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LATE PREHISTORY OF THE NILE BASIN AND THE SAHARA

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[Vol. 1.] Origin and early development of food-producing cultures in North-eastern Africa. Poznań 1984
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Cover

Petroglyph depicting a boat and humans, found in Wadi Abu Wasil (Egyptian Eastern Desert). After H. A. Winkler, Rock Drawings of Southern Upper Egypt I, Pl. XXXVII, 51. London: The Egypt Exploration Society, 1938

**LATE PREHISTORY
OF THE NILE BASIN
AND THE SAHARA**

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STUDIES IN AFRICAN ARCHAEOLOGY

Vol. 2

POZNAŃ ARCHAEOLOGICAL MUSEUM

LATE PREHISTORY OF THE NILE BASIN AND THE SAHARA

Edited by

LECH KRZYŻANIAK

and

MICHAŁ KOBUSIEWICZ

Poznań 1989

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Co-Editor
WOJCIECH ŚMIGIELSKI

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Dymaczewo near Poznań, 11 - 15 September, 1984

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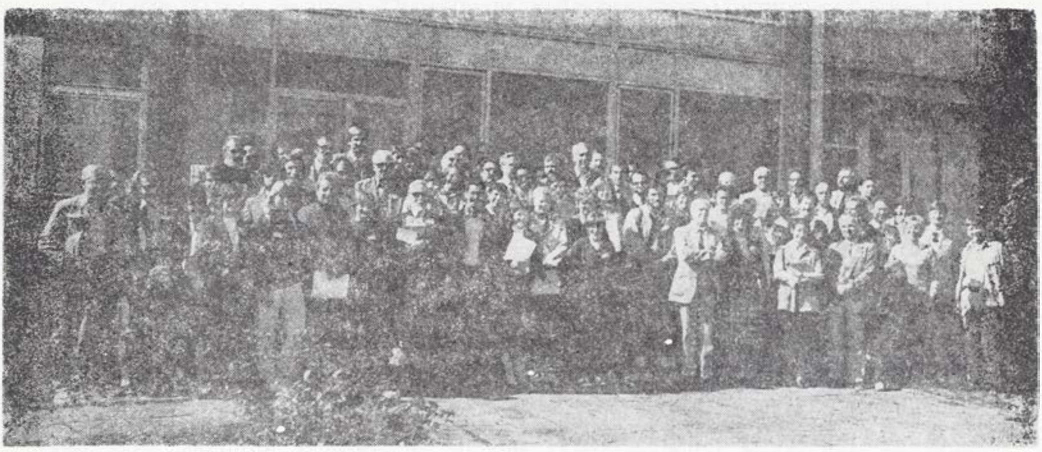
From the Organizers and Editors

The programme of this symposium has been planned as a logical extension of that held here in Dymaczewo in 1980 and devoted to the origins of the domestication of plants and animals in north-eastern Africa. While we all thought that it would be useful to hold another symposium in four years' time oriented to some extent towards the same subject we also felt that it should be open to other topics stemming from recent research on the later prehistory of this part of Africa. These



Members of the Symposium

Proceedings contain the papers read at the symposium in 1984 or submitted to us by those who were not able to attend it in person. We hope that their publication constitutes a contribution to a better understanding of later prehistory of the Nile Basin and the Sahara.

At the closing session of the 1984 symposium it was decided to meet again in 1988. Yet undoubtedly the most important decision then taken was the creation of the International Commission of the Later Prehistory of North-Eastern Africa, with Professor J. Desmond Clark as its Patron and Professor Fred Wendorf as its President. The Commission will help us in organizing an appropriate forum to discuss our research, exchange information and to coordinate our fieldwork and other research on the later prehistory of the north-eastern Africa.

The Organizing Committee

Chairman	Deputy Chairman
Lech Krzyżaniak	*Michał Kobusiewicz*

List of Participants in the Symposium

1. Joanna Aksamit. Polish Centre of Miditerranean Archaeology, 14 Baron Empain, Heliopolis, Cairo, Egypt
2. Albert J. Ammerman. Department of Anthropology, Colgate University, Hamilton, New York, USA
3. El-Anwar A. Magid Osman. Historical Museum, University of Bergen, 5014 Bergen, Norway
4. Zoheir Hassan Babiker. Department of Archaeology, University of Khartoum, P. O. Box 321, Khartoum, Sudan
5. Monika Baur. Institut für Ur-und Frühgeschichte, Universität zu Köln, Weyertal 125, D-5000 Köln 41, Federal Republic of Germany
6. John R. F. Bower. Department of Sociology and Anthropology, 103 East Hall, Iowa State University, Ames, Ia 50011, USA
7. Steven A. Brandt. Department of Anthropology, University of Georgia, Athens, Georgia 30602, USA
8. Burckhard Brentjes. Martin-Luter-Universität, Universitätplatz 12, 402 Halle, German Democratic Republic
9. Helga Brentjes. 1156 Berlin, Eberhardstrasse 3, German Democratic Republic
10. Peter Breunig. Institut für Ur-und Frühgeschichte, Universität zu Köln, Weyertal 125, D-5000 Köln 41, Federal Republic of Germany
11. Isabella Caneva. Dipartimento di Scienze Storiche, Archeologiche e Antropologiche dell Antichità, Sezione di Paletnologia, Università di Roma, Via Palestro 63, 00185 Roma, Italy
12. Maria Casini. Dipartimento di Scienze Storiche, Archeologiche e Antropologiche dell Antichità, Sezione di Paletnologia, Università di Roma, Via Palestro 63, 00185 Roma, Italy
13. Marek Chłodnicki. Muzeum Archeologiczne, ul. Wodna 27, 61-781 Poznań, Poland

14. Waldemar Chmielewski. Instytut Archeologii, Uniwersytet Warszawski, ul. Widok 10, 00-023 Warszawa, Poland

15. Krzysztof Ciałowicz. Instytut Archeologii, Uniwersytet Jagielloński, ul. Gołębia 11, 31-007 Kraków, Poland

16. J. Desmond Clark. Department of Anthropology, University of California at Berkeley, Berkeley, Ca 94720, USA

17. Angela E. Close. Department of Anthropology, Southern Methodist University, Dallas, Texas 75275, USA

18. Erwin Cziesla. Institut für Ur-und Frügheschichte, Universität zu Köln, Weyertal 125, D-5000 Köln 41, Federal Republic of Germany

19. Maria Dardas. Muzeum Archeologiczne, ul. Wodna 27, 61-781 Poznań, Poland

20. Andrzej W. Daszewski. Polish Centre of Mediterranean Archaeology, 14 Baron Empain, Heliopolis, Cairo, Egypt

21. T. Dzierżykray-Rogalski. Institute of Extraeuropean Countries, Polish Academy of Sciences, ul. Nowy Świat 72, Warszawa, Poland

22. Grażyna Effenberg. Polish Academy of Sciences, Poznań Branch, Mielżyńskiego 27/29, Poznań, Poland

23. Eva Eggebrecht. Am Backhaus 3, D-3207 Hönnersum, Federal Republic of Germany

24. Arne Eggebrecht. Roemer-und Pelizaeus-Museum, Am Steine 1 - 2, D-3200 Hildesheim, Federal Republic of Germany

25. Erika Endesfelder. Department of Egyptology and Sudan Archaeology, Humboldt University Berlin, 1040 Berlin, Reinhardstrasse 7, German Democratic Republic

26. Rodolfo Fattovich. Dipartimento di Studi e Ricerche su Africa e Paesi Arabi, Istituto Universitario Orientale, Piazza S. Giovanni Maggiore 30, 80134 Napoli, Italy

27. Ursula Francke. Institut für Ur-und Frühgeschichte, Universität zu Köln, Weyertal 125, D-5000 Köln 41, Federal Republic of Germany

28. Alicja Gałęzowska. Muzeum Archeologiczne, ul. Wodna 27, 61-781 Poznań, Poland

29. Achilles Gautier. Laboratorium voor Paleontologie, Rijks Universiteit te Gent, Krijgslaan 281, B-9000 Gent, Belgium

30. Francis Geus. Section Française de la Direction des Antiquités du Soudan, Sudan Antiquities Service, P. O. Box 178, Khartoum, Sudan

31. Bolesław Ginter. Instytut Archeologii, Uniwersytet Jagielloński, ul. Gołębia 11, 31-007 Kraków, Poland

32. Fekri A. Hassan. Department of Anthropology, Washington State University, Pullman, Washington 99164, USA
33. Randi Haaland, Historical Museum, University of Bergen, 5014 Bergen, Norway
34. Thomas Hays. North Texas Archaeology Laboratory, P. O. Box 952, Denton, 76201, USA
35. Diane Holmes. Institute of Archaeology, University of London, 31-34 Gordon Square, London WCIH OPY, Great Britain
36. Rostislav Holthoer. Institute of Egyptology, Uppsala University, Gustavianum, S-752-20 Uppsala, Sweden
37. Stefan Jakobielski. Centre of Mediterranean Archaeology, Polish Academy of Sciences, Pałac Kultury i Nauki, Warszawa, Poland
38. Dobrochna Jankowska. Instytut Prahistorii, Uniwersytet im. Adama Mickiewicza, ul. Marchlewskiego 124/126, Poznań, Poland
39. Jacek Kabaciński. Zakład Archeologii Wielkopolski IHKM PAN, ul. Zwierzyniecka 20, 60-814 Poznań, Poland
40. Birgit Keding. Institut für Ur-und Frühgeschichte, Universität zu Köln, Weyertal 125, D-5000 Köln 41, Federal Republic of Germany
41. Zsolt Kiss. Centre of Miditerranean Archaeology, Polish Academy of Sciences, Pałac Kultury i Nauki, 00-901 Warszawa, Poland
42. Frank Klees. Institut für Ur-und Frühgeschichte, Universität zu Köln, Weyertal 125, D-5000 Köln 41, Federal Republic of Germany
43. Else J. Kleppe. Historical Museum, University of Bergen, 5014 Bergen, Norway
44. Michał Kobusiewicz. Zakład Archeologii Wielkopolski IHKM PAN, ul. Zwierzyniecka 20, 60-814 Poznań, Poland
45. Hanna kóčka-Krenz. Instytut Prahistorii, Uniwersytet im. Adama Mickiewicza, ul. Marchlewskiego 124/126, Poznań, Poland
46. Janusz K. Kozłowski. Instytut Archeologii, Uniwersytet Jagielloński, ul. Gołębia 11, 31-007 Kraków, Poland
47. Halina Królik, Instytut Historii Kultury Materialnej PAN, ul. Świerczewskiego 105, 00-140 Warszawa, Poland
48. Lech Krzyżaniak. Muzeum Archeologiczne, ul. Wodna 27, 61-781 Poznań, Poland
49. Rurolph Kuper. Institut für Ur-und Frügeschichte, Universität zu Köln, Weyertal 125, D-5000 Köln 41, Federal Republic of Germany
50. Jean Leclant. Institut de France, Academie des Inscriptions et Belles-Lettres, 23 Quai de Conti, Paris 75006, France

51. JADWIGA LIPIŃSKA. Muzeum Narodowe, Al. Jerozolimskie 3, 00-495 Warszawa, Poland
52. LEWIS E. MACNAUGHTON. P. O. Box 221, McKinney, Texas 75069, USA
53. EWA MADEYSKA. Instytut Botaniki PAN, ul. Lubicz 46, 31-512 Kraków, Poland
54. ANTHONY E. MARKS. Department of Anthropology, Southern Methodist University, Dallas, Texas 77275, USA
55. MARK A. MILBURN. Frobenius-Institut, Liebigstrasse 39, 6000 Frankfurt /M1, Federal Republic of Germany
56. ANTHONY J. MILLS. Trencreek, Blisland, Bodmin, Cornwall, Great Britain
57. SHARON MÜLLER. Institut für Ur-und Frühgeschichte, Universität zu Köln, Weyertal 125, D-5000 Köln 41, Federal Republic of Germany
58. ALFRED MUZZOLINI. 7 Rue de Resseguier, 31000 Toulouse, France
59. KAROL MYŚLIWIEC. Centre of Mediterranean Archaeology, Polish Academy of Sciences, Pałac Kultury i Nauki, 00-901 Warszawa, Poland
60. KATHARINA NEUMANN. Botanisches Institut der Universität zu Frankfurt, Siesmayerstrasse 70, 6000 Frankfurt/M 11, Federal Republic of Germany
61. ALESSANDRA NIBBI. 13 Lovelance Road, Oxford, Great Britain
62. JACEK NOWAKOWSKI. Wojewódzki Konserwator Zabytków, Rynek 18, 61-100 Leszno, Poland
63. IWONA OKUNIEWSKA-NOWACZYK. Zakład Archeologii Wielkopolski IHKM PAN, ul. Zwierzyniecka 20, 60-814 Poznań, Poland
64. PAUL DE PAEPE. Laboratory of Geology, State University of Ghent, Krijgslaan 281, 9000 Ghent, Belgium
65. ETIENNE PAULISSEN. Laboratorium voor Prehistorie, Katholieke Universiteit te Leuven, Redingenstraat 16 bis, 3000 Leuven, Belgium
66. MACIEJ PAWLIKOWSKI. Zakład Mineralogii i Geochemii, Instytut Geologii i Surowców Mineralnych, Akademia Górniczo-Hutnicza, Al. Mickiewicza 30, Kraków, Poland
67. JORIS PETERS. Laboratorium voor Paleontologie, Rijks Universiteit te Gent, Krijgslaan 281, 9000 Gent, Belgium
68. ELŻBIETA PROMIŃSKA. Institute of Extraeuropean Countries, Polish Academy of Sciences, Pałac Staszica, ul. Nowy Świat 72, Warszawa, Poland
69. EWA RAJKOWSKA. Muzeum Archeologiczne, ul. Wodna 27, 61-781 Poznań Poland
70. JÜRGEN RICHTER. Institut für Ur-und Frühgeschichte, Universität zu Erlangen, Kochestrasse 4, 8520 Erlangen, Federal Republic of Germany
71. MARCIN ROSZCZYK. Akademia Sztuk Pięknych, Warszawa, Poland

72. CATHERINE SAYSSET. 36 Rue Daubenton, 75005 Paris, France
73. ROMUALD SCHILD. Instytut Historii Kultury Materialnej PAN, ul. Świerczewskiego 105, 00-140 Warszawa, Poland
74. PETER SHINNIE. Department of Archaeology, University of Calgary, Alberta T6G 2H4, Canada
75. SYLVIA R. SCHOSKE. Staatliche Sammlung Ägyptischer Kunst, Meiserstrasse 10, 8000 München 2, Federal Republic of Germany
76. WERNER SCHÖN. Institut für Ur-und Frühgeschichte, Universität zu Köln, Weyertal 125, D-5000 Köln 41, Federal Republic of Germany
77. ANDREW B. SMITH. 7 Dumbuie Avenue, Dumbarton, Scotland G82 25H, Great Britain
78. EWA STELMACHOWSKA. Muzeum Archeologiczne, ul. Wodna 27, 61-781 Poznań, Poland
79. JOHN E. G. SUTTON. British Institute in Eastern Africa, P. O. Box 30710 Nairobi, Kenya
80. ZBIGNIEW SZAFRAŃSKI. Instytut Archeologii, Uniwersytet Warszawski, ul. Widok 10, Warszawa, Poland
81. JACQUES TIXIER. Préhistorie URA 28, Centre de Recherches Archeologiques, C.N.R.S., 1 Place Aristide Briand, 92190 Meudon, France
82. SAVA TUTUNDŽIĆ. Department of Archaeology, University of Beograd, Čika Ljubina 18 - 20, 11000 Beograd, Yugoslavia
83. WILLEM VAN NEER. Laboratorium voor Prehistorie, Katholieke Universiteit te Leuven, Redingenstraat 16 bis, 3000 Leuven, Belgium
84. PIERRE M. VERMEERSCH. Laboratorium voor Prehistorie, Katholieke Universiteit te Leuven, Redingenstraat 16 bis, 3000 Leuven, Belgium
85. FRED WENDORF. Department of Anthropology, Southern Methodist University, Dallas, Texas 75275, USA
86. ROBERT WENKE. Department of Anthropology, University of Washington, Seattle, Washington 98195, USA
87. DIETRICH H. WILDUNG. Staatliche Sammlung Ägyptischer Kunst, Meiserstrasse 10, D-8000 München 2, Federal Republic of Germany
88. MAŁGORZATA WINIARSKA. Muzeum Archeologiczne, ul. Wodna 27, 61-781 Poznań, Poland
89. ANNALISA ZARATTINI. Soprintendenza Archeologica per Il Lazio, Via Pompeo Magno 2, 00192 Roma, Italy

List of those who were not able to attend and submitted their papers for publishing in the Proceedings of the Symposium

1. ABBAS S. A. MOHAMMED ALI. Department of Archaeology, University of Khartoum, P. O. Box 321, Khartoum, Sudan
2. ABDEL RAHIM M. KHABIR. Department of Archaeology, University of Khartoum, P. O. Box 321, Sudan
3. AHMED M. ALI HAKEM. Department of Archaeology, University of Khartoum, P. O. Box 321, Khartoum, Sudan
4. KIMBALL M. BANKS. Bureau of Indian Affairs, Forestry, P. O. Box M, Window Rock, AZ 86515, USA
5. BARBARA BARICH. Istituto di Paletnologia, Università di Roma, Via Palestro 63, Roma 00185, Italy
6. CLAUDIO BAROCAS. Dipartimento di Studi e Ricerche su Africa e Paesi Arabi, Istituto Universitario Orientale, Piazza S. S. Giovanni Maggiore 30, 80134 Napoli, Italy
7. DOUGLAS J. BREWER. Laboratory of Anthropology, Department of Anthropology, University of Illinois at Urbana-Champaign, 109 Davenport Hall, 607 South Mathews Avenue, Urbana, Il 61801, USA
8. HUGH DOGGETT. 15 Bandon Road, Girton Cambs CB3 OLU, Great Britain
9. WILLIAM I. EDWARDS. Victoria College, Burwood Campus, 221 Burwood Highway, Burwood, Victoria, Australia
10. VICTOR M. FERNÁNDEZ. Departamento de Prehistoria, Universidad Complutenses de Madrid, Ciudad Universitaria, Madrid, Spain
11. MARCELLA FRANGIPANE. Istituto di Paletnologia, Università di Roma, Via Palestro 63, 00185 Roma, Italy
12. MICHAEL A. HOFFMAN. Earth Sciences and Resources Institute, University of South Carolina, Columbia, South Carolina 29208, USA
13. COLIN A. HOPE. University of Melbourne, Parkville, Victoria, Australia 3052
14. JAN JELÍNEK. Antropos Institute, Moravian Museum, nám. 25 února 7, 65937 Brno. Czechoslovakia
15. RICHARD MATSON. Department of Anthropology, Washington State University, Pullman, Washington 99164, USA
16. ALBA PALMIERI. Istituto di Paletnologia, Università di Roma, Via Palestro 63, Roma 00185, Italy
17. MAURIZIO TOSI. Dipartimento di Studi Asiatici, Istituto Universitario Orientale, Piazza S. Giovanni Maggiore 30, 80134 Napoli, Italy

Opening Address

Ladies and Gentlemen,

On behalf of the Archaeological Commission of the Poznań Branch of Polish Academy of Sciences I have the honour to open the international symposium on "Late Prehistory of the Nile Basin and the Sahara".

I welcome very warmly Professor Jerzy Topolski, the Member of the Presidium of Polish Academy of Sciences, Poznań Branch, Professor Jan Żak, the President of our Archaeological Commission, and all other members of the Commission present here. I welcome with all my heart all our foreign guests from thirteen countries, that is from: Belgium, Canada, France, the Federal Republic of Germany, the German Democratic Republic, Great Britain, Italy, Norway, the Sudan, Sweden, Tchechoslovakia, the United States of America and Yugoslavia. I would also like to give a warm welcome to our Polish colleagues and friends from several academic centres of our country.

Among more than eighty participants we are entertaining today not only prehistorians but also egyptologists, nubiologists and meroitists as well as scholars representing the archaeobiological and archaeogeographical sciences which are of so great importance for our research. We hope that such a multidisciplinary composition of our group will be very helpful for our debates aimed at a better understanding of the late prehistory and early history of North-Eastern Africa.

Our symposium devoted to the African prehistory is the second organized by our Archaeological Commission. The first one, as many of you probably will remember, took place four years ago, also in Dymaczewo near Poznań. I would like to emphasise how happy we are to welcome all of you once more, as well as the participants who have come to Dymaczewo for the first time, and I would like to express our hope that the conference will be a useful and fruitful one.

Michał Kobusiewicz
Deputy Chairman
Archaeological Commission
of Polish Academy of Sciences
Poznań Branch

Opening Address

Ladies and Gentlemen,

On behalf of the Archaeological Commission of the Poznań Branch of Polish Academy of Sciences I have the honour to open the international symposium on "Late Prehistory of the Nile Basin and the Sahara".

I welcome very warmly Professor [illegible], the Member of the Presidium of Polish Academy of Sciences, Poznań Branch, Professor Jan Żak, the President of our Archaeological Commission, and all other members of the Commission present here. I welcome with all my heart all our guests from different countries, that is from Belgium, Canada, France, the Federal Republic of Germany, the German Democratic Republic, Great Britain, Italy, Norway, the Sudan, Sweden, Czechoslovakia, the United States of America and Yugoslavia. I would also like to greet a number of Polish scholars and guests from several scientific centres of our country.

[illegible]

This symposium is devoted to the African prehistory [illegible] by our Archaeological Commission. [illegible] as many of you probably will remember, [illegible] I would like to emphasize [illegible] I am happy we are to welcome all of you here, as well as the participants [illegible] I would like to express the hope that the conference will be a useful and fruitful one.

Michał Kobusiewicz
[illegible]
Archaeological Commission
of Polish Academy of Sciences
Poznań Branch

[illegible]

ALBERT J. AMMERMAN

The use of Landsat imagery for reconnaissance work in the Sahara

One of the more fascinating research problems for both the archaeologist and the human ecologist at the present time concerns the origins of the Neolithic in the Sahara (Wendorf and Schild 1980; Clark and Brandt 1984). Already by the 8th millennium B.C., for example, there appears to be evidence in the Bir Kiseiba region of the Western Desert of Egypt for a Neolithic complex which includes cattle pastoralism and pottery (Connor 1982; Wendorf *et al.* 1984). What were the forms of cultural adaptation in the Sahara that made occupation of this part of the world possible during the early Holocene? In order to answer this important question, we probably first need to have a better idea of what local conditions were like in the Sahara at the time (Williams and Faure 1980). This report is meant to draw attention to a line of environmental study, the use of Landsat imagery, whose potential has remained to date essentially untapped. Given the inherent difficulties that are normally involved in doing fieldwork in the desert, Landsat imagery may also prove to be of considerable use when it comes to the planning and conduct of archaeological surveys in the Sahara.

Examples of Landsat imagery will be presented for two regions of the Sahara: the Tadrat Acacus in Libya and Bir Kiseiba in Egypt. Specifically, the aim of this report will be to illustrate how Landsat images can be used in three ways: a) to provide environmental information on a region, b) to aid in the planning of reconnaissance work, and c) to aid in the mapping of sites and other features of the landscape during the course of surveys. While Landsat "paper products", photographic prints which present in summary form the information contained on Landsat tapes, have seen some previous use in Saharan archaeology, very little use had been made up to the time that our work started in January 1982 of the much more detailed images which can be obtained when the tapes are processed in a remote sensing laboratory. The comment should perhaps be made here that the delay in the Sahara basin contrast with the situation in the southwestern part of the United States where Landsat images were already in wider use (Lyons *et al.* 1980). One of the reasons for this would be the equipment that is required for a remote sensing laboratory. Another would be a more general lack of familiarity with developments in the field of remote sensing.

The study was done in collaboration with Prof. R. Lyon, who is in charge of the Remote Sensing Laboratory in the Department of Applied Earth Sciences at Stanford University. For a basic account of Landsat technology and also a description of image processing in the context of archaeological studies, reference is made here to various publications by the National Park Service (*e.g.*, Lyons and Avery 1977; Lyons 1981; Ballew and Lyon 1977). Desert areas of the world offer favourable conditions for Landsat imagery, since there are often times when an image can be taken with almost no cloud cover. This is one of the main factors to consider in the selection of a Landsat tape. The tape selected for the Tadrat Acacus region was that taken on 6 November 1972. In the case of the Bir Kiseiba region, the date was 20 February 1976. The whole area covered by a Landsat tape measures 180 km on a side. Displayed as a false colour image on a television screen (with its rectangular format), one can obtain scenes such as the 60×90 km image shown in Fig. 2. Different areas can further be enlarged on the screen down to a size of about 6.7×10 km, at which point the grain of individual pixels has begun to obscure the overall image. Good detail and resolution are provided by scales in the range from 10×15 km to 20×30 km on the television screen. On the system at Stanford, one of the ways to examine a tape is to scroll over the region at such a scale. In terms of what is seen on the screen, it is as if one were floating slowly over the region in a hot air balloon, looking down on different parts of the whole scene.

There are several ways in which the images that appear on the television screen can be recorded. One of these is by taking coloured slides of the images on the screen. Before taking a slide, it is possible to introduce notes and symbols on the screen (*i.e.*, over the image) by means of a computer program. In our case, a series of 35 mm slides was made for each of the regions. The slides are particularly useful for study purposes, since they can be projected as large images using a conventional slide projector. Another possibility is to make coloured photographic prints directly from the images seen on the television screen. Such prints may offer certain advantages for purposes of eventual publication. It is clearly unfortunate that so much is lost when the false colour images are printed in black and white as is often necessary for publications. A third possibility is to make maps in black and white where the values of pixels are displayed according to a grey scale using a dot printer. Several examples of geometrically corrected maps at a scale of 1 : 25,000 were made for selected areas in the Tadrat Acacus. For educational purposes, we also decided to make a videotape (on a Betamax recorder) of a session in which one of the Landsat tapes was examined. This was done with the aim of illustrating for the non-specialist how this kind of work is actually done. As one scrolls over the region, a running commentary is given on various things that the images reveal such as the occurrence of faults (and their implications for hydrology), large dune fields (and their implica-

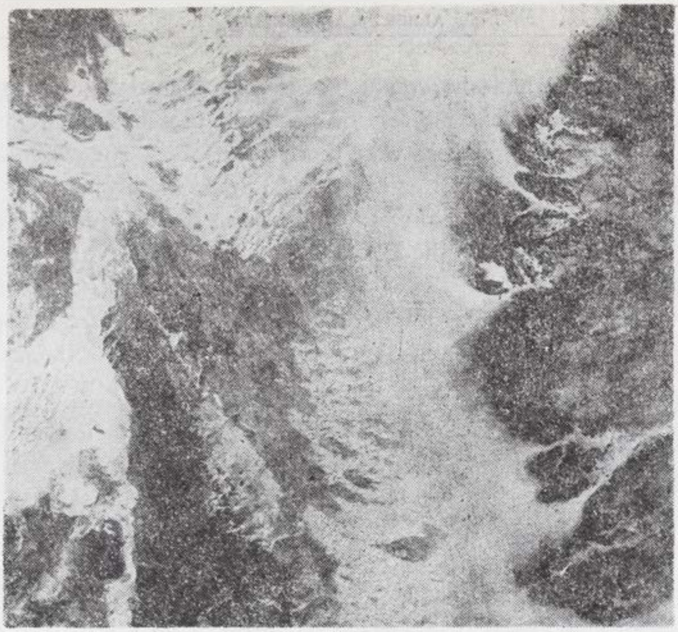


FIG. 1. Landsat image of the Tadrat Acacus region of Libya. It shows the whole area covered by the Landsat tape. The image measures 180 km on a side. The geographic coordinates of the center of the image are given in the text

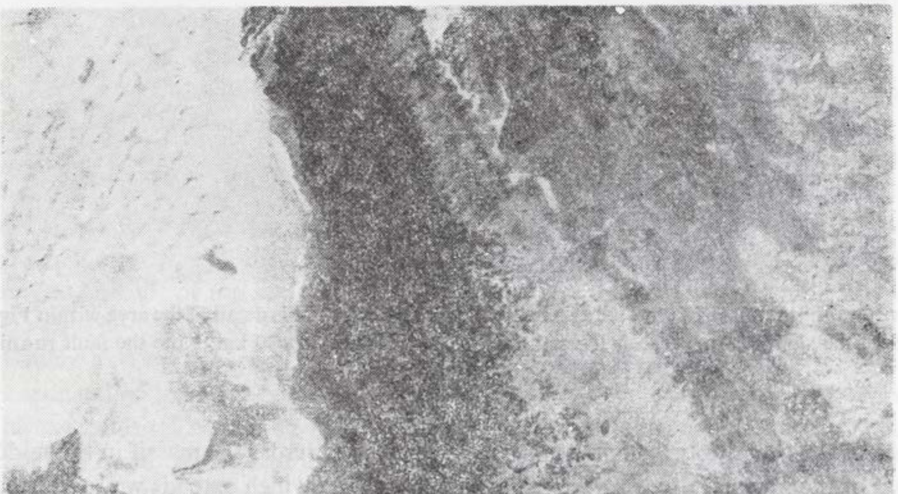


FIG. 2. Landsat image of the Tadrat Acacus region of Libya. This is a detail of the left side of Fig. 1. The image measures 60 × 90 km. The massif appears in the darker colours here and runs essentially in a N-S direction

tions for site visibility and the conduct of archaeological fieldwork), and playa sediments (and their implications for the potential presence of prehistoric sites).

The first images to be processed were those from Libya. The whole scene for the Tadrat Acacus study, whose center is located approximately at 11°0′ E, 25°45′N, is shown in Fig. 1. Archaeological research has been carried out in this part of the Fezzan (Fig. 2) by a team from the University of Rome for more than twenty years (Mori 1965). Of particular interest in our case is the site of Ti-n-Torah which has produced levels with microlithic tools dating to the early part of the Holocene (Barich 1978). The rock shelter is located in a Wadi on the eastern side of the massif (Fig. 3).

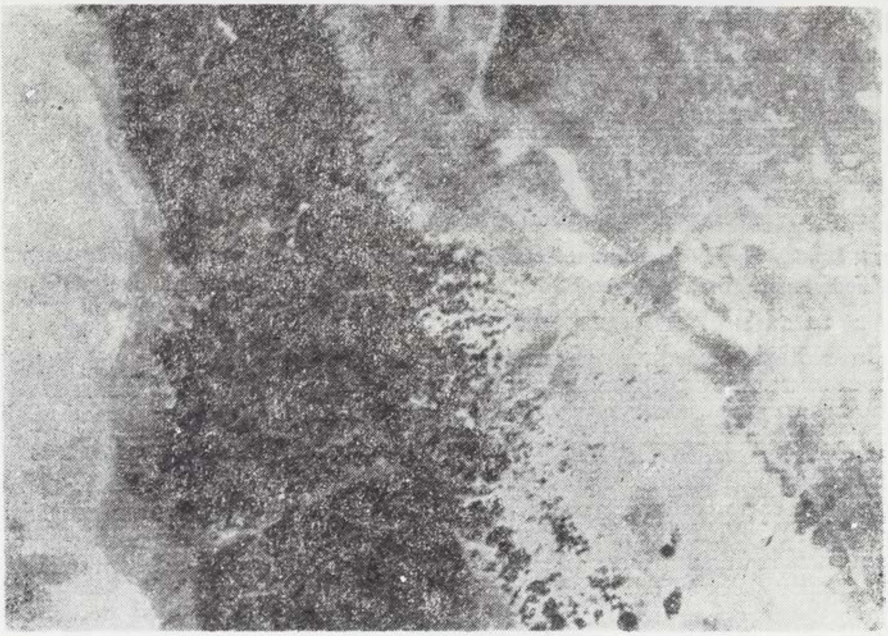


FIG. 3. Landsat image of the Tadrat Acacus region of Libya. In this detail of the area within Fig. 2 where the site of Ti-n-Torah is located, the image measures 20 × 30 km. Note the fault running in an E-W direction through the massif

One of the things to note here is the fault which runs across the massif in the middle part of the image. In terms of hydrology, such a fault which extends well to the east of the massif would be conducive to the occurrence of spring lines on this side of the massif. The fault also produces a pathway for movement by human groups in an east-west direction across the rugged relief of the massif. The Landsat images also indicate that the slopes on the east side of the massif are in general less steep than those on the west side – with the suggestion being that the drainage may be more favourable in terms of potential for human settlement on the east side. Notwith-

FIG. 4. Landsat image of the Bir Kiseiba region of Egypt. The Kiseiba Basin with its sequence oj playa sediments is located to the south of central part of the image

standing these observations, it would seem to be well worth while looking for open air sites on the west side of the massif at its outer edge.

The other series of images to be processed was that from Bir Kiseiba. Only one image from this study (Fig. 4) will be presented here. Others have appeared in a recent publication (Wendorf *et al.* 1984 : Fig. 3 : 5). In Fig. 4, the place known as Two Hills (after two promenient conical outliers along the scarp) is located immediately to the left of the scale on the east side of the Kiseiba scarp. This Landsat image can be compared directly with the one for the same area presented by McCauley and co-workers (1982 : Fig. 8) in their Shuttle Radar study. Located approximately 5 km to the south of the right end of the scale is the area where five prehistoric sites (E-79-8, E-80-1, E-80-2, E-80-3 and E-80-4) have been investigated. These sites occur in the central portion of the Kiseiba Basin where a sequence of playa silt pans are observed. Site E-79-8 appears to be the earliest one in date and has produced a group of six C-14 determinations which fall in the range between 9,840 and 8,920 B.P. This site also yielded a good sample of faunal remains which included a small proportion of *Bos* (Gautier 1980). For our purposes here, it is worth noting that the playa sediments in this area of the Bir Kiseiba region show up as a distinctive colour (in comparison with other rock and dune surfaces in the region) on the Landsat imagery. It should be added that in the Shuttle Radar study (McCauley *et al.* 1982) ground control as seen in pit A which was dug in a nearby area confirmed the presence of alluvium. The more general point that needs to be made here is that remote sensing provides a means for recognizing areas with playa sediments within the Sahara. Since such areas seem to be attractive ones for early occupation, we may have a useful tool for guiding reconnaissance work in this part of the world.

In bringing this report to a close, it is worth briefly reviewing the three ways mentioned earlier in which Landsat imagery can be used for archaeological research in the Sahara. It should be added here that these three ways by no means exhaust all the possible uses of Landsat imagery. In terms of our knowledge of environmental conditions, the Landsat images would definitely seem to give us a chance to gain a sense of what the terrain is like in a given area of the Sahara before we ever go there. The images also help to place known sites in a wider regional context. A prime example here would be the site of Ti-n-Torah in the Tadrat Acacus. It is located on the eastern fringe of the massif and close to a place where there appears to be a line of movement in an east-west direction from one side of the massif to the other. If early Holocene adaptations in the Sahara involved a semi-mobile way of life, which was oriented in part to chasing rainfall as it occurred locally over the landscape (Smith 1984), then we could now acquire a better understanding of the favourable location of Ti-n-Torah. This line of interpretation would also encourage us to look for sites occupied perhaps on a more short term basis within the line of movement created by geological faulting. This brings us to the use of Landsat images in the planning of reconnaissance work in the Sahara. Another example that was mentioned above would be the identification of areas with playa sediments. A third example related to reconnaissance would concern the avoidance of areas with extensive dune covers. Finally, there is the possibility of using Landsat generated maps for recording the locations of sites during the course of survey work. This could be done in cases such as the Fezzan where there is a lack of aerial photographs or geographic maps at an adequate scale. The problem of recording the locations of sites in different parts of a region with a rugged relief like that of the Tadrat Acacus can be a serious one. As mentioned above, it is possible using the Landsat tapes to generate geometrically corrected dot print maps at a scale of 1 : 25,000. Such maps now need to be tested in the field to see how well they actually work.

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HUGH DOGGETT

A suggested history of the crops common to Ethiopia and India

Few crop plant remains have been found by archaeologists: the reconstruction of crop history is, therefore, largely conjectural. In some places, excavations are fraught with difficulty. They are very unevenly distributed. Rivers such as the Nile and the Indus deposit vast quantities of silt in areas where archaeological research would be especially valuable. Some countries, such as Ethiopia, have received relatively little archaeological study covering sites relevant to the history of the last 10,000 years. There are few facts on which to base theories.

Biased opinions

Each individual brings personal biases to his presentation of a subject. The writer admits to three, doubtless there are many others. They have resulted from over 40 years of working in agriculture and agricultural research in the developing world.

1. The problem of how the idea of agriculture first arose has not been given sufficient thought. How did people who were seed gatherers get the idea not only of sowing seed, but also of cleaning a piece of land first, and of weeding the growing crop? Doubtless the non-shedding character (persistent spikelets) exists in most wild grass populations, and can be exposed by simple selection, as Harlan *et al.* (1973 : 311) found with *Andropogon hallii.* Supposing that a seed-gatherer found one such panicle: why should he think of sowing its seed? Why should anybody sow grass seed into land where there was already an abundance of grass seed anyway? How would he know that he must search for the particular type sown when the grass seed ripened? Why should he think of cleaning a piece of land in which to sow the seeds? Why should he mark the place where the seed was sown so that he kould weed around it? Why should he think of weeding anyway? The idea that a cnowledge of plant selection and agriculture could have arisen in rain-fed grassland

ab initio seems highly improbable. These difficulties in areas where the grass in question was a major constituent of the vegetation would have been accentuated. It is all too easy to assume the existence of the idea of agriculture.

A characteristic of the three oldest civilizations of the Old World is that they all arose along rivers: in due course, each spread out along its respective river valley for hundreds of miles (Fairservice 1971). Rivers and seasonal streams provide sites where the idea of cultivation may have emerged. Many patches of silt, exposed as the rains ended and the rivers fell, would have been weed-free at first. People gathering seeds of wild grasses for food, who also fished, could well have noticed that seed dropped on these patches sometimes grew into mature plants on residual moisture. From this, the use of sickles for harvesting would have favoured the variants with persistent spikelets. Gradually, the idea of sowing these riverine flats with seed so harvested, and replanting them the following season, would have led to the accumulation of non-shedding types. People would gradually have become accustomed to the regular discipline of seed-time and harvest on silt flats needing no land preparation and no weeding. This would have provided an additional resource: fishing, food--gathering, and hunting would have continued as before. Once seeding became an established practice, it is not difficult to imagine a gradual awakening of interest in crop improvement.

This reconstruction of possible origins of agriculture also provides an explanation for the way in which people became locked into the hard labour and drudgery involved. So long as people were using the natural resources of hunting, fishing and food gathering, the population could not increase beyond what those natural resources would carry. Improved harvesting and grass-seed processing technology made better use of the resource base, but did not enlarge it. Learning to seed the silt flats deliberately was a different matter. This enlarged the resource base, and provided a way to feed an expanding population. As the population grew, more silt flats could be seeded. In due course the population expanded beyond the point of no return. No longer were hunting, fishing and food-gathering sufficient. From then on, the pressures demanded the extension of irrigation, the preparation and weeding of land to imitate the conditions on the silt flats, leading on eventually to the development of rain-fed agriculture. For that, there was a basic crop husbandry to be learnt: clearing the land, tillage, the time and method of sowing, and weed control; all to be done initially with sticks and stone axes as the only tools.

There must have been incipient agriculturalists, who withdrew before they became locked into the drudgery of subsistence agriculture. Reed (1977a) drew attention to three coastal societies: the Natufians, who developed an agriculture; the people of the Ancon-Chillon region of Peru, who finally adopted an agriculture about which they had known for a thousand years; and the peoples of the north-west coast of North America, who retained their original way of life without recourse to agriculture.

The reason why anyone ever accepted dependence upon arable agriculture as a way of life is hard to understand. Hunter-gatherers have time for leisure, and seldom suffer from lack of food. It seems probable that early agriculture was developed initially as just one more food resource among several, and that gradually changing conditions resulted in some people becoming locked into the system (Reed 1977a; Redman 1978). It is difficult to imagine people walking into it knowingly.

Certainly the ancient scripture reads in this way. At the close of the golden age when Man had become disobedient, the Lord God said to him: "Because of what you have done, the ground will be under a curse. You will have to work hard all your life to make it produce enough food for you. It will produce weeds and thorns, and you will have to eat wild plants. You will have to work hard to make the soil produce anything, until you go back to the soil from which you were formed" (Genesis, 2). Few young people from the non-affluent world of today would willingly return to the drudgery of subsistence agriculture endured by their parents, even though they have the advantage over early agriculturalists of using steel axes and hoes.

2. The second belief is that an individual crop moved only a) at the very beginning of agriculture; b) when there were settled agriculturalists to whom it could be transferred; c) when it was an auxillary food source of a pastoral people. Many pastoral people adopted a cereal crop to feed those who could not move to the distant grazing grounds with the cattle in the dry season. The crop was often grown with minimum care and attention. The pastoral people took a pride in their cattle, not in their crops – they were not agriculturalists in any professional sense.

3. The third opinion held is that settled agriculturalists do not move until they are forced by circumstances to do so. They then take their technology and HYV's as a package with them, having first located the site which they consider suited to their crops and methods. Harlan *et al.* (1976), referring to the spread of agriculture to the west and to the east from West Asia, noted that: "What moved out of the nuclear area was a complete system including barley, emmer wheat, einkorn wheat, lentil, vetch, peas, chick-pea, fava bean, rape, flax, vegetables, spices, tree and vine fruits, sheep, goats, cattle and an array of agricultural techniques".

The origin of agriculture in West Asia

During the Pleistocene, the Mediterranean region had a cold dry steppe climate: The "Mediterranean climate" had been pushed southwards into Africa by the shifting storm-tracts. The boundary date for the return of the Mediterranean climate to its present location is set at around 11,000 b.p. The transitional date varied with location, but the earliest was around 14,000 b.p. During the period prior to 12,000 b.p., Zagros was intensely cold, and may have been vacated by man. The wild ancestral cereals, barley and einkorn and emmer wheats, may have been absent or rare in southwestern Asia. The continental-type steppe climate probably extended also to the highlands of Palestine, though not to the lowlands. Wild barley may well have occurred for some distance along the Nile, it is still to be found in Israel as well as along the coast near the river mouth. Both wild emmer and wild einkorn probably occurred commonly in southwest Palestine. At the beginning of the seventh millennium b.c., all three "cultivated" grains were being grown further east at Ali Kosh. Emmer wheat and barley were both being grown in Egypt about 4,500 B.C. They were also being grown at Beidha in southern Jordan around 7,000 B.C. The barley from Beidha did not have conjoint internodes, so was a "cultivated wild barley". The excavations at Jarmo have shown that this internode transition occurred around 6,500 B.C. The depth of the Nile silt prevents our obtaining a true picture of the situation in Egypt at that period.

Wendorf and his colleagues recorded indications of early food production along the Nile. They found a large cereal-type pollen, tentatively identified as barley, preserved in ephemeral ponds. This pollen suddenly increased in amount to between ten and fifteen percent near the top of the sequence. They found sites with numerous grinding stones north of Aswan, dating to 12,000 - 14,000 b.p. A site at Isna *ca* 12,000 years old, yielded grinding stones and sickle blades. Barley grains were discovered at Wadi Kubbaniya, but later these proved to be more recent intrusions. This should not be allowed to obscure the other indications of "grain" production, and population increase more than 10,000 years ago. (Helbaek 1966; Harlan and Zohary 1966; Wright 1976; 1977; Reed 1977b; Wendorf *et al.* 1979; Wendorf and Schild 1984).

People and languages in Northeast Africa

The people

A long-headed, long-faced people with narrow, high-nosed skulls has been present in the eastern African region since the later Pleistocene, perhaps going back to the Third Glacial (Howells 1960). Hiernaux (1974) referred to them as "Elongated East Africans" or "Elongated Africans". Eastern Africa was defined as the Sudan, Ethiopia, Somalia, Tanzania, Kenya, Uganda, Rwanda, and Burundi.

The languages

Greenberg (1963; 1973) demonstrated that a language group, Afroasiatic, arose in this area, and subsequently differentiated into six languages: Semitic, Berber, Ancient Egyptian, Cushitic, Omotic, and Chadic. Semitic spread into

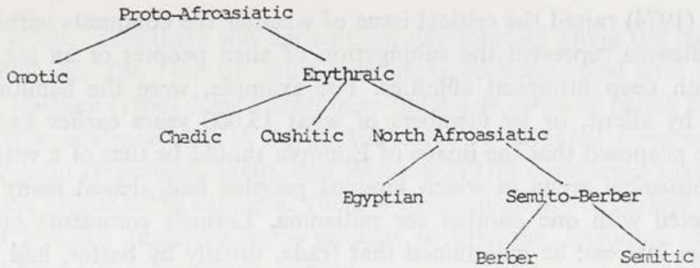

FIG. 1. Development of the Afroasiatic language family (from Ehret 1979)

Southwest Asia, and the Chad language spread across northern Africa, giving rise to a number of languages now spoken in that area, including Hausa. Ehret (1979) traced the development of this language family as shown in Fig. 1. The homeland of the speakers of proto-Afroasiatic was in Ethiopia, and extended very approximately on the western side from the Amba Farit mountains, past Lake Tana, almost as far as Lake Nasser on the Nile. On the eastern side it followed the shores of the Red Sea. The proto-Afroasiatic speakers lived at least 15,000 years ago: the time span for Cushitic covers some 7,000 - 9,000 years. Thus, this group of people who came to occupy Ethiopia, the Horn of Africa, Nubia, Egypt, and some areas of southwest Asia, spoke a common language at least 11,000 years ago, at the time when the Mediterranean flora was returning to its present locations. The people would have been able to understand each other for practical purposes, such as trade, more recently than that.

The Berbers and Chadic peoples had an important influence in North Africa: the Semitic branch furnished many names in the king-lists of the early Sumerian kings, and people from Mesopotamia were carrying their culture to India prior to 3,000 B.C. (Hawkes 1973; Piggot 1950).

Ethiopia

At one time, a romantic view was taken of Ethiopia, which was regarded as an ancient culture where many crop plants were ennobled. A reaction followed, and the view was put forward that agriculture in Ethiopia and the Horn was recent, much influenced by technology introduced from South Arabia.

The recognition that Ethiopia forms an important part of the region in which the Afro-Asiatic language developed has made the former view much the more probable. Ehret's (1979) language studies suggested that agriculture is old among at least some of the peoples using this language. He surmised that grass-seed collecting itself was invented in or near Lower Nubia, perhaps in the region between the Nile and the Red Sea, and spread from there to other areas. Simoons (1965) had earlier presented reasons for believing that agriculture was old in Ethiopia.

Levine (1974) raised the critical issue of whether the conquests within Ethiopia of past millennia represent the subjugation of alien peoples or an ingathering of peoples with deep historical affinities. For example, were the Semitic invasions incursions by aliens, or by members of what 15,000 years earlier had been one people? He proposed that the image of Ethiopia should be that of a vast ecological area and historical arena in which kindred peoples had shared many traditions, and interacted with one another for millennia. Levine's comments on trade are of particular interest: he maintained that trade, usually by barter, had constituted a major form of interaction within Ethiopia for thousands of years. Local pacts between warring factions were made, so that the markets were on neutral ground, undisturbed by fighting. Local markets dealt with regional markets, many Ethiopians would use more than one market. Trade caravans linking these markets are also old, utilising salt bars from the Afar desert and gold from the kingdom of Inarya in the southwest. Hallpike (1970; 1972) has written a perceptive and sometimes beautiful account of the Konso people, who still practise a very old agriculture.

Access to Ethiopia from the Nile is not difficult: it is possible to travel up the course of the Atbara, and up the course of the Blue Nile: also along the floor of the Abbay Trough. By 2,000 B.C., the Egyptians had established a trading post at Kerma in Nubia. Oliver and Fage (1962) stated that, from the beginning of the dynastic period at least, there was regular contact with the coasts of Eritrea, Somaliland, and southern Arabia, from where incense and myrrh were obtained. The former was important for the Egyptian religion: the latter essential for embalming the mummies. It is difficult to believe that Ethiopia was often isolated from the Nile. Sufficient information is now available for the onus of proving their case to be placed on those who maintain that Ethiopian culture and agriculture are relatively modern phenomena.

