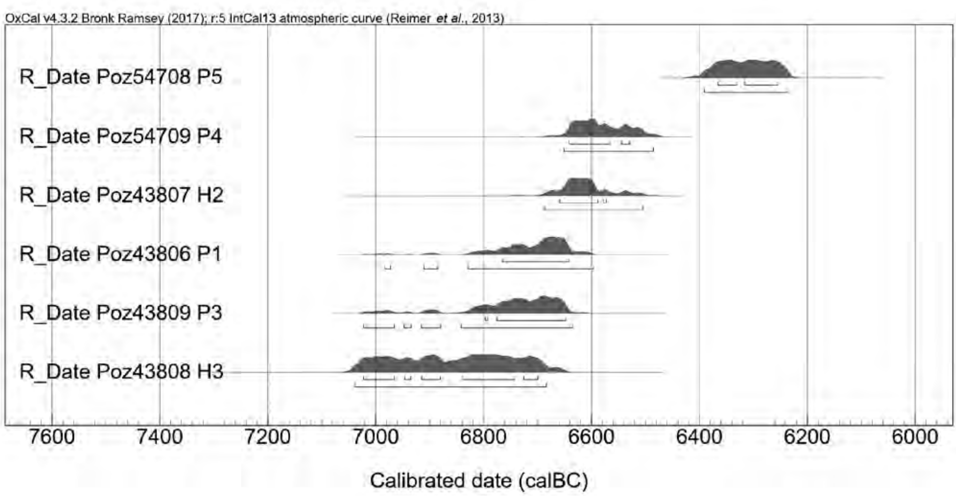

Fig. 15. Bargat El-Shab. Site E-05-1/2. Absolute chronology of excavated features. Results of calibration 14C dates (Poznan Radiocarbon Laboratory).

this area of the Western Desert (Close 1992; Close and Wendorf 1992; Wendorf and Close 1992; Wendorf *et al.*, 1992; Wasylikowa *et al.*, 1993; 1995; 1997; Wasylikowa and Mitka 1998). Features of similar form, and above all distinctive bell-shaped pits, but also hearths were discovered in the Nabta Playa region, at sites E-75-6 (Królik and Schild 2001) and in various locations at site E-91-1 (Wendorf *et al.*, 2001) and E-92-7 (Królik and Fiedorczuk 2001). In terms of the structure of the raw materials, as well as from a technological and typological perspective, the lithic assemblage from the site at Bargat is comparable to those of the previously-mentioned sites. Analogies can be found in the artefacts from Pits 1 and 3 and Hearth 3 to the material from the so-called Horizon B at site E-75-6 associated with El Nabta type settlement (Królik and Schild 2001: 117–142). On the other hand, the remaining features, above all those from Pits 4 and 5 and are similar to material of Horizons A and C at the site associated with Al Jerar settlement (Królik and Schild 2001: 111–117, 142–146). Two vessel fragments of the so-called type R1 with the Rocker Stamp motif which were found in the fills of Pit 4 appear above all in the Al Jerar phase (Gatto 2002: 70). Meanwhile, the Stem and Leaf ornament motif – type R5, which appears on a single fragment from Hearth 4, was featured on vessel ceramics during the El Nabta and Al Jerar phases (Gatto 2002: 70).

SUMMARY

The site at Berget El-Sheb is located in the driest part of the Sahara, where irregular precipitation currently occurs once every few years. A direct consequence of the weather conditions and edaphic environment prevalent in the region discussed is very scarce vegetation, limited to a few trees and very few herbaceous plants growing near springs (e.g., Bornkamm 1986; Mitka and Wasylikowa 1995; Wasylikowa and Mitka 1998). The results of surveys at site E-05-1 clearly indicate that in 7000 cal BC, during the Holocene climatic optimum, the Bargat el Shab region featured dry Sahel conditions and a semi-arid climate. It was a place which was settled multiple times by nomadic Epipaleolithic / Neolithic (?) peoples representing the El Nabta / Al Jerar settlement variant; this has been confirmed by comparative, relative as well as absolute chronology. The key factor allowing for long-term settlement was access to fresh drinking water. The conditions prevailing at the shores of the lake and beds of seasonal rivers were beneficial to growth of relatively lush vegetation which provided food for people and animals (fodder?), as well as fuel. The use of plants as food is confirmed by the discovery of querns and pestles. The analysis of animal remains from the Neolithic site in Bargat El-Shab, albeit of a relatively tentative manner, provided essential data about the ecosystem and the adaptive strategies and exploration of fauna inhabiting the area. Wild animals: gazelles (dorcas and dama) and hares were the main sources of meat. However, archeozoological materials do not provide any clear convincing information as to whether cattle at the site was wild or domesticated. On the one hand, the image of the exploitation of fauna formulated on the basis of analysis results are well in line with existing opinions on Early Holocene pastoral communities (e.g., Osypińska 2018). Herds of ruminants (cattle, sheep and goats) which required great effort to maintain, were rather the source of in vivo benefit: capital, milk or manure. Very often cattle in particle played a cultural and sacral role. The meat of breeding animals in such communities is eaten only occasionally. The first choice in terms of a source of meat is game, or in this case gazelles and hares. In such a situation, the osteological materials from the Bargat El-Shab site reflect such a type of environmental exploration and model of ruminant breeding. On the other hand, at this phase of the research, we have to agree with the arguments regarding the domestication of cattle and hence the neolithization of the Western Desert that were recently presented by Michael Brass (2018: 108). He suggests:

> "… a different perspective on the hydroclimatic conditions there during the early Holocene. It, together with revisiting the botanical data, strongly indicates that the early Holocene ecology at Nabta Playa – Bir Kiseiba was capable of supporting both small game animals such as hares, medium-sized bovids beyond gazelles such as hartebeest and wild Bos, and other semi-arid adapted animals. The lithic assemblages too are similar to hunter-gatherer toolkits, possessing no significant distinguishing features indicative of herding (Kuper and Kröpelin 2006; Riemer 2007)".

REFERENCES

Asouti, E. and Austin, P. 2005. Reconstructing woodland vegetation and its exploitation by past societies, based on the analysis and interpretation of archaeological wood charcoal macro-remains. *Environmental Archaeology* 10: 1–18.

Bobrowski, P., Jórdeczka, M., Mańka, D., Królik, H., Schild, R. and Wendorf, F. 2010. The Combined Prehistoric Expedition in Nubia 2003–2008. *Gdańsk Archaeological Museum African Reports* 6: 15–30.

Bornkamm, R. 1986. Flora and vegetation of some small oases in S-Egypt. *Phytocoenologia* 14: 275–284.

Brass, M. 2018. Early North African cattle domestication and its ecological setting: A reassessment. *Journal of World Prehistory* 31: 81–115.

Bronk Ramsey, C. 2017. Methods for Summarizing Radiocarbon Datasets. *Radiocarbon* 59(2): 1809–1833.

Close, A. E. 1992. Holocene Occupation of the Eastern Sahara. In F. Kless and R. Kuper (eds), *New Light on the Northeast African Past Africa Prehistorica vol. 5*, 155–183. Köln.

Close, A. E. and Wendorf, F. 1992. The Beginnings of Food Production in the Eastern Sahara. In A. B. Gebauer and T. D. Price (eds), *Transitions to Agriculture in Prehistory*, 63–72. Madison.

Connor, D. R. 1984. Report on Site E-79-8. In A. E. Close (ed.), *Cattle–keepers of eastern Sahara. The Neolithic of Bir Kiseiba*, 217–250. Dallas, Southern Methodist University.

Denys, C. 2002. Taphonomy and experimentation. *Archaeometry* 44(3): 469–484.

El Hadidi, M. N. 1985. Food plants of prehistoric and predynastic Egypt. In G. F. Wickens, J. R. Goodin and D. V. Field (eds), *Plants for Arid Lands. Proceedings of the Kew International Conference on Economic Plants for Arid Land held in the Jodrell Laboratory, Royal Botanic Gardens, Kew, England, 23–27 July 1985*, 87–92. London, Boston, Allen & Unwin.

Fahmy, A. G. 2014. Plant food resources at Hidden Valley. In B. E. Barich, G. Lucarini, M. A. Hamdan, and F. A. Hassan (eds), *From Lake to Sand. The Archaeology of Farafra Oasis, Western Desert, Egypt*, 333–344. Florence, All'Insegna del Giglio.

Gatto, M. C. 2002. Early Neolithic pottery of Nabta-Kiseiba area: stylistic attributes and regional relationships. In K. Nelson and Associates, *The pottery of Nabta Playa (Holocene Settlement of Egyptian Sahara, vol. 2)*, 65–78. New York.

Jórdeczka, M., Królik, H., Masojć, M. and Schild, R. 2013. Hunter-Gatherer Cattle-Keepers of Early Neolithic El Adam Type from Nabta Playa. Latest Discoveries from Site E-06-1. *African Archaeological Review* 30: 253–284.

Królik, H. and Fiedorczuk, J. 2001. Site E-92-7. An Al Jerar and Late Neolithic Settlement. In F. Wendorf, R. Schild and Associates (eds), *Holocene Settlement of the Egyptian Sahara*, *vol. 1. The Archaeology of Nabta Playa*, 331–351. New York, Boston, Dordrecht, London, Moscow.

Królik, H. and Schild, R. 2001. Site E-75-6. An El Nabta and Al Jear Vilage. In F. Wendorf, R. Schild and Associates (eds), *Holocene Settlement of the Egyptian Sahara, vol. 1. The Archaeology of Nabta Playa*, 111–144. New York, Boston, Dordrecht, London, Moscow.

Kuper, R. and Kröpelin, S. 2006. Climate-controlled Holocene occupation of the Sahara: Motor of Africa's evolution. *Science* 313: 803–807.

Lityńska-Zając, M. 2010. Archaeobotanical investigations on sites at Gebel Ramlah. In M. Kobusiewicz, J. Kabaciński, R. Schild, J. D. Irisch, M. C. Gatho and F. Wendorf (eds), *Gebel Ramlah. Final Neolithic Cemeteries from the Western Desert of Egypt*, 239–246. Poznań.

Lityńska-Zając, M. and Wasylikowa, K. 2005. *Przewodnik do badań archeobotanicznych*. Poznań, Vademecum Geobotanicum.

Lityńska-Zając, M. and Wasylikowa, K. 2018. The role of *Ziziphus* in the economy of Neolithic nomadic societies of the Sahara (S Egypt). In J. Kabaciński, M. Chłodnicki, M. Kobusiewicz and M. Winiarska-Kabacińska (eds), *Desert and the Nile. Prehistory of the Nile Basin and the Sahara. Papers in honour of Fred Wendorf*, 551–560. Poznań. Studies in African Archaeology 15.

López-Dóriga, I. L. 2012. Reconstructing food procurement in prehistory through the study of archaeological plant macroremains (seeds and fruits). In J. Cascalheira and C. Gonçalves (eds), *Actas das IV Jornadas de Jovens em Investigação Arqueológica*, 167–172. Faro. Promontoria Monográfica 16.

Lucarini, G. 2014. Exploitation and management of wild grasses at Hidden Valley, Farafra Oasis. In B. E. Barich, G. Lucarini, M. A. Hamdan and F. A. Hassan (eds), *From Lake to Sand. The Archaeology of Farafra Oasis, Western Desert, Egypt*, 345–367. Florence.

Lucarini, G. and Radini, A. 2015. A disowned nobility: the role and exploitation of wild plants in north Africa during the Holocene, analyzed through an integrated functional analysis on stone tools. In *Revolutions the Neolithisation of the Mediterranean Basin: the transition to food-producing economies in North Africa, Southern Europe and the Levant. Workshop. October 29–31, 2015. Berlin. Programme, Abstracts*, 15–17. Berlin.

Mitka, J. and Wasylikowa, K. 1995. Numerical analysis of charred seeds and fruits from an 8000 years old site at Nabta Playa, Western Desert, south Egypt. *Acta Palaeobotanica* 35(1): 157–162.

Nelson, K. and Associates. 2002. *Holocene settlement of Egyptian Sahara, The pottery of Nabta Playa, vol. 2*. New York.

Osypińska, M. 2018. *Krowie królestwa. Zwierzęta w historii doliny środkowego Nilu. Studium archeozoologiczne*. Warszawa.

Reimer, P. J., Bard, E., Bayliss, A., Beck, J. W., Blackwell, P. G., Bronk Ramsey, C., Grootes, P. M., Guilderson, T. P., Haflidason, H., Hajdas, I., Hatt, C., Heaton, T. J., Hoffmann, D. L., Hogg, A. G., Hughen, K. A., Kaiser, K. F., Kromer, B., Manning, S. W., Niu, M., Reimer, R. W., Richards, D. A., Scott, E. M., Southon, J. R., Staff, R. A., Turney, C. S. M. and van der Plicht, J. 2013. IntCal13 and Marine13 Radiocarbon Age Calibration Curves 0–50,000 Years cal BP. *Radiocarbon* 55(4): 1869–1888.

Riemer, H. 2007. When hunters started herding. Pastro-foragers and the complexity of Holocene economic change in Western Desert of Egypt. In M. Bolling, O. Bubenzer, R. Vogelsang and H.-P. Wotzka (eds), *Aridity change and conflict in Africa. Proceedings of an International ACACIA Conference held at Königswinter, Germany, October 1–3 2003*, 105–144. Köln, Henrich Barth Institute.

Van der Veen, M. 2006. Food and Farming in the Libyan Sahara. In: D. Mattingly, S. McLaren, E. Savage, Y. al-Fasatwi and K. Gadgood (eds), *The Libyan Desert: Natural Resources and Cultural Heritage*, 171–178. London. The Society For Libyan Studies, Monograph 6.

Wasylikowa, K. 1997. Flora of the 8000 years old archaeological site E-75-6 at Nabta Playa, Western Desert, southern Egypt. *Acta Palaeobotanica* 37(2): 99–205.

Wasylikowa, K. and Mitka, J. 1998. Rola roślin w gospodarce wczesnoneolitycznej osady na stanowisku Nabta Playa E-75-6 w Egipcie na podstawie analiz ilościowych nasion i owoców. *Archeologia Polski* 43(1–2): 7–35.

Wasylikowa, K., Harlan, H. J., Evans, J., Wendorf, F., Schild, R., Close, A. E., Królik, H. and Housley, R. 1993. Examination of botanical remains from early Neolithic houses at Nabta Playa, Western Desert, Egypt, with special reference to sorghum grains. In T. Schaw, P. Sinclar, B. Andah and A. Okpoko (eds), *The Archaeology of Africa. Food, metals and towns*, 154–164. London–New York.

Wasylikowa, K., Schild, R., Wendorf, F., Królik, H., Kubiak-Martens L. and Harlan, J. R. 1995. Archaeobotany of the early Neolithic site E-75-6 at Nabta Playa, Western Desert, south Egypt (preliminary results). *Acta Paleobotanica* 35(1): 133–155.

Wasylikowa, K., Mitka, J., Wendorf, F. and Schild, R. 1997. Exploitation of wild plants by the early Neolithic hunter-gatherers in the Western Desert of Egypt: Nabta Playa as a case-study. *Antiquity* 71: 932–941.

Wendorf, F. and Close, A. E. 1992. Early Neolithic Food-Economies in the Eastern Sahara. In R. Friedmann and B. Adams (eds), *The Followers of Horus. Studies dedicated to Michael Allen Hoffman 1944–1990*, 155–162. Oxford. Egyptian Studies Association Publication No. 2.

Wendorf, F., Close, A. E., Schild, R., Wasylikowa, K., Hausley, R. A., Harlan, J. R. and Królik H. 1992. Saharan exploitation of plants 8000 years BP. *Nature* 359: 721–724.

Wendorf, F., Close, A. E. and Schild, R. 2001. Site E-91-1: An Al Jerar Phase Locality at Nabta Playa, Part I: The 1991–1997 Excavations. In F. Wendorf, R. Schild and Associates (eds), *Holocene Settlement of the Egyptian Sahara, vol. 1. The Archaeology of Nabta Playa*, 148–183. New York, Boston, Dordrecht, London, Moscow.

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Results of Geophysical Survey in Bargat El-Shab in Southern Egypt. Insight into the Early Holocene Settlement Pattern of the El Nabta / Al Jerar Interphase

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Global climatic changes which occurred at the beginning of the Holocene had a huge impact on cultural development in northeast Africa. The shift of the tropical rain zone to the north led to the transformation of the desert into a savannah. The appearance of vegetation and animals also attracted people to considerable areas of the southern part of the Western Desert in Egypt. Settlement was concentrated around natural depressions or deflation troughs, which during periods of rain would fill with water creating seasonal lakes or playas. One such place is the playa located in Bargat El-Shab. Particularly intense traces of settlement dated to the climatic optimum of the Holocene was discovered on the eastern shore of the palaeolake (Site E-05-1). Artefacts are dispersed over an area of over 2 ha. Excavation conducted in a few locations also uncovered the remains of storage pits, hearths, wells, etc., the fills of which are characterised by an enhanced magnetization of features in the ground. The geophysical survey conducted during the last season of research provided exceptionally interesting data allowing the partial recreation of the actual extent of the site and its relation with the lake basin.

KEY-WORDS: Early Holocene, Western Desert, settlements, magnetometry

INTRODUCTION

In 2019, a survey was conducted at the Bargat El-Shab site using a gradiometer to define the range and spatial structure of early Holocene settlement of the El Nabta / Al Jerar phase. The premise behind this survey was also to enable designation of the border between the coastal zone of the early Holocene reservoir and the settlement structures.

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For this purpose, profiling was applied with the use of a gradiometer within the measurement area located at Site E-05-1. The site is situated on the eastern edge of the basin, on a small elevated monadnock, made of Nubian sandstone and covered with a layer of lacustrine silty sands. The entire surface of the site, spanning around 250 m along the NS axis and 100–150 m along the EW axis, is covered with the remains of prehistoric settlement forming smaller and larger concentrations. The most legible concentration of artefactual material on the surface was observed within two distinct summits of the monadnock mentioned. Initial surface studies and excavations[1] were conducted within the area of two trenches E-05-1/1 and E-05-1/2 established at the locations of heavy concentration of stone artefacts on the surface (Bobrowski *et al.*, 2010). In the first trench, within a morphologically homogeneous layer, the presence of artefactual material from a variety of settlement phases was recorded, beginning with the oldest phase associated with the El Adam population, through artefacts associated with settlement of the climatic optimum of the Holocene of the damp El Nabta / Al Jerar phase to younger Neolithic settlement phases, referred to as Middle and Late Neolithic (Schild and Wendorf 2013: 128). The creation of this layer is associated with the exceptionally heavy deflation of the site and post-depositional processes. In the second trench, under a layer 5–30 cm thick also containing mixed multi-phase artefactual material, the bases of features – storage pits and hearths – were registered. The fills of these features contained quite frequent artefactual and archaeobiological material, including burnt plant remains. The typological analysis of the artefactual material, confirmed by absolute dating of the macroremains of plants, allows us to associate these features with the Late early Holocene El Nabta / Al Jerar settlement phase (Bobrowski *et al.*, 2010; 2020; Bobrowski 2019: 120).

The nearly homogeneous image of the entire surface, including the lack of any legible traces of archaeological structures on the surface makes recognition of the actual structure and extent of the settlement within the site described quite difficult. As mentioned above, recognition of the relation between prehistoric settlement and the Early Holocene lake reservoir was of particular significance. Given the limited time resources and the extent of regular excavation studies, the only chance here was to perform a non-invasive geophysical survey (magnetometer), based on magnetic anomalies that indicate the presence of fills of underground structures (pits and hearths) in certain locations (trenches E-05-1/2, E-05-1/4 and E-05-1/5) cause.

[1] The research was led by Przemysław Bobrowski as a part of the Combined Prehistoric Expedition in 2005–2006 and 2011–2012.

GEOLOGICAL AND GEOMORPHOLOGICAL SETTING

The El Bargat El-Shab playa is located about 16 km from Gebel Nabta (Nubia-Sheb Pediplain; see Osman 1999; Wendorf *et al.*, 2001: 11f). The catchment area of the Bargat El-Shab playa, which occupied a shallow depression at the foot of Gebel Bargat and measure up to 6 km² (Fig. 1). The central part of the basin is irregular in shape, about 4 km long along the northeast to south axis, and about 2 km wide in the east-west direction. The shape of the basin is determined by outcrops of erosion-resistant rocks to the west and east. Lake in Nabta Playa, the floor of the basin is covered by quaternary deposits, mostly composed of lacustrine and windblown sands created as a result of deflation processes during the Late Holocene (Wendorf *et al.*, 2001)

From a geological point of view, the area around Gebel Bargat El-Shab and Nabta Playa is dominated by a Maastrichtian-Eocene sedimentary succession divided into four main rock units: the Dungul Formation (late Eocene limestones), the Garra Formation (late Eocene-upper Palaeocene shales), the Kurkur Formation (Palaeocene limestones). The Late Cretaceous-Early Tertiary succession in the El Berget area is composed mostly of silty shales alternating with limestones. This sequence overlies a sandstone unit

Fig. 1. View of the El Bargat playa basin from the top of Gebel Bargat El-Shab. Photo F. Welc.

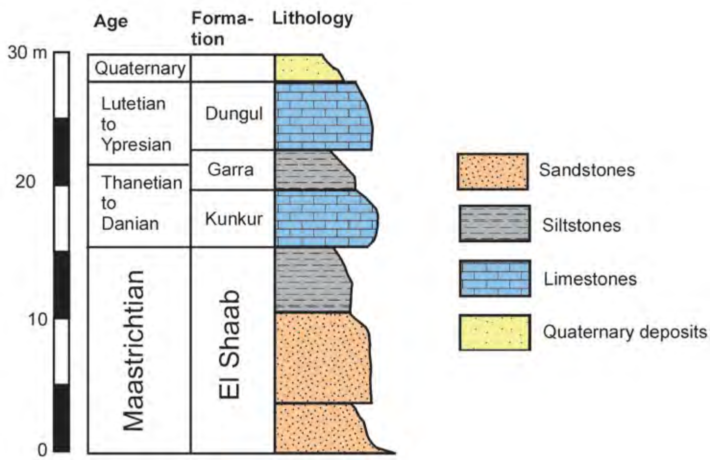

Fig. 2. The Late Cretaceous-Early Tertiary succession in the Bargat El-Shab area is composed mostly of silty shales alternating with limestones (after Sherbini *et al.*, 1989, modified by F. Welc).

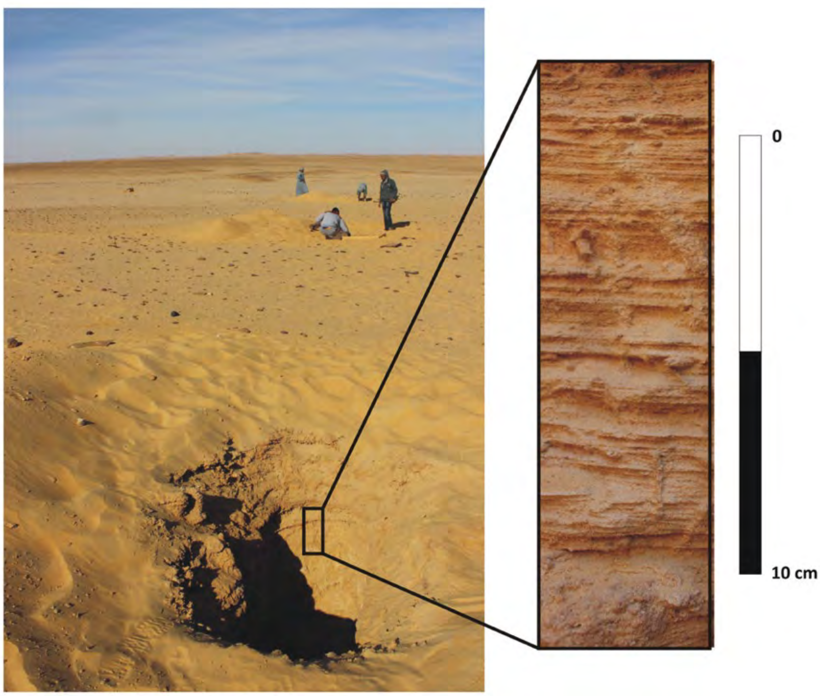

Fig. 3. The thin layered lacustrine silty sands which occupy the lowermost part of the basin in Bargat El-Shab are covered by windblown sand. Photo: F. Welc.

belonging to the Nubia Formation (Issawi 1971; Klitzsch 1983; Sherbini *et al.*, 1989; Fig. 2). In the Berget El-Shab area, the Garra formation comprises a 4 m thick bed of grey gypsiferous shale and underlies the Dungul Formation. The first formation is represented by a white, hard limestone bed (5 m thick) exposed on the top of Gebel Bargat El-Shab (Sherbini *et al.*, 1989). Early Holocene, thin layered lacustrine silty sands which occupy the lowermost part of the Bargat El-Shab basin are covered by a thin layer of windblown sands (Fig. 3).

This part of the basin filled with palaeolake sediments measures about 2 km by 2 km. Thickness of this succession is difficult to established, but in the deepest part of the basin it can be estimated to reach a few metres. In the littoral zone of the basin, interbedded sands and silts layers contain numerous calcareous marshy (reed) plant casts. Numerous tributaries are entering the Bargat Basin from all directions. During time of their activity silty-sand deposits interbedded with alluvial sediments form wadis draining the surrounding desert were deposited. Similar like in Nabta Playa deposited layered lacustrine silts in El Berget are result of precipitation of suspended matter during inundation season. In result they are poorly sorted as a result of the admixture of coarse windblown sand accumulated during arid intervals (Wendorf *et al.*, 2001).

METHODOLOGY

In general, magnetometer surveying is used to detect very small changes in the Earth's magnetic field caused mostly by concentrations of ferrous minerals in the soil (Herwanger *et al.*, 2000; Fassbinder 2005; 2015; Aspinall *et al.*, 2008). It should be emphasized here that the formation of the iron oxides in the soil is a very complex process, which depends on geochemistry, erosion rates, biological activity and local climate conditions (Evans and Heller 2004; Maher 2011; Fassbinder 2015). The anomalies observed on magnetic maps indicate remnant magnetism which is associated with sediments or features enriched with fine-grained magnetic particles affected by the magnetic field and inducted magnetism connected with sediments or materials which retain past magnetism (Fassbinder *et al.*, 2011; Fassbinder 2015; 2017). If sediments or other buried features were exposed to high temperatures, they became magnetized by thermoremanent magnetization (TRM; Fassbinder 2015; 2017). Because nearly all types of organic sediments like soils are characterized by enhanced magnetization (Armstrong *et al.*, 2012; Fassbinder 2015), anthropogenic pits or ditches refilled by topsoil generate distinctive positive magnetic anomalies (high values of nT). In contrast, negative anomalies may have numerous causes (Fassbinder 2017). Areas where there are remains of hearths or stones rich in magnetic minerals very often appear on magnetic maps as distinctive high amplitude features (Welc *et al.*, 2019).

Fig. 4. At Bargat El-Shab, gradiometer data was collected using the Bartington Grad 601 gradiometer with single sensor placed close to the ground (approx. 20 cm above the surface). Photo: P. Bobrowski.

At Bargat El-Shab, data were collected using the Bartington Grad 601 gradiometer equipped with single sensor (Fig. 4). Three adjoining grids of 40 × 30 m were measured with profiles spaced at 50 cm and 4 measurement points collected per metre; the data were then processed and filtered to generate magnetic maps using the TerraSurveyer software. In the first step, the DeStripe filter was used to equalize differences between grids. In the next step, a clipping procedure was used, which is very useful to replace extreme amplitude values outside a specified minimum and maximum, in this case in the range from -5 to 4.3 nT. Finally, the interpolation procedure was applied to increase the resolution of obtained maps of distribution of magnetic anomalies. The final procedure applied was the Low Pass filter to remove low frequency values in a data set (for more on these procedures see: www.dwconsulting.nl).

RESULTS AND DISCUSSION

As mentioned above, at Bargat El-Shab gradiometer data were collected within three adjoining grids with dimensions of 40 × 30 m. This 120 m long strip partially covers the littoral zone of the early Holocene basin and the northern part of the El Nabta / Al Jerar phase settlement marked as E-05-1 and oriented on the NE–SW axis (Fig. 5).

The results of magnetic measurements are presented below in form of black – white maps of distribution of the anomalies (called positive mode). On such maps dark areas correspond to the high amplitude anomalies measured in nanoteslas – nT, while lighter areas correspond to lower values of magnetic field strength. In other words, the areas in black indicate a concentration of sediments rich in ferromagnetic minerals; in most cases such areas are effect of extensive past human activity (Welc *et al.*, 2019).

The magnetic map indicates the presence of numerous highly magnetic zones (darker areas) round in shape (Fig. 5). These positive magnetic readings are a function of an accumulation of organic matter or ashes. It is important to note here that areas with remains of hearths very often appear on magnetic map as a distinctive feature – so called dipoles marked by a pair positive and negative point anomalies with a north – south orientation. Without a doubt, concentrations of the positive magnetic anomalies seem to show

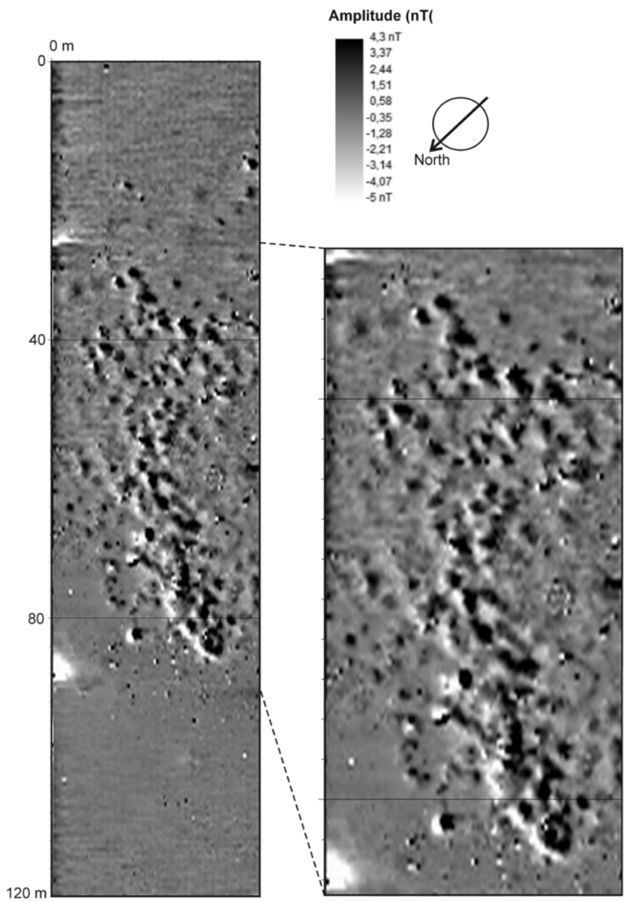

Fig. 5. Results of the magnetic survey carried out at Site E-05-1. Photo: F. Welc.

evidence of human activity in the zone, but their age and stratigraphic context could not be determined using only magnetic maps (Welc *et al.*, 2019).

As mentioned above, the magnetic image reveals the concentration of numerous oval-shaped anomalies that on the basis of analysis of their amplitude value can be identified as remains of hearths or storage pits. Moreover, we can see that some of these anomalies overlap each other, suggesting that the site had several phases of occupation. These assumptions confirm the results of excavations carried out at trenches E-05-1/4 (within the tested area) and E-05-1/2 (within the northern summit of the monadnock; Fig. 6). Characteristic oval features with a diameter of about 1–2 m were uncovered there, most of which are remains of hearths. Within some of them, burnt stones have also been preserved that give a strong magnetic signature on the presented map (Figs. 5 and 7).

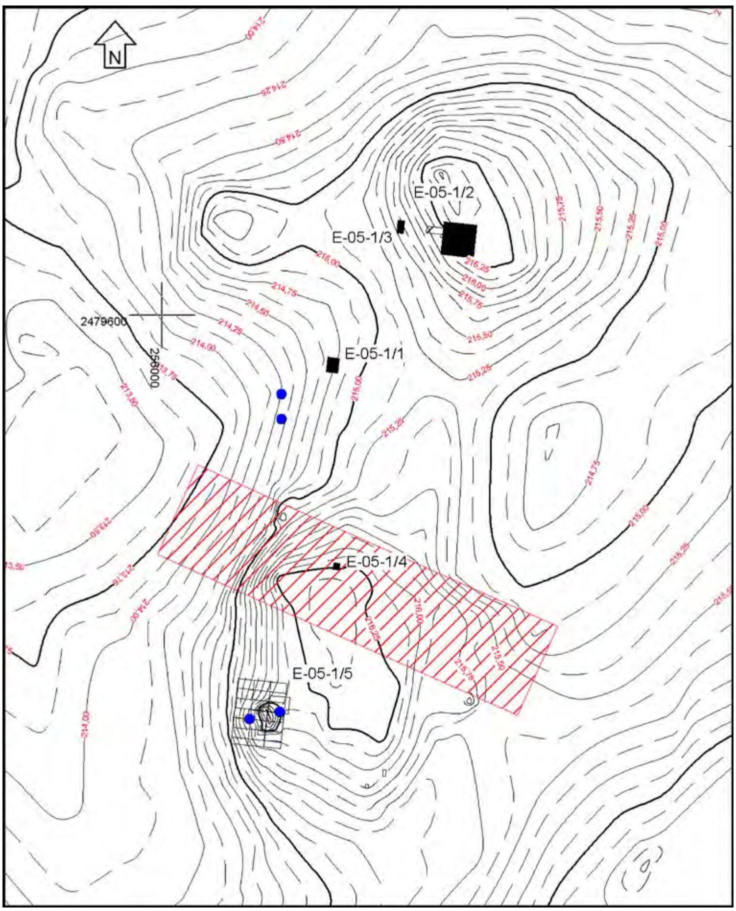

Fig. 6. Map of the archaeological Site E-05-1 excavated in the Bargat El-Shab area. Drawn: P. Wiktorowicz.

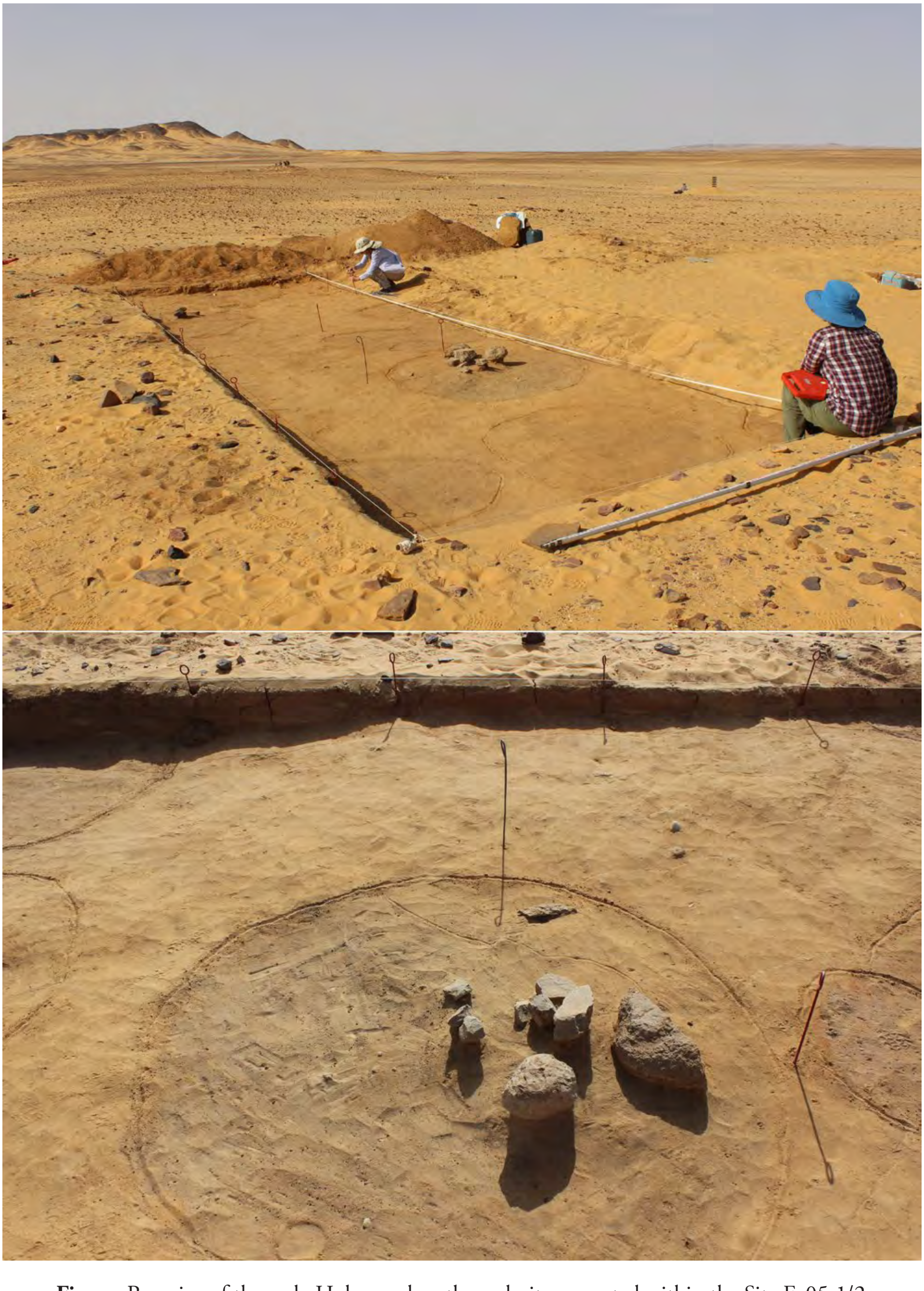

Fig. 7. Remains of the early Holocene hearths and pits excavated within the Site E-05-1/2. Photo: F. Welc.