Annual crop development in Africa

There is no evidence at all for early cereal crop development prior to 1,000 B.C. in Africa other than in the north-eastern quadrant. At Kintampo, Ghana, the K6 site produced numerous cowpeas, which Flight (1976 : 212) considered were probably cultivated. The date was subsequent to 1,400 B.C. Munson (1976) suggested that the cultivated pearl millet found at Dhar Tichitt probably arrived there about 1,000 B.C., and he noted the absence of evidence for cultivation prior to 1,100 B.C. The Nok culture was probably based on agricultural production, but is unlikely to predate 1,100 B.C. (Fagg 1959 : 288). Shaw (1976 : 107; 1977) has gathered the available evidence for early annual crop agriculture in West Africa. It is likely that several of the Ethiopian crops had already reached India before 1,000 B.C., as will be discussed later, and so must have been developed in Africa well before that date.

The possibility that there was agricultural development along the Nile has been mentioned above. The Nile silt must hide many archaeological sites in northern Egypt and Helbaek (1966) drew attention to the whole series of barley forms grown on the early agricultural sites in Egypt. Helbaek also recorded *Hordeum irregulare* from the Fayum (Haelbaek, 1960), and Renfrew (1973) considered that this group seems to have originated in Ethiopia. There is a great diversity of barleys in Ethiopia. Harlan (1972) noted numerous forms peculiar to Ethiopia, including unique series of both *deficiens* and *irregulare* barleys.

According to Ethiopian tradition, barley is a very ancient crop in their country. We suggest that it may have been the first cereal crop in Ethiopia. It could have been carried there from Egypt. Alternatively, if "wild" barley was originally deliberately grown for some distance along the Nile and its tributaries, it may have been moved up into the hills, following the barley climate to higher altitudes as the general environment warmed up behind the northward movement of the Mediterranean climate.

Developments in the hills

Settled cultivators are sitting targets: after harvest, they have a stock of food which others would like to seize. The arable agriculturalists would have occupied defensive positions on the hills, although they may well have cultivated in the valleys as well, returning to their defended communities daily before nightfall.

These cultivators in the hills were caught between increasing population size on the one hand, and the climatic and ecological limitations of barley culture on the other. The latter pressure would have tended to increase as the climate became warmer and drier, and population numbers increased. These early Ethiopian agriculturalists responded to these challenges in two ways: a) by domesticating new crops adapted to warmer or more difficult conditions than those suited to barley; b) by developing a more intensive agricultural system.

The crops

Crops that can survive well on difficult soils in the barley zone included niger seed (noug, *Guizotia abyssinica*), t'eff (*Eragrostis tef*), and linseed (*Linum usitatissimum*). Noug can grow on shallow and illdrained soils, and has the reputation of suppressing weeds and being a good precursor crop. T'eff grows better than other cereals on the thin, black, peaty soils to be found in the highlands: linseed is also a crop of difficult highland soils. It is interesting that local collections of these crops show no response to fertilizer treatment. Noug was almost certainly ennobled in Ethiopia. T'eff could well have originated from one of the preferred grasses of the grass seed collecting days, taken into cultivation as a result of knowledge of the principles of agriculture, and subjected for selection for persistent spikelets. To the casual observer, t'eff is a wild grass. Linseed could well have been introduced: the fibre (flax) was used by the Egyptians, especially for the fabric with which to bind the dead. Its putative ancestor, *L. angustifolium* is common in southern Europe and western Asia (Durrant 1976). In Ethiopia, linseed is an oilseed food crop, and like noug is widely grown by subsistence farmers in the highlands. There is much variability in Ethiopia, and also in India, where linseed is also a traditional oilseed food crop.

Tetraploid emmer wheat is an important highland crop, and also shows much variability, with forms peculiar to Ethiopia. The same combination of emmer and barley was found in ancient Egypt, going back to at least 4,500 B.C. It was probably introduced to Ethiopia at an early stage.

Two cereal crops extending from the highlands – usually rather below the "barley line" – to the lowlands, are finger millet (*Eleusine*) and sorghum. There is little doubt that finger millet was developed from *E. africana*. One archaeological find probably dates to the third millennium B.C. (Mehra 1962; 1963; Harlan 1969; Hilu and de Wet 1976; Phillipson 1977b; Hilu *et al.* 1979).

Harlan and Stemler (1976) suggested that African cereals agriculture originated south of the Sahara and north of the equator, with early cultivated sorghums (bicolor) arising in the southern Sudan-Chad region, spreading out and developing from these. The writer is not aware of any evidence to support this opinion. It seems more probable that sorghum arose in Ethiopia, as did a few other unquestionably old crops. In Ethiopia, there were skilled agriculturalists. Today, wild sorghums occur below 2,300 m. The crop could well have been ennobled in the valleys along water courses and in the upland fields of southwestern Ethiopia. Wild sorghum is commonly found as a weed in wheat fields in the 1600 to 1800 m belt between Debra Zeit and Nazareth, as well as further south. No doubt this is also true elsewhere in the country. The crop would have moved rapidly to the plains. Wetter conditions prevailed in those days, and the guinea race of sorghum, adapted to such conditions, would almost certainly have been the major race first developed, as Harlan and Stemler (1976) suggested. It has spread southwards to Malawi and beyond, eastwards to India. It moved westwards above the forest belt to the west coast of Africa – perhaps on the margins of Sutton's (1974) "aquatic culture". There, a secondary centre of variability developed. Today, guinea sorghums are found 200 miles further south, in the Sudan and Northern Uganda. Within Ethiopia, they are found in Konso, near the Sagan river in southwest Ethiopia. Occasional collections have been made in the western region, all of which showed high altitude adaptation when grown at Alamaya University in the Chercher highlands (Brhane Gebrekidan, personal communication 1982). It is probable that these occurrences in Ethiopia are relics of a former wider distribution there, under different climatic conditions.

The durra race probably arose from crosses between the early cultivated types and the wild *aethiopicum* race, which is very drought – tolerant and characterised by larger spikelets than the other wild forms. These sorghums are widespread in the drier areas of Ethiopia, and all intermediate stages from the wild type to the best high yielding durra types of the Chercher highlands are to be found in that country. Durras spread to West Africa along the southern fringe of the Sahara; to the drier parts of Tanzania in East Africa; and also to India. The only two races to reach India before the 18th century were guineas and durras.

Discoveries at Kadero, located 18 km north of the junction of the Blue and White Niles, and 6.5 km east of the main Nile channel, have thrown an interesting light on progress in the improvement of finger millet and sorghum. Numerous potsherds (about one metric ton) were obtained from two pits in the settlement, 300 pieces were selected by the excavator and given to Melania Klichowska to study (Krzyżaniak 1978; 1984; and personal communication 1985; Klichowska 1984). These carried impressions of threshed grains of sorghum and finger millet, among others. The mean dimensions of two groups of sorghum grains (15 and 11 impressions respectively) were 3.4×3.6 mm, and 3.7×3.4 mm. Twenty impressions of finger millet gave a mean of 2.1×2.0 mm. These dimensions are within the range of modern cultivars, and well outside those for the wild forbears. The calibrated dates belong to the end of the 5th millennium B.C. More remains to be learnt about this discovery – no harvesting tools were found on the site; but wherever those pots were made, cultivated types of both sorghum and finger millet were available, with fair sized grains that could be removed from their glumes without much difficulty.

Sesame (sim-sim) is another ancient crop of the medium and low altitudes, found in Ethiopia. There is considerable variability in the west of the country. Although an ancient crop in Palestine and Syria, its wild relatives occur in Africa and India, not in Central or West Asia. The indications that agriculture is older in Ethiopia than in penninsular India, tilt the balance in favour of an Ethiopian origin (Nayar 1976).

Cultural methods and soil and water management

Very important developments in land and water management essential to reduce the effects of population pressure on the land, may best be illustrated by looking at the current agriculture of the Konso. These people have lived in southwest Ethiopia for a long time, although they claim to have inherited at least some of their practices from the Mado people who they claim preceeded them. We may speculate about the order in which the various practices were developed: but the whole "package of practices" is impressive. The Konso lived in relative isolation (apart from contacts through their market system), prior to 1896.

Soil is preserved by the construction of many hundreds of miles of stone terraces, which follow the contours. They are built as dry stone walls, the soil being cut away vertically and the wall built against the vertical face. Only undressed stones from the ground near the place of construction are used, but with great skill and neatness. The terrain is steep, terraces are often about 2.5 m wide and 1.5 m high. The wall projects above the level of the field it is retaining. After heavy rain, a length of wall may collapse, but it is immediately rebuilt by the owner, who will rush out naked in a rainstorm to see what is happening to the water on his land. The land itself has a ridge on the outside, and other ridges are made at right angles to it, forming a series of boxes, like tie-ridging or basin listing, to hold the water.

Any streams are used to irrigate the fields, and the streams are walled, to protect the fields from flood water. Elaborate stone leats are constructed to allow the water to pass through a series of walled gardens. Such irrigable streams are rare: most of the stone-lined drains carry storm water, and are used as paths, especially for cattle. The run-off is carefully channelled through leats onto the land, and the owner will be there during heavy rain to see that the water is being well distributed over his land. Water for domestic use is obtained from wells, or from permanent streams (very few). Huge reservoirs have been constructed to conserve rain water for cattle: dams may be as much as 12 m high and more than 60 m in length, containing many hundreds of thousands of litres. Towns are usually situated on high ground, and the stream beds are in the valleys. Water may be collected from points half--an-hour's walk from the town, and 60 m below it.

Fertility is maintained by the liberal use of manure, which is applied once before sowing, and frequently during the growing season. Human manure is used, mixed with animal manure. In each town, there are number of places, generally along the outer walls, for defecation. The faeces dry quickly in the sun; they are collected and periodically taken to the fields as manure. This may well be a further indication of the age of agriculture in the area: it is hard to believe that the organized use of human manure would have been adopted and retained as an ancient custom if animal manure had been readily available. This custom could pre-date the adoption of cattle in Ethiopia. The manure is collected outside the homesteads to rot, and in some areas pits are dug in which the dung can mature.

The people live in walled towns with gates built in defensive positions. Only in recent years have the gates been neglected and security relaxed. The cattle (including sheep and goats) are penned within the homesteads, and are partly stall-fed. They are taken out under careful supervision along certain walled paths to the grazing area. Only a few pastures are found near the town: the greater part of the available land is situated some distance away, and the cattle are grazed there. Many of the distant fields are terraced, but not manured, and rotation with fallow is practised, where the grazing of the cattle doubtlessly contributes to fertility maintenance.

Ploughing was introduced by the Amhara: traditional cultivation used a three-pronged hoe of a type found formerly in ancient Egypt.

Konso cropping

The sketch maps show the Konso area (Fig. 2) and the lay-out of the towns in Konso (Fig. 3). The plateau of the Takadi area to the west is only a few hundred feet above the Garati region to the east, yet the cropping is different. Wheat and barley

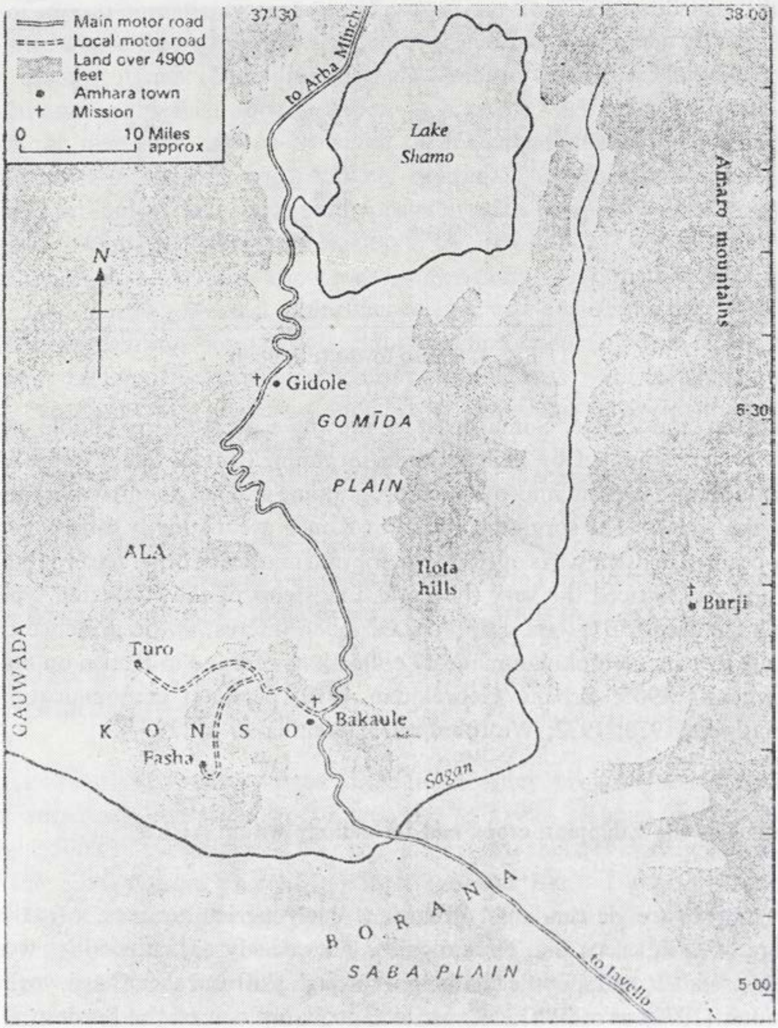

FIG. 2. The Konso area (Ethiopia)

are the main crops on the Takadi plateau; linseed, sorghum and finger millet are also grown there. These two crops are grown mainly on the lower ground – the Garati area, and ripen several weeks before the same crops on the plateau. Other crops grown are chick-peas, beans, cowpeas, horse gram (*Dolichos uniflorus*) yams and

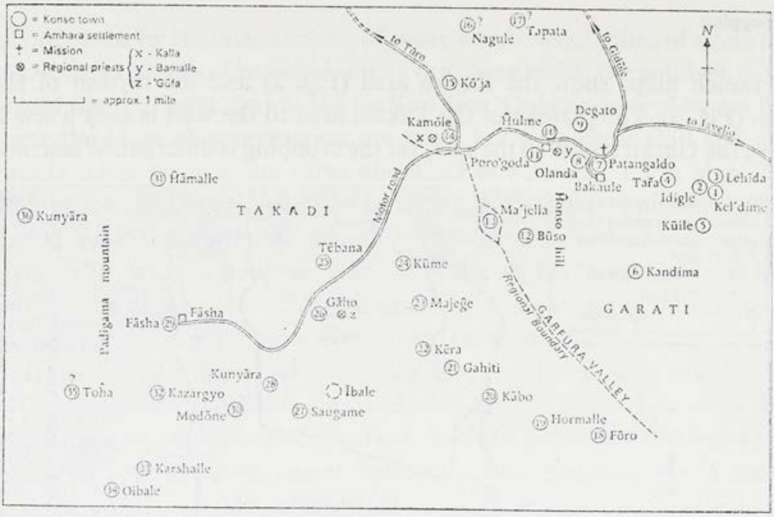

FIG. 3. Konso towns (Ethiopia)

taros, cotton and coffee. Some enset is grown, especially on Gidole mountain, where it is accompanied by high altitude sorghum. Brhane Gebrekidan who built up the Ethiopian sorghum improvement programme and has an unrival'ed knowledge of the crop, wrote "The sorghums found in Konso are distinctly different from sorghums obtained in other parts of Ethiopia, for that matter, in other parts of the world". He particularly noticed the very thin, grasslike stems of the cultivated types, many of which are used for ratoon cropping. Of much interest is the presence of guinea sorghums. Brhane Gebrekidan made 17 collections of these in Konso on his 1969/70 visit (Simoons 1965; Brhane Gebrekidan 1970; personal communications 1981, 1982; Hallpike 1970; 1972; Westphal 1975; Stemler *et al.* 1977).

The spread of the Ethiopian crops and technology within Africa

The Konso are descendants of ancient early agriculturalists, or at least the inheritors of their crops and technologies. These early agriculturalists were under relentless pressure, and met the challenges through skill and sheer hard work. Brhane Gebrekidan (1970) wrote "The Konso are probably one of the hardest, if not the hardest, working groups in Ethiopia". This was also true of the early agriculturalists. They developed new crops, intensified their production methods, yet population pressures on the land still grew. The local situation evidently required defensive positions for settled agriculturalists' towns. The only course left was emigration. There are no signs of a large-scale emigration, nor of any movement of agriculturalists on a broad front. Rather, they moved very much as the people under pressure in the Sahel zone are moving today. The man of the family goes south, living as best he can. He prospects: and if he finds a suitable area, he returns to help his family pack up. They move, taking with them their seed and their accumulated agricultural knowledge and wisdom. It is unlikely that the movement of the ancient agriculturalists out of Ethiopia was very different. Probably they moved in rather larger groups, perhaps of several households, for mutual protection. They re-established themselves on hilly sites where they could practise their agriculture. These may be clearly identified in eastern Africa: and some of their Cushitic traditions have become well established among the East African tribes, such as the "age grade" system. In due course, as the new sites became crowded, their descendants moved further south, reaching at least to Malawi, and probably beyond. They took with them guinea sorghum, finger millet, and niger seed, probably also cowpea. Some are likely to have moved towards the west from Ethiopia, to sites such as the Nuba mountains and the Cameroun highlands. There were longstanding links between Yemen and Ethiopia. Their peoples invaded each other at intervals during the past 4,000 years, and Ethiopian agriculture became well established in Yemen. It should be emphasized that in most regions these early agricultural settlements were isolated, and very scattered. No doubt they acted as nucleii for the spread of agriculture. Gramly (1979) noted that a new technology may often be spread by groups of skilled people moving into populations of the uninitiated, rather than by a process of diffusion.

Pearl millet (*Pennisetum americanum*) is another African cereal to have been carried to India. It was developed in the African savanna to the south of the Sahara. Only race *typhoides* spread to India in early times (Brunken *et al.* 1977).

The passage to India

Wheat and barley had been moved to the Indus valley, probably overland through Iran, and were being cultivated by 5,000 B. C. Field peas, sesame, and mustard had arrived by 2,5000 B. C. Sea traffic was also important: there is evidence of sea trade between the Kulli culture of south Baluchistan and Early Dynastic Sumer soon after 2,8000 B. C. Ships from the port of Dilmum (probably Bahrein island) traded extensively along the coast, probably as far as Lothal. Trade with Ethiopia and Egypt moved by caravan through Somalia and across the straits to Aden. Ethiopia (Abyssinia) was interested in gaining control of the trade, and finally succeeded in 525 AD. The Red Sea was hazardous for small boats, and the overland route to Petra and Gaza was developed. The main caravan routes to Asia depended on donkeys and mules initially, and many halts were necessary, so staging posts were developed. Camels were introduced to Arabia as beasts of burden perhaps before the end of the second millennium B.C. The pace of trade quickened, and local marauding tribes found it more profitable to levy a tax for a safe journey than to pillage the caravans. Staging

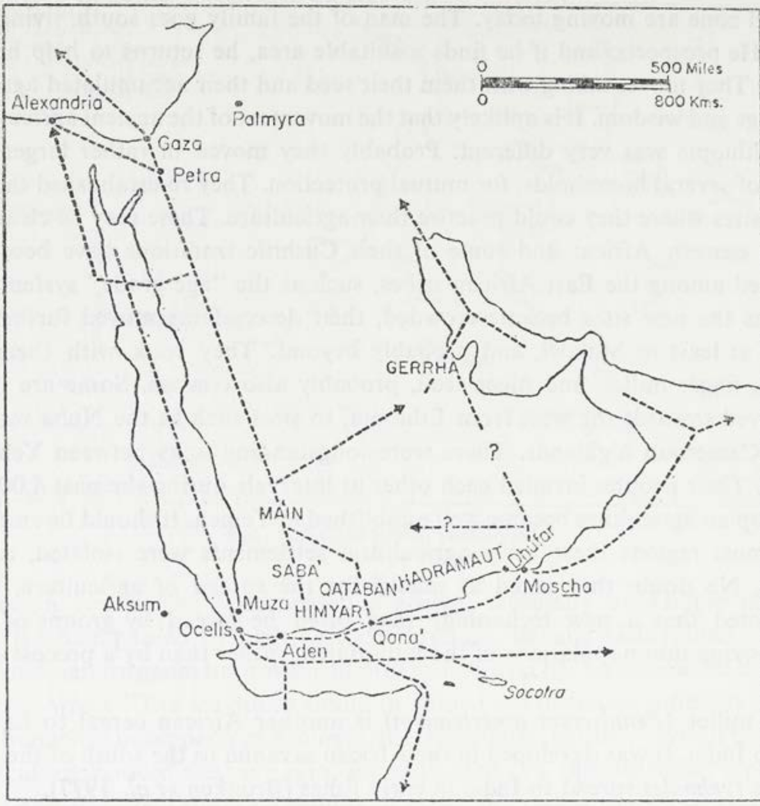

FIG. 4. Land and sea routes: South Arabia and the Horn of Africa

posts developed into towns, with water supply (often from construction of a dam). The townspeople grew food, including barley, wheat, and "millet" – which must surely often have been sorghum. Later, as bigger boats were built, sea-traffic largely replaced the overland route, especially when the monsoon wind system had been understood. Thus, there were a period of small boats trading along the coast, followed by overland caravans, which were themselves superseded by larger ships. Before the turn of the era, there was sea trade between the port of Dhufur in Saba, and India. A sketch map from Doe (1971) illustrates the trade routes in Arabia (Fig. 4). (Piggot 1950; Doe 1971; Ratnagar 1981).

Ancient agriculture in India

The first settled agricultural communities in India were established in the western Indus system, within the period 8,000 - 5,000 B.C. The Harappan civilisation developed from the numerous and widespread agricultural settlements of the Early

Indus period. The Great Indian Desert isolated Maharashtra from the Indus valley. The Banas Culture developed in the hilly country east of the Aravalli mountains around 2,500 B.C. and continued until 1,500 B.C. No Harappan sites have yet been found in this area, and Harappan influence seems to have been slight. On the Malwa plateau, sites were found at Kayatha, dating from *ca* 2,400 B.C., and at Navdatoli dating from *ca* 2,020 B.C. In Maharashtra, excavations at Daimabad revealed a chalcolithic culture, dating from *ca* 2,200 B.C. There were several similar sites in that area, including Inamgaon and Prakash, from around 2,000 B.C. These sites suggested links to the Harappan culture, but this is uncertain and requires confirmation. At another site, Jorwe 1,500 - 1,050 B.C., the huts were rectangular, as at Malwa, but at Inamgaon, 1,100 - 800 B.C., the huts were all circular.

In Karnataka, a Neolithic culture was discovered, the first phase of which was dated approximately to the period *ca* 3,000 - 2,000 B.C. From then on, more permanent settlements were discovered, often located on the crowns and slopes of granitic hills, dated between *ca* 2,100 and *ca* 1,700 B.C. Kodekal and Utnur are representative of the first period, and the people had domesticated cattle, sheep and goats. Numbers of rubbing stones and querns were found, indicating either seed collecting, or even grain cultivation. The second period occurs at Utnur, but more information has been obtained from Piklihal and Hallur, dating approximately from *ca* 2,500 and 2,200 respectively and continuing until the Early Iron Age. In period II, circular hutments of daub and wattle on a wooden frame were found, with mud floors. Tool types in the third period are reminiscent of those found in the Banas culture, Malwa and the Maharashtra sites. Grinding stones were found, with mullers, and large pots buried up to their necks probably served as storage jars. Cattle raising continued, but crops found include horse gram (*Dolichos uniflorus*), and finger millet (Allchin and Allchin 1982).

Dhavalikar (1979) underlined the problem of the chalcolithic cultures of Central India. This had already been considered by Sankalia *et al.* (1971). Sankalia has played the leading part in the excavations within reach of Pune, and has a thorough knowledge of all the evidence. He and his colleagues postulated four claimants for the development of the Malwa culture: 1. Immigrants from West Asia or Iran; 2. Aboriginal tribes who were chased up into hills by the Aryans *ca* 1,000 B.C.; 3. Unknown indigenous people who merged completely with the Sanskrit peoples; 4. A primitive indigenous people such as the Bhilo, who, coming in contact with a few immigrant people or ideas from Western Asia, developed into early farming, agricultural communities.

Dhavalikar postulated three components: a) some influences from Western Asia infiltrating through the north-western regions of the sub-continent; b) Harappan influences, especially on pottery; c) the Neolithic farmers of the southern Deccan. Somewhere in this picture might perhaps be added a small number of farmers from Ethiopia, brinding with them their crops and technology. Those crops have provided the base for arable agriculture in penninsular India ever since (supplemented by rice).

It may be fanciful to link the terraces at sites such as Kallur or Piklihal in Karnataka to transferred technology: the terraces were formed of soil behind retaining walls built of stone. We have seen that there is reason to believe that a similar movement took place from southern Ethiopia down through Eastern Africa. Communications were good to India because of the frankincense-myrrh-spice trade via South Arabia – a similar emigration of small groups to India seems quite possible.

The last event in Indian history relevant here is the Aryan invasion. In the second millennium B.C., or perhaps before the end of the third millennium, the Indo-Aryans began to enter India in several waves, the main incursion probably occurring around 1,700 B.C. There were times of violence and destruction of cities, but generally the Aryans were good colonizers, and the Sanskrit languages replaced Dravidian and Munda right across the north. The process of Aryanization had probably already begun in the Dravidian-speaking south by the opening of the first millennium B.C. If some groups of Aryans did reach the far south, they lost their original speech, and adopted the Dravidian language and customs of the people among whom they settled, indicating that rather few tried to penetrate far into the Peninsula (Allchin and Allchin 1982). Today, Karnada, Telegu, Malayalam and Tamil represent the main Dravidian languages of the Peninsula.

The African crops in India

Allchin and Allchin (1982) emphasize that the Indian sub-continent can be divided into three regions defined by hill and forest zones, as follows: 1. A western region centering on the Indus system; 2. A combined northern and eastern region, centering on the Ganges system; and 3. A southern or peninsular region. The Great Indian Desert forms a barrier between the Western region (Baluchistan and Sind in Pakistan) and the Southern region. Overland communications are easiest along a corridor to the south of the desert, linking Sind to Gujarat, Malwa, and southern Rajasthan, and thence through the lower rainfall regions of Maharashtra to the Tamil Nadu coast of the southern Peninsula. The internal movements of crops probably followed this route, although coastal trading boats are likely to have been involved also.

A second important consideration is the existence of an independent indigenous culture in the southern Deccan region of peninsular India. This dates back prior to 3,000 B.C., and so was contemporary with the urban phase of the Harappan civilisation. As recorded above, Sankalia and Dhavalikar suggested that the chalcolithic cultures of central India could have been much influenced by both this neolithic culture and the Harappan culture, with possibly a component from somewhere outside.

A third consideration is the inadequacy of the present archaeological record for crop plants. The samples are small, some of the identifications are in dispute, some of the dates are uncertain. Even where the date of the remains of a crop has been well established, that tells us very little about the date when it arrived in the area where it was discovered.

Sorghum. Kajale recorded charred grains of sorghum from Jorwe in W. Maharashtra dating to *ca* 1,000 B.C. Another possible identification comes from Inamgaon, near Ahmadnagar in Maharashtra, dated around 1,800 - 1,500 B.C. during the Malwa period. It has also been recorded from Pirak, E.S.E. of Harappa, from around 1,350 B.C. Pirak was occupied by Harappan people during the first and second millennia B.C. Sorghum was also reported from Ahar, near Udhaipur, Rajasthan, dating to 1,500 B.C. or later.

Pearl millet. Finds at Ahar, dated *ca* 1,200 - 1,000 B.C. were thought to be pearl millet, as were some from Lothal (1,400 B.C.). Lothal was an important port in the Gulf of Bombay, controlled for a time by the Harappans, but a local culture existed alongside the Harappan culture.

Finger millet was found by Kajale at Jorwe *ca* 1,000 B.C. It has also been reported from a site in Karnataka, close to the Tungabhadra river, a tributary of the Krishna, during the Tekkalakota I period (2,100 - 1,500 B.C.). This is still a major crop among the Dravidian peoples of South India, notably in the Bangalore area. It is also an important crop for the agricultural Tribals in the Peninsula (Allchin and Allchin 1982; Kajale 1977; Vishnu-Mittre 1977).

Wheat. Harlan (1969) noted that the emma wheats in Ethiopia may be related to the Khapli wheats of south India, since both have more than two vascular bundles in the coleoptile. This could be another indication of direct links between the two areas.

Sesame is an old crop in West Asia, and has been found at Harappa II (2,500 - 2,000 B.C.). However, it is also an old crop in western Ethiopia and in the Sudan. The Tamils of south India have ancient rites involving this crop at birth, marriage, and death. Sesame seed is always placed in the mouth of a person who has just died: Bedigian and Harlan (1983) reported similar rites among the peoples of the Nuba mountains (Sudan) which are still in use. The writer mentioned this in a lecture in Nigeria, and was told afterwards by a Chadic language speaker that his people still observe these same rites. This is another crop in India, widely grown though often in small amounts. The sesame from N. India differs markedly in plant type and photoperiodic response from that in S. India. The latitudes of peninsular India and of Ethiopia are very similar, so photoperiodic responses are likely to be similar.

Niger seed (Noug, *Guizotia abyssinica*) is an important oilseed crop in Ethiopia, and also among the Tribal peoples of India practising agriculture. Many of these Tribals are the remnants of older indigenous peoples of India, displaced by later incursions.

It is interesting that there is such an association between the old crops of Ethiopia – finger millet niger seed, sorghum, sesame, perhaps also desi-chickpeas, – and the old peoples of India, the Dravidians and the Tribals. It does not seem probable that these crops all came from or even through north India: growing conditions, especially day-length, are very different. There is scope for some interesting botanical analyses of the crop populations of Ethiopia and peninsular India, especially now that gene probes can be used. This could shed light on the history of the annual tropical seedcrops common to Ethiopia and India.

Crop movements

These crops were moved from Ethiopia to India, perhaps a long time ago. Small coastal craft could have been involved initially. Ships' provisions would have been needed, and crops such as finger millet, guinea sorghum, and niger seed store well. Agriculture would have been becoming familiar in Ethiopia, and it is probable that trading posts would have been established along the coasts, with crops from the Ethiopian region grown to provide familiar food, and to supply the boats pushing yet further along the coasts. The distribution of guinea sorghums from southern Africa to the coasts of China must surely be an illustration of this. The same must have happened when the larger dhows were operating on the monsoons, the trade winds of the Indian Ocean.

Of special interest is the period between the small boat traffic and the larger dhows, when the incense and spice trade was making the Arabian states and Abyssinia so wealthy that the overland caravan routes were worth operating right through into India and China. Doe's (1971) comment that agricultural settlements were established along the route to feed the staff at the staging posts *en route* is of much interest. There is reason to believe that settled agriculturalists were beginning to migrate out of the Ethiopian region perhaps around the second or third millennium B.C. Certainly that highly developed agriculture came across into Yemen. Conditions on the route to India may not have been so arid as they are today. Piggot (1950) noted that the climate of the Baluchistan-Sind region must have been wetter in Harappan times, and speculated about a small shift in the monsoon. The idea that agriculturalists gradually moved around the southern side of the Great Indian Desert and down to the south may not be fantastic. Sankalia *et al.* (1971) and Dhavalikar (1979) were certainly looking for an outside influence to explain their findings. The crops will be worth studying, as well as the human mitochondrial DNA of the peoples involved.

The age of the Ethiopian crops

There was a cut-off date for crop movement, probably around 525 A.D. when the Abyssinians overthrew the Himiyar. In 628 A.D. the Persian satrap embraced Islam, and the land-routes finally ceased as a factor in the international trading scene (Doe 1971). The history of sorghum shows that only the races guinea and durra reached India. The more recent caudatum and kafir races did not.

The dates for sorghum and finger-millet in India suggest that they were there by 1,000 B.C., and could have reached there by 1,500 B.C. – possibly somewhat earlier, samples are few thus far. The excavations at Kadero indicate that good progress had been made there in ennobling finger millet and sorghum by the end of the fifth millennium B.C., which fits in quite well with the dates when these crops were carried to India. We may guess that crop development in Ethiopia had begun by the beginning of the fifth millennium B.C.

End note

Seegeler (1983) made the following comment: "It is curious to note an old tradition of the region of Wolcait reported by Baldrati (1950). According to this legend an Ethiopian queen had occupied a vast region of India in the very remote past. She forced groups of Ethiopians to emigrate to India. How far this story has historical background is unknown, but it is striking that there are so many similarities between the crops of traditional agriculture in Ethiopia and in India, and that there are groups of Jaferbad in Kathiawar that consider themselves to be of Ethiopian origin".

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

WILLEM VAN NEER

Fishing along the prehistoric Nile

This brief overview is limited to archaeological sites, which the author has under study (*cf.* Van Neer 1984) and to some ichthyofaunas described in the literature. Of the latter category only those with quantitative data are considered. Geographically this synthesis is limited to Egypt and the Sudan; the sites are of Late Palaeolithic, Epipalaeolithic and Predynastic times. Two faunal assemblages from Dynastic times are also included as they are important for the interpretation of the place of capture of the fish. Bibliographical references are limited to the faunal reports. An extensive bibliography on the biology of the fish and on the ethnographic data mentioned in this paper can be found elsewhere (Van Neer 1984; Gautier and Van Neer 1989; von Brandt 1984).

Of the some 50 fish genera recorded from the Nile in Egypt and the Sudan today, only a small part is found in archaeological context. This is mainly due to differential preservation. Only those genera that are often encountered on archaeological sites will be considered here. These are here divided arbitrarily into a group with a prolonged stay on the alluvial plain and into a group that does not, or only briefly, enter the floodplain. The habitat preferences of the fish and the migrations in function of the water level determine where and when they are most likely captured.

Floodplain *versus* main river dwelling fish

The proposed division is based on biological data of the fish, but also on the comparison of the ichthyofaunas from a number of sites (Table 1 and 2). From these fossil assemblages it becomes clear that certain fish are often associated.

Clarias (catfish), *Protopterus* (lungfish), *Tilapia* and *Barbus* are grouped here as fish with a prolonged stay on the alluvial plain. *Clarias* and *Protopterus* are able to resist deoxygenation as they dispose of accessory breathing organs enabling them to take up oxygen from the air. *Protopterus* burrows into the mud when the floodplain dries out and can survive complete habitat desiccation by forming cocoons.

Table 1

Percentage frequencies of the most common fish found in archaeological context in Egypt and Sudanese Nubia

Sites	Sample size	Floodplain dwellers			Open water forms			
		Cyprinidae (mostly Barbus)	Clariidae (mostly Clarias)	Tilapia	Hydrocyon	Bagridae (mostly Bagrus)	Synodontis	Lates
Late Palaeolithic								
Wadi Kubbaniya (1)								
E 78-2, E 78-3, E 78-4, E 81-1 totals	74804	0.34	99.27	0.38	-	0.01	-	-
E 81-3, E 81-4, E 82-3 totals	13966	0.16	48.21	51.62	-	-	0.01	-
Makhadma 2 (2)	1303	-	98.7	1.3	-	-	-	-
Makhadma 4 (2)	7294	0.40	29.85	68.40	-	-	1.34	0.01
Idfu and Isna (3)	±2500	0.7	99.0	0.2	-	0.1	-	-
Kom Ombo (4)	448	0.2	99.1	-	-	-	-	0.7
Nubia (5)								
1017	71	-	100	-	-	-	-	-
8859	161	0.6	98.2	0.6	-	-	-	0.6
ANW-3	64	1.6	93.7	-	-	-	3.1	-
2004	36	94.5	5.5	-	-	-	-	-
443	15	6.7	93.3	-	-	-	-	-
1018	3	-	100	-	-	-	-	-
1020	2	-	100	-	-	-	-	-
1028	54	16.7	83.3	-	-	-	-	-
8905	291	-	100	-	-	-	-	-
8956	12	-	100	-	-	-	-	-
34	19	-	100	-	-	-	-	-
ANE-1	48	12.5	87.5	-	-	-	-	-
448	240	0.8	98.0	-	-	0.4	0.8	-
8899-C	1	-	100	-	-	-	-	-
440	362	0.3	76.0	0.8	-	0.8	11.0	11.1
Epipalaeolithic								
Nubia (5)								
DIW-1	35	-	14.3	-	-	68.6	17.1	-
DIW-51	4	-	-	-	-	-	-	100
Elkab (6)	32	-	18.8	-	-	3.1	25.0	53:1
Predynastic								
El Khattara (Nagada) (7)	132	2.3	66.7	4.6	-	0.7	8.3	17.4
Maghara (8)	42	2.4	23.8	4.8	-	50.0	7.1	11.9
Dynastic								
Elephantine (9)								
Cemetery	724	4.4	0.5	-	3.4	20.0	44.7	27.0
Temple of Sattet	1770	1.8	0.6	-	-	64.6	12.4	20.6

The original data are borrowed from: (1) Gautier, Van Neer 1989; (2) Vermeersch, Paulissen, Van Neer, this volume; (3) Greenwood, Todd 1976; (4) Churcher 1972; (5) Greenwood 1968; (6) Greenwood 1978; (7) Van Neer, in press a; (8) Van Neer, in preparation; (9) Boessneck, von den Driesch 1982.

Clarias, however, needs a minimum supply of water and oxygen to survive in burrows. *Tilapia* and *Barbus* depend on gill breathing exclusively, but of all Nile fishes, their hemoglobine has the highest affinity for oxygen, even in the presence of high carbon dioxide tensions. Because of their respiratory adaptations the above mentioned

Table 2

Frequencies of the most common fish found on archaeological sites in Central Sudan

Sites	Sample size	Floodplain dwellers: Protopterus	Barbus	Clariidae (mainly Clarias)	Tilapia	Open water forms: Hydrocyon	Bagrus	Synodontis	Lates
Early Khartoum									
Khartoum Hospital (1)	?	P(a)	–	P	P	P	P	P	P
Shabona (b)	?	?	?	?	P	?	?	P	P
Saggai (2)	>1000	R	–	F	R	R	R	F	F
Khartoum Neolithic									
Shaheinab (3)	315	0.3%	–	61.9%	9.9%	–	–	18.1%	9.8%
Zakiab (3)	961	72.6%	–	9.0%	10.1%	–	–	6.0%	2.3%
Um Direiwa 1 (3)	20	75.0%	–	15.0%	–	–	–	10.0%	– (c)
Nofalab (3)	59	–	–	55.9%	11.9%	–	–	28.8%	3.4%
Kadero (4)	36	19.4%	–	33.3%	2.8%	–	2.8%	22.2%	19.4%
Geili (2)	>100	–	–	F	–	–	–	F	F
Late Neolithic									
Kadada (5)	±1000	–	R	R	?	?	R	F	F

P – present; R – rare; F – frequent

(a) This genus was not mentioned in the original report, but we found it in the mammalian collection restudied by IJ. Peters (Laboratorium voor Paleontologie, Rijksuniversiteit te Gent);

(b) Until now we only saw very few fish remains from this site. A detailed study is planned;

(c) Some *Lates* bones derived from very small individuals are not included here as they are believed to have been captured on the alluvial plain.

The original data are borrowed from: (1) Arkell 1949; (2) Van Neer 1983; (3) Tigani el Mahi 1982; (4) Van Neer, n press b; (5) Van Neer 1986.

genera are able to remain on the alluvial plain for a long period. They can even stay there all year round but for *Tilapia* and *Barbus* remnant pools with slightly oxygenated water are necessary. In case of complete desiccation of the floodplain, only *Protopterus* is able to survive; the other species will die if they did not migrate into the main channel. For the interpretation of fish remains from archaeological sites, it is important to stress that within each species, large individuals return to the main channel before smaller ones.

Opposed to the floodplain dwellers a group of open water forms is accepted here, consisting of *Lates* (Nile perch), *Hydrocynus* (tiger fish) and two catfish genera: *Synodontis* and *Bagrus*. If these fish come on the alluvial plain at all, their stay is of short duration. Some of them are even said to never leave the main channel. Fishes of this group remain shortly on the alluvial plain to spawn or lay their eggs in the main channel. In the latter case, the fry migrate into the floodplain where there is an abundance of food and shelter. After a period of rapid growth the juveniles migrate towards the main channel. Very small individuals of these species may hence also be considered as taken from the alluvial plain.

Floodplain *versus* main river exploitation in prehistoric times

With reference to the two groups of fish defined in the foregoing paragraphs, three types of sites can be distinguished: those with floodplain fishing, those with main river exploitation and a third category with fishing in both environments.

At most Palaeolithic sites ichthyofaunas seem to be exclusively derived from floodplain fishing. At the Late Palaeolithic sites from Egypt and Sudanese Nubia (with the exception of site 440), *Clarias*, *Tilapia* and *Barbus* are the predominating genera (Tables 1 - 2). It is unlikely that these fish were taken from the main river for in case fishing from the shore was practised, other fish genera should be present as well. Possibly site 440 from Sudanese Nubia represents a settlement where shore fishing was practised. From post-Palaeolithic times only Um Direiwa 1 has given evidence so far for fishing restricted to the floodplain. The Nile perch remains found on that site are of very small individuals that may represent juveniles in their first growing period, captured on the alluvial plain before the migration towards the main channel.

Settlements with open water fishing only are rare; apparently alluvial plain exploitation was not practised on those sites where the floodplain is absent or very narrow. This must have been the case at the Dynastic sites from Elephantine and at El-Kadada, where floodplain dwellers are rare. These fish may have been taken from the narrow floodplain or may have been included in the catch of the main channel. In Epipalaeolithic times and onwards, fishing seems to have been practised in both floodplain and main river; the importance of the exploitation of each part of the river system probably was related to the extent of the alluvial plain and its topography (presence of residual pools, oxbow lakes etc.).

Season of capture and fishing techniques

The season of capture can be derived from the biology of the fish in relation to the behaviour of the river. Some of the hypotheses formulated here might eventually be confirmed by growth ring analysis on fin spines, vertebrae or otoliths.

At the very beginning of the inundation *Clarias* undertakes its spawning runs and is very vulnerable to predation by man. During one or a few consecutive nights catfish are found spawning in shallow marginal areas (less than 10 cm to 40 cm deep) and can be easily caught by hand, or with striking or wounding gear, or cover pots as is still done today. *Tilapia* also spawn in shallow marginal areas, but their breeding season can cover several months. In their circular nests breeding *Tilapia* are easy to trace and capture.

When the breeding is over, adult fish migrate into the deeper waters of the alluvial plain and become very dispersed. Fishing will hence not be very productive until the Nile waters recede. To keep back migrating fish, dams and fences are often erected today. Archaeological evidence for such structures is available for some late south African sites (Deacon 1984).

Another peak of productive fishing occurs when residual pools are formed. Simple fishing techniques are again very successful and are likely to have been practised in group. In addition to hand grasping, use of striking and wounding gear, cover pots, stupefaction of fish by stirring up the mud or with ichthyotoxic plants may have been adequate techniques. Fish gorges made of bone were found at Makhadma 4 and Wadi Kubbaniya. Attached to bottom lines such gorges are suitable for the capture of catfish. In case they were used for the capture of *Tilapia* rod and line or drift lines were necessary.

Table 3

Complete ichthyofauna of the Wadi Kubbaniya sites that yielded large samples
(relative frequencies, per cent)

	Anguilla	Barbus	Clarias	Tilapia	Hydrocyon	Bagrus	Synodontis	Lates
Wadi Kubbaniya								
E 78-2	0.51	0.13	99.30	0.06	-	-	-	-
E 78-3	0.43	0.05	99.28	0.23	-	-	-	-
E 78-4	4.25	0.47	94.24	1.03	-	0.01	-	-
E 81-1	10.61	2.38	86.58	0.43	-	-	-	-
E 81-3	-	-	85.83	14.17	-	-	-	-
E 81-4	0.01	0.17	27.82	72.00	-	-	-	-
E 82-3	0.02	0.16	76.89	22.91	-	-	0.02	-

At the Wadi Kubbaniya sites it was possible to distinguish between sites on which fish was captured mainly at the beginning of the inundation and sites with fish taken mainly from residual ponds (Table 3). Sites E 78-2, E 78-3, E 78-4 and E 81-1 yielded more large catfish and *Tilapia* (Table 4), apparently captured when breeding. This is indicated by the presence of eel, a species that follows spawning fish and feeds on their eggs and fry. Eel is virtually absent from the second category of sites on which the catfish and *Tilapia* remains are on the average of small individuals.

Table 4

Relative frequencies (per cent) of *Clarias* and *Tilapia* in the different size classes at Wadi Kubbaniya

Site	Very large		Large		Medium		Small	
	Clarias (>75 cm SL)	Tilapia (>45 cm SL)	Clarias (50-75 cm SL)	Tilapia (30-45 cm SL)	Clarias (25-50 cm SL)	Tilapia (15-30 cm SL)	Clarias (<25 cm SL)	Tilapia (<15 cm SL)
E 78-2	2.9	-	24.6	-	72.5	-	-	-
E 78-3	0.4	-	11.8	7.0	84.0	87.0	3.8	6.0
E 78-4	-	-	18.3	6.0	76.9	90.0	4.8	4.0
E 81-1	3.4	-	42.4	-	52.5	96.5	1.7	3.5
E 81-4	-	-	-	0.7	55.7	88.4	44.3	10.9
E 82-3	-	-	2.7	2.0	78.5	84.8	18.8	13.2

Small samples not included.

This also is in agreement with the biology of the fish: adults migrate first into the main channel. At least two of these sites, E 81-3 and E 81-4 are situated near a shallow basin that may have contained water for a considerable period of the year. Because of the comparable composition of the ichthyofauna (high percentage of *Tilapia*, *cf.* Table 1), the fish found at Makhadma 4 is also considered as taken from residual pools rather late within the post-flood season. Moreover, the fish from this site are mostly of small size. All the material from Late Palaeolithic sites of Egypt and Sudanese Nubia should be re-analysed (size estimations) to allow for similar statements about the periods of floodplain fishing. The low percentage of *Tilapia*, however, seems to indicate that long lasting residual pools such as found at Wadi Kubbaniya and Makhadma 4 were absent.

Protopterus lungfish were not found at the above mentioned sites, but even today they are rare north of Khartoum. The easiest ways to capture lungfish is the use of striking and wounding gear when floodplain waters are shallow, or to dig the aestivating animals out of their burrows later in the year when their habitat has dried out.

As still is the case today, fishing on the main channel will have been practised when the water was low, for reasons of access, but also because the main Nile waters are less turbulent then. Fishing equipment suitable for the capture of large Nile perch, *Synodontis* and *Bagrus* are hooks, harpoons and nets. With the possible exception of hook and line, the successful use of this gear seems difficult without the help of rafts or boats. Harpoon fishing from the shore is possible, but some fish, especially large Nile perch, occur only exceptionally inshore. All Early Khartoum sites (Shabona, Khartoum Hospital, Saggai) have yielded bone harpoons; at Khartoum Hospital small (line?) sinkers of fired clay were found. Not a single hook made of Nile bivalves was found in these sites; the earliest evidence for such fish hooks comes from Khartoum Neolithic sites. This does not exclude, however, that fishing with hooks was practised during the Early Khartoum as perishable materials such as acacia thorns may have been used. It is possible that during the Early Khartoum times fishing on the main Nile was practised from rafts; during the Khartoum Neolithic dug-outs may have appeared as indicated by the presence of tools for hollowing wood since that period. Direct archaeological evidence for rafts or boats is not available, however.

With the exception of Catfish Cave (Wendt 1966), no bone harpoons have been found at the Epipalaeolithic sites in Egypt and Sudanese Nubia, but this may be a result of the small number of settlements excavated until now and of the poor preservation of the bone recovered so far. The main technological innovation of the Epipalaeolithic is the manufacture of microliths, some of which may have been hafted into wooden sticks to obtain wounding gear suitable for fishing (arrow, harpoon).