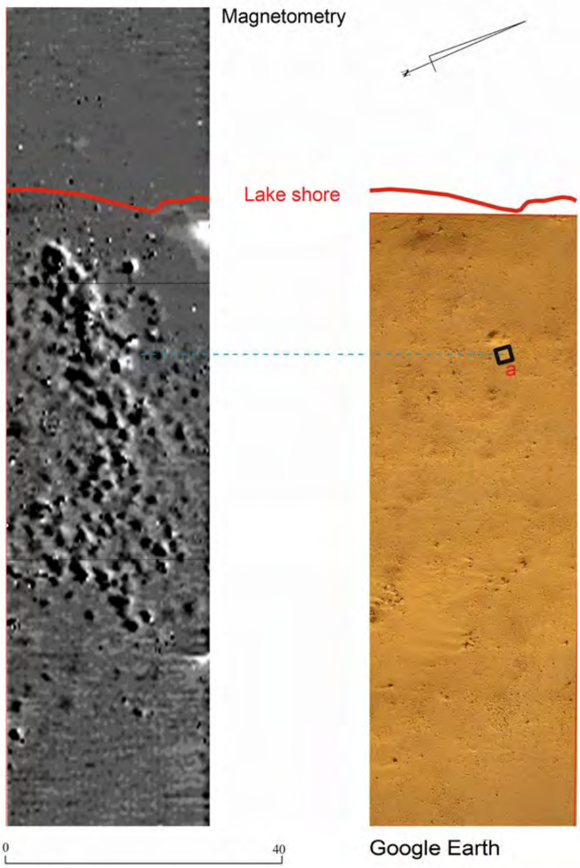

Fig. 8. Magnetic map and Google image of the early Holocene settlement with east edge of the former lake and trench E-05-1/4 (a) marked. Drawn and photo: F. Welc and P. Wiktorowicz.

Very interesting information was obtained after comparing and applying the magnetic map to the topographic map (Fig. 8). This combination allows us to draw a border between the edge zone of the former Holocene lake and a small flat elevation on which the Neolithic settlement of the El Nabta / Al Jerar phase was located. It is clear that the remains of hearths and storage pits are concentrated on gentle elevation slopes, probably above the highest water levels in the lake. It is interesting that the flat top of the hill does not seem to be occupied by hearths and other settlement structures. From the east, magnetic studies also do not reveal clear traces of settlement. On the one hand, we can assume that the lack of features on the southern summit of the monadnock is the result of a heavy deflation of the site, which completely levelled any features in the ground in that part. On the other hand, however, we cannot rule out that the image presented on the magnetic map reflects a completely different function (non-utility) of this part of the El Nabta / Al Jerar site. The clear lack of features on the magnetic map

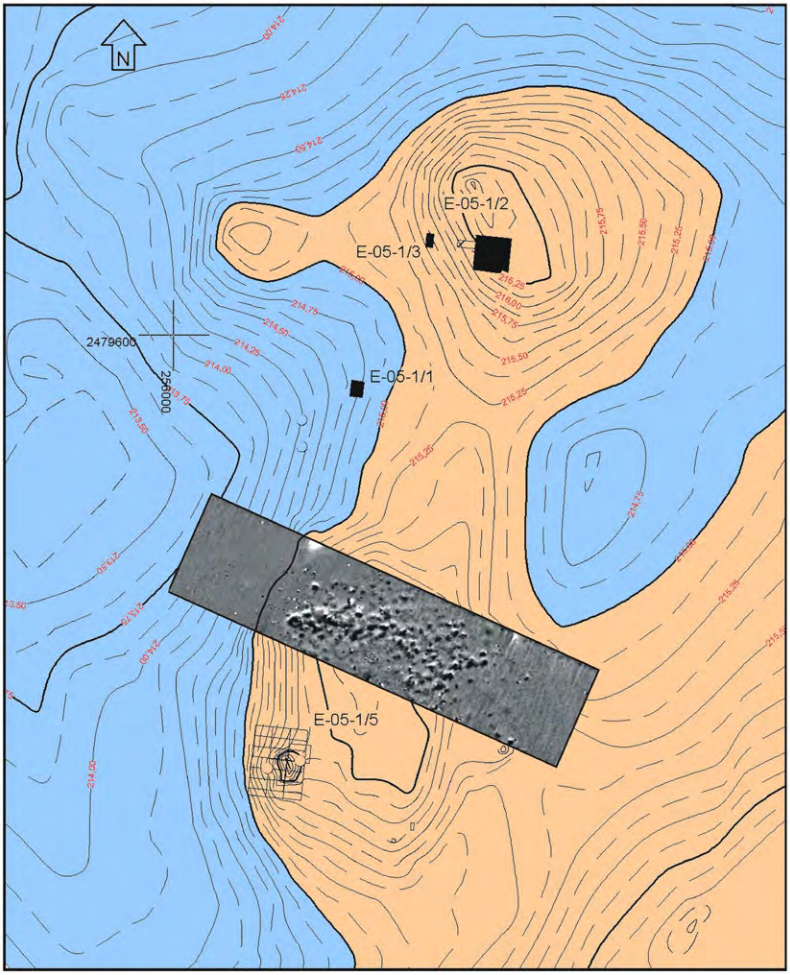

Fig. 9. Magnetic plan and elevation map with east edge of the former lake (blue). Drawn: F. Welc and P. Wiktorowicz.

in the eastern and western part of the tested area (from the direction of the palaeolake) reflects the actual extent of the site (Fig. 8). The situation in the northern part is not as clear, as there we can also observe a slight dispersion of the features. This fragment of the tested area partially comprises a visible depression between both summits of the monadnock. This could perhaps be a natural border between parts of the settlement or between two separate settlements from the same El Nabta / Al Jerar time horizon. We also cannot exclude the possibility that deflation in this part of the site was stronger and hence the distinct dispersion or lack of features (Fig. 8).

The analysis presented above allows us to reach some important conclusions. The multi-phase El Nabta / Al Jerar period settlement was located on a local elevation, which in the period of high lake water levels would have been a peninsula (Fig. 9). The concentration of most settlement remains in the flood-free land level by the lake suggests that people appeared around the reservoir during the rainy period, e.g., the summer monsoon. As mentioned above, the basal sediments of the lake are mainly thin layers of sandy silts interlaced with coarse windblown sands, which allows us to classify this palaeolake as a sandy playa. This indicates that during rainfall, the lake was filled with water, while in the winter season the reservoir would partly or completely dry up. In the El Nabta / Al Jerar period therefore this forced seasonal migration of people that lasted from summer to autumn. In winter, most likely, people migrated south or towards the Nile Valley, but this theory needs to be supported by additional specialized research and analysis, particularly of the playa deposits preserved at Bargat El-Shab.

CONCLUSIONS

The geophysical survey conducted at Site E-05-1 which took advantage of the enhanced magnetization of features in the ground (utility pits and hearths) allowed us to recognize the structure of Holocene settlement within the site and define its actual scope. The correlation of the magnetic and topographic map enabled us to specify the maximum reach of the palaeolake and the actual shape of the site during the climatic optimum of the El Nabta / Al Jerar phase of the early Holocene. We were able to determine its eastern and western reach and the internal zones of feature dispersion (southern summit and depression between two summits of the monadnock). Although random, the image obtained thanks to the geophysical survey considerably differs from the situation observed on the surface of the site. The artefactual material registered on the surface is scattered over an area which is significantly larger than the actual extent of the site. This is most likely the result of post-depositional processes. On the surface of the site, there is a lack of distinct traces of features in ground, which appear under a relatively homogeneous layer of silty sand at a depth ranging from a few to several dozens of centimeters. The excavation work conducted within several trenches in various parts of the Site (E-05-1/2, E-05-1/4, E-05-1/5) allowed us to register features in ground with a very uniform chronology. The absolute dating performed for most of them enable us to associate all with the late Early Holocene represented by the El Nabta / Al Jerar settlement phase. We can presume that the concentration of features visible on the magnetic map (in this part also the features registered in trench E-05-1/4) represent the same time horizon. Their mutual relations are most likely the effect of multiple, probably seasonal, occupation of this location. Verification of this thesis, knowledge of the actual chronology, functions and mutual relationships of features in ground will be possible once we conduct regular excavations in the area that was surveyed using geophysical methods, as was possible in trench E-05-1/2 at the northern end of the settlement.

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REFERENCES

Armstrong, A., Quinton, J. and Maher, B. 2012. Thermal enhancement of natural magnetism as a tool for tracing eroded soil. *Earth Surface Processes and Landforms* 37: 14–20.

Aspinall, A., Gaffney, C. F. and Schmidt, A. 2008. *Magnetometry for Archaeologists*. New York, Toronto, Plymouth Altamira Press, Lanham.

Bobrowski, P. 2019. Berget el Sheb, Western Desert, Egypt. In M. Chłodnicki and P. L. Polkowski (eds), *Gdy Sahara była zielona. Polskie badania nad prahistorią Afryki Północnej (When Sahara was Green. Polish archaeological research on the prehistory of North Africa)*, 119–124. Poznań.

Bobrowski, P., Jórdeczka, M., Mańka, D., Królik, H., Schild, R. and Wendorf, F. 2010. The Combined Prehistoric Expedition in Nubia 2003–2008. *Gdańsk Archaeological Museum African Reports* 6: 15–30.

Bobrowski, P., Jórdeczka, M., Lityńska-Zając, M. and Osypińska, M. 2020. The Early Holocene archaeological evidence (site E-05-1) in Bargat El-Shab (Western Desert Egypt). *Archaeologia Polona* 58: 195–220.

Evans, M. E. and Heller, F. 2004. *Environmental Magnetism*. Amsterdam.

Fassbinder, J. W. E. 2005. Methodische Untersuchungen zur Magnetometerprospektion von Viereckschanzen. In P. Neumann-Eisele (ed.), *Rätselhafte, Viereckschanzen, der Kelten, Bauwerke*, 11–22. Kelheim, Museumsheft 8.

Fassbinder, J. W. E. 2015. Seeing beneath the farmland, steppe and desert soil: magnetic prospecting and soil magnetism. *Journal of Archaeological Science* 56: 85–95.

Fassbinder, J. W. E. 2017. Magnetometry for archaeology. In S. Gilbert and S. Allan (eds), *Encyclopedia of Geoarchaeology*. Springer.

Fassbinder, J. W. E., Narr, D., Linck, R., Deller, T. and Becker, F. 2011. Prospektion am römischen Kastell Großprüfening. *Das archäologische Jahr in Bayern* 2010: 92–95.

Herwanger, J. H., Maurer, A. G., Green, J. and Leckebusch, J. 2000. 3-D inversions of magnetic gradiometer data in archaeological prospecting: Possibilities and limitations. *Geophysics* 65(3): 849–860.

Issawi, B. 1971. Geology of Darb El-Arbain, Western Desert, Egypt. *Annals of the Geological Survey of Egypt* 1: 53–92.

Klitzsch, E. 1983. Paleozoic formations and a carboniferous glaciation from the Gilf Kebir-Abu Ras area in southwestern Egypt. *Journal of African Earth Sciences* 1: 17–19.

Maher, B. 2011. The magnetic properties of Quaternary aeolian dusts and sediments, and their Quaternary palaeoclimatic significance. *Aeolian Res* 3: 87–144.

Osman, R. 1999. Geological interpretation of the main geomorphic units in Egypt. In B. Issawi, M. El Hinnawi, M. Francis and A. Mazhar (eds), *The Phanerozaic Geology of Egypt, A Geodynamic Approach*, 7–54. Cairo, The Egyptian Geological Survey Special Publication No. 76.

Schild, R. and Wendorf, F. 2013. Early and middle Holocene paleoclimates in south western desert of Egypt – The world before unification. *Studia Quaternaria* 30(2): 125–133.

Sherbini, M. I., Kora, El. M. and Issai, G. H. 1989. Mineralogy and geochemistry of the Late Cretaceous-Early Tertiary sediments in southwestern Egypt. *Journal Univrsity of Kuwait (Sci.)* 16: 365–364.

Welc, F., Nebelsick, L. D. and Wach. D. 2019. The first Neolithic roundel discovered in Poland reinterpreted with the application of the geophysical Amplitude Data Comparison (ADC) method. *Archeological Prospection* 26(4): 283–297.

Wendorf, F., Schild, R. and Associates. 2001. *Holocene settlement of the Egyptian Sahara. Vol. 1: The Archaeology of the Nabta Playa*. New York, Boston, Dordrecht, London, Moscow.

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Recent Research on Neolithic and Predynastic Development in the Egyptian Nile Valley

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From the very beginning of his studies in Northeastern Africa, Professor Michał Kobusiewicz concentrated on the prehistory of this region. His interests went beyond the Palaeolithic to encompass later periods during which the foundations were laid for the unified Egyptian state. This is well evidenced by his paper on "Neolithic and Predynastic Development in the Egyptian Nile Valley", presented at a meeting of the members of the International Commission of the Later Prehistory of Northeastern Africa in Cologne and published in 2002 (Kobusiewicz 2002). Professor Kobusiewicz delivered both a very detailed overview of the contemporary state of research on the period in question as well as an outline of the most important research problems for further investigations. Since the publication of that paper, further research on the prehistory of Northeastern Africa has shed new light on the issues pointed out by M. Kobusiewicz. This article reviews the most recent studies on one of those issues, e.g., the origins of the Neolithic in Northeastern Africa.

KEY-WORDS: Egyptian Neolithic, Egyptian Prehistory, Nile Valley, Fayumian, early and middle Holocene, Western Desert

INTRODUCTION

In 2002, Professor Michał Kobusiewicz published his paper on "Neolithic and Predynastic Development in the Egyptian Nile Valley" in the proceedings of the symposium "State of Current Research in the Archaeology of Northeastern Africa" held in Cologne in spring 1990 (Klees and Kuper eds 2002). The aim of the meeting was to summarize the state of research on the prehistory of this region. However, most of the contributors pointed out large gaps in the knowledge on this subject. In his paper, Professor Kobusiewicz (2002) focused on the Neolithic and Predynastic of the Egyptian

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Nile Valley and presented both the current state of research in this region as well as an outline of the most important research problems for further investigations. One of the matters for further studies mentioned in the contribution was the problem of the origins of the Neolithic communities in Northeastern Africa, both in the Nile Valley and in the Egyptian part of the Sahara. M. Kobusiewicz also outlined the need to investigate the relations between the communities from the Nile Valley and those from the neighbouring regions – the Western Desert and the Near East. In addition, he mentioned the existence of some chronological gaps in our picture of Egyptian prehistory and the importance of lithic assemblages neglected by many researchers.

Over the years that have passed since the publication of the paper, new research on the prehistory of Northeastern Africa has shed fresh light on the issues presented by M. Kobusiewicz. Although gaps still exist, our knowledge on the socio-economic processes that took place in the Egyptian Nile Valley as well as in the Sahara in the early and middle Holocene is now much richer than in the 1990s. In this paper, the author focuses on one of the research matters outlined by M. Kobusiewicz – the origins of the Neolithic in Northeastern Africa, both in Lower Egypt as well as in the desert. From the perspective of the current state of research, especially in the Fayum region, it is clear how accurate were his assessments of the problems identified by M. Kobusiewicz, and how apposite were his research suggestions and tips.

THE ORIGINS OF THE NEOLITHIC IN NORTHEASTERN AFRICA

Lower Egypt

The first Neolithic communities emerged in Lower Egypt approximately in the middle of the 6th millennium BC. A new subsistence strategy, the introduction of pottery and a sedentary lifestyle have been named as the main features distinguishing this period from the preceding Epipalaeolithic. It is generally agreed that domesticated plants and animals, alongside other elements of the Neolithic package, were introduced into Lower Egypt from the southern Levant (Krzyżaniak 1977; Ciałowicz 1999; Midant-Reynes 2000; Wengrow 2006; Tassie 2014).

The timing of the discoveries of Neolithic sites in Lower Egypt (early 20th century) had a major effect on today's idea of the prehistoric communities occupying this region in the period in question. The culture-historical approach, widely accepted at the time of the discoveries, resulted in dissecting the Neolithic occupation of Lower Egypt into three isolated cultural units characterised by a limited quantity of available data. On the basis of the discoveries made in the first part of 20th century, three cultural units were identified and are currently known as the Fayumian, the Merimde, and the el-Omari cultures (Caton-Thompson and Gardner 1934; Junker 1920–1940; Debono and Mortensen 1990). The communities represented by these units occupied

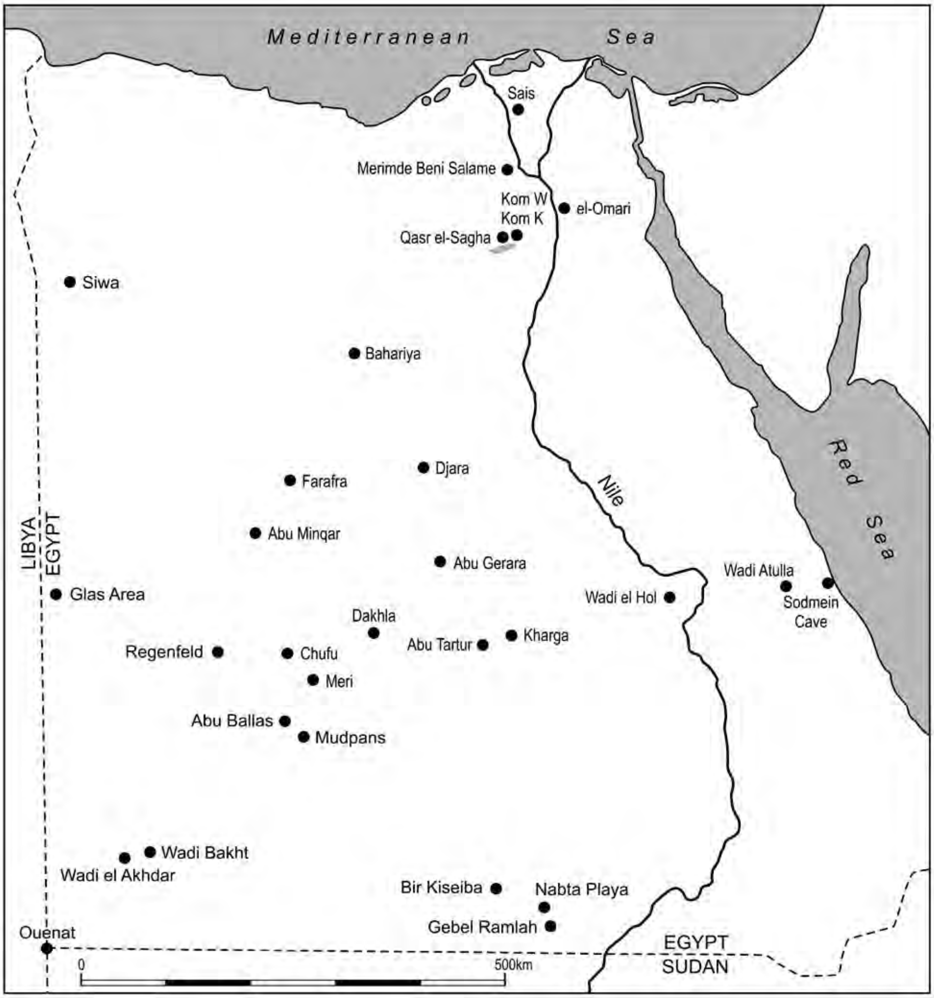

Fig. 1. Map of Northeastern Africa showing the most important Prehistoric sites. Drawn: J. Kędelska.

different parts of Lower Egypt and overlapped only in certain periods. However, it is quite obvious that the cultural map of Lower Egypt in the period in question is full of blank spots, while all the currently known Neolithic (Fig. 1) sites probably represent only a small fraction of sites representing the actual Neolithic presence in Lower Egypt (Mączyńska 2018).

Archaeologists have returned to the Fayum Depression as well as to Merimde Beni Salame after a long break. Research carried out in the Fayum between 2003–2013 contributed to a number of important discoveries that changed our knowledge of the region (Holdaway and Wendrich eds 2017). The latest discoveries in the area indicate that the lack of traditional settlement structures associated with a traditional farming society probably results from the movement of people and animals across this region. The mobile way of life linked to the exploitation of various resources was not conducive to permanent occupation. Sites from the area were probably short-term hunting or fishing stop-over locations, perhaps accompanied by somewhat larger seasonal base camps. Another part of the mobile pattern were storage facilities used by groups moving across the area (Holdaway and Phillipps 2017). The early Fayumian people were probably pastoralists herding domesticated sheep, goats and cattle. These animals, although of Near Eastern origin, could have been introduced to the Fayum from the Eastern and Western Desert, where their presence in the 6th millennium BC is unquestionable (Tassie 2014: 236; Brass 2018). At a certain point in time, the inhabitants of the northern shore of Lake Qarun adopted also domesticated plants of Near Eastern origins (barley, wheat, flax). The plants may have arrived from the Delta area, where farming settlements already existed in Merimde Beni Salame and Sais (Tassie 2014: 236). At the beginning, plants grown for food were probably only an addition to the resources offered by the lake, still intensively exploited (Linseele *et al.*, 2014). At that time, pigs and dogs may have been introduced too, in addition to the previously known domesticated species (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 in 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 light of the recent investigations, many features of the Fayumian community (settlement pattern, grain storage systems, mobility, the small proportion of domestic animals and use of wild resources) mean that this community was closer in nature to the groups that occupied Northeastern Africa, rather than to the Neolithic Levantine societies (Holdaway *et al.*, 2016; Holdaway and Phillips 2017).

The research in the Fayum has also helped fill in a gap in the Neolithic period. It has demonstrated human activity on the shore of Lake Qarun during the occupation gap between the Epipalaeolithic and the Neolithic periods. A number of age determinations from the later part of the early Holocene indicates frequent human activity across the northern shore of Lake Qarun until around 4000 BC (Holdaway *et al.*, 2016: 176–177).

Our 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 (Fig. 1) with the aim of surveying the western Delta hinterland around the Neolithic settlement (Rowland and Tassie 2014; Rowland 2015; Rowland and Bertini 2016). The researchers involved in the project set out to recreate the local environment and determine the role of humans in relation to it 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, its authors have already managed to collect information about human activity in this area from the Middle Palaeolithic and to demonstrate that the area occupied by the Neolithic settlement in Merimde was actually larger than once believed. 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 Wadi el-Gamal and exploited available resources for hunting, food processing and working tools (Rowland 2015).

The Egyptian part of the Sahara

Archaeological research conducted since the 1960s in the Egyptian Sahara confirmed the existence of evidence for intensive activity of hunter-gatherer and early herder groups in the early and middle Holocene. Remains left in the desert indicate the presence of a unique socio-economic system during the Holocene humid phase (8500–5300 BC; Kuper and Kröplin 2006).

In the early Holocene (*c.* 9000 cal. BC), the desert changed into a dry savannah, as a result of an abrupt northward shift of the tropical rainfall belt. Despite milder conditions, human presence in this area still depended on a few important elements, such as water, vegetation, and animals (Kuper and Kröplin 2006; Bubenzer and Reimer 2007).

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 (Gehlen *et al.*, 2002).

During the early Holocene, the Nabta Playa-Bir Kiseiba area was a special place (Fig. 1). Its specific environmental and climatic conditions had a significant impact on the trajectory of the development of human groups occupying this area. This is where the oldest traces of domesticated cattle (late 9th and 8th millennium BC) and intensive exploitation of wild plants were found. The special relationship between humans and animals, as well as the possibility to collect and store 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 adopted for use in other parts of the Egyptian Sahara (Wendorf and Schild 2001; Jórdeczka *et al.*, 2013).

The middle Holocene (7000 cal. BC) saw an improvement in climatic conditions and, consequently, an intensification of human activity in the eastern Sahara, with a growing number of sites across the entire region. Traces of extended human presence were recorded as well, interpreted as an episode of sedentism (e.g., Dakhleh Oasis, Farafra Oasis; Fig. 1). However, mobility still guaranteed survival, and people travelled over long distances in search of water, animals, and plants. 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 was still the main source of food. However, people started to move not only in search of water and food but also in search of pastures for animals. The relationship between humans and animals that which began at the time, led to the development of a pastoral economy at the end of the Holocene humid phase (Kuper and Riemer 2013; Riemer *et al.*, 2013).

Around 5300 BC, a declining number of C14 dates from the Western Desert have been recorded, suggesting a decline in settlement activity (Riemer *et al.*, 2013). This change has been linked to the southward withdrawal of the monsoonal rains and the onset of the desiccation of the Egyptian Sahara. The climatic changes triggered the movement of people and thus caused a migrational shift to the north (the Fayum, the Delta), to the Nile Valley, to southern Egypt, and to northern Sudan. In the oases, isolated from northern and southern influences, new cultural traditions began to develop. Moreover, the area between the Nile and the desert was criss-crossed by pastoral groups (e.g., Tasian) who stopped over in oases or in locations ensuring easy access to water and the pastures in the Nile Valley.

Tasian materials are known from a few localities in the Western and Eastern Desert (Fig. 1) e.g., at Gebel Ramlah, Wadi el-Hol, the Kharga Oasis and Wadi Atulla (Darnell 2002; Friedman and Hobbs 2002; Gatto 2010; Briois *et al.*, 2012; Dachy *et al.*, 2018). 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 desert traditions developed during the Holocene humid phase, rather than with the Nile Valley. The Saharan hunter-gatherers and early herders could have been the ancestors of the Tasa groups who were forced to modify their way of life when the conditions in the desert became harsher. They adopted pastoralism and moved between the valley and the desert, which allowed them to survive (see also Tassie 2014: 266–282).

CONCLUSIONS

Over the last few years of research on the origins of the Neolithic in Northeaster Africa many new aspects of the social and economic development in the region in the period in question have emerged.

First of all, together with the progress of research, it became more apparent how the Neolithic Lower Egyptian groups gradually could no longer be seen as resembling the typical Neolithic farming communities known from the area of the Near East. Although the bones of domesticated animals are present in archaeological assemblages, it now seems that the role of animal husbandry as one of the subsistence strategies was rather minor (Linseele *et al.*, 2014). During the 6th millennium BC, domesticated plants were probably not known in Lower Egypt, or were known on a very small, experimental scale (see Shirai 2017). The Neolithic groups, thanks to the abundance of natural resources in the vicinity of the lake or the river, relied on food resources offered by the environment (Linseele *et al.*, 2014). The lack of permanent settlement structures in this area is interpreted in the context of a partially mobile way of life. Moving within the Fayum Depression or Wadi el-Gamal and adjacent desert areas, people were able to use the resources offered by the natural environment, including food and raw materials used for tool production.

Secondly, the origins of the Neolithic groups in Lower Egypt are linked both to the influences from the Levant as well as those from the Egyptian Sahara. Importantly however, the available evidence does not prove any direct contacts between Lower Egypt and the southern Levant or Lower Egypt and the Western Desert, or the presence of migrants from the eastern Sahara or the Near East in the northern part of Egypt during the Neolithic. This research problem still needs further investigation (Tassie 2014: 194–240; Mączyńska 2018: 52–64).

Finally, the recent research on the origins of the Neolithic communities in Northeastern Africa has allowed the partial filling of the other gaps outlined by M. Kobusiewicz. New chronological determination from the Fayum have proven that the gap between the Neolithic and the Epipalaeolithic should be interpreted only as a result of lack of evidence, rather than an actual hiatus in occupation on the shores of Lake Qarun (Holdaway *et al.*, 2016). Additionally, investigations in Lower Egypt and the eastern Sahara have provided plenty of information on the relationships between the two regions (Shirai 2010; 2013; Mączyńska 2018). Moreover, research in both areas has demonstrated that lithic assemblages offer important clues for researchers, as suggested by Professor M. Kobusiewicz in his paper (Kobusiewicz 2002: 215).

The recent investigation have provided valuable evidence for understanding the cultural development of prehistoric Northestern Africa. However, many issues still require further study. Even now, with access to the newest dating methods, chronology still seems to be the weakest point in the research on the prehistory of these regions. Moreover, the challenges are similar to those faced in the 1990s. Prehistoric remains are still in danger due to the intensive development of farming areas in Egypt.

REFERENCES

Brass, M. 2018. Early North African Cattle Domestication and Its Ecological Setting: A Reassessment. *Journal of World Prehistory* 31(1): 81–115. https://doi.org/10.1007/s10963-017-9112-9

Briois, F., Midant-Reynes, B., Marchand, S., Tristant, Y., Wuttmann, M., De Dapper, M., Lesur, J. and Newton, C. 2012. Neolithic occupation of an artesian spring: KS043 in the Kharga Oasis, Egypt. *Journal of Field Archaeology* 37: 178–191.

Bubenzer, O. and Riemer, H. 2007. Holocene Climatic Change and Human Settlement between the Central Sahara and the Nile Valley: Archaeological and Geomorphological Results. *Geoarchaeology: An International Journal* 22(6): 607–620.

Caton-Thompson, G. and Gardner, E. W. 1934. *The Desert Fayum*. London.

Ciałowicz, K. M. 1999. *Początki cywilizacji egipskiej*. Warszawa-Kraków.

Dachy, T., Briois, F., Marchand, S., Minotti, M., Lesur, J. and Wuttmann, M. 2018. *Living in an Egyptian Oasis: Reconstruction of the Holocene Archaeological Sequence in Kharga. African Archaeological Review*. https://doi.org/10.1007/s10437-018-9306-2

Darnell, D. 2002. Gravel of the Desert and Broken Pots in the Road: Ceramic Evidence from the Routes between the Nile and Kharga Oasis. In R. F. Friedman (ed.), *Egypt and Nubia. Gifts of the Desert*, 156–177. London.

Debono, F. and Mortensen, B. 1990. *El Omari. A Neolithic settlement and other sites in the vicinity of Wadi Hof, Helwan*. Mainz am Rhein. Archäologische Veröffentlichungen 82.

Friedman, R. F. and Hobbs, J. J. 2002. A '*Tasian*' *Tomb* in Egypt's Eastern Desert. In R. F. *Friedman* (ed.), *Egypt and Nubia. Gifts of the Desert*, 178–191. London.

Gatto, M. C. 2010. Pottery from Gebel Ramlah. In M. Kobusiewicz, J. Kabaciński, R. Schild, J. Irish, M. C. Gatto and F. Wendorf (eds), *Gebel Ramlah. Final Neolithic Cemeteries from the Western Desert of Egypt*, 125–167. Poznań.

Gehlen, B., Kindermann, K., Linstädter, J. and Riemer, H. 2002. The Holocene Occupation of the Eastern Sahara: Regional Chronologies and Supra-regional Developments in four Areas of the Absolute Desert. In T. Lenssen-Erz, U. Tegtmeier, S. Kröpelinas, H. Berke, B. Eichhorn, M. Herb, F. Jesse, B. Keding, K. Kindermann, J. Linstädter, S. Nußbaum, H. Riemer, W. Schuck and R. Vogelsang (eds), *Tides of the Desert: Contributions to the Archaeology and Environmental History of Africa in Honour of Rudolf Kuper*, 85–116. Köln.

Holdaway, S. and Phillipps, R. 2017. Human Environmental Interrelationships and the Origins of Agriculture in Egypt and Sudan. In *Oxford Research Encyclopedia of Environmental Science*. http*://dx.*doi.org/10.1093/acrefore/9780199389414.013.177

Holdaway, S., Phillipps, R., Emmitt, J. and Wendrich, W. 2016. The Fayum revisited: Reconsidering the role of the Neolithic package, Fayum north shore, Egypt. *Quaternary International* 410A: 173–180.

Holdaway, S. and Wendrich, W. (eds). 2017. *The Desert Fayum Reinvestigated*. Los Angeles.

Holdaway S., Wendrich, W. and Phillipps, R. 2017. The Desert Fayum Reinvestigated. The Evidence Considered. In S. Holdaway and W. Wendrich (eds), *The Desert Fayum Reinvestigated*, 213–231. Los Angeles.

Jórdeczka, M., Królik, H., Masojć, M. and Schild, R. 2013. Hunter-Gatherer Cattle-Keepers of Early Neolithic El Adam Type from Nabta Playa: Latest Discoveries from Site E-06-1. *African Archaeological Review* 30(3): 253–284.

Junker, H. 1929–1940. *Merimde I–VI. Vorläufiger Bericht über die Grabungen der Akademie der Wissenschaften in Wien auf der Neolithischen Siedlung von Merimde-Benisalame*. Wien.

Klees, F. and Kuper, R. (eds). 2002. *New Light on the Northeast African Past. Current Prehistoric Research*. Köln. Africa Praehistorica 5.

Kobusiewicz, M. 2002. Neolithic and Predynastic Development in the Egyptian Nile Valley. In F. Klees and R. Kuper (eds), *New Light on the Northeast African Past. Current Prehistoric Research*, 207–217. Köln. Africa Praehistorica 5.

Krzyżaniak, L. 1977. *Early Farming Cultures on the Lower Nile. The Predynastic Period in Egypt*. Warsaw.

Kuper, R. and Kröplin, S. 2006. Climate-controlled Holocene occupation in the Sahara: motor of Africa's evolution. *Science* 313: 803–807.

Kuper, R. and Riemer, H. 2013. Herders before Pastoralism: Prehistoric Prelude in the eastern Sahara. In M. Bollig, M. Schnegg and H. P. Wotzka (eds), *Pastoralism in Africa. Past Present and Future*, 31–65. Oxford.

Linseele, V., Van Neer, W., Thys, S., Phillipps, R., Cappers, R., Wendrich, W. and Holdaway, S. 2014. New Archaeozoological Data from the Fayum "Neolithic" with a Critical Assessment of the Evidence for Early Stock Keeping in Egypt. *PLoS One* 9(10):e108517. https://doi.org/10.1371/journal.pone.0108517

Mączyńska, A. 2018. *Search of the Origins of Lower Egyptian Pottery: A New Approach to Old Data*. Poznań. Studies in African Archaeology 16.

Midant-Reynes, B. 2000. *The Prehistory of Egypt. From the First Egyptians to the First Pharaohs*. Oxford.

Riemer, H., Lange, M. and Kindermann, K. 2013. When the Desert Dried up. Late Prehistoric cultures and Contacts in Egypt and Northern Sudan. In D. Raue, S. J. Seidlmayer and P. Speiser (eds), *The First Cataract of the Nile. One Region – Diverse Perspectives*, 157–183. Kairo, DAI Kairo Sonderschrift.

Rowland, J. M. 2015. Prehistoric groups along the western Nile Delta. *Egyptian Archaeology* 42: 31–33.

Rowland, J. M. and Bertini, L. C. 2016. The Neolithic within the context of northern Egypt: New results and perspectives from Merimde Beni Salama. *Quaternary International* 410A: 160–172.

Rowland, J. M. and Tassie, G. J. 2014. Prehistoric Sites along the Edge of the Western Nile Delta: Report on the Results of the Imbaba Prehistoric Survey, 2013–2014. *Journal of Egyptian Archaeology* 100: 49–66.

Shirai, N. 2010. *The Archaeology of the First Farmer-herders in Egypt. New insights into the Fayum Epipalaeolithic and Neolithic*. Leiden.

Shirai, N. 2013. Was Neolithisation a struggle for existence and the survival of the fittest, or merely the survival of the luckiest? A case study of socioeconomic and cultural changes in Egypt in the Early-Middle Holocene. In N. Shirai (ed.), *Neolithisation of Northeastern Africa,* 213–235. Berlin.

Shirai, N. 2017. Teething problems in cereal cultivation in prehistoric Egypt: a restudy of Fayum Neolithic sickle blades. *Azania: Archaeological Research in Africa* 52(2): 209–232. http://dx.doi.org/10.1080/0067270X.2017.1328209

Tassie, G. J. 2014. *Prehistoric Egypt. Socioeconomic Transformations in North-East Africa from the Last Glacial Maximum to the Neolithic, 24,000 to 6,000 cal BP*. London.

Wendorf, F. and Schild, R. 2001. Conclusions. In F. Wendorf and R. Schild (eds), *Holocene Settlement of the Egyptian Sahara. Volume I. The Archaeology of Nabta Playa*, 648–675. New York.

Wengrow, D. 2006. *The Archaeology of Early Egypt: Social Transformation in North-East Africa, 10,000 to 2650 BC*. Cambridge.

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A few Remarks about Cosmetic Palettes from Tell el-Farkha[1]

Krzysztof M. Ciałowicz[a]

Tell el-Farkha is a Predynastic site in the Eastern Delta. Among the artefacts unearthed during twenty years of excavations one of the most important groups is composed of the cosmetic palettes, discovered in the graves as well as in the settlement. During Naqada IIIB, palettes were still important elements of the equipment of graves, but in general only geometrical shapes with characteristic incised frame were used. Zoomorphic or shield-shaped palettes were very rare. At Tell el-Farkha cosmetics palettes are known also from the settlement layers. A few bird-shaped cosmetic palettes from the Western Kom are connected with the older stage of the administrative-cultic centre, which can be dated to the beginning of Naqada IIIB. The dimensions of palettes and their distribution in the area suggests that such palettes were connected in some way with the early cult.

KEY-WORDS: Tell el-Farkha, Naqada culture, cosmetic palette, grave, administrative-cultic centre

Tell el-Farkha is located next to the northern outskirts of the modern village of Ghazala, along the southern side of the Ghazala Drain, about 14 km east of El-Simbillawein and 120 km to the northeast of Cairo. The site occupies an area of about 45,000 sq. m, with maximum height of *c.* 4.5 m above the level of the cultivation plain. It is composed of three koms (Western, Central, Eastern).

The site was discovered by the Italian Archaeological Mission in the Eastern Nile Delta in 1987. The Italian expedition directed by R. Fattovich carried out test excavation at the site between 1988–1990, and later the work was stopped (see, e.g., Chłodnicki *et al.*, 1991). In 1998, excavations at Tell el-Farkha were resumed by Polish Archaeological Mission to the Nile Delta, with the kind agreement of Italian colleagues (see, e.g., Chłodnicki *et al.*, 2012; Ciałowicz *et al.*, 2018).

From the beginning of the excavation, it was clear that all three koms contained the remains of houses and workshops, as well as graves. The stratification confirmed that the site was occupied for more than a 1000 year-long span, starting many centuries before the foundation of the pharaonic state, and divided into seven chronological phases

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Fig. 1. Tell el-Farkha. Eastern Kom. The bottom level of grave no. 94 and the red layer (ochre) on its east side. Photo: R. Słaboński.

(Ciałowicz *et al.*, 2018: 7). Phase 1 can be correlated with Naqada IIB – C (*c.* 3700–3500 BC), phase 2 is related with Naqada IID1 (*c.* 3500–3450 BC). In both phases, the site was occupied by the Lower Egyptian culture, but while in phase 1 the residents were only autochthonous inhabitants of the Delta, in phase 2 traces of the first settlers from Upper Egypt, connected with the Naqada culture, become evident. They gradually gained predominance over the autochthonous inhabitants of Tell el-Farkha and, probably due to the assimilation and acculturation processes, Lower Egyptian culture disappeared. The apogee of development of Tell el-Farkha occurred during phases 3–5 (Naqada IID2 – Naqada IIIC1, *c.* 3450–3000 BC). In the middle of the First Dynasty, the prosperity collapsed, but the inhabitants of Tell el-Farkha continued to live on the site into the early 4th dynasty.

During Polish research a lot of important discoveries have been made (see, e.g., Chłodnicki *et al.*, 2012). It is enough to mention the big buildings from the time of the Lower Egyptian culture and monumental Naqadian magazines on the Central Kom, the oldest brewery centre in the Nile Delta, the huge Naqadian buildings and Early Dynastic cultic-administrative centre with two votive deposits on the Western Kom, as well as golden figurines representing a Predynastic ruler, a monumental mastaba and a cemetery on the Eastern Kom.

A lot of artefacts were unearthed during twenty years of excavations. One of the most important groups is composed of the cosmetic palettes, discovered in the graves as

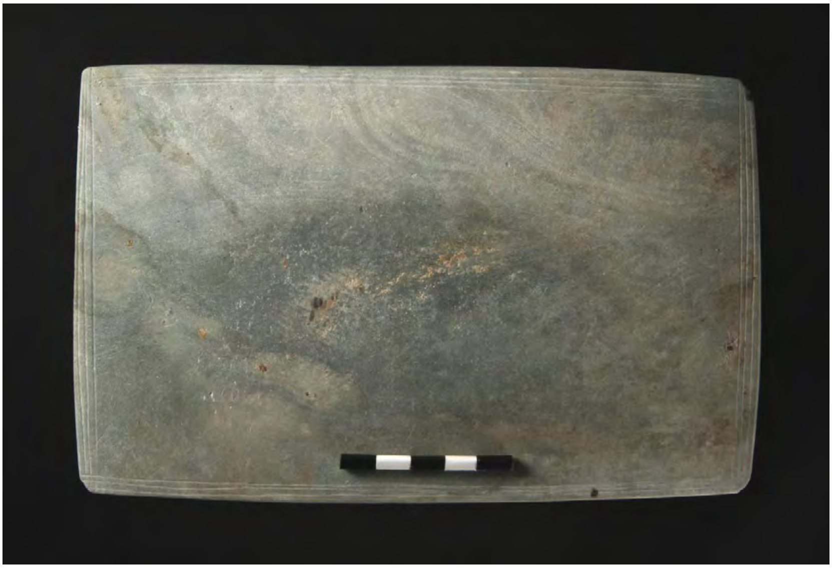

Fig. 2. Tell el-Farkha. Eastern Kom. Rectangular palette from grave no. 94. Greywacke. Photo: R. Słaboński.

well as in the settlement layers. Until now, 77 palettes and their fragments have been discovered. Part of them has been published earlier (Buszek 2012), but some should be treated separately.

Grave no. 94, dated to the first half of Naqada IIIB, was a small mastaba preserved to a height of about 2.5 m. Just to the east of the grave (Fig. 1) and at its bottom level, an oval pit was discovered filled with a thin layer of red substance, possibly ochre, which was probably used for covering the bottom of the burial chamber during funerary ceremonies (Chłodnicki and Ciałowicz 2015: 193). The deceased was equipped with 15 pottery and 3 stone vessels, a necklace of 141 carnelian beads and two cosmetic palettes with a grinder. Unfortunately the condition of bone preservation did not allow for any anthropological analyses and the sex and age of the deceased remain unknown (Dębowska-Ludwin 2012: 59). The bottom of the chamber was covered with pure sand and red ochre. The palettes were lying over the head of the deceased together with a basalt bowl and a travertine cylindrical jar. One of the palettes is rectangular with incised decorated edges (Fig. 2), the second is shield-shaped with two figurines of animals – possibly lions – modeled on its upper part (Fig. 3). The rectangular palettes with incised rectangular frame around the edges are characteristic for the Naqada III period (Ciałowicz 1991: 32) and the presence such item in a grave dated to Naqada IIIB is not a surprise. Much more unusual is the presence in the same grave of a shield-shaped palette, these are almost exclusively represented during the Naqada II period (Ciałowicz 1991: 30). Schematic representation of animals or birds on top of palettes are also characteristic of the Gerzean period. It is therefore possible that the example from Tell el-Farkha was produced earlier, but for an unknown reason was put into the grave many years after its creation.

Grave no. 99 is also dated to the first half of Naqada IIIB. It is also a small mastaba surrounded by massive walls with a very deep burial chamber. A male aged 30–35 was buried with 11 pottery vessels, 3 stone vessels, 3 greywacke cosmetic palettes (Fig. 4), a string of carnelian and serpentine beads. A layer of red ochre (Fig. 5) covered the body

Fig. 3. Tell el-Farkha. Eastern Kom. Shield-shape palette from grave no. 94. Greywacke. Photo: R. Słaboński.

Fig. 4. Tell el-Farkha. Eastern Kom. Three rectangular palettes from grave no. 99. Greywacke. Photo: R. Słaboński.

(Dębowska-Ludwin 2012: 60). The position of the palettes was different from those known from grave no. 94. In grave no. 99, they were laid near the feet of the deceased together with four pottery cylindrical jars and a basalt bowl. The palettes are rectangular and surrounded by incised frames consisted of three lines. Traces of use are clearly visible on all of them.

The next small mastaba no. 130 is dated to the very beginning of Tell el-Farkha phase 5 (Naqada IIIB/C1), which means it was built during Dynasty 0 (Chłodnicki and Ciałowicz 2016: 246). At Tell el-Farkha, Early Dynastic graves, from the second half of the Naqada IIIC2/D (second half of the First – Second Dynasty) were often embedded in the small Protodynastic mastabas. Such a situation was observed also in this case. On top of the grave no. 130 was built grave no. 126 (Fig. 6). In the northern chamber the deceased man (25–35 years old) was lying, in a typical position.[2] He was wealthy, and equipped with 12 stone pots and one bead as well as 11 clay vessels (mainly beer-jars) in the southern chamber. Similar to other graves dated to this period, no cosmetic palette was deposited in grave no. 126. This confirms the earlier supposition,

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2 Anthropological analysis of graves 126 and 130 by Katarzyna Mądrzyk, Institute of Zoology and Biomedical Research, Jagiellonian University, Cracow.

Fig. 5. Tell el-Farkha. Eastern Kom. Burial chamber in grave no. 99 with a layer of red ochre on the body. Photo: R. Słaboński.

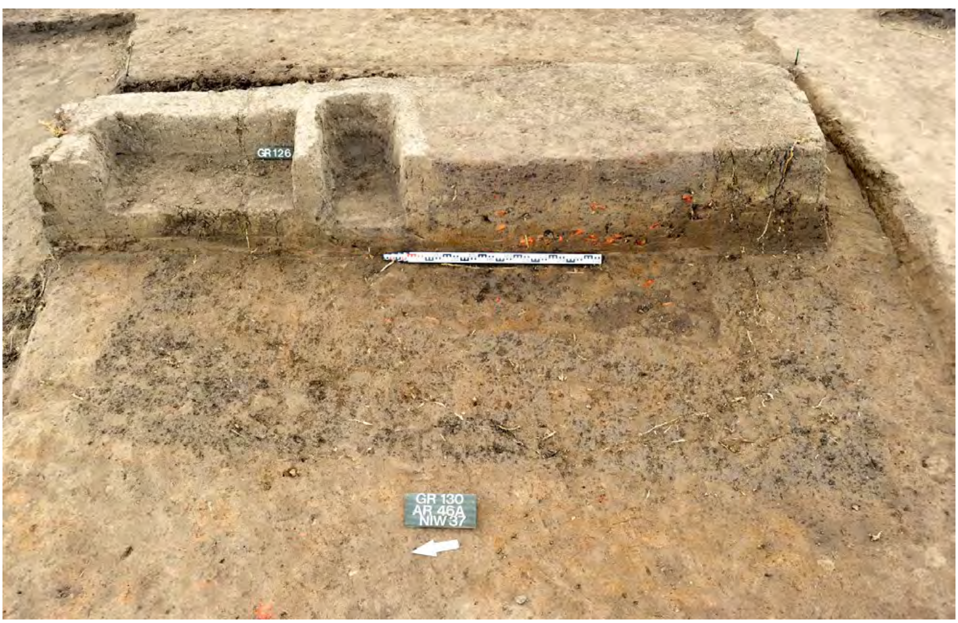

Fig. 6. Tell el-Farkha. Eastern Kom. Graves nos. 126 and 130. Photo: R. Słaboński.

Fig. 7. Tell el-Farkha. Eastern Kom. Square palette from grave no. 130. Greywacke. Photo: R. Słaboński.

that such items disappeared from grave goods after the middle of the First Dynasty (Ciałowicz 1991: 38–40).

The superstructure of grave no. 130 was at least 1.5 m high. Below a roof of the burial chamber was partially preserved. It was a kind of mat made of reeds and twigs. Further down, a burial chamber with rounded corners was found. There, a woman 30–39 years old was found lying in a contracted position on her left side, with the head to the north. She was equipped with 4 stone and 17 clay pots, a square greywacke cosmetic palette (Fig. 7), and a necklace of 139 carnelian beads and a lapis-lazuli one. The palette was almost square (10.5 × 11 cm) and surrounded by an incised frame consisting of three lines. On one side, traces of red substance (ochre?) are visible.

The superstructure of grave no. 153, from the Naqada IIIB period, was also preserved to the height of more than 1.5 m. The deceased (a man, about 40–50 years old) was on the left side with head to the north and in a typical, contracted position.[3] Because the burial chamber was covered (intentionally) by a thick layer of mud, most of the pottery vessels forming the equipment were destroyed. Together in this grave, twenty-five pottery vessels (19 cylindrical jars and 6 storage jars), one travertine cylinder and one rectangular greywacke palette (Fig. 8) were discovered. The palette is decorated with 3 incised lines on all sides.

3 Anthropological analysis of graves 153 and 154 by dr hab. Anita Szczepanek, Department of Anatomy, Collegium Medicum, Jagiellonian University, Cracow and Institute of Archaeology and Ethnology Polish Academy of Sciences, Cracow.

Fig. 8. Tell el-Farkha. Eastern Kom. Rectangular palette from grave no. 153. Greywacke. Photo: J. Skłucki.

In grave no. 154, also dated to the Naqada IIIB period, the first example at Tell el-Farkha of a pottery coffin was discovered. The badly preserved skeleton belong to a young person (20–25 years old), probably a woman. The deceased was equipped with 2 stone bowls (basalt and travertine), a bracelet composed of 127 beads of different stones, and 4 pottery vessels. Between them were a wine-jar with inscription (a boat and two birds – probably herons), two cylindrical jars with rope decoration and one grain storage jar. Also a small rectangular greywacke palette (Fig. 9) was put into the grave. It is not decorated, only a little hole was drilled near one of the shorter edges.

At Tell el-Farkha cosmetics palettes are known also from the settlement layers. One of the most important is a big palette (28 cm long) in the shape of a falcon (Fig. 10). The falcon is presented in a very schematic way, but the species can be conclusively confirmed on the basis of the features of the head. The palette was discovered in the Western Kom set in an upright position dug into the ground outside eastern wall of the older stage of the administrative-cultic centre (Chłodnicki and Ciałowicz 2004: 48). This fact, coupled with the impressive dimensions allow us to assume that this palette was of great importance and it could have been an element of some kind of religious and political practices (Buszek 2012: 317).

To the south of the administrative-cultic centre, another important and quite big (21.3 × 14.4 cm) palette was discovered. It also represented a schematic image of bird,

Fig. 9. Tell el-Farkha. Eastern Kom. Rectangular palette from grave no. 154. Greywacke.
Photo: J. Skłucki.

but probably a water bird (Fig. 11). Unfortunately the beak is not preserved. Traces of use are visible as well as red stains, probably from the grinding of ochre.

Another bird-shaped cosmetic palette (Fig. 12) is also connected with the administrative-cultic centre. In this case, it is probably a schematic representation of a lapwing (*rechit*) bird. The palette (18.5 × 14.0 cm) was discovered in the northern part of the edifice, in a storage jar together with a small (7.8 cm long) flint knife.

All the described palettes from the Western Kom at Tell el-Farkha are connected with the older stage of the administrative-cultic centre (Ciałowicz 2012a: 171–175), which can be dated to the beginning of Naqada IIIB. They are almost contemporary with the palettes discovered in the oldest graves from the Tell el-Farkha cemetery.

A little bit later, but still from Naqada IIIB, is a small (8.7 × 4.4 cm) fish-shaped palette, hidden in a storage jar discovered on the floor of the second stage of the western chapel of the administrative-cultic centre (Ciałowicz 2012a: 175, Fig. 22). A shallow relief on both surfaces illustrates the anatomical details of the fish, and both eyes are emphasized by drilled holes (Buszek 2012: 317). The general shape of the body resembles the tilapia, one of the most characteristic Nile fishes. The figurine of tilapia is also known from votive deposit discovered in the same chapel (Ciałowicz 2012b: 217). It was made of hippopotamus ivory and the details were carefully executed.

After twenty years of excavations, it is evident that at least from the time contemporary with Naqada IIB, until the middle of the First Dynasty, Tell el-Farkha was one of the most important towns in Lower Egyptian culture, not only in the Eastern Delta (Ciałowicz 2018).

Analysis of cosmetic palettes allows the addition of new arguments. It is necessary to stress that during Naqada IIIB, palettes were still important elements of the equipment of graves, but in general only geometrical shapes with characteristic incised frame were used. Zoomorphic or shield-shaped palettes were very rare. The abovementioned shield shaped palette from grave no. 94 is an exception, and it is possible that this palette was used during a long period and was put into the grave many years after its creation.

In the same time in the administrative-cultic center at Western Kom, zoomorphic palettes were still popular. Significantly three of them were schematic representations of birds. The dimensions of palettes and their distribution in the area suggests that such palettes were connected in some way with the early cult.

It is very possible, that palettes in the shape of a falcon are directly connected with the royal cult. Under the northern wall of the western chapel of the administrative-cultic centre a storage jar with foundation deposit was discovered (Ciałowicz 2012a: 175). Especially interesting is a faience cylinder seal with depictions of ibexes and crosses. Above one of the crosses is a very schematic representation of a Horus-falcon. The crosses may be a schematic rosette, similar to that which appears on objects related to the kings Scorpion and Narmer, and at the end of the rows of animals decorating the Brooklyn knife-handle and the Davis comb. Such rosettes should probably also be associated with the iconography of rulers (Ciałowicz 1992: 254). All these symbols may then point to a connection with a ruler and his symbolism. This is also confirmed by some of the figurines from the votive deposit: a king in coat, griffin or falcon.

The palettes in the shape of water-birds may refer to symbolic representation of the people of the Delta, often depicted as a lapwing (*rechit*) in early Egyptian art (see for example on the Scorpion Macehead). Also in the votive deposit a figurine of water bird (goose or swan) is preserved.

Fig. 10. Tell el-Farkha. Western Kom. Palette in the shape of a falcon. Greywacke. Photo: R. Słaboński.

Fig. 11. Tell el-Farkha. Western Kom. Palette in the shape of a water bird. Photo: R. Słaboński.

Fig. 12. Tell el-Farkha. Western Kom. Palette in the shape of a lapwing. Photo: R. Słaboński.

To summarize it should be emphasized that the results of the excavations at Tell el-Farkha confirmed that zoomorphic, as well as shield shaped, palettes during Naqada IIIA-B had a symbolic and ceremonial meaning connected with royal and divine cult. Earlier they were used in everyday life and used as grave goods (Ciałowicz 1991: 28–32). These functions during Naqada IIIB were served by geometric palettes.

REFERENCES

Buszek, A. 2012. Cosmetic palettes. In M. Chłodnicki, K. M. Ciałowicz and A. Mączyńska (eds), *Tell el-Farkha I. Excavations 1998–2011*, 315–322. Poznań-Kraków.

Chłodnicki, M. and Ciałowicz, K. M. with contribution by Abłamowicz, R., Dębowska, J., Jucha, M., Kirkowski, R. and Mączyńska, A. 2004. Polish Excavations at Tell el-Farkha (Ghazala) in the Nile Delta. Preliminary report 2002–2003. *Archeologia* 55: 47–74.

Chłodnicki, M. and Ciałowicz, K. M. 2015. Tell el-Farkha. Excavations 2012–2013. *Polish Archaeology in the Mediterranean* 24(1): 173–197.

Chłodnicki, M. and Ciałowicz, K. M. 2016. Tell el-Farkha: archaeological fieldwork 2014–2015. *Polish Archaeology in the Mediterranean* 25: 227–253.

Chłodnicki, M., Ciałowicz, K. M. and Mączyńska, A. (eds), 2012. *Tell el-Farkha I. Excavations 1998–2011*. Poznań-Kraków.

Chłodnicki, M., Fattovich, R. and Salvatori, S. 1991. Italian Excavations in the Nile Delta: Fresh Data and New Hypothesis on the 4th Millennium Cultural Development of Egyptian Prehistory. *Rivista di Archeologia* 15: 5–33.

Ciałowicz, K. M. 1991. *Les palettes Égyptiennes aux motifs zoomorphes et sans décoration. Études de l'art Prédynastique*. Kraków.

Ciałowicz, K. M. 1992. La composition, le sens et la symbolique des scènes zoomorphes prédynastiques en relief. Les manches de couteaux. In R. Friedman and B. Adams (eds), *The Followers of Horus: Studies in Memory of M. A. Hoffman*, 247–258. Oxford. Egyptian Studies Association Publication 2, Oxbow Monograph 20.

Ciałowicz, K. M. 2012a. Protodynastic and Early Dynastic settlement on the Western Kom. In M. Chłodnicki, K. M. Ciałowicz and A. Mączyńska (eds), *Tell el-Farkha I. Excavations 1998–2011*, 163–180. Poznań-Kraków.

Ciałowicz, K. M. 2012b. Early Egyptian objects of art. In M. Chłodnicki, K. M. Ciałowicz and A. Mączyńska (eds), *Tell el-Farkha I. Excavations 1998–2011*, 201–243. Poznań-Kraków.

Ciałowicz, K. M. 2018. Socio-political transformations in the Eastern Delta in the second half of IVth Millennium BC. View from Tell el-Farkha. In K. M. Ciałowicz, M. Czarnowicz and M. Chłodnicki (eds), *Eastern Nile Delta in the 4th Millennium BC*, 9–20. Kraków-Poznań.

Ciałowicz, K. M., Czarnowicz, M. and Chłodnicki, M. (eds). 2018. *Eastern Nile Delta in the 4th Millennium BC*. Kraków-Poznań.

Dębowska-Ludwin, J. 2012. The cemetery. In M. Chłodnicki, K. M. Ciałowicz and A. Mączyńska (eds), *Tell el-Farkha I. Excavations 1998–2011*, 53–75. Poznań-Kraków.

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Flints from the Road: on the Significance of two Enigmatic Stone Tools Found along the Darb el-Tawil

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This paper explores the function and dating of two rectangular flint tools found at different positions along the Darb el-Tawil caravan route. This route directly connecting the Dakhla Oasis with the Nile Valley has seen caravan transport during almost 4500 years from the Old Kingdom to the 20th century. The two flint objects are a rarity along this route but are also not well-known from archaeological sites elsewhere in Egypt. In bringing together the evidence from the site contexts of the current flint tools with parallels related to morphology and technical aspects of types of flint tools known from Egypt or beyond, it is concluded that these artefacts are likely to be interpreted as a sickle element in the one case and a gunflint in the other.

KEY-WORDS: Egypt, caravan route, sickle element, gunflint

INTRODUCTION

The current paper seeks exploring the functional significance and cultural background of two enigmatic flint tools found during the survey along the Darb el-Tawil caravan route. The Darb el-Tawil is the principle route directly connecting Dakhla Oasis with the Nile Valley. Its primary track starts from the old town of Balat in the eastern part of this oasis, and enters the Nile Valley at Beni Adi in the area of Manfalut after some 250 km (Fig. 1).

Since the beginning of road construction in 2015 of a modern asphalt highway planned to follow exactly the tracks of the caravan route, investigations have started to survey the old route and document its sites and artefacts (Bubenzer *et al.*, 2018). Due

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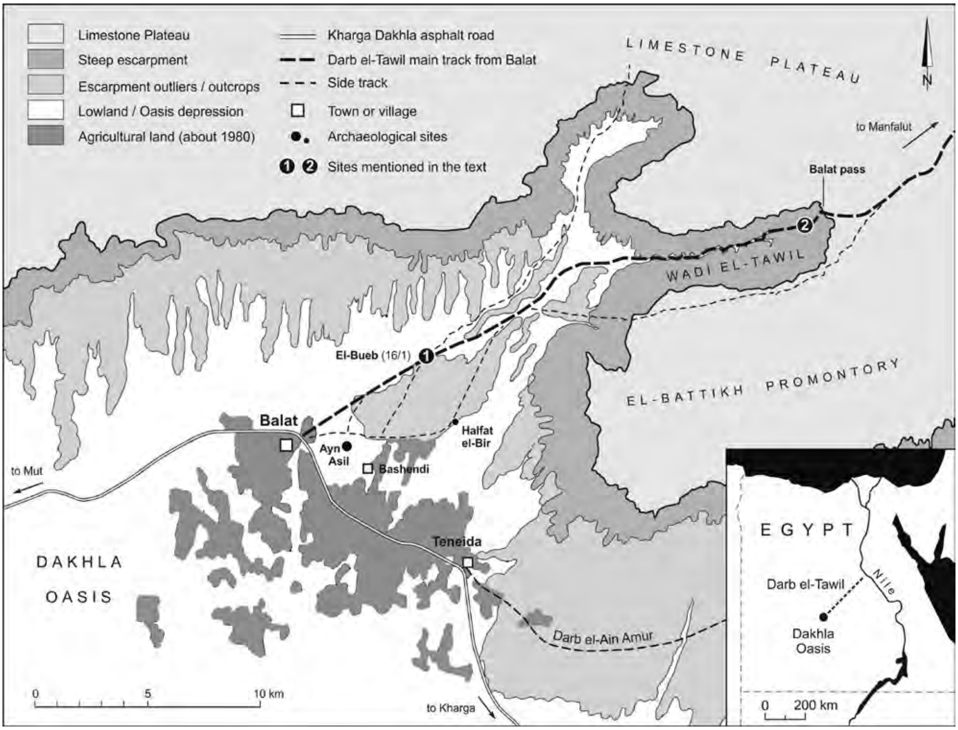

Fig. 1. Map of the eastern part of the Dakhla Oasis showing the positions of the two flint objects found along the Darb el-Tawil caravan route: 1 – Sickle insert; 2 – Gunflint. Graphic design: H. Riemer.

to administrative reasons, only about the first 30 km from Balat leading up to the so-called Balat pass, where the road finally enters the Egyptian Limestone Plateau, have been surveyed. It was on this stretch of road that the two flint tools were found (Fig. 2).

Pottery makes up the most numerous category of artefacts found along this route. Sherds of about 1000 ceramic vessels allowed the first comprehensive chronological sequence of this route to be established. It shows that the Darb el-Tawil was firmly established already during the Old Kingdom, as previously supposed in earlier papers on the basis of the rich Old Kingdom remains excavated at Dakhla Oasis (e.g., Giddy 1987: 208). Caravan transport along this route lasted for more than 4000 years until the 20th century, when it ceased during the 1970s. A few phases are not properly represented in the corpus of pottery from this route, especially the Middle and New Kingdom material. The absence of material from the latter periods is likely a result of a shift of state-organized transport to more westerly routes, when the capital moved from Memphis to Upper Egypt. Knowledge of pottery of Islamic times in Egypt has

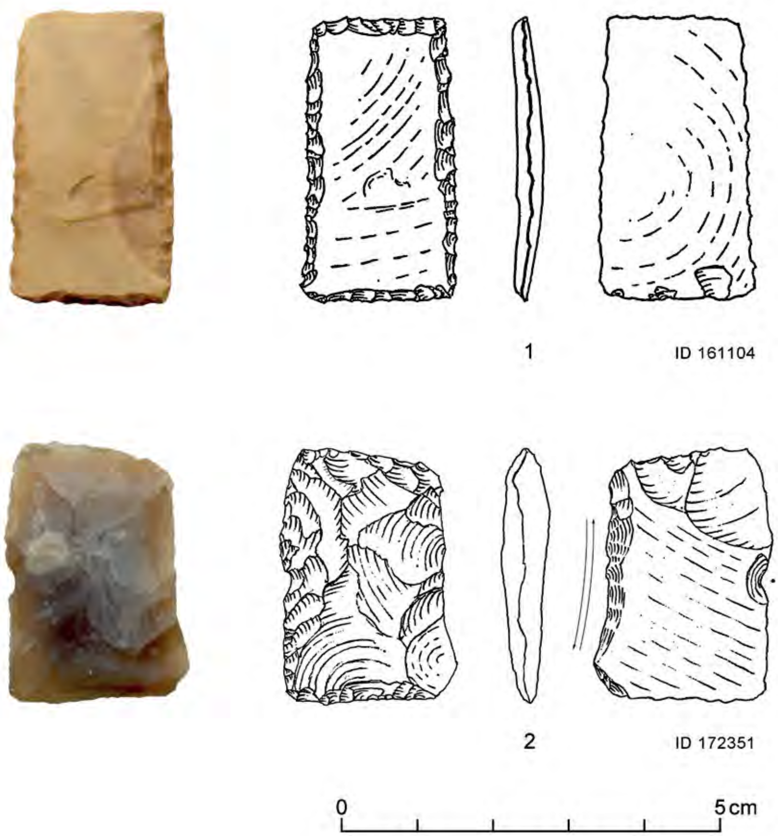

Fig. 2. Two chipped flint objects from the Darb el-Tawil caravan route:
1 – Suggested rectangular sickle element from site El-Bueb 16/1;
2 – Suggested gunflint from the environs of the Balat pass. Scale 1:1.
Computer graphics: H. Riemer and K. Kindermann.

only tremendously improved recently, however, it is still not well understood regarding regional variations; and Ottoman ceramics are even less well studied. Yet, there are many ceramic and other objects from these phases along the Darb el-Tawil indicating intense caravan transport there.

The flint finds that are the subject of the present paper were associated with this caravan route. The period when this route was in operation sets the time frame for the dating of these flint objects. In the following it is attempted first to discuss the problems and possibilities of dating of artefacts found along a caravan route. In a second step, it is attempted to apply these rules to both flint objects individually in order to establish a best-fit statement on their dating and function.

METHODS: DATING AND CONTEXT OF STONE ARTEFACTS ALONG A CARAVAN ROUTE

The assigning of artefacts found along a caravan route to specific periods of time is particularly difficult due to a number of reasons. Due to the highly mobile character of human activities along desert routes, most objects found there are single surface finds or related to shallow deposits, meaning that the contextual information is extremely meagre or even non-existent. Most of the objects found on the route were accidentally lost during its use, for example as the result of a mishap involving a pack animal or loss of a load due to improper lashing. The few places where caravans halted for a rest are often littered with artefacts; but again most objects found there result from the accident-prone moments of loading and unloading when the pack animals are agitated. Some objects, however, could have been deliberately placed at these places, such a storage jar in a water depot or a cooking pot next to the camp fire, but these deposits are usually shallow and do not provide much contextual information.

Objects found without context may be dated by comparison with types well dated elsewhere. Much of the pottery found along caravan routes has been identified in this way. It is, however, fair to say that in every region some phases in the chronological sequence are usually less well known than others. This is particularly true for the most recent phases in Egypt, such as the late Medieval and Ottoman periods. Moreover, some pottery represents types especially used for caravan transport or storage, which rarely shows up as stratified finds in excavations of settlements, temples or burials.

The interpretation of single stone artefacts in this regard is even more difficult. Stone tools of some periods are not characteristic enough for single artefacts to be ascribed a date. This especially pertains to the expedient production of some late prehistoric groups, such as the Sheikh Muftah in the Dakhla Oasis. The present almost total lack of knowledge of post-Old Kingdom stone knapping traditions in Egypt is another reason that dramatically hampers proper identification of loose stone tools found along a caravan route.

As far as we can see, regular trade and transport along caravan routes was only established in the socio-economic-context of early state formation, when geopolitical, economic and social preconditions substantially increased the demands for transportation and exchange of resources and products. Potentially, this would exclude the dating of objects to earlier periods; but unfortunately it is largely unknown when exactly most roads were established.

It should, however, also be noted that roads usually did not develop out of nothing; rather it appears that some roads were established on older trail networks of local nomadic people, as seems to be the situation in the case of the Darb el-Tawil. It cannot be excluded that artefacts found on a caravan route originally came from a site that predates the establishment of the route. The oasis depression of Dakhla is rich in archaeological remains of prehistoric camp sites, the artefacts of which often have survived on the desert surface due to excessive wind erosion and low sedimentation rates. This also holds true for many prehistoric camp sites by short-term water basins on the Egyptian Limestone Plateau between this oasis and the Nile Valley. It is not surprising that caravan tracks accidentally crossed abundant prehistoric sites from which stone artefacts in particular have survived.

In the following discussion, the two objects in question will be interpreted first in the frame of their individual find positions along the caravan route and the evidence that their respective spatial contexts at these locations provides. Secondly, we will seek possible parallels known from Egyptian contexts, and in the case that no parallel can be found from these sources, to search on a global scale.

SICKLE ELEMENT (OBJECT ID 161104), ABOUT 7 KM FROM BALAT AT SITE EL-BUEB 16/1

Location and context

The flint item in question here is a rectangular retouched flint tool made of a thermoclastic sherd of so-called "caramel flint" (Fig. 2:1). This flint artefact was found associated with one of the most productive activity sites discovered during the Darb el-Tawil survey so far. This site, situated about 7 km from the old town of Balat in the eastern oasis (Fig. 1), is the most prominent natural landmark along the principle track of the Darb el-Tawil half-way between Balat and the mouth of the Wadi el-Tawil. It features in the landscape as a conspicuous sandstone ridge in an otherwise rather featureless landscape, with the route winding through a cut in the ridge downwards into an old playa pan. In the survey, this place was labelled site 16/1, but is known locally to old caravanmen as *El-Bueb*, "the small gate or door" (cf. Moritz 1900).

Archaeological inspection of this site revealed a high density of potsherds, bones, stone artefacts and other indications of repeated human activity related to caravan transport. The site is not only prominent from its natural appearance, but a number of artificial features of practical and symbolic functions. Numerous *alamat* (cairns) on the tops of the flanking rocks as well as rock engravings signal a site of importance. The latter feature Arabic names of the 19th and 20th century, some with dates added. On the other end of the time scale, there are a few pharaonic engravings in a rock shelter, accompanied by some sherds of red-slipped bowls of Old Kingdom/First Intermediate Period age. The shelter is some 5 m above the ground, but well-protected from the wind and with a good view of inbound caravans. There is also a windscreen on top of the site's front rock providing a commanding panoramic view, indicating that this is one of the so-called "hilltop sites" interpreted as serving to control caravan routes during the Old Kingdom (Kaper and Willems 2000). It is therefore likely that this site was manned permanently or during longer periods in the caravan season. The site is within the distance of a one-hour normal march from Ayn Asil, the provincial capital of Dakhla Oasis during the late Old Kingdom/First Intermediate Period (or about half of the time for a running messenger).