All the open water forms are here considered as taken from the main channel. In reality some of them may also have been captured on the floodplain during maximum high water. If this was the case, it might be better to speak of deep water fishing versus shallow water exploitation. Technologically, however, this makes no difference as in both environments the same fishing gear as well as boats or rafts were necessary. In case deep water fishing in the floodplain was practised, main river fishing may have been less considerable than indicated by the percentages of open water forms. The biological data, however, indicate that not all these fish can come from the floodplain, as certain species and especially their large adults do not enter the alluvial plain.

Preparation and preservation of the fish

Archaeozoological evidence for preparation or conservation of fish from archaeological sites along the Nile is scarce so far. The intraskeletal distributions of the fish remains already studied shows a constant scarcity of catfish vertebrae. With the abundant material from Wadi Kubbaniya it was possible to demonstrate that this underrepresentation must be considered as a result of lesser preservation chances of vertebrae in comparison with catfish head bones and with vertebrae of other species. These findings are confirmed by a comparable underrepresentation of the catfish vertebrae from pre-Quaternary sites. Decapitation, drying and subsequent removal of fish bodies from the sites seems hence not to be involved. Even on archaeological sites with permanent habitation (protohistoric sites of Koyom in Chad and Sou in Cameroun) catfish vertebrae are extremely rare. Ethnographic evidence for decapitation of catfish in Africa is also difficult to collect. Moreover, removing a catfish head may be rather difficult if only stone tools are available.

It is very likely that fish were dried after capture as is still done today. Either sun or smoke drying may have been practised. For the latter way of preparation evidence may be present at Makhadma (*cf.* Vermeersch, Paulissen and Van Neer, this volume). Loss of fish meat occurs in the first stages of drying because of the infestation by blowfly larvae. Once the fish meat is dry, dermestid beetles are attracted and within a few months leave nothing but skins and skeletons. On the basis of these observations made today, it is unlikely that dried fish will have been an all year round food supply on sites where only floodplain fishing was practised. If sufficient fish is caught at the beginning of the inundation, enough meat may be available until residual pools can be exploited. However, the fish dried at that moment will in our opinion, not preserve until the next inundation.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
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KIMBALL M. BANKS

The appearance and spread of cattle--keeping in Saharan North Africa

Recent research has established Saharan North Africa as an early center of domestication, as early if not earlier than the South-Western Asia. The distinguishing feature of animal domestication in North Africa is that cattle – not sheep/goat – were the primary domesticate. The purpose of this paper is to examine one possible explanation for the appearance and spread of this domesticate.

Domesticated cattle first appeared in the Sahara during the Neolithic or Holocene Wet Phase, the last major interval during which climatic conditions permitted extensive human occupation of the Sahara. The beginning of this period has been variously dated from about 16,000 B.P. to between 12,000 and 10,000 B.P. It ended between 3,000 and 4,000 B.P. The earliest cattle remains date to around 9,500 B.P. and persist throughout the remainder of the sequence.

A comparison of palaeoclimatic data and the spacial and temporal distribution of the cattle remains suggests that environmental conditions, in part, could have promoted the appearance and spread of these domesticates. The earliest remains come from the Egyptian Western Desert in the Eastern Sahara and from the Core Area, north of the massifs in the Central Sahara. Environmental conditions in both regions were much more severe than the rest of the Sahara throughout the Holocene Wet Phase. It was only during the second half of the Holocene Wet Phase, when environmental conditions throughout the Sahara were deteriorating, that cattle and cattle-keeping became widespread. The evidence suggests a correlation between the appearance and spread of cattle and cattle-keeping and spatial and temporal variations in the distribution of rainfall and, hence, floral and faunal density and diversity.

Three features characterize the environment of the Sahara today. The first is that the majority of the Sahara can be characterized as a relatively flat peneplain; the most pronounced relief being the massifs in the Central Sahara, such as the Tibesti and the Ahaggar. The area having the least amount of relief is the Eastern Sahara, between Gebel Uweinat, the Gilf Kebir, and the Nile Valley.

The second feature is that rainfall comes primarily from the south in the form of summer monsoons and, secondarily, from local depressions. These depressions, though, only affect the massifs of the Central Sahara and the adjacent lowlands. The distribution and intensity of the rains are controlled by the seasonal movement of the Intertropical Convergence Zone (ITCZ) and air circulation in the upper atmosphere around the massifs. The result is a rainfall gradient that decreases from south to north, from west to east, and from uplands to lowlands. The areas receiving the least amount of rainfall are the Eastern Sahara and the Core Area north of the massifs. The areas receiving the most rainfall are the massifs and the southern edges of the Central Sahara.

The third feature is that the density and diversity of the flora and fauna follow that of the rainfall. Thus, the areas having the highest density and diversity are the massifs and the fringe areas. The areas with the lowest are the Eastern Sahara and the Core Area.

These features not only characterize the environment of the Sahara today but were also the distinguishing features of environments during the Holocene Wet Phase. Thus, the environments of the Holocene Wet Phase did not differ so much in kind as in quantity. Rainfall was more abundant, but it was derived from the same sources as today. The rainfall gradient was still present but was more pronounced as it was more compressed. Floral and faunal density followed that of the rainfall gradients. The areas having the least amount of rainfall were again the Eastern Sahara and the Core Area while the areas having the most were the massifs and the southern fringes.

Geomorphological evidence indicates that the impacts of the Holocene Wet Phase were felt differently in different areas. In the massifs of the Central Sahara, the predominate impacts were increased wadi activity, the formation of the middle and lower terraces, and the appearance of shallow playas. In the lowlands, they were the appearance of playas, particularly around the massifs, and some wadi activity. In the Eastern Sahara, the dominant impacts were the appearance of playas of varying sizes.

Nowhere, though, were climatic conditions stable throughout the Holocene Wet Phase. Sedimentary changes in these same profiles indicate that the Holocene Wet Phase was a period of fluctuating humidity, alternating between more humid and more arid intervals. In the Eastern Sahara, these perturbations resulted in at least four major playa transgressions of varying intensities and durations and separated by shorter periods of recession. However, throughout the sequence here rains came from the south as summer monsoons.

The sequence was a little different in the Central Sahara, particularly in the massifs. Sedimentological differences between the middle and lower terraces in the Ahaggar and Tibesti suggest that the Holocene Wet Phase consisted of two major humid intervals separated by a short but intense arid interval. The first humid period began between 12,000 and 10,000 B.P. and ended between 7,500 and 7,000 B.P. and was accompanied by the formation of the Middle Terrace in the Ahaggar and Tibesti massifs. Compared with the second humid period, this period was of longer duration and was characterized by a greater amount of rainfall. Rains during this interval were more evenly distributed throughout the year and came from both summer monsoons and local depressions. Runoff from these depressions affected not only the massifs but also the Chad Basin and the Upper Niger River drainage basin.

The second humid interval began around 6,000 B.P. and ended between 4,000 and 3,000 B.P. and was accompanied by the formation of the Lower Terrace. Rains throughout this were more sporadic and torrential, suggesting a rainfall pattern closer to that of today. They were predominately from summer monsoons as rainfall from the local depressions was no longer as pronounced as during preceding period. In short, the major difference between the two intervals is that the local depressions delivered appreciably more rainfall during the first interval than the second. This same difference also distinguished the Central Sahara from the Core Area and the Eastern Sahara, the latter two never having received rains from local depressions. In short, the Core Area and the Eastern Sahara were climatically more stable than the Central Sahara with the result that environmental variability in the first two was not as pronounced.

If the radiocarbon dates for the known cattle remains are compared against this model of Holocene environment, a distinct pattern appears. The temporal and spatial distribution of the remains follow that of increasing aridity. Thus, the earliest remains come from those areas that would have been most arid: the Eastern Sahara and the Core Area. It is only after 6,000 B.P., when environments throughout the Sahara were more uniform and the entire region was experiencing increasing aridity, that cattle-keeping became widespread. Cattle dating after this period are recurrent throughout the Sahara. The spatial and temporal distribution of remains suggest a definite correlation with increasing environmental degradation and the increasingly widespread use of cattle.

There are several problems inherent with this interpretation. The first is that few of the cattle remains have been described in detail so that it is difficult to ascertain definitely their domesticated status. The second is the few number of known remains. However, the data also suggest another intriguing possibility. Assuming that these remains were of domesticated cattle, their spatial distribution suggests a movement from east to west. The earliest remains are those from the Eastern Sahara. If so and extending this distribution even farther east, the data would suggest that cattle-keeping may have originated in the Nile Valley. There is evidence – such as burial practices – that indicates that cattle were particularly important in Late Palaeolithic economies. If such is the case, and cattle-keeping did originate in the Nile Valley, than the reasons for its adaptation there undoubtedly differed from those in the Sahara, given the differences in environment.

FRED WENDORF,
ANGELA E. CLOSE and ROMUALD SCHILD

Early domestic cattle and scientific methodology

The Combined Prehistoric Expedition has worked for several years on problems of the Holocene settlement of the Eastern Sahara. The results of this work have been published in three monographs (Wendorf and Schild 1980; Wendorf *et al.* 1984; Banks 1984) and several articles. One of the conclusions to which our research has led us is that domestic cattle appeared very early in the Eastern Sahara. No formal paper was presented on this subject at the second Poznań conference, but there was, nevertheless, a very lively discussion of the topic and this paper is a response to some of the points raised there.

The possibility that there might have been very early domestic cattle in the Eastern Sahara was first raised in a rather tentative fashion in the preliminary publication of our data from the Nabta area (Wendorf and Schild 1980). Further research in the Desert since then has significantly strengthened the case for their presence (Wendorf *et al.* 1984). The new data are derived from a series of Holocene sites in the area of Bir Kiseiba (22°34′ N, 29°53′ E), some 200 km west of the Nile; there has also been a restudy specifically of the "large bovids" from the sites at Nabta. This new information has led to an expansion and clarification of our views, but is apparently completely unknown to our critics. We therefore feel it is worthwhile to restate our arguments and make more explicit the way in which we reached our conclusions.

Our method is that of "strong inference" (Platt 1964), involving the formulation of alternative hypotheses, the testing of these to exclude one or more of them and the adoption of what remains. This is based on the principle that "any conclusion that is not an exclusion is insecure" (Platt 1964: 347), or, to paraphrase Popper, that since another, later explanation may be as good or better, there is no such thing as proof and science advances only by disproofs.

The data with which we have to deal are derived from 23 early Holocene sites in the Eastern Sahara. We must begin by confessing that we have not formally tested the hypothesis that these "archaeological sites" do indeed represent the results of human activity, as our Lower Pleistocene colleagues would have done. If this assumption cannot be made for the Holocene, then we may discount as unfounded every paper presented at the entire symposium. The sites have yielded 29 cultural assemblages, which are grouped into Early Neolithic, Middle Neolithic and Late Neolithic, on the basis of dating and coincidental similarities in artefact types. The Early Neolithic is further subdivided into four consecutive stages, of which the first three were formerly called Terminal Palaeolithic (Wendorf and Schild 1980). Details of these groupings and of their numerous radiocarbon dates have been published elsewhere (Wendorf and Schild 1980; Wendorf *et al.* 1984) and need not be repeated here. Table 1 summarizes the groups, their chronological ranges and the frequency of large bovid bones associated with each cultural assemblage. Site E-77-1, which yielded some of the large bovid bones noted in the 1980 publication, is omitted

Table 1

Frequencies of large bovid bones and of all identifiable mammal bones in Eastern Saharan Neolithic sites

Region	Site	Large Bovid Bones	Identifiable Mammal Bones
Early Neolithic of El Adam type: 9500-9000 B.P.			
Nabta	E-77-7	2	6
Kiseiba	E-79-8	9	387
Kiseiba	E-80-4	9	50
Early Neolithic of El Kortein type: 8800-8500 B.P.			
Nabta	E-75-6, lower	1	138
Nabta	E-77-3	1	29
Kiseiba	E-80-1, Area A	0	0
Kiseiba	E-80-2	0	0
Early Neolithic of El Ghorab type: 8500-8200 B.P.			
Kharga	E-76-6	0	0
Dyke area	E-72-5	0	0
Nabta	E-77-6	0	0
Kiseiba	E-79-1	0	15
Kiseiba	E-79-3	0	7
Kiseiba	E-79-4, lower	1	130
Kiseiba	E-79-8, Area X	0	2
Early Neolithic of **El Nabta type:** 8200-7900 B.P.			
Nabta	E-75-6, upper	1	410
Kiseiba	E-79-4, upper	0	41
Kiseiba	E-79-5	0	24
Kiseiba	E-80-1, Areas C & D	2	60
Kiseiba	E-80-3	0	0
Middle Neolithic: 7700-6200 B.P.			
Nabta	E-75-8, lower	39	603
Nabta	E-77-5	1	63
Nabta	E-77-5A	0	0
Kiseiba	E-79-2	1	459
Kiseiba	E-79-6	3	100
Kiseiba	E-79-7	0	22
Late Neolithic: 6200-5000 B.P.			
Nabta	E-75-8, upper	20	143
Kiseiba	E-79-4, "Late Neol"	0	0
Kiseiba	E-79-5B	3	3
Kiseiba	E-79-9	0	0

from the table, since it is a mixed Early and Middle Neolithic site. It is obvious from Table 1 that although large bovid bones are very rare, they occur in every faunal assemblage with a significant number of identifiable mammal bones. The collection from the upper layers of E-79-4, with 41 identifiable mammal bones, is the largest not to contain large bovids.

Since large bovid bones are so rare, it can be hypothesised that they might be intrusive into the sites. There are three taphonomic classes of intrusive faunal remains: geological, penecontemporaneous and recent (Gautier 1984). The bovid bones are not fossilised and so are not geological intrusives. There are not large bovids in the Eastern Sahara today and have not been for several millennia, so they cannot be recent intrusives. If intrusive, the bovid bones must be penecontemporaneous with the sites. This would imply that there were large bovids in the Eastern Sahara during the early Holocene, dying at random across the landscape, and that we have found the remains of those which chanced to die in archaeological sites. As far as surface remains are concerned, the most cursory visit to the Eastern Sahara shows that there is not a random scatter of large bovid bones across the surface of the desert; they occur only in archaeological sites. It is more difficult to determine the overall subsurface distribution of large bovid bones, but the hundreds of square metres of stratigraphic trenches excavated away from the sites have never yielded such bones, suggesting that the subsurface large bovid bones also occur only in archaeological sites. The correlation between sites and large bovid bones is almost perfect (imperfect only because not all sites yielded bovid bones) and we may reject the hypothesis of intrusion. The large bovid bones are in true archaeological association with the sites.

Large bovids occurring in Holocene contexts in northeastern Africa may be giant buffalo (*Pelorovis antiquus*, formerly *Homoioceras antiquus*), African buffalo (*Syncerus caffer*), wild cattle (*Bos primigenius*) or domestic cattle (*B. primigenius* f. *taurus*). The identification with giant buffalo may be rejected on both osteometric and morphological grounds (Gautier 1984). African buffalo falls within the same size-range as cattle and the avocational palaeontologist might have difficulty in distinguishing between the two. The entire collection has been carefully re-examined to verify that this is not a problem and, morphologically, the bones are very unlikely to belong to *Syncerus* (Gautier 1984). Metrically and morphologically, the large bovid bones can be assigned to cattle.

We therefore have cattle bones in true association with archaeological sites in the Eastern Sahara from about 9,500 to about 5,000 B.P. The crucial question is whether these are the bones of wild cattle or of domestic cattle. It has been suggested that the earlier cattle, at least, were wild on the basis of their size, although size alone is a very treacherous criterion to use as an indicator of domestication. Change in size may result not only from genetic isolation, but also from environmental change or stress. European wild cattle were smaller in the Holocene than in the Pleistocene (Bökönyi 1974: 99; Lasota-Moskalewska 1980: 121) without being any whit less wild, and there are several well-documented instances of both reduction and increase in size of domestic cattle during and after the European Neolithic (*op. cit.*). It is, in any case, very unlikely that there was a complete barrier to interbreeding between wild and domestic cattle during Neolithic times anywhere, and interbreeding seems actually to have been encouraged in, for example, the Globular Amphorae culture, where domestic cattle were fully as large as their wild relatives (Lasota-Moskalewska 1977). Size, then, is ambiguous. The samples from the Neolithic of the Eastern Sahara fall overall within the size-ranges of larger domestic cattle and of smaller wild cattle (Gautier 1984). This could actually be taken to support their domestic status, since the environmental conditions were so difficult (see below) that any wild cattle would have undergone a significant reduction in size, purely as a response to stress. In the end, however, the samples are so limited as to be inconclusive.

The critical argument, and the one which seems to be least understood, is the ecological one. All of the faunal assemblages are dominated by small dorcas gazelle (*Gazella dorcas*) and hare (*Lepus capensis*), with, usually, minor quantities of the larger dama gazelle (*G. dama*). In the absence of cattle, this would indicate an environment with a very low carrying capacity, restricting the ruminants to gazelles. This is in accord with the sedimentological and pedological studies, which also show an arid environment. Except for two fragments of oryx or addax from the Middle Neolithic of E-75-8, there are no remains of animals intermediate in size between the gazelles and the cattle. Large bovids are known from other parts of the Sahara at this and earlier periods, but in every case are associated with a full spectrum of animals of other sizes: the giant buffalo in the Middle Palaeolithic of Bir Tarfawi, for example, occurs with white rhinoceros, wild camel, warthog and large and medium-sized antelopes, as well as gazelles (Gautier 1980). What is known of the ecology of modern arid and semi-arid environments suggests that a fauna composed of gazelles, hare and cattle, with nothing in between, would be surprising at the very least. The carrying capacity of the Eastern Sahara in the Early Holocene was simply unsuitable for herds of wild cattle.

There is also the problem of water. Gazelle can survive for extended periods on only the moisture they obtain from green vegetation. Hares are not quite so desert-adapted, but can obtain sufficient moisture from dew. Cattle need actually to drink water at least every other day. There was no permanent, standing water in the Holocene Sahara (although there had been during the period of the Middle Palaeolithic), only ephemeral playa lakes. These filled during the rainy season but stood dry for much of the year, at which time the only way to obtain water was to dig wells for it. We know the human occupants of the area dug wells but such behaviour has not yet been demonstrated for *Bos* sp. We may therefore reject the hypothesis that cattle were an integral part of the natural, wild fauna of the Eastern Sahara in the Early Holocene.

We know that wild cattle were numerous in the lush environment of the Nile

Valley at this time, and it can be hypothesised that each year the Nilotic cattle ranged westward into the Desert of their own accord, to graze on the new grass after the summer rains, and returned to the Valley before the dry season. This might be possible for Nabta (100 km west of the Nile), but is extremely unlikely for Bir Kiseiba (200 km west of the Nile), and, again, makes very little ecological sense. In the Valley, the wild cattle are accompanied, as expected, by the full range of animals of other sizes (Gautier 1976; 1978). If the cattle went far out into the Desert, why did the medium-sized animals not do likewise? This is a particularly pertinent question for the hartebeest, which was quite common in the Valley, which is much better adapted to aridity than the cattle, but which was absent from the Eastern Sahara. We may, again, reject the hypothesis that the animals in the Desert were wild cattle coming from the Nile Valley.

We are left with the hypothesis that the cattle bones, found in true archaeological association with Eastern Saharan sites of the 10th to 6th millennia B.P., are those of animals that were to some extent domesticated. The process of biological domestication may still have been at an early stage, which would accord with the rather large size of the animals, but there seems to have been very effective human control of their movements. This is simply a working hypothesis and has not been "proved". Nothing is proved in the natural sciences; the theory of gravity has been a useful and reliable predictor of future events for several centuries, but it remains unproven. If another, later hypothesis should be as good or better, then we may reject the hypothesis of domestic cattle. For the moment, however, it seems to be our closest approximation to what was actually happening in the Eastern Sahara during the Early Holocene.

Like other useful hypotheses, this not only answers questions but also raises them. If the cattle were in the Desert as domestic animals, where were they domesticated? Further, since our evidence suggests that the desert was not occupied year-round before about 8,200 B.P., where did the early cattleherders take their herds during the dry season? Smith has suggested elsewhere (1984: 323) that the cattle were domesticated from local wild stock. Since there were no local wild stock we may discount this suggestion. The process of domestication must at least have begun in an area where wild cattle occurred naturally; that is, an area where water was more readily and permanently available. Such an area could also have served as a refuge during the dry season in the desert. In the Early Holocene, there were two such regions adjacent to the Eastern Sahara: western Sudan and the Nile Valley to the East.

If, as seems most likely, the Early Holocene wet periods in the Eastern Sahara resulted from a northward shift of the summer monsoon belt, then northern Sudan received more rainfall than did southern Egypt, and wild cattle may have occurred naturally across the modern Sahel. It can be hypothesised that they were domesticated there, and that in the Eastern Sahara we have the northern section of a North-

-South pattern of transhumance. The prehistory of western Sudan remains largely unknown. However, preliminary survey work in the area of Merga, in northern Darfur, has shown that while there are Early Holocene sites, they differ markedly from contemporary sites in Egypt in both lithics and ceramics, and their faunas do not include cattle. This lack may be due to the lower quality of forage in the higher--rainfall zone. Under modern Sahelian conditions and particularly in sandy soils, vegetation which grows where water, rather than nitrogen is the limiting factor (less than 300 mm of rain *per annum*) is richer in protein, leading to the curious situation that at the end of the dry season there is more good forage in the northern Sahel than in the southern Sahel or Savannah (Breman and de Wit 1983). This might explain why there was early Neolithic cattle-herding in southern Egypt, which corresponded to the modern northern Sohel, but not in northern Sudan, which was more like the modern southernSahel. In any case, it see msunlikely that the Early Holocene pastoralists of the Eastern Sahara either came from, or returned to, the South.

The method of strong inference leads us to suppose that the first cattle-pastoralists came from the Nile Valley. The latitudes of Bir Kiseiba and Nabta suggests specifically, the area between the First and Second Cataracts, which, unfortunately, now lies beneath Lake Nasser. A few Early Holocene sites are known from this part of the Valley (Schild *et al.* 1968), and resemble the Desert occurrences in lithic technology and typology, and in a shared preference for Egyptian flint; they also yielded many cattle bones. However, recent re-examination of the Nilotic cattle bones (Gautier 1984) has shown that the cattle were larger than those in the Desert and fall within the size-range of wild cattle, *Bos primigenius*. This apparently contradictory situation is not, in fact, at variance with a Nilotic origin for the Saharan domestic cattle. Cattle bones are extremely rare in the Saharan sites (Table 1), indicating that they were not kept primarily for meat, but rather for products such as milk and blood, as are the cattle of many East African pastoralists to this day. Such a restricted use of the domestic animals would be maintained during the dry seasons in the Nile Valley – it would make no sense to slaughter them – while the Nilotic wild cattle could be hunted for meat. This leads to the curious situation where the camp-sites of cattle-pastoralists apparently contain the bones only of wild cattle. The bones of occasional domestic animals that died (or were killed) in the Valley are statistically lost among the much larger wild population. This implies that the domestic cattle are archaeologically invisible not only in the dry season sites of established pastoralists, but also in those sites occupied when domestication was first beginning. We may recognise the early Saharan cattle as domestic on ecological ground, but are quite unable to recognise the first domestic cattle in the Nile Valley.

In short, the data which are currently available permit us to exclude many hypotheses, but not the one that there were domestic cattle in the Eastern Sahara by the 10th millennium B.P. We suppose that these were cattle first domesticated at an earlier, but unguessable, date in the Nile Valley. It is unfortunate that our critics were aware only of our initial and tentative suggestions and not of the additional research and many more data that have further supported them. It is doubly unfortunate that they were unaware of the scientific rigour by which we arrived at our conclusions. We hope that this exposition will be helpful to them.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

ANDREW B. SMITH

The Near Eastern connection: Early to Mid-Holocene relations between North Africa and the Levant

To understand the development of culture change during the Mid-Holocene in North Africa and the Southern Levant culture contact between the two areas has to be well established. Unfortunately the data is obscure and equivocal except for the fact that Near Eastern domesticates entered Africa and spread throughout the continent. Land connections between the two regions are restricted to the Sinai "funnel", but the possibility exists that the Southern Levant and North Africa should be considered as part of a single area of influence.

The physical connection

The two land masses are connected by the Sinai Peninsula with actual contact only in the area between the port towns of Suez and Port Said. All other connection has to be by water.

Today the Sinai is primarily a desert zone with annual rainfall usually less than 100 mm. There are several mountain areas, such as Gebel Katherina and Gebel Maghara which, because of their altitude, create special microenvironmental conditions and higher rainfall. The Mediterranean coastal strip from Gaza to the Nile Delta has a distinctive Mediterranean flora, but does not penetrate as far south as Gebel Maghara, 50 km from the coast, although the flora of the massif contains Mediterranean relicts (Shmida 1977).

The substrate of this coastal area comprises an east/west coarsening of sands with coarse-textured stable sands near the Suez Canal (Danin 1983: 21) and more mobile finer sands to the east. The vegetation in these dune areas is dominated by *Stipagrostis scoparia*, when it is protected from overgrazing (*Ibid*: 92). Other grazing comes from *Retama raetam*, which is also highly regarded as good charcoal material (*Ibid*: 94). Useful plants also found include *Artemisia monosperma* (fuel, building material, dry season forage) and *Thymalaea hirsuta* (ropes). The dried leaves of the latter can be eaten by goats (Bailey and Danin 1981: 148). In the Sinai and Negev a number of salty and sour plants, usually rejected by livestock, exist as a counter against intestinal parasites carried by the annual plants most favoured by the animals (*Ibid*: 149). These are mostly C_4 plants which may also serve the function of supplying necessary salts needed to prevent metabolic disorders. This pattern is similar to that of the Tuareg of Mali who go on a month-long trek to edge of the Sahara with their animals so they can graze the salt grasses and drink mineral-rich waters (Smith, S.E. 1980: 479). The good grazing would have offered a habitat for wild ungulates attractive to prehistoric hunters, and, of course, later for pastoral peoples using the coastal zone as seasonal pasture.

These coastal sands and salt marshes would have been the main avenue of connection between North Africa and the Levant. The question is: what conditions existed in the past that would facilitate either human occupation, or at least human passage?

A crucial factor in human land-use of this area would have been the availability of surface water. Since this is a winter rainfall zone virtually all standing water would have existed during the winter months, but the highly permeable sandy soils would have meant water only remaining in a few places for any length of time. In the Gaza Strip the water table near the coast lies just below the loess soils which in turn underlie mobile sand-dunes. This is tapped by modern agriculturalists in their *mawasi* field system to produce water-rich fruits and vegetables.

While palaeoenvironmental analyses from the Eastern Mediterranean during the Holocene are somewhat sparse, it would appear that climatic conditions were dry prior to 10,000 B.P. followed by moister conditions (Fekri Hassan, pers. comm.) Some authors suggest this wet period lasted until 8,500 B.P. with a drier interlude between 8,500 and 7,000 B.P. This was followed by a wetter period until 5,000 B.P (Goldberg and Bar-Yosef 1982: 409). The moister periods would have produced good pasture advantageous to both wild and domestic animals, and such fluctuations would have influenced human use of the landscape, particularly when pasture for domestic stock was at stake.

In North Africa and the Sahara environmental conditions equally showed periods of fluctuating rainfall and evaporation, as seen in the changes in lake levels and pollen profiles. The Northern Sahara and Maghreb appear to have had somewhat different periods of higher rainfall from the Central and Southern Sahara as shown in the data compiled by Rognon (1976) and Rognon and Williams (1977). In the north wetter conditions appeared *ca* 15,000 B.P. and slowly dropped off to a low around 6,000 B.P. In contrast, the southern area had low rainfall until 9,000 B.P. and much wetter conditions were experienced between 9,000 and 8,000 B.P. (Servant and Servant 1980). An arid period between 8,000 and 6,500 B.P. was once more followed by a resurgence of greater moisture until 4,500 B.P. (*Ibid*; Clark *et al.* 1973 Smith, A.B. 1980c) which is suggested as a shift from tropical depressions with fine rains to heavier monsoonal rains (Maley 1977; 1983).

During the same period the Fayum Depression was fed by waters from the Nile flood-plain (Butzer 1980: 271). This resulted in several high stands of the lake, manifested in diatomites and lacustrine sands, dated 8,100 B.P., 7,140 B.P. and in the 6th - 5th millenium B.C. The probability exists that the lake never completely dried up during this period, although it fluctuated in depth considerably during the Mid-Holocene. Thus, not only was there fresh water from the Nile itself, but also in this arm of the Nile stretching into the Western Desert.

The Neolithic of Sinai

The conference held at Southern Methodist University in December 1973 on North Africa and the Levant (Wendorf and Marks 1975) was primarily concerned with problems of Pleistocene prehistoric research. Only limited attention was given to the Neolithic and the problems of early food production in these two areas. While a lot of information has been accruing on early farming communities of the Levant, the crucial area connecting the Levant with North Africa has only received attention during the years of Israeli occupation of Sinai after 1967, and is not as well known as areas further north.

Two major surveys were carried out in Northern Sinai. The first to Gebel Maghara (Bar-Yosef and Phillips 1977), the second along the coastal strip from Gaza to the Suez Canal (Oren 1982).

The survey of Gebel Maghara showed Harifian occupation dated to 10,230 - 9,970 B.P. (Phillips 1977: 217) and Pre-Pottery Neolithic B (PPNB) dated by analogy with sites further north to the second half of the 7th millennium B.C. (Mintz and Ben-Ami 1977: 244).

The archaeological traces were all stone tools, including projectile points, supporting the thesis that in these desert areas hunting was practised. That food production was excluded comes from other work in the southern Sinai, at least up to 8,000 B.P. (Bar-Yosef 1981a). No pottery Neolithic sites were located in this survey. The next identifiable occupation period was Late Bronze Age.

A similar dearth of late Neolithic material emerged from the survey of the coastal area. A few PPNB projectile points were found (I. Gilead, pers. comm.), but the vast majority of Holocene sites were of Chalcolithic and later age (Oren 1982: 183). The only areas where Pottery Neolithic material was recognised was at Qatif, near Gaza, at Rafi'a and well inland on the western margins of the central Negev in Wadi Luzan and Qades Barnea (Bar-Yosef 1981b). The Qatif site is dated to the 5th millennium B.C. No structures were recognised in the excavation (E. Oren, pers. comm.), but the fauna included domestic cattle and ovicaprids. The other sites may be older, *i.e.* end of the 6th millennium B.C., but this has to be verified by radiocarbon dating (*Ibid*: 231).

The general picture of land-use from these northern surveys, as well as others carried out in southern Sinai (Bar-Yosef 1981a), is the Pre-pottery Neolithic hunters systematically exploited the hinterland of the peninsula and coast of the Gulf of Suez probably in an annual transhumant round. The Mediterranean coastal area, while showing traces, has not produced a sizeable settlement to compare with that at Wadi Tbeiq in southern Sinai (*Ibid*: 11). Like the northern Sinai sites no domestic, animals have been found in Pre-pottery Neolithic sites in the south.

The archaeology of the Nile Delta and Fayum

The closest excavated site to the Levant in Egypt of similar age to the Qatif site is that of Merimda Beni Salame on the western edge of the Nile Delta excavated by Junker in 1927 - 28. This settlement was occupied in the 5th millennium B.C. and produced some culture traits at variance with what was to be found on contemporary sites in Upper Egypt. Of interest to us is the burial pattern, whereby the body was flexed on its side and accompanied by very few grave goods, other than the odd bead, bracelet or simple personal decorative item. This is a Saharan Neolithic pattern found in the central Sahara at Adrar Bous, and later in the Sahel (Smith, A. B. 1974a; 1974b). There appears little doubt that the occupants of Merimda were farmers with a mixed herding and agricultural economy. It was a sedentary community living in houses 1.6 × 3 m in area (Hoffman 1980: 175) in which were found a variety of ceramic wares and stone tools with characteristic sickle gloss used for harvesting emmer wheat. The animal protein in the diet came from pigs, cattle and ovicaprids, as well as wild game and fish from the Delta, hunted using hollow-based projectile points, among others. The stone-tool kit also included polished axes.

Further to the south the Fayum Depression produced quantities of Neolithic material. No house structures were found, but underground silos attested to the storage of grains to carry the people throughout the year. As noted above, during the Mid-Holocene the high Nile levels repeatedly filled the depression making this area in the desert an acceptable place for people to live. Caton-Thompson (1934) divided the Holocene cultural material into two groups: "Fayum A" was considered older than "Fayum B". It turned out to be the reverse, with "Fayum B" sites lacking domesticated stock and pottery.

The "Fayum B" (now called Qarunian) is dated to between 8,835 and 7,500 B.P. The tool-kit was primarily microlithic, although flaked axes were numerous. There is no evidence for agriculture, although wild grains were probably harvested, if the bifacial blades were used as sickles. In contrast "Fayum A" (or Fayumian) appears to have been an agricultural society with the sunken silos, coarse, straw-tempered pottery and domestic stock: ovicaprids and cattle, as well as wild game (Trigger 1968: 68). The economy is very similar to that of Merimda and the radiocarbon dates of the 5th millennium B.C. indicate some degree of contemporaneity. The Fayumian peoples were possibly more transhumant or only occupied the site on a more seasonal basis than those at Merimda, thus the lack of structures. The Fayum Depression could have been their fall/winter camp after the harvest of the wheat and barley.

The "Neolithic" in the Sahara

Several authors dealing with the Saharan ceramic industries have, in the past, assumed that ceramics and food production were equated "... sur le... terrain archéologique nord-africain et saharien... les preuves de l'existence d'une agriculture préhistorique ne sont pas encore données, bien que cette agriculture soit hautement probable au Néolithique; son existence est certaine... si nous la lions à celle de la céramique" (Camps 1974: 217). This has led to circular arguments in interpretation of cultural material and the way of life of Holocene Saharan peoples. As pointed out by Hays (1977: 201): "All of the sites exhibit generalized 'Neolithic' characteristics (*e.g.* ceramics, grinding stones, polished axes, bone harpoons), but direct evidence for domestication is rare".

Some very early dates for ceramics exist in the Sahara. The earliest are 9,370 to 9,330 B.P. from Tagalagal, Niger (Roset 1982a). Another date of 9,080 B.P. comes from Ti-n-Torha (Barich 1978a; 1978b), and *ca* 8,700 B.P. (Camps 1969). Two other dates related to this early period are known from Launey: 9,210 B.P. (Maitre 1971) and Tamaya Mellet: 9,350 B.P. (Delibrias *et al.* 1974). These early dates are consistent with those from harpoon/microlithic sites at Tagra, Sudan: 8,370 B.P. (Adamson *et al.* 1974) and 9,030 B.P. at Adrar Bous, Niger (Roset 1983). Equally early dates for ceramics have been run on samples from Nabta Playa: *ca* 8,100 B.P. (Banks 1980), and Sarurab II in Sudan (Hakem and Khabir 1984).

Because ceramics exist in association with these dates at many of the sites they are referred to as part of a "Neolithisation" process (Camps 1974; Roset 1982b), the assumption being that the appearance of ceramics is in some way connected with the origins of food production.

This same thinking has permeated the literature with respect to the appearance of seeds and grindstones. Initial claims for early attempts at domestication in the Pleistocene have been rescinded (Wendorf *et al.* 1984), but the problem is only partially resolved as we do not know when the earliest domesticated cereals were to be found in the Nile Valley.

Large numbers of grinding stones do not necessarily mean domesticated plants. They can be indicators of grain use, but we know today wild grains are still important commodities in transhumant pastoralist diet (see Smith S.E. *op. cit.*; Tubiana and Tubiana 1977; *etc.*).

Other early claims for domestication comes from work on faunal material from Saharan sites. On the basis of palaeoenvironmental interpretation Gautier (1980: 337) has suggested that the low biomass of the semi-arid environment of Mid-Holocene Eastern Sahara was not ideal for large herbivores, therefore the early cattle bones found at Nabta Playa dated to between 9,300 and 8,100 B.P. were domesticated, in spite of the very small sample of "large bovid/cattle" bones identified.

The real sign of domesticates from Nabta Playa comes from the appearance of ovicaprids which are exotics from the Levant. The earliest dates from site E-75-8:

6,595 B.P. (averaging the 12 "Middle Neolithic" charcoal dates ranging from 7,120 to 6,130 B.P.). These dates conform to Higgs' (1967: 166) data from Hauta Fteah where a date of *ca* 6,800 B.P. is suggested for early ovicaprid appearance.

The cattle bones are much more numerous from E-75-8, and are probably domesticates. If so, these would be the earliest dated domesticated *Bos* remains in Africa at the present, and supports the probability that they also occurred about this time in the Acacus Mountains of S.W. Libya (Mori 1965; Smith A.B. 1980a).

Few settlement structures have been found from this early period. One known structure with dates from E-77-5A, Nabta Playa, gives information of a type of shelter used in the 6th millennium B.C. (Wendorf and Schild 1980: 143 - 144). It would appear that most shelters of this early period, and on into the main period of pastoralism, were made from perishable materials, of the kind used by Sahelo-Saharan pastoralists today.

The initial pastoral occupation of the Central Sahara coincided with a wet phase between 6,500 and 4,500 B.P. This occupation produced a consistent cultural pattern, with minor regional variants, extending all the way from the Nile Valley at the confluence of the Blue and White Niles to Mali (Smith A.B. 1980b; 1984).

Discussion

The relationships between the Southern Levant and North Africa during the Mid-Holocene are poorly documented. Pre-pottery Neolithic sites are more common in the Southern Sinai than along the Mediterranean coastal strip, and there is no evidence for food production on any of these sites. Pottery Neolithic sites are even scarcer. In fact this dearth suggests that links between the Levant and North Africa may not have existed between 8,000 - 7,000 B.P. The Late Pottery Neolithic site at Qatif was occupied at the same time as the rapid spread of pastoralism throughout the Sahara in the 5th millennium B.C., and when Near Eastern grains began to be cultivated on the edge of the Nile Delta and Fayum. Although the Near Eastern connection between the Southern Levant and sites in Northern Egypt, such as Merimda and Fayum, has been made on the basis of comparable stone tools and pottery (McBurney 1960; Trigger 1968; Clark 1971; *etc.*) the case for this is currently poorly substantiated. A problem area is the Nile Delta. The appearance of a settlement the size of Merimda in the 5th millennium B.C. strongly suggests that sedentary communities had previously been established, but have not yet been found as they would be under many metres of deltaic alluvium. From all accounts this was a rich environment from which wild game: animals, birds and fish, as well as plant foods could be exploited. The fact that pigs were apparently found in large numbers at Merimda underlines the more sedentary nature of the economy, but not simply a direct importation from the Levant.

Information flow could well have been in both directions. Ceramics were well-established in the Sahara and the Nile Valley by this time, possibly even before they were found in the Near East. The pottery from Qatif is relatively crude, as is that from Wadi Quderat in the Western Negev (Bar-Yosef 1981b: 228) and from the Fayumian. This may represent the idea of ceramic manufacture being introduced through pastoral contacts with North Africa. The flaked stone axes of the Late Pottery Neolithic site at Qatif show similar lateral polishing to Central Saharan ones, and indicate comparable interest in woodworking.

The drier period in the Central Sahara *ca* 8,000 - 6,500 B.P. would have meant increased dependence on the well-watered Nile Valley by Saharan peoples. Under such conditions of stress it is possible that this was the impetus for closer man/animal relationships that finally led to the controls and manipulation of genetic material fundamental to the domestication process. The opening up of the grassland niche after 6,500 B.P. allowed an expansion of the pastoral way of life throughout the Central Sahara. This is coincident with the appearance of the first ovicaprids exotic to Africa. The coincidence of an equally amenable climate in the Eastern Mediterranean may have resulted in a mutual exchange of ideas between North Africa and the Levant.

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ZOHEIR H. BABIKER

Corrélations culturelles et problèmes chronologiques entre le Nil Soudanais et le Sahara

Il y a quelques années encore, par manque de preuves archéologiques, on estimait que le Néolithique Soudanais était peu développé, sortout en ce qui concerne la domestication et l'agriculture. Aujourd'hui, è la lumière des recherches rècentes, l'aspect du Nèolithique Soudanais pourrait être modifié car les résultats récemment obtenus semblent indiquer une évolution locale d'une tradition néolithique autochtone qui se développait sur les berges du Nil. Cette tradition fut caratérisée par l'expoitation des ressources riveraines, la fabrication de la céramique, une évolution remarquable dans les industries lithiques et plus tard, par l'élevage des bovins et la culture des sorghos.

Par ailleurs; en Europe et au Moyen Orient, le Néolithique est caractérisé à la fois par l'élevage et l'agriculture, mais aussi par les premières céramiques et les premières outils en pierre polie. Une telle définition ne peut s'appliquer strictement aux Néolithiques Soudanais et Saharien, car les premières céramiqies Sahariennes et Soudanaises apparaissent plusierurs milliers d'années avant les premières essais de culture et d'élevage connus jusqu'ici. Comme ce fut le cas au Sahara, les premières céramiques soudanaises sont associées à une économie lacustre fondée sur l'exploitation des mammifères aquatiques et des poissons, par exemple, à Khartoum Hospital et Shabona. Les témoignages culturels comprennent la céramiques à décor en vagues et en vagues pointillées, les harpons en os à barbelure unilatérale et les microlithes géométriques. Ces cultures lacustres s'étendaient du Nil jusqu'en Mauritanie. Quelques uniformités dans les exemples lithiques et céramiques ont été signalées, mais ceci n'implique pas nécessairement des migrations de population. Il'y a eu vraisemblablement la même adaptation aux conditions de milieux très comparables, aidée sans doute par des contacts culturels entre les diverses bandes de chasseurs – pêcheurs.

A part la céramique, le Sahara nigéro-tchadien a livré beaucoup de vestiges comprenant des industries semblables à celles du Néolithique Soudanais. De ces industries retient plus particulièrement notre attention la fabrication des harpons en os.

L'apparition des harpons en os en Afrique semble bien avoir précédé celle de la poterie, surtout sur le Nil Soudanais (Clark 1975: 558 - 591). Selon Sutton (1974: 546), l'exploitation des ressources riveraines par une technologie spécialisée dans les bassins du Haut Nil aurait probablement commencé pendant des conditions humides an 9ème millénaire B.C. En effet, les premiers harpons en os ont été trouvés par de Heinzelin en Ishango sur la rive congolaise du lac Eduard. D'après de Heinzelin (1962: 105 - 106), la station d'Ishango aurait été occupée entre 9,000 et 6,000 B.C., et d'Ishango, le harpon évolué à un range de barbes et enchoche et ligature aurait gagné vers l'est, Gamblès Cave au Kenya, vers le nord, Nanoropus sur le Lac Rodolphe et de là, Khartoum. Mais; si l'on accepte cette idée, la technique de fabrication des harpons aurait été au départ diffusée vers les régions proches d'Ishango, par exemple; le site de Tagra sur le Nil Blanc où de tels harpons, en os datant an 7e millénaire B.C. ont été trouvé (Clark 1974: 123). De là, cette technique aurait gagné la région de Khartoum.

Au site d'Khartoum Hospital, les harpons ont des barbes unilatérales, la ligature se faisant par encoche ou stries parallèles transversales, mais l'emmanchement direct n'est pas exclu. A Shaheinab, daté de 3,490±380 B.C. mais considéré comme contemporain du Fayoum A par Arkell, la pointe emmanchée est armée d'un (exceptionnellement de deux) rang de barbes et l'on voit apparaître la perforation de ligature.

A part Khartoum Hospital et Shaheinab, les harpons ont été attestés dans d'autres sites néolithiques an Soudan, par exemple, Shabona, Zakiab et el Kadada.

De Shaheinab, de Heinzelin trace und flèche de diffusion vers la Haute Egypte où se trouve des harpons à barbelure unilatérale et enchoche transversale dans la culture de Nagada (Amratien), datable vers le milieu du 4e millénnaire B.C. D'autre part, le site de Fayoum en Egypte a révélé des harpons en os, sans encoche à la base, minces, de longueur variable, avec une à trois barbes couchées. Egalement, de Heinzelin trace une flèche de diffusion remontant le Nil, car les harpons de Nagada ressemblent à ceux du Soudan.

Selon de Heinzelin, à l'ouest du Nil, les harpons seraient parvenus dans la zone du lac Tchad en provenance: d'une part, de Shaheinab, d'autre part, d'Ishango, par une diffusion passant entre les bassins du Nil et du Congo.

La présence des harpons a été également attestée à Méniet au nord-ouest du Haggar où Hugot (1962: 149 - 178) a découvert en 1958 un gisement où existaient des harpons en os ainsi que de la céramique à décor en vagues. Ce site a été daté à 3,150±150 B.C.

D'autres sites à harpons en os en majorité à barbelure unilatérale, ont été répertoriés au Tachad, au Niger, à l'ouest du Haggar et au nord de Tombouctou.
Comme au Soudan, une perforation ou des stries à la base des harpons servaient à fixer un filin mais il n'était pas possible de les dater parce qu'ils ont été recueillis en surface (Huard 1964: 285).

Comme c'était le cas avec la Wavy Line, on remarque que la 'présence des harpons sur des sites difénts a été interprétée comme étant le résultat de diffusion. Huard et Massip (1964: 108) sont plutôt favorables à l'idée d'une diffusion suivant les voies fluviales du Congo. D'après ces deux chercheurs, la diffusion des harpons en os, soit d'Ishango, soit du Nil Soudanais semble avoir rencontré des facilités le long des fleuves centrafricains ou des zones lacustres subsahariennes, occupées au Néolithique par des pêcheurs-chasseurs. En ce concerne ces zones, on peut imaginer divers processus de diffusion et d'adoption : transmission de harpons d'origine ou des copies locales répétées de ces modèles (Huard et Massip 1964: 109).

Toutefois, dans l'état actuel des recherches, l'idée d'une transmission matérielle des harpons nous paraît très fictive. D'autre part, à l'époque qui nous intéresse, les pays du Nil n'étaient nullement privilégiés par rapport aux régions sahariennes du Bahr el-Ghazal, du Ténéré, des vallées descendant du Tibesti et du Haggar, et on ne voit pas la raison qui aurait poussé les occupante du Nil Soudanais à quitter un milieu tellement riche pour s'enfoncer dans des régions moins faborables. En ce qui concerne le Néolithique Soudanais et l'hypothèse d'une diffusion d'est en ouest, it faut noter qu'à l'ouest du Nil, le nombre des sites décroit rapidement. En effet, à l'ouest de Khartoum dans le territoire Soudanais aucun harpon n'a été trouvé

D'autre part, le fait que la plupart des harpons Sahariens soient recueillis en surface (Huard 1964 : 285) constitue un handicap sérieux aux résultats déjà connus et interdit toute tentative decomparaison et donc toute déduction en ce qui concerne une eventuellee diffusion des harpons du Nil Soudanais. Néanmoins, bien que nous soyons opposés à l'idée, d'une diffusion matérielle de ces engins de pêche, Ishango nous paraît mieux placé pur une telle pratique.

Cepandant, dans l'ensemble, le nombre des harpons retrouvés ainsi que leurs associations matérielles constituent une évidence bien mince pour baser sur elle ces théories de diffusion.

Dans l'état actuel l'hypothèses d'une fabrication locale nous parait la plus plausible et on ne voit pas la raison qui aurait empêché les populations du Sahara nigéro-tchadien de fabriquer leur propres outils de pêche puisqu'ile fréquentaient un milieu somblable à celui de leurs voisins du Nil Soudanais.

En outre, les datations absolues au carbone 14 qui ont été obtenues pour des sites Sahariens, par exemple, Amkeni 6,100 B.C. et Délébo 5,230±300 B.C. semblent rejeter toute tendance d'antériorité des sites soudanais et semblent indiquer entre autres que si cette diffusion avait vraiment eu lieu elle se serait faite de l'ouest vers le Nil Soudanais.