Stone artefacts found directly on the tracks of the caravan route were not collected, because the danger of pseudo-flaking on flint pieces or older blank products resulting from trampling by pack-animals is so high that we presume that 100% of the flint pieces there would be affected by this process (cf. Driscoll *et al.*, 2016). The site's surfaces away from the tracks, however, have been surveyed carefully for retouched items. There is a very low-density scatter of stone artefacts over most of the site. One scatter in front of the aforementioned habitation shelter is of higher density, and especially composed of some ready-made tools. They represent end- or laterally edge-retouched items and borers. The overall impression is that of an expedient blank production characterized by informal flakes and naturally formed flint pieces (thermo-clastic pieces). This way of production is typical for the expedient "outdoor" production at some hill-top sites around Dakhla Oasis as well as for the local nomadic Sheikh Muftah people (cf. McDonald 2000; Riemer 2011; Kobusiewicz 2015).

Most of the items are made of omnipresent Palaeocene Tarawan sherd available sub-locally from outcrops in the escarpment cap rock, and locally in the debris on escarpment outliers ranging for some kilometres into the depression of the oasis (Kleindienst *et al.*, 1999: 89). The conspicuous caramel flint, obviously occurring in the upper beds of the same geological formation, is represented only twice at the site, pointing to the use of resources that are more exotic. Outcrops of this material have been found atop the escarpments of Kharga Oasis. Farther west, along the rim of the Abu Gerara escarpment, prehistoric sites contain the highest percentage of this good-quality raw material that appears in different qualities and shape there, mainly in tabular blocks and as thermo-clastic sherds on the surface (Kindermann 2010). According to the these observations, the position of the sources providing caramel flint were about 100 km away from Balat, but can easily be accessed from Balat via the Darb el-Tawil within three marching days.

Rectangular sickle elements in the Dakhla Oasis

The stone tool of interest is a rectangular flat piece of caramel flint with all four edges regularly retouched by semi-steep flaking. This rectangular object from site 16/1 parallels pieces found in great numbers in the context of the Old Kingdom / First Intermediate Period settlements of Dakhla Oasis. Due to the finding of sickle gloss on their lateral edges, they are interpreted as insets in wooden sickle shafts, of which a reconstruction is shown by Jeuthe (2012: 142; cf. Kobusiewicz 2015: 76). In archaeological contexts, rectangular sickle elements are usually accompanied by triangular elements, the latter forming the end-pieces in a series of rectangular elements fitted into the sickle shaft (Fig. 3:2).

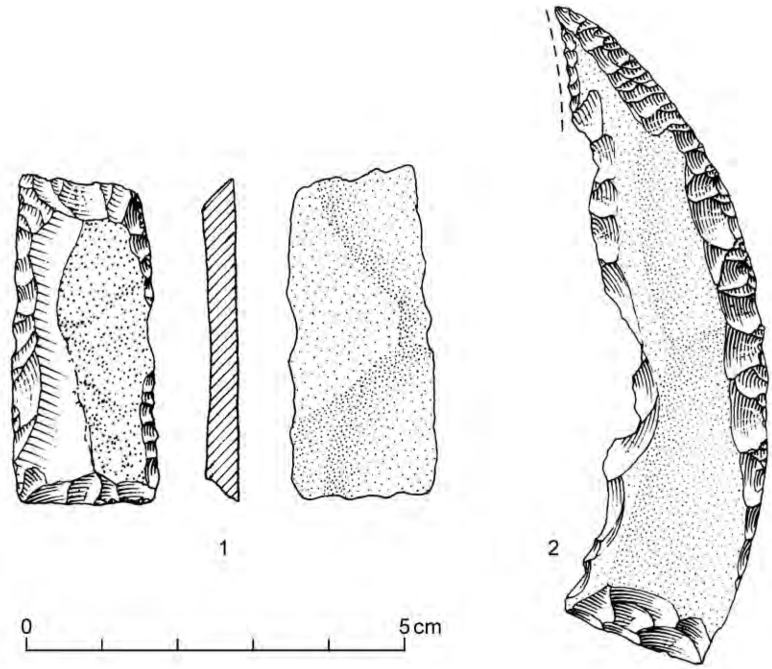

Fig. 3. Old Kingdom/First Intermediate Period flints from Ayn Asil, Dakhla Oasis: 1 – Rectangular sickle element (with gloss); 2 – Triangular sickle element (modified after Midant-Reynes 1998: pl. 23.2; 25.1). Drawn: H. Riemer.

Both rectangular and triangular examples of these insets from the oasis are usually not made of blades or flakes chipped from a core, but of tabular thermo-clastic sherds, the latter which usually form natural debris piles at flint outcrops on the Limestone Plateau from where they probably originate. They differ markedly from sickle elements made out of regular blades, which occur in great numbers in other Predynastic to Old Kingdom contexts in Egypt. The alternative use of tabular thermo-clastic material is obviously a phenomenon characteristic for the southern oases of the Western Desert, where lithic tools for agricultural purposes were introduced not before the colonization of Dakhla Oasis by Pharaonic Egypt presumably during the 3rd to 4th dynasty (Hope and Pettman 2012).

Midant-Reynes, in her analysis of the lithic material from Ayn Asil, explicitly distinguishes between (1) regular blades or segments of blades exhibiting sickle gloss and (2) rectangular or triangular sickle elements of tabular flint with gloss on, "imitating" blades or blade segments of the same function (Midant-Reynes 1998: 31; Fig. 3). This approach was further developed by Jeuthe in her study of the lithic workshops from the same site (Jeuthe 2012: 135). Kobusiewicz, who studied the lithic collection from Ayn el-Gazzareen in the western part of Dakhla, names the above first type "sickle blade" as opposed to the second type, which he calls "massive rectangular/triangular sickle inserts" (Kobusiewicz 2015: 34).

Ayn Asil and Ayn el-Gazzareen, at which sickle elements are abundant, are among Dakhla's main settlement centres during the Old Kingdom/First Intermediate Period. Both settlements are characterized as centres of trade and agricultural production. The crafts also include the production of sickles for the harvest and their lithic insets in workshops specialized in the standardized mass-production of this type of lithic elements, such as amply indicated in Jeuthe's study (2012). Ayn Asil additionally represents the provincial capital of the oasis with the palace of the governor, and was probably the primary centre from which cultivation and transport of produce as well as exchange with the Nile Valley were administered. This given, it is not surprising that most sickle elements come from excavations of these settlements: 170 sickle insets from Ayn el-Gazareen represent about one fourth of all chipped lithic tools found at this site; and again about one fourth of the insets are on tabular thermo-clastic material (Kobusiewicz 2015: 34). The workshop assemblage from Ayn Asil numbers 1449 sickle insets or about half of all chipped lithic tools there; three-quarters of the insets are on tabular material (thermo-clastic pieces). Yet chipping from tabular material was by no means preferred as the production method of sickle insets: At Ayn el-Gazzareen, more than half of all tools were made of tabular material, about the double of the percentage of the tabular sickle insets. At Ayn Asil, the proportion of insets on tabular material is actually only slightly below the mean in the tool total, the latter at almost 80%.

Despite all the similarities in the occurrence of sickle elements in the early settlements of Dakhla, there is also some variation apparent between Ayn el-Gazzareen and Ayn Asil in the frequencies of sickle elements and the respective raw materials, this may be because of a multitude of secondary factors difficult to pin down. The highest density of sickle elements in the lithic workshop area at Ayn Asil is self-explaining; but there might also be a distinction in the political significance between the two settlements, with Ayn el-Gazzareen probably subordinated to Ayn Asil in terms of administration. Moreover, the different geographic positions in the Dakhla depression, Ayn el-Gazzareen lying about 40 km west of Ayn Asil, may have facilitated different access to raw materials on the local and more distant level. Finally, it should not be forgotten that these settlements have varying chronological sequences with a range of overlap currently difficult to define precisely: Ayn el-Gazzareen and the lithic assemblage has been pottery-dated to dynasties 5 and 6 (Pettman 2012; Kobusiewicz 2015: 26). For Ayn Asil, the material studied by Midant-Reynes comes from contexts generally dated to the late Old Kingdom/First Intermediate Period (Midant-Reynes 1998: 1). The workshop area excavated by Jeuthe is associated to building phase 2 dating to the final Old Kingdom/First Intermediate Period (Jeuthe 2012: 31–37; Jeuthe *et al.*, 2013).

Few rectangular sickle insets came from sites other than the settlements. Their number is extremely small, and elements of this kind may represent accidental losses or items used opportunistically for other purposes. Only one exception deserves mentioning due to its special context. Valloggia (1986: pl. 87) presents a small collection of triangular and rectangular sickle elements found in the mastaba of the Governor Medu-Neferat at Qilla el-Debba, the burial ground of the local dignities of Ayn Asil.

Without any doubt, the present lithic tool found at site El-Bueb 16/1 represents a rectangular sickle element made on a tabular piece of caramel flint. This is likewise supported by the metrical values of this object, which fits into the figures given for such objects in the studies from Ayn Asil.

The data taken from the study by Midant-Reynes (1998: 31) on the lengths and widths of rectangular elements are not directly comparable with those published by Jeuthe (2012: 140). While Midant-Reynes gives mean, maximum, minimum and standard deviation of length and width measurements of 87 rectangular elements, Jeuthe provides the number of elements by length and width classes. However, it is possible to extract approximate 68% (standard deviation) and 95% ranges from her data. It should however be noted that all 9 elements of Jeuthe's variant "2.3" have been excluded from the type of rectangular elements in the present analysis, because in our opinion they rather represent a variant of triangular shape (cf. Jeuthe 2012: 59), so that a total of 185 rectangular elements remain from Jeuthe's study. The graph in Fig. 4 shows that the specimen found at site El-Bueb 16/1 is a rather small representative of the category of rectangular elements. Nevertheless, with a length of 38 mm and a width of 21 mm, it is in the range of the standard deviations given for lengths and widths measurements by Midant-Reynes, and only marginally shorter than the standard deviation approximation of lengths measurements from the data given by Jeuthe.

It is notable that the rectangular sickle element from site El-Bueb 16/1 has no sickle gloss, either because it has never been used for cutting, or due its long surface exposure that is suspected of being destructive to gloss preservation. This also touches on the question of the significance of a sickle element left behind at a hill-top site of a caravan route. One possibility is that the sickle element had been brought from Dakhla by the men stationed at the hill-top site, in order to use its cutting edges for purposes other than harvesting. The fact that it does not show substantial damage or use wear does not support this idea, however. Otherwise, it could have been brought by a donkey caravan from the Limestone Plateau together with a load of collected caramel flint sherds, destined for the workshops in Ayn Asil. Because of circumstances unknown to us, the piece was lost at site El-Bueb 16/1. It seems rather unlikely, however, that the flint sherd had already been retouched at the outcrop. It is probable that tabular flint slabs and sherds were roughly trimmed at the outcrops due to transport efficiency, but that the retouching of working edges was accomplished only in the workshops of the oasis. Nevertheless, this case opens up our view to the long neglected aspect of

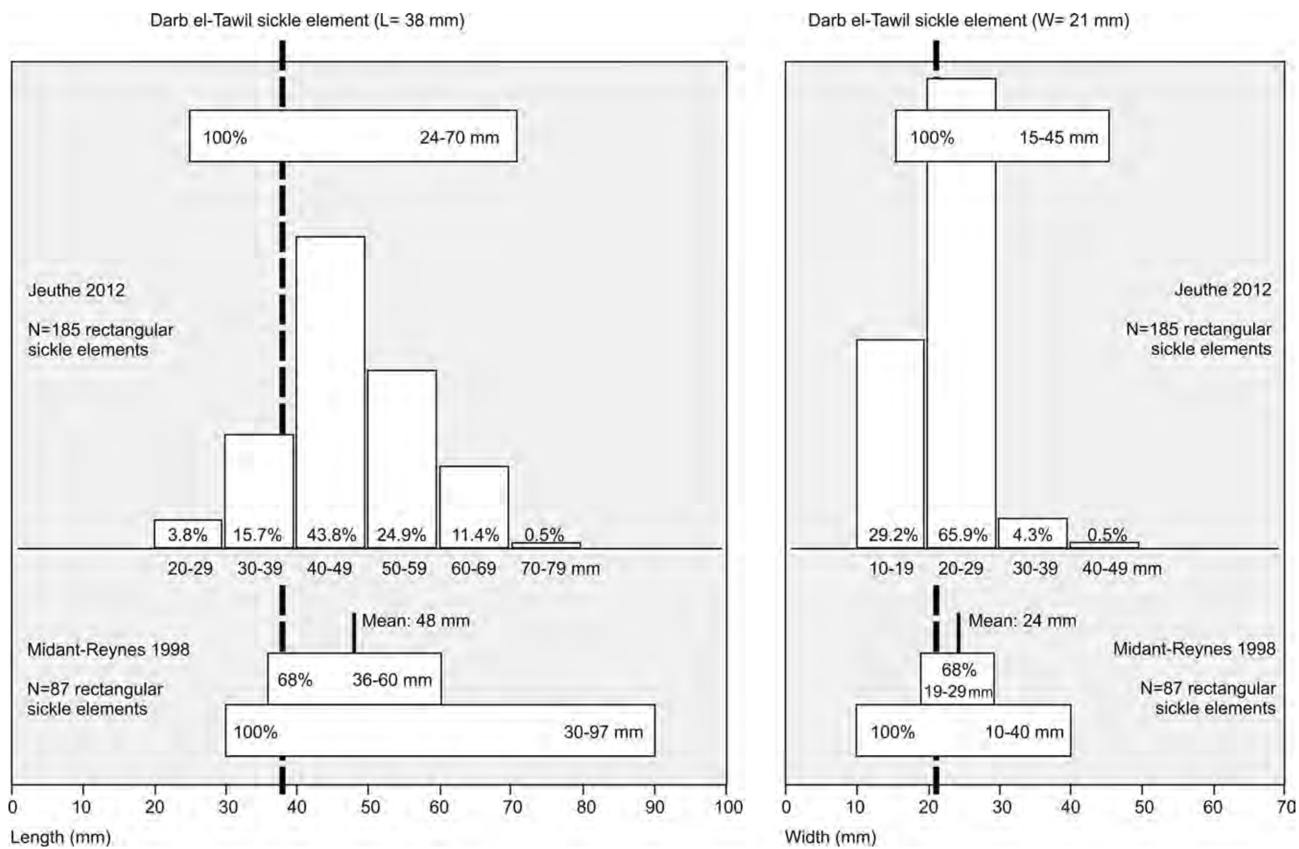

Fig. 4. Comparison of length and width of the suggested rectangular sickle element from the Darb el-Tawil with information given on rectangular sickle elements by Midant-Reynes (1998: 31) and Jeuthe (2012: 140), showing that the flint in question here is well in the range of other sickle elements. Computer graphics: H. Riemer.

lithic raw material acquisition during the Old Kingdom. It is only during recent years that research on Old Kingdom flint mining in the Eastern Desert has drawn attention to the modes of supply and transport of quarried flints (Briois and Midant-Reynes 2014; Köhler *et al.*, 2017), and it is more than likely that high-quality caramel-coloured flint was mined or rather collected on the Egyptian Limestone Plateau.

GUNFLINT (OBJECT ID 172351), ABOUT 27 KM FROM BALAT, NEAR BALAT PASS

Location and context

The second stone artefact discussed in this paper is an almost rectangular chipped piece of flint (Fig. 2:2). The raw material is a dense semi-translucent greyish brown flint of a type perfectly suited for knapping. This stone artefact was found some 2 km below the Balat pass (Naqba Balat), the final climb out of the Wadi el-Tawil onto the Egyptian Limestone Plateau (Fig. 1). It was discovered just by the main track of the route on the desert surface. No other artefact was found directly associated, nor was any site feature or cluster of artefacts observed on the spot that could indicate a temporary halting place for the caravans. But it is of interest that west of the finding place the route climbs a steep sand ramp which is littered by camel bones and lost objects, among which is a considerable number of sherds from jars, porcelain, and clay pipes dating to the Ottoman period.

The current flint piece is of rectangular shape, but significantly shorter than the sickle element described above for the site El-Bueb 16/1. The continuous slightly convex surface does not show indications of a typical ventral face. It is obviously a thermo-clastic sherd (or frost fracture) typical for flint-rich desert surfaces. Such fragments as well as the greyish brown raw material are characteristic for the Limestone Plateau, which the Darb el-Tawil caravan route crosses (Kindermann 2010). The dorsal surface is completely covered by larger thinning scars. The lateral edges are retouched, one on the ventral face, and the other edge on the dorsal face. The scars of the ventral edge retouch show traces of polish along their ridges.

It appears that this item is not comparable to any of the chipped lithic tool types known in Egypt. Although the raw material is characteristic for the region, and both the facial retouch and the use of thermo-clastic fragments is common for the mid-Holocene lithic production of late hunter-gatherers between the oases and the Nile Valley, the rectangular shape and relatively small size of the object does not fit with any of the lithic tools of this or other periods.

Flint was of course one of the most important materials for the production of stone artefacts for millennia during pre- and early historic times, but this raw material was also used for specific purposes in modern times too. The use of stone tools survived into the modern world, where they could do something cheaply and as effectively as metal tools or even performed tasks metal could not. Stone elements were used in the past, for instance, as insets in wooden threshing sledges (e.g., Anderson 2003; Weiner 2012c; Anderson and Whittaker 2014; Whittaker 2014). They were also used as strike-a-lights (e.g., Stapert and Johansen 1999; Weiner 2012a), or gunflints (e.g., Weiner 2012b). Finds of the latter group of artefacts would not be surprising on an old trade or caravan route that has been used up to the 20th century.

Flintlock firearms

The second half of the 16th century saw the emergence of firearms in which the ignition mechanism (called flintlock) created a spark by means of an inserted gunflint. The widespread use of flintlock rifles, muskets and pistols in the past created a high demand of retouched flint artefacts, so-called gunflints (Germ. *Flintensteine*, French *pierres à fusil*, Ital. *pietrefocaie* or *pietre da fucile*, Span. *piedras de fusil*). They replaced wheelock firearms (known from the early 16th century on), in which a spark was created by friction between a denticulated wheel of steel and a piece of pyrite. In the flintlock (Fig. 5), a trigger releases the so-called cock or hammer (Germ. *Hahn*, French *chien*), which holds the gunflint, almost always wrapped in a piece of leather or lead. This falls against a piece of steel, named frizzen or battery (Germ. *Batterie*, French *batterie*), which produces sparks that ignite a priming charge. This in turn sets off the main charge of gunpowder (Whittacker 2003: 52; Weiner 2012b: 962; Kolesnik and Holubieva 2018, 132–133).

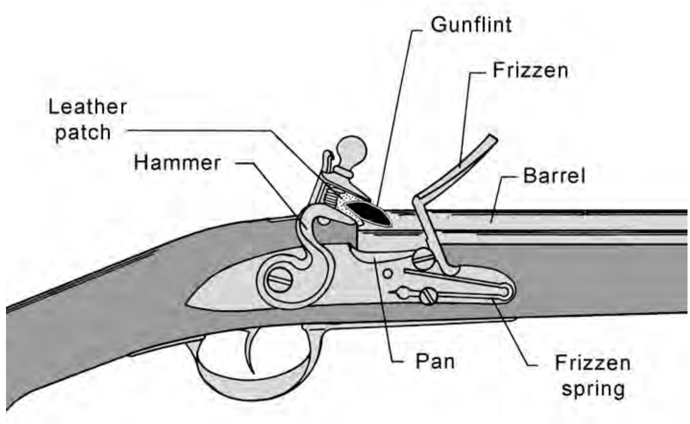

Fig. 5. Elements and operating principle of the firing mechanism of a flintlock musket. Modified after Kenmotsu (1990: 95, Fig. 3).

The flintlock system quickly became popular, and was known and used in various forms throughout all of Europe and most probably also in North Africa and the Middle East. Flintlock weapons were the major weapon of all European nations from the late 1600s until the early 1800s (Whittacker 2003: 52), a period in which also trade on the Darb el-Tawil route was quite active and certainly needed protection from raids and robbery by armed persons. The flintlock firearm was commonly used by the military until the middle of the 19th century, when it was replaced by a so-called percussion lock system, a system without gunflints (Weiner 2012b: 961). Such a percussion lock gun of the 19th century was accidentally found during an archaeological survey near to the Darb el-Farafra, the direct caravan route between the Nile Valley and the oasis of Farafra starting at about the same point at the Nile Valley as the Darb el-Tawil (Fig. 6). This find indicates that guns were carried by caravan people in the recent past.

Gunflints

The high demand for gunflints created by the dominance of flintlock arms during the past centuries generated a revival in flint-knapping in several regions in the 16th–17th centuries. This production gained military and thus economic importance and hence, in several European countries of the 16th–19th centuries, a distinctive flint industry developed. Thus, in regions with suitable flint deposits, specialized gunflint manufactories were established for a mass production. Among the most important centres were those in France and in England (Skertchley 1879: 963–964). French gunflints were generally regarded as the highest quality and were therefore imported to various European countries and also to the French colonies abroad. English gunflints were only used by the English military and in their own colonies. Until the middle of the 19th century, large quantities of gunflints were also produced in other European limestone regions as for example in Belgium, Austria, Denmark, Sweden, Italy, Poland, Albania, Bulgaria, Turkey or Russia (Hahn 1993: 138; Weiner 2012b: 963–964; Kolesnik and Holubieva 2018: 132–133). In Egypt, firearms became common with the occupation by the Ottoman Empire, unfortunately only very little is known about gunflints in this part of Northeast Africa. The use of flintlocks and the production of gunflints are indirectly evidenced by Schweinfurth (1885), who mentions the finding of gunflints in the Eastern Desert, but neither is there information about the technical aspects of the production nor of the shape of the final gunflints.

Gunflints resemble a special type of geometric microlith that was used exclusively for the production of sparks. Due to their shape and appearance, some researchers call them "gunflint microlith inserts" or "prismatic gunflints" but a clear morphological typological division does not exist. However, this may probably not be very effective either, since the shape of a gunflint had no real practical meaning as it is always wrapped in the gunlock and could hence vary to some extent in shape and edge trimming, from segment-like (Germ. *Hufeisenform*, French *talon rond*) with one striking (leading)

Fig. 6. Find of a percussion lock gun near to the caravan route between the oasis of Farafra and the Nile Valley. Photo: R. Kuper (1993).

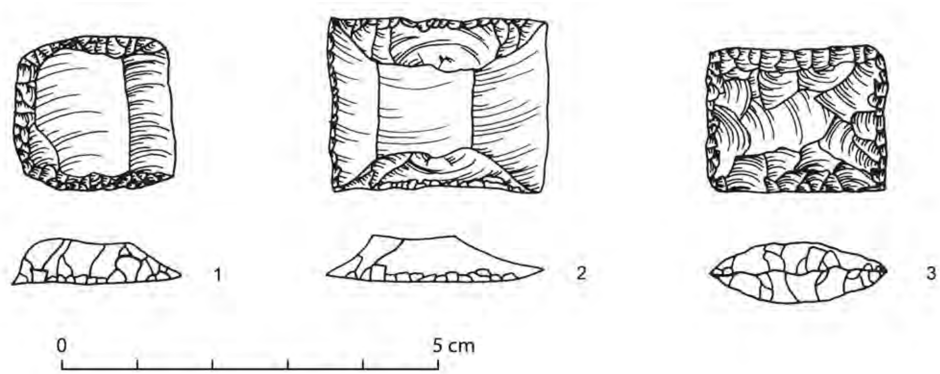

Fig. 7. Typical shapes of gunflint: 1 – French gunflint from blade, 1700s; 2 – British gunflint from blade, 1800s; 3 – Native American bifacial gunflint, 1600s. Modified after Whittaker (2003: 53, Fig. 3.22).

edge to sub-square with one or two opposed striking (leading) edges (Weiner 2012b: 964; Kolesnik and Holubieva 2018: 132–133, 140). Generally the lateral edges as well as the leading edge and the heel were beveled, which could be produced by retouching. Often the thin leading edge, as the working-edge of the gunflint, was unmodified but could be strengthened by retouch on the lower face of the edge (Ballin 2012: 117).

In morphological and technological terms, of importance are only the two main structural parts of a gunflint, the striking (leading) edge and the back or the heel (Fig. 7). The first is more or less straight and mostly sharp, whereas the heel, hidden in the wrap, varied in its morphology (Kolesnik and Holubieva 2018: 132–133).

Gunflints could be knapped out of flakes as well as blades (Weiner 2012b: 964–969), generally these blanks were afterwards broken (knapped) into short sections by the gunflint makers (Skertchly 1879; Whittaker 2003: 11). Early gunflints were sometimes knapped from the ventral faces of large, thick flakes, which give them two opposed ventral faces (Ballin 2012: 118). After gunflint crafts in the French, English and other centres developed mass production, gunflints were usually made out of regular blades with a range of a rather standardized set of morphological types. But the additional use of flakes and other blank types may have persisted in other regions.

Detailed descriptions of such manufacturing process as well as characteristic features and absolute measurements of gunflints are not easy to find in the literature. A comprehensive study of the English gunflint production of Brandon is published by Skertchly (1879; cf. Lotbiniere 1977; 1984). Regarding the absolute dimensions of a gunflint, research on gunflints from 16th/17th century of south-eastern Ukraine by Kolesnik and Holubieva indicates that "the sizes of the gunflints were probably determined by the shape of the gunlocks, and they varied between 24 mm and 37 mm in length for this type with approximately the same variation in width" (Kolesnik and Holubieva 2018: 140).

Gunflints from the road?
The flint object (Fig. 2:2) from the Balat pass on the Darb el-Tawil caravan route described above can be interpreted in the light of morphology and size of the gunflints discussed above as falling into the same range. The nature of its find spot would also correspond to the archaeological and chronological setting one would expect for artefacts related to flintlock weapons. It was a single surface find lying in the direct context of the Darb el-Tawil (one of the major long-distance trade routes of Northeast Africa) and found with ceramics dating to the Medieval to Ottoman periods. The interpretation of the stone artefact as a gunflint would fit the wider context; given its general shape and that it does not match any other type of flint tool known from the Egyptian deserts.

Although this piece with its rectangular shape seems comparable to the rectangular sickle flint described above, it appears substantially different, due to its shortness and greater thickness, as well as its facial retouch. A bevel, as described for gunflints in general, seems also to have been consciously created along the edges of this piece by retouch. The form of the longitudinal edges of the artefact could be considered as the leading edge and a heel of a gunflint. Likewise the lateral retouch on the ventral face of the artefact would support the gunflint interpretation, which could be a strengthening retouch on the lower face of the leading edge as described before. Whether the blank used for this stone artefact may have originally been a "janus-like" piece is difficult to decide. In addition, it seems possible that the scars and negatives on the "ventral" face as well as the little notch on the lateral edge (heel?) of the piece may be due to its use as a gunflint.

CONCLUSION

Lithic studies are usually the domain of archaeologists studying Pleistocene and Holocene hunter-gatherers as well as the early Neolithic, and have more recently also appeared in research on pastoral nomadic contexts and early state-based societies. In general, the importance of lithic artefacts and technology as a research subject decreases in the study of later periods, virtually vanishing in more recent history, even though flints have been used for specific purposes up to modern times. The pre-industrial production of gunflints has been described in books of the 19th and early 20th century, but there has been little attention payed by archaeologists to the role such objects have played in history. The current study should serve to encourage lithic studies of more recent societies and draws attention to the fact that lithic objects may occur unexpectedly out of their usual context, such as on the line of a caravan route, and that their function in trade and transport has so far been barely explored.

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REFERENCES

Anderson, P. C. 2003. Observations on the threshing sledge and its products in ancient and present-day Mesopotamia. In P. C. Anderson, L. S. Cummings, T. K. Schippers and B. Simonel (eds), *Le traitement des récoltes: Un regard sur la diversité, du Néolithique au present,* 417–438. Antibes.

Anderson, P. C. and Whittaker, J. C. 2014. Blades, sickles, threshing sledges and experimental archaeology in northern Mesopotamia. In A. van Gijn, J. C. Whittaker and P. C. Anderson (eds), *Exploring and Explaining Diversity in Agricultural Technology*, 161–168. Oxford.

Ballin, T. B. 2012. 'State of the art' of British gunflint research, with special focus on the early gunflint workshop at Dun Eistean, Lewis. *Post-Medieval Archaeology* 46(1): 116–142.

Briois, F. and Midant-Reynes, B. 2014. Sur les traces de Georg August Schweinfurth. Les sites d'exploitation du silex d'époque pharaonique dans le massif du Galâlâ nord (desert Oriental). *Bulletin de l'Institut français d'archéologie orientale* 114(1): 73–98.

Bubenzer, O., Bolten A. and Riemer, H. 2018. In search of the optimal path to cross the desert: Geoarchaeology traces old Trans-Saharan Routes. In C. Siart, M. Forbriger and O. Bubenzer (eds), *Digital geoarchaeology. New techniques for interdisciplinary human-environmental research,* 139–148. Berlin.

Driscoll, K., Alcaina, J., Égüez, N., Mangado, X., Fullola, J.-M. and Tejero, J.-M. 2016. Trampled under foot: A quartz and chert human trampling experiment at the Cova del Parco rock shelter, Spain. *Quaternary International* 424: 130–142.

Giddy, L. L., 1987. *Egyptian oases. Bahariya, Dakhla, Farafra and Kharga during Pharaonic times*. Warminster.

Hahn, J. 1993. *Erkennen und Bestimmen von Stein- und Knochenartefakten. Einführung in die Artefaktmorphologie*. Tübingen.

Hope, C. A. and Pettman, A. J. 2012. Egyptian Connections with Dakhleh Oasis in the Early Dynastic Period to Dynasty IV: new data from Mut al-Kharab. In R. Bagnall, P. Davoli and C. A. Hope (eds), *The Oasis Papers 6: Proceedings of the Sixth International Conference of the Dakhleh Oasis project*, 147–165. Exeter. Dakhleh Oasis project: Monograph 15.

Jeuthe, C. 2012. *Balat X. Ein Werkstattkomplex im Palast der 1. Zwischenzeit in Ayn Asil*. Cairo, Fouilles de l'IFAO 71.

Jeuthe, C., Le Provost, V. and Soukiassian, G. 2013. Ayn Asil, palais des gouverneurs du règne de Pépy II. État des recherches sur la partie sud. *Bulletin de l'Institut français d'archéologie orientale* 113: 203–238.

Kaper, O. E. and Willems, H. 2002. Policing the Desert: Old Kingdom Activity around Dakhleh Oasis. In R. Friedman (ed.), *Egypt and Nubia: Gifts of the Desert*, 79–94. London.

Kenmotsu, N. 1990. Gunflints: A Study. *Historical Archaeology* 24(2): 92–124.

Kindermann, K. 2010. *Djara: Zur mittelholozänen Besiedlungsgeschichte zwischen Niltal und Oasen (Abu-Muharik-Plateau, Ägypten)*. Cologne.

Kleindienst, M. R., Churcher, C. S., McDonald, M. M. A. and Schwarcz, H. P. 1999. Geography, Geology, Geochronology and Geoarchaeology of the Dakhleh Oasis Region: An Interim Report. In C. S. Churcher and A. J. Mills (eds), *Reports from the Survey of the Dakhleh Oasis 1977–1987*, 1–54. Oxford.

Kobusiewicz, M. 2015. *The Production, Use and Importance of Flint Tools in the Archaic Period and the Old Kingdom of Egypt*. Oxford.

Köhler, E. C., Hart, E. and Klaunzer, M. 2017. *Wadi el-Sheikh: A new archaeological investigation of ancient Egyptian chert mines. PLoSOne* 12(2): e0170840. https://doi.org/10.1371/journal.pone.0170840

Kolesnik, A. and Holubieva, I. 2018. Gunflints from 16th/17th century archaeological assemblages from the central part of the Severskiy Donets River (south-eastern Ukraine). *Archäologische Informationen* 41: 131–148.

Lotbiniere, S. de 1977. The Story of the English Gunflint Some Theories and Queries. *The Journal of the Arms & Armour Society* 9(1): 40–53.

Lotbiniere, S. de 1984. Gunflint recognition. *International Journal of Nautical Archaeology and Underwater Exploration* 13(3): 206–209.

McDonald, M. M. A. 2000. Appendix: The Chipped Stone from Nephthys Hill, Locality 386. In R. Friedman (ed.), *Egypt and Nubia: Gifts of the Desert*, 91–92. London.

Midant-Reynes, B. 1998. *Le silex de ʿAyn-Aṣīl, Oasis de Dakhla – Balat*. Cairo.

Moritz, M. 1900. Excursion aux oasis du désert libyque. *Bulletin de la Société Khédiviale de Géographie* 5(8): 429–475.

Pettman, A. J. 2012. The Date and the Occupation of ʻAin el-Gazzareen based on Ceramic Evidence. In R. Bagnall, P. Davoli and C. A. Hope (eds), *The Oasis Papers 6: Proceedings of the Sixth International Conference of the Dakhleh Oasis project*, 181–208. Exeter, Dakhleh Oasis project: Monograph 15.

Riemer, H. 2011. *El Kharafish: The archaeology of Sheikh Muftah pastoral nomads in the desert around Dakhla Oasis (Egypt)*. Cologne.

Schweinfurth, G. 1885. Kiesel-Nuclei aus der arabischen Wüste. *Zeitschrift für Ethnologie* 17: 128–134.

Skertchly, S. B. J. 1879. *On the manufacture of gun-flints, the methods of excavating for flint, the age of palæolithic man, and the connexion between neolithic art and the gun-flint trade*. London.

Stapert, D. and Johansen, L. 1999. Flint and pyrite: making fire in the Stone Age. *Antiquity* 73: 765–777.

Valloggia, M. 1986. *Balat I. Le Mastaba de Medou-Nefer, Fascicule II: Planches*. Cairo.

Weiner, J. 2012a. Feuerschlagsteine und Feuerzeugung. In H. Floss (ed.), *Steinartefakte vom Altpaläolithikum bis in die Neuzeit*, 943–960. Tübingen.

Weiner, J. 2012b. Flintensteine. In H. Floss (ed.), *Steinartefakte vom Altpaläolithikum bis in die Neuzeit*, 961–972. Tübingen.

Weiner, J. 2012c. Dreschschlitten. In H. Floss (ed.), *Steinartefakte vom Altpaläolithikum bis in die Neuzeit*, 973–980. Tübingen.

Whittaker, J. C. 2003. *Flintknapping. Making and Understanding Stone Tools*. Austin.

Whittaker, J. C. 2014.The manufacture and use of threshing sledges. In A. van Gijn, J. C. Whittaker and P. C. Anderson (eds), *Exploring and Explaining Diversity in Agricultural Technology,* 141–144, 184–189. Oxford.

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Rock Art and Archaeology – a Short Visit to Zolat el Hammad, Northern Sudan

Friederike Jesse[a]

The striking sandstone formation of Zolat el Hammad is located in the southern Libyan Desert, about halfway between the Middle Wadi Howar and El Atrun. The place has been known for its numerous rock engravings for more than a hundred years. Wild and domesticated animals as well as few human figures are depicted. Cattle engravings largely dominate, followed by giraffes and ostriches. In 1997 the first paintings were discovered in a small rock shelter. Very schematic bovids are drawn in red and white colour. However, even though it is one of the most remarkable rock art sites in this part of the Sahara, Zolat el Hammad has never been intensely studied. Observations on rock art and archaeology made during a short stay in 2001 are the basis for presenting an account of the area with the aim of encouraging further research on it.

KEY-WORDS: Northern Sudan, Libyan Desert, Zolat el Hammad, rock art, archaeology

INTRODUCTION

The striking rock formation of Zolat el Hammad, situated about halfway between the Middle Wadi Howar and El Atrun (Fig. 1:I), has been known for more than one hundred years. Under the name Zolat el Hammad, the sandstone formation discovered in 1907 by Capt. Coningham is already noted on the map sheet 1:250.000 "Jebel Rahib 44-K" from 1908 with the addition "Peculiar pillar-like boulders on N. E. side of Rocky Jebel" (Newbold 1924: 67, the quotation here; Kröpelin 1993: 59). The unusual forms of the sandstone pillars, some reminiscent of animals or human figures, are also referred to in the Arabic name of the site: "Zolat" means rocks or pebbles and "el Hammad" means the praiseworthy (Newbold 1924: 67). The rock art present in the approximately circular area with a diameter of *c.* 6 km was described only later (see "A short history of research"). However, Zolat el Hammad was always only afforded

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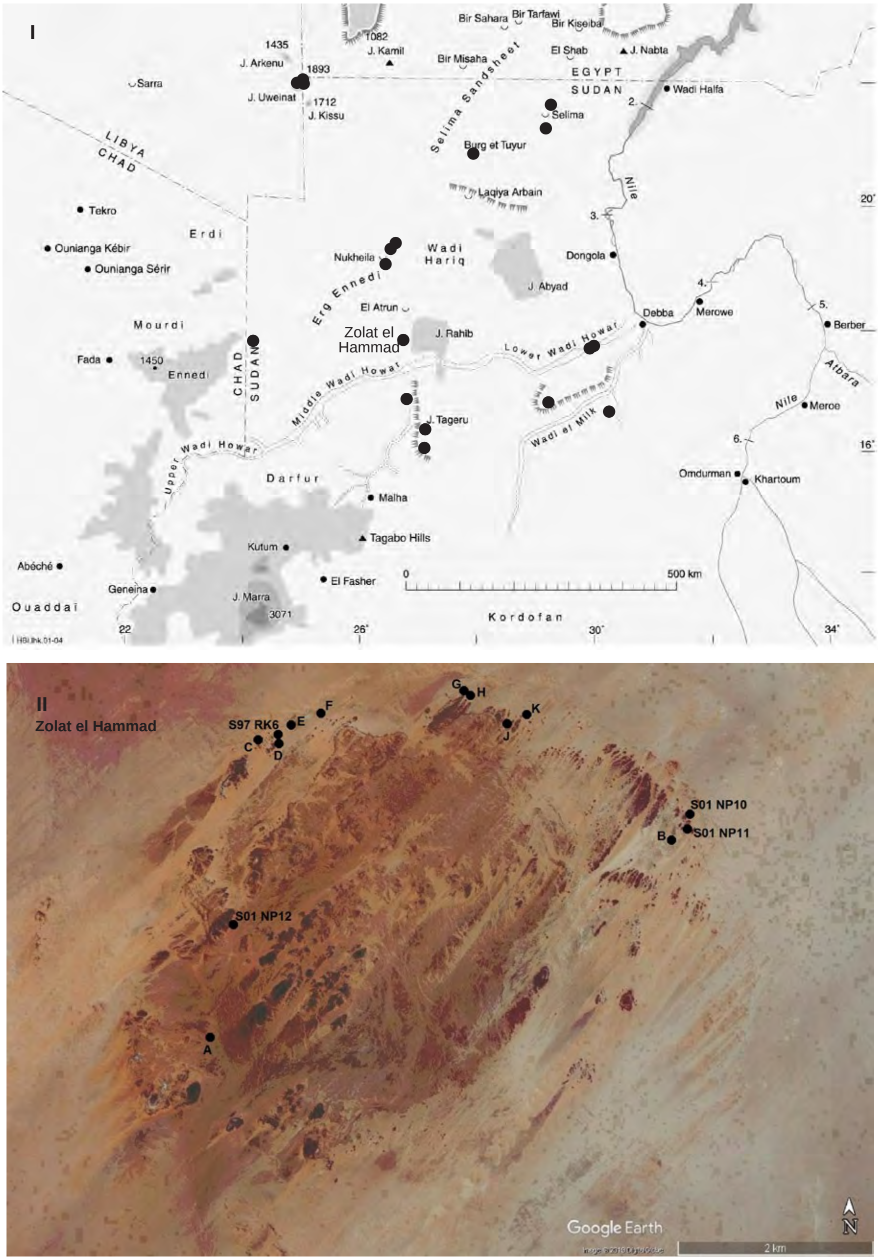

Fig. 1. I – Map of the southern Libyan desert showing the location of Zolat el Hammad and further rock art sites (Map Forschungsstelle Afrika); II – The area of Zolat el Hammad indicating the rock art sites (points A–K) and further archaeological observations (Base map Google Earth). Computer graphics: F. Jesse.

a short stop for numerous visitors – besides various research expeditions also various tourist groups. A systematic recording of the entire rock art site, already described by the first visitors as extraordinarily rich, has not yet taken place. There is little evidence of other archaeological remains, such as pottery, stone artefacts or other traces of human presence: only Kröpelin (1993: 62) mentions the existence of ring-shaped stone settings. In November 2001, during an excavation campaign of the Cologne research project ACACIA (Arid Climate Adaptation and Cultural Innovation in Africa), the author was able to spend a short stay in Zolat el Hammad for the first and to date only time. The volume dedicated to Michał Kobusiewicz offers a good opportunity to briefly introduce the site's rock art and archaeology by means of the notes and observations made there and to bring Zolat el Hammad back into focus as an object of research.

A SHORT HISTORY OF RESEARCH

Douglas Newbold was the first European to describe the rock art in Zolat el Hammad (Newbold 1924; 1928). Already in 1917, nomad Howawir had discovered rock art "near a clump of bushes and trees, called Waara el Gilud (also: Wa'ra el Gilud) – 'The coppice of the Skins'". It was so named, since the Howawir had found the site, "when skinning slaughtered game here" (Newbold 1928: 277). During his very short first stay in 1923, Newbold made some pictures and sketches of the engravings found there (Newbold 1924: 64–67). On another visit in 1927, now together with William Boyd Kennedy Shaw, a more detailed description was possible (Newbold and Shaw 1928; Newbold 1928). "There are represented tailed phallic and plumed men, elephants, giraffes, ostriches, oryx, cattle innumerable, dogs, and several other animals difficult to determine, but possibly including monkeys, addax, rock-rabbits and a lion. There were no camels" (Newbold 1928: 277).

Since then the rock paintings of Zolat el Hammad have been visited again and again. The *11. Deutsch-Innerafrikanische Forschungs-Expedition* (DIAFE XI) under Leo Frobenius at the beginning of the 1930s was among the numerous other visitors to the striking sandstone formation. However, due to logistical difficulties (water and fuel shortage), the expedition could only stay for a short time in Zolat el Hammad. A sandstorm made the conditions even more difficult and so photos and some quick sketches were made only (Rhotert 1952: 79; see also Almásy 1935: 207–208; 1997: 223). Rhotert (1952), however, provides a quite detailed record of the rock art in Zolat el Hammad and describes the sandstone rock group as "almost strewn with engravings" (Rhotert 1952: 79; original: "mit Gravierungen geradezu übersät").

In the 1980s, geoscientific and archaeological research projects based at the universities of Berlin and Cologne reached the region. During the excavation campaign of the Cologne project *Besiedlungsgeschichte der Ostsahara* (B. O. S.) at the beginning of 1984, a longer stop in Zolat el Hammad was possible. Various rock art locations were documented photographically (for pictures see the African Archaeology Archive Cologne [AAArC][1]: search term "Zolat"). Among others, this is the "main engraving site", which was already presented by Newbold (1924; 1928) and Rhotert (1952; Fig. 1:II, point A[2]). Site 84/94 was also documented (see below). The rock art lies on the western side of the area of Zolat el Hammad. Here also the main routes run through the southern Libyan desert, among them the famous Darb el Arba'in, the road of 40 days (for an overview see Riemer and Förster 2013: 52–53).

During a geological survey conducted by the Berlin Collaborative Research Centre 69 in 1985, petroglyphs on the eastern side of Zolat el Hammad were documented (Kröpelin 2004: 114). These had apparently already been discovered by the desert explorer Samir Lama earlier on[3] (Berger 1997: 81). Thus two rock art areas can be distinguished: "Zolat el Hammad West", the Waara el Gilud already described by Newbold and Rhotert (Hinkel 1979: 130–131; Kröpelin 1993: 59; Berger 1997: 81) and "Zolat el Hammad East" (Kröpelin 1993: 59–62; 2004: 114–116; Berger 1997). On the platform-like surface of the sandstone hill above the rock formations of Zolat el Hammad East, some circular stone settings with diameters around 2 m were found. These may be remains of human habitation (Kröpelin 1993: 62).

During the field research of the Cologne ACACIA project, Zolat el Hammad was visited several times: In the spring of 1997, for the first time paintings were discovered in a small abri and noted under the site designation S97 RK6 (see below). Further short stays took place in November 2001 and between 2003 and 2005 (Jesse *et al.*, 2013: 84–85; for pictures see AAArC[4]).

THE ROCK ART

The spectrum of rock art depicted in Zolat el Hammad has already been outlined in the first descriptions (Newbold 1924; 1928; Rhotert 1952) and supplemented by further publications (Kröpelin 1993; 2004; Berger 1997; 1999): wild and domesticated animals as well as human figures. There are a large number of depictions of cattle in a wide variety of forms and designs. In addition to very schematic illustrations (e.g., Rhotert 1952: plate XLIII, 4–7), there are clearly more naturalistic ones, which also show

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1 https://arachne.dainst.org/project/afrarchcologne

2 For the mapping of the "main engraving site" the indications given in the archaeological map of Sudan (Hinkel 1979: 130–131 and map) were used.

3 Berger (1997: 81) mentions the late 1940s but this seems to be an error.

4 https://arachne.dainst.org/entity/5061851; arachne.dainst.org/entity/5061852; arachne.dainst.org/entity/5061848

the pattern of the coat (e.g., Rhotert 1952: plate XLI; AAArC[5]). The variety of the horn forms is striking: "There are high or wide open, lyre-shaped, large round horns, arched to the front, steeply standing upwards, short, flat curved horns standing at an obtuse angle to each other or asymmetrically arranged horns"[6] (Rhotert 1952: 80, see also Tab. p. 102). Dogs are rarely depicted (Rhotert 1952: Taf. XLV, 3 and Taf. XLVII, 1–3). Kröpelin (2004: 114–115, Fig. 11) also mentions goats.

Giraffes clearly dominate the depicted wild animals. Here, too, there are strongly stylised representations (e.g., Rhotert 1952: plate XLIV, 1) as well as more naturalistic ones (e.g., Rhotert 1952: plate XLV, 4–5). Petroglyphs showing "seated" giraffes are striking (e.g., Rhotert 1952: plate XLV, 1; AAArC[7]; see also Berger 1997: 84). Occasionally elephants are depicted (Almásy 1935: 208; e.g., Rhotert 1952: plate XLVI, 1–4; Kröpelin 1993: 61, photo 14b), then surprisingly small. Rhotert (1952: 84) therefore assumes that these were depicted from memory or according to indirect information. Ostriches are present, sometimes in the middle of cattle herds (e.g., Kröpelin 1993: 60, also photo 13b; 2004: 115, Fig. 12). At a rather inaccessible place in Zolat el Hammad East engravings of rhinoceroses were discovered. A real herd is depicted together with human figures with strikingly round heads (Kröpelin 2004: 116, also Fig. 16). Long human figures with rounded heads, mostly without arms and depicted in a static posture, are only known from Zolat el Hammad East (Kröpelin 2004: 114–115). The human representations located in the western part of Zolat el Hammad are clearly different (Newbold 1924; 1928; Rhotert 1952: 82, see also plate XL, 2–3 and plate XLII, 5; AAArC[8]). More schematic depictions such as sandal-like forms are rare (Rhotert 1952: 86, see e.g., plate XLVII, 6).

The engravings are executed quite differently, partly only deliminated by pecked outlines, partly worked out over the entire surface (Rhotert 1952). On the basis of superposition and patina, a certain time depth of the rock engravings is assumed for both areas (Kröpelin 1993: 60). Paintings have so far only been observed at one point, S97 RK6 (see below). These are very schematically depicted bovids in red and white colour. During the author's one and a half day stay in Zolat el Hammad in November 2001, both rock art areas – Zolat el Hammad East and Zolat el Hammad West – were visited (Fig. 1:II, points B–K). The engravings seen fit well into the spectrum described above. No systematic recording of the rock art was made, only a photographic documentation took place. In the following, some observations will be briefly presented.

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5 https://arachne.dainst.org/entity/6063264

6 Translated from the original quotation: "Es gibt hohe oder breiter offene, lyraförmige, große rund, bogenförmig nach vorn gekrümmte, steil aufwärtsstehende, kurze, flach gebogen in stumpfem Winkel zueinander stehende oder auch unsymmetrisch angeordnete Hörner" (Rhotert 1952: 80).

7 https://arachne.dainst.org/entity/5061848

8 https://arachne.dainst.org/entity/6060322

Fig. 2. Zolat el Hammad East, point B. Large frieze with petroglyphs including an Arabic inscription. Photo: F. Jesse.

A larger panel in Zolat el Hammad East (Fig. 1:II, point B) shows, beside animal representations (giraffes, bovids, ostriches) also an Arab inscription (Fig. 2). The name “Rahmadan Koko Muhdir” can be read. According to our accompanying NCAM inspector Muawiya Ali El-Tayeb, this might be a person coming from the Nuba Mountains as “Koko” is a common name there for the eldest son.

In Zolat el Hammad West, engravings were documented at various places (Fig. 1:II, points C–K). The engravings were made on different surfaces – vertical as well as horizontal ones. Often they are veritable friezes, but also single engravings were observed. Higher rocks were also used. On an isolated large sandstone block (Fig. 1:II, point E), engravings were found on the eastern side showing among other things giraffes, bovids with long horns, an elongated human figure and other only badly recognizable engravings. (Fig. 3:A). A large herd of cattle is depicted within a larger frieze together with other animals such as goats (Fig. 1:II, point F; Fig. 4). Superposition indicates that this place was visited again and again. Only about 150 m south a frieze with at least two giraffes was discovered in a rather high position. Very schematic engravings of cattle were seen on the northern side of a stone block (Fig. 1:II, point H; Fig. 3:B). On a horizontal surface near a small rock shelter (Fig. 1:II, point J) the representation of an insect-like animal was discovered next to giraffe representations consisting purely

Fig. 3. Zolat el Hammad West. A – Petroglyphs at point E; B – Petroglyphs at point H; C – Petroglyphs at point K; D – Petroglyphs at point J. Photo: F. Jesse.

of dotted lines (Fig. 3:D). At point K (Fig. 1:II) gazelles respectively antelopes (possibly Oryx?) were found as well as cattle with pronounced horn deformation (Fig. 3:C). This can best be classified in the category of lyre-shaped horns (Rhotert 1952: 102, table), but this representation is much more elaborate than the examples mentioned there. On the eastern side of a large stone block (Fig. 1:II, point D) giraffes, bovids, a human figure, goats and dogs are engraved (Fig. 5). Directly in front of it lay a block chipped off from this stone, which was also densely engraved with giraffes on the chipped side.

FURTHER ARCHAEOLOGICAL OBSERVATIONS – THE SITES

Although rock art has always been the focus of the various visits to Zolat el Hammad, some archaeological sites have also been described during the short stays within the framework of the excavation campaigns of the Cologne projects B. O. S. and ACACIA (Fig. 1:II). These are listed here in chronological order of discovery.

Fig. 4. Zolat el Hammad West. Large frieze with different animals among others a cattle herd at point F. Photo: F. Jesse.

Fig. 5. Zolat el Hammad West. Engravings at point D. Photo: F. Jesse.

Zolat el Hammad 84/94

In 1984, an extended loose artefact scatter discovered on a playa-like sediment near the long known rock engravings of Zolat el Hammad (Fig. 1:II, point A) was recorded as site 84/94 (AAArC[9]). Among the stone artefacts, which are mainly made of coarser and fine-grained quartzite, some segments were recorded. A few pieces of pottery were found, among them sherds with a Dotted-Wavy-Line pattern (AAArC[10]). On the east side of the hills, a small cave without sediment was discovered, in which some "younger" sherds were lying, among them a rim sherd with a kind of herringbone pattern (AAArC[11]).

S97 RK6

At the beginning of March 1997, a small shelter located on a promontory between the northern boulders of Zolat el Hammad was discovered. (Fig. 1:II; Fig. 6:A) The shelter extends over about 3 × 3 m and has in it very schematic representations of bovids in red and white colour (Fig. 6:B). Engravings are also present. Pottery with fine quartz temper as well as unretouched stone artefacts were observed.

During the stay in November 2001, in between the sandstone formations of Zolat el Hammad East, flakes and much eroded pottery were observed at many places. At one place, however, a denser artefact scatter justified a site documentation (S01 NP10).

S01 NP10

The open air site with a loose artefact scatter extends over an area of about 80 × 50 m. Decorated and undecorated pottery was observed. All sherds were very worn and rounded and heavily tempered with quartz. Among the decorative patterns there were horizontal rows of dots impressed with rocker technique. For the production of stone flakes, a brown silicified sandstone was used as well as quartzite of ochre colour, little chalcedony and quartz. Upper and lower grinding stones were observed as well as animal bones (e.g., bovid tooth lamella fragments).

S01 NP11

This is a small, very flat shelter filled with sandy sediment, which does not appear to be of great depth. A stone post in the entrance of the shelter had two fainted engravings on its left side. Animals are represented. It was, however, not possible to further identify them. Inside the shelter a few flakes of quartzite (some with retouch) were found as well as a few bone splinters and pieces of ostrich eggshell. One half of a lower

9 https://arachne.dainst.org/entity/6060322
10 https://arachne.dainst.org/entity/6064266
11 https://arachne.dainst.org/entity/6060987

Fig. 6. Site S97 RK6. A – Overview of the site;
B – Schematic paintings of bovids in red colour.
Photo: R. Kuper.

Fig. 7. The petroglyphs at site S01 NP12. Photo: F. Jesse.

grinding stone made of a highly micaceous granitoid lay in front of the shelter. Large flakes mostly made from a brown fine-grained quartzitic sandstone and partly with edge retouch were present. Only few quartz flakes were observed. Two hammerstones, one made of quartz, as well as one core made of a bright quartzite and one upper grinder were also recorded.

S01 NP12

On the western bank of a valley through which the Darb el Arba'in runs, a small rock shelter was discovered. The place offers a perfect view over the valley where some acacias grow and thus also over the Darb el Arba'in. Therefore the shelter might have been used as a *poste de guetteur*, a guard. Three pecked petroglyphs representing animals (among them one giraffe) were found on a stone which borders the shelter to the southeast (Fig. 7). Unretouched lithic artefacts were observed.

CONCLUDING REMARKS

In a nutshell, the spectrum of rock engravings depicted at Zolat el Hammad includes domesticated and wild animals as well as human figures. A striking feature of the cattle depictions is the diversity of the horn forms, which can be seen as an expression of the importance of cattle for prehistoric groups, similar to the sometimes careful depiction of coat patterns. Within the group of wild animals, giraffe representations dominate. The unusual round-headed human figures in Zolat el Hammad East are so far unique in the Libyan Desert (Kröpelin 2004: 116; for the figures also Berger 1999). So far no camel representation has been found, which gives an indication of the chronological position of the rock art. The engravings in Zolat el Hammad East and West are different from a stylistic point of view as the animals and figures are differently worked. However, a much more detailed recording should take place for verification and refinement of this statement. Most engravings are found at places which can easily be reached, and only seldom are friezes at high altitudes. The few paintings at site S97 RK6 are remarkable. In the southern Libyan desert engravings are much more numerous, e.g., in Jebel Tageru (Newbold 1928) or Lower Wadi Howar (Kröpelin 2004; Jesse 2005).

Different time horizons for the rock art of Zolat el Hammad can be recognised on the basis of patina and superposition. Due to their patina, the rhinoceroses, together with the round-headed human figures, are probably among the oldest representations in Zolat (Kröpelin 2004: 116). In the light of the numerous depictions of cattle, the bulk of the engravings was certainly made by cattle herders. These were present in the Wadi Howar region since the end of the 5th millennium BC. Pastoral groups are attested up to the 2nd millennium BC (Jesse and Keding 2007; Jesse *et al.*, 2013). The lack of camel representations also indicate that Zolat el Hammad was obviously no longer frequented after the onset of today's aridity during the 2nd millennium BC. Beyond the rock art itself, due to a lack of diagnostic finds, the archaeological observations made so far are not sufficient to clearly identify phases and patterns of human use. A longer research visit with a comprehensive documentation not only of the rock art but also of the archaeological sites in the whole area of Zolat el Hammad would certainly provide more information here.

REFERENCES

Almásy, L. E. 1935(1934). *Ismeretlen Szahara* (Unknown Sahara). Budapest, Franklin Társulat.

Almásy, L. E. 1997. *Schwimmer in der Wüste. Auf der Suche nach der Oase Zarzura*. Innsbruck, Haymon.

Berger, F. 1997. Report about a Petroglyph Site at Zolat el Hammad in the Libyan Desert, Northern Sudan. In S.-A. Pager (ed.), *Rock Art Research – Moving into the Twenty-First Century*, 80–93. Okahandja (Namibia). Occasional SARARA Publication No. 4, Southern African Rock Art Association.

Berger, F. 1999. The humans from Zolat el Hammad (Sudan) a status report. *Cahiers de l'Association des Amis de l'Art Rupestre Saharien* (AARS) 5: 5–7.

Hinkel, F. W. 1979. *The Archaeological Map of the Sudan II. The Area of the South Libyan Desert*. Berlin, Akademie-Verlag.

Jesse, F. 2005. Rock Art in Lower Wadi Howar, Northwest Sudan. *Sahara* 16: 27–38.

Jesse, F. and Keding, B. 2007. Holocene Settlement Dynamics in the Wadi Howar Region (Northern Sudan) and the Ennedi Mountains (Chad). In O. Bubenzer, A. Bolten and F. Darius (eds), *Atlas of Cultural and Environmental Change in Arid Africa*, 42–43. Köln. Africa Praehistorica 21.

Jesse, F., Keding, B., Lenssen-Erz, T. and Pöllath, N. 2013. 'I hope your cattle are well': Archaeological Evidence for Early Cattle-centred Behaviour in the Eastern Sahara of Sudan and Chad. In M. Bollig, M. Schnegg and H.-P. Wotzka (eds), *Pastoralism in Africa. Past, Present and Future*, 66–103. New York-Oxford, Berghahn.

Kröpelin, S. 1993. *Zur Rekonstruktion der spätquartären Umwelt am Unteren Wadi Howar (Südöstliche Sahara / NW-Sudan)*. Berlin. Berliner Geographische Abhandlungen 54.

Kröpelin, S. 2004. New petroglyph sites in the Southern Libyan Desert (Sudan-Chad). *Sahara* 15: 111–117.

Newbold, D. 1924. A Desert Odyssey of a Thousand Miles. *Sudan Notes and Records* 7: 43–92.

Newbold, D. 1928. Rock pictures and archaeology in the Libyan Desert. *Antiquity* 2: 261–291.

Newbold, D. and Shaw, W. B. K. 1928. An Exploration in the South Libyan Desert. *Sudan Notes and Records* 11: 103–194.

Riemer, H. and Förster, F. 2013. Ancient desert roads: Towards establishing a new field of archaeological research. In F. Förster and H. Riemer (eds), *Desert Road Archaeology in Ancient Egypt and Beyond*, 19–58. Köln. Africa Praehistorica 27.

Rhotert, H. 1952. *Libysche Felsbilder. Ergebnisse der XI. und XII. Deutschen Inner-Afrikanischen Forschungs-Expedition (DIAFE) 1933/1934/1935*. Darmstadt.

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Animal Hill – a Large Prehistoric Rock Art Site CO178 in the Central Dakhleh Oasis, Egypt

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This article introduces one of the largest rock art sites found in the central Dakhleh Oasis. Firstly, an overview of all the panels with petroglyphs is provided and the images briefly described. The panels' description contains basic information on their location and visibility, motifs and their compositional aspects, and chronology. This is followed by a brief summary of the presented data and a discussion situating the site in the broader context of Dakhleh and the surrounding Western Desert. Particular motifs and their arrangements, like a herd of giraffes, are further briefly discussed, and parallels from the Dakhleh region and the Nile valley cited in order to compare the CO178 rock art.

KEY-WORDS: Rock art, Petroglyphs, Giraffe, Oryx, Dakhleh Oasis

INTRODUCTION

The aim of this paper is to present finds of rock art from site CO178 in the central Dakhleh Oasis, Egypt and provide short descriptions of them, as well as some comments and observations. It is intended here to distinguish and characterize especially those features that find parallels both in the oasis and a broader context of the Western Desert. This report will present, however, neither an in-depth study of possible cultural connections between various rock art regions, nor will it venture into considerations on possible meanings of particular groups of petroglyphs. Nevertheless, it is hoped that this article has potential to act as a trigger for conducting further comparative work on rock art between the Western Desert and the rest of Egypt. This is one of the reasons site CO178 has been chosen, as, despite certain features that make it exceptional, it also displays many traits that can be considered typical for the Dakhleh Oasis rock art.

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ANIMAL HILL: THE CONTEXT

The site was discovered in the central Dakhleh Oasis about 6 km south of the tarmac road that links the region of Balat with Mut. It was registered as CO178 and nicknamed Animal Hill, taking its name from abundant zoomorphic depictions crowding its walls. Although provisionally documented during a survey (Polkowski 2016: 167–173), CO178 was meant to be thoroughly recorded in subsequent seasons. However, since 2014, due to security reasons, the Petroglyph Unit of the Dakhleh Oasis Project (PUDOP) still has not been able to resume fieldwork, making a return to the site an impossible task (Polkowski 2018a).

Animal Hill is one of over 250 rock art sites discovered in the central oasis area (Polkowski 2019). Although a substantial number of these contain prehistoric imagery, historical rock art is equally abundant (Polkowski *et al.*, 2013). In fact, CO178 is surrounded by localities with large numbers of dynastic and post-dynastic petroglyphs, away from the nearest significant prehistoric sites with comparable imagery by *c.* 1.5 km north-east (04/08; Polkowski 2018b) and some 1–1.2 km south-east (a cluster of sites including 02/06, 04/06, 08/06, 09/06; Kuciewicz *et al.*, 2008). Within a radius of *c.* 1 km there is thus a scarcity of prehistoric rock art, with only a handful of isolated panels scattered around and often eclipsed by historical petroglyphs (e.g., CO189). Moreover, the above mentioned larger sites cannot be compared to Animal Hill when it comes to number of depictions.

The hill itself is relatively large being *c.* 60 m long and *c.* 35 m wide. All rock art panels were found in its southern portion, particularly on the eastern and south-eastern slopes. Eighteen panels in total were registered, of which the majority (n = 12) have been

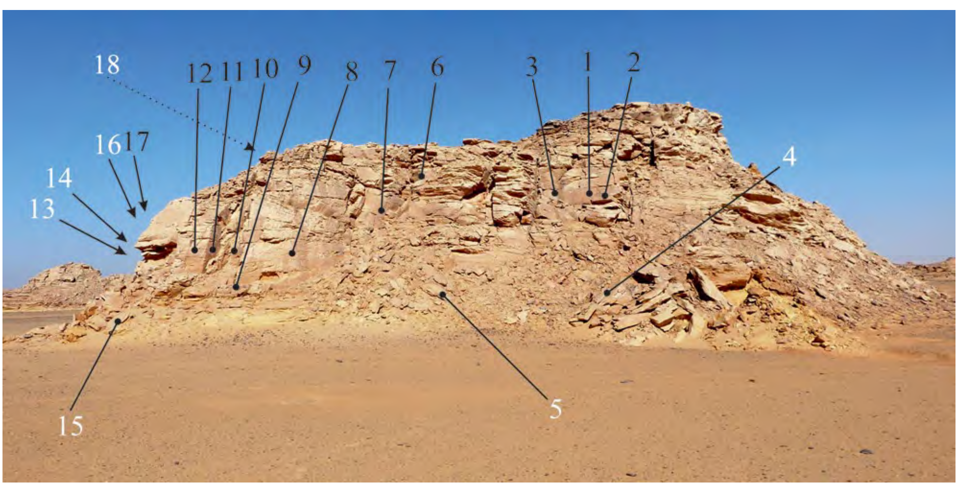

Fig. 1. Animal Hill (site CO178). Panels indicated in white are most probably not prehistoric. View from SE. Photo: P. L. Polkowski.

tentatively recognised as bearing prehistoric petroglyphs (Fig. 1). The remainder are either later additions, or remain unidentified as to both their content and chronology. All the panels considered prehistoric are preserved in situ and cover vertical rock walls; unlike the remaining ones, found mostly on loose slabs and hence of uncertain origin. It cannot be, however, ruled out that more rock art, including prehistoric petroglyphs, lie buried beneath countless boulders, rubble and sand overlying the steep slopes.

Although no unique rock art motif has been recognised on the site so far, Animal Hill remains an extraordinary place in the central oasis area. The reason for that is a combination of several factors, the most compelling ones being an unusually large amount of figures and the strong visual impact of some of the panels. In order to discuss observations on the site's nature, first a short survey of the panels is provided. Following this, an attempt is made at contextualising the Animal Hill type-site by setting it into the wider Western Desert background.

OVERVIEW OF ROCK ART PANELS

Panel 1 (Fig. 2)

Location and visibility: The panel is located high above the slope, a few metres below the hilltop. Despite its vertical placement it is rather difficult to see from distance and, due to its location, reaching it requires a considerable effort. The panel is oriented to the south/south-east. It is the middle one of the three panels forming a sort of "triptych", apparently produced within a short time-range.

Motifs and composition: The panel bears a well preserved composition. The right-hand side of the rock surface has been heavily eroded, making some of the figures less visible. Zoomorphic depictions prevail and, among them, giraffes (n = 6) outnumber other species (oryx; n = 1). An anthropomorphic figure is inserted between the two giraffes, but the nature of this spatial relationship is unclear. In addition, two other (anthropomorphic?) images are placed in the upper part of the panel (left-hand side). Their isolated placement and the fact that they are engraved, not pecked, may suggest a different chronology.

All the giraffes except one are facing right (as is the oryx). They represent two "stylistic" variants with both formal and technical differences. Three specimens are pecked and smoothed, their bodies are oval and elongated, whereas legs and necks are very long and slightly "shaky". The second group, also consisting of three figures, differs in the execution of the body (which is more rectangular and filled with dense pecking), as well as in a more naturalistic overall shape of the animal, and in the way the legs are rendered, that is as straight lines and/or additionally filled with peck-marks. The oryx figure shares stylistic similarities to the former group.

Chronology: Prehistoric.

Fig. 2. Panel 1 containing six giraffes, one oryx, one anthropomorph and two undetermined figures. Photo: P. L. Polkowski.

Fig. 3. Panel 3 with giraffes of the A-type. Photo: P. L. Polkowski.

Panel 2
Location and visibility: This is on an adjacent surface to the one with panel 1. Panel 2 is oriented to the south and is clearly visible only when directly approached.
Motifs and composition: The panel contains only one identifiable petroglyph, which is a giraffe pecked into the surface in a manner similar to the three other "rectangular" animals on panel 1. It has straight and thin legs, a massive neck and a very long linear tail with no obvious termination. There is a possible remnant of another figure just behind the giraffe, which is perhaps a similar zoomorph.
Chronology: Prehistoric.

Panel 3 (Fig. 3)
Location and visibility: The third part of the "triptych" is located below the hilltop. Although facing east, the panel is not clearly visible from the foot of the hill. It is almost vertical and for the most part of the day it remains shaded.
Motifs and composition: The composition comprises four figures, all directed towards the right-hand side. These are three giraffes and one oryx. Giraffes have unnaturally long legs, necks and tails. Their bodies are oval and entirely pecked. The neck of the specimen to the far right is exceptionally long and deformed, as it is winding, thus making the image highly unrealistic. The middle giraffe shares most of these features, but it differs in the way the head is shown. This concerns the ossicones that look more like horns, being fairly long and bent forward. Nevertheless, this image can be identified as a giraffe, considering the very long legs and neck, as well as the overall similarity to other giraffes. The third giraffe resembles the first one, except for straighter lines forming its body and limbs. The oryx is simple and the structure of its body is very much like that of the other figures. It is recognisable owing to its very long, thin and curved sable-like horns.
Chronology: Prehistoric.

Panel 4
Location and visibility: One of the loose slabs covering the south-eastern slope.
Motifs and composition: The surface of the stone is covered with a number of petroglyphs, of which only two (or three) foot images can be definitely identified (Polkowski 2018c).
Chronology: A most probable time-range from the Dynastic until the Late Antique Period.

Panel 5
Location and visibility: A loose slab on the south-eastern slope.
Motifs and composition: Another two (or three) foot depictions. Unlike the panel 2 specimens, these are rectangular. They seem to be enclosed in an angular frame.
Chronology: A most probable time-range from the Dynastic until the Late Antique Period.

Panel 6 (Fig. 4a)
Location and visibility: Panel 6 is another panel located high on a vertical wall, about half up the distance towards the top of the hill. It is fairly easy to see and oriented to the east.
Motifs and composition: It contains at least three zoomorphic depictions, all being solely engraved, which is a rare feature to be observed on the site. This, in addition to the relatively good state of preservation and a "fresher" appearance, may suggest more recent dating, either late prehistoric, or Dynastic Period(?). It is actually possible that these figures are later imitations inspired by older petroglyphs found in other spots scattered around. Although all three images are considered here as depicting giraffes, the middle specimen may be in fact another species. Its conspicuous short neck and a long muzzle make it look similar to a horse. This would, of course, mean that the picture is not prehistoric. However, because it seems that the four elements protruding from the top of the head probably indicate ears and ossicones (although the mane cannot be ruled out), it is possibly another giraffe. The short neck may be thus a result of the artist's struggle with limited space, as the rock surface ends just above the animal.
Chronology: Probably prehistoric, but more recent dating cannot be ruled out.

Panel 7 (Fig. 4b)
Location and visibility: A smooth surface with just one petroglyph. The rock wall here is slightly inclined and the panel oriented to the north-east.
Motifs and composition: The figure depicts an oryx. It has, however, straight horns, which make this identification somewhat uncertain. The petroglyph is fully engraved and the overall rendering of the animal differs significantly from nearly all other oryx depictions on the site. Particularly unique is the shape of the body, which is tapering towards the animal's rump. This feature resembles more a canine than an antelope. Nevertheless, the neck, horns and a relatively long tail suggest that it is most likely to be the latter.
Chronology: Uncertain, but probably late prehistoric or later.

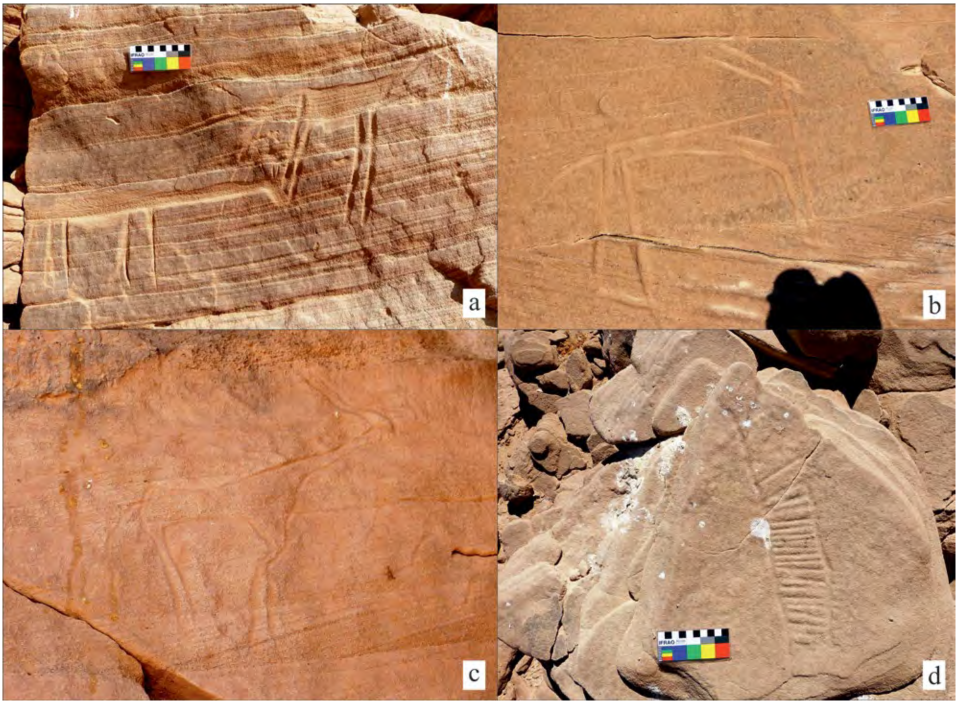

Fig. 4. Petroglyphs from: a – panel 6; b – panel 7; c – panel 17; d – panel 18. Photo: P. L. Polkowski.