Des autres éléments de comparaison entre le Néolithique Soudanais et son homologue Saharien sont les gouges, ou herminettes taillées, destinés trẽes probablement au travail du bois. En effet, des gouges semblables à celles du Néolitique Soudanais ont été trouvées au Borkou, à l'ouest du Tibesti, et dans le Ténéreen daté de 3,140±300 B.C., à L'Adrar Bous (Baillud 1958). Selon Arkell (1975 : 23), la gouge aurait été inventée par les Lupembans dans les forêts du Congo. A partir de cette rêgion, elle aurait pu gagner d'autres rêgions, par exemple, Ténéré, Shaheinab et Fayoum. Mais cette hypothèse nous semble très conjecturale et elle ne repose sur aucune preuve archéologique.

Par ailleurs, le matériel propre au Sahara tchadien comprend des anneaux de pierre, parfois volumineux, qui ont dû être emmanchés, des massues cylindro-coniques à perforation centrale. Ces deux formes étaient connues dans le Néolithique Soudanais. On trouve exceptionnellement de modestes récipients évidés dans le tuf, le grès ou la lave. Le très abondant matériel de broyage (meules dormantes, molettesi pilons) est le même que sur le Nil Néolithique et dans toud le Sahara (Huard et Leclant 1972 : 15). Au Borkou, on a trouvé d'autres formes d'outils lithiques qui rappellent le Néolithique Soudanais (haches taillées ou polies, grattoirs, lamelles à das abattu) où elles se rattachent au complexe industriel de Ténéré.

Dependant, dans l'ensemble, les industries lithiques sahariennes et soudanaises montrent des différences remarquables et étant donné ces variations, on ne peut pas parler d'une uniformité réprésentée par les divers facies des deux traditions néolithiques. Comme nous l'avons déjà montré, il existe des différences même entre les sites d'une seule région, par exemple, dans la région de Khartoum. Même dans des limites géographiques très étroites, une analyse comparative des outils lighiques montre des différences remarquables. Parfois, seulement les caractéristiques les plus générales peuvent être retenues comme preuves d'affinité. D'autre part, dans le cas du Néolithique Soudanais tout semble indiquer une évolution locale des industries lithiques et la thèse d'un développement local des technologies lithiques semble la plus vraisemblable.

En ce qui concerne le Néolithique Saharien, rien ne laisse croire que la développement des industries lithiques Sahariennes était le résultat des influences extérieures.

Nous venons de montrer que quelques ressemblances peuvent être remarquées entre les Néolithiques Soudanais et Sahariens. Ces ressemblances sont évidentes dans les motifs décoratifs de la céramique, les harpons en os de même que dans les industries lithiques. Cependant comme nous l'avons déjà indiqué, des différences remarquables existent également entre les deux traditions néolithiques et dans l'état actuel des recherches on ne semble pas en mesure de parler d'une diffusion d'une région à l'autre.

Néanmoins, ces deux régions semblent avoir été culturellement liées et quelques traits culturels auraient été échangés, par exemple, quelques motifs de décor, surtout la wavy line, ainsi que la technique des penitures repestres. Mais; l'idée d'une diffusion matérielle est catégoriquement réfutable.

Toutefois, quelques chercheurs ont tendance à favoriser les pays du Nil par rapport aux régions Sahariennes. D'après Clark (1970 : 198), la fabrication de la poterie et les haches polies sont des traits incontestablement venant du Nil et qui ont été introduits dans le Sahara par les routes de Kharga, Dackha, Gilf Kebir, Oweinat et Tibesti à travers Darb el Arbain, commencant en Assyut et finissant en Wadi Hawar. Ennedi et Darfour.

Pour Haurd et Leclant (1972 : 15), les premières industries en os et lithiques, la poterie, et beaucoup plus tard, l'agriculture, qui ont été attastées dans les marches orientaux du Sahara tchadien sont venues du Soudan.

Nous avons déjà montré que cela n'était pas le cas, surtout en tenant compte des preuves archéologiques dont nous disposons aujourd'hui. D'autre part, ces hypothèses de diffusion ont été arbitrairement basées sur des déductions dont l'authenticité vient d'être mise en cause. Les différences dans les thechnologies céramiques, combinées avec celles présentées par les outils lithiques semblent montrer les natures différentes des deux traditions néolithiques et écartent l'idée largement acceptée selon laquelle Khartoum serait le centre de diffusion des traits néolithiques vers le Sahara nigérotchadien.

Aujourd'hui, la chronologie nous permet d'aller plus loin et de nous demander si le Sahara Central et méridional ne fut pas un foyer de néolithisation et de création céramique. En effet, ceux qui supportent la thèse de diffusion des traits neolithiques de la vallée du Nil à travers le Sahara semblent ignorer plusieurs point importants.

Tout d'abord, du point de vue climatologique, les régions sahariennes du Ténéré, des vallées descendant du Tibesti et du Huggar bénéficiaient des conditions environnementales comparables à celles des pays du Nil.

D'autre part, les plus vieilles dates d'industries accompagnées de céramiques ne sont pas celles obtenues dans la vallée du Nil, mais bien celles obtenues des sédiments et dépôts archéologiques des massifs centraux Sahariens et de leurs abords. A cet égard, il faut rappeler qu'au Proche-Orient, la plus vieille date d'instried avec céramique est celle de 6,480±102 B.C. et qui a été obtenue du niveau IX à Çatal Hüyük en Turkie (Mellart 1965 : 52).

Aujourd'hui, on croit de plus en plus à un développement indépendant de traditions céramiques dans le Sahara et dans la vallée du Nil. Des informations récemment recueillies montrent que la technologie céramique a été indépendament développée au Sahara Central aussi bien qu'au Proche – Orient (Hays 1975 : 200). Les fouilles de Barich à Torha de l'est en Libye ont monté que la céramique était connue dans cette région depuis 7,130±70 B.C. (Barich 1977; Smith 1980 : 452). Les trouvailles de Mori dans la région de Fezzan montrent que cette région était déjà occupée par un peuple néolithique avec poterie au début du 7e millénaire B.C. Dans la grotte de Délébo dans la région de Fada au Tchad, Bailloud (1966 : 37) a pu obtenir deux dates de 5,230 B.C. et 4,950 B.C. pour des couches archéologiques contenant des tessons de Dotted Wavy Line.

Egalement, la dotted wavy line a été trouves dans la niveau inférieur du sondage de la grotte de Gabrong à Tibesti; le C14 a permis de la dater aux environs de 6,000 B.C. (Gabriel 1973: 168; Huard et Leclant 1980 : 11). Ouan Mahuggiag a donné quatre dates fort utiles pour établir la chronologie su site. A la base du gisement un foyer fur daté de 5,480 B.C., le niveau immédiatement supérieur donna la date de 4,000 B.C. Ce niveau renfermait des ossements de voeuf vraisemblablement domestiques. A Amkeni, Camps (1968 : 224), a pu obtenir la date de 6,100 B.C., pour une industrie à céramique qui comprend la Way Line.

En ce qui concerne la domestication, le site de la grotte des Hava Fteah a livré des preuves de domestication du mouton et de la chévre datable des environs de 5,000 B.C. (Higgs 1967 : 171). Ces dates sont plus vieilles que celles de la domestication du Fayoum. Selon Hayes (1964 : 72) Fayoum A est daté de 4,430 et 4,134 B.C. Cependant, ce site a éte récemment daté à 3,910±115 B.C. (Wendorf *et al.* 1970 : 1168). Quant à la domestication du boeuf, les fouilles du gisement d'Ouan Muhuggiag ont montré que la domestication était connue depuis le 5e millénaire B.C. et par conséquent, la domestication du boeuf en Afrique Sub-Saharienne est à rapprocher avec celle de l'Egypte. D'après Clark (1970 : 197), des ossements de boeuf domestique pourrait être trouvés dans les couches les plus profondes de ce site daté à environ 5,500 B.C. D'autre part, l'ensemble culturel de l'Adrar Bous au Ténéré a montré une continuation dans l'évolution des industries lithiques d'une population de pêcheurs à peuple pasteur vers 3,900 B.C. Selon Smith (1976 : 181 - - 196), cela réflète l'adoption des traits néolithiques par un groupe indigène.

Par ailleurs, on doit signaler le fait que le boeuf identifié à Fayoum appartient au type au longues cornes. Alors que les boeufs d'origine Saharienne montrent des cornes courtes. Dans la vallée du Nil on constate l'absence des boeufs aux cornes courtes et cela indique que c'était le concept de la domestication qui s'était répandue à travers le Sahara et la thèse selon laquelle ces peuples pasteurs seraient venus du Nil ne semble pas très convaincante. Huard et Leclant (1980 : 504) affirment que le Sahara Central a été un centre essentiel de développement de l'élevage, que celui – ci ait trouvé sa voie sur place ou y a été importé partiellement ou par imitation. D'autre part, ils s'opposent à l'idée d'importations initiales du bétail a partir du Proche – Orient, car selon eux la vallés du Nil a été l'habitat naturel d'espèces domesticables (*Ibid.* : 441). Toujours d'après Huard et Leclant (1980 : 493) le Nil égyptien a été un centre important primitif ou secondaire de domestication et aussi de diffusion.

Récemment Mc Hugh (1974 : 236) a mise en doute la thèse classique qui place dans la vallée du Nil, l'origine du pastoralisme Saharien. Selon lui, il faudrait considérer sérieusement l'hypothèse d'une domestication indépendance au Sahara.

Par ailleurs, la possibilité d'un développement local d'agriculture Saharienne pendant une phase humide (6,000 - 3,500 B.C.) plutôt qu'une diffusion de l'Asie du sud – ouest à travers l'Egypte a été proposée par Camps (1969 : 211) et Hoebler et Hester (1969 : 120 - 123). Hester (1968 : 498) estime qu'une domestication indépendante des plantes d'origine locale comme le sorgho et le millet était possible. Une fois developpée, cette agriculture n'aurait pas duré longtemps en raison de l'ardité du climat qui aurait favorisé un mode de vie pastoral.

En de qui concerne le Soudan; les preuves de domestication de Kadero ont indiqué un développement local des pratiques de l'élevage et aucune influence extérieure n'a été démontrée. Les dates au C14 de Kadero – 3,390±90 B.C. sont plus récentes que calles, de la domestication Saharienne.

Pour G. Camps (1968 : 224), les datations les plus anciennes des manifestations néolithiques dans l'Ennedi, le Tadrart Acacus, le Tassili – n'Ajjer et le Hoggar constituent un ensemble cohêrent avec les observations géomorphologiques et climatiques: ainsi, le lacustre d'Hirafok (Hoggar) daté de 6,430 B.C., nous rappelle qu'au début du Néolithique de grandes masses d'eau occupaient encore de vastes sones du Sahara, ce qui explique en quelque sorte les activités de pêches des populations sahariennes.

D'après les preuves fournies par les industries à céramiques du Sahara, il semble qu'a la fin du 7e millénaire B.C. que s'organissent aux abords des massifs centraux les premières cultures néolithiques Sahariennes. Par contre, dans la vallée du Nil, le Néolithique le plus ancien du Fayoum A parait se situer dans la deuxième moitié du 5e milléннaire B.C. (4,300 - 4,400 B.C.), le village néolithique de Mérimdé Beni Salamé dans le Delta, est du même age (4,400 B.C.). Comme nous l'avons déjà indiqué, les datations les plus anciennes du Néolithiques Soudanais ne dépassent guère 4,500 B.C. et dans l'état actuel des recherches l'antériorité du Néolithique de la vallée du Nil en général et du Néolithique Soudanais en particulier sur celui du Sahara n'est pas démontrée.

Toutefois, cela ne veut pas dire pour autant que la néolithisation du Soudan fut le résultat des influences Sahariennes, car nous n'avons aucune preuve matérielle pour affirmer le fait que la chronologie nouvelle des sites Sahariens les place quelques milliers d'années avant les sites soudanais ne veut pas dire que les traits néolithique ont été diffusés du Sahara vers le Nil Soudanais, mais cela montre tout simplement que la néolithisation du Sahara avait précédé celle du Soudan.

Certes, le Sahara humide de 7e milléннaire B.C. avait joué un rôse important dans la néolithisation de toutes les régions limitrophes et il semble avoir été un foyer particulier de néolithisation. Toutefois l'idée de l'invention locale et l'innovation dans plusieurs régions nous semble la plus plausible.

Comme nous l'avons déjà montré, l'apparition des traits néolithiques au Sahara avant leur apparition et adoption sur le Nil Soudanais ne veut pas forcément dire qu'ils étaient diffusés de Sahara vers le Nil. Inégalement réparties dans la vellée du Nil dans les déserts occidentaux d'Egypte, de Nubie, du Soudan Central et du Sahara, les industries néolithiques sont les témoignage des populations d'origines diverses qui les ont propagées; leurs formes sont addoptées aux matériaux et aux geners de vie locaux dominants; leur chronologie relative et absolue ainsi que leur durée et même leurs rapports ne sont pas totalement déterminés.

Toutefois, grâce aux recherches poursuivies dans les régions indiquées plus haut, nos connaissances s'enrichissent d'un jour à l'autre, car beaucoup de renseignements sont révélés et dans l'ensemble ils contribuent à une nouvelle interprétation du Néolithique dans chaque région de même qu'à mieux définir les rapports qui auraient existé entre les populations néolithiques de ces régions.

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PIERRE M. VERMEERSCH,
ETIENNE PAULISSEN and WILLEM VAN NEER

The Late Palaeolithic Makhadma sites (Egypt): environment and subsistence

Introduction

In this paper, we have assembled the three communications concerning the Makhadma sites (Qena, Upper Egypt) presented at this Symposium.

In 1980 we surveyed and evaluated the Qena area and examined the sections of the Makhadma site E6104 published by Wendorf and Schild (1976). According to these authors, the site contains a very fresh early Late Palaeolithic assemblage. In 1982 F. Wendorf kindly assigned further research on the Makhadma site E6104, which we will name further Makhadma 1, to the Belgian Middle Egypt Prehistoric Project of Leuven University.

Our 1983 campaign started with a survey of the area. Investigations in the vicinity of Makhadma 1 yielded several new Late Palaeolithic sites (Makhadma 2, 3, 4 and 5), all situated on the lower part of a scarp and characterized by a grey-black archaeological layer, features obviously missing at Makhadma 1. During the '83 and '84 campaigns our efforts focused on these sites, unknown to us outside the area, and the sites Makhadma 2 and 4 were chosen for excavation (Vermeersch 1983). In addition, several trenches were opened in the surroundings.

The physical environment, the stratigraphical position, the site characteristics, the archaeological material and the faunal remains of Makhadma 2 and 4 are treated briefly. In the last section the environment and related subsistence activities are discussed.

Physical environment

Between Wadi Qena and Wadi Makhadma, at a 10 km distance to the north, a 20 m high and rectilinear NW-SE scarp forms the contact between the Nile valley bottom (altitude: 70 - 73 m) and a higher surface to the north.

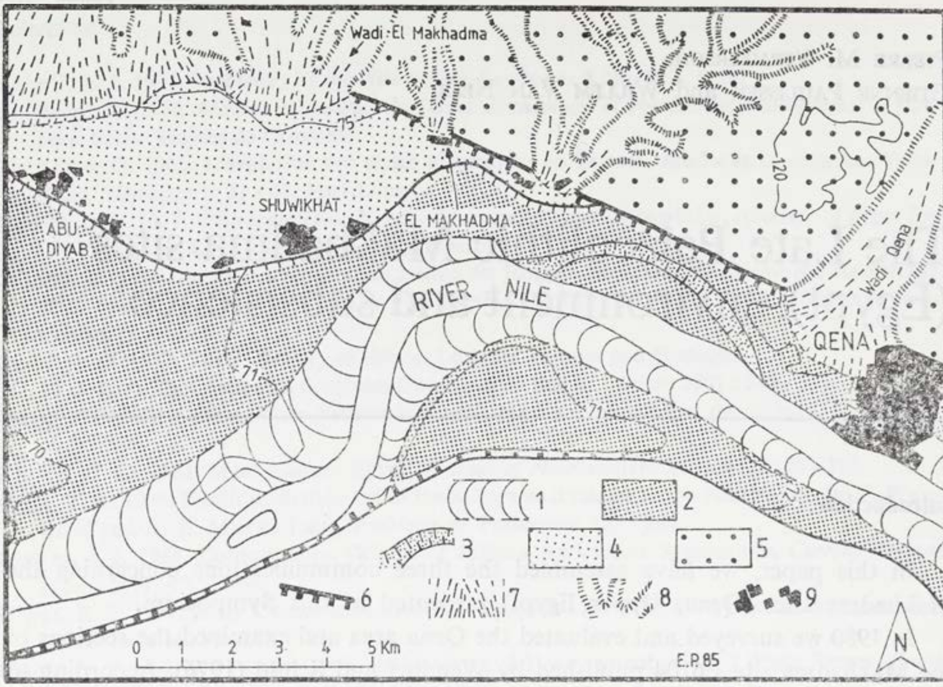


FIG. 1. Geomorphological map of the Qena-Makhadma region

1: Natural levees; *2*: Floodplain flats and basins; *3*: Abandoned Nile channel; *4*: Shuwikhat terrace; *5*: Surface above 90 m; *6*: Northern 20 m scarp of the Nile valley bottom; *7*: Important wadi fan deposits; *8*: Wadi; *9*: Town and villages.

In the Qena-Dishna area (Fig. 1) cultivation is not limited to the floodplain, but also includes the major part of a Nile Valley bottom terrace. This terrace, which we named the Shuwikhat Terrace (Paulissen and Vermeersch 1985) is well preserved in the area Makhadma-Abu Diyab just downstream of the deposits at the mouth of Wadi Qena. A fringe of former desert villages, now situated in the cultivated land, underlines the contact between the floodplain and the Shuwikhat terrace. The top of this silt terrace, originally situated at an altitude of more than 74 m, is planed off at about 72 - 73 m in the Makhadma area (Fig. 2). The terrace deposits are almost uncovered. At the out eredge however, towards the desert fringe, the Shuwikhat terrace is covered with wadi fans or slope deposits of minor importance, as is partly the case west of Makhadma in a narrow belt not yet cultivated. In the top of these slope deposits, the Late Palaeolithic industry of Makhadma 1 was recovered by Wendorf and Schild (1976).

The older surfaces, north of the 20 m scarp, are intensively dissected by wadis. It is a complex unit of Nile and wadi deposits developed at the mouth of Wadi Qena. Near Makhadma this unit is composed mainly of coarse sands – named Qena Sands by Said (1981) – covered by small hills of exotic cobbles. These hills are the inverted remnants of important accumulations in fluviatile channels eroded

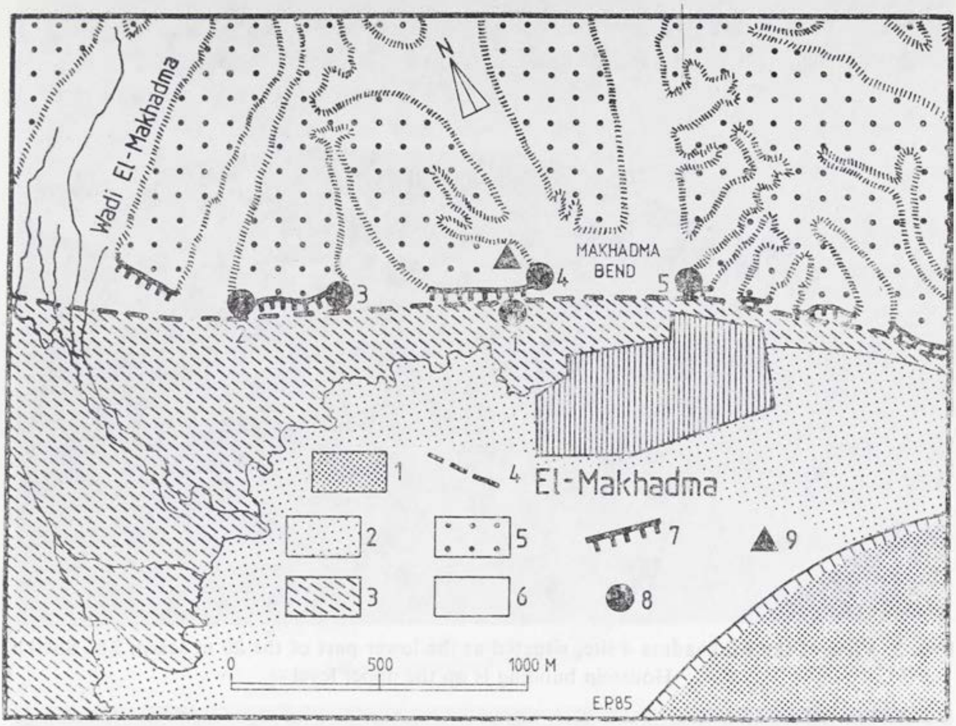


FIG. 2. Geomorphological map of the Makhadma area

1: Floodplain flat; *2*: Shuwikhat terrace planed off, silt exposed and under cultivation; *3*: Shuwikhat terrace covered with wadi fans and slope deposits; *4*: Outer limit of Shuwikhat silts; *5*: Surfaces higher than 90 m; *6*: Wadi; *7*: Northern 20 m scarp of the Nile valley bottom; *8*: Locations of the Makhadma sites; *9*: Location of the Sheikh Houssein building

in the underlying Qena Sands. The whole area is covered with a lag deposit, an admixture of cobbles and coarse sands.

As the slope deposits overlying the Late Palaeolithic Makhadma sites are of minor importance – less than 0.5 m thick and very restricted in surface – the related erosion on the higher levels must be evaluated as secondary. The physical aspect of the higher levels during Late Palaeolithic occupation was probably very similar to their present aspect, namely a rolling hill topography with nearly all the area under the sites paved with cobbles.

The Makhadma sites 2, 3, 4 and 5 are located in similar positions on the lower part of the slope near the divide between the wadi entrance and the scarp directed towards the Nile.

Makhadma 2 is situated on the Eastern divide of a local wadi very near to Wadi Makhadma, an important wadi with a large flat bottom grading with a 1% slope into a large sandy cone prograding over the Shuwikhat terrace.

Makhadma 4 (Fig. 3) is situated on the western divide with the Makhadma Bend

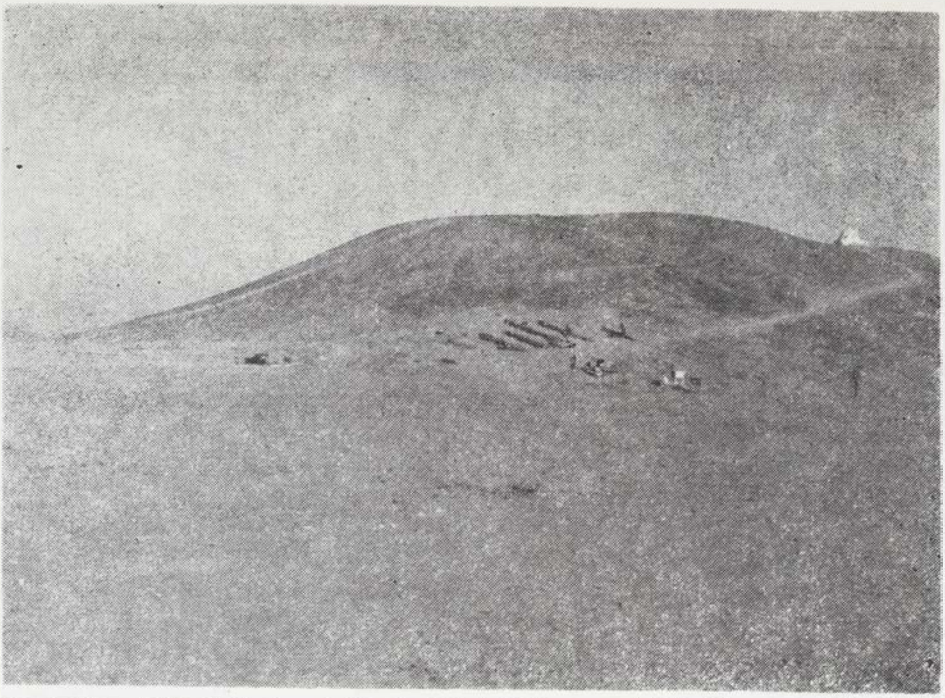


FIG. 3. View of the Makhadma 4 site, situated at the lower part of the 20 m scarp. The Sheikh Houssein building is on the upper level

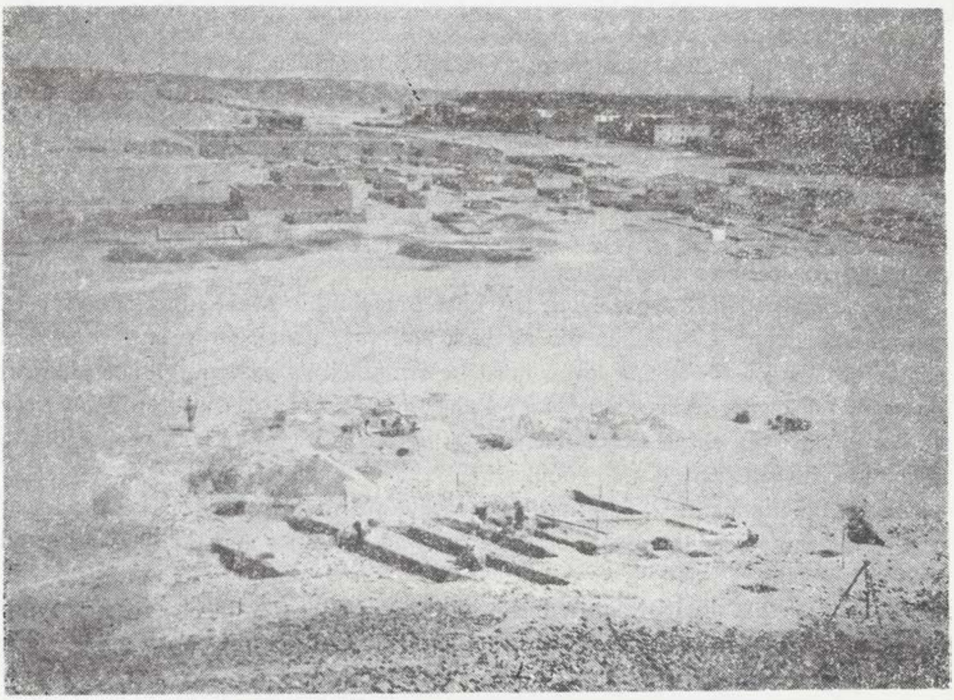


FIG. 4. View of the Makhadma bend, eastwards from the scarp above Makhadma 4

(Fig. 4), an embayment resulting from the coalescence of different wadi bottoms and the subsequent erosion of the wadi divides. The bottom of this bend is rather flat and covered with a thin layer of wadi deposits.

The sites in their local geomorphic and stratigraphic position

The local geomorphic and stratigraphic record is figured in a catena profile (Fig. 5). We will summarize the main events from oldest to youngest.

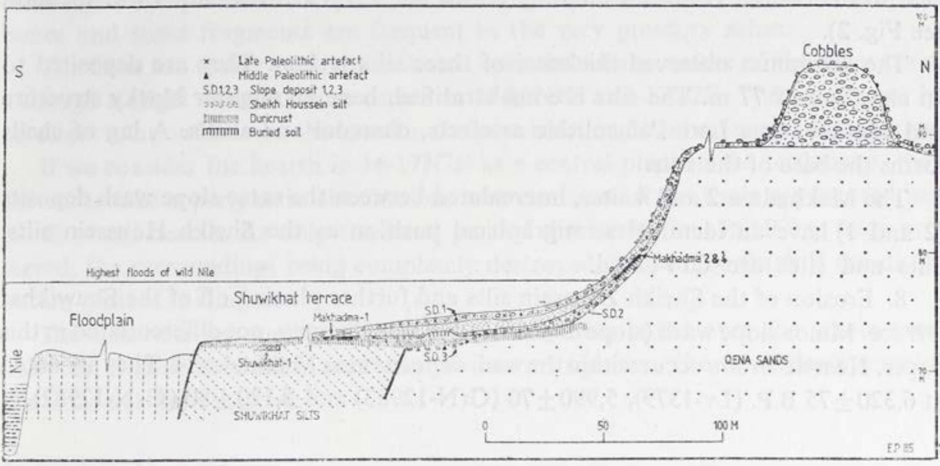


FIG. 5. General catena profile through the Makhadma area

1. Nile valley formation within older deposits, mainly the Qena Sands, resulting in the formation of a 20 m scarp at Makhadma. This history is complex but not differentiable at Makhadma.

2. Slope evolution and scarp retreat. The corresponding gravel lag contains rolled Middle Palaeolithic artefacts (slope deposit 3). This slope deposit is reworked near the scarp by slope deposit 2.

3. Nile erosion and formation of a valley wherein the Shuwikhat silts (see 4) have aggraded.

4. Aggradation of brown Nile silts, named the Shuwikhat Silts, and formation of the Shuwikhat Terrace (Paulissen and Vermeersch 1985). In the upper part of these silts we excavated a Late Palaeolithic site, Shuwikhat 1. These silts have been termed "possible Dandara" by Wendorf and Schild (1976: 116) and "Dandara" by Said (1981: 67).

5. Slope evolution and planing off of the Shuwikhat Terrace. Slope deposits contain reworked Middle and Late Palaeolithic artefacts. In top of these slope deposits (slope deposit 2), Wendorf and Schild (1976) recovered the Mahadma 1 site.

This layer grades into the lower slope deposits at Makhadma 1, 2 and 4. This lower slope wash is termed Makhadma Formation by Said (1981: 67).

6. Formation of a torrifluvent in the valley bottom and an inceptisol with ochric epipedon on the white slope deposits, only observed under Makhadma 4. Duricrust formation on top of the Shuwikhat silts, between 0.5 and 1.5 m below surface.

7. Deposition of dark calcareous Nile silts (7.5 - 10YR 5/3) to the base of the scarp and nearly in direct contact with the sites Makhadma 2 and 4. The silts have been considered as possible Sahaba by Wendorf and Schild (1976: 119). We gave these silts a local name: Sheikh Houssein Silts, according to the type location very near to the Sheikh Houssein building above the scarp at Makhadma (for location see Fig. 2).

The maximum observed thickness of these silts is 1 m. They are deposited to an elevation of 77 m. The silts are not stratified, have an angular blocky structure and contain some Late Palaeolithic artefacts, charcoal and shells. A lag of shells forms the base of the silts.

The Makhadma 2 and 4 sites, intercalated between the same slope wash deposits (2 and 1) have an identical stratigraphical position as the Sheikh Houssein silts. Silts and sites are C14-dated.

8. Erosion of the Sheikh Zoussein silts and further planing off of the Shuwikhat terrace. Minor slope wash (slope deposit 1) and wadi activity, not differentiated in this paper. Hearths *in situ* occur within the wadi deposits near Makhadma 4. They are dated at 6,320±75 B.P. (Lv-1379), 5,990±70 (GrN-12983) and 5,120±80 (GrN-12982).

The site characteristics

MAKHADMA 2

Site structures

Due to quarrying activity and erosion, less than 15 m² of this site was preserved. The excavation surface was thus limited.

On the lower part of the scarp, the in situ Qena sands are covered with a slope deposit of locally derived coarse sands, pebbles, cobbles and some rolled Middle Palaeolithic and Late Palaeolithic artefacts, distributed apparently at random. Upslope this slope deposit attains a thickness of 1 m, but thins out rapidly in the downslope direction.

The slope deposit is subdivided by the archaeological layer into 2 units. The lower slope deposit – slope deposit 2 – consists of stratified rill deposits at the base, covered by non-stratified sediments. The artefact-bearing layer, situated between an altitude of 77.0 and 78.5 m is very powdery and also contains some cobbles. The upper slope deposit – slope deposit 1 – covering the archaeological layer is very sandy and has an observed maximum thickness of 0.30 m.

Because the lower slope deposits are rich in derived terrace cobbles, it is a risky task to make the distinction between slope deposit cobbles and manuports. Nevertheless manuports certainly are present in the artefact bearing layer. Some of them are intensively rubified. There is, however, no sufficient reason for considering the cobbles as being part of a constructed pavement.

Two conical post holes could be observed. They have an upper diameter of 40 to 50 cm and have been planted to a depth of 80 cm. Two hearths were recovered: hearth 1 in 16N2E and hearth 2 in 13N1E. Both hearths consist only of an accumulation of charcoal and ashes, resting on rubified sand in a shallow pit. Only the base of hearth 2 was preserved, so that it is isolated from the archaeological layer. Burnt bones and stone fragments are frequent in the very powdery ashes.

The flints are rather evenly distributed over the whole surface of the excavation, although a slight concentration occurs in 17-18N1E and 17N2E. There seems to be no direct relation between the hearths, the post holes and the horizontal distribution.

If we consider the hearth in 16-17N2E as a central place in the settlement, then the cores take a peripheric distribution, whereas most of the tools are located just north of the hearth. As only the basal part of the hearth in 13N1E has been preserved, the surroundings being completely destroyed, we cannot check if the distribution pattern is similar.

The fish remains, mainly *Clarias*, are evenly distributed over the whole area; however, a clear maximum occurs in the central squares. The few *Tilapia* remains are from northern squares.

Archaeological material

The archaeological material collected at Makhadma 2 will be considered as belonging to a single occupation period, even if this is unlikely. However, we have no possibilities of separating the material (Table 1).

The faunal remains are listed in Table 2.

All the chert is derived from the higher terrace cobbles, which are rich in chert (about 30%). This chert is not homogeneous and different qualities are present. Upper Palaeolithic man had a clear preference for a fine grained soft-feeling chert of light brownish grey colour (5 to 7.5 YR 7/2), which makes up about 1% of the terrace cobbles. This is a good quality chert. Besides chert, other materials occasionally were utilized for flaking, such as basalt and limestone. About 2,000 artefacts have been collected during the excavation.

The single platform core type (66%) occurs most frequently. The debitage technique is very simple and consists of the removal of a primary flake, perpendicular to the long axis of the chert cobble, thus creating a single platform, which was subsequently used for blade production along the long axis of the core. Judging from the low number of core trimming pieces, a *crête* sometimes was prepared before starting blade production.

Table 1

Tool type list of Makhadma 2 and Makhadma 4

Tool types	Makh 2	Makhadma 4	
	N	N	%
1. Single end-scraper on a flake	2	6	3.57
5. Denticulated end-scraper	8	5	2.98
8. Single end-scraper on a blade	2	1	0.60
12. Single piercer		2	1.19
17. Angle dihedral burin	1		
17-18. Dihedral burin		23	13.69
19. Burin on a break	1	28	16.67
19b. Burin on a natural surface		1	0.60
19c. Multiple burin on a break		1	0.60
21. Burin on a straight normal truncation		1	0.60
23. Burin on a concave truncation		4	2.38
26. Multiple truncation burin		1	0.60
27. Multiple mixed burin	1	1	0.60
28. Core-like burin		2	1.19
44. End-scraper burin	1		
45. Pointed straight backed bladelet		2	1.19
55. Bladelet with curved backed end		6	3.58
64. Shouldered bladelet		1	0.60
66. Fragment of a backed bladelet		5	2.98
68d. Backed and truncated bladelet with retouched base		1	0.60
74. Notched flake	1	14	8.33
75. Denticulated flake	7	11	6.55
76. Notched blade or bladelet		4	2.38
77. Denticulated blade or bladelet	9	5	2.98
80. Truncated piece		21	12.50
82. Segment		2	1.19
84. Asymmetrical trapeze		3	1.79
87. Trapeze with two concave sides		1	0.60
88b. Trapeze with two convex sides		1	0.60
89. Isocele triangle		4	2.38
93. Triangle with two convex sides		1	0.60
105. Pieces with continuous retouch	not yet recorded		
106. Side scraper		2	1.19
109a. Pointed piece with unilateral proximal retouch		3	1.79
109b. Pointed piece with bilateral proximal retouch	2	3	1.79
112. Miscellaneous	1	2	1.19
Total	46	168	100.07

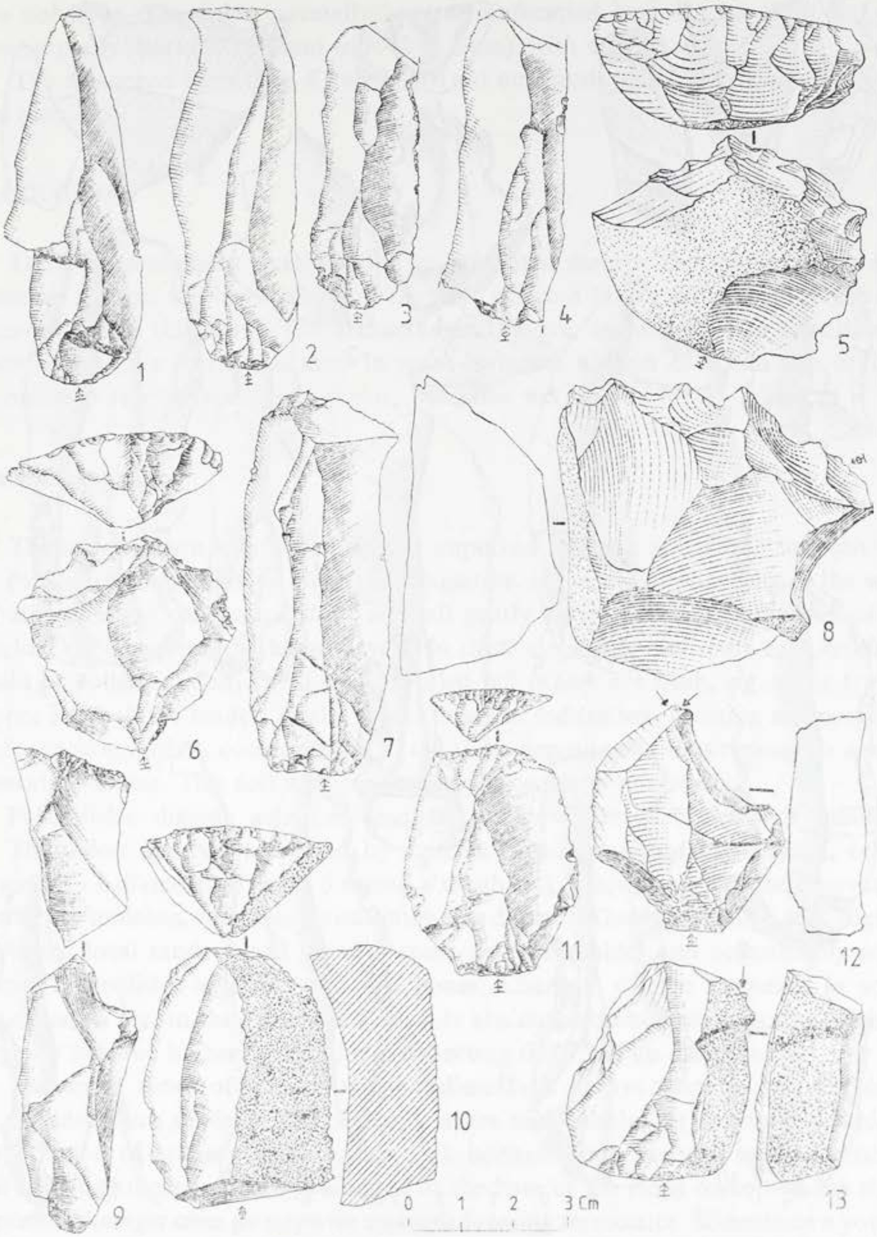


FIG. 6. Makhadma 2. Lithic assemblage
1 - 4: Blades; *5 - 11*: End-scrapers; *12, 13*: Burins

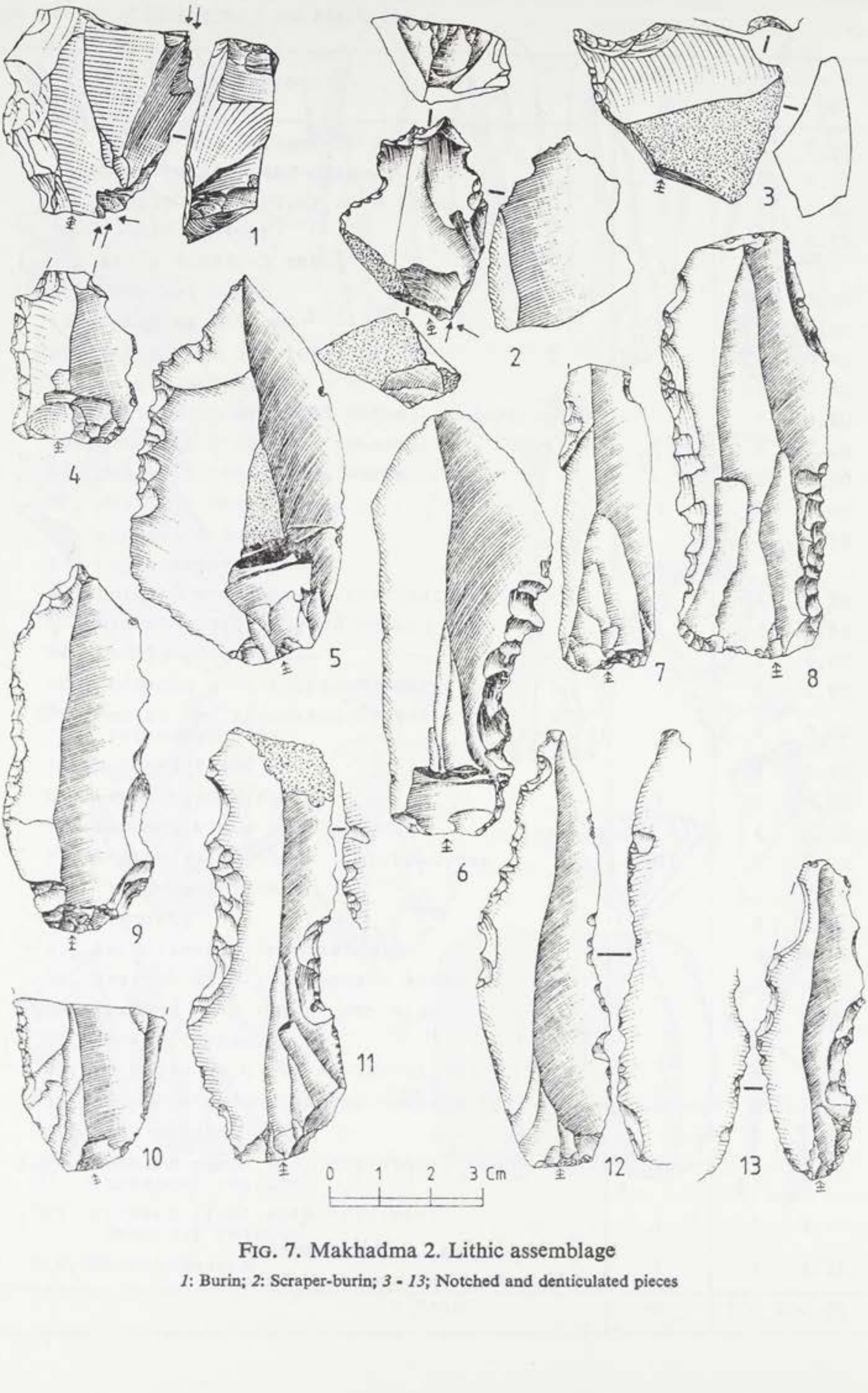


FIG. 7. Makhadma 2. Lithic assemblage
1: Burin; *2*: Scraper-burin; *3 - 13*; Notched and denticulated pieces

It is not surprising that many flakes have preserved cortex patches as the cobbles are not large. The flakes normally have an unfacetted butt. Blades (Fig. 6: *1 - 4*) are normally short (10 cm) and wide (2 to 3 cm), with unfaceted butt.

The retouched tools (Fig. 6 and 7) are not numerous and the typological groups are restricted.

MAKHADMA 4

Due to the complex stratigraphy, we excavated mainly in a system of parallel trenches and on the lower slope of the site, where a larger surface of 12 m^2 was excavated with thin spits. The archaeological layers, consisting of fine sediments, were sieved on a mesh of 2 mm. In some instances a mesh of 1 mm was utilized in order to recover seeds and grains, but none were found.

Site structures

The site structure is complex due to important digging and filling up activities by Palaeolithic man. Before intensive occupation of the site, topography of the wadi mouth edge was characterized by a small gently sloping surface composed of reworked cobbles from the higher levels. In these slope deposits some rare artefacts could be collected. Some of them are rolled but others are fresh, *e.g.* some typical Upper Palaeolithic blades. Slight weathering and induration, forming an inceptisol with ochric epipedon, occurs on top of the slope deposits and thus represents a sedimentation hiatus. This soil was preserved only on some rare spots.

Palaeolithic digging activities resulted in two different systems of infillings.

The oldest one is represented by a series of pits, some of them small, others large, with a diameter of up to 5 m and a depth of 1.5 m. Because of the excavation strategy in trenches, complete pit outlining was difficult. The pits are filled with slightly reworked local sands mixed up with some derived pebbles and occasionally some Upper Palaeolithic artefacts and fish bones. Charcoal can be frequent. In some instances, as *e.g.* in the trench at 27N, pits are not contemporaneous: the younger ones are situated higher on the slope, dissecting the fill of an older one.

The upper series of anthropogenic sediments is always more or less darkened by an admixture of dark silt, charcoal, ashes and cobbles. It is characterized by a succession of archaeologically rich dark horizons and less rich sandy horizons. The oldest of these horizons is situated at the base of the slope on top of the slope deposits. Younger ones go stepwise upwards forming terracettes. Sometimes a younger one may cut into the deposits of an older one. At the base of this grey-black layer some small holes, probably postholes, could be observed. The top of the upper series was eroded by posterior slope evolution (slope deposit 1). The present thickness of this series is certainly only part of what it was in Palaeolithic times. The eroded

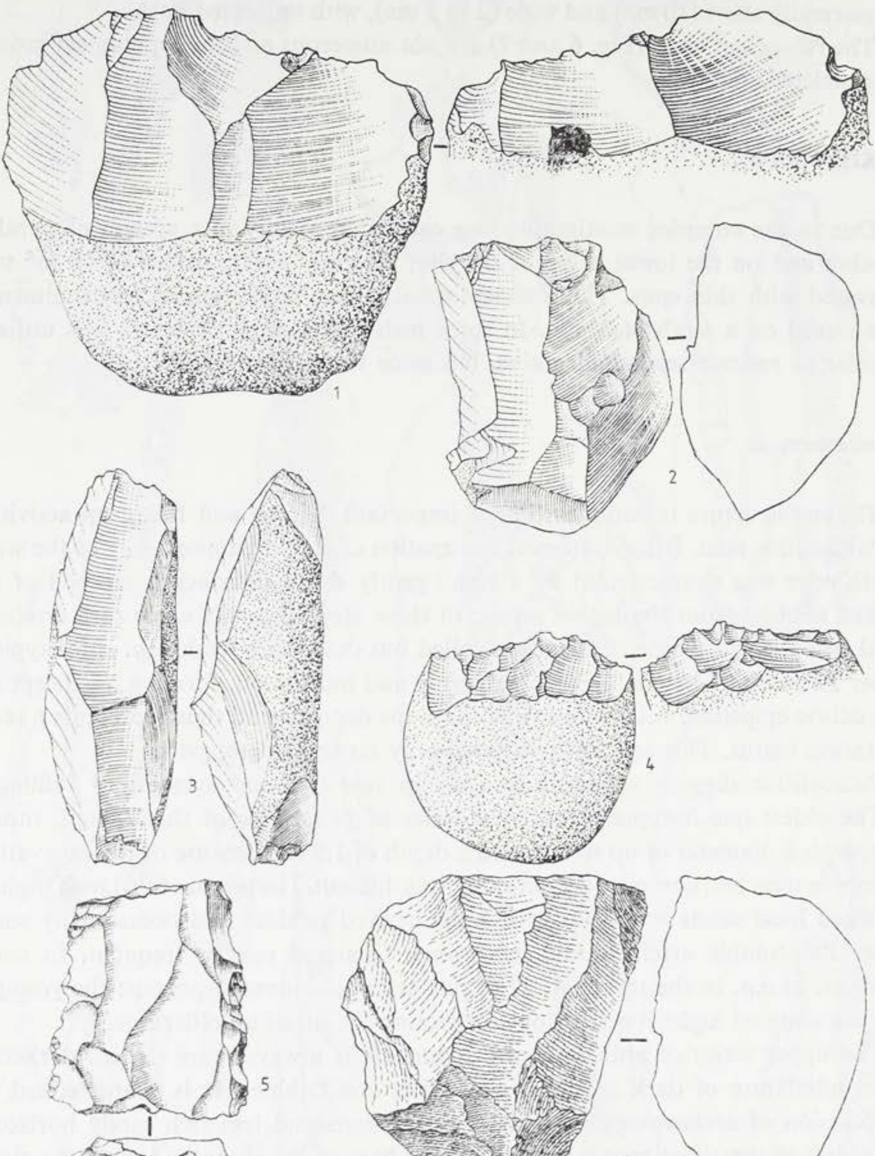


FIG. 8. Makhadma 4. Cores

black archaeological layer can be found as a slope deposit at the base of the slope, *e.g.* in the larger excavated surface. These slope deposits are rich in archaeological material, even in very fragile fish remains.