Panel 8 (Figs. 5–6)

Location and visibility: The largest panel on the site. It covers a great part of the vertical rock wall that faces east and north-east. The highest situated petroglyphs are *c.* 2.40 m above the ground. Due to a large number of figures, their dimensions, and the panel's exposed location, it is a clearly visible feature; a prominent landmark. The figures are relatively well preserved, apart from the lower portion. However, some petroglyphs have been thoroughly eroded and/or superimposed.

Motifs and composition: The panel can be noticed from afar, but once it is approached it reveals its "palimpsest" nature. It has several layers of petroglyphs and a high occurrence of superimpositions. All of this makes reading panel 8 a difficult task. However, apart from portions of the panel that are densely populated and vague, one can distinguish several sets of figures and their arrangements that are easier to recognise.

The major sub-composition involves a "herd" of giraffes occupying a very exposed part of the rock wall (Fig. 6a). The animals, which are six in total, are pecked deep into the surface, each displaying a similar set of formal features. The largest exceeds

Fig. 5. Panel 8 and 11 (in the background). View from E. Photo: P. L. Polkowski.

Fig. 6. Detail of panel 8: a – a herd of giraffes; b – oryxes; c – a possible b-shaped anthropomorph, a zoomorph and a crenelated line. Photo: P. L. Polkowski.

0.5 m, the smallest being *c.* 45 cm high. Their bodies, angular in shape, are fully pecked and ground, so, particularly in the raking light, they are outstandingly perceivable. The giraffes closely follow each other, being directed towards the right-hand side of the panel. Above them, more zoomorphs have been executed. One can observe at least seven giraffes (if not more) and some eight other quadrupeds, most probably antelopes. Although the oryx remains the most plausible identification, at least one individual image seems to depict a different species that might be a hartebeest (*Alcelaphus buselaphus*). Bones of the hartebeest are known from the Sheikh Muftah sites at Dakhleh (see Churcher *et al.*, 2008: 16).

Directly to the right of the above-mentioned zoomorphs, there is a fragment of the panel containing a slightly different group of petroglyphs (Fig. 6b). They include three figures which may, or may not, be mutually linked. One is an engraved meandering line composed of lines bending at a right angle (cf. with crenellated lines in Kuhlmann 2005: 270–278; Bergmann 2011: 88, Figs. 25–26). It is, in turn, overlaid by a fully pecked bovid-like zoomorph. The front of the animal is better preserved and displays forward-pointed horns. Together with a pronounced head and muzzle, they may indicate cattle. The third element is most questionable. It may be tentatively identified as an anthropomorphic figure belonging to a group of depictions often referred to as "female figures", but of the highly schematic type. The discussed picture would be of the b-shape type, which has been attested at several spots in and around Dakhleh (Winkler 1939: pl. XLVIII, 16–17; Bergmann 2011: 79, Fig. 10; Kuper 2014–2015: 295, Abb. 22).

The remaining parts of the panel comprise mostly antelope figures (Fig. 6c). Oryxes prevail and occupy the left-hand side of the panel in particular, including the least reachable corner. There is a considerable diversity of oryx renderings, which refers to the way the horns are shown, but also differences in the form of legs, body and head. Unlike most of the giraffes on the site, antelopes are generally smoothed with engraved additions, being only rarely pecked (Polkowski 2018d: 19–22).

Panel 9 (Fig. 7a)

Location and visibility: A loose slab lying below panel 8.

Motifs and composition: Apart from a few strokes, only one definite motif can be recognised. It can be best described as two parallel lines terminating into mushroom-shaped elements at both ends.

Chronology: Unknown.

Panel 10

Location and visibility: Panel 10 is situated on a vertical rock wall, facing mostly the south-east direction. The rock surface is significantly damaged and many petroglyphs have already partially disappeared.

Fig. 7. Petroglyphs from: a – panel 9; b – panel 13; c – panel 15. Photo: P. L. Polkowski.

Motifs and composition: Panel 10 has only a handful of figures preserved. Zoomorphs prevail but their identification poses some problems. It seems that one or two giraffes might be depicted there, as well as three or four antelopes or gazelles. Apparently, one of the alleged giraffes is associated with a stick-like anthropomorphic figure. As the upper parts of both the animal and the anthropomorph have been eroded away, the nature of the figures' relationship remains unknown.
Chronology: Prehistoric.

Panel 11 (Fig. 8)
Location and visibility: Another vertical rock with a smooth surface. This wall faces north-east.
Motifs and composition: Six petroglyphs and one straight line can be observed on the panel. Five of them are quadrupeds whose species cannot be easily determined; almost all of them have no head due to erosion and damage. The only stick-like zoomorph, distinctly more recent, seems to have long horns and might depict a bovine. In the highest portion of panel 11, a pair of anthropomorphs and an animal are shown. The quadruped, smoothed and engraved, is barely visible. The same applies to a human figure apparently depicted in profile, which is already very shallow. After closer examination, it reveals features which enable it to be tentatively identified as another example of a "female anthropomorph". It is not of a usual build, as it has prominent buttocks that taper down into straight legs. Such a body-type finds, however, parallels (Winkler 1939: pl. XLVIII, 26–27), reinforcing the proposed identification. Moreover, it seems to be juxtaposed with another anthropomorph; this time an elongated stick-like specimen. Such a composition consisting of two figures of which one is larger (e.g., more obese) and the other thinner is a recurring motif in this part of the Western Desert (Polkowski 2019: 17, Fig. 4).
Chronology: Prehistoric.

Panel 12
Location and visibility: Panel 12 is located on another very exposed rock formation. The rock surface is highly eroded, thus most of the petroglyphs have become less visible than on other panels. The panel faces east/south-east.
Motifs and composition: Panel 12 contains at least eight zoomorphic figures and several more unidentified petroglyphs. The former group includes, most probably, seven oryxes and one giraffe. The oryxes are all similar to each other in that they are static, have rectangular/linear bodies and fairly naturalistically rendered sable-horns. The giraffe is not well preserved, so some of the details cannot be determined. It seems to be smoothed out, has a long slightly uneven neck, and the front legs are somewhat spread out, as if the animal was depicted running.
Chronology: Prehistoric.

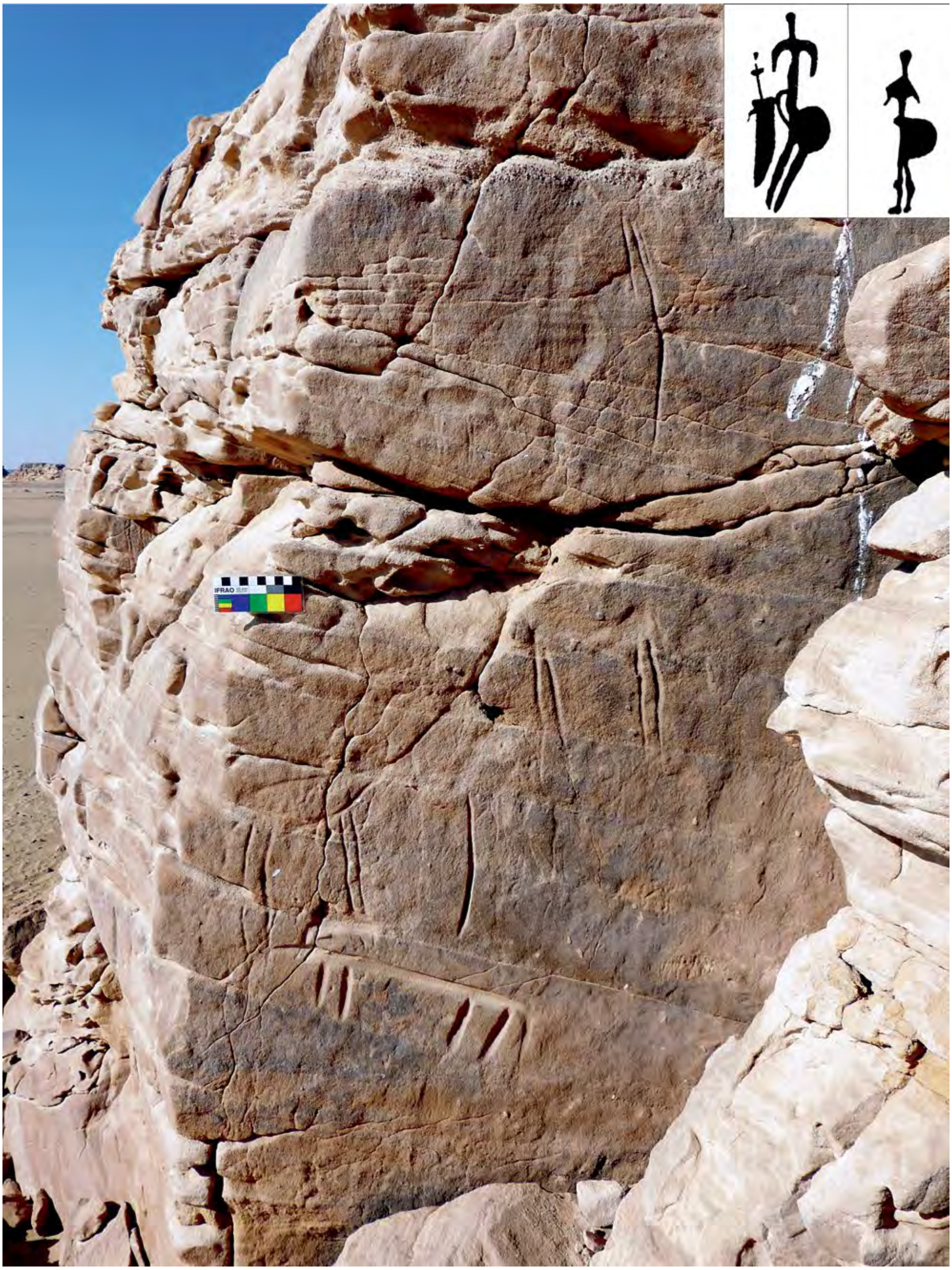

Fig. 8. Panel 11 and anthropomorphs recorded by Hans Winkler in the eastern oasis (after Winkler 1939: pl. XLVIII.26–27). Photo: P. L. Polkowski.

Panel 13 (Fig. 7b)
Location and visibility: One of the panels located on the southern slope. A loose elongated slab with a very smooth surface.
Motifs and composition: The boulder is covered with enigmatic depictions. They include three highly stylized anthropomorphic figures that have elongated outline bodies. The legs form the extension of the torso, similarly to the head that is of the same width as the rest of the body. The head is filled with large dots, drilled rather than pecked, which may schematically mark facial features. The neck is not indicated. The outstretched hands are slight and very short. They terminate into several short lines, most probably, indicating fingers. However, the creators of these petroglyphs focused particularly on the sexual body features. One thus observes breasts marked with two short grooves and a very pronounced pudendum. In all three cases, the latter is shown as a long and very deep groove surrounded by dots (from 6 to 12). There can be no doubt as to the sex of the anthropomorphs and the emphasis put on a sexual nature of the composition. Two additional motifs, one of which is U-shaped with a dot inside, may also share a sexual character. All these petroglyphs bear some general resemblance to the Bedouin rock art known for instance from Bahariya (Fakhry 1950: 70–72, Fig. 52; Colin and Labrique 2001) but also Dakhleh (Kuciewicz and Kobusiewicz 2011: 243, Fig. 12).
Chronology: Unknown, but post-Antique dating is most probable.

Panel 14
Location and visibility: On a vertical surface above panel 13.
Motifs and composition: Only an engraved quasi-square figure is clearly visible. It is juxtaposed with a deep oval hole (Ø = *c.* 2.5 cm). Several other faint lines can be discerned, but not much can be said about them.
Chronology: Unknown.

Panel 15 (Fig. 7c)
Location and visibility: A loose flat slab located at the southernmost tip of the hill. Easily approached, but not visible from afar.
Motifs and composition: The panel contains three motifs. The first is of a T-shape form with three dots above its left arm. The second motif resembles a pubic triangle, but lacks a line that would form a base (cf. Harding King 1925: 327, no. 86). The last motif is n-shaped and has two grooves and one dot inserted between its sides (cf. Harding King 1925: 327, no. 70; Fakhry 1950: 70–72, Fig. 52). The first two symbols are known to have been used in numerous variations as wusûm in the whole Near East region (Field 1952).
Chronology: Probably post-Antique.

Panel 16
Location and visibility: One of just three panels found on the south-western side of the yardang. Panel 16 is situated on an extremely flat and smooth surface, in a place which is well shaded when the sun is high. It faces west.
Motifs and composition: Although the surface seems to be perfect for making rock art, only part of it contains petroglyphs. Moreover, they have been shallowly engraved and scratched into the surface and now, even in the raking light, are barely visible. Only one figure is clear enough so it can be identified as a boat. It is of simple construction, having a sickle-shaped hull and a mast placed in the centre of the deck. It seems that this pole is topped by a rectangular sail, although this part of the composition is less clear and interferes with other unidentified motifs.
Chronology: Dynastic or later.

Panel 17 (Fig. 4c)
Location and visibility: Just south of panel 16, there is a small rock shelf perpendicular to the wall with rock art images. A small shelter is formed there, open to the north and west, providing plenty of shade and offering a place to rest. Panel 17 is located just above the shelf.
Motifs and composition: Only one figure has been identified on the panel. It is an antelope shown in outline, but the contour is "shaky". Two parallel horns extend backwards and although they are not curved they probably indicate an oryx. The overall "style" of the petroglyph does not correspond well with the rest of zoomorphs found on the site, apart from the specimen on panel 7, which is also outlined and has straight horns. The latter differs, however, in that it has different body proportions and its contour line is straight and solid.
Chronology: Uncertain, but probably late prehistoric or later.

Panel 18 (Fig. 4d)
Location and visibility: A horizontal panel located at the interface of the slope and the flat hilltop.
Motifs and composition: The only petroglyph on the panel is probably another depiction of the "female anthropomorph" type. No definite sexual traits are indicated though, so a possibility that it is a male is equally plausible. The figure is eroded, especially in its upper parts. It seems to have a small oval head and outstretched arms. The torso is linear and turns into an elongated rectangular shape at the bottom. This is most likely to represent a skirt decorated with internal parallel lines (n = 17) placed horizontally. A similar filling has been noted elsewhere in the oasis (Winkler 1939: pl. XLV.1) and particularly on site CO188 which is located nearby (Polkowski 2016: 146, Ryc. 5.21). The latter petroglyphs share also other stylistic features such as the elongated rectangular body shape and a stick-like upper body.
Chronology: Prehistoric.

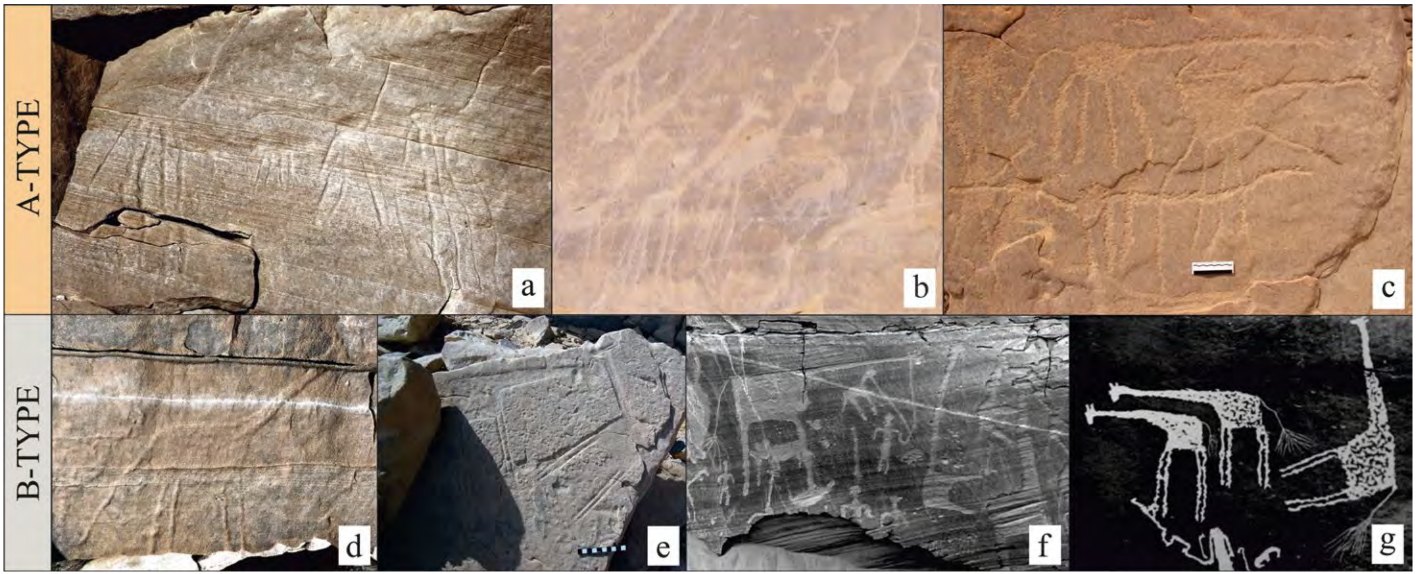

Fig. 9. Two variants of giraffes known from Animal Hill and their analogies: a – Animal Hill, panel 3; b – Split Rock, Kharga (© Salima Ikram, NKOS); c – Gebel Silsila, Upper Egypt (© Maria Nilsson & John Ward, Gebel Silsila Project); d – Animal Hill, panel 2; e – Winkler 67, Dakhleh (Photo: E. Kuciewicz); f – Aa's Rock, Kharga (after Ikram 2009a: 268, Fig. 2); g – Wadi Sab' el-Rigal, Upper Egypt (after Winkler 1939: pl. LI.2). Computer graphics: P. L. Polkowski.

SUMMING UP THE ANIMAL HILL PETROGLYPHS

The total number of 18 panels seem fairly homogenous when it comes to the subject-matter. Zoomorphic figures (n = 96) clearly prevail over anthropomorphs (n = 8, including 5 prehistoric) and other figures (n = 22; surely underestimated), although it must be stated that more petroglyphs are expected to be identified (particularly on panel 8) once a more detailed documentation has been compiled. The recognised animal species are distributed in the following numbers: 41 **giraffes** (at least 6 uncertain), 38 **oryxes** (3 uncertain), two **cattle** (uncertain) and one **hartebeest** (uncertain). The list ends with **unidentified quadrupeds** (n = 13) which may include further giraffes and oryxes, as well as gazelles or other antelopes. These figures show a clear, if not an overwhelming, dominance of two species, the giraffe and the oryx, which is in concordance with a similar pattern observed both in Dakhleh (Polkowski 2018d: 15, Fig. 2) and the Western Desert (e.g., Ikram 2009a; Riemer 2009). What is, however, unexpected is the total lack of ostrich depictions, otherwise widely attested in this region (Polkowski and Kobusiewicz 2012: 243, Fig. 2).

And so, here, homogenous subject matter meets heterogeneous form. This is particularly noticeable in the case of the giraffe imagery. Although certain traits are shared by nearly all the giraffes on the site, namely a clear exaggeration of body features and a static appearance, they differ in the way selected attributes and details are rendered. Two main groups can be discerned here on the basis of the employed technique(s) of execution, as well as proportions and shape of the animal's body (Fig. 9). The first group (here: A-type) includes specimens with oval, often elongated, trunks and very long legs that can be "shaky", in some cases resembling strings of spaghetti (panel 3). Even their necks, although only occasionally, seem to have been executed in a similar manner. Their bodies are often smoothed and ground, but can be also deeply pecked, while the legs are usually just pecked.[1] The B-type specimens differ mainly with regard to the shape of the trunk which is square, rectangular or at least angular. They also have long necks, while their legs, with some exceptions, seem to be shorter on average. The way the extremities are depicted can also differ, as they may be represented in pairs, showing a considerable space between the hind legs and the front legs (unlike most of the A-type figures in which a similar distance between each of the four legs is kept).[2] Pecking remains the major technique of execution, especially in the case of the trunk. Various body parts can be smoothed or engraved, and there is no apparent rule concerning sinking the trunk into rock surface. Giraffes in both groups often

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1 For similar depictions from Kharga see Ikram 2009b: 75, Fig. 10; entirely pecked giraffes from the Nile valley, see e.g., Nilsson and Ward 2016: 174, Fig. 3.

2 Similar rendering of giraffes are known e.g., from Aa's Rock in Kharga (Ikram 2009a: 268, Fig. 2) or Shat el-Rigal in the Nile Valley (Winkler 1939: Pl. LI.2).

have bushy tails indicated by several very thin lines. There are also variations between the petroglyphs when it comes to the head. On Animal Hill, many giraffes have well marked ossicones and ears, sometimes all of these attributes simultaneously, so the number of protrusions varies between two and four (note that depictions with no appendages also exist).

No doubt, these two groups allow the pictures to be ordered according to selected formal characteristics and the differences between them are fairly clear. It is, however, impossible to say whether such a division results from any chronological variation, or is more of an intra-cultural differentiation. The latter seems to be a more plausible explanation; petroglyphs created in both ways share the spaces on the same panels and often seem to be mutually interlinked. The great accumulation of depictions in one place (e.g., on the hill), the very restricted range of themes and a similar state of preservation of numerous images, suggest that the majority of the petroglyphs could have been produced and used within one broad cultural tradition in which there was a place for some formal idiosyncrasy and “artistic” freedom. This is why we observe the type-A and B specimens side by side alongside each other, and among giraffes that cannot be ascribed to either group.

The above applies also to the oryxes, even though the differences between them are less systematic. Due to the much smaller size of these petroglyphs, they are usually simpler and devoid of many formal variables. The vast majority of oryxes have smoothed trunks with engraved additions (legs, tail and horns). This feature has been observed in at least 22 cases. The remaining images depict bodies which are either stick-like, or outlined, while some are difficult to describe due to a heavy erosion. This clear, although not rigid, difference in rendering bodies of giraffes and oryxes remains in line with observations on these two groups of images in the broader context (Polkowski 2018d: 37).

The most expressive trait of the oryx are the horns. The typical horn shape, which leaves no doubt when determining the species, is long and curved. There are at least 22 figures of oryxes with scimitar-shaped horns, whereas the rest have horns either only slightly curved, or entirely straight (but always long). Two probable oryx images occur on panel 7 and 17; both outlined and with straight horns. It is, however, difficult to propose a convincing alternative identification.

SITUATING CO178 IN THE BROADER CONTEXT OF DAKHLEH AND THE WESTERN DESERT

As a site, defined here as a cluster of panels within definite boundaries of just one hill, CO178 does not find many parallels in Dakhleh. In the central oasis area, at least that part surveyed so far, there is not a single site that has a comparable large number of prehistoric petroglyphs. Sites such as 02/06 (Kuciewicz *et al.*, 2008), 04/06 (Krzyżaniak 2004), 21/08 (Kuciewicz and Kobusiewicz 2011), 05/09 (Kuciewicz and Kobusiewicz 2012), 06/09 (Polkowski and Kobusiewicz 2012), or CO53 (Polkowski *et al.*, 2013: 110, Fig. 11), all feature one or two main panels with similar iconography, but not of the size and density of Animal Hill's panel 8. The above-mentioned sites often contain no other prehistoric compositions (like 04/06 or 05/09), and if they do (like 21/08 or 06/09), these are usually individual figures scattered around. The accumulation of prehistoric images at CO178 is extraordinary, especially if we take into account an almost complete lack[3] of similar petroglyphs in a radius of *c.* 1 km.

In the eastern Dakhleh, sites such as Winkler's 62, 64, or 66 (Winkler 1939; Kuciewicz *et al.*, 2014), offer a better comparison. At these localities, there is a high concentration of prehistoric petroglyphs, which is not so surprising, as in general the eastern oasis is the location of a larger number of prehistoric rock art images than the central part (the same is true for early and mid-Holocene archaeological sites). Nevertheless, even though Winkler 62 (Kuciewicz *et al.*, 2014: 238, Fig. 8) and 64 (Winkler 1939: pl. LIII.1, LVI) contain huge panels, none displays such a dense palimpsestic content as panel 8 on Animal Hill. In terms of frequency and subject-matter, CO178 finds also parallels at site complexes of Winkler 67 (which includes 11 adjacent hills; Kuciewicz *et al.*, 2015: 285) and 61-39/E3 (Krzyżaniak 1987).

Contrary to what may appear from the above overview, most of the prehistoric rock art in Dakhleh cannot be labelled as monumental. The majority of panels, especially in the central oasis, contain no more than several petroglyphs, whereas sites having more than two or three panels are relatively rare. In this context, Animal Hill appears to be almost unique. However, apart from rock art quantity, CO178 shares many similarities with other sites, at least insofar as the subject-matter is concerned. Its repertoire is mostly limited to giraffes, oryxes and anthropomorphs, and in that it finds analogies on multiple sites. It might be worth considering a particular assemblage as an example.

This concerns a row of giraffes on panel 8. Six animals are shown in one register and stand out against the background. This introduces a sense of order that is otherwise difficult to grasp on other panels (at least from our etic point of view). If we compare, for instance, panel 1 and 8, we will see two compositions both involving six giraffes but arranged in two wholly different ways. The latter is a linear group of animals of similar size, facing the same direction, and all formally alike. In turn, panel 1 shows animals oriented in two opposite directions, depicted in two different manners, and scattered. Its idiosyncratic nature makes that panel more difficult to analyse comparatively. This is

3 With the exception of site CO175 with one giraffe, *c.* 400 m N of CO178; CO184 with a quadruped, *c.* 375 m SW; and a large panel with prehistoric zoomorphs (but extremely eroded) on site CO189, *c.* 200 m SW.

in contrast to the giraffes on panel 8, which were most likely produced during a single event. They display a "syntax" that may be traced also on other sites. In the central oasis, four further similar arrangements are known from sites: CO122 (3 giraffes), CO126 (9?), 06/08 (6) and 21/08 (4); while from the eastern part three more herd compositions can be mentioned: "Hill 168"[4] (3), Winkler 67-1-13 (5) and 67-1-21 (3). Knowing that in Dakhleh there are nearly 150 panels containing at least one giraffe, the low number of only eight "herd scenes" (plus several quasi-linear arrangements) may in fact suggest their unusual character. It would be then a rarely depicted concept, but a highly defined one. The Western Desert produces some more parallels. A very close scene is known from site Meri 06/12, south of Dakhleh (Riemer 2011: 246–53, Fig. 255). There, six giraffes of the B-type (with outline and ground bodies) are depicted, all facing the same direction. They are between 60 and 90 cm tall and all except one have a line attached to their necks. According to their discoverers, "the engravings of panel A were executed on the most extended upright rock face that occurs at the hill" (Riemer 2011: 248). Another herd is reported from Farafra region (Le Quellec *et al.*, 2005: 35, Fig. 27), although the panel is actually located in the Meri area, south of Dakhleh.[5] This time, four fully pecked angular giraffes are oriented to the left and again, they are placed on a vertical rock surface which is easy to spot. Compositions of this type were found also on Djedefre Water Mountain (4 giraffes in a row; Berger 2012: 297, Fig. 21) and the site Chufu 01/09 (4 giraffes; Kuper 2014–2015: 295, Abb. 20); both scenes occurring high on vertical, well visible panels. The motif of a herd is known also from Upper Egypt and Nubia (e.g., Almagro Basch and Almagro Gorbea 1968: 267, Fig. 281; Hellström and Langballe 1970: pl. 16; Červíček 1974: Abb. 92; Curto 1987: Tav. 43; Váhala and Červíček 1999: 94, Taf. 88.349), and the available publications indicate its relative rarity in comparison to other compositional arrangements involving giraffes. We can then tentatively conclude that the "herd scene" type of composition is a relatively rare motif which is in most cases displayed in prominent places, on vertical walls visible from afar.

It is clear that Animal Hill is part of the broader prehistoric rock art tradition of the central Western Desert. This is manifested not only in utilizing the particular motif such as the "herd of giraffes", but especially on a more basic level of subject-matter selection. Moreover, some formal "stylistic" traits (e.g., giraffes of A- and B-type) can be traced far east and south-east towards the Nile valley. The extent to which this is either a coincidence or due to cultural affiliation needs to be researched further. In light of the "contacts" between the oases and the Nile valley in the mid-Holocene (McDonald 2002) this kind of rock art research may prove to be valuable.

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[4] Documentation in the Poznan Archaeological Museum, archives of Lech Krzyżaniak.

[5] I visited the site in 2013.

IN CONCLUSION: A WORD ON ANTHROPOMORPHS

One more element linking Animal Hill with other Dakhleh and Western Desert sites is the presence of anthropomorphic figures of particular types. As a paper on the Dakhleh Oasis "female anthropomorphs" is in preparation, and the above examples will be treated there in detail, I limit myself here just to providing very general remarks. The specimens found on the site either belong to schematic variants, or are very weathered. They all find formal analogies though, already indicated above. Co-occurrence of anthropomorphs with zoomorphic depictions, giraffes in particular, is well attested in Dakhleh and the neighbouring regions (e.g., Dakhleh, Polkowski *et al.*, 2013: 106–111; Kharga, Ikram 2009b: 75, Fig. 10; desert, Bergmann 2011: 79, Fig. 11), however on Animal Hill these associations are not as strict as in the cited examples. Panel 18 shows a completely isolated "female" figure, whereas on panel 8 and 11 the link between anthropomorphs and giraffes is limited to the fact that they share the same surface. The specimen on panel 8, certainly the most debateable one, seems to be in association with a cattle-looking animal and/or a crenelated line. However, the nature of this composition remains vague. The assemblage on panel 11 seems to be clearer and one observes there a pair of anthropomorphs and a quadruped that may be an oryx. This composition resembles very much another scene known from site 61-39/E3-15 in the eastern oasis (Krzyżaniak 1987: 189, Fig. 5). There too, a pair of slim and obese figures are depicted, while one of them seems to be connected by a line to an antelope. On panel 11 we see no such line but the overall similarity is striking. Perhaps we are dealing here with another compositional motif that in the past could have referred to a particular set of meanings and was to some extent "defined".

Site CO178 has been selected to be documented in detail with the use of photogrammetry, RTI and other digital photography methods in order to gain a better recognition of its rock art. It is particularly panel 8 that requires a very precise recording, as its state of preservation and a palimpsestic nature of petroglyphs make it difficult to read and comprehend. It is thus hoped that in the near future the Petroglyph Unit will be granted permission to re-start fieldwork in Dakhleh, and Animal Hill, being properly documented, will reveal much more information that allow to verify the presented above interpretations and identifications.

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REFERENCES

Almagro Basch, M. and Almagro Gorbea, M. 1968. *Estudios de Arte Rupestre Nubia. Yacimientos situados en la orilla oriental del Nilo, entre Nag Kolorodna y Kasr Ibrim*. Madrid. Memorias de la Misión Arqueológica 10.

Berger, F. 2012. Rock art west of Dakhla: "Water mountain" symbols. In J. Kabaciński, M. Chłodnicki and M. Kobusiewicz (eds), *Prehistory of Northeastern Africa. New ideas and discoveries*, 279–305. Poznań. Studies in African Archaeology 11.

Bergmann, C. 2011. On the origins of the hieroglyphic script. In V. G. Callender, L. Bareš, M. Bárta, J. Janák and J. Krejčí (eds), *Times, signs and pyramids. Studies in honour of Miroslav Verner on the occasion of his seventieth birthday*, 65–100. Prague.

Červíček, P. 1974. *Felsbilder des Nord-Etbai, Oberägyptens und Unternubiens. Ergebnisse der 8. DIAFE nach Ägypten 1926*. Wiesbaden.

Churcher, C. S., Kleindienst, M. R., Wiseman, M. F. and McDonald, M. M. A. 2008. The Quaternary faunas of Dakhleh Oasis. Western Desert of Egypt. In M. F. Wiseman (ed.), *Oasis Papers 2. Proceedings of the Second International Conference*, 5–6. Oxford. Dakhleh Oasis Project Monograph 12.

Colin, F. and Labrique, F. 2001. Recherches archéologiques dans l'Oasis de Bahariya (1997–2000). *Dialogues d'histoire ancienne* 27: 159–192.

Curto, S. 1987. *Korosko-Kasr Ibrim: Incisioni Rupestri Nubiane*. Milan.

Fakhry, A. 1950. *Bahria Oasis II*. Cairo.

Field, H. 1952. *Camel brands and graffiti from Iraq, Syria, Jordan, Iran, and Arabia*. Baltimore. Supplement to the Journal of the American Oriental Society 15.

Harding King, J. W. 1925. *Mysteries of the Libyan Desert*. Philadelphia.

Hellström, P. and Langballe, H. 1970. *The Rock Drawings*. *2 vols.* Odense.

Ikram, S. 2009a. A desert zoo: An exploration of meaning and reality of animals in the rock art of Kharga Oasis. In H. Riemer, F. Förster, M. Herb and N. Pöllath (eds), *Desert animals in the eastern Sahara: Status, economic significance, and cultural reflection in antiquity*, 263–291. Köln. Colloquium Africanum 4.

Ikram, S. 2009b. Drawing the World: Petroglyphs from Kharga Oasis. *Archéo-Nil* 19: 67–82.

Krzyżaniak, L. 1987. Dakhleh Oasis Project: interim report on the first season of the recording of petroglyphs, January/February 1988. *Journal of the Society for the Study of Egyptian Antiquities* 17(4): 182–191.

Krzyżaniak, L. 2004. Dakhleh Oasis. Research on petroglyphs 2003. *Polish Archaeology in the Mediterranean* 15: 181–189.

Kuciewicz, E. and Kobusiewicz, M. 2011. Dakhleh Oasis Project, Petroglyph Unit. Rock art research, 2008. *Polish Archaeology in the Mediterranean* 20: 237–244.

Kuciewicz, E. and Kobusiewicz, M. 2012. Dakhleh Oasis Project, Petroglyph Unit. Rock art research, 2009. *Polish Archaeology in the Mediterranean* 21: 279–287.

Kuciewicz, E., Jaroni, E. and Kobusiewicz, M. 2008. Dakhleh Oasis, Petroglyph Unit. Rock art research, 2006. *Polish Archaeology in the Mediterranean* 18: 317–322.

Kuciewicz, E., Polkowski, P. L. and Kobusiewicz, M. 2014. Dakhleh Oasis Project, Petroglyph Unit: rock art research 2011. *Polish Archaeology in the Mediterranean* 23(1): 229–244.

Kuciewicz, E., Polkowski, P. L. and Kobusiewicz, M. 2015. Dakhleh Oasis Project, Petroglyph Unit: Seasons 2012 and 2013. *Polish Archaeology in the Mediterranean* 24(1): 275–296.

Kuhlmann, K. P. 2005. Der "Wasserberg des Djedefre" (Chufu 01/1). Ein Lagerplatz mit Expeditionsinschriften der 4. Dynastie im Raum der Oase Dachla. *Mitteilungen des Deutschen Archäologischen Instituts, Abteilung Kairo* 61: 243–289.

Kuper, R. 2014–2015. Mefat für Memphis: Cheops' Expeditionen in die Libysche Wüste. *Mitteilungen des Deutschen Archäologischen Instituts, Abteilung Kairo* 70/71: 285–299.

Le Quellec, J. L., de Flers, P. and de Flers, P. 2005. *Du Sahara au Nil. Peintures et gravures d'avant les Pharaons*. Paris.

McDonald, M. M. A. 2002. Dakhleh Oasis in Predynastic and Early Dynastic Times: Bashendi B and the Sheikh Muftah Cultural Units. *Archéo-Nil* 12: 109–120.

Nilsson, M. and Ward, J. 2016. Pictorial Graffiti at Gebel el-Silsila: A 10 000 Year-Long Repertoire. In G. Capriotti Vittozzi and F. Porcelli (eds), *Archaeology and Environment*, 167–194. Rome.

Polkowski, P. L. 2016. *Krajobraz i sztuka naskalna. W palimpseście egipskiej Oazy Dachla* [with English summary]. Poznań.

Polkowski, P. L. 2018a. Working on Rock Art in the Dakhleh Oasis: Some thoughts on Threats to Petroglyphs and Possibilities of Research in the Western Desert, Egypt. *African Archaeological Review* 35(2): 191–210.

Polkowski, P. L. 2018b. A tale of giraffe. On enigmatic composition from site 04/08 in the central Dakhleh Oasis, Egypt. In J. Kabaciński, M. Chłodnicki, M. Kobusiewicz and M. Winiarska-Kabacińska (eds), *Desert and the Nile. Prehistory of the Nile Basin and the Sahara. Papers in honour of Fred Wendorf*, 687–706. Poznań. Studies in African Archaeology 15.

Polkowski, P. L. 2018c. Feet, Sandals and Animate Landscapes. Some Considerations on the Rock Art of Dakhleh Oasis, Egypt. In D. Huyge and F. Van Noten (eds), *What Ever Happened to the People? Humans and Anthropomorphs in the Rock Art of Northern Africa*, 371–395. Brussels.

Polkowski, P. L. 2018d. Oasis bestiarum. Animals in Dakhleh Oasis rock art. *Afrique: Archéologie & Arts* 14: 11–40.

Polkowski, P. L. 2019. Ladies, sandals, and giraffes. Four Decades of Rock Art Research by the Dakhleh Oasis Project. In C. Hope and G. Bowen (eds), *The Oasis Papers 9. A Tribute to Anthony J. Mills after Forty Years in Dakhleh Oasis*, 9–24. Oxford. Dakhleh Oasis Project Monograph 19.

Polkowski, P. L. and Kobusiewicz, M. 2012. Badania nad sztuką naskalną w Oazie Dachla (Pustynia Zachodnia, Egipt). Stanowisko 06/09. *Fontes Archaeologici Posnanienses* 48: 237–248.

Polkowski, P. L., Kuciewicz, E., Jaroni, E. and Kobusiewicz, M. 2013. Rock art research in the Dakhleh Oasis, Western Desert (Egypt). Petroglyph Unit, Dakhleh Oasis Project. *Sahara* 24: 101–118.

Riemer, H. 2009. Prehistoric Rock Art Research in the Western Desert of Egypt. *Archéo-Nil* 19: 31–46.

Riemer, H. 2011. *El Kharafish. The archaeology of the Sheikh Muftah pastoral nomads in the desert around Dakhla Oasis (Egypt)*. Köln. Africa Praehistorica 25.

Váhala, F. and Červíček, P. 1999. *Katalog der Felsbilder aus der tschechoslowakischen Konzession in Nubien*. 2 vols. Prague.

Winkler, H. A. 1939. *Rock-drawings of Southern Upper Egypt: Sir Robert Mond Desert Expedition 2: Season 1937–1938*. London.

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DISCUSSIONS AND CRITICISM

Green Saharas, Grey Markets: Commercial Exploitation of North African Prehistory, an Overview

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In a number of countries, the collecting of archaeological artefacts is regarded as a valid manner of public engagement with the past and has experienced an explosive growth in the last fifty years. This is due to two factors: the spread in the 1970s of the use of metal detectors for hobby artefact hunting, and then in the mid 1990s internet trading changed the face of the antiquities market and placed the commerce in archaeological artefacts at the reach of everybody. This in turn is currently deeply affecting public perceptions of archaeology in those countries. Thousands of people, in Europe and North America in particular, engage in collecting either through artefact hunting on local sites, while others acquire objects through purchase, driving a growing international antiquities market. This paper attempts to explore some of the wider material consequences of this general phenomenon, focusing on the collection of and commerce in prehistoric lithic material from the Sahara region. Part of it is framed around a detailed search in 2019 of the major internet portals handling this type of material.

Popular interest in the indigenous cultures of the Sahara was a legacy of European colonialism and a growing interest (from about the mid 1950s) in western societies in owning and collecting "ethnic" and "tribal art" (Graburn ed. 1977: 315; Corbey 2000) associated with an idyllic sentimentalist vision of the *bon sauvage* living in harmony with nature. Imaginations were fired in the 1950s and 1960s by the discoveries and popular publications of Henri Lhote (e.g., 1958) about the prehistory of the desert regions of North Africa. The enigmatic rock art he described appealed to modern aesthetics as well as New Agers; the whole issue of a primordial "Green Sahara" raised questions that resonated with environmentalists. These factors encouraged the growth of a market for collectables from this region.

In the 1960s to 1980s, trade in antiquities and ethnographic objects was in the hands of knowledgeable and experienced specialist dealers with brick-and-mortar "galleries", high overheads, and limited clientele (e.g., Ede 1976). This dictated the quality, nature and cost

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of the pieces offered. The market changed dramatically in 1995 with the rise of widespread internet trading (Bruhns 2000; Vitelli 2000: Chippindale and Gill 2001; Lidington 2002; Brodie 2015; 2017; Barker 2018). After that watershed event, anybody with access to a computer could sell antiquities with access to a truly global market of suppliers and buyers. A significant effect of this has been a downward shift in the types of artefacts that were offered, the market shifting from limited movement of articles of relatively high value to bulk commerce in smaller items (marketed as "pieces of the past in your hand") of much less value, often a few dollars apiece. But the quantities of artefacts on the market increased, and along with it the pace of the destruction of the archaeological record to obtain them, leading to concern that this threatens the discipline itself (Brodie and Tubb 2002).

The high demand and limited licit sources of supply means that a lot of antiquities on the market today are fake or illicitly trafficked from source countries whose legislation makes archaeological and ethnographic material the property of the state and curbs its private ownership or export (Jury 2005; van Ham *et al.*, 2011). The 1970 UNESCO Convention art. 3 defines trafficked and smuggled items of cultural property as illicit (UNESCO 1970). The internal national legislation of the market countries where they are bought and sold often do not adequately regulate trade in such material, resulting in the commerce in portable antiquities often taking the form of an ambiguous grey market (Mackenzie and Yates 2016).

SOURCES OF ARTEFACTS

It is not easy to determine how Saharan Neolithic material is reaching the market. The antiquities market is very secretive, and rarely willing to share information about the dealer's sources. This is allegedly due to the need to hide this information from the competition, the truth is that it can also hide dishonest dealing practices, such as price-hiking and dubious sources of supply.

Much of the material reaching collectors through today's antiquities market is currently being obtained by the ongoing collection-driven exploitation of the archaeological record in the source countries. Some of the bulk material sold online seems to have been coming out of Marocco, while some sellers assert their material is coming from Algeria. Mali and Mauretania are also explicitly mentioned as source countries. In the majority of cases however (thousands of items), there is no location of source offered that is more precise than "Africa", "Sahara" or "deserts of Northwest Africa".

Although they usually have not secured any paperwork documenting the assertion, most dealers claim that the material they sell comes from old collections created before the 1970 UNESCO definition. This however ignores several objective facts. Much of the sort of material now regarded as collectable would neither have been available, nor considered collectable, before the changes in the antiquities market after the mid

1990s. The number of collectors in the 1970s (when the global population was 3.7 billion) would have been much smaller than in the 2020s (population 7.8 billion), and collecting was an elite activity, so there would be fewer former collections to satisfy modern demand. Also many of the artefacts collected a generation ago were dispersed or ended up in museums on the collector's death.

In the case of the Sahara, the region's inhabitants, driven by poverty, the lack of other economic opportunities and the need for money, know that buyers can be found for the ancient artefacts that can be found in the desert. So they go out and scour sites to obtain it. Some of this material may be sold directly to tourists visiting this region. Jeremy Keenan notes (2005; 2013: 225) "there is scarcely a settlement in the Sahara in which a local market selling such artefacts will not materialise within minutes of the arrival of tourists". The development of this market however is not only a result of the demands of collectors, for he says "I have witnessed tourists buying such objects in some of the most remote and impoverished corners of the Sahara simply because they feel that they should contribute to the alleviation of hardship, rather than for any desire to possess the items being sold". Keenan (2013: 225) adds that this activity is further stimulated by middlemen who have developed networks to the most distant desert communities to provide traders, agents and collectors in the main tourist centres with a supply of *objets d'art* for the souks, shops and hotel foyers of the tourist centres. He also reports that some local and European tour operators even offer artefact hunting excursions to known productive sites to visitors as part of the "desert experience" (and Di Lernia 2005: 448 notes cases of these sites being contaminated by their "seeding" with fake artefacts for tourists to "find").

The Sahara region, Morocco in particular, has since the 1980s been a source of many high grade fossils and mineral specimens. Since *c.* 1997 it has also been a major conduit for the transit of meteorite finds surface reportedly gathered in the Sahara by nomads who learnt that western markets were interested in them and brought them to local middlemen and dealers by the sack and camel-load (Gilmer [2009]; Keats 2014). It seems that they also learnt to gather arrowheads and other lithic items at the same time. This is probably the source of the stories frequently told by dealers who suggest that the prehistoric lithic material is "gathered by indigenous nomadic tribes during their travels across the Sahara Desert in Africa" to sell to earn money for supporting their families. The activity is thus depicted as economically beneficial for the populace of the developing countries.

Despite the image of supporting the desperately poor opportunistic nomads of the region that western dealers may prefer to project, it is clear that the trade is also being supplied by highly mobile professional European artefact hunters who enter the Sahara and scour archaeological sites for artefacts for sale (Keenan 2013: 221). The features of the assemblages offered by several dealers seen in the 2019 survey suggested that this was the manner in which the items in their stock had reached the market.

These activities have caused significant damage to the archaeological record of several regions of the Sahara. Keenan suggests (2013: 230) that although the precise number of artefacts looted from the Sahara is not known, it is an enormous amount, "for example, it is generally estimated that some two million artefacts have been looted from the Tassili region of Algeria alone". Savino Di Lernia (2005: 447) discussed the effects of this looting in Libya, noting the "astonishing impoverishment of the archaeological record" across the region, where over the last few years, sites have suffered from:

> "continuous pillage of prehistoric artefacts: lithics, pottery and grinding stones have been almost entirely 'vacuumed up' from hundreds of sites, which were virtually untouched only a few years ago. Indeed, the popularity of these elements of the Sahara's cultural heritage has generated a growing appetite for their acquisition, with the result that there is a recognisable market based on the looting and theft of these prehistoric artefacts from their places of origin. African arrowheads, grinding stones, Acheulean hand-axes – to name but a few, are to be found in the stalls of European and North American markets […and] on Internet sale sites".

Several dealers, observing the market, seem fully aware of the degree of this depletion. One writes in his sales offers on eBay: "in my opinion, this is one of the last frontiers in relic collecting, so add some of this material to your collection while it lasts". Another adds: "These pieces are getting harder and harder to come by […] each batch I get I think it will be my last".[1] Keenan reports (2003) that in the areas of the desert with which he is familiar, "vast regions of immense archaeological importance have been simply sterilised by systematic 'vacuuming' of artefacts". He gives (2013: 223) a thought-provoking example of a region that has been affected by the obliteration of "most of the best-known and accessible sites":

> "For example, a reconnaissance of the most accessible terraces between the much publicised Temet dunes and Aïr (Niger) in November 2002, which had been liberally covered with Palaeolithic and Neolithic tools and pottery as recently as 1998, revealed that they had been thoroughly scoured: not a single stone tool or potsherd could be found. The same reconnaissance revealed that most of the western margin of the Tenéré desert appeared to have been equally well scoured".

Here it is worth noting that the Aïr and Ténéré Biosphere Reserve in the Agadez region of the north of Niger has been a World Heritage site since 1997.

ANTIQUITISM AND LITHICS

It is clear that through the antiquities trade, large numbers of freshly obtained "portable antiquities" (archaeological artefacts) are disappearing into innumerable scattered

1 eBay sellers r…o and g…r. The last comment comes from the sale of a batch of 1000 assorted projectile points sold in February 2020 for 800 dollars. It is one of 20 batches of this size that the latter seller listed at the end of 2019. He sold at least two of them in a matter of weeks.

ephemeral personal collections. Despite them providing the motor for the activity, the collectors themselves are largely invisible. Little is known about what they accumulate and how they actually go about using the material they buy. For many, these objects may function as something that makes the past tangible. They may carry an emotional charge, inspiring reflection on transience and yet the common humanity of generations long, long past. Probably many people buying these artefacts see them simply as something "cool", and unusual, and many most likely are sold to individuals that do not go on to become collectors.

Some collectors claim a more serious, academic interest in the items they collect. The dedicated collectors of portable antiquities often claim that by accumulating these items, they are not only "preserving them", but they are also engaging in the study of the past/past cultures. They represent both of these activities as somehow enlightened and beneficial (Saweged 1999; Atwood 2004: 31–33; Tokely 2006). The frequent argument that, by giving them a good home (McIntosh *et al.*, 1995) by purchasing them, a collector is preserving the artefacts from some threat, ignores the fact that the loose objects derive from the destruction of an archaeological context, financed by the collectors' market itself.

The collectors of portable artefacts quite often see what they do with their finds as some kind of academic pursuit and represent themselves as independent (amateur or vocational) scholars. The study of loose decontextualised antiquities without even a known findspot as merely a heap of finds on a table has obvious limitations, and in the absence of (or disregard of the value of) contextual information, their handling ("antiquitism") is centred on subjective interpretation of the formal characteristics of the object.

In the case of Saharan lithics, there are relatively few publications written by such collectors, but one notable example is the book *Flint Artefacts of North Africa* (2005) by US collector Dave Greenwell. He realises that the production of regional typologies, is impossible "due to the way these artefacts have been collected [...] almost all provenance information has been lost forever. I don't offer this as a criticism, just as an observation". He does mention that collectors' lore associates some of the object types to particular regions. Some of them relate to pre-dynastic artefacts of the Nile Valley (see below), while he identifies some types that are said to be from Mali, Mauretania and Algeria. The book centres on producing "a methodological typology for Saharan Neolithic flint artefacts" and is organized in four sections. In the first ("a taxonomist's view") the types are organized in hierarchical dendrograms (with the typology derived from that used in the collecting of Native American lithics). The second gives a brief description of the characteristics and rarity on the market of each of the forms he identifies. Although it is called "an academic's view" there is nothing academic about it. In the book's third and fourth parts he illustrates selected points with colour photos ("the artist's view") and attempts a superficial account of the raw materials ("a geologist's view"). The bulk of the items classified are 55 types of Neolithic arrowheads, but also some small tools (drills/borers, items termed "gravers", scrapers, crescent knives and discs). One group of unifacial points is differentiated (Greenwell 2005: 44–46) and labelled "Mesolithic". There are no axes/celts/gouges or other pecked and ground tool types mentioned. The book makes no reference to any outside literature, with no references to any of the archaeological literature existing at the time.

Very similar in content is the expensive self-published and self-justificatory coffee-table book *Sahara: Material Culture of Early Communities, Prehistoric Artifacts* (Klenkler *et al.*, 2016). This is another collectors' attempt to imitate scholarship through merely typological sorting and narrativisation of decontextualised material. The authors cannot give the findspots of the finds they illustrate (but claim that this is to protect the sites from which they came from looting). This book received a detailed review by two French scholars (Vernet and Le Quellec 2017) who are scathing about its approach, methods and failure to use modern literature in attempting to present a collectors' picture of prehistory:

> *Ce type de classification ne présente donc strictement aucun intérêt… sauf pour les acheteurs de pointes de flèches qui se demandent comment ordonner leurs acquisitions dans leurs vitrines.* […] *cet ouvrage s'apparente à un catalogue de salle de vente sur lequel on aurait omis d'indiquer les prix. La passion typologique dont il témoigne est typique des collectionneurs ignorant tout du contexte culturel des objets qu'ils ont amassés, mais qui veulent néanmoins les classer.*[2]

They end by noting that this book is similar to a genre that has recently become common: pseudo-manuals intended to be used as reference books by "collectors who spend their leisure time searching for artefacts on archaeological sites or buying them on the Internet", and noting with regret that the modern demand for works of this kind is such that they can become bestsellers, constantly reprinted, with a circulation that can sometimes exceed 50,000 copies.

A LOOK AT THE TRADE IN SAHARAN NEOLITHIC MATERIAL

There are many online venues where Palaeolithic to Neolithic artefacts originating in North Africa may be obtained, ranging from specialist antiquities dealers with their own internet shops to major public media outlets such as eBay or Facebook or several dedicated portals such as Sixbid, Catawiki, V-coins and many local sites (such as Allegro

[2] "This type of classification is therefore of absolutely no interest… except for buyers of arrowheads who want to know how to order their acquisitions in their showcases […] This work is similar to a salesroom catalogue in which the prices have been omitted. The typological passion it exhibits is typical of collectors who are unaware of the cultural context of the objects they have collected, but who nevertheless want to classify them". Translated by Author.

in Poland). A detailed search carried out in August 2019 indicated that a large amount of Saharan lithic material was being openly offered on the internet.

This presentation will concentrate on only part of this global trade, namely the sales conducted via the longest established and largest, eBay. This is because the information available about the sales and dealers on other sites could not be presented in a consistent format to allow analysis. EBay has over 90 million users and annually sells some 700 million objects of all types. Table 1 presents the results of a search for Saharan Neolithic material carried out, from 5th to 9th August 2019, on eBay.com and its semi-independent national services in the UK, Canada, Australia, France, Spain, Germany, Holland, Switzerland, Belgium, Italy, Poland and Russia. This material was located by using a variety of search terms in various languages in the portal's own search engine, and the results were manually processed to avoid duplication. Results were also sought from the eleven countries that cover parts of or are adjacent to the Sahara desert (Algeria, Chad, Egypt, Libya, Mali, Mauritania, Morocco, Niger, Sudan, Tunisia and Western Sahara). The other objects being offered by each seller identified were also examined, to determine the place of Saharan Neolithic material in their offers. Their feedback was analysed, in order to examine the history of recent transactions. The research was quite time-consuming, eBay is deliberately constructed to maintain buyer and seller anonymity and obscure a number of features about transactions, both those in progress as well as those that took place in the recent past. In the first week of 2020, the same sites and sellers were revisited, to see whether the situation had changed six months later. In fact few changes were observed, which suggests that the 2019 survey can be taken as representing a snapshot of the current state of this part of the market.

Dealers

The distribution of the sellers is shown in Figure 1 (which shows non eBay sellers too). Most of the Saharan Neolithic material is being redistributed by dealers operating through eBay.com (the main US-based one, 22 sellers) and eBay.uk (9 sellers). On eBay Canada and Australia, there were three and two sellers respectively. Among the European eBay portals, the French one with ten sellers was the most involved in this trade. The local eBay portals for Belgium and Holland had none and the Spanish and Italian ones two each. The German one had seven sellers. It is notable that the Austrian one had just one seller and the Swiss one none. This is significant because from 1st July 2008, the German, Austrian and Swiss portals of eBay introduced new regulations concerning the sale of archaeological artefacts. They must be accompanied by proper documentation showing the seller's title, and that the correct procedures for reporting and export have been followed. Interestingly, one of the biggest German dealers avoids this by listing his Saharan Neolithic artefacts in the section for rocks, minerals and fossils (in the "Mammut" subsection). In August 2019, there was a total lack of Saharan Neolithic material from the eBay portals in eastern Europe, including the Russian one (which does contain auctions of local Stone Age material).

In Table 1, the screen names of dealers have been anonymised (in the same way that eBay uses to protect buyer identity). They are organized by the size of their feedback, suggesting their overall volume of trade and longevity. Their location is listed in the second column (using the standard 2-digit USP abbreviations for states in the USA and the 3-digit ISO country codes elsewhere). Column three gives first the number of Saharan lithic items being sold at the time of the survey, and then the total number of objects on sale by that dealer at the same time; this gives an idea of the relative importance of the material under discussion to the dealer's whole offer. The fourth column contains abbreviations (arranged in order of prominence in the sales offers) denoting other types of material being handled by this dealer.[3]

The sixty or so sellers seem to belong to a number of groups (cf. Fay 2013: 197). One consisted of individuals offering a small number of Saharan lithic items in an offer that consists mostly of a wider variety of general collectables or unwanted household items. Their feedback on past transactions may or may not exhibit traces that they have sold other such items in the past. Rather than as a result of a concerted collecting action, it is probable that the Saharan Neolithic artefacts offered have come from the incidental purchases (for example at a rocks and minerals fair) of a few items as "something cool to have" that were now being disposed of, or maybe these were items picked up at an estate sale, or perhaps bought on speculation for resale.

Most of the sellers seem to be dealers trading in various collectables, such as mineral specimens, fossils, meteorites, ethnographic items and along with them they have moderate quantities of Saharan lithic items in their stock. Some seem to have got their specimens from the same area (in the case of rocks and minerals, most often it seems Morocco), others have stocks that have been obtained from different worldwide sources. There is a smaller group of dealers that (while occasionally offering other items) specialise in the sale of Saharan lithics and have relatively large assemblages of this material in stock with high volume sales. These dealers also sell other items alongside the stone tools (minerals, North African ethnographic collectables etc.). It is possible that some of these dealers are in fact collectors, who buy in bulk in order to obtain the best specimens and then sell the surplus to cover their costs.

It is notable (Fig. 1) that, the sellers are for the most part based in the US, the UK and several western European countries. This is not surprising, the US and UK are both major players in the global art and antiquities market (Fay 2013: 197). The distribution in the US corresponds to that of dealers and collectors of ancient artefacts

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3 These are as follows: M – rocks, fossils and minerals; N – Native American artefacts; E – other ethnographic objects and art; Z – general collectables (sports cards, antique items, modern coins, paper money, postcards etc.); A – portable antiquities; C – ancient and medieval coins; B – collectable (antique) beads other than Saharan Neolithic ones; J – modern and collectable jewellery; D – household items and bric-a-brac; O – other.

Table 1. Summary of all eBay sellers offering Saharan prehistoric artefacts in August 2019, abbreviations and contents explained in text. For explanation of the abbreviations, see footnote no. 3 in the text.

Seller	Location	Sales (lots)	Other goods	Saharan Items (presumed Neolithic unless otherwise noted)	Value (USD)
E…s (31925)	Taylorsville OH	127/1519	M, Z	Acheulean × 12, Aterian × 59 (Algeria), large assemblage of projectile points all labelled Tidikelt,[a] × 820 (Algerian Moroccan border zone), knapping waste/artefacts of Libyan Desert Glass × 32	3600
R…0 (25426)	Sevierville TN	56/98	C, E, O	Projectile points × 323, spear point × 1, axes × 12, beads × 168 and six bead strings (some included in 5 boxed sets of multiple artefacts with Greenwell 2005 book)	2203
G…r (19843)	Winchester OH	11/68	N, E, A	Acheulean × 5, projectile points × 347,[b] labrets × 26	707
A…n (17181)	Canyon Lake TX	18/660	M, A, N, Z	Projectile points × 34 (Mali), axes × 3, boxed set of assorted artefacts × 1	296
A…7 (14132)	Evansville IN	4/112	N, M, C	Labrets × 4 (W Sahara)	104
R…o (12510)	Erlangen DEU	367/2576	M	Oldowan × 34, Acheulean × 2, projectile points × 677, axe × 1	14758
C…a (8443)	Erlenbach a.m. DEU	19/19	A, E, B	Projectile points × 13, axes × 2, beads × 86	210+
T…s (8086)	Vienna AUT	4/47	E	Projectile points × 22, potsherd × 1, all from Niger/Ténéré – collecting history available	52

[a] Not all are.
[b] Since this survey, this seller listed 20 batches of 1000 assorted points, and another new batch of 100.

Seller	Location	Sales (lots)	Other goods	Saharan Items (presumed Neolithic unless otherwise noted)	Value (USD)
C…k (7066)	Fairfax VA	9/9	A, E, B	Projectile points × 32 (northern Mauritania/Mali), projectile points × 12 (Algeria), projectile points × 72, Mesolithic × 5 (Morocco),	146+
M…a (6868)	Williams OR	114/5657	E, B, M, Z	Projectile points × 191, axes × 4, serrated blade tools × 12, labret × 1 (none of the many beads seem Neolithic – not counted)	1079
P…s (6377)	Beccles GBR	3/86	M	Acheulean × 2, axe × 1	100
d…s (6278)	Cardiff GBR	9/452	M	Acheulean × 8 (Morocco), projectile points × 100	470
b…t (5816)	Sunderland GBR	471/745	J, N, C, D	Aterian × 111, projectile points × 4603, (sold singly, and cased in lots, includes 146 mounted as jewellery), blades × 12	11948
A…3 (5416)	Alhendin ESP	3/50	C	Projectile points × 40, blade segments 13	133
b…j (5407)	Montreal CAN	21/1977	D, Z, B	Aterian × 8, projectile point × 1	116
K…a (5087)	La Junta CO	20/55	N, B	Aterian × 11, projectile points × 12, axes × 3, labrets × 3, beads × 48 and 2 strings (some Algeria)	547
Z…a (4750)	Paris FRA	2/13	E, B	Beads × 220 (in four lots)	263
m…n (4736)	Agen FRA	3/9618	Z, C, D	Projectile points × 8	25
d…8 (4509)	Buchen DEU	3/368	E, J	Beads × 3 (Mali)	19
a…s (4509)	Sareau FRA	16/314	B	Projectile points, beads × 94 (not all are ancient?)	597
3…d (4299)	Aptos CA	22/594	E	Grinder × 1, ground tool × 1, ring × 1. All from Mali/Niger. Beads × 109 (plus 4 strings).	1803
f…g (4257)	San Diego CA	2/2217	E, A, B	Axes × 2	330

Seller	Location	Sales (lots)	Other goods	Saharan Items (presumed Neolithic unless otherwise noted)	Value (USD)
O…t (3526)	Oxford MI	1/137	N, Z	Projectile points × 58	16
V…a (3304)	Hampshire GBR	3/415	M, A[c]	Axes × 3	234
B…y (3033)	Fort Worth TX	304/401	C, N, A, B	Acheulean × 22 (localities in Egypt and Mauritania), blades × 94 (Birket Qaraun Egypt)	11130
T…2 (3022)	Yelm WA	6/985	C, M, A, Z, D	Projectile points × 52 (some from Algeria)	54
k…t (2917)	Nouakchott MRT	78/266	A, B	Acheulean × 8 (Mauritania), epipalaeolithic blade × 1, projectile points × 62, Stone rings × 4, stone weight × 1, fishing weights × 3 lots (76), pots × 2, schist pendant × 1	1314
g…e (2355)	Abilly FRA	2/7	M	Projectile points × 10, lithophones × 2	136
Y…s (2243)	York GBR	1/5018	A	Beads × 8	93
A…A (1809)	Sydney AUS	6/83	C, A, M, D	Projectile points × 10	130
M…e (1552)	Bourg en Bresse FRA	9/20	A	Acheulean × 3, Aterian × 1, Capsian points and tools × 40 (mounted on two cards), labrets × 2, beads × 3	1531
a…y (1469)	Perth AUS	8/452	M	Aterian × 6, axes × 2	502
j…o (1367)	Bockeel NLD	2/22	A	Axe × 1 Tilemsi river	90
G…s (1463)	Brownsville KT	5/58	C, A, N	Aterian × 10, Mesolithic blades × 5, projectile points × 4 [some of above bought from seller C…k], beads × 8	170

[c] including flint pseudo-artefacts

Seller	Location	Sales (lots)	Other goods	Saharan Items (presumed Neolithic unless otherwise noted)	Value (USD)
e…9 (1452)	London GBR	3/25	A	Projectile points × 3	37
A…b (1392)	Cowes IoW GBR	8/22	M	Projectile points × 145, blade × 1	649+
O…n (1224)	Unterfranken DEU	1/17	Z, M	Aterian × 1	7
S…r (941)	Cologne DEU	21/89	A, C, B	Acheulean × 1, projectile points × 4, ceramic fishing weights × 4, ceramic spindle whorls × 2, labret × 1	896
R…3 (938)	Forli ITA	18/25	Z, M	Aterian × 1, Mesolithic × 3, beads × 10	238
P…i (860)	Venice ITA	5/912	J, B [A]	Pendants × 5	610
f…0 (860)	Baxter AR	2/5	D, N, E	Projectile points × 9	23
S…l (750)	Dinard FRA	41/41	M	Acheulean × 4, Aterian × 1, Axes × 10, gouge × 1, Spearpoints × 2, knives/blades 11, scrapers × 5, handstones × 2, grooved stone × 1, grinders × 2, querns × 2, palette × 1 (some from Ténéré)	3198
I…i (675)	Koningsbrun DEU	2/24	E	Projectile point × 1, Tool of Libyan Desert glass × 1	36
O…s (655)	Rotterdan NLD	4/20	E, A	Acheulean × 4, Morocco	312
1…u (651)	Lyon FRA	1/492	A, Z, E	Axe × 1	195
A…e (482)	Winnipeg CAN	5/33	A, N	Projectile points × 26,	612
S…0 (481)	Meyenheim FRA	1/ 24	Z, A	Display case of tools, points and axes (“Sahara”) × 1	78
C…9 (445)	Hilversum NLD	5/35	A	Projectile points × 25	56

Seller	Location	Sales (lots)	Other goods	Saharan Items (presumed Neolithic unless otherwise noted)	Value (USD)
a…e (375)	Corsica FRA	8/22	E, A	Projectile points × 49, axes × 9, discs and other tools from Hoggar × 8, pottery bowl × 1, stone bracelet × 1	6277
e…d (288)	London GBR	3/30	Z, D	Projectile points × 3	24
V…s (282)	Rennes FRA	43/99	Z, A	Acheulean × 12, Aterian × 3, projectile points 193 (six lots in cases), axes × 28 (much from Mali)	1523
7…s (257)	Ontario CAN	1/48	C, N	Uniface “Mesolithic” blade × 1 (fake?)	22
S…1 (253)	Chalons ?(C) FRA	2/29	Z, E	Projectile points × 3, axes × 3	120
T…t (158)	Chesterfield MO	4/29	Z	Projectile points × 20	20
d…9 (109)	Rennes FRA	35/35	-	Projectile points × 86 (in 35 lots), axes × 2 (all N. Mali)	773
t…s (108)	Madrid ESP	4/217	M, A[d]	Stone ball, Algeria × 1, flint core, pestle, pounder	195
e…1 (104)	Christchurch GBR	1/28	Z, C, A	Aterian × 1	20
m…s (59)	Koningsbrun DEU	4/15	Z, D	Labret × 1	53
U…k (74)	Mougins FRA	3/75	Z, C	Projectile points × 3	20
1…2 (10)	Bedford IN	1/23	M	Projectile point (fake?)	10
g…1 (9)	La Boulaye FRA	28/50	C	Acheulean × 2, Aterian × 1. projectile points × 18, axes × 2 (Morocco), bead polisher × 1	564
Total				**8000+ items**	

[d] These are all flint tools and other items

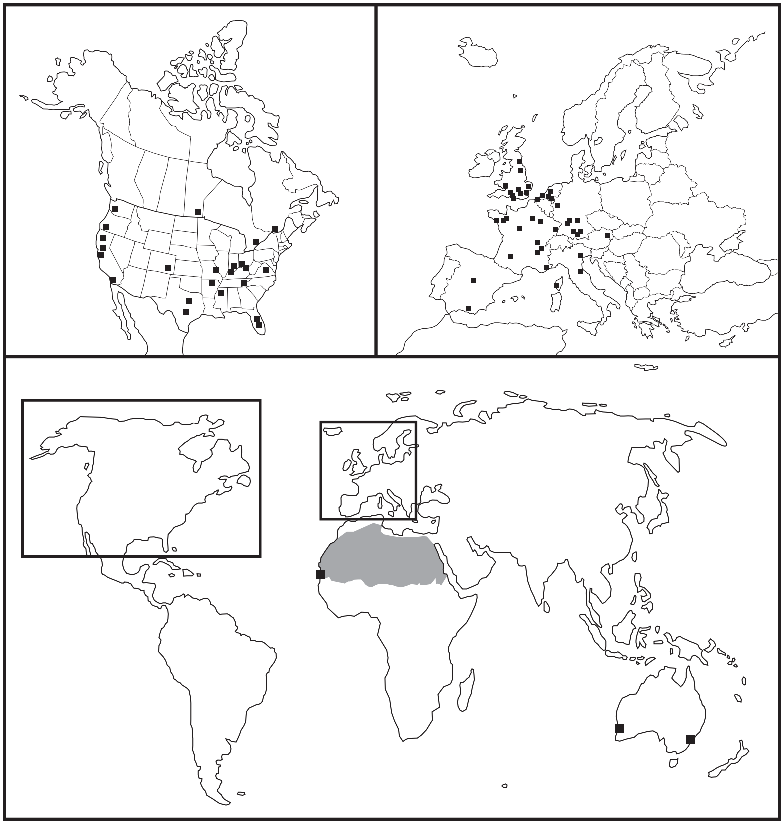

Fig. 1. Map showing global distribution of all online sellers (not only on eBay) offering Saharan prehistoric artefacts in August 2019. Drawn: M. Kosińska.

(including coins) in general. This to some extent matches the distribution of population and wealth. The same applies to the concentrations of dealers in the richer areas of Germany, Britain, France and the Low Countries. It should be noted that only one of these dealers is based in the source countries. It would be problematic to sell ancient artefacts abroad if a country does not allow such export, and it is interesting to note that this seller has some arrangement whereby the artefacts are posted from France, thus avoiding direct export straight to the customer.

Buyers

We know very little about the buyers, whose identity and location are known only to the seller. Their own comments in feedback mainly refer to the ease and reliability of the transaction, or the bargain price. One or two reveal something of their attitude concerning what they have bought: "Very pleased with this – it is a display quality object. Thanks", "beautiful objects, outstanding", "awesome!", "awesome artifacts", "A+ A+ A+ little buggers they are", "fantastic value for something this age", "this item is just what I wanted for a good price", "Jim patiently answered all my questions, and I got exactly what I wanted!", "A knowledgeable collector and a pleasure to work with", "Really a great authentic artifact – thanks a lot!", "excellent relics", "well packaged and exactly as described. My students will love touching them", "perfect, I felt like I time-travelled holding it ☺ Thanks, will buy again". Occasionally, it seems that one seller had bought an item from another and then tried to resell it at a higher price.

Authenticity

The expanding global antiquities market has to cope with a situation where a market exists for material that is becoming more difficult to obtain as the most accessible and productive sites become depleted. The demand is often met by producing fake artefacts. Many archaeologists are aware that the internet market in antiquities is full of fakes (Stanish 2009; Fay 2011; Brodie 2015: 11), and it is a major concern of buyers to avoid getting caught out. The market for prehistoric stone tools is no exception to this general rule. It is difficult to use the photos and descriptions in sales offers unequivocally to determine whether a given artefact is a fake. Bad fakes stand out easily, while the best ones will deceive even the most discerning collectors. There are a number of articles in the amateur literature connected with arrowhead collecting in the US that give pointers to identifying fakes (but they will not be rehearsed here because repetition would make it easier for the fakers to perfect their craft).

There is probably somewhere in North Africa a workshop that is turning out considerable numbers of "Acheulean handaxes" in a biscuit-coloured laminated sandstone, and then apparently given a "desert patina" by sandblasting (possibly in a car bodywork workshop).They are mainly sold by one dealer but several other dealers have similar looking objects that might have come from the same supplier. In the case of the Aterian points, one may observe that quite a lot seem to have been retouched after being affected by deep patination. Although this effect has apparently been observed in "grounded" (archaeologically obtained) artefacts too, in the case of material that has freshly surfaced on the market, it seems more likely that this was an attempt to "improve" a poorly-shaped item to make it more saleable. Some dealers specifically note that their material has not been retouched, showing that this is something the buyer ought to be wary of.

When it comes to the artefacts relating to the Neolithic Green Sahara period, it seems that the relative quantities of dubiously-authentic material are not as great as in the case of US arrowhead collecting (Hothem 1992; Whittaker and Stafford 1999; Berner 2002). It does seem, however, that there are a number of skilled flint-knappers operating in the Sahara region producing some very passable ancient-looking artefacts. One high-volume seller has an interesting range of lithic items, many of which are well-crafted and attractive (including for the colour and pattern of the stone), but although it seems he has some artefacts that do look authentic, there are quite a lot of others that have a number of characteristics that suggest, whatever they are represented as being, that they are modern products made for the market. There are a number of other sellers that also have similar fresh-looking material (see also Di Lernia 2005: 448).