Archaeological material

As in Makhadma 2, terrace cobbles have been utilized in the debitage procedure. Artefacts are normally in a fresh state of preservation. However, some artefacts are more or less rolled. As a general rule the most intensively rolled ones can be found in the basal part of the gray-black layer, whereas the very fresh ones are to be found in the central part of that layer. Artefacts from the pits are not numerous.

The faunal remains are listed in Table 2.

Cores are made out of cobbles. The chert is of varying quality, often of light brownish gray colour. Some of the cobbles have rather fresh cortex whereas others are fully rolled.

The single platform core (Fig. 8: *2 - 6*) is the most numerous type. A *crête* was only sporadically prepared. Striking platforms are flat. As at Makhadma 2, debitage technique is very simple, consisting in removing a primary flake perpendicular to the long axis of the nodule, thus creating a single platform. The final products of the flaking strategy are mainly bladelets and elongated flakes. Core edges are not regularized, but strongly denticulated as to be comparable to some of the thick denticulated scrapers. Cortex is often present at the reverse side of the core.

Flakes and blades occur by thousands, but for the time being, a complete record is not yet available. There is, however, a general resemblance with the Makhadma 2 debitage. Blades are short and wide (L: 42.42$\pm$18.6 mm; W: 16.45$\pm$7.9 mm; T: 5.85$\pm$4.0 mm), but sometimes of very good quality. The butt is flat.

Retouched tools (Table 1) are not numerous and the typological groups are restricted. We tried to exclude the artefacts with accidental retouches. Pieces with a continuous retouch have not been recorded in our listing.

Single end-scrapers (Fig. 9: *1 - 6, 9*) are not numerous nor are they of good quality. The burin (Fig. 9: *8, 10 - 13*; 10: *1 - 14*), accounting for 37% of the tools, is an important category. The backed bladelet group (Fig. 11: *6 - 12*) is represented by some rather atypical elements. Some of them are rather flakes than bladelets. A carefully manufactured one (Fig. 11: *7*) is a backed and truncated bladelet with retouched base. Some of the bladelets with curved backed end (Fig. 11: *3 - 5*) are similar to some of the truncations. Notches are the best represented tool category at the site. The category of truncations (Fig. 11: *10 - 30*) is an important group. Geometric microliths (Fig. 11: *31 - 40*) are rare but present. The absence of microburins and trihedral points suggests that the microburin technique has not been utilized. Segments (Fig. 11: *35, 37*), trapezes (Fig. 11: *32 - 33, 36, 40*) and triangles (Fig. 11: *31, 34, 38 - 39*) can be found. The trapezes, however, are atypical. Naturally pointed blades or bladelets can have an unilateral or a bilateral proximal retouch (Fig. 8).

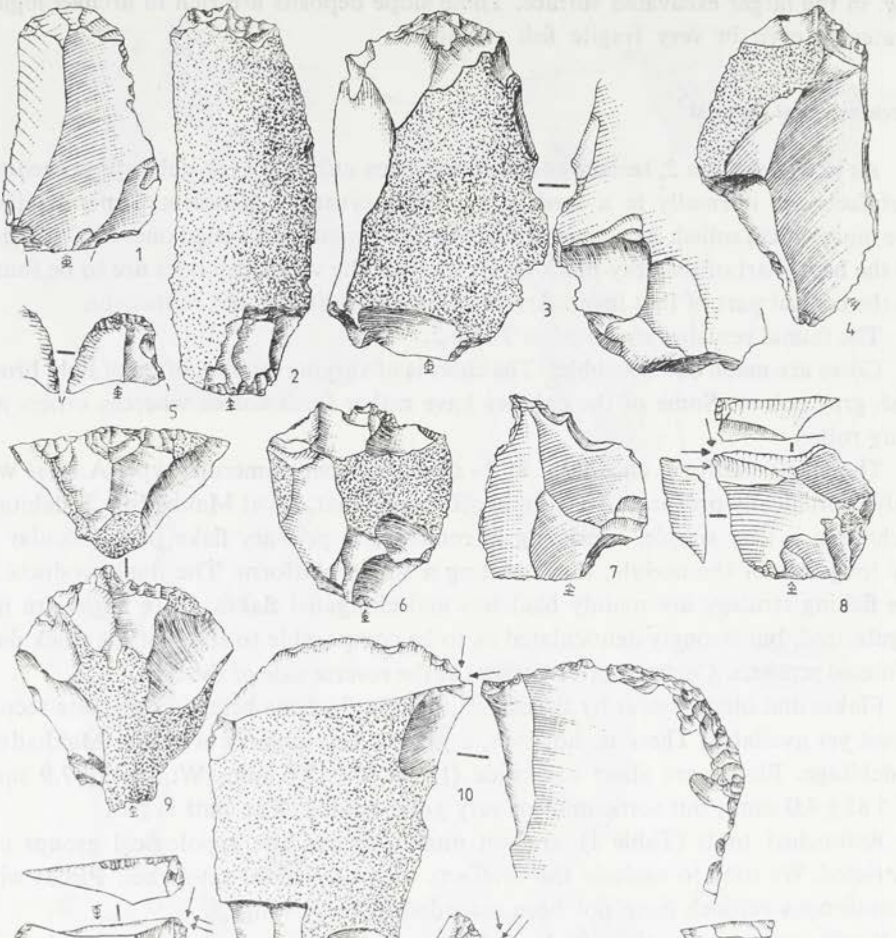
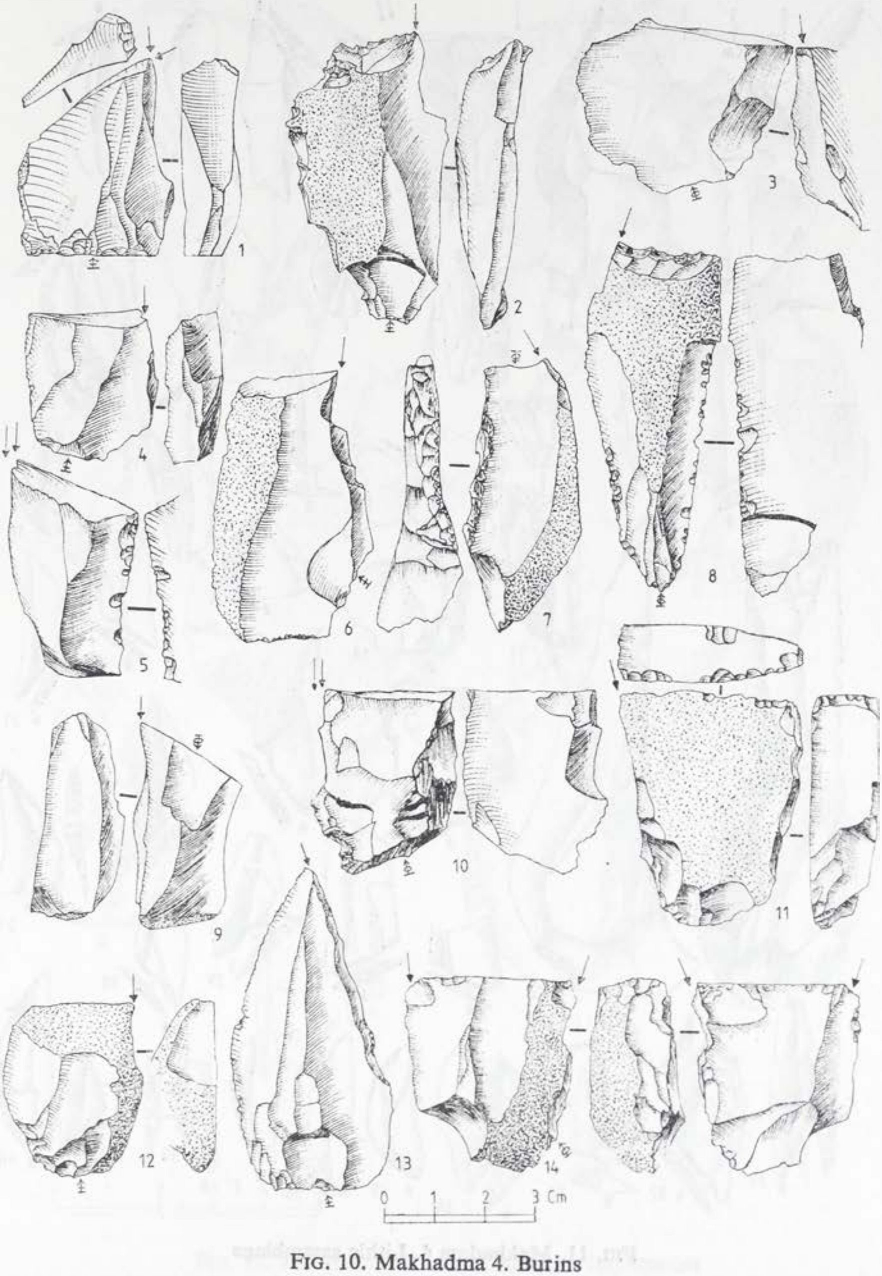


FIG. 9. Makhadma 4. Lithic assemblage

1 - 6, 9: End-scrapers; *7*: Piercer; *8, 10 - 13*: Burins

FIG. 10. Makhadma 4. Burins



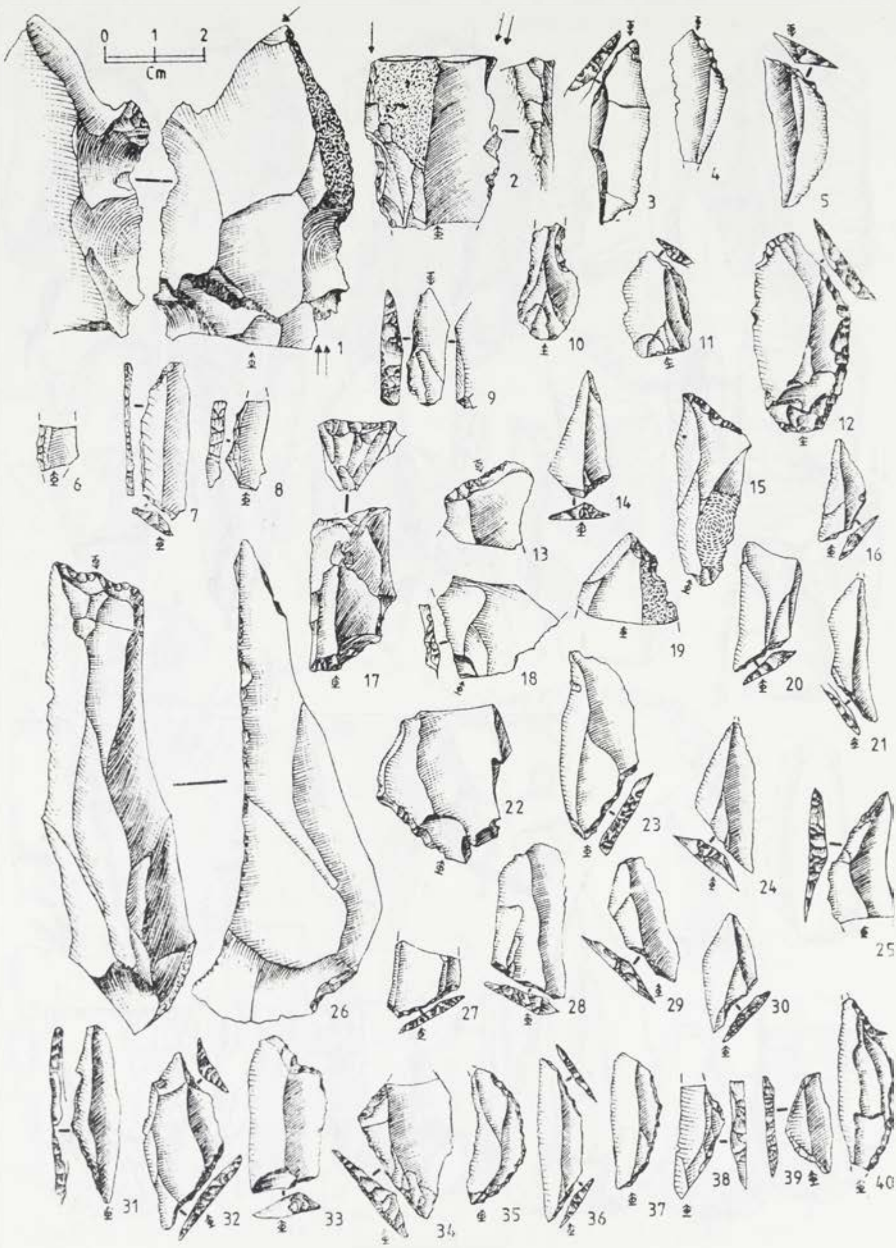


FIG. 11. Makhadma 4. Lithic assemblage

1, 2: Burins, *3 - 5*: Bladelets with curved backed end; *6 - 12*: Backed bladelets; *13 - 30*: Truncations; *31 - 40*: Geometric microliths

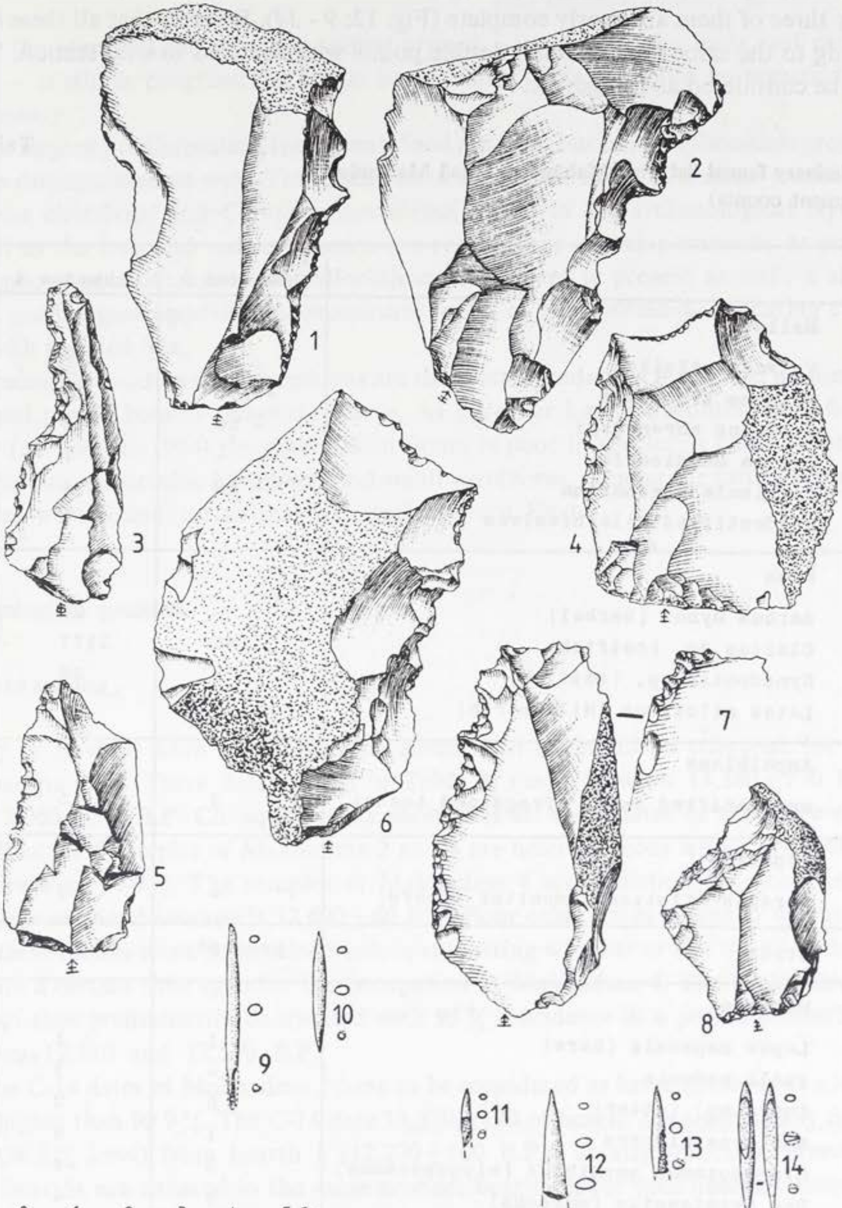


Fig. 12. Makhadma 4. Lithic and bone implements
1 - 8: Notched and denticulated pieces; *9 - 14*: Bone tools

The site yielded some bone tools which have been obtained from mammal bone. Only three of them are nearly complete (Fig. 12: *9 - 14*). It seems that all these tools belong to the same type of small double points with rounded to oval section. They can be considered as fish gorges.

Table 2

Preliminary faunal list from Makhadma 2 and Makhadma 4
(fragment counts)

	Makhadma 2	Makhadma 4
Molluscs x		
Valvata nilotica	-	1
Bulinus truncatus	± 100	25
Gyraulus ehrenbergi	± 50	19
Engina mendicaria	-	1
Corbicula consobrina	± 20	4
unidentified Nile bivalves	-	9
Fish		
Barbus bynni (barbel)	-	29
Clarias sp. (catfish)	1285	2177
Synodontis sp. (catfish)	-	98
Lates niloticus (Nile perch)	-	1
Amphibians		
unidentified Anura (frogs and toads)	3	5
Reptiles		
Varanus niloticus (monitor lizard)	-	1
Birds	present	present
Mammals		
Lepus capensis (hare)	1	1
small rodents	-	3 xx
Lutra sp. (otter)	5	3
small carnivores	1	8
Hippopotamus amphibius (hippopotamus)	3	4
Bos primigenius (aurochs)	3	4
Alcelaphus buselaphus (hartebeest)	1	7

* With the exception of 1 *Gyraulus* and 1 *Bulinus* the molluscs from Makhadma 2 are sampled in and at the base of the Sheikh Houssein silts.

** In addition to these isolated fragments, three almost complete skeletons were found.

In section ,,Fish" species *Tilapia* sp. should be added: 18 for Makhadma 2, and 4989 for Makhadma 4.

Faunal remains

As the identification of some animal groups – especially the birds and carnivores – is still in progress, the faunal list given in Table 2 should be regarded as preliminary.

The majority of the material represents food remains, but other taphonomic groups can be distinguished as well. The small molluscs *Valvata nilotica, Bulinus truncatus, Gyraulus ehrenbergi* and *Corbicula consobrina*, found in the archaeological layers, as well as the frog and rodent remains are regarded as contemporaneous or pene-contemporaneous intrusives. An allochthonous element is present as well: a shell of the marine gastropod *Engina mendicaria* found at Makhadma 4, indicating contact with the Red Sea.

Among the food waste, fish remains are the most abundant at both sites; mammal, bird and reptile bone is relatively scarce. As on other Late Palaeolithic sites from Egypt (*cf.* Gautier 1984) the mammalian fauna is poor in species: it contains hare, hippopotamus, aurochs, hartebeest and small carnivores. Among the latter, remains of otter were found, an animal now extinct from Egypt.

Chronological position

The C-14 samples

Up to now we have at our disposal seven C-14 dates, all on charcoal, for the Makhadma sites. These dates, listed in Table 3, range between 13,380±770 B.P. and 12,060±280 B.P. Chi-square tests show that all C-14 dates of the three sites as well as the 6 samples of Makhadma 2 and 4 are heterogeneous with a probability of more than 99.9%. The samples of Makhadma 4 are statistically homogeneous and their weighted average is 12,690±60 B.P. Four other dates currently are under way; these results must be obtained before suggesting whether or not the C-14 dates indicate a certain time span for the occupation at Makhadma 4. The Makhadma 4 site can thus preliminarily be situated with 95% confidence in a period somewhere between 12,810 and 12,570 B.P.

The C-14 dates of Makhadma 2 have to be considered as heterogeneous at a level even higher than 99.9%. The C-14 date 13,330±170 of hearth 2 is significantly different (99.9% level) from hearth 1 (12,270±100 B.P.). Stratigraphically, however, these hearths are situated in the same artefact bearing layer with hearth 1 situated about 4 m upslope from hearth 2.

The C-14 date 12,060±280 B.P. of derived charcoal sieved out of the Sheikh Houssein silts at 10 m from the site fits remarkably well with the apparent age of hearth 1, so that these 2 samples can date the same event. Their average age is: 12,250±95 B.P., dating the event at a 95% confidence level between 12,450 and 12,050

Table 3

C-14 dates of the Makhadma sites

Site	C-14 dates in B.P.	Laboratory No	Provenience of charcoal
1/A [x]	13,380 ± 770	I-3440	from thin layer of Sheikh Houssein silts
2	12,060 ± 280	GrN-12029	sieved out from Sheikh Houssein silts
2	12,270 ± 100	GrN-12030	hearth at 17N2E
2	13,330 ± 170	GrN-12031	hearth at 13N1E
4 [xx]	12,790 ± 170	GrN-12032	scattered fragments from 15-18N8E. Depth: 50-80 cm
4	12,570 ± 80	GrN-12033	scattered fragments from 19N5E. Depth: 70 cm
4	12,940 ± 130	GrN-12034	scattered fragments from 27N7-8E. Depth: 60 cm

* Wendorf and Schild 1976: 118.

** C-14 dates of the pits are now (1989) available: 12,410±120 (GrN-12984); 12,410±60 (GrN-12985); 12,340±70 (GrN-12936); 12,320±100 (GrN-12981).

B.P. The stratigraphical position of hearth 1 overlaying a posthole structure makes clear that this event is certainly related to the occupation of the Makhadma 2 site and its associated industry.

Datation of the Sheikh Houssein silts

The date of charcoal from the Sheikh Houssein silts at Makhadma 1 has a very large standard deviation, so that it is not possible to specify its position in relation to the dates of the other sites. The sample of derived charcoal GrN-12029 (Table 3) within the top part of the Sheikh Houssein silts at Makhadma 2 antedates of course part of this silt aggradation. It means that this aggradation continued for a while after 12,250±95 B.P.

Chronological succession of the Makhadma sites

Due to the stratigraphical position in the top of slope deposits underlying the Sheikh Houssein silt, Makhadma 1 is considered to be the oldest of the sites involved. No C-14 dates are available. The Makhadma 1 C-14 date is not situated within the archaeological site.

Makhadma 4 is preliminarily dated at 12,690±60 B.P. Dating of Makhadma 2 is hampered by the interpretation of the sample GrN-12031. If this sample age is related directly to the occupation of the site, then the site history ranges between 13,330±170 B.P. and 12,250±95 B.P. with a discontinuous occupation over a longer period. However, if the sample age is unrelated to the occupation (burning of old wood, remnant from older occupation on the same spot), then prehistoric man lived at this spot somewhere between 12,450 and 12,050 B.P.

The available C-14 dates indicate that the Makhadma 2 and 4 were both inhabited in a time period less than a millennium between 13,000 and 12,000 B.P.

General discussion

Site characteristics and subsistence activities

The Makhadma 2 and 4 sites with gray-black archaeological deposits are middens, similar to the *escargotières* of the Maghreb, but with fish remains instead of snail shells. Most of the sediments of the black archaeological layer are of human origin. Only the sandy matrix and the cobbles are locally derived. The bones, flints and ashes are a typical midden deposit. The admixture with black silt is probably due to the frequent contact between the site and the muddy fishing grounds. From the inner structure of the black archaeological layer, it can be inferred that the midden deposits are the result of a relatively long, but not necessarily continuous occupation period.

From the faunal list it is evident that fishing must have been the main subsistence activity at both Makhadma 2 and 4. Hunting and fowling apparently were practised less intensively but the meat yield of each catch, especially of the ungulates, was much higher.

Makhadma 2 and 4 are rare examples of sites where the occupation and the corresponding behaviour of the Nile have been dated separately. The contemporaneous Nile deposits are the Sheikh Houssein silts, still aggrading posterior to 12,250±±95 B.P. The identical stratigraphical position of sites and silts, the subsistence activities, and the location of the sites just above and beyond these well preserved deposits are considered as important additional arguments for linking sites and silt deposits.

The Sheikh Houssein silts and the "Wild Nile"

The field observations clearly show that a well marked hiatus exists between the Shuwikhat silts, containing a Late Palaeolithic site at Shuwikhat 1 and the Sheikh Houssein silts. These latter silts are related to a period with very high Nile floods, the highest in Late Palaeolithic times. The maximal flood level is at about 6 m above the floodplain and at about 4 m above the Shuwikhat Terrace.

At Makhadma these silts are dated not only by two C-14 dates (Table 3), but also by the presence of a key horizon, the so-called burned layer, dated at Kumbelat (between Qena and Luxor) at 12,500±230 (I-3424, Wendorf and Schild 1976: 102 - 104). This horizon is *in situ* at the base of the silts near Makhadma 1, within the silts near Makhadma 4 and is in derived position within the silts at Makhadma 2. In the Kom Ombo Plain, Butzer and Hansen (1968: 115) mentioned already sporadic evidence of high Nile floods (22 m above floodplain), having an averaged date of 11,940±90 B.P. (V-1446; HV-1264 and HV-1265).

The Sheikh Houssein silts, defined at Makhadma, are thus a thin layer of dark Nile silts often conserved at the outer edge of the inundated area and deposited in a stage with occasional or temporay Nile floods of exceptional amplitude, termed the "Wild Nile" by Butzer (1980: 272). From all existing evidences in the Egyptian Nile valley, this catastrophic period is dated from 12,690±60 B.P. to 11,940 ±90 B.P. The Sheikh Houssein silts can be correlated tentatively with the upper part of the Darau Member, Gebel Silsila Formation (Butzer and Hansen 1968; Butzer 1980), termed also the Sahaba-Darau Aggradation or Formation (Wendorf and Schild 1976; Said 1981; for d'scussion see Wendorf *et al.* 1979).

Environment and seasonality

The "Wild Nile" inundations were related to climatological changes in the head-waters and occured in an environment largely determined by local climatic conditions. For this stage we assume a hyperarid climate. This statement is based on following observations pointing to a lack of water activity induced by local rains. The observations are: deposition of Sheikh Houssein silts in the wadi mouths, no intercalations of wadi deposits within these silts and no rill erosion or sedimentological stratifications within the midden deposits, even on the steep slopes. The area free of inundations is thought to be a barren desert with similar geomorphological and environmental characteristics as today.

During the highest floods of the "Wild Nile" stage, and especially during its waxing phase, when terrestial life was not yet adapted to the new system, the changes in the Nile valley bottom had to be dramatic. Indeed, just prior to these events, the Nile floodplain is supposed to be situated below the actual floodplain. During the "Wild Nile" stage, with a flood height of +6 m above the modern floodplain, the inundated area extended all over the valley bottom and included the Shuwikhat Terrace so that no refuge was left for man or other mammals. Higher floods also inundated the Makhadma bend and reached the scarp. The Makhadma sites are thus situated on a safe place as close as possible to the inundated area and on the contact between extreme environments. It seems reasonable to suppose that these events directed prehistoric man towards the exploitation of greater riverine resources.

Whereas the mammalian fauna is comparable at both sites, this is not the case for the ichthyofauna. Makhadma 2 yielded almost 99 % *Clarias*, but at Makhadma 4 only some 30 % of the fish remains belong to this genus. *Tilapia* predominates at Makhadma 4 with some 68 % of the total ichthyofauna; *Barbus*, *Synodontis* and *Lates* are scarce. In spite of their different composition, the fish faunas from both sites were taken from the former inundated area. This statement is based on biological data of the fish and on the comparison of a large number of sites along the Nile (*cf.* Van Neer, this volume). *Clarias*, *Tilapia* and *Barbus* can stay for long periods on the floodplain, since they are able to resist adverse hydrologic conditions. *Synodontis* and *Lates* are rare at Makhadma 4 and absent at Makhadma 2. These two genera often occur together in high frequencies on post-Palaeolithic sites, indicating fishing in the main channel. At Makhadma 4 only one *Lates* bone of a large adult was found: it may represent an individual taken on the floodplain during its short spawning run. The *Synodontis* are of small size and may represent young individuals trapped in residual pools.

The high frequency of *Clarias* at Makhadma 2 is typical of most Late Palaeolithic sites in Egypt and Sudanese Nubia (Van Neer, this volume). Sites with an ichthyofauna comparable to that of Makhadma 4 are rare. High frequencies of *Tilapia* are only known from sites E 81-3, E 81-4 and E 82-3 at Wadi Kubbaniya (Gautier and Van Neer 1989). At least two of these sites are situated close to a shallow basin. At Makhadma 4 the local morphology also can explain the high percentage of *Tilapia*. This genus does not dispose of accessory breathing organs and therefore requires deeper and better oxygenated water than *Clarias*. The fishing grounds near Makhadma 4 were indeed of greater extent, and small basins probably existed much longer during the declining flood season than was the case at Makhadma 2. The Makhadma Bend was indeed the first zone becoming wadable at the beginning of the postflood season. At the same time, the area accessible by man near Makhadma 2 was limited to a small strip.

At Wadi Kubbaniya it was possible to demonstrate that two major phases of fishing were present: one at the very beginning of the inundation when breeding fish occur in shallow marginal areas and a second one when the waters have receded, leaving residual ponds on the floodplain. The fish of the first category of sites are larger on the average. That they are breeding fish is also indicated by the presence of eel, a predatory species that feeds on eggs and fry. Eel is virtually absent on the Wadi Kubbaniya sites that are supposed to contain fish mainly captured later within the year when the breeding is over. The smaller average size of the fish on this second category is a result of the migration of the larger individuals into the main channel. Smaller fish migrate towards the main river later on or can stay on the floodplain until the next flood, if backwaters persist.

The high percentage of *Tilapia* at Makhadma 4 and the small size of both *Tilapia* and *Clarias* indicate that fishing must have been practised rather late within the post--flood season. For Makhadma 2 it is difficult to make similar statements as the number of remains allowing a size estimation is low. The catfish and *Tilapia* remains from that site may theoretically come from individuals taken at the beginning of the flood season when spawning took place, or later within the year when floodwaters receded. If residual pools existed they probably were shallow and desoxygenated as indicated by the preponderance of *Clarias*.

One may wonder why the Makhadma area could be so attractive to prehistoric man during the "Wild Nile" stage. Perhaps the answer is found in the characteristics of the valley bottom and its effects on the fishing grounds, as illustrated in Fig. 13. When the valley bottom is composed mainly by the floodplain, an increase in the flood level creates only a minor increase in the inundated area. The wadable strip along the valley borders remains similar, but the global fishing conditions become adverse as it takes a longer time before the declining water level has isolated basins within the floodplain.

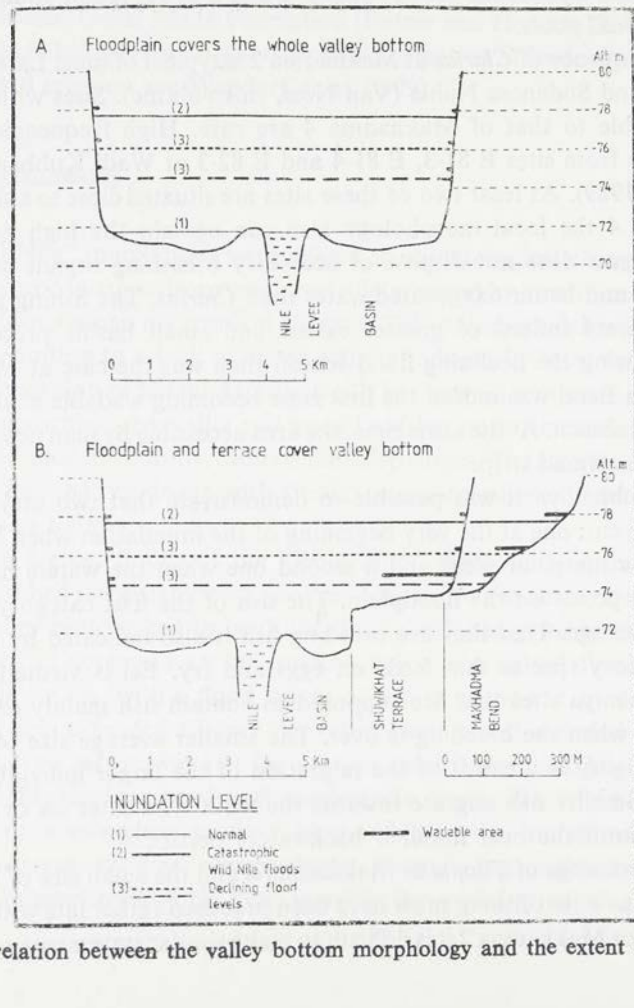


FIG. 13. The relation between the valley bottom morphology and the extent of wadable areas

When a terrace or wadi mouth is inundated in the valley bottom, as in the Makhadma area, whether or not this area remains continuously wadable depends on the flood level. In any case, with declining water level after the highest flood, some of these areas become suitable for fishing activities sooner than others.

Fishing techniques

From the foregoing it is clear that fishing must have been practised mainly when the fish were most vulnerable, namely when they occurred inshore for spawning or when they were trapped in shallow basins wadable to man. It is likely that group fishing was practised as still is the case today. Fish gorges are the only archaeological evidence that gear was used. Other techniques, however, are likely to have been practised: grasping by hand, use of striking and wounding gear. The small size of the fish makes it probable that more sophisticated gear was known as well, such as thrust baskets, nets, and scoop baskets (*cf.* von Brandt 1984). Some of the cobbles found in the Sheikh Houssein silts near Makhadma 4 may represent net weights. Baited fish gorges may have been used for the capture of both catfish and *Tilapia*. Attached in the middle to a bottomline, fish gorges are suitable for *Clarias* fishing. Set our for the night, they can capture fish effecting their daily inshore movements for feeding. Although *Tilapia* are essentially herbivorous they are easily hooked. Normally gorges are inserted lengthwise into a bait, held more or less parallel to the line. This makes it easier for the fish to swallow the bait. The gorge takes up a transverse position when the fish swims away or when the line is pulled (von Brandt 1984). In case *Tilapia* were captured with gorges, they must have been used in combination with rod and line or attached to drift lines.

Fish preparation and conservation

The fish captured in large quantities probably was not all intended for direct consumption. Traditional techniques of preparation of fish in Africa today involve sun and smoke drying and salting. The large amount of charcoal at the Makhadma sites indicates that fire was used to hasten the process of dehydratation of the fish. The simplest techniques of fish preparation with the use of fire involve spreading of the animals on piles of grass that are set on fire or by suspending the fish and making fire under them (Blache and Miton 1962). This preparation technique may have been used both at Makhadma 2 and 4; the post holes found at the former site are perhaps related to the suspension of the fish. At Makhadma 4 the charcoal production occurred on a steplike succession of terracettes. The use of shallow pits in a slope for fish smoking is known ethnographically along the Chad basin (Blache and Miton 1962). Fish may have been charred on the terracettes found at Makhadma 4 or may have been smoke dried if they were suspended above the fire.

A striking difference between Makhadma 2 and 4 lays in the presence at the latter site of large pits under the black layer. We have no indication about their function. We would suggest that the pits are contemporary with, rather than predating, the gray-black layer; the latter accumulated while the pits were in use. In such a system the pit was always higher on the slope. The existence of many pits stresses the presumption of a site utilization over a long period.

The industry

The lithic material of Makhadma 2 and 4 is characterized by the absence of the Levallois- and microburin technique. Flaking was almost always executed on single platform cores. This is rather exceptional since on most Late Palaeolithic sites opposed platform cores predominate. The burin is the most important tool type and is mostly of dihedral technique. End-scrapers and pointed blades with proximal retouch are present. The microliths of Makhadma 4 consist mainly of obliquely truncated pointed bladelets forming microlithic points and also some geometrics such as irregular trapezes and isocele triangles. It is our impression that the absence of microliths at Makhadma 2 is only due to the tool poverty of that site.

Technologically, the Makhadma 2 material is clearly Late Palaeolithic, but seems uncharacteristic. Makhadma 4, with the presence of some microliths, can be compared with the Idfuan (Wendorf and Schild 1976: 243), *e.g.* site E71K9, which, in our opinion, is rather typologically uncharacteristic because of the small inventory of tool types. According to Wendorf and Schild, the non-Levallois Idfuan appears to have considerable variations in the frequencies of certain tools. All of them share an emphasis on retouched flakes and blades, which represent half or more of the total tools, while endscrapers and backed elements are rare to absent. All of the Idfuan sites have considerable values for notches and denticulates and the frequencies of truncations are generally low. It has been related with the Ballana-Masmas aggradation around 17,400 B.P. (Wendorf and Schild 1976), which is of course much older than the Makhadma sites. Makhadma 4 differs from the Idfuan by its high frequency of truncations forming microliths.

Another possible correlation can be found within the Silsilian, where proximal truncations are frequent. The Makhadma 4 site, however, differs from the Silsilian by a high burin percentage, the presence of some geometrics, and the absence of microburins. In both complexes blades with proximal retouch occur. The Silsilian has been dated around 15,000 B.P. (Smith 1966) but more recent occurrences have also been reported (Vermeersch *et al.* 1985).

The Makhadma 4 material also has some similarities with the Afian, where truncations forming microliths and bladelets with rounded base occur. The Afian, however, is characterized by a high microburin and a low burin frequency.

Fish gorges like those of Makhadma 4 have been found at Wadi Kubbanyia E-78-8 (Wendorf and Schild. 1980: 188) around 17,000 B.P. and also in the Qarunian around 8,000 B.P. and are thus not characteristic for a specific period or cultural group.

As stated by Roubet and Hadidi (1982) the Late Palaeolithic of Egypt is very complex. Its study is also hampered by many typologically non-characteristic sites. However, our present understanding of the Upper and Late Palaeolithic industries of the Egyptian Nile valley suggests an important synchronic variability but also an absence of diachronic evolution in the techno-complexes. This can be due to site specialisation, may be related to seasonal occupation patterns, or, more probably, it is the consequence of our poor understanding of what happened during that period. Therefore, at the present time we prefer not to correlate out Makhadma material with one of the previously defined groups in the Nile Valley.

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EDITORIAL

This volume is the second one in the series of the "Studies in African Archaeology" published by the Poznań Archaeological Museum. It was started by the volume "Origin and Early Development of Food-Producing Cultures in North-Eastern Africa" published jointly with the Poznań Branch of the Polish Academy of Sciences in 1984. The third volume in the series, "Environmental Change and Human Culture in the Nile Basin and Northern Africa until 2nd Millennium BC", is expected to come out in 1991. All these volumes contain the Proceedings of the international symposia held at Dymaczewo near Poznań in 1980, 1984 and 1988. It seems worth reminding that the last one was organized by the "International Commission of the Later Prehistory of North-Eastern Africa" in collaboration with the Poznań group of prehistorians working in Africa.

It is planned to expand the contents of the series. It will contain not only the proceedings of the past and future Dymaczewo symposia but should also comprise different accounts of the archaeological field-work carried out in north-eastern Africa and its results. With few exceptions, the series will be published in English.

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Lech Krzyżaniak
Editor

ANGELA E. CLOSE

Lithic development in the Kubbaniyan (Upper Egypt)

Introduction

Wadi Kubbaniya is one of the major wadis draining from the Eastern Sahara to the Nile Valley, and reaches the Nile some 25 km north of Aswan. In 1978 and 1981 - 1984, it was the focus of a major research programme by the Combined Prehistoric Expedition, which is jointly sponsored by Southern Methodist University, the Polish Academy of Sciences and the Geological Survey of Egypt. Twenty-six Palaeolithic sites in the wadi were studied as part of this programme. Most sites were occupied several times, some were occupied many times and they range in age from the Middle Palaeolithic (>50,000 years ago) to *ca* 12,000 B.P. The sites and their various occupations are assigned to a wide variety of archaeological industries. This paper will be concerned only with some of the sites which are called Kubbaniyan.

The Kubbaniyan industry is closely related to the Halfan (Marks 1968;Close 1980a: 252 - 257) and is known to occur outside Wadi Kubbaniya (at Site E71K13 near Isna; Phillips 1973). It remains, however, best represented at and best known from Wadi Kubbaniya itself (Wendorf *et al.* 1980). Twelve Kubbaniyan sites have been investigated in the wadi, of which nine are included in this study (Tables 1 and 2); two are excluded because the artefact-samples are very limited (E-78-5 and E-78-8) and one (E-82-1) is a specialised quarry-site for the manufacture of grinding--stones.

Kubbaniyan settlement and seasonality

The Kubbaniyan sites occur in three different micro-environmental settings in the wadi (Wendorf and Schild 1980) and are grouped accordingly in Tables 1 and 2. The first group, the dune sites, lie 3 - 4 km from the wadi mouth, on and in the Late Pleistocene dunefield, which was invading the wadi from the North during the period of Kubbaniyan occupation. The three sites listed were all reoccupied many times, the occupations of Site E-78-3 being particularly intense, as is apparent from the sample-sizes (Table 1). The occupation-layers of E-78-4 (unpublished data from the 1981 - 1984 excavations are here included by kind permission of Dr. Hanna Więckowska) were less rich in artefacts, and those at E-81-1, while numerous, seem to represent only brief and relatively poor occupations. Since the three sites occur in the same dunefield, it has been possible to establish a relative stratigraphy for them. The units of study are listed in Tables 1 and 2 in the correct stratigraphical order, from E-78-3, Layers 1-10, the oldest, to E-78-4, Levels a-b, the youngest. In addition, Table 1 gives an estimated age (in radiocarbon years) for each unit, based on the long series of radiocarbon dates for the sites (Close 1980b; 1984). The entire series of units from the dune sites covers a period from *ca* 18,600 B.P. to *ca* 17,300 B.P., which is almost the whole duration of the Kubbaniyan industry. The dune sites are believed to have been seasonally (but not necessarily annually) occupied, perhaps at and immediately after the maximum flood of the Nile (late August or September if the Nilotic regimen was the same as that of today). The presence of winter birds in the sites suggests that occupation extended to, or was repeated in, the winter months. All of the sites have yielded very similar assemblages both of faunal remains (heavily dominated by Nile catfish) and of floral remains (principally of species still indigenous to the Nile Valley in modern times), and all seem to represent the same types of occupation and of subsistence-strategy.

The second group of sites are those from the sandy swales in the floodplain adjacent to the dunefield. The sites lie within a few hundred metres of the dunes and are, again, 3 - 4 km from the wadi mouth. Unfortunately, there are no clear stratigraphical relationships between these sites so their relative ages are unknown. The ages given in Table 1 are based on radiocarbon dates of 17,850$\pm$200 B.P (SMU 592) for E-78-7, Trench 7, and 16,660$\pm$370 B.P. (SMU 1221) for E-83-2. (both on charcoal). The sites represent multiple occupations and, since they are in the floodplain, must have been occupied later in the year than the dune sites, after the level of the Nile had fallen considerably. The faunas are similar to those of the dune sites, with a predominance of catfish, but there were no floral remains nor any indirect indication of extensive plant-processing, such as grinding-stones. The data for E-78-7 are from the 1978 excavation (Wendorf and Close 1980); the unpublished data from Sites E-83-1, E-83-2 and E-83-3 are here included by kind permission of Ms. Brenda Scoggins.

The third group of sites are those in the floodplain near the mouth of the wadi, here represented by Sites E-78-5 and E-78-9. Permission to use the unpublished data from both sites was kindly given by Dr. Michał Kobusiewicz. Again, there is no direct stratigraphical relationship between the two sites and the estimated age in Table 1 is based on a radiocarbon date of 18,230 B.P.$\pm$200 years (SMU 1226) on *Unio* shell from E-78-9. The wadi mouth sites could have been occupied only during the low-water phase of the Nile, and the faunal assemblages differ from those of the sites farther up the wadi in that fish are much less important; there is no evidence for the processing of plant-foods. Again, both sites result from many reoccupations of a single, favoured spot.

Trends in raw material usage

In Table 1 are given the percentage-frequencies of the raw material groups in the debitage from the Kubbaniyan units under study. The chert group is composed of fine-grained, homogeneous rocks, including chert, agate, jasper, chalcedony and petrified wood. These are all good quality raw materials and are locally available in the form of rather small pebbles. The sandstone group includes a variety of coarse-grained rocks – all locally available – mostly sandstones with rare occurrences of granite and basalt. Egyptian flint is the finest raw material in quality and is the only one which was not locally available. During the Kubbaniyan period, when hyper-aridity closed the Eastern Sahara to human use, the nearest accessible sources of flint were in the area of Idfu and Isna, 100 - 150 km down the Nile Valley, where it occurs as large nodules in the wadis. Quartz is a locally available, but low quality, raw material, which was never much favoured by the makers of the Kubbaniyan industry; it is included here for the sake of completeness.

If one considers first only the data from the dune sites, which are in chronological order, three consistent, diachronic trends are immediately apparent and statistically significant ($p=0.05$): the frequency of the chert group decreases through time ($r=-0.91$, for the correlation between time and the frequency of cherts); the frequency of the sandstone group increases through time ($r=0.87$); the frequency of flint also increases through time ($r=0.90$). Since the frequencies are expressed as percentages, which are mutually dependent, when one increases, another must decrease. What seems to be happening in this case is that the sandstones and flint both become more important through time, leading to a consequent decrease in the importance of the chert group.

There is no evidence of the Levallois technique in the earliest unit (E-78-3, Layers 1 - 10). Thereafter it is always present, although remaining rare. Its frequency does not vary with time.

The swale sites and the wadi mouth sites are all very rich in cherts, very poor in sandstones and poor, or very poor, in flint (Table 1). Such a combination in the dune sites would be an indication of placement in the early part of the Kubbaniyan sequence. The wadi mouth sites may be quite early, although the date for E-78-9 indicates that that site, at least, is not very early. Of the swale sites, however, we know on the basis of the radiocarbon dates that E-78-7 is quite late and that E-83-2 is very late; there are typological reasons (the presence of scaled pieces – see below) why E-83-1 and E-83-3 may be rather late in the Kubbaniyan. It would appear, therefore, that whatever were the factors operating to bring about consistent, dia-

Table 1

Percentage frequencies of principal raw material in the debitage of Kubbaniyan sites

	Age (B.P.)	Chert Group	Sandstone Group	Egyptian Flint	Quartz	Sample Size	Levallois Technique
Dune Sites							
E-78-4, Levels a-b	17,300	71.9	6.5	19.1	2.5	5,349	+
E-78-4, Levels b/c-h/i	17,700	69.5	5.6	21.7	3.2	7,420	+
E-81-1	17,800	68.8	7.7	18.4	5.1	5,813	+
E-78-3, Layers 23-24	18,100	78.3	4.6	16.1	0.9	1,449	+
E-78-3, Layer 22/23	18,200	83.4	3.1	13.3	0.2	3,190	+
E-78-3, Layer 20-22	18,400	88.3	3.3	8.4	+	34,086	+
E-78-3, Layer 18 (s.1.)	18,500	89.9	2.5	7.4	0.2	13,607	+
E-78-3, Layers 1-10	18,600	96.2	0.3	2.8	0.7	5,319	-
Swale Sites							
E-78-7, Trenches 7 & 9	17,900	98.0	0.1	1.3	0.5	11,420	+
E-83-1	?	90.1	2.1	6.1	1.1	7,304	-
E-83-2	16,700	94.1	0.7	4.5	0.8	8,982	-
E-83-3	?	93.7	0.6	4.9	0.8	5,901	+
Wadi Mouth Sites							
E-78-5	?	91.1	0.4	8.0	0.5	16,704	-
E-78-9	18,200	98.0	0.2	1.7	0.1	22,987	-

chronic change in the dune sites, either they did not affect sites elsewhere in the wadi or else they operated differently there.

The decrease in chert in the dune sequence is explicable as a consequence of the increase in other raw materials. The increase in the sandstone group seems to be related to the shaping and reshaping of grinding-stones. There are many large grinding-stones in the dune sites, made for the most part on blocks of sandstone quarried from the wadis edges. The sandstone debitage is of same type of rock, and the traces of grinding-surfaces present on the dorsal faces of numbers of the larger flakes indicate that they were struck from actual grinding-stones. The dune sites also yielded numerous remains of plants, which could well have been ground on the grinding-stones. No grinding-stones have been found in the swale sites or the wadi mouth sites (nor have any plant-remains, although this may reflect the relatively unfavourable conditions for preservation in the silts). The paucity of sandstone debitage in these sites presumably results from the absence of grinding equipment. Conversely, the increase in sandstone in the dune sequence may well indicate the increasing importance of grinding-activity and, thus, of plant-foods.

The frequency of flint indicates the geographical orientation of the Kubbaniyan. The earliest unit (E-78-3, Layers 1 - 10) is similar in typology and technology to the Halfan of Nubia, but the increase in flint thereafter betrays a northward orientation that became more and more important through time. The single Kubbaniyan site known at Isna (Phillips 1973) is indistinguishable from the middle phase at Wadi Kubbaniya (see below), except that almost all the artefacts are flint. This, and the sheer quantity of flint at Kubbaniya, would suggest not merely contact or trade between the two areas, but actual movement of people. The low frequencies of flint at the swale sites, even though one of them, at least, is known to be late in the Kubbaniyan sequence, may be a reflection of seasonal differences. If the flint were brought into Wadi Kubbaniya when poeple moved onto the dune sites at about the time of the maximum flood, it can be expected to have become much rarer by the time the swale sites were occupied, several months later.

Typological development

Table 2 gives the percentage frequencies of some of the major tool-groups in the Kubbaniyan, and the proportion of tools made on flint. Backed bladelets are the essence of Kubbaniyan typology. They are usually unpointed, are often made with Ouchtata retouch rather than true backing and are frequently only partially backed. They are always important, sometimes overwhelmingly so (E-78-5), and would presumably, therefore, represent common, everyday activities. In this sense, they form a background against which the fluctuations of other tool-groups may be measured, but without any implication that backed bladelets were ever "unimportant" in the Kubbaniyan (*cf.* Mazel and Parkington 1981: 23).

Table 2

Percentage frequencies of backed pieces, burins, scaled pieces and flint among retouched tools at Kubbaniyan sites

	Backed Pieces	Burins	Scaled Pieces	Egyptian Flint	Sample Size
Dune Sites					
E-78-4, Levels a-b	36.7	2.3	47.0	19.5	215
E-78-4, Levels b/c-h/i	58.3	1.6	22.3	23.2	314
E-81-1	35.8	2.8	51.3	29.0	378
E-78-3, Layers 23-24	85.3	2.9	-	23.5	68
E-78-3, Layer 22/23	91.2	-	-	23.9	113
E-78-3. Layer 20-22	83.9	2.3	-	25.7	1,000
E-78-3, Layer 18 (s.l.)	83.9	1.5	-	25.9	409
E-78-3, Layers 1-10	72.2	-	-	0.9	108
Swale Sites					
E-78-7, Trenches 7 & 9	60.3	0.4	0.9	4.8	458
E-83-1	66.7	1.1	1.1	17.8	90
E-83-2	32.9	-	-	17.1	152
E-83-3	38.9	0.9	1.9	9.3	108
Wadi Mouth Sites					
E-78-5	96.2	2.0	-	13.3	345
E-78-9	91.9	6.1	-	10.8	148

On the basis of the stratified sequence in the dune sites, the Kubbaniyan may be informally divided into three developmental phases. The first of these includes only the earliest unit E-78-3, Layers 1-10 (Tables 1 and 2). Here, there is almost no use of flint for the manufacture of tools (neither was flint very common in the debitage), there are no scaled pieces, there are no burins and, significantly, there is no evidence of the Levallois technique.

The second phase comprises the remaining layers of E-78-3. Consistently, about a quarter of all tools are made on flint regardless of the frequency of that raw material in the debitage, there are still no scaled pieces, but the Levallois technique is present as are also burins. Layer 22/23 of E-78-3 did not yield any actual burins, but there were several flint, burin resharpening spalls.

The Kubbaniyan burins, which appear in this second phase, are distinctive and very characteristic. Typically, they are multiple burins on which each burin-edge has been resharpened several times. They are almost invariably made on flint and, where the type of blank can be identified, specifically on large, Levallois flakes of flint. There is no evidence for the manufacture of these flakes at Wadi Kubbaniya itself: there are very few Levallois cores, there are no flint cores large enough to have yielded flakes of such a size and there is very little preparatory flint debitage. The large, flint, Levallois flakes seem to have been brought into the wadi already made, although, if one may judge from the number of initial burin spalls, probably not already in the form of burins. This combination of complex, heavily used burins and the Levallois technique is a characteristic of the Kubbaniyan which appears at the beginning of the second phase. Thereafter, both burins and the Levallois technique are consistently present, although not common, throughout the Kubbaniyan sequence.

The third phase includes E-81-1 and E-78-4. The proportion of tools made on flint remains relatively unchanged, burins and the Levallois technique continue present, but there are suddenly very large numbers of scaled pieces (none was found at E-78-3). The proportion of scaled pieces fluctuates, but not with time. The sudden importance of this tool-group should suggest the beginning of some equally important, new activity in Kubbaniyan life. Unfortunately, there is no corresponding change in the faunal or floral collections, and no microscopic traces of use-wear have been detected on the scaled pieces themselves (H. Kenny, pers. comm.). This new activity therefore remains hypothetical and elusive.

When we move away from the dune area into the swale and wadi mouth sites, again, the stratigraphically established dune sequence no longer seems valid. Among the swale sites, E-83-2, lacking burins, the Levallois technique and scaled pieces, should be early but is dated late, while the other three sites have the "late" features of burins and scaled pieces (although scaled pieces are much rarer here than they are in the dunes), but the "early" features of low frequencies of flint in both tools and debitage, no use of the Levallois technique at E-83-1 and a rather early radiocarbon date for E-78-7. It is also worthy of note that the swale sites are all typologically much more varied than the dune sites: they all include notable quantities of truncations, of notches and denticulates and of pieces with continuous retouch.

At the wadi mouth sites, on the other hand, not many of the tools are made on flint, burins are present, scaled pieces are lacking and almost all of the retouched tools are backed bladelets.

Conclusions

The stratified sequence of Kubbaniyan sites in the Late Pleistocene dunefield of Wadi Kubbaniya enables us to trace a diachronically consistent development of the Kubbaniyan industry in this particular microniche. The principal features of this development are greater typological complexity through time, more emphasis on grinding equipment – presumably of plant-foods – and an increasingly northward geographical orientation, as reflected in the importance of imported Egyptian flint.

The dunefield pattern of development is, at best, extremely hard to see in Kubbaniyan sites in other areas of the wadi. It is possible that the two sites at the wadi mouth may both fall within a rather early part of the Kubbaniyan, probably corresponding to the later layers of E-78-3, or the second phase as defined above. The swale sites, however, seem each to combine features of both the earlier and later parts of the dunefield sequence. It is suggested that this results from micro-environmental differences between the swale area and the dune area. The sites are only a few hundred metres apart, but it is more important that they were occupied during different stages of the annual Nilotic cycle, the dune sites during high flood and perhaps in winter, and the swale sites when the flood had fallen significantly from its maximum. These differences are also reflected in the lack of grinding equipment at the swale sites, and in the evident need there for a more varied range of retouched stone tools. The differences in exploitation between these two adjacent micro-environmental niches seem to have been great enough to mask any similarities in development between sites in the two areas. The diachronically consistent pattern of development in the dunefield is apparent, then, only because there is little or no micro-environmental variation between the sites there. The data from the swale area are, unfortunetely, too limited to allow detection of a corresponding sequence fort hat microniche.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

DOUGLAS J. BREWER

A model for resource exploitation in the prehistoric Fayum

This paper discusses the zooarchaeological research program that has been initiated in the Fayum Depression. It presents a model for Fayum resource exploitation based on a preliminary analysis of the Fayum faunal remains.

Background to the study

Caton-Thompson and Gardner (1934) were the first to extensively investigate the prehistory of the Fayum depression, Egypt (Fig. 1). They concluded that two distinct cultures had occupied the area during the Early to Middle Holocene. They placed these two cultures in a chronological sequence based on their own construction

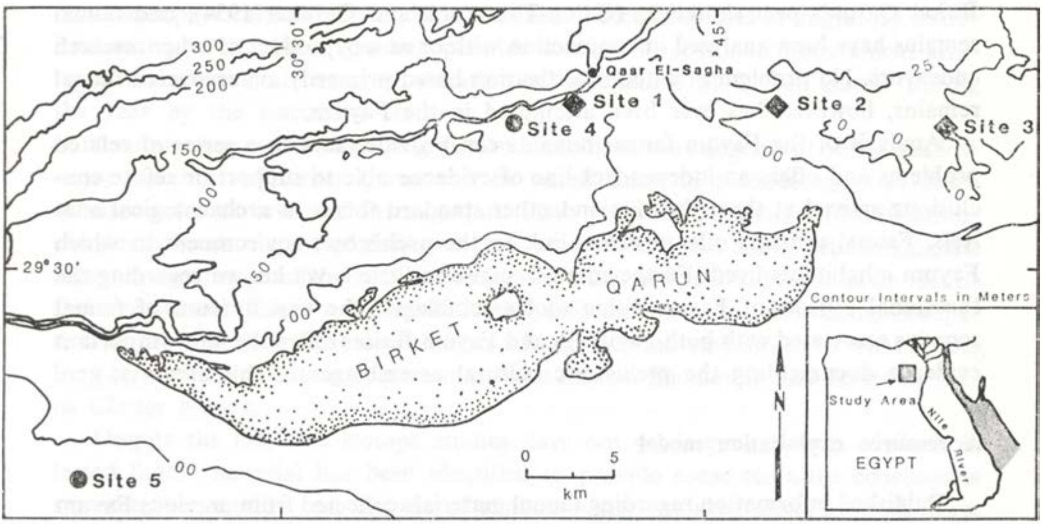

FIG. 1. Map of the Fayum showing location of sites used in this analysis

of the prehistoric levels of the Holocene lake predating the present Birket (Lake) Qarun. Fayum A sites, which represented the earliest industry, are characterized by a bifacial lithic tool assemblage, pottery, and the remains of domestic plants and animals. The presence of a Neolithic assemblage suggested to Caton-Thompson and Gardner (1934 : 1) that Fayum A sites represented village life supported by a fully developed Neolithic economy based on domesticates. Fayum B, the second cultural complex, was believed to represent a younger immigrant population into the Fayum area. Fayum B lithic materials are composed of backed blades and bladelets; bifacial tools are conspicuously absent. Additionally, Fayum B sites lacked pottery and any evidence suggesting that this population might have utilized domestic plants or animals. Caton-Thompson and Gardner (1934) referred to Fayum B as a lingering Mesolithic group.

Caton-Thompson and Gardner (1934) were correct in identifying two distinct cultural complexes, but later studies (Wendorf and Schild 1976; Wenke *et al.* 1983) have shown that Caton-Thompson and Gardner (1934) incorrectly interpreted the sequence of the Holocene lake levels. As a result of this misinterpretation, they placed the Fayum cultures in the wrong chronological order. Recent work in the Fayum (Wendorf and Schild 1976; Wenke *et al.* 1983) has shown that Fayum B sites consistently date earlier than Fayum A sites and are associated with an earlier period of lake transgression.

Archaeological research in the Fayum, while it has served to substantiate that two cultural groups used Fayum resources, has compiled little evidence pertaining to what resources were used and how changes in resource availability might have affected Fayum inhabitants. Molluscan remains have been used as indicators of Birket Qarun's past shorelines (Caton-Thompson and Gardner 1934), and faunal remains have been analyzed in conjunction with or as a byproduct of other research endeavors. No problem oriented investigation based primarily on recovered faunal remains, however, has ever been attempted in the Fayum.

Analysis of the Fayum faunal remains can provide clues to a series of related problems and offers an independent line of evidence able to support or refute conclusions arrived at through lithic and other standard forms of archaeological analysis. Faunal remains offer a direct link to the prehistoric environment in which Fayum inhabitants lived. Furthermore, because so little is yet known regarding the functional aspects of Fayum lithic tool assemblages, the vast amount of faunal remains associated with both Fayum A and Fayum B sites offers the most important evidence documenting the prehistoric cultural assemblages in this area.

A resource exploitation model

Published information regarding faunal materials collected from previous Fayum expeditions has presented evidence that procurement strategies regarding mammalian fauna differed between Fayum A and B cultural assemblages. The younger

Fayum A sites are dominated by the remains of domestic animals; the Terminal Paleolithic Fayum B sites possess only the remains of wild game animals (Caton-Thompson and Gardner 1934; Gautier 1976). However, Wenke *et al.* (1983 : 35) in a preliminary report described fish remains, predominantly catfish remains, as the most common animal identified from both Fayum A and B sites. When I examined this faunal assemblage I found catfish of the genus *Clarias* to be the most common animal recovered. In fact, *Clarias* accounts for approximately 66% of the identifiable fauna recovered from the Neolithic site that Wenke *et al.* (1983) investigated.

Clarias, the Nile catfish, prefers deoxygenated, shallow, swampy environments (Boulenger 1907; Greenwood 1966; 1968; Roberts 1975). This type of habitat would have been present across a relatively large area around the prehistoric Fayum lakes when they were at a high level. The large quantity of *Clarias* remains identified suggests that Fayum inhabitants heavily utilized the shallow water resource areas surrounding prehistoric Lake Qarun.

The gentle sloping nature of the Fayum Depression suggests that changes in lake depth would greatly influence the extent of land inundated by water. The shallow water habitats providing cover and breeding areas for waterfowl and certain fish species would be destroyed if lake levels were to decrease significantly. Human populations dependent upon these resources would then be faced with a crisis necessitating a change in procurement strategies.

The identification and analysis of faunal remains found in association with cultural assemblages identified as Fayum A or Fayum B can demonstrate the exploitation of shallow water habitats. Moreover, the investigation of annual growth on *Clarias* pectoral fin spines and the presence of certain species of migratory waterfowl will provide clues regarding possible changes in seasonal procurement strategies and in general terms the duration of occupation of Birket Qarun during the year by the respective cultures.

A subsistence model suggesting Fayum inhabitants were dependent on the shallow water resources of Birket Qarun can be tested using zooarchaeological evidence at three separate levels of investigation. First, standard taxonomic identifications can demonstrate the use of shallow water resources and will aid in determining the seasonal occupation of the area. Secondly, the study of structural features on identified elements of *Clarias* will provide further information as to the seasonal occupation of the area. Third, isotope analysis will provide information as to what effects long term changes in temperature may have had on fluctuating lake levels as well as *Clarias* growth.

Despite the fact that isotope studies have not yet begun, enough of the collected faunal material has been identified to provide some tentative conclusions regarding seasonality and the use of shallow water resource areas by prehistoric Fayum groups.

Faunal remains were collected using systematic transect surveys running perpendicular to the former beach ridges of the ancient Fayum lakes (Wenke *et al.* 1983; Brewer 1984). A total of five sites were incorporated in this analysis. Sites 1, 3, 4, and 5 were identified as Fayum A; site 2, Fayum B (Fig. 1). Two of the sites (sites 1 and 2) produced a very large faunal sample. They served as the main data base. Sites 3, which produced a very small sample, and sites 4 and 5 because they were collected by other research teams, were used in a supportive role.

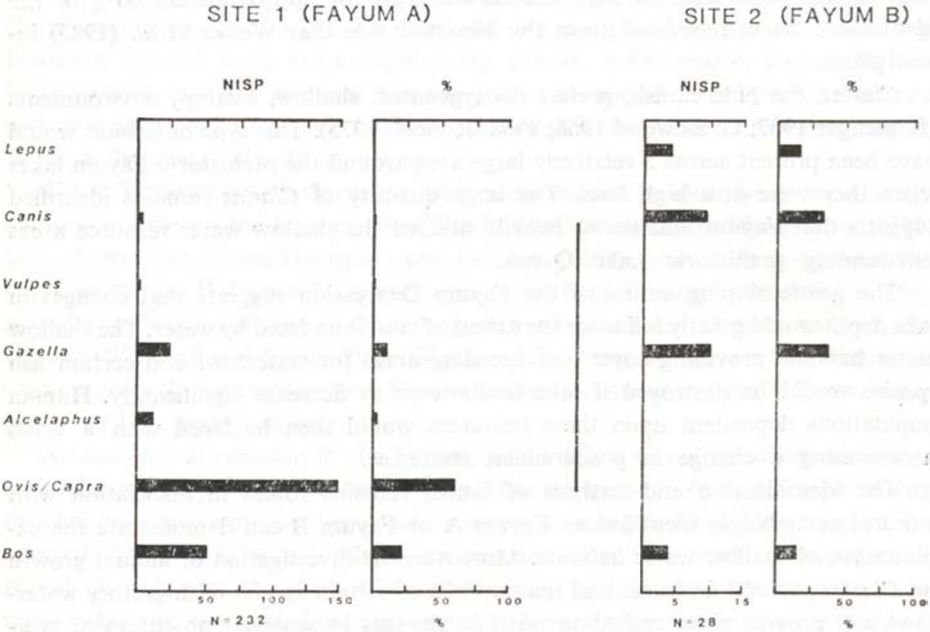

FIG. 2. Relative frequencies and NISP for Site 1 (Fayum A) and Site 2 (Fayum B) mammalian fauna

Figure 2 presents both the number of identified specimens (NISP) and the relative frequencies of the identified mammalian material from sites 1 and 2. The site 2 material is from a Fayum B cultural area; the site 1 material is from a Fayum A locality. The comparisons of mammalian fauna show a rather predictable pattern. The Fayum A site shows a predominance of domesticates supplemented by wild game animals. The Fayum B cultural assemblage lacks domesticates, but the presence of wild ungulates in the assemblage suggests that Fayum B folks practiced large game hunting. Evidence gathered from other Fayum A sites also shows use of domesticates, but in greatly reduced frequencies (Fig. 3). It seems safe to assume that domesticates were not the sole source of animal protein for Fayum A people. Other sources were, indeed, utilized. Minimally, based upon the faunal identifications, we can say that both Fayum A and B cultural groups took advantage of the area's wild terrestrial fauna.

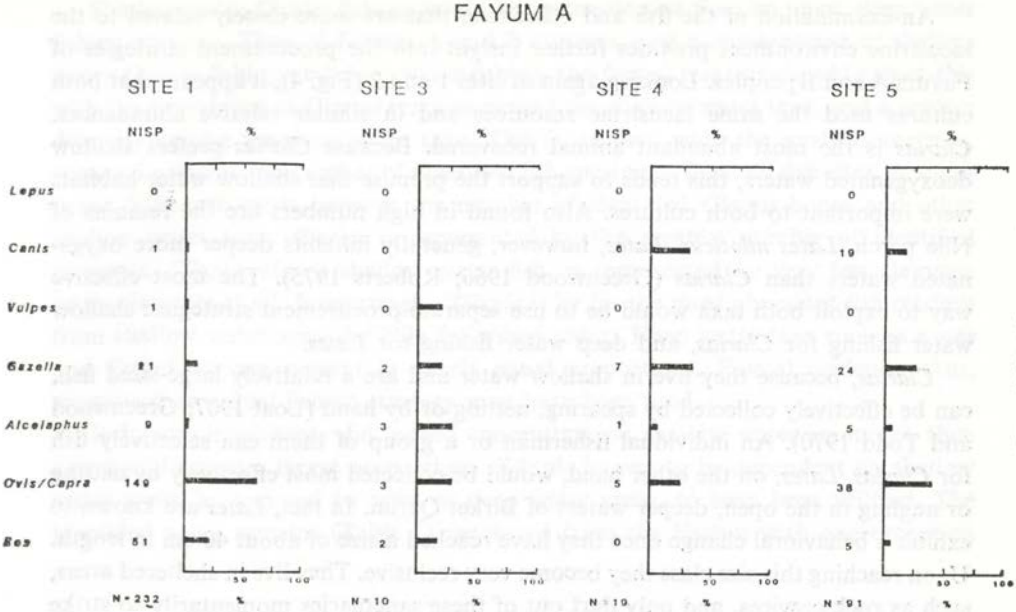

FIG. 3. NISP and relative frequencies for identified mammals from Fayum A sites

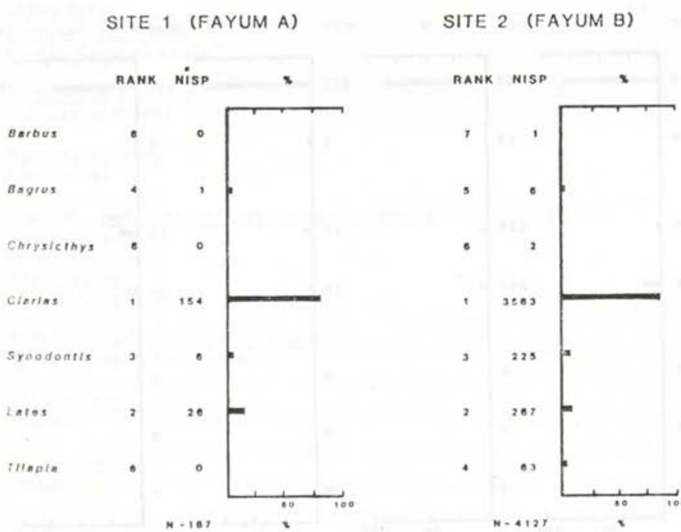

FIG. 4. NISP, relative frequencies, and rank order of Site 1 (Fayum A) and Site 2 (Fayum B) ichthyofauna

An examination of the fish and other taxa that are more closely related to the lacustrine environment provides further insight into the procurement strategies of Fayum A and B peoples. Looking again at sites 1 and 2 (Fig. 4), it appears that both cultures used the same lacustrine resources and in similar relative abundances. *Clarias* is the most abundant animal recovered. Because *Clarias* prefers shallow deoxygenated waters, this tends to support the premise that shallow water habitats were important to both cultures. Also found in high numbers are the remains of Nile perch, *Lates niloticus*. *Lates*, however, generally inhabits deeper more oxygenated waters than *Clarias* (Greenwood 1966; Roberts 1975). The most effective way to exploit both taxa would be to use separate procurement strategies: shallow water fishing for *Clarias*, and deep water fishing for *Lates*.

Clarias, because they live in shallow water and are a relatively large-sized fish, can be effectively collected by spearing, netting or by hand (Loat 1907; Greenwood and Todd 1970). An individual fisherman or a group of them can selectively fish for *Clarias*. *Lates*, on the other hand, would be collected most effectively by netting or angling in the open, deeper waters of Birket Qarun. In fact, *Lates* are known to exhibit a behavioral change once they have reached a size of about 40 cm in length. Upon reaching this size class they become very reclusive. They live in sheltered areas, such as rock crevices, and only dart out of these sanctuaries momentarily to strike at food (Hopson 1972).

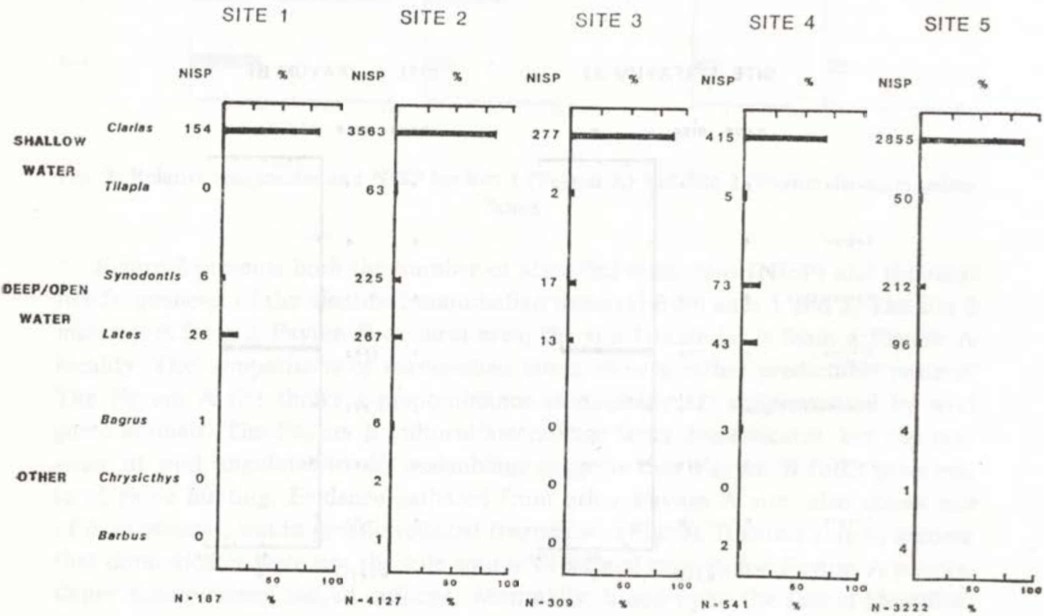

FIG. 5. Comparison of deep and shallow water taxa based on NISP and relative frequencies

Shallow water *Clarias* fishing would be more selective than an open, deep water fishing strategy. Thus, if Fayum A and B cultures used a combination of shallow water *Clarias* fishing and deep water fishing, the faunal remains should reflect this with the prevalence of *Clarias* remains among the shallow water taxa, and a greater diversity among the deep water taxa. This is, in fact, what the analysis suggests. Figure 5 presents the number of identified fish specimens from all five sites. A significant difference exists between the number of identified *Clarias* bones and other shallow water taxa. *Clarias* is represented by the greatest number of identified elements. *Tilapia*, also a shallow water fish, is represented by very few elements or no elements at all. Interestingly, *Tilapia* is by far the most abundant fish retrieve from shallow water areas by Nile fishermen today. Deep water taxa such as *Lates* and *Synodontis* are present in nearly equal proportions. Faunal evidence, thus, suggests that a dual fishing strategy may have been used.

It Fayum inhabitants did indeed concentrate on shallow water resources, then one would expect a larger proportions of birds known to be dependent on shallow water areas, as opposed to open or deep water areas, to have been utilized. The identified avian remains (Table 1) recovered from the Fayum with one exception

Table 1

Fayum avian remains

	Fayum B	Fayum A
Shallow Water		
Podeceps cristatus (Great Crested Grebe)	15	
Ixobrychus minutus (Little Bittern)	1	
Tadorna tadorna (Shelduck)	1	
Anas cf. *penelope/strepera/acuta/clypeata* (Ducks spp.)	16	10
Anas crecca (Green-Winged Teal)	2	
Porphyrio cf. *madagascariensis* (Green-backed Gallinule)	1	
Fulica atra (Coot)	11	1
Cygnus cygnus (Swan)		1
Open Water		
Gallinula chloropus (Moorhen)	1	

were all shallow water birds. If we include open water birds that require fringes of shallow water vegetation, such as the moorhen, all birds recovered from the Fayum A and B sites are at least partially dependent on shallow water habitats.

Fayum seasonality

Because *Clarias* remains dominate the shallow water fauna and because *Clarias* can be gathered year round, an intensive study of the growth cycles of this genus provide us with information as to the time of year it was collected. *Clarias* is an ectothermic animal (cold blooded). It depends on outside temperatures to maintain its metabolic activity. When conditions are warm, as in summer, the fish is active, feeds heavily, and growth is registered on its skeletal elements. Conversely, during the cold months of the year, the fish is relatively inactive, does not feed heavily and growth decreases dramatically. The seasonal variations in growth can be measured on any of several skeletal elements. I chose to study the pectoral fin spine because it preserves well and can be securely identified (Fig. 6).

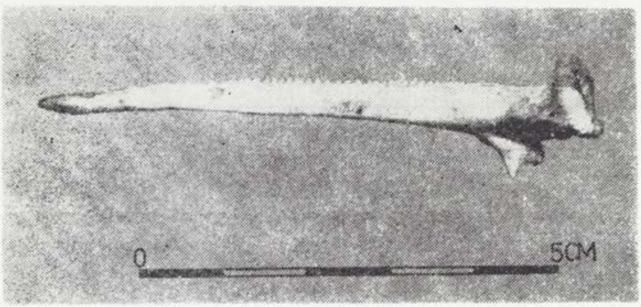

FIG. 6. *Clarias* pectoral spine

FIG. 7. Schematic view of *Clarias* pectoral spine thin section (after Morey 1983)

Figure 7 is a schematic diagram of a cross section of a *Clarias* pectoral spine. The dark bands represent the colder months, and the wider, light bands represent the warmer months. The edge of the spine from the last winter arrest line registers the final growth period and season of death of the fish.

I collected *Clarias* for an entire year from 3 localities: Cairo, El Minya, and Luxor. The Cairo group was my control group. I collected over 100 fish from Cairo alone, thin sectioned the spines, and computed a growth ratio. The denominator was the last full season of growth recorded on the spine, and the numerator was the final growth period truncated by the animal's death. This ratio was then associated with the date of the fish's capture.

Because temperature is one of the main contributors to fish growth, I divided the year into four temperature regimes corresponding to Egypt's yearly temperature cycles: Group I (December – February) represents the cool season or winter, Group II (March – May), a warming period, Group III (June – August), the hot months of the year, and Group IV (September – November), a cooling period.

Statistical tests (ANOVA and Bonferroni) showed that fish growth from the control group could be separated by factors other than chance for groups I - III. Groups III and IV were shown to be not significantly different from each other. A comparative chart was constructed with the mean growth for each group plotted ±1 standard deviation (Fig. 8). The *Clarias* spines recovered from Fayum A and B sites were then compared to the chart.

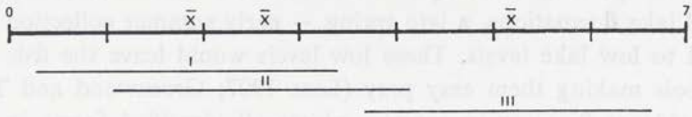

FIG. 8. Seasonality comparative chart

Group I: $\bar{X} = 1.865$ (Dec.-Feb.); Group II: $\bar{X} = 2.645$ (Mar.-May); Group III: $\bar{X} = 5.107$ (Jun.-Nov.)

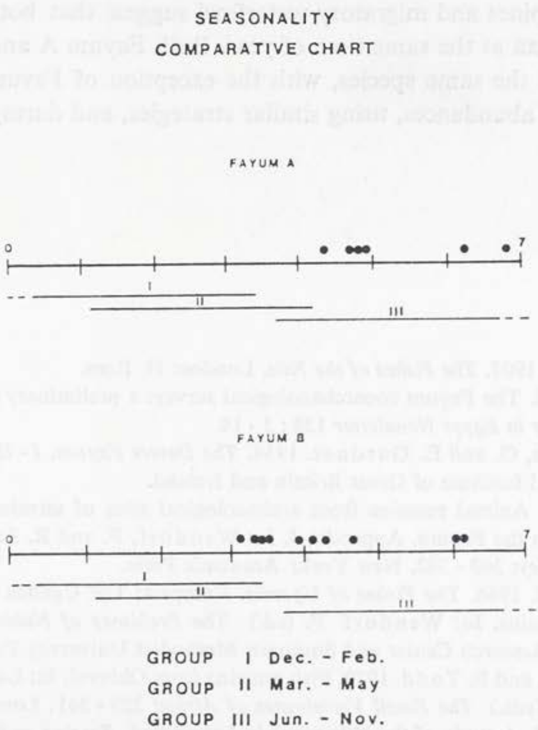

FIG. 9. Seasonal assessment of Fayum A and B spines

The results show that Fayum B *Clarias* were collected in late spring-early summer and again in the summer/fall. Fayum A spines show the same pattern (Fig. 9). The seasonality study suggests that both Fayum A and B groups collected *Clarias* at two different periods in the year. Because of the clustering around spring-early summer, I believe *Clarias* was captured by both groups in the late-spring early summer, and again in the summer-fall. It appears that Fayum A fish collecting may have taken place a little later in the summer than Fayum B, but it cannot be determined at this time if this is a cultural factor or one based on environmental circumstances.

Late summer-early fall would if Birket Qarun were connected to the Nile, coincide with a seasonally high Nile and also with the *Clarias* spawning season. During the spawning season, *Clarias* would be highly aggregated, which would facilitate their capture. If Birket Qarun were connected to the Nile, and, thus, subject to seasonal lake fluctuations, a late spring – early summer collection date would correspond to low lake levels. These low levels would leave the fish stranded in shallow pools making them easy prey (Loat 1907; Greenwood and Todd 1970). Seasonal evidence from avian remains places all identified forms in the Fayum during the winter months, roughly October – March.

In conclusion, standard taxonomic identifications point to a heavy use of shallow water resources by both Fayum A and B peoples. Seasonal inferences from *Clarias* pectoral spines and migratory waterfowl suggest that both cultural groups exploited these taxa at the same time of year. Both Fayum A and B groups appear to have exploited the same species, with the exception of Fayum A domesticates, in similar relative abundances, using similar strategies, and during the same time of year.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

ROBERT J. WENKE and MARIA CASINI

The Epipaleolithic-Neolithic transition in Egypt's Fayum Depression

Introduction

The general problem of the origins of agriculture in Egypt encompasses a complex set of related questions. When, for example, did the first domesticates appear in Egypt, and from where? What kinds of adaptations preceded agriculture? Were these pre-agricultural societies "converted" to agricultural economies or simply replaced by agricultural peoples moving into the Nile Valley and Delta? And, perhaps most important, what is there about the evolution of agricultural economies and village societies in Egypt that helps us understand this transition as it occurred in other parts of the world?

Egypt's Fayum Depression first served as a laboratory for investigations of these issues in the 1920s, when Caton-Thompson and Gardner (1934) excavated there and found evidence in support of the "Oasis Hypothesis" of agricultural origins, which had been proposed by Pumpelly (1908) and Childe (1952). Since that time other scholars have continued research on the Epipaleolithic-Neolithic transition in the Fayum (Puglisi 1967; Wendorf and Schild 1976; Ginter and Kozłowski 1983; Brewer 1986; Buck 1984; Wenke *et al.* 1983), and there has been important relevant research in other areas of Egypt as well (*e.g.* Wendorf and Schild 1980; Hassan *et al.* 1980; Hassan 1984).

Our work in the Fayum consisted of 6 months of archaeological survey and excavations during 1981 in the southwestern part of the Depression (Fig. 1). This region contains large scatters of artifacts, faunal remains, and other remnants of numerous Epipaleolithic ("Fayum B" or "Qarunian") and Neolithic ("Fayum A") occupations. We concentrated on this area partly because the archaeological sites in this region seemed similar in composition to those on the northern shore, where most previous research had been conducted, yet these southern sites' relative inaccessibility had protected them from the looting that has severely damaged sites on the northern shore. Because we were interested in relating the Fayum data to general problems of agricultural origins in Egypt, we designed our fieldwork in such a way that we could estimate changes in settlement patterns and subsistence strategies from Epipaleolithic to Neolithic times. Thus we made extensive surface collections in a random sampling design (Fig. 2), so that we can study the spatial associations between hundreds of thousands of stone tools, pottery sherds, animal bones, and other debris.

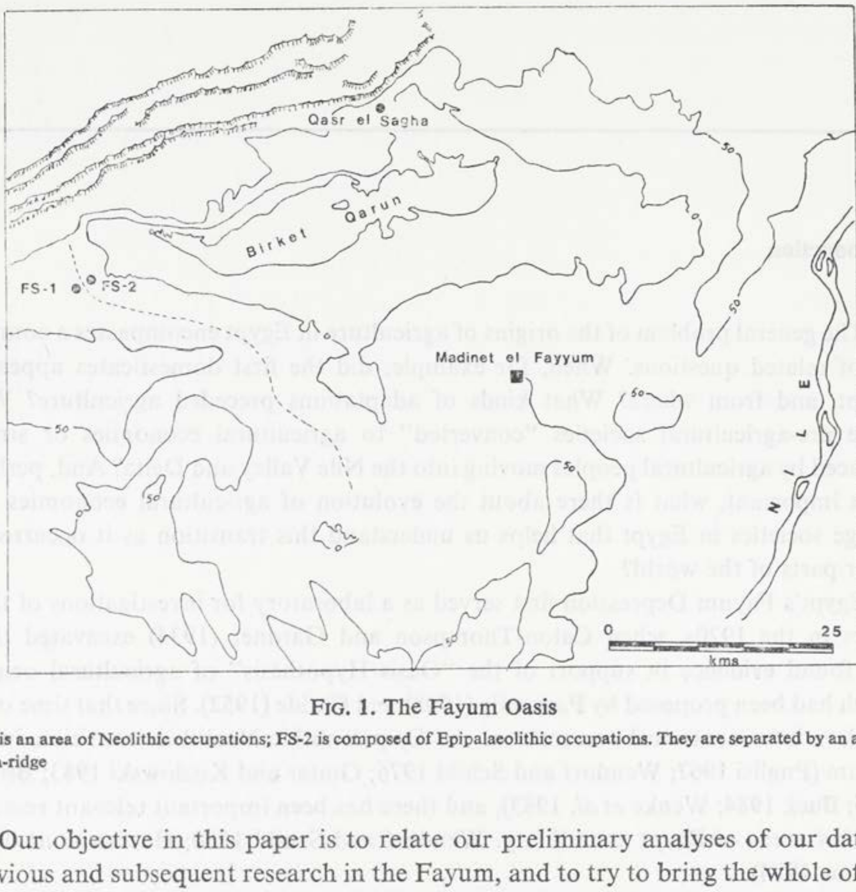

FIG. 1. The Fayum Oasis

FS-1 is an area of Neolithic occupations; FS-2 is composed of Epipalaeolithic occupations. They are separated by an ancient beach-ridge

Our objective in this paper is to relate our preliminary analyses of our data to previous and subsequent research in the Fayum, and to try to bring the whole of this information to bear on general questions pertaining to early agriculture in Egypt.

We are still analysing the hundreds of thousands of lithics, ceramics, floral and faunal remains, geological samples and other data recovered during the 1981 season. Thus our remarks here are necessarily somewhat tentative: most of our inferences cannot yet be supported with much quantified evidence and may be altered after additional analyses have been completed.

The theoretical context

Questions pertaining to the evolution of agricultural economies remain at the center of contemporary methodological and theoretical debates in archaeology. Indeed, conflicts between various schools of thought about the general nature of anthropological and historical inquiry have often been expressed most sharply in their treatment of agricultural origins (Flannery 1973; Binford 1968; Rindos 1984; Hassan 1981: 209 - 221).

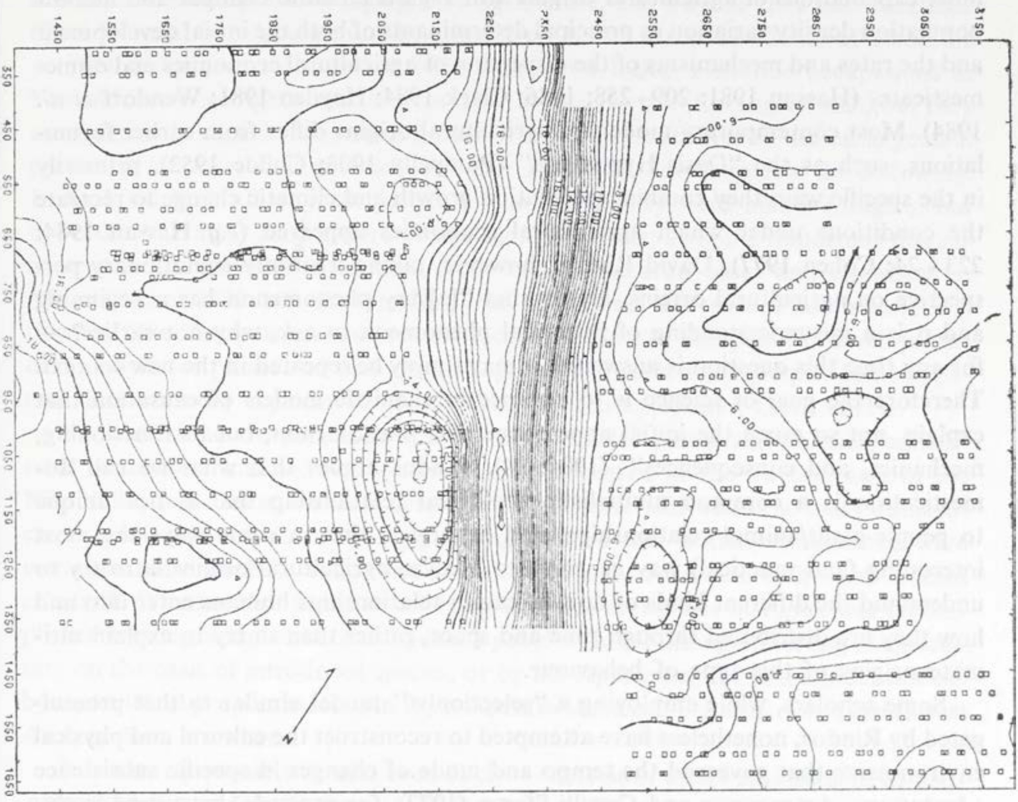

FIG. 2. Sampling design for surface collections at sites FS-1 (Neolithic) and FS-2 (Epipalaeolithic)

Each square represents a 5 × 5 m square in which all surface artifacts were collected. The vertical axis is in direction of the present lake.

As applied to the specific case of Egypt, there are several aspects of these debates about the nature of agricultural origins that are particularly relevant to our analyses of the Fayum data. Agricultural economies apparently appeared in the Nile Valley and Delta at least 3000 years later than they did in Southwest Asia, even though these Egyptian environments possessed enormous agricultural potential and indigenous species capable of domestication. Thus we might look to Egypt for examples of the factors that controlled both the rate and the mechanisms by which agricultural economies were established in different areas. It should be of some significance, for example, that the basic wheat barley-sheep goat form of agriculture took approximately as long to be incorporated in fully-agricultural economies in Egypt as they did in Central Europe, despite the fact that Egypt is so much closer in space and more similar in environment to the supposed centers of initial domestication of these species.

Before considering the Fayum data in this context, it should be noted that today most explanations of agricultural origins still regard climatic changes and human population density variation as principal determinants of both the initial development and the rates and mechanisms of the dispersion of agricultural economies and domemesticates (Hassan 1981: 209 - 258; 1986; Clark 1984; Hayden 1981; Wendorf *et al.* 1984). Most contemporary models of agricultural origins differ from earlier formulations, such as the "Oasis Hypothesis" (Pumpelly 1908; Childe 1952), primarily in the specific ways they combine population growth and climatic change to recreate the conditions under which agricultural economies appeared (*e.g.* Hassan 1984: 223 - 24; Cohen 1977). David Rindos, however, taking a strictly evolutionary perspective on agricultural origins, argues that "[e]very phenomenon has a beginning and it is a misunderstanding of historical phenomena to ask, why not earlier? – for any time this question is answered, it may simply be repeated in the new context. Therefore the goal of science is to advance mechanistic models of causation that explain, not so much the initial appearance of a phenomenon, but its functioning, mechanics, and consequences" (1984: 34). Rindos argues that what we call domestication is a common mutualistic ecological relationship that is not unique to people-plant/animal relationships, and he argues that in some ways the most interesting (and practical) way in which to analyze agricultural origins is to try to understand the different kinds of domestication relationships humans enter into and how they are distributed through time and space, rather than to try to explain ultimate origins of this type of behaviour.

Some scholars, while employing a "selectionist" model similar to that promulgated by Rindos, nonetheless have attempted to reconstruct the cultural and physical environments that governed the tempo and mode of changes in specific subsistence adaptations. Ammerman and Cavalli-Sforza (1977), for example, have used evolutionary models to analyze the spread of agriculture from Southwest Asia into Europe. To explain the timing of the appearance of agricultural economies, Hassan (1981: 225) stresses the role of "microclimatic fluctuations" attendant on the end of the Pleistocene and in the context of increasing human technological sophistication, as well as changing demographic and socio-economic conditions, and, perhaps increasing human cognitive abilities.

Our approach here is somewhat similar. We are trying to place the Fayum in the context of the spread of agricultural economies about 7,500 years ago, both in terms of the origins of this form of subsistence and the selective environments that determined when and where this adaptation would appear. We hope that our knowledge about the specifics of early Egyptian agriculture will provide useful test of more general models, such as that proposed by Rindos (1984).

Early Egyptian agriculture

With the recent reassessment of the Wadi Kubbaniya data as reflecting late Pleistocene hunting and foraging, not agriculture, the Fayum sites and Merimde (Beni Salama) once again must be considered as the earliest evidence of Neolithic peoples living near to or in the Nile Valley and Delta. Neolithic occupations at Merimde may be slightly earlier than those in the Fayum (Eiwanger 1982), but they are sufficiently close in time as to be considered representatives of the same general pattern of cultural change. Such evidence as we do have suggests the following: 1. At 7,000 B.C. all or most people in the Nile Valley were hunter-foragers, but by 4,000 B.C. most people were village agriculturalists; 2. Some important domesticates were apparently introduced from eastern Saharan oases and elsewhere in Africa (Butzer 1976: 10 - 11; Wendorf *et al.* 1984), and others from Southwest Asia; thus the Nile Valley was not a primary location of *in situ*, independent development of domesticated plants and animals and agricultural economies (despite some apparent domesticatory experiments with several indigenous species, Clark 1971).

To understand the processes whereby domesticated plants and animals, agricultural economies, and sedentary communities appeared in the Fayum, and in the Nile Valley and Delta, we must determine: 1. Whence and when the main domesticated species on which early Egyptian agriculture was initially established were introduced into the Nile Valley and Delta and in what order and with what cultural effects; 2. Whether the introduction of agricultural economies in Egypt was accomplished by the gradual shift of indigenous peoples from hunting-collecting to agriculture on the basis of introduced species, or by the replacement of non-agriculturalists by agricultural peoples moving in from Northwest Africa, Saharan oases, Southwest Asia, or from elsewhere.

It is entirely possible – and even likely – that both direct replacement of non--agriculturalists and the "conversion" of hunter-collectors to agriculturalists occurred, and that important domesticates and other cultural influences came from several different areas, such as Southwest Asia, Northwest Africa, and Saharan oases. Thus the problem of understanding early Egyptian agriculture is almost certainly one of establishing degrees of significance of various factors in a complex multivariate pattern of cultural and environmental interaction. But some preliminary questions must be answered before we can even begin a comprehensive analysis of these complex interactions. For example, if agricultural peoples, dependent on domesticated wheat, barley, sheep, goats, cows, and other plants and animals, moved into Egypt from South west Asia and displaced or assimilated local hunters and gatherers in a gradual process, the remains of their communities in the eastern Delta and northern Nile Valley may have been destroyed or buried beneath the alluvium by subsequent floods. If so, agricultural communities in the Fayum and at Merimde would likely be relatively late manifestations of the shift to agriculture in Egypt and are now considered early only because of the accidents of preservation (in the case of the Fayum, Ptolemaic-period rulers severed the connections between the Fayum lake and the Nile, thereby greatly reducing the level of the Birket Qarun and stranding the Neolithic and Epipaleolithic sites in the desert). The early agricultural communities in the Fayum, at least, may have been marginal adaptations, where hunting and gathering remained an important part of the economy long after agriculture was also practiced. In contrast, communities in the Nile Valley at this time, where there was greater potential for agricultural (tied to annual siltation and the possibilities of irrigation), may have evolved economies more narrowly and productively focussed on agricultural products (Clark 1971; Hassan 1985; 1986 n.d.; Butzer 1976: 8 - 11).