It may be that not all of the dealers selling these fakes are knowingly engaging in fraudulent activity. In some cases, the fake items occur on sale alongside other material that seems authentic. Dealers that do not have specialist knowledge of the field may have bought these items on the understanding that this was all freshly looted from archaeological sites, when in fact real artefacts had been bulked out with fakes (this apparently happens a lot in other areas of the antiquities market). It is interesting to note that in one case examined in the 2019 survey, it seems it was apparently genuine Saharan arrowheads that were being added to improve a range of sales otherwise consisting entirely of fakes representing antiquities from a variety of old world cultures.

Comments on the Categories of Artefacts Sold

The fifth column in Table 1 gives a summary of the various types of object being sold as prehistoric artefacts by these sellers, they are described below. In the next column is the total value assigned to them by the sellers (the great majority of them were fixed-price Buy-it-Now items, where there was bidding, the price was the bid at the end of the week). Beads will be discussed separately below.

Palaeolithic Lithics

There were two main groups of Palaeolithic material sold. There were some primitive tools that were described as Oldowan, although the photos however suggest that not all of these items had clear evidence of human manufacture. The second group were a larger number of handaxes (87) that were labelled Acheulean. Again, not all of them seem to be genuine ancient artefacts. In both cases, the general locality where they had been found was reported; they had come from a wide range of places across the region.

Middle Stone Age

The Middle Stone Age was represented mainly by 214 "pedunculate points" assigned to the Aterian technocomplex. Some "Aterian discs" were also noted, but no other artefact types. Most of these are sold individually, but some bulk lots also appear. They mostly seem to have been made of chert or flint and many are rather poorly-made. The objects tend to be heavily-patinated. The sellers seem unsure of the dating, giving a variety of BP and BC dates: 30 ka+, 40 ka, 120–55 ka, 120–30 ka, 145–20 ka (the dates given in Wikipedia). The Late Palaeolithic is represented only by a few points (including some of "Ounanian" type). A few items (points and blades) labelled "Mesolithic" were being sold by several dealers.

Neolithic Lithics

The bulk of the material revealed by this survey comprises Neolithic flints, associated by sellers with the "Green Sahara" (Neolithic Humid Phase) phase. Here too a wide variety of dates is cited by the sellers: 10.2–2k BC, 9–4 ka, 7–5 ka, 7–3 ka, 6–3 ka, 5–3 ka, *c.* 5000 BC, *c.* 4000 BC, "around 4000 BC".

The most prominent component (98%) of this material consisted mainly of small projectile points, mostly complete (only a few sellers have cheap bulk lots of fragments, probably broken ones were removed before the left the source country). Sellers tend to market these singly (in which case they often put them in a small box with transparent lid and a generic label saying what it is), but most commonly they are sold in groups of between five and 50 items. Again, these may be mounted in display cases.

There is a wide variety of typology, though the examples seen in 2019 were mostly of the types designated "common" by Greenwell (2005; see also Hugot 1991). The groups of points offered by individual dealers tended to have different formal and technological characteristics, presumably due to the material coming from different regions and cultural contexts. Since any information about their origins and collection history has been obliterated by their passing through the market, no attempt was made to document this. Although many sellers give only a rough idea of size, the majority of the points are relatively small. Examples from 15–20 mm long are not uncommon, the majority seem to be 30–40 mm and examples 50–60 mm long are less common in the marketed assemblages. These points seem from the photos (for descriptions are rare) to have been mainly made of opaque chert or flint, or translucent flint of varied colours. Chalcedony, quartzite, and jasper were also occasionally used. Sellers frequently photograph the objects to show the craftsmanship and elaborate technology of the flaking, one of the attributes making them collectable. It can be seen that many of them are finely-made and the majority thinned and finished by extensive pressure-flaking. Some effort seems to have been put into creating points of high quality with specific desired characteristics. Some examples have serrated edges. They do not all seem particularly sharp, which raises the question of the function of such small points. As noted above, even though these items are generally sold very cheaply, there seem to be fakes on the market (cf. Di Lernia 2005: 448), but their extent is not clear. Apart from a few larger points that tend to be termed "spear heads", and a few discoidal knives, there were very few knapped flint tools being sold.

Neolithic "axes"

A number of sellers have typical Neolithic polished axes, referred to variously as "celts" or "axes", some merely as "tools" (but also some are termed "scrapers"). Some would classify as "gouges", but that is a term not seen very frequently in the online sales. Rarely is the material identified. The photos showed that many were of igneous rocks (basalt, dolorite, diorite, aplite and granite were mentioned), some seem to have been quartzite, while more common were those of silaceous materials (labelled chert and flint by the sellers). Many are ground all over, but some are only partially ground with extensive areas of flaking visible. The size ranges of the ones on offer clustered fairly equally into three groups 30–60 mm, 85–105 mm and 155–218 mm long, with only about 10% of them between 110 and 140 mm. There a few "miniature" examples under 25 mm long and an outlier at 240 mm (total number of axes 92). It is difficult to determine from the photos if any of these items are modern fakes.

Other ground and pecked stone tools occurred only occasionally, and were priced accordingly, they include so-called "handstones" (of varying morphology and uncertain function), pestles, grinders and pounders, the occasional quern, perforated discs (weights?) and two items labelled lithophones. Possibly the infrequency with which they appear online is related to their weight and bulkiness (important if the artefact hunter is hand-carrying their haul while flying out of the region).

Labrets

Several sellers had smooth polished cylindroid artefacts and their fragments that they labelled labrets (also ear spools and lip plugs/pins) and dated to the Neolithic period. They were of varying sizes and shapes and many were made of polished quartz or chalcedony. Two separate items recently on sale online are pictured with what appears to be heavily corroded copper or iron wire wrapped around one end, which suggests that these examples at least are not Neolithic (or from the desert). While Neolithic labrets of this form have been excavated, they were used in other prehistoric periods and even the ethnographic past in various areas of North Africa (Garve *et al.*, 2017). It is possible that dealers are taking advantage of the cachet attached to the label "Saharan Neolithic". Some of these exotic and fragile items might be modern fakes produced for the collectors' market.

Fishing weights

Several sellers offered, usually in groups, small somewhat roughly made longitudinally perforated elongated biconical and cylindrical fired clay objects 40–60 mm long and some 220 mm diameter that they sold as Neolithic fishing net weights, adding emotively "from the vanished lakes and rivers of the Green Sahara". These weights seem to have been found in some numbers, but equally could be fakes. Despite their brutalist form, it seems that they were marketed as suitable for making ethnic jewellery (with an interesting and evocative story).

Neolithic beads and pendants

The collecting of historical beads is a relatively popular hobby in Northern America and Europe, and African beads (for example African trade beads) are an important part of the material available (Francis 1994; Simak *et al.*, 2010). Fifteen sellers listed in Table 1 (some of whom specialised in collectable beads and jewellery) had 717 loose and nine strings of Saharan Neolithic beads and pendants on sale (with an expected retail value of 5690 dollars). These were sold as wearable antiquities. The forms of these beads was variable, but the most common were rather roughly-made discoid or doughnut-shaped examples apparently of white or transparent quartz, discoid beads of varying size of ostrich eggshell, and small cylindrical beads of carnelian. There were also some small cylindrical beads of Amazonite, but since their findspots re not known they have nothing to add to our knowledge of the routes by which such beads (Zerboni *et al.*, 2018) were distributed. Alongside the beads were also a number of larger discoidal or block-shaped pieces of a variety of stones sold as Neolithic pendants (or "amulets").

The authenticity of attribution of these items is unclear, we still know very little about the characteristics of "grounded" (excavated) assemblages of Neolithic and later beads from different parts of this large region (cf. Bar-Yosef 2013).[4] Among the beads shown in the sellers' photos are examples that can be paralleled in excavated assemblages of later beads (such as from the region of Sudan in Meroitic times). Some beads can be seen to have perforations that must have been made with a modern metal drill. Ostrich eggshell beads also have a long history in the region (Bednarik 2011). It may well be that not all of them come from looting of Neolithic sites, but an unknown number of these beads might be more "primitive" looking ones salvaged from the breaking-down of recent bead strings containing old beads of mixed ages and merely marketed as Saharan Neolithic.

Nile Valley

Some of the early pre-dynastic cultures of the Nile valley overlap with the Neolithic Green Sahara period, while the middle pre-dynastic period probably correlates with its end. Several of the hollow base point types among the flint material on the US market related to the pre-dynastic and early dynastic cultures of the Nile Valley. Greenwell (2005: 36) notes the parallels and adds: "these types do not appear to be terribly rare but, due to the Egyptian antiquities laws, are difficult to find, except in old collections". There is indeed relatively little from this region on eBay. Some material from Egypt apparently from such an old collection was being sold by one US dealer who is offering 95 Neolithic blades and knives from the shoreline of Birket Qarun in the Fayum (with findspots recorded) found in the 1930s and 40s from a "private collector from Port Townsend Washington". He also has 21 Acheulean handaxes from several sites in Egypt and Libya. Another seller has 18 pieces of ancient (?) knapping waste made of Libyan desert glass that were "found many years ago on an eroded site in Egypt". Apart from these, there are four other antiquities (of the Naqada culture), reputedly from old collections, being sold by an additional three US dealers.

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[4] I would like to thank Dr Lenka Varadzinová for discussing beads with me.

Later Objects

Although outside the scope of this presentation, to put the sales offers of Saharan Neolithic material in context, it may be noted that the same online sellers generally have relatively few items dating to the 6800 year span after the end of the Saharan Final Neolithic. This material clearly does not have such wide appeal as the prehistoric "Green Sahara" artefacts. A few of the sellers of Table 1 have Berber, Tuareg, Moorish and Bedouin ethnographic items (jewellery, decorative objects, knives).[5] A number also have ethnographic items (masks, sculptures, jewellery etc.) from all over Africa and "tribal art" from other regions too. There are quite a number of glass and stone beads from Northern Africa on eBay.com in general (including by these sellers) that are labelled Roman, and also some that are sold as "Islamic". Not all of these however seem ancient. In contrast to the rest of northern Africa, antiquities from Ancient Egypt have long been eagerly collected. As a result, at the time of the 2019 search, there were 7421 artefacts and pseudo-artefacts dated to the period from the Old Kingdom to Ptolemaic times on ebay.com.

Prices

The prices established by the sellers for Buy-it-now sales were tabulated. The prices for Oldowan tools was between 13–270 US dollars, while Acheulean handaxes ranged in price from 30 to 180$ (with most falling between 40 and 90), though one US dealer priced his from 90 to 200 dollars (in both cases were outliers up to 400$). Aterian points were mostly priced in the range 13–23$ each. Though there were more expensive ones, Neolithic polished axes tended to range in price between 20 and 150 dollars, with the majority falling in the range 30–70 dollars. Most of the larger and heavier tool types (grinders, pounders, quern fragments) were priced relatively highly, reflecting their scarcity on the market. Beads were variously-priced, but often expensive compared to the other artefacts (some for 50–60 dollars for an individual item). Projectile points however were sold comparatively cheaply. While a few could be priced 30, 50 or 60 dollars each, the bulk of them (97%) fell into the price range 1–18 dollars. Among these, 81% of the whole sample were priced 1–7$, and the majority of these (26, 15 and 15% of the whole sample respectively) were in the range 1–3$. Though there is obviously money to be made from this trade, if the bulk of these points are selling at such a price, artefact hunters themselves are not getting much of a share of it unless they bring huge numbers of artefacts to the middlemen (see Brodie 1998).

5 The total number being offered on eBay.com by these and other sellers at the time of the survey was something like 853.

Sales Dynamics

The overall numbers of items on sale at the time of the survey is shocking. In total 61 sellers were offering for sale 8817 artefacts and beads with a total value assessed at over $70,000. Not all of these items would have been sold at once (indeed a few of the objects seen in January 2020 were the same ones that had been offered in August the previous year), but in many cases when they were, they would be replaced with others.[6] On eBay, articles that were sold through bidding and started with a low starting price very frequently attracted some bidding and were sold within a few days of being put online. Unless the dealer employed a "shill" to push bids up (illegal, but known to happen on eBay), slow bidding means that an item may sell for lower sums (this is the attraction of auctions of course for the buyer). Many buyers therefore prefer to place the items online for a higher buy-it-now price, which tends to postpone the sale, which may have to be relisted several times.

As noted, eBay is constructed in such a way that it is difficult to follow the activities of individuals. The majority of the feedback records on past transactions are often set up (by the seller) to hide some of the details of the transactions, and therefore cannot provide a picture of the volume and rate of turnover. Analysing these records is also very time consuming. For this overview, the past sales of only a sample of the dealers that handled relatively high volumes of Saharan Neolithic material were analysed. They fall into two groups, sellers that only retailed items by auction (bidding) and a larger group that listed items that primarily had (higher) buy it now prices. Sellers of the first group consistently managed to sell all or at least 80% of their periodic sales offers in the past six months. The "Buy-it-now" sellers examined varied in their success rate. In half the cases examined, in six months some of them sold 50% of their offered stock while others moved 20–25%. The other half however had minimal sales of this type of material (even though buyers were more interested their other objects). A major factor seems to be their pricing policy, many sellers (and in particular those that also specialise in "tribal art") seem to overestimate the worth of the objects they have on offer. It seems therefore that some sellers can sell the equivalent of their entire current offer of Saharan Neolithic material in a year's trading (and continually replace what is online), while others will sell about half of it, while others still will sell considerably less. Fay (2013: 201–202) found that 52% of the artefacts (and 74% of the coins) on eBay were sold during the four months when she was observing it in 2008.

For many of these dealers, Saharan Neolithic artefacts are not the only product they sell, but six months trading in such items alone earned about half the dealers surveyed an income of several hundred dollars, while others were making sums of 1500 to 3500 dollars from such sales. It is clearly impossible to generalise from such figures, but it is clear that selling North African lithics can be quite profitable.

6 See footnote 1.

CONFLICT ANTIQUITIES

Politically, much of northern Africa has been relatively unstable in post-Colonial times and recent events there invite reflection on the relationship of the antiquities trade to social inequality and injustice (Harsch 2006; Krishnan *et al.*, 2016), in particular whether some of these artefacts may even be conflict antiquities (Stevenson 2016; Hardy 2017). The Western Sahara is still a contested region, there has been recent conflict and civil war in Algeria (1991–2002), Libya (2014–present), Sudan (1983–2005 and 2003–present) and Mali (2012–2019). The 2011 Arab Spring revolution was followed by antiquities looting in Egypt and Libya. Unrest and militant action in Niger (2007–2009 and later) also affected the areas where some of these artefacts are coming from. Some of the artefacts now surfacing on the antiquities market thus may well have been the products of earlier looting during the breakdown of law and order and originally sold in order to raise money to support armed conflict (Lehr 2019). In such a situation, as with other antiquities generally, their handling, sale and purchase raise a number of moral and ethical questions.

CONCLUSION

The number of Saharan Neolithic artefacts currently on sale online is disturbingly high. Although it seems that the turnover of this trade is not as rapid as other artefact types, it is still significant enough to substantiate the claim that since the mid 1990s, several million artefacts have been removed from sites in the Sahara and scattered on the international antiquities market, and this process is ongoing. This is looting on an industrial scale. It seems that some areas have been stripped of diagnostic material. As long as a lucrative market for this material exists, the extent of the areas stripped out will only spread.

In the Sahara, the majority of Neolithic sites consist of shallow surface spreads of material and the bases of negative features exposed by deflation in the desert conditions that have prevailed here for six millennia. As such, they are extremely fragile and sensitive to interference. A single unrecorded search episode removing the most collectible (and therefore diagnostic) material will irreversibly alter not only the composition of the site assemblage but, above all, the pattern of distribution of material that constitutes the main body of evidence that the site holds. In analysing prehistoric landscapes in the desert, the stratigraphic, artefactual and environmental data from single sites are not the main type of evidence. Desert surveys analyse the cumulative distribution of sites and off-site findspots not only in relation to each other but also to the geological effects of changing landscapes and natural environment. Rendering unrecognizable sites and findspots forming part of those patterns disrupts that research.

Much of the current discussion or collection-driven exploitation of the archaeological record ("archaeological looting") is predicated on equating archaeological technique and research solely with excavation and, therefore is based on the notion of "diggers", individuals that excavate holes into archaeological stratigraphy to remove buried artefacts, like the *haqueros* discussed by Atwood (2004) or metal detectorists. In the UK, the removal by the latter of material that is "only" taken from the disturbed topsoil is taken as an exoneration of this collection-driven activity (Deckers *et al.*, 2018: 323). Paradoxically, the recording and analysis of the patterns of material in that same topsoil is a basic technique of landscape archaeology (a discipline that largely developed in Britain).

The damage caused by collection-driven stripping of surface sites does not manifest itself in a visibly legible form as a site honeycombed with holes that can produce shocking photographs at ground level and the progress of which across a site can be tracked on time-lapse aerial and satellite photos (as seen recently in looting in Iraq and Syria, and in looting on the *limes* in Bulgaria). Yet, although so rarely highlighted, this types of damage (seen elsewhere too, e.g., in Victoria in Australia: Lever 2016) is devastating to the archaeological record.

The collection-driven destruction of the Sahara's Stone Age archaeological resources threatens to obliterate part of the world's cultural heritage and also profoundly affects our ability to understand the human past of the region. About 15% of the world's population today live in arid regions. These and other areas are being placed under increasing stress as we face the prospect of imminent climate change. In such circumstances, attempting to understand better both how human activity may affect environmental change in this fragile ecosystem (Wright 2017), but also how human communities adapted to those changes is potentially of more than mere academic interest (Brooks 2013).

Fifteen years ago, Brodie and Renfrew (2005) looked at the impact of collection-driven exploitation on the world's archaeological heritage, and came to the conclusion that the response of archaeologists and opinion-makers to the issue was, as they put it, inadequate. Since then, nothing much has changed, the damage has gone on apace. Artefact hunting, alongside erosion and other geological processes, agricultural expansion, military activity, road construction, vandalism or mining and other extractive industries, is just one of the threats to archaeological sites in the fragile environment of the Sahara region. Yet it is one that arguably we can still be doing something about. Why aren't we?

REFERENCES

Atwood, R. 2004. *Stealing history: tomb raiders, smugglers, and the looting of the ancient world*. New York.

Bar-Yosef, D. 2013. Towards a typology of stone beads in the Neolithic Levant. *Journal of Field Archaeology* 38(2): 129–142.

Barker, A. 2018. Looting, the antiquities trade, and competing valuations of the past. *Annual Review of Anthropology* 47: 455–474.

Bednarik, R. G. 2011. About ostrich eggshell beads. *The Bead Forum* 59: 2–8 (accessible online: http://www.ifrao.com/wp-content/uploads/2015/02/97Ostrich.pdf).

Berner, J. 2002. *American Indian artifacts: genuine or reproduction?* Roswell.

Brodie, N. 1998. Pity the poor middlemen. *Culture Without Context* 3: 7–9.

Brodie, N. 2015. The internet market in antiquities. In F. Desmarais (ed.), *Countering Illicit Traffic in cultural goods: the global challenge of protecting the World's Heritage*, 11–20. Paris.

Brodie, N. 2017. Virtually gone! The internet market in antiquities. In *Proceedings of the 6th International Conference of Experts on the Return of Cultural Property; Overseas Korean Cultural Heritage Foundation: Seoul, Korea, 2017*, 190–204. Seoul.

Brodie, N. and Renfrew, C. 2005. Looting and the world's archaeological heritage: the inadequate response. *Annual Review of Anthropology* 34: 343–361.

Brodie, N. and Tubb, K. W. 2002. *Illicit antiquities: the theft of culture and the extinction of archaeology*. London.

Brooks, N. 2013. Beyond collapse: climate change and causality during the Middle Holocene Climatic Transition, 6400–5000 years before present. *Geografisk Tidsskrift – Danish Journal of Geography* 112(2): 93–104.

Bruhns, K. 2000. www.plunderedpast.com. *Society for American Archaeology Bulletin* 18(2): 14–15.

Chippindale, C. and Gill, D. 2001. On-line auctions: a new venue for the antiquities market. *Culture Without Context* 9: 4–12.

Corbey, R. 2000. *Tribal art traffic a chronicle of taste, trade and desire in Colonial and Post-colonial Times*. Amsterdam.

Deckers, P., Dobat, A., Ferguson, N., Heeren, S., Lewis, M. and Thomas, S. 2018. The Complexities of metal detecting policy and practice: a response to Samuel Hardy. *Open Archaeology* 4(1). Electronic document: https://www.degruyter.com/view/journals/opar/4/1/article-p322.xml.

Di Lernia, S. 2005. Incoming tourism, outgoing culture: tourism, development and cultural heritage in the Libyan Sahara. *Journal of North African Studies* 10(3–4): 441–457.

Ede, C. 1976. *Collecting Antiquities an Introductory Guide*. London.

Fay, E. 2011. Virtual artifacts: eBay, antiquities, and authenticity. *Journal of Contemporary Criminal Justice* 27: 449–464.

Fay, E. 2013. *Trading in antiquities on eBay: the changing face of the illicit trade in antiquities.* PhD Thesis, Keele University October 2013. Electronic document: http://eprints.keele.ac.uk/197/1/Fay%20PhD%202013.pdf.

Francis, P. 1994. *Beads of the world: a collector's guide with price reference*. Atglen.

Garve, R., Garve, M., Türp, J. C. and Meyer, C. G. 2017. Labrets in Africa and Amazonia: medical implications and cultural determinants. *Tropical Medicine and International Health* 22(2): 232–240.

Gilmer, M. [2009]. *About NWA meteorites. Galactic stone and ironworks*. Webpage: http://galactic-stone.com/about-nwa-meteorites/

Graburn, N. H. H. 1977. *Ethnic and tourist arts: cultural expressions from the Fourth World*. Berkeley.

Greenwell, D. 2005. *Flint artifacts of North Africa*. Self published [no place given].

Hardy, S. A. 2017. Curbing the spoils of war. *UNESCO Courier* 2017(3): 12–16.

Harsch, E. 2006. Combating inequality in Africa. *Africa Renewal* 20(2): 16–21.

Hothem, L. 1992. *Fake chipped artifacts: some considerations*. Lancaster–Ohio.

Hugot, H.-J. 1991. *Essai sur les armatures de pointes de flèches du Sahara*. Calvisson.

Jury, L. 2005. Art market scandal: British Museum expert highlights growing problem of fake antiquities. *Independent*, 24 May 2005. Available online: https://www.independent.co.uk/news/uk/this-britain/art-market-scandal-british-museum-expert-highlights-growing-problem-of-fake-antiquities-222955.html.

Keats, J. 2014. Playing the meteorite market. *Discover magazine*, June 2014: 34. Available online: https://www.discovermagazine.com/the-sciences/playing-the-meteorite-market).

Keenan, J. 2003. Tourism, development and conservation: a Saharan perspective. In D. J. Mattingly, S. McLaren, E. Savage, Y. al-Fasatwi, and K. Gadgood (eds), *Natural resources and cultural heritage of the Libyan Desert: proceedings of a conference held in Libya. 14–21 December 2002*, 14–21. London. Electronic document: http://www.psi.org.uk/ehb/docs/keenan-tourism-200302.pdf.

Keenan, J. 2005. Looting the Sahara: The material, intellectual and social implications of the destruction of cultural heritage (briefing). *Journal of North African Studies* 10(3–4): 471–489.

Keenan, J. 2013. The material, intellectual and social implications of the destruction of cultural heritage (Briefing). In J. Keenan (ed.), *The Sahara: past, present and future,* 214–32. Abingdon.

Klenker, E. K., Dreikluft, R., Milburn, M. and Jiang, Z. 2016. *Sahara: material culture of early communities: prehistoric artifacts*. Self published [no place given].

Krishnan, N., Ibarra, G. L., Narayan, A., Tiwari, S. and Vishwanath, T. 2016. *Uneven odds, unequal outcomes: inequality of opportunity in the Middle East and North Africa*. Washington, D. C., World Bank Group Report. Electronic document: https://bit.ly/2BBjJj8.

Lehr, D. 2019. Art and antiquities: conduits for money laundering and terrorist financing. *AML Challenges*, Dec. 2018–Feb. 2019 (Association of Certified Anti-Money Laundering Specialists). Available online: https://www.acamstoday.org/art-and-antiquities-conduits-for-money-laundering-and-terrorist-financing/.

Lever, M. 2016. A damaged past: the effects of historical artefact collecting on the stone artefact record. *Victoria Excavations, Surveys and Heritage Management in Victoria* 5: 47–50.

Lhote, H. 1958. *A la Découverte des Fresques du Tassili.* Paris.

Lidington, H. 2002. The role of the Internet in removing the "shackles of the saleroom": anytime, anyplace, anything, anywhere. *Public Archaeology* 2: 67–84.

Mackenzie, S. and Yates, D. 2016. What is grey about the "grey market" in antiquities. In J. Beckert and M. Dewey (eds), *The architecture of illegal markets: towards an economic sociology of illegality in the economy*, 70–86. Oxford.

McIntosh, R. J., Togola, T. and McIntosh, S. K. 1995. The Good Collector and the premise of Mutual respect Among Nations. *African Arts* 28: 60–69.

Sawaged, T. 1999. The Collecting Culture: an exploration of the collector mentality and archaeology's response. *Nebraska Anthropologist* 121: 80–88.

Simak, E., Dreibelbis, C., Liechty, J., Donato, M. and Dubin, L. S. 2010. *African beads: Jewels of a continent.* Denver.

Stanish, C. 2009. Forging ahead. Or, how I learned to stop worrying and love eBay. *Archaeology* 62(3): 58–60.

Stevenson, A. 2016. Conflict antiquities and conflicted antiquities: addressing commercial sales of legally excavated artefacts. *Antiquity* 90(349): 229–236.

Tokely, J. 2006. *Rescuing the Past: The cultural heritage crusade.* Exeter–Charlottesville.

UNESCO 1970. *Convention on the means of prohibiting and preventing the illicit import, Export and transfer of ownership of cultural property.* Paris.

van Ham, T., Leukfeldt, R., Bremmers, B., Stol, W. and van Wijk, A. 2011. *The art of the Internet: a study of illegal online trading in cultural goods*. The Hague.

Vernet, R. and Le Quellec, J.-L. 2017. Recension de: Eckhard Klenkler, Robert Dreikluft, Mark Milburn and Z. Jiang 2016. Sahara. Material culture of early communities. *Les Cahiers de l' l'Association des Amis de l'Art Rupestre Saharien* 19: 295–297.

Vitelli, K. D. 2000. E-commerce in antiquities. *Society for American Archaeology Bulletin* 18(4): 4–5.

Whittaker, J. C. and Stafford, M. 1999. Replicas, fakes, and art: the twentieth century Stone Age and its effects on archaeology. *American Antiquity* 64(2): 203–214.

Wright, D. K. 2017. Humans as agents in the termination of the African Humid Period Front. *Earth Science* 5: 1–14.

Zerboni, A., Salvatori, S., Vignola, P. and Mohammed, A. A. 2018. The long-distance exchange of amazonite and increasing social complexity in the Sudanese Neolithic. *Antiquity* 92(365): 1195–1209.

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BOOK REVIEWS

Iwona Sobkowiak-Tabaka, *Rozwój społeczności Federmesser na Nizinie Środkowoeuropejskiej* [The Development of Federmesser Communities on the Central European Plain], Warszawa 2017, Instytut Archeologii i Etnologii Polskiej Akademii Nauk, pp. 400+CD, 151 illustrations in the text.

Reviewed by Andrzej Wiśniewski

This monograph by Iwona Sobkowiak-Tabaka is a study of the development of the Federmesser culture in the northern part of the European Plain, taking into account the chronological, climatic and natural background. The phenomenon of Federmesser culture arose as the result of the transformation of the previous cultural models of Magdalenian and Epigravettian hunters and gatherers into a different "canon" with significant regional differences. The subject of the work is a large series of archaeological and natural data originating from the area located between the Hercynian mountains and the coast of the Baltic and North Seas. The material analysed in the work dates from the s3econd half of Bølling to the beginning of the younger Dryas (12240 and 10630 BC).

The work is one of a series of monographs that have been published in the last decade that discuss the colonisation process of Central Europe after the disappearance of the MIS 2 continental ice sheet, which was accompanied by profound transformations in the natural environment. Despite this, the monograph of Iwona Sobkowiak-Tabaka fills a peculiar gap, as most of these studies deal with slightly older sections of the late Palaeolithic, often limiting themselves to much smaller territorial units.

The work consists essentially of seven extensive chapters as well as the Introduction and Conclusion, as well as a comprehensive appendix that includes a catalogue of archaeological sites. In the introduction, the Author outlines the purpose and subject of the study, emphasizing the usefulness of the growing series of dates made by the AMS technique and the increasing amounts of data that we now have related to climate and reconstruction of the natural conditions.

The First Chapter of the work is devoted to the history of academic interest in Federmesser material. In the course of this, there is a presentation of the development of the contemporary definition of this taxon and the issue of the underlying regional diversity that this raises. This is a problem that affects research on almost every Palaeolithic period due to the complicated history of archaeological research and the use of different paradigms.

The second chapter presents comments on the subject of climate and chronostratigraphy. This presentation results from the assumption adopted by the Author that population dynamics are a function of the characteristics of the climate and natural environment. A very interesting element of this chapter is an attempt to analyse the relevant environmental and climate changes based on a synthesis of information from ice cores, lake sediments, volcanic sediments, dendrochronology and palynological data, which allowed the recreation of plant succession in several regions. Chronological data were analysed taking into account their modelling in the OxCal program (function Boundary). The use of information from the territory of Federmesser culture itself is particularly important, because (despite some gaps), it reflects in a more realistic way the evolution of the terrestrial environment than data from ice or sea cores.

The next chapter discusses the lithic material, which is the most common type of material reflecting human activity in this period. The chapter is preceded by an extensive introduction on the history of the classification of artefacts, from Mortillet's pioneering attempts to modern systems. This is followed by a detailed presentation of the results of the analysis of collected data from nearly 500 archaeological sites. Among them, 60 sites from Belgium, the Netherlands, Denmark, Germany and Poland have been characterized in more detail. Their spatial division was discussed paying attention to the structural features of inventories. The chapter is equipped with numerous illustrations presenting mainly tool forms. A separate part is subsection III.2 dedicated to backed blades, or more specifically their typological diversity. The Author highlights the various reasons for the variability of these tools, considering that one of the main causes of their variability was the nature of their raw material. Methods of cultural information transmission were treated separately in this chapter making use of various techniques for measuring variability and adopting a neo-Darwinian perspective. This is an introduction to an attempt to analyse Federmesser inventories in qualitative and quantitative terms. Here, the Author cites various previous attempts to classify site assemblages, from very archaic ones, having no application to most late Palaeolithic sites, to newer numerical approaches, which in turn are not realistic. The Author rightly distances herself from such divisions, showing the complexity of categorical solutions. She proposes her own classification, which is based on numerical criteria.

The fourth chapter is devoted to the characteristics of the development of the Federmesser culture in time. The Author cites the most important findings regarding site stratigraphy, especially concerning soil markers. Then, she attempts to analyse radiocarbon dating preceded by critical remarks regarding factors that have a key impact on the final results. This is followed by a presentation of a series of calibrations of dating of major sites, discussing the chronological ranges of traces of occupation. These chronological ranges were used to present a chronological model for the Federmesser unit as a whole. A group of 127 radiocarbon determinations were selected for more detailed analysis, rejecting others because of, e.g., too large standard deviation of results. The Author presents the results of her thoughts on the reliability of these determinations and their calibration, setting general ranges for Central and Western Europe (ranges 1–5). The Author tries to find in the differences in dating evidence of the development of territorial exploitation by the Federmesser community, which was detectable in spatial terms, through an extension of the area and increasing the number of sites at different times. The relative chronology of 61 major sites was discussed separately. The categories of selected tools and their subcategories were used for the analysis, paying attention to the upward and downward trends in the participation of particular types of tools over time. Simple numerical comparisons illustrated with bar charts were used. Analysis of the data led the Author to the conclusion that the origins of the Federmesser culture coincides with the Greenland ice core phase GI-1e, while its decline falls in GS-1 (Bølling-younger Dryas). The chronological ranges have been correlated with palynological chronosons.

In the next chapter, the Author discusses the evidence for the lifestyle of communities represented archaeologically by the Federmesser culture, citing information on paleodemography and *in vivo* strategies. In the demographic subsection, we get a very good overview of the concept of the size and dynamics of population development, although this reviewer feels that a few more references to the literature on the ethnological findings of the size of social groups would have been helpful here. The next parts of this chapter focus on strategies for obtaining food through hunting (large, medium and small mammals), fishing and other ways of obtaining food. This is a very interesting part of the book and is based among other things on paleozoological and isotope data. The raw material used for making stone tools and the issue of mobility were also discussed. In Chapter Six, the Author touches on the issue of art, and its role in the communities, seen as a kind of communication system.

In the final chapter, the Author synthetically presents the most important conclusions resulting from the research on the subject of Federmesser culture.

It must be said that the book, with a clear and informative introduction and concluding section, and a well-structured and organized sequence of chapters and subchapters, is structured in a clear and exemplary manner, thanks to which the work reads very well. Nevertheless, this reviewer feels that the work could have been made even more clear by careful editing. For example, the chapter devoted to the lifestyle of hunters would have been better had the discussion of “optimal foraging theory” been included in the section on survival strategies, e.g., hunting, etc. In Chapter Two, dealing with climate issues, transparency would have been improved by a more synthetic presentation of the comments on the construction of isotope curves and the description of ice drilling projects. Similarly, the chapter on flint assemblages would have benefited from a more synthetic approach, limiting the comments on the development of the classification of the lithic items within various paradigms. In general, the work has been prepared carefully in terms of graphics. Nevertheless, the quality of some maps (see e.g., Fig. 20) could have been given more attention, they should, perhaps, have been broken down into smaller sections for better legibility of the positions of some of the sites.

In some chapters, which show the Author's extraordinary erudition, the reader meets text that touches on very complex issues, e.g., in the field of evolutionary psychology or neo-Darwinism, such as in copying products. These are interwoven with comments, e.g., on techniques for testing differences and similarities, using morphometry (see subsection III.2). In the latter context, it should be noted that the first attempts of using a morphometric approach were made by a Polish-German team with the participation of J. M. Burdukiewicz at the beginning of the 1980s. However, both these and subsequent efforts to use metric features did not apply to blades. In relation to the geometric-morphological (not morphometric) method, it should be added that it analyses the shape, intentionally ignoring dimensions. This applies to both the Procrust approach and the Fourier transformation.

In Chapter Four, the Author presents a chronological perspective of the sites discussed that exhibits her extensive knowledge about the construction and interpretation of radiocarbon date lists. It seems, however, that some comments, e.g., on the history of the development of the radiocarbon method, could have been slightly shortened without harming the presentation of the Author's main arguments. In addition, it would have been good to have seen an attempt to build a uniform Bayesian model for most of the numerical data collected to see if the ranges extracted were still so well readable in this perspective.

Another minor criticism concerns some of the information in the section on stone raw materials (V.4), which refers to Lower Silesian quartzites (probably Bolesławiec deposits), this reviewer considers that they should not have been included due to the lack of features allowing their controlled fracture. It should also be added that in the analysis of the chocolate flint outcrops, the discovery of similar raw materials in the vicinity of Wolbrom (northern part of the Polish Jura) should also have been taken into account. The Author's interesting idea regarding the numerical composition of tool assemblages in a chronological perspective are certainly noteworthy. The book's Author has noticed some trends. In this reviewer's opinion, the numerical representation of some tools considered as ad hoc forms could be evidence of a greater stability of groups, but it is not clear if this is a good measure of the group's chronology, even in relative terms. However, this is a matter for further research.

In summary, this monograph is one of the first attempts to recreate the dynamics of the Federmesser culture community in such a broad perspective. The work presents a number of new ideas that testify to the solid and thorough research conducted by its Author of numerous data sets from many regions of Europe. The work is provided with rich, thoroughly prepared illustrative material and extensive supporting literature and a catalogue of material. Due to these features, this monograph has already become one of the more frequently cited works of archaeologists dealing with the older Stone Age.

Translated by Paul Barford