But our interpretation of the significance of the Fayum data perhaps would be entirely different from the above reconstruction, if the most important domesticates and agricultural economies were established there by peoples moving in from Northwest Africa and the Saharan oases rather than from Southwest Asia. Various scholars have suggested that groups in the Western Sahara developed an essentially Neolithic economy based on domesticated cattle – perhaps of species originating from southern Africa – and intensive plant use in oases environments, and that they eventually moved into the Fayum and the western margins of the Nile Valley. Once there, they may have been able to add to their economy domesticated cereals and sheep/goats and other animals (which may have been available as minor parts of the economy by the late Epipaleolithic), thereby displacing, assimilating, or replacing indigenous hunter-collector groups. From this early establishment in the Fayum, at Merimde, and at other communities along the western edge of the Delta and Valley, agricultural economies would have quickly spread into the Delta and Valley and become more fully agricultural than those in the Fayum, by virtue of the greater agricultural potential of the Delta and Valley proper.

Regarding this last reconstruction, Butzer has argued that "The sum total of the evidence... favours an introduction of the Neolithic (in Egypt), but from a northwestern rather than a northeastern source. The new groups involved were intrusive, but they were North African, and they may have come from the oases of the northern Libyan desert or further west in the Sahara, or along the Mediterranean littoral" (1976: 11). Trigger, on the other hand, emphasizes the importance of southwest Asian domesticates and cultural influences, suggesting, for example, that "... even if Egyptian domesticated ɪsg and cattle were bred from North African wild ancestors, the idea of their domestication must have come from south-west Asia..." (1983: 20).

Hassan suggests that the primary stimulus to agricultural origins was a period of severe aridity after about 6,700 B.P. that "... most likely led to the gradual depopulation of the desert and the infiltration of the Nile Valley by individuals and families in a manner not unlike the modern dispersal of the Sahel peoples... Similar aridification seems to have affected the Sinai and Negev, and a similar movement toward the Nile is plausible. This was no mass invasion, but a gradual infiltration by drifters and refugees over a period of about 500 years or more. These groups mingled easily with the local inhabitants of the Nile Valley, who were at that time hunters, gatherers, and fishers... Agriculture therefore did not displace the pre-existing subsistence patterns but supplemented it. The change in subsistence was almost imperceptible peaceful, and gradual" (1984: 222).

Wendorf and Schild recently have reported numerous Neolithic communities based on cattle-raising and extensive (but undetermined) plant use in oases in the eastern Sahara, beginning as early as 9,800 B.P. (1984: 409). These communities seem to coincide with several periods of significantly increased rainfall. Wendorf and Schild conclude that: "Both cattle and pottery seem to have been known in the Sahara as early as anywhere else in the world. We believe, however, that they were brought in from elsewhere by the first Holocene colonists, as part of the response to their precarious environment, and not that domestication and ceramic technology were actually invented there. We would not suggest that the Holocene Sahara was an area of great innovation, but as an area of adaptation it is perhaps unsurpassed" (1984: 428).

If agriculture was, indeed, mainly introduced from the eastern Saharan oases and Northwest Africa, the Fayum may have been among the earliest areas so occupied, and may have been, in fact, the area in which the Saharan Neolithic economies were combined with Southwest Asian domesticates to produce the fully-agricultural economies that quickly formed the basis for initial Egyptian cultural complexity.

In looking at the sources and timing of early Egyptian agriculture, we must also consider the concept of "preadaptation". Preadaptation to agriculture by hunter--collectors has been suggested for other areas where agriculture was introduced, such as in the aboriginal North American southeast. Before the appearance of agriculture based on maize, beans, and squash in this area, the inhabitants exploited various "starchy seeds" (*e.g. Chenopodia*) in a manner that suggests domestication and even agriculture. Rindos (1985) suggests that the timing of the appearance of maize-based agriculture in this region depended on the preadaptation of these people to habitual plant use, the development of a technology of seed gathering, processing, storage, and so on. A similar concept of preadaptation has been applied to early agriculture Egypt by Clark (1971), among others, and in the Sudan by Caneva (1983). Hunting and gathering peoples of the Delta and the Nile Valley may have developed a technology and subsistence strategy that "preadapted" them to agriculture, so that the timing of the appearance of agricultural economies in Egypt was determined in large part by the degree of "preadaptation" in the Fayum, the Delta, and the Nile Valley, and that agriculture subsequently spread at a rate and direction determined by the economic advantages of agriculture over local adaptations.

The Fayum data

Considerable additional data and analyses will be required before we can identify the origins of the domesticates of the Egyptian Neolithic and the processes by which they were incorporated into Neolithic economies throughout the Nile Valley. Data from the Fayum, however, are relevant to several of these issues.

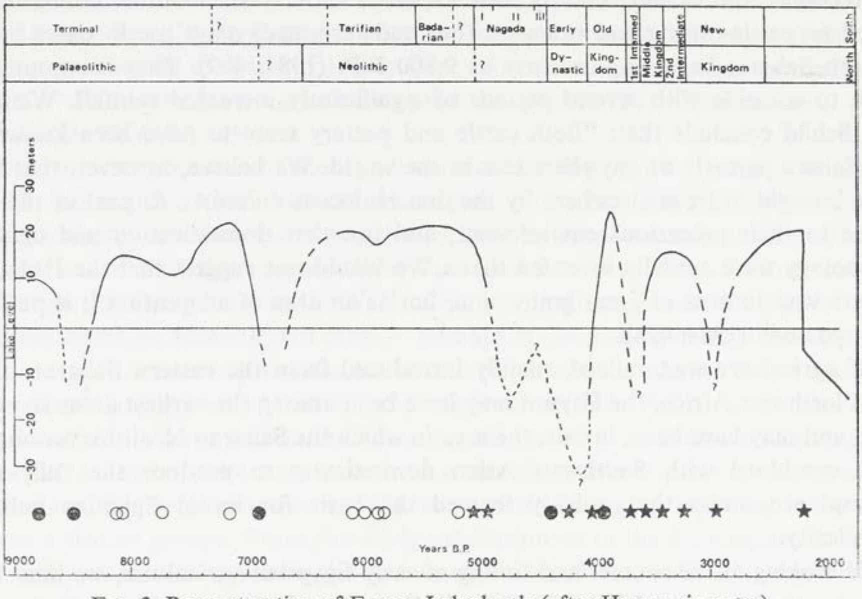

FIG. 3. Reconstruction of Fayum Lake levels (after Hassan, in press)

The symbols are used as follows: circles – radiocarbon dates; hexagons – stratigraphic evidence; rectangles – historical evidence

To begin with the problem of the chronology of human habitation of the Fayum, we must consider first the physical environment of the ancient Fayum Depression. Fayum lake levels have been studied by many scholars (reviewed in Wendorf and Schild 1976: 155 - 162; Hassan 1986). It is generally acknowledged that the primary determinant of early human occupation in the Fayum has always been the lake, the Birket Qarun, but there seems little doubt that at various times there was sufficient rainfall that the eastern Sahara, including the desert margins of the Fayum, were much richer in floral and faunal resources than at present. Studies in southern Egypt, such as at Bir Kiseiba (Wendorf *et al.* 1984), indicate significant population densities in areas that are now – and for many millennia have been – too arid for occupation.

The most recent reconstruction (Fig. 3) of lake levels – that by Hassan, done in connection with our 1981 fieldwork – illustrates the role of the lake in determining the origins of agricultural economies in the Fayum. If one considers the distribution of known settlements in the Fayum (Wendorf and Schild 1976; Wenke *et al.* 1983), it seems likely that the Fayum was virtually abandoned in the Predynastic, Old Kingdom, and early New Kingdom periods. These time intervals correlate well with markedly reduced lake levels. In contrast, population densities were relatively high in the Epipaleolithic, Neolithic, Middle Kingdom, and Late New Kingdom periods, all of which were times of relatively high lake levels.

Table 1

Histogram of radiocarbon dates from Fayum sites

MIDDLE OF INTERVAL	NUMBER OF OBSERVATIONS	
4900	1	*
5100	3	***
5300	4	****
5500	5	*****
5700	2	**
5900	3	***
6100	2	**
6300	4	****
6500	1	*
6700	0	
6900	0	
7100	1	*
7300	0	
7500	2	**
7700	2	**
7900	0	
8100	2	**
8300	1	*
8500	0	
8700	0	
8900	1	*

All dates are in radiocarbon years BP, uncorrected; these dates are listed with error factors and source in Hassan (in press).

It should be noted that this strong correlation between lake levels and population densities may also have to do with the agricultural potential of the Fayum *vis-à-vis* that of the Nile Valley proper. Under conditions of reduced Nile floods, agricultural lands of the Fayum may have been more severely affected than those in the Delta and Valley. The amount of fertility-renewing silts and sediments borne by the flood waters would probably have been greater in the valley than in the Fayum basin, since these sediments would have been partially precipitated in the channel connecting the Nile and the Fayum basin. Also, the extremely shallow slope of the southern and western Fayum basin would have meant that fluctuation in lake levels would radically alter the extent of areas covered by water. Although extensive irrigation works were constructed in the Fayum in Ptolemaic times, there is no evidence of their use in earlier periods, and thus farmers of pre-Ptolemaic times would have been directly dependent on the extent and richness of lands exposed by receding flood waters.

If, as Fig. 3 suggests, Fayum lake levels decreased sharply in the transitional period between Epipaleolithic and Neolithic occupations (at about 4,800 B.C.) this may have been sufficient to displace indigenous hunter-gatherers and thereby render the Fayum an "open-niche" for agriculturalists. Presumably, hunter-gatherers would have been drastically affected by either a sudden lowering of the lake, which would strand the gallery-forests of the lake margin in the desert, or by rising lake levels, which would drown these forests and their associated floral and faunal communities.

In this context the distribution of radiocarbon dates from many different Fayum sites (Table 1) is quite interesting. It is possible that sites that have been destroyed or not yet located account for the gap between Epipaleolithic and Neolithic sites in Fig. 4, but on the basis of our surveys we regard this possibility as remote.

The source of Fayum Neolithic cultures

The primary evidence we have to test the alternative possibilities of direct colonization as opposed to indigenous cultural change in the Fayum during the Epipaleolithic – Neolithic transition is variability in artifact styles. Presumably, if agriculturalists colonized the Fayum and either replaced or displaced hunter-collectors, their lithics and ceramics would show similarities to those in their original territories. Unfortunately, the geographical distributions of Fayum A- and B-style assemblages are not well-known. The distinctive hollow-base points found in Fayum A assemblages seem to exhibit considerable stylistic expression, but this variability has never been precisely mapped in time or space. Caton-Thompson and Gardner examined the possibility that this lithic style originated in Wadi el-Arish, Kharga Oasis, and other sources, but concluded that there is no convincing evidence, and that the "... possibility of an autochtonous Delta origin should not be dismissed and in many ways appears the most satisfactory provisional guess" (1934: 94).

But there are many other possibilities. The apparent lack of sites indicating the development and dispersion of the styles associated with the Fayum A assemblages may be a result of site destruction and alluviation in the Nile Valley. Wendrof and Schild (1984: 515), for example, suggest now-obscured sites in the Nile Valley as a likely source for the very early Holocene Neolithic cultures they describe in the

Bir Kiseiba areas of the eastern Sahara. It is possible that the later Neolithic cultures of the Fayum derive from a similar source. On the other hand, Wendorf and Schild suggest: "... some sort of Saharan-Nilotic interaction may be indicated by the presence of numerous Late Neolithic sites associated with playas in the Sand Sea. These sites contain fiber-tempered pottery and hollow-based bifacial arrowheads, closely resembling those of the Fayum A Neolithic (R. Kuper, personal communication). Fayum A has long seemed very different from Neolithic complexes in the adjacent Nile Valley, particularly in its pottery, and the presence of Fayum A-like sites in the Sand Sea raises the possibility that the Fayum A may have been the Saharan groups who moved to the Fayum basin seasonally in order to fish. This would presumably have occurred in late summer after the flood. The Sand Sea sites must be dated and compared in detail with the Fayum A sites before this can be regarded as more than a suggestion..." (Wendorf *et al.* 1984: 428).

In our analyses of the Fayum artifacts we considered ways in which to test the common assumption that the Fayum A and Fayum B lithics are sufficiently distinctive stylistically that, even allowing for changes attendant on the transition from a hunting and gathering strategy, two culturally distinct groups of people are indicated. Our research on this topic has just begun, but we hope to make wide-ranging comparisons between our assemblages and those from the eastern Sahara and elsewhere. Long (personal communication), in analyzing the differences in size and shape of debitage and tools between Fayum A and B assemblages, has stressed that lithic reduction strategies are related to the size, shape, quality, and abundance of available raw materials. Small size lithics with high length breadth ratios (*e.g.* blades) maximize the amount of cutting edge produced per unit of raw material. Thus, the arrival of a new population in the Fayum is perhaps not a complete explanation for the change from the small blade industry of Fayum B to the larger flake industry of Fayum A. It is entirely possible that a change in the source of the raw materials used in these two industries is an important factor in the observed changes in lithic tool shapes and sizes. There seems to be, for example, a somewhat higher frequency of a close-grained, light coloured flint in the Fayum A sites, but this greater frequency may have to do with the need in a Neolithic economy for certain large cutting tools.

Much additional stylistic analysis of the Fayum lithics and ceramics will have to be accomplished before we can make significant comparisons of these artifacts with other assemblages, and we hope to publish these comparisons in our final report (Wenke and Lane [eds.] in preparation).

Another form of evidence concerning the alternative possibilities of colonization *vs.* indigenous development is the sample of radiocarbon dates illustrated in Table 1. If the Neolithic occupations represent a new group moving into the area after, perhaps, depopulation during the Epipaleolithic as a result of high or low flood levels, we might expect to see the radiocarbon dates occur in two clusters, separated by a period when there were no occupations. Alternatively, if agriculture was a matter of indigenous development, or a slow refocussing of the local economy on introduced domesticates, we would expect to see a continuum of dates spanning the transitional period.

Too few dates have been produced to test these ideas definitively, but the pattern in Table 1 suggests some separation in time between Fayum B and A sites. Pazdur interprets the dates on materials recovered by the Polish mission to Qasr el-Sagha as indicating two phases of Neolithic habitation: "The first phase... called Unit I, lasted from 5,000 B.C. ... to about 4,400 B.C., while the second phase... lasted from *ca.* 4,330 B.C. to 3,900 B.C. (1983: 117). Pazdur conjectures that these different periods may be associated with dramatic climatic changes, in which the level of the lake or the amount of rainfall in the surrounding deserts altered sufficiently to affect settlement distributions.

The dates presented in Table 1 make this interpretation possible but by no means inescapable. If we do accept the pattern in Table 1 as indicative of two periods of Neolithic occupation, we would then have to associate this discontinuity with either alterations in lake levels or precipitation rates, or with cultural factors, such as, perhaps, the introduction of Southwest Asian domesticates.

To a limited extent, the questions of from where Fayum agriculture originated and how can be addressed by examining the economy and settlement patterns of Fayum Epipaleolithic and Neolithic sites. If, for example, Fayum agriculture developed out of the migrations of Saharan cattle-raisers, as suggested by Wendorf and Schild (1984: 428), we might expect the settlement patterns and animal exploitation practices of both groups to show considerable resemblance – modified, of course, by the unique aspects of the Fayum's lacustrine resources. If, on the other hand, hunter-collectors who were "preadapted" to agriculture by intensive exploitation of Fayum plant and animal populations were transformed into agriculturalists by the introduction of domesticated species from Northwest Africa or Southwest Asia, we would expect to see this reflected in the kinds of exploitation and settlement pattern changes attendant on the Epipaleolithic-Neolithic transition.

To consider this latter point first, there is little in the available evidence, either from our own research or that of others, to indicate that the Epipaleolithic peoples of the Fayum were somehow "preadapted" to agriculture through millennia of systematic plant and animal use. Although few botanical remains have been recovered from Fayum Epipaleolithic sites, those that have been reported are principally field weeds that cannot have had especial significance as foods (Wetterstrom, personal communication). Moreover, there is no indication of Epipaleolithic Fayum encampments having achieved the permanence that those based on seed-collecting in other areas did; all Epipaleolithic sites now known in the Fayum are the artifact scatters one would expect from frequent movements of small groups. Wendorf *et al.* (1984: 414) in fact comment specifically on the great contrasts between the Fayum B, or Qarunian, small "fishingcamps" and the much more substantial contemporary communities in the eastern Sahara.

Nowhere in the Fayum do we find overlying levels that span the period of the transition and show a gradual change in settlement type. Perhaps more significantly, there are few or no grinding stones asociated with Epipaleolithic sites in our sample, yet such implements are common in association with Neolithic occupations.

Yet some aspects of the economy indicate continuity between Epipaleolithic and Neolithic adaptations in the Fayum. Brewer (1984) reports that the kinds of fish exploited and the seasonality of their exploitation varied extermely little when Epipaleolithic and Neolithic sites on the northern Fayum shore are compared. Until the era of systematic over-exploitation, fish in the Fayum were a reliable, predictable resource, the exploitation of which probably would have required no major rescheduling of agricultural activities or any new technologies.

On the other hand, the relative rate of caloric return from cereals is usually so high that even subsistence farmers in areas with rich aquatic resources typically quickly focus most of their economy on the reliable, prolific cereals, and in some cases seem to ignore entirely the rich aquatic resources they had once depended upon (Tauber 1981).

The weights of the faunal remains of the various taxa recovered in our 1981 season are presented in Table 2, based on approximately an 80% sample of the remains from Neolithic sites, and from the single Epipaleolithic and "Predynastic" sites investigated. It is clear that in both the Epipaleolithic and Neolithic periods massive

Table 2

Weights of faunal remains of selected taxa from three Fayum sites

Site	FS-1 (Neolithic)		FS-2 (Epipaleolithic)		FS-3 (Predynastic)	
Taxa (weight:grams)		%		%		%
Indentified Fish	5541.3	29.9	47.7	2.6	4458.8	20.0
Unidentified Fish	4101.6	22.1	735.5	40.0	9538.3	42.6
Turtle	2351.3	12.7	11.1	0.6	625.7	2.8
Crocodile	13.3	0.1		0.0	1244.9	5.6
Bird	29.1	0.2	29.9	1.6	23.8	0.1
Hartebeest	18.9	0.1	132.2	7.2	146.8	0.7
Gazelle	65.0	0.4	2.5	0.1	180.9	0.8
Canid	21.2	0.1	.6	0.0	243.6	1.1
Cattle	3.9	0.0	224.9	12.2	14.1	0.1
Sheep/Goat	131.7	0.7		0.0		0.0
Addax		0.0	86.3	4.7		0.0
Pig	.1	0.0		0.0		0.0
Unidentified Mammal	6265.3	33.8	566.9	30.9	5907.2	26.4

1. Many other species have been identified in the 1981 Fayum faunal assemblages, and these will be fully published in our final report, along with more detailed information about differential frequencies of body parts in some species and measurements on selected faunal elements;
2. The fauna from FS-1 are from surface collection while those from FS-2 and FS-3 are from excavations, so these data are not directly comparable;
3. The data for FS-1 represent the faunal remains recovered in approximately 80% of the surface collections· the remaining 20% will be published in our final report;
4. The primary fish species represented in our collections were *Clarias*, *Synodontis*, *Tilapia*, *Lates*, *Bagrus*, and *Tetradon*;
5. FS-3 was identified as Predynastic by Caton-Thompson and Gardner and located to the southwest of the Ptolemaic site of Philoteris (1934: Pl. CVIII).

quantities of fish were eaten (primarily *Clarias* and *Heterobranchus*), as well as turtles, crocodiles, antelopes, gazelles, aurochs, hares, and various invertebrates. As for the use of domesticates in the Fayum Neolithic, the evidence is somewhat ambiguous. The small representation of domestic sheep, goats, and cattle in the sites analyzed in our 1981 work indicates a very restricted role for these animals, but the bovids may have been used in the Nilotic Saharan tradition of milk and blood exploitation, rather than as primarily a meat source (Wendorf and Schild 1984: 428). And some of the bovids in our samples may be from wild populations of this genus: Gautier, in his discussion of the faunal remains from Neolithic sites on the northern Fayum shore (1976), suggests that at least some of the cattle remains there were from wild populations.

It is somewhat curious that the pig – which may be presumed to have lived in great numbers in undomesticated form in the swamps and lake margins of the Fayum – has been tentatively identified at one of our Epipaleolithic sites but appears to be either absent or uncommon in Neolithic sites in the southwestern Fayum. Caton-Thompson and Gardner reported pig-remains from Kom W, a major Neolithic site on the northern Fayum shore, although they note that these pigs may not have been domesticated, and indeed, they doubted that "... domestic animals played much, if any part, in this lake side economy" (1934: 89).

These and other aspects of the cultural ecology of the Fayum should become somewhat clearer when we have finished our statistical analyses of the associations between the faunal remains and artifacts.

Regarding the Neolithic settlement pattern, our statistical analyses of artifact distributions on the southwestern edge of the Fayum are still in process, but there is little in our initial findings to indicate the existence of permanent villages. Residences of the Fayum A peoples may well have been insubstantial reed huts, of course, and, if so, we would expect to find few evidences of these. But even such simple structures would probably have produced distinctive artifacts distributions and associated features, such as storage bins, graves, and specialized activity areas. There is little in the archaeological record of the Fayum to support the notion of permanent Fayum villages, however. Kom W, the largest Fayum A site in the Fayum, had several meters of occupational debris at its maximum height, but Caton-Thompson and Gardner found not a single recognizable wall-trench, housefloor, or structure. Kom W seems to have been produced by hundreds of small encampments around hearths and probably spanned several centuries of such episodic occupations.

It is in this context that we have examined closely the conclusion of Ginter and Kozłowski (1983) that some sites on the northern Fayum shore are the remains of "dwelling structures" of Neolithic agriculturalists. Their maps (1983: Fig. 22) of these settlements show post-holes in position near hearths and other domestic remains. They also distinguish two Neolithic periods (an earlier Neolithic I and a later Neolithic II), and they conclude that the "Neolithic character of Unit I, that is its agricultural-breeding economy, is revealed only in the large base camps such as Kom W, while the sites discovered in the Qasr el-Sagha region represent rather seasonal (dry-season) specializations based mainly on "fishing" (1983: 70).

The grinding stones, sickles, plant and animal remains, and other artifacts at Kom W leave no doubt that these people used domesticated plants and animals and practiced agriculture. But Kom W, by far the largest and stratigraphically complex of the known Fayum A sites, does not at all resemble Neolithic communities in most other areas of the world: there is little convincing evidence of post-holes, floors, burials, houses, storage bins, or other markers of year-round settlement in an agricultural community. Nor are there indications in Puglisi's (1967) analyses of sites in the extreme northern part of the Fayum Depression of sedentary agricultural communities.

In fact, none of the known Fayum A sites closely resembles permanent agricultural communities. This lack of resemblance may be an artifact of poor preservation or inadequate sampling, but at this point it seems clear (as various scholars, beginning with Caton-Thompson and Gardner 1934, have suggested) that the Fayum A adaptation was quite different from other Neolithic adaptations, and that the Fayum A peoples remained somewhat mobile, even after they had begun substantial agriculture and stock-breeding.

If this was the case, the importance of the Fayum Neolithic may be in what it can tell us about the association of agriculture and the village way of life, as well as in its evidence about the timing and spread of agricultural economies.

The association of full-fledged agricultural economies with sedentary populations and permanent village life is not absolute, but it is quite close. There are good reasons for this. Cereal crops have relatively short periods of optimum maturation for harvesting, and competition for the ripened seeds from birds, rodents, and other animals is severe (Flannery 1973). Immediate storage of gathered cereals is required to avoid enormous losses to animals and spoilage, and both the stored grain and the technology for collecting and processing it is not easily portable. So why would the Fayum Nelithic population have remained quite mobile, if indeed they did?

If the Fayum Neolithic derived from Saharan sources, as Wendorf *et al.* (1984) suggest, they may have continued the Saharan tradition of cattle-exploitation coupled with a diverse hunting-collecting, agricultural economy. Whatever the ultimate source of the colonists or domesticates, the Fayum's low agricultural potential *vis-à-vis* that of the adjacent Nile Valley (prior to the exposure in Ptolemaic times of the rich Fayum lake bottom) may simple have offered a better return on a mixed agricultural-hunting-collecting economy that a fully agricultural one.

We hope that additional analyses of our data will help resolve these questions. Ultimately, of course, the archaeology of the Faytum can only be interpreted in the context of the archaeology of other areas, including the eastern Sahara, Sinai, the eastern Delta, and the southern Nile Valley – the areas from which domesticates and agricultural economies may have been initially introduced to the Fayum.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

JANUSZ K. KOZŁOWSKI and BOLESŁAW GINTER

The Fayum Neolithic in the light of new discoveries

The present state of investigations

The term Fayum Neolithic was introduced by G. Caton-Thompson and E. Gardner who in the twenties of this century carried out large-scale excavations at the northern border of the Fayum Oasis, north of the present Birket Qarun Lake (Caton-Thompson and Gardner 1926; 1934). On the strength of the results obtained, the authors claimed that the neolithic inventories discovered in the area were different from the culture units known till that time on the territory of Egypt. The observed differences led – as we know – to the isolation of two new units within the framework of the Egyptian Neolithic. This was done mainly on the evidence from the explored large settlements, *i.e.* Kom W and Kom K, and surface finds from the region around Qasr el-Sagha. The first of the two units is the so-called Fayum A culture.

Its description was based on the materials obtained during exploration of the above-mentioned Kom W and K. According to Caton-Thompson and Gardner the lithic inventory of Fayum A contains typically bifacially retouched tools including knives, arrowheads and sickles, various types of chipped and polished axes, stone grinders, a variety of flint tools with retouch of the edge made on flakes, blades and pebbles. Diverse ceramic types are represented mainly by spherical and hemispherical vessels, S-profile pots, pots with more or less cylindrical necks, vessels with everted rims, bowls of various depth with rims everted, and finally pedestalled vessels. The Fayum A unit had a typical neolithic economy of intensive land cultivation and stock breeding.

The Fayum B culture – which according to Caton-Thompson and Gardner is later than Fayum A – shows considerable differences as to the lithic inventories and economy type. Flint tools contain convex and straight backed pieces and numerous other tools – mainly blade tools formed by retouch of the edge. Besides these, a small number of tools formed by bifacial surface retouch occur. The latter are all hunting tools. In respect of economy the Fayum B was supposed to indicate the reversion to hunting and fishing (economy of the Palaeolithic type). Relative chronology of Fayum A and Fayum B was principally based on the vertical differentiation of sites in relation to their elevation above sea level. Caton-Thompson and Gardner worked on the assumption that the level of the present-day Birket Qarun Lake lowered gradually from the Late Pleistocene to the Early Holocene. Consequently, the sites stratified higher were supposed to be older than the sites situated in lower areas.

Already in 1936 Little verified the hypothesis of Caton-Thompson and Gardner about the dynamics of the changes in the level of the Birket Qarun Lake. Intensive investigations in the region of the Hawara Canal led him to the conclusion that the lake level fluctuated periodically. One of the factors causing fluctuations was the action of rivers discharging their waters into the lake.

Later, the existing conceptions were developed and presented in new light due to investigations by Combined Prehistoric Expedition conducted in the sixties at the northern edge of the Birket Qarun Lake. In the outcome the occurrence of several consecutive lake transgressions was revealed separated by distinct periods of recession when the lake receded a fair distance, thus making large areas accessible by Epi-Palaeolithic and Neolithic populations. Four phases of transgression were distinguished: the earliest falling at *ca* 7,000 b.c., the latest at the Period of the Old Kingdom. They were dennotated respectively: the Palaeo-Moeris, Pre-Moeris, Proto-Moeris and Moeris Lake. Investigations of this Expedition into the prehistory of the end of the Pleistocene and the Early and Middle Holocene in the Qasr el-Sagha region together with the areas directly beyond confirmed the presence of the Fayum A culture – as it was understood by Caton-Thompson – whereas the views on the Fayum B culture underwent revision. Materials supposedly representing Fayum B were reidentified as belonging to a new taxonomic unit which has been distinguished and dennotated as the Qarunian. Numerous stratigraphic observations and radiocarbon determinations date this unit to the 7th and 6th millennia b.c. (Wendorf and Schild 1976). The unit corresponds to the Holocene phase of the Late Palaeolithic in north-eastern Africa and had the hunting and fishing economy.

Further investigations in the region of Qasr el-Sagha were carried out in 1979 by the authors of the present paper from the Archaeological Institute of the Jagiellonian University in Kraków with the participation of the staff of the Mining and Metallurgy Academy and the Archaeological Museum in Kraków, in cooperation with the Cairo Branch of the German Institute of Archaeology. Explorations concentrated about 1.5 km from the Qasr el-Sagha temple and covered the territory investigated by the Combined Prehistoric Expedition – by kind permission of Professors Wendorf and Schild.

Palaeography of the Birket Qarun Lake

Sedimentation in the northern margin of the Fayum depression shows a large hiatus between the Upper Eocene slates (UES formation) and the lacustrine Holocene deposits whose sequence begins with lacustrine marl-diatomites (LMD unit). The sedimentation of the lowermost series of these deposits is connected with several fluctuations of the lake level which discontinued with the arid recession phase. Traces of this phase can be observed such as anhydrite crystals in the top of the LMD unit, and charcoal from fires of the parched vegetation round the dry lake shore. The development of the LMD unit falls within the period of 8,835 ± 890 B.P. (Gd-709) and 7,440 ± 60 B.P. (Bln-2336), in accordance with the dates obtained from recent investigations in the region of Qasr el-Sagha. This dating corresponds to the transgressions of the Pre- and Proto-Moeris Lake as determined by Wendorf and Schild (1976).

Another, much smaller hiatus separated the LMD formation from the overlying grey hard silts (GHS) containing the first traces of Neolithic settlement. The formation of the middle and upper parts of the GHS unit took place in a fairly dry recession phase, when the settlement was distributed at the level of 14.75 m above sea level, in the period from *ca* 6,480 ± 170 B.P. (Gd-2021) and 6,320 ± 60 B.P. (Gd-1497). The silts are medium or fine-grained and do not show sedimentation structures (Fig. 1).

A new transgression period starts with the sedimentation of the white sands silts complex (CWSS), horizontally strongly differentiated in result of differences in the sedimentation regimen and a heavy uneven erosion of the top of the GHS unit. In the western part of the investigated area cross-bedded sands occur. These are deltaic sediments from the estuary of wadis discharging water from the territories of the Western Desert in the north.

The borderline between the GHS and CWSS formation will have fallen at the first half of the 4th millennium b.c. in the interval between the radiocarbon dates 5,990 ± 60 B.P. (Gd-695) and 5,650 ± 70 B.P. (Gd-1495), and 5,540 ± 70 B.P. (Gd-1140).

The top of the CWSS formations corresponds again to a recession period. As a result abundant traces of settlement are found in the eastern part of the investigated area. In the same area humus soil developed on the CWSS unit indicates that the climate ameliorated by becoming drier. It has been dated to ca 5,000 ± 60 B.P. (Gd-1496) and 5,010 ± 110 B.P. (Gd-907). The shore-line at that time displaced markedly to the south, most probably beyond the boundaries of the territory under investigation.

Another transgression of the lake starts with the deposition of brown sands consisting of several layers separated by periods of erosion. The floor itself of the BS unit is dated to 4,829 ± 100 B.P. (Gd-976), although earliest dates have been obtained synchronous with determinations for the soil: 5,080 ± 110 B.P. (Gd-976),

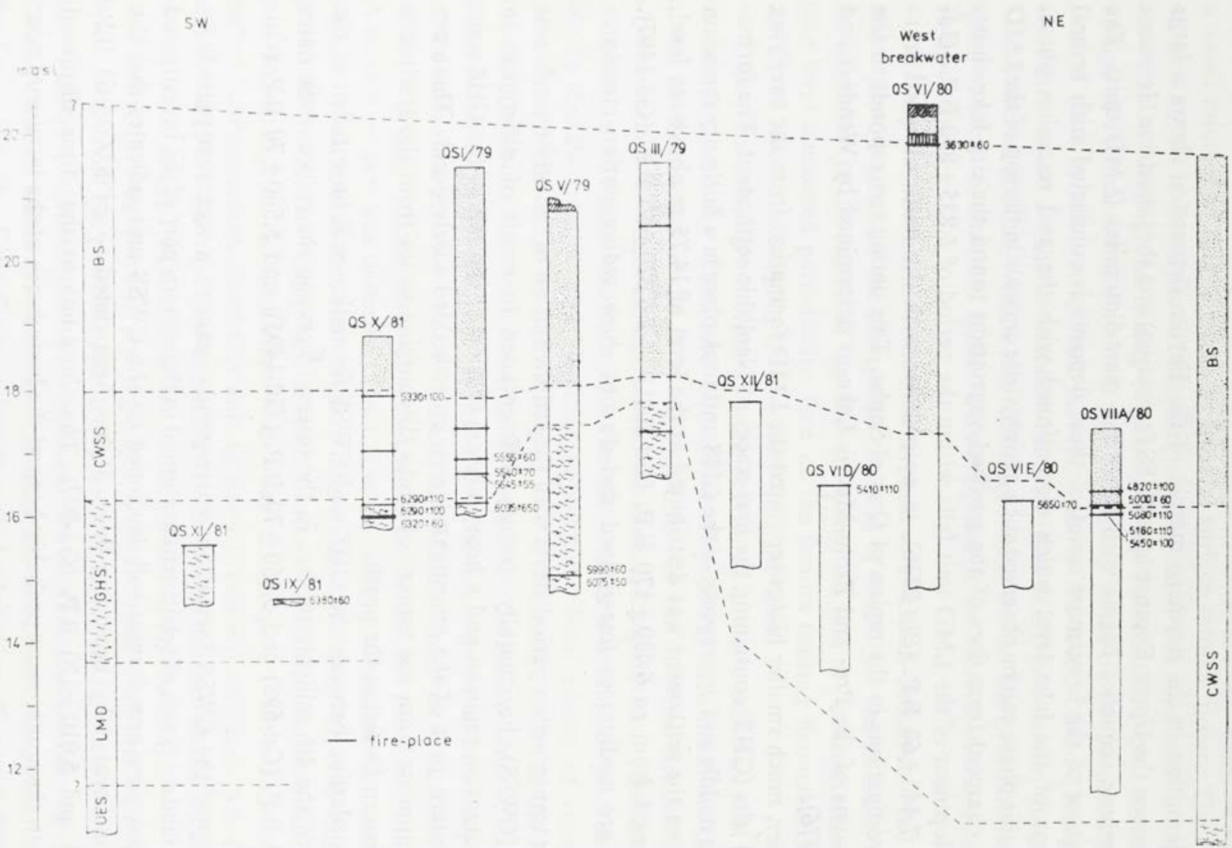

FIG. 1. Simplified stratigraphic section of Qasr el-Sagha region

and 5,120±110 B.P. (Gd-874). The top part of the BS unit is an equivalent of the maximum transgression of the lake during the Middle Kingdom period. When we correlate the stratigraphic units just mentioned with palaeoclimatic events in the Sahara and the Nile Valley, then the end of the LMD sedimentation coincides with the end of a slightly wetter period dated in the Gebel Nabta region in the Western Desert to 9,650±750 B.P. (Wendorf and Schild 1980) corresponding to the aggradation of the Nile verified in the Catfish Cave for the end of the 6th millennium b.c. (Wendt 1966).

The next lake transgression, connected with beginning of the formation of the CWSS unit, corresponds in turn to another aggradation of the Nile dated in the region of Dibeira-West to the middle of the 4th millennium b.c. This was at the same time a wetter period in the Western Desert as shown by huge deltaic sediments at the estuaries of wadis in the western part of the investigated area.

The subsequent recession and aridity of climate took place at the turn of the 4th and 3rd millennia b.c., that is: slightly earlier than the maximum climatic aridity according to data from the oases in the Western Desert, for example, Siwa and Garra (Hassan 1976; 1978).

The lake fluctuation during the deposition of the BS unit seems to have been related primarily to the water works in the region of the Hawara Canal, which permitted periodical flow of water from the Nile to the Fayum depression. Another factor was the action of torrential rains in the Western Desert which brought about partial destruction of Middle Kingdom settlements located in the region of Qasr el-Sagha.

Stratigraphic and geochronological basis for the identification of culture units

Within the sequence of Holocene sediments in the Qasr el-Sagha region we have just discussed, two principal stages of Neolithic settlement can be distinguished in the period between the Epipalaeolithic and Dynastic (possibly Proto-Dynastic) settlement.

The local Epi-Palaeolithic is linked with the LMD formation only and falls at the period from 8,835±890 B.P. (Gd-709), dated by the Epi-Palaeolithic finds on the secondary deposits at site QS I/79, to 7,740±60 B.P. (Bln-2336), and by the hearth in the top of the LMD at site QS II/79. These determinations tally with dates obtained for the Qarunian at site E-29G1: 8,100±130 B.P. (I-4128); E29HI: 8,070±±115 B.P. (I-4126); E29G3A: 7,500±125 B.P. (I-4130).

If these dates are taken into account, then a large hiatus becomes apparent between the Epi-Palaeolithic and the beginning of the Neolithic. The oldest Neolithic site QS XI/81 in the middle of the GHS formation yielded the date of 6,480±170 years B.P. (Gd-2021). Thus the hiatus is of about one thousand years.

The development of the Early Phase of the Fayum Neolithic falls at the period of formation of the central and upper part of the GHS unit and the lower part of the CWSS unit. This was initially a period of recession, when the lake shore was accessible for at least seasonal settlement, followed by the onset of the transgression phase. Thus, the beginning of the period was dry and then the climate got increasingly wetter until heavy rainfalls occurred in the Wester Desert activating the wadis which discharged water into the lake. Radiometric determinations date this period to the second half of the 5th millennium b.c., for example: site QS XI/81 – 6,480 ± ± 170 B.P. (Gd-2021), QS IX/81 – 6,380 ± 60 B.P. (Gd-149), QS V/79 – 6,075 ± ± 50 B.P. (Bln-2335), 5,990 ± 60 B.P. (Gd-695), QS I/79 – 6,035 ± 650 B.P. (Gd-708), as far as sites stratified within the GHS formation are concerned. Sites which are contained within the bottom of the CWSS and the corresponding deltaic sands date to the first half of the 4th millennium b.c., *e.g.*, QS I/79 – 5,645 ± 55 B.P. (Bln-2334), 5,555 ± 60 B.P. (Bln-2333). 5,540 ± 70 B.P. (Gd-1140), QS VIE/81 – 5,650 ± 70 B.P. (Gd-1495).

Thus, a chronological hiatus is found as well between the sites of the Early Phase of the Neolithic in the GHS formation as well as at the bottom of the CWSS unit in the period from 5,990 to 5,650 B.P. The hiatus may be accounted for, we are inclined to believe, by heavy erosion of the top of the GHS formation which may have caused the destruction of sites originating from this temporal interval, and moreover may have created limited conditions for settlement in the northern part of the Fayum depression.

The onset of the next recession stage corresponding to the top of the CWSS formation and the overlying fossil soil falls within the second half of the 4th millennium b.c. This has been confirmed by dates from the top of the CWSS formation (site VII) A/80: 5,480 ± 100 B.P. (Gd-977), 5,070 ± 110 B.P. (Gd-895), 5,160 ± 120 B.P. (Gd-915); site VID: 5,410 ± 110 B.P. (Gd-903) and the uppermost hearth No. 6 at site QS X/81: 5,330 ± 100 B.P. (Gd-978).

The top of the CWSS formation and the overlying soil contain the Late Phase of the Neolithic settlement. Its taxonomic position differs considerably from that of the Early Phase. The end of the Late Phase in the fossil soil (and possibly initial sediments of BS) is synchronous with the remains of Proto-Dynastic settlement of the Qasr el-Sagha region-sites QS VIII/80: 5,010 ± 120 B.P. (Gd-904), QS VII/80: 5,129 ± 110 B.P. (Gd-874).

The Early Phase of the Fayum Neolithic took place, therefore, after the dry episode had finished and a wetter one began (second half of the 5th and the beginning of the 4th millennium b.c.), whereas the Late Phase developed, on the contrary, at the end of the wet climatic episode (second half of the 4th millenium b.c.). Between the Early and the Late Phase occurs not only a typological hiatus but also – as we intend to show – a chronological hiatus of at least one hundred years in the very middle of the 4th millenium b.c.

Settlement of the Late Phase of the Neolithic persisted during the dry episode until the first Proto-Dynastic settlements appeared in the Qasr el-Sagha region.

The direct confirmation of such a sequence of two phases of the Neolithic is the stratigraphy revealed at site QS X/81. At this site hearth 3 and 4 were contained in the top of the GHS formation. Hearth 1 yielded the date of 6,320$\pm$60 B.P. (Gd-1497). Overlying hearths 2 and 5 yielded almost identical dates 6,290$\pm$100 B.P. (Gd-979) and 6,290$\pm$110 B.P. (Gd -980). Still higher, at the top of the CWSS unit hearth 6 was stratified with the data of 5,330$\pm$100 B.P. (Gd-978). Scanty material from hearths 1 - 5 shows links with the Early Phase, and hearth 6 with the Late Phase.

The Early section of the Neolithic sequence: the Fayumian

The early part of the Neolithic sequence in the Qasr el-Sagha region which we have designated as the Fayumian and which is identified with Caton-Thompson's Fayum A culture, is represented by sites concentrating mainly in the SW section of the investigated area, about 1 to 1.5 km SW of the temple. The sites are located at the foot and in the lower parts of mounds surmounted sometimes with stone constructions from the period of the Middle Kingdom. Some sites are located directly next to the mounds. The main bulk of material has been collected from contemporary surfaces of uncovered sediments, while a part comes from excavations of the butts. As we have said in the previous section – the oldest site (QS IX/81) is contained in the central part of the GHS, the next two (QS XI/81 and the lower part of X/81) in the top part of the GHS, next one (middle part of QS X/81) at the bottom of the CWSS, and the youngest sites (QS V/79 and QS I/79) in the central part of the CWSS. The most recent radiocarbon determinations date the oldest site of the Fayumian at 6,480$\pm$170 B.P., the youngest site at 5,540$\pm$70 B.P. The chronological sequence of the Fayumian we have established is therefore contained within the temporal framework of more than 900 radiocarbon years. The description of the Fayumian is based on the analysis of all the sites mentioned above, first of all on the rich inventory from site QS IX/81.

For flint tools making, pebbles occurring in large quantities on the surface of the high desert plateau between Qasr el-Sagha and Gebel Qatrani were used. Apart from these diverse flint pebbles and thermal fragments of cherts are found. Among small and very small cores single-platform flake cores in various phases of processing prevailed (Fig. 2 : *2 - 6,9*). They are mostly unprepared or only with prepared platforms. Considerably fewer are double–platform flake cores, flake cores with changed orientation (Fig. 2 : *7, 8, 11 - 13*), discoidal and sub-discoidal cores (Fig. 2 : *10*). Only single examples bear traces of flake and blade processing. Debitage is represented almost exclusively by various types of flakes. Blades do not exceed 3% of all lithic inventories. These are predominantly blades struck off blade-flake cores, or pseudo-blades struck off the edge of the flaking face of the core. On all the sites cortical flakes constitute from one half to two-thirds of all flake forms. Wholly corti-

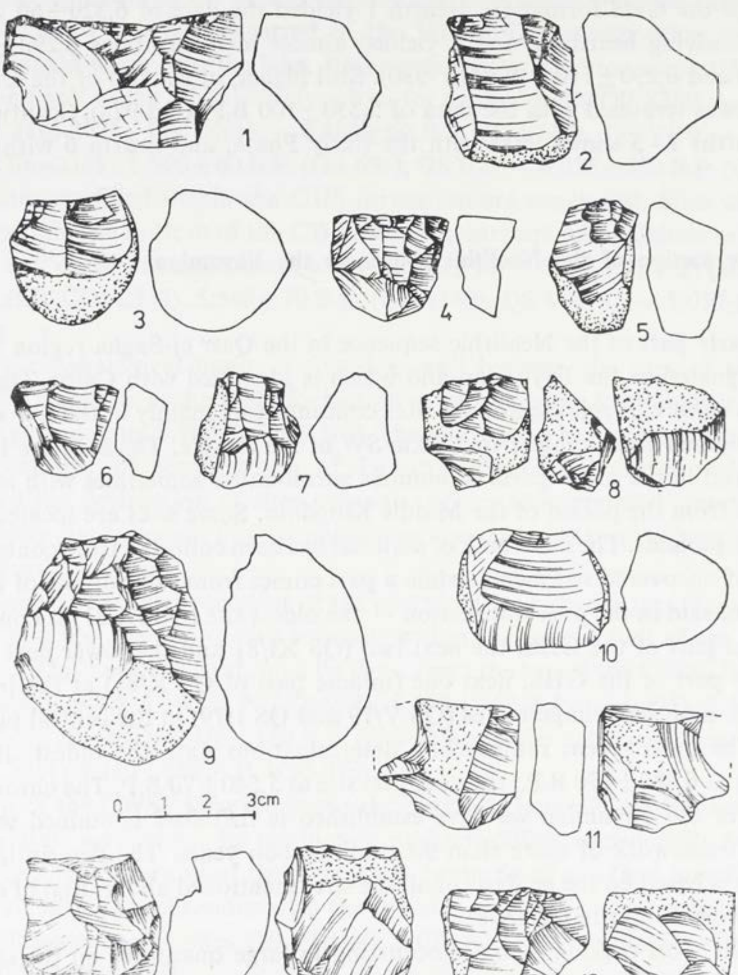

FIG. 2. Qasr el-Sagha, Site IX/81. Cores

cal flakes occur fairly frequently. Next to flakes with scars on the dorsal side struck off parallel to the flake axis there are also flakes with opposite scars struck off double-platform cores with a common flaking face, and flakes with crossing and centripetal scars. The latter are undoubtedly the evidence of the application of discoidal core technique. Relatively numerous are flakes with a narrow strip of cortex on one side resembling short and thick *couteau à dos naturel*, but removed from discoidal cores. Characteristic but not very frequent are atypical side-blow flakes with the elongated cortical platform and flakes removed by splintered technique.

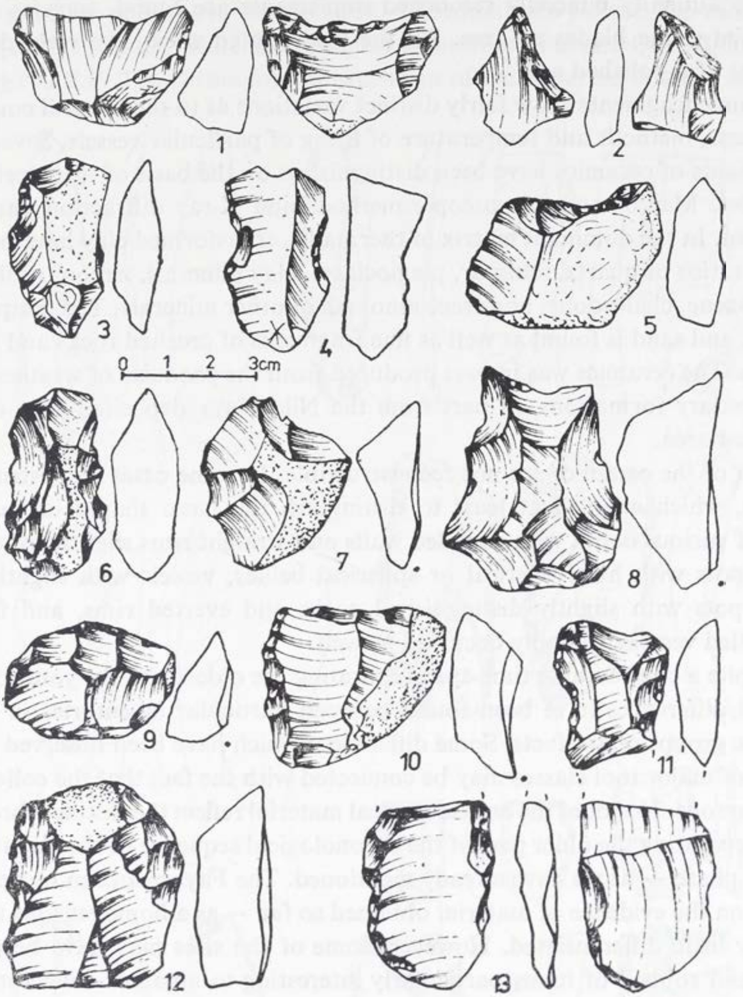

FIG. 3. Qasr el-Sagha, Site IX/81

1 - 5: Notched implements; *6 - 8*: Denticulated tools; *9 - 13*: Side-scrapers

Four basic tool groups have been indentified: notched tools (Fig. 3 : *1 - 5*), denticulated tools (Fig. 3 : *6 - 8*), side-scrapers (Fig. 3 : 9 - *13*) and retouched flakes. They appear in various ratios with the predominance of notched and denticulated tools or with a slight ascendancy of side-scrapers, while the ratio of retouched flakes remains stable and fairly high. Only in the uppermost culture level at site QSI/79 single retouched blades have been recorded. Tools with retouch on the edge are usually made on flakes. This corresponds to the conspicuously flake-based character of flint industries of the Fayumian observed in the groups of core and debitage. Occasionally bifacially retouched implements are found, such as fragments of bifacial sickle blades or axes. All the investigated sites have yielded only one fragment of a polished axe.

Ceramic fragments show fairly distinct variations as to the mineral composition, admixtures, methods and temperature of firing of particular vessels. Several groups and variants of ceramics have been distinguished on the basis of their technological properties. Macro- and microscopic methods and X-ray diffraction pattern have been used. In the dominant matrix of thermally transformed clay have been found various ratios of quartz, feldspar, plagioclases, clay minerals, zircon, rutile, turmaline, piroxene, chalcedone, and trace amounts of other minerals. The temper is often organic, and sand is found as well as fine fragments of crushed rocks and fragments of shells. The ceramics was in part produced from the products of weathering of the local Tertiary formations, in part from the Nile clays deposited east of the investigated area.

Most of the ceramics are not reconstructible. In some cases reconstruction was possible, which enabled at least to distinguish the basic shapes of vessels, *i.e.*: bowls of various depth with rounded walls and straight rims slightly everted or inverted, pots with hemispherical or spherical bellies, vessels with slightly profiled bellies, pots with slightly distinguished necks and everted rims, and flat plates. Pedestalled vessels probably occurred as well.

Despite a considerable time-span separating the oldest and the youngest sites no essential differences have been found between particular inventories in respect of the basic groups of artefacts. Some differences which have been observed in the frequency of major tool classes may be connected with the fact that the collections are not numerous. Nor does the archaeological material reflect the distinct chronological hiatus separating the older part of the chronological sequence of the Fayumian from its later phase – as we have already mentioned. The Fayumian can be perceived – at least on the evidence of material obtained so far – as a homogeneous unit, typologically little differentiated. However, some of the sites may have been impoverished and robbed of items particularly interesting to amateur collectors, such as especially bifacially retouched tools.

The younger section of the Neolithic sequence – the Moerian

Sites representing the younger section of the Neolithic sequence in the Qasr el-Sagha region are located in the NE part of the investigated area, or directly next to the temple. Part of the material has been collected from the contemporary deflation surface, but a large portion of it has been obtained from excavations, mainly at site QS VII/80. All the assemblages were found in the top of the CWSS (QS VI/80, XII/81 and – as already mentioned – VII/80). Materials from site QS VII/80 formed a stratigraphic sequence occurring in the white unstructured sands over the white silts, below and above humus beds. The oldest site yielded the radiocarbon date of 5,410 ± 110 B.P., while the youngest cultural level at site QS VII/80 is dated to 4,820 ± 100 B.P. The chronological time-span of the Moerian is, then, about 600

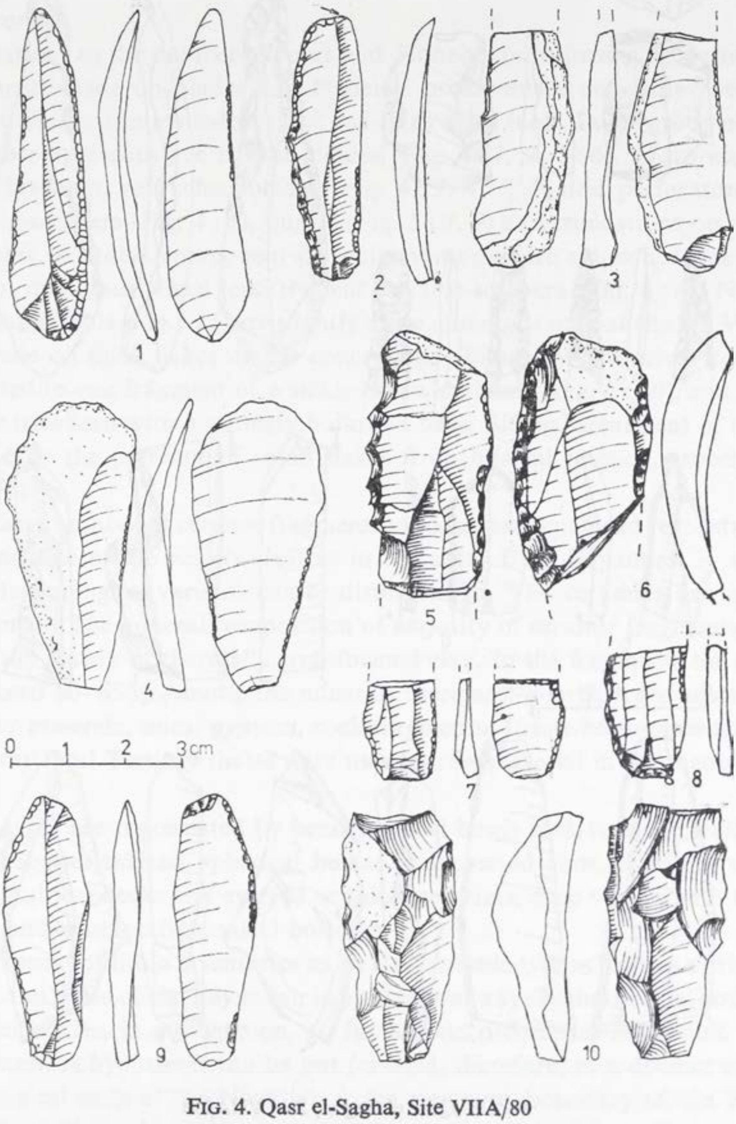

FIG. 4. Qasr el-Sagha, Site VIIA/80

1 2: **Backed implements;** *3, 4, 7 - 9*: **Retouched blades;** *5*: **Denticulated tool;** *6*: **Side-scraper;** *10*: **Bifacially retouched tool** radiocarbon years. The latest date for the Moerian seems to bring to its close the development and persistence of Neolithic cultures at the northern border of the Birket Qarun Lake, clearly overlapping with Proto-Dynastic cultures in this area.

The characterization of the Moerian has been based first of all on materials from the richest site QS VIIA/80. Materials from the remaining poorer sites, have also been taken into account. Numerous ceramic fragments all come from site QS VII/80.

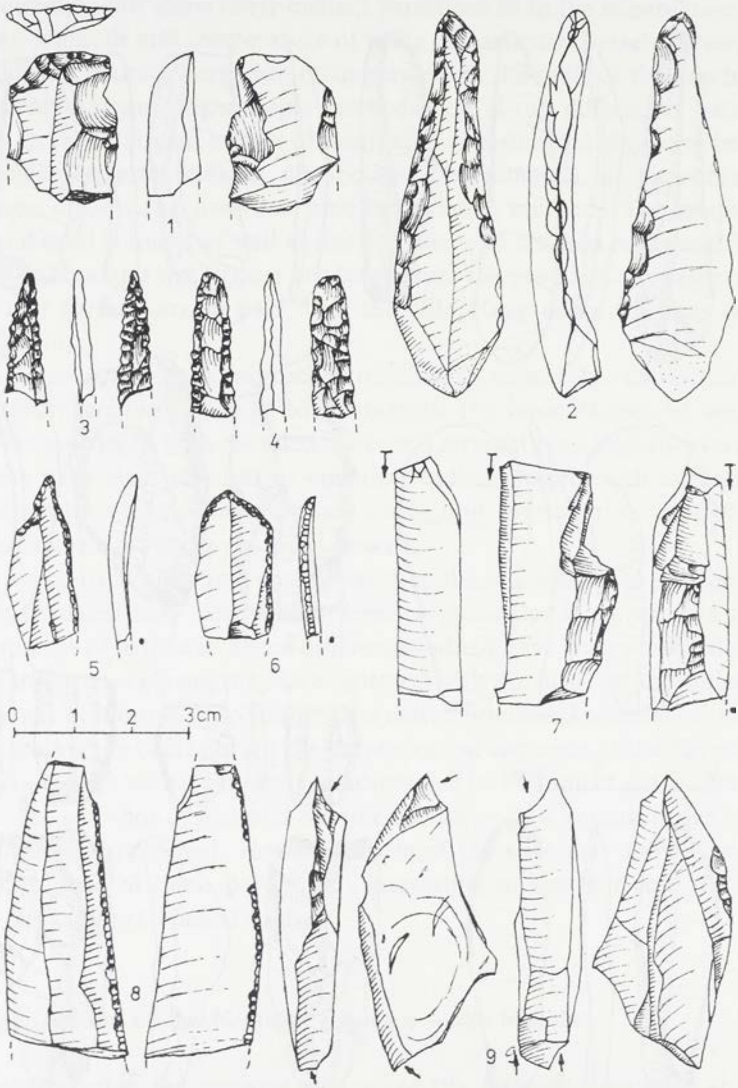

FIG. 5. Qasr el-Sagha, Site VIIA/80

1: End-scraper; *2 - 5*: Perforators; *6*: Backed implement; *7, 9*: Burins; *8*: Retouched blade

The raw materials for flint tools making are mainly small flint pebbles and cherts, and larger concretions probably brought from a distance. These were used to manufacture single- and double-platform cores with separate flaking faces for blades and bladelets, and flake cores single-platform and discoidal. Part of the flakes may have come from the preparation of blade cores. In the group of debitage flakes predominate over occasional blades. There are few elongated blade-flakes. Flakes have scars parallel to the axis of the ventral side, much fewer are flakes with opposite scars, crossing or centripetal. This is in agreement with the character of not very numerous cores.

In comparison to the number of cores and debitage, tools form a numerous group. Implements made on blades and bladelets predominate decidedly over flake tools. The latter constitute one-fourth or one-third of all tools. In the group of blade tools the most numerous are backed blades (Fig. 4 : *1*, *2*; 5 : *6*), microretouched blades and bladelets, retouched blades (Fig. 4 : *3*, *4*, *7*, *9*) and perforators (Fig. 5 : *2* - *5*). End-scrapers (Fig. 4 : *1*), burins (Fig. 5 : *7*, *9*) and truncations occur only as single items. A stable component of tool inventories are retouched flakes, but these are not numerous. Even less frequent are side-scrapers (Fig. 4 : *6*). Notched and denticulated tools (Fig. 5 : *5*) are slightly more numerous only at site QS VID/80. They are made on thick flakes or flat concretions. Bifacially retouched tools are scanty, limited to one fragment of a sickle or a wide blade (Fig. 4 : *10*), and a fragment of an arrowhead with a strongly hollowed base. Bifacial treatment of tools is corroborated by the presence of small flakes from bifacial retouch, especially at site QS XII/81.

A fairly large number of ceramic fragments in some cases enablead reconstruction of shapes and size of the vessels. Just as in the case of the Fayumian – several groups and technological variants can be distinguished. The ceramics has organic and sand temper. The mineral composition of majority of ceramic fragments is dominated by the matrix of thermally transformed clay. In the fragments the matrix does not exceed 60 - 65%. Among the minerals there are: quartz, trace amounts of feldspar, silty minerals, mica, gypsum, rock fragments. It has been experimentally shown that the local Tertiary shales were used as raw material in the manufacture of ceramics.

Ceramic types are represented by hemispherical bowls with rounded walls, vessels with hemispherical and spherical bellies and everted rims, S-profile vessels, pots with cylindrical necks and everted or thickened rims, deep vessels with rounded bottoms, and vessels with conical bottoms.

Both in respect of lithic inventories as well as ceramic types the sites of the Moerian differ from those of the Fayumian in an essential way. Technological and typological dissimilarities, in our opinion, go far beyond differences admissible within one culture unit. A hypothesis can be put forward, therefore, of a distinct cultural and chronological units of the Neolithic at the northern boundary of the Fayum Oasis, or at least along the major section of the shores of the Birket Qarun Lake.

The Fayumian and Fayum A in the approach of G. Caton-Thompson

The culture unit from the Early Phase of the Neolithic in the Qasr el-Sagha region which we have distinguished and described, seems to be a fairly close equivalent of the so-called Fayum A culture as defined by Caton-Thompson and Gardner (1936). The similarity is pronounced in respect to ceramic shapes and ceramic technology. All forms of vessels from sites QS I/79, QS V/79, QS IX/79 and QS XI/79 have close parallels in the ceramics from, for example, Kom W. This refers both to hemispherical bowls (*cf.* Ginter *et al.* 1980: Fig. 18), which have close analogies at Kom W (Caton-Thompson and Gardner 1936, Pl. XIII: *4*, *6*; XVI: *4,7 - 10*, *13*) as well as the taller bag-shaped vessels (Ginter *et al.* 1980: Fig. 19; Caton-Thompson and Gardner 1936, Pl. XIV), and less frequent pedestalled vessels (Ginter *et al.* 1980: Fig. 20: *1 - 3*; Caton-Thompson and Gardner 1936, Pl. XVI: *11*, *12*).

Table 1

Comparison of core types from sites Kom W and QS I/79

Core types	Kom W	QS I/79
Single-platform flake cores Fig. 6:1,2,4	9	2
Discoidal and sub-discoidal cores, often small Fig. 6:6-8	6	6
Cores with changed orientation, on flakes Fig. 6:3,5	2	7

Less obvious are the affiliations in the case of lithic industry, since Fayum A industry consists exclusively of core axes, bifacial leaf points, bifacial arrowheads with a hollowed base, bifacial points in the shape of fish-tail, and elongated sickle blades.

Such a composition of lithic industry, limited only to core and bifacial implements, resembles closely the very specific composition of the industry of the Merimde culture. Verificatory investigations conduced on a small scale at Kom W in 1981 have proved that a different interpretation of the composition of the Fayum A lithic industry is possible. In the area where Caton-Thompson had conducted her research a large number of flake artefacts remained, which suggests that during exploration Caton-Thompson selected her material on the spot. In the effect, only bifacial and core implements were collected. As a control sample, to verify the material overlooked by Caton-Thompson, we have collected finds from a randomly chosen square meter in the neighbourhood of "strip E" – a unit used by Caton-Thompson. The square yielded a total of 34 retouched tools – all on flakes, 15 cores and 263 flakes which is equivalent to the average density at the Neolithic sites we have explored in the Qasr el-Sagha region, where – on the other hand – core and bifacial tools are very rare. These sites may have been depleted by the activity of amateurs-collectors.

Table 2

Comparison of flake typology from sites Kom W and QS I/79

Flake types	Kom W	QS I/79
Wholly cortical flakes	10	9
Flakes with>50 % of cortex	38	34
Flakes with<50 % of cortex	67	80
Flakes with concentric scars	15	22
Flakes with perpendicular scars	6	14
Flakes with opposite scars double-platform	1	5
Flakes with the same direction of scars	–	14
Flakes from splinters	1	4
Trimming flakes	10	–
Pseudo-blades	18	–
Chips and fragments	20	41
Total	186	223

Table 3

Comparison of platform types on flakes from Kom W and sites excavated in Qasr el-Sagha area

Platform types	Kom W	QS XI/81	QS I/79	QS V/79
Cortical and other unprepared	90	429	86	65
Formed by blows	55	215	24	16
Punctiform	28	160	6	12
Dihedral	11	16	4	4
Faceted	11	4	7	2

The structure of the material which we have collected from Kom W is an exact parallel to our collections from the sites QS I/79, QS V/79, and QS IX/81. The correspondence refers primarily to the occurrence of similar core types (Table 1). The dissimilarities in frequencies are the result of a less advanced core processing at Kom W, hence fewer cores with changed orientation.

The flake structure is also similar (Table 2). There are similarities as well as regards the structure of flake platforms, which indicates a high degree of technological homogeneity of the series under discussion (Table 3). Although the series of retouched tools are not large, the frequencies of particular groups and types are distincly similar (Table 4).

Table 4

Comparison of retouched tools typology from Kom W and sites excavated in Qasr el-Sagha area

Tool types	Kom W	QS XI /81	QS I/79	QS V/79
Notched tools Fig. 7:3,4,7,8	9	19	5	3
Denticulated tools Fig. 7:2,5,9	14	6	7	10
Side-scrapers Fig. 7:1,6	2	11	1	12
Retouched flakes	5	14	4	4
Perforators	1	5	-	-
End-scrapers	-	1	-	-
Burins	1	-	2	-
Knife-like tools	1	-	2	-
Bifacial tools	1	1	-	1
Backed blades	-	1	-	-
Total	34	59	21	31

On the basis of these comparisons we may infer that at Kom W the lithic industry was principally flake-oriented, based on the processing of single-platform and discoidal cores (Fig. 6 and 7). It was identical with the industry identified for the Early Phase of the Neolithic in the region of Qasr el-Sagha. The industry at Kom W occurred together with a set of bifacial and core implements much less numerous than the debitage and flake tools. Consequently, it should be admitted that the picture of the industry of the Fayum A culture has been distorted by Caton-Thompson due to the selective nature of her collection. Our collection, on the other hand, from sites of the Early Phase of the Neolithic may have been impoverished (particularly sites QS I/79, V/79 and IX/81) by amateur-collectors who had picked bifacial and core implements.

At Kom W ratio of bifacial and core implements to flake tools and debitage cannot be estimated. However, judging from the number of surface finds in the area excavated by Caton-Thompson and Gardner, flake tools ratio must have been many times higher than the core and bifacial component.

It should be added that the above description of the Fayumian corresponds with the characterization of Neolithic inventories published by Wendorf and Schild

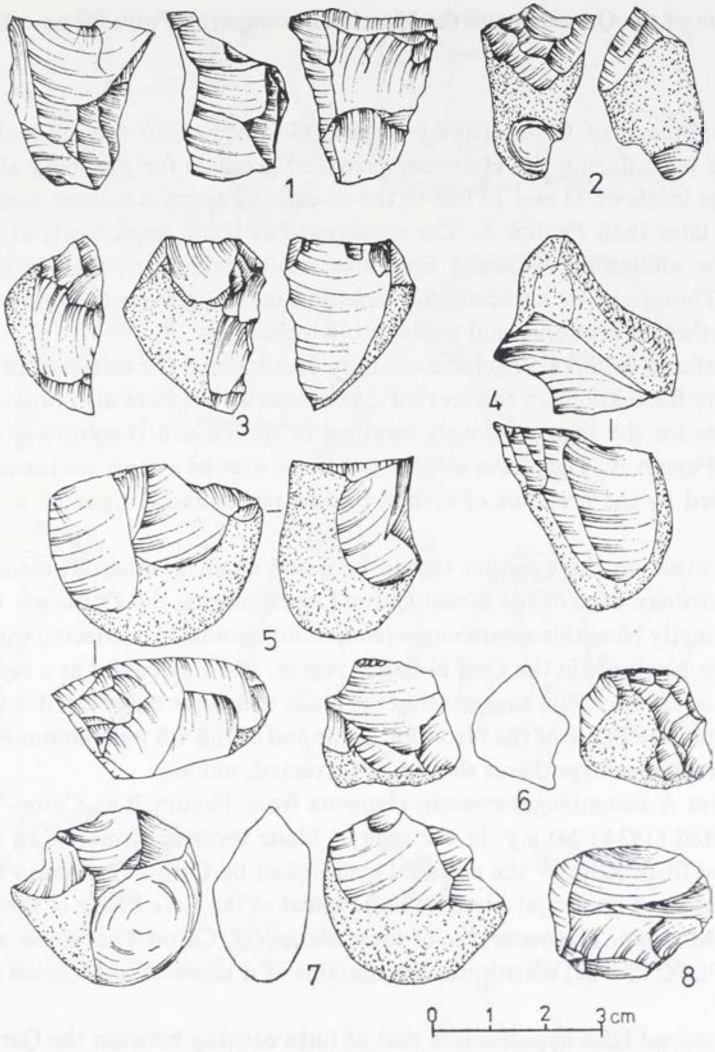

FIG. 6. Kom W. Cores

(1976) from sites E29G3 and E29G2, and the ceramics from the same sites analysed by Banks (1980). Wendorf and Schild have claimed that these lithic industries typically used the flake technique and the hard hammer in the production of some bifacial artefacts. It is characteristic that the radiocarbon date – from the erosional surface of the GHS formation – 5,910±115 B.P. obtained for site E29H2, *i.e.* Caton-Thompson's Kom W (I-4127) is only slightly later than the dates we have obtained from the top of the GHS formation in the region of Qasr el-Sagha.

The problem of the Qarunian and the Moerian in comparison with the so-called Fayum B culture

The hypothesis of Caton-Thompson and Gardner about the gradual lowering of the lake level during the Holocene provided grounds for ascribing all the sites between the levels of 33 and 13 feet to the so-called Fayum B culture, considered to have been later than Fayum A. The occurrence of blade implements at these sites which show affiliations with the Epi-Palaeolithic techniques, was accounted for by Caton-Thompson by an economic recession resulting from the relapse into the hunting-gathering economy and palaeolithic techniques.

Wendorf and Schild (1976) have not only documented the existence of a number of Holocene fluctuations in the level of Lake Moeris, but have also obtained radiometric dates for the sites previously ascribed to the Fayum B culture in the period preceding Fayum A. They have singled out these sites as a separate taxonomic unit characterized by the presence of arched backed pieces and designated as the Qarunian.

In this situation the question should be posed again whether all blade artefacts from the northern edge of the Birket Qarun Lake represent the Qarunian. Our discovery of distinctly Neolithic assemblages (containing ceramics) connected with the Late Phase of the Neolithic in the Qasr el-Sagha region, and singled out as a separate unit designated as the Moerian, suggests that the blade technique reappeared in the Fayum region in the Late Phase of the Neolithic at the end of the 4th millennium B.C. In this light two erroneous hypotheses should be corrected, namely:

1. Fayum A assemblages contain elements from Fayum B as Caton-Thompson had suggested (1934 : 24) *e.g.* in the case of blade tools in Kom W. In fact, when we collected from Kom W the material overlooked by Caton-Thompson we recorded the presence of blades (also retouched) typical of the Late Phase of the Neolithic, *i.e.*, of the Moerian. The occurence of these blades (*cf.* Caton-Thompson and Gardner 1934, Pl. X: 23 - 28) constitutes the remains of a short-term Moerian settlement at Kom W.

2. The second false hypothesis is that of links existing between the Qarunian and Fayum A, assumed on the basis of – supposedly – the occurrence in the former industry of core axes, bifacial sickle blades and hollow based arrowheads, as suggested by Hoffman (1979: 185). This hypothesis is based on an incorrect interpretation of Moerian assemblages, basing merely on their hypsometric position and the presence of blade tools as belonging to the Qarunian. In fact, the purely Qarunian assemblages – such as have been characterized by Wendorf and Schild – should be

distinguished from Moerian assemblages (with bifacial and core elements and ceramics), or possibly from mixed assemblages containing both Qarunian and Moerian elements, for example site Z (investigations of Caton-Thompson and Gardner 1934: Pl. LXVIII).

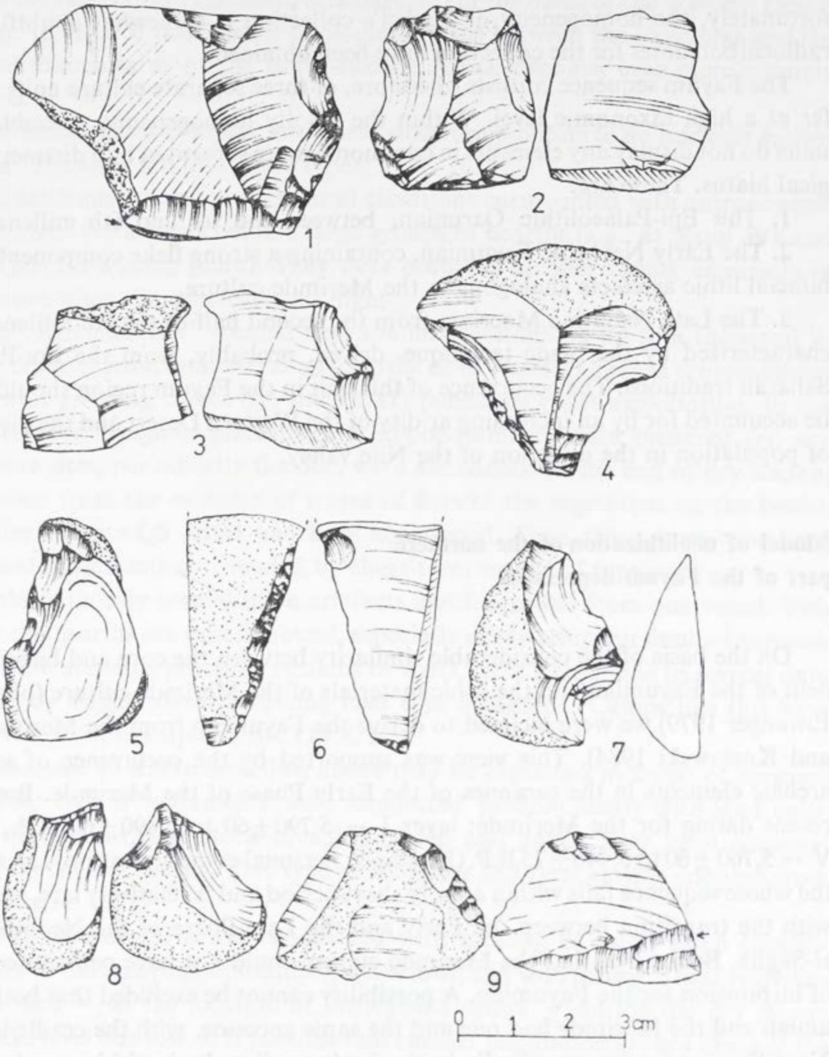

FIG. 7. Kom W

1, 6: Side-scrapers; *2, 5, 9*: Denticulated tools; *3, 4, 7, 8*: Notched implements

It should be stressed that the range of distribution of the Qarunian and the Moerian is much wider than the area we have explored. Investigations of S.M. Puglisi in the north-western part of the Fayum depression (*ca* 7 km north of the contemporary bank of the Birket Qarun Lake, at the height of *ca* 12 m above sea level) revealed rich Qarunian asemblages (the site known as "Two Sisters", *cf.* Caneva *et al.* 1978; the authors put more emphasis, however, on analogies with the Fakhurian). Puglisi collected at the so-called "East Kom I", next to hearth 12, a set of blade tools including backed blades and triangular bifacial points identical with Moerian artefacts. Unfortunately, the homogeneity of Puglisi's collection is somewhat doubtful; and no radiocarbon dates for the collection have been obtained.

The Fayum sequence consists, therefore, of three separate culture units which differ at a high taxonomic level. Within the wholly homogeneous assemblages these units do not display any elements in common but are separated by a distinct chronological hiatus. These are:

1. The Epi-Palaeolithic Qarunian, between the 7th and 6th millennium B.C.
2. The Early Neolithic Fayumian, containing a strong flake component, core and bifacial lithic artefacts analogous to the Merimde culture.
3. The Late Neolithic Moerian, from the second half of the 4th millennium B.C. characterized by the blade technique, drived, probably, from the Epi-Palaeolithic Saharan traditions. The occurrence of this unit in the Fayum region should, perhaps, be accounted for by an increasing aridity of the Western Desert and the displacement of population in the direction of the Nile valley.

Model of neolithization of the northern part of the Fayum depression

On the basis of the considerable similarity between the core and bifacial component of the Fayumian and the lithic materials of the Merimde culture (phases II - V; Eiwanger 1979) we were inclined to derive the Fayumian from the Merimde (Ginter and Kozłowski 1984). This view was supported by the occurrence of some fairly archaic elements in the ceramics of the Early Phase of the Merimde. But the most recent dating for the Merimde: layer I – 5,790±60 to 5,890±60 B.P., and layer V – 5,760±60 to 5,440±75 B.P. (Eiwanger, personal communication) has shown that the whole sequence falls within a fairly short period and is relatively late, synchronous with the transition between the Early and the Late Phase of the Neolithic in Qasr el-Sagha. Because of that the Merimde culture could not have constituted a source of inspiration for the Fayumian. A possibility cannot be excluded that both the Fayumian and the Merimde had one and the same ancestor, with the cradle land in the Near East, and more specifically in the Jordan valley. It should be emphasized that in north-eastern Africa no pre-Neolithic units with core and bifacial techniques have been recorded, whereas units like this do occur in the Near East both in the ceramic and pre-ceramic Neolithic. Despite the huge chronological hiatus separating the two units Butzer is inclined to derive these techniques in the Egyptian Neolithic from the Aterian (Butzer 1978).

If we assumed the existence of the same ancestor for both the Fayumian and the Merimde, the ancestor characterized by undecorated ceramics, bifacial and core tools with the Near East links, then we would have to ascribe to this ancestor-unit also the flake technique typical only for the Fayumian and unknown in the Late Palaeolithic cultures in the Nile valley (Elkabian, Shamarkian) or the oases of the Western Desert (Qarunian). In view of this, the chronological hiatus between the Fayumian and the Epi-Palaeolithic cultures of the north-eastern Africa becomes even more strongly pronounced.

The Fayumian has a complex settlement structure pointing to an intricate economic system. The sites fall into three types:

a) large settlements located on natural elevations surmounted with antropogenic sediments. These settlements contain large groups of hearths (*e.g.*, at Kom W) and granaries (pits for storing grain). They were occupied all year round, especially in the wet season when the lake level was high;

b) large "Khsemenitsas" located near the lake, containing up to a thousand lithic artefacts and sherds from several up to dozen or so vessels. The sites are sometimes furnished with grinding stones (*cf.* site IX/81) indicating plant exploitation. In the vicinity there are slaughter places where hippopotamuses were quatered (*cf.* site XI/81). These sites, periodically flooded, were abandoned in the end of dry season, as can be seen from the evidence of traces of fires of the vegetation on the banks, directly after the site QS XI/81 had been abandoned. Thus, these must have been base seasonal settlements surrounded by short-term camps of type *c*;

c) hearths with only several lithic artefacts and fragments from one vessel. Fish bones near the hearths are usually found, especially of the sturgeon family (Acipensperidae). These are most probably remains of visits, lasting from one to several days at the most, by single fisherman fishing near type *b* campus. Camps like this have been discovered, for example at site QS X/81.

The settlement structure described above may be explained in terms of seasonal specialization: type *a* settlements were connected predominantly with land cultivation (barley, wheat) and stock breeding (sheep and goat). They were occupied mainly during the wet season. This type of economy had been clearly adopted from the Near East.

Camps of type *b* and *c* were connected with hunting of large game inhabiting the shore of the lake (hippopotamus), water fowl, and with fishing. These activities were performed – as the location of settlements shows – during the dry season when the lake level was low. It is possible that smaller population groups living at the lake shore at that time had brought along stock and perhaps small supplies of grain.

Neolithizatión introduced with the emergence of the Fayumian had, therefore, a seasonal character, and reduced the hunting-fishing economy to a complementary function in relation to the farming-breeding economy. The model we have offered resembles the neolithization model known in mountain valleys of Mezo-America, *i.e.*, from Tehuacan (Mc Neish 1963), alt hough even in that area we have a model of a stable farming culture, *e.g.*, in the basin of the Chalco Lake (Niederberger 1980).

It is difficult to determine what had caused the seasonality in the Fayum region. It seems that specific ecological conditions in combination with relative poverty of soils brought about the necessity of supplementing food resources by means of food-gathering and fishing economy.

The origin and economy of the Moerian is totally different. Undoubtedly, this unit with its special distinct blade industry is affiliated to the technological tradition of the Western Desert. Bificial elements too show links with the advanced Neolithic of the Western Desert, *e.g.*, from the region of Gebel Nabta (Wendorf and Schild 1980).

Although some sites of the Moerian contain concentrations of several hearths (site QS VIIA/80 with wind shelters) and single hearths (*e.g.*, site QS XII/80), yet their arrangement is not as varied as that of Fayumian sites. There is no proof either of the seasonal nature of settlements. The fact that a large amount of fish have been found and no traces of plant cultivation have been recorded may suggest that food-producing economy played a minor role.

Most probably synchronously with the end of the Moerian, in the Qasr el-Sagha region emerged blade and flake industries of the Proto-Dynastic type. They differ considerably from both the Fayumian and the Moerian. At the same time, it has been found that neither the Fayumian nor the Moerian exerted influence on the development of the Proto-Dynastic cultures of the Nile valley and the Delta; in these territories a separate evolution took place, connected by new links with the Near East and the Nile valley in Upper Egypt.

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MACIEJ HENNEBERG, MICHAŁ KOBUSIEWICZ,
ROMUALD SCHILD and FRED WENDORF

The Early Neolithic, Qarunian burial from the Northern Fayum Desert (Egypt)

Investigations of prehistoric sites in the Fayum were carried there for quite a long time (Caton-Thompson and Gardner 1929; 1934; Caton-Thompson *et al.* 1937; Puglisi 1967; Wenke 1984; Mussi *et al.* 1984; Casini 1984). During the season of 1968 - 1969 a team of American, Egyptian and Polish investigators operating within the framework of the Combined Prehistoric Expedition conducted extensive research in the area of Northern Fayum Desert. In the area between Qasr El-Sagha and Kom Aushim eight sites were explored. The oldest of them are of Early Neolithic age, previously described as Terminal Palaeolithic, and are dated back to Early Holo-

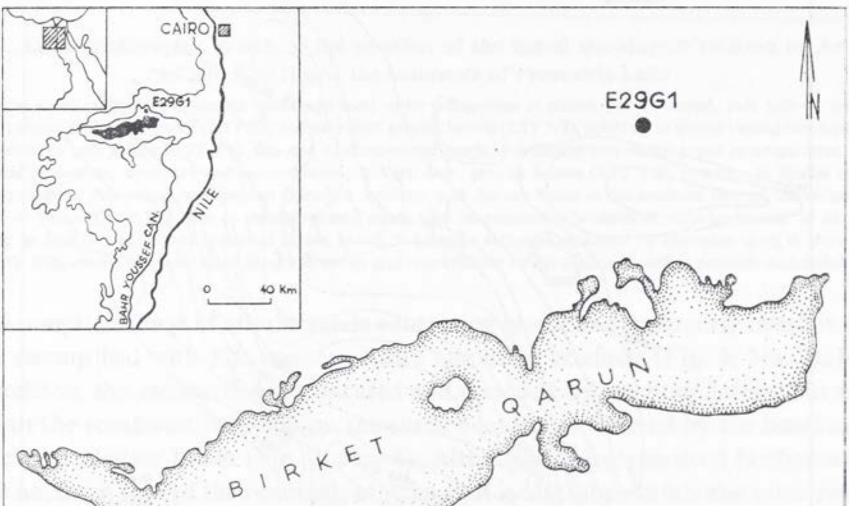

FIG. 1. Map showing the location of Site E29G1 in the Fayum Depression

cene, while the most recent are of Middle Kingdom age (Said *et al.* 1972; Wendorf and Schild 1975; 1976). The change in terminology from "Terminal Palaeolithic" to "Early Neolithic" was prompted by recent work in the Western Desert which has resulted in the recovery of bones identified as probably domestic cattle associated with sites similar to those in the Fayum (Wendorf *et al.* 1984), and by the presence of cattle in one of the Qarunian sites in the Fayum (E29H1B; Gautier 1976).

The burial dealt with here was saved much later from imminent destruction by a petroleum geologist and is now in the Geological Museum in Cairo. The locality which yielded the skeleton is close to one of the oldest sites known in the Northern Fayum Desert. The site is labelled E29G1 and is also known under the name of Z-1 in the publications of Caton-Thompson and Gardner (Fig. 1).

Age and litho-stratigraphic placement of the skeleton

The skeleton was found embedded in cemented, pale yellow to yellow, mottled sands with ferruginous stains of glay character and inconspicuous lamination, perhaps representing an early beach face. It was found 130 m to 135 m and 30° towards east from the center of an elevated lacustrine remnant at Area F of Site E29G1, some 18 m to SE from a surface Qarunian concentration designed as Area C of the same site (Fig. 2).

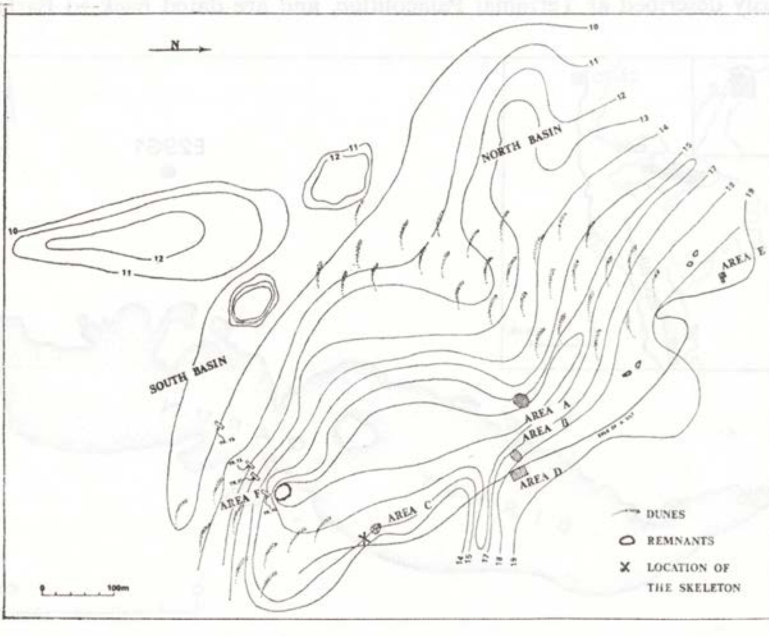

Fig. 2. Topographic map of Site E29G1

Except for surface geological work and necessary measurements no additional trenching or boring was done at the site of find. On the other hand, extensive litho--stratigraphic investigations accompanied by expended trenching of the area were conducted by the Combined Prehistoric Expedition in the 1969 season (Wendorf and Schild 1976). This work resulted in an adequate understanding of the dynamics and chronology of the lacustrine formations at site E29G1. It is this work which permits a relatively good chronological and cultural placement of the skeleton.

It is certain that the skeleton occured in the lacustrine sands of Premoeris Lake at an elevation of *ca* 17 m above sea level (Fig. 3). There are several reasons for

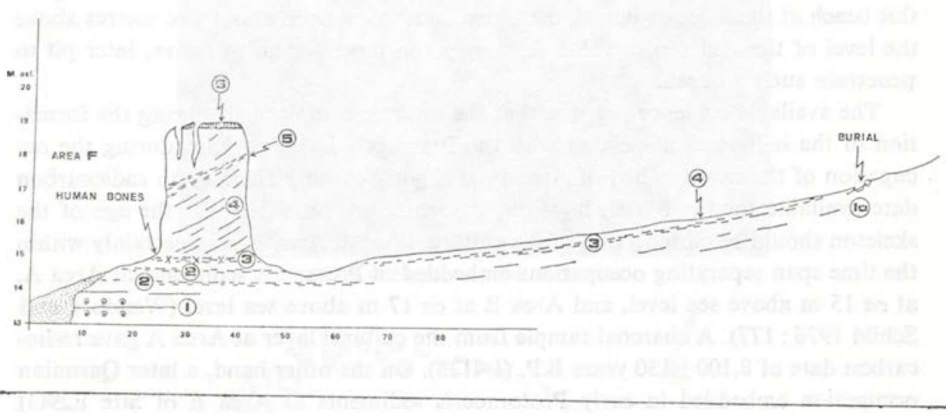

FIG. 3. Litho-stratigraphic sketch of the position of the burial showing its relation to Area F of Site E29G1 and the sediments of Premoeris Lake

1: Shallow water sands with lacustrine snails and local water truncations at places; *1a*: Cemented, pale yellow, mottled beach (?) sands; *2*: Grayish brown (2.5Y5/2) and very dark grayish brown (2.5Y 3/2), powdery to friable swamp silts separated and overlain by pale yellow (2.5Y 8/4), fine and medium-grined sands with ferruginous staining and inconspicuous, semi-horizontal lamination, cemented and carbonaceous; *3*: Very dark, grayish brown (2.5Y 3/2), powdery to friable swamp silts with shells of *Pila ovata*, rare chipped Qarunian artifacts and human bones at the southern foot of the remnant in Area F; *4*: Yellow (2.5Y 7/6), fine to medium-grined sands with inconspicuous lamination, semi-horizontal at the base, grinding up into foreset beds of cemented deltaic beach; *5*: Swampy sediment separated by cemented sand; *6*: Very dark gray (2.5Y 3/0), swamp silts with small blocky structure and rare artifacts on the surface as well as partially embedded in it.

this assumption. First of all, the sands containing burial are apparently overlain by a dark, swamp bed with *Pila ovata* and rare Qarunian artefacts (Fig. 3, No. 3). Near the skeleton, the swamp bed is truncated and removed by recent deflation, but some 10 m to the southwest it occurs on the surface and/or is covered by the basal sands of the next, deltaic beach (Fig. 3, No. 4). Although again truncated farther south, at the northern foot of the remnant, at Area F, it is almost certainly the same swamp bed in which the artefacts and rare, heavily damaged human bones of this area occurred during the work of the 1969 season. At this stage of research, however, it cannot be entirely excluded that the studied swamp sediments at Area F and south of the skeleton belong to different subhorizons forming a series of alternating swamp silts and sands, similar to those at Areas A and B of the same site (Wendorf and Schild 1976 : 177). In any case, the sediments have to be associated with the Premoeris Lake.

When found, the burial at Site E29G1 had no upper seal which would have helped chronological placement of the find. Theoretically, this situation does not, however, exclude a remote possibility that the burial pit had been sunk from a later surface, perhaps that of the Protomoeris Lake (?). Although theoretically possible, such a situation seems to be highly unlikely. First of all, there were no other than local sediments observed in the pit, and as indicated by the lithology of the remnant, the Premoeris beach at the place of the burial reached at least the level of *ca* 19 m above sea level, a similar elevation as that at Area E of Site E29G1. The top of this beach at the place of burial, therefore, must have been about two metres above the level of the skeleton, a value seemingly too large for an intrusive, later pit to penetrate such a depth.

The available evidence suggests that the interment took place during the formation of the sediments associated with the Premoeris Lake, perhaps during the occupation of the swampy bed of Area F or slightly earlier. There is no radiocarbon date available for the burial, however, it seems very probable that the age of the skeleton should be close to that of the cultural layer at Area A, and certainly within the time span separating occupations embedded in Premoeris sediments at Area A, at *ca* 15 m above sea level, and Area B at *ca* 17 m above sea level (Wendorf and Schild 1976 : 177). A charcoal sample from the cultural layer at Area A gave radiocarbon date of 8,100 ± 130 years B.P. (I-4128). On the other hand, a later Qarunian occupation embedded in early Protomoeris sediments at Area E of Site E29G1 gave a radiocarbon date, on burnt shells, of 7,140 ± 120 years B.P. (I-4129). In short, it is almost certain that the burial at Site E29G1, in the northern Fayum, is associated with the early Qarunian occupation and dates around 8,000 B.P.

Archaeology

The skeleton was lying on its left side in a flexed position with its head to the east, facing south. The left hand was placed under the head, the right one apparently covered the face. Lower extremities were flexed so much that the knee almost touched the albows (Fig. 4 and 5). Till now, not many Terminal Palaeolithic and Early Neolithic burials from Northeastern Africa have been recorded. Moreover, all hitherto discovered burials were found rather far from the Fayum depression. Flexed position is highly typical for the Northeastern African Terminal Palaeolithic and Neolithic burials; however, positioning of skeletons with respect to geographical directions varies. The style of the burial dealt with here is exactly similar to the majority of burials at Terminal Palaeolithic cemetery of Jebel Sahaba in Sudanese Nubia (Wendorf 1968) related to the Qadan industry. Similarly, though with a higher number of exceptions than those at Jebel Sahaba, the deceased were

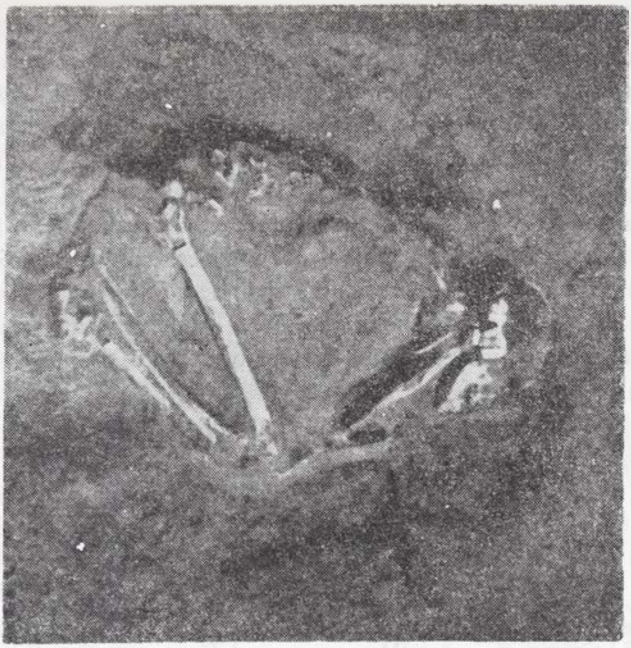

FIG. 4. Skeleton when excavated

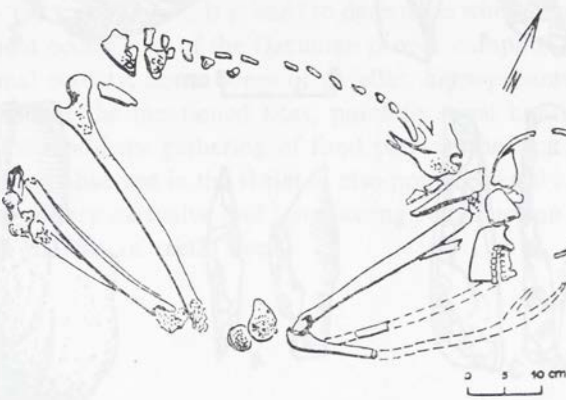

FIG. 5. Position of skeleton

buried at approximately the same time on the western bank of the Nile, opposite Jebel Sahaba (Armelagos 1965). A child's skeleton from the Neolithic settlement (site El Ghorab – E-79-4) of Egyptian Western Desert was equally strongly flexed, but placed on its right side with the head pointing west (Kobusiewicz 1984). Nearby, in the vicinity of Jebel Nabta, a double burial of probably Terminal Neolithic origin was excavated in which both individuals were lying on their right sides with their heads directed to the west, facing south, and the hands close to their faces. The legs of one of the skeletons were strongly flexed, while the other one's legs looked as if pulled back (Wendorf and Schild 1980).

No artifacts were found in the immediate vicinity of the skeleton at the Fayum. To the northwest of the burial ,at a distance of about 18 m, a flint assemblage was found on the surface. It was labelled as Area C of site E29G1. Areas A, B and D of the same site are 220 m to the north-northwest of the burial (*cf.* Fig. 2).

The foregoing stratigraphic data indicate that the burial at site E29G1 should be dated to a period of lake Premoeris aggradation, or to an early period of lake Protomoeris aggradation, most probably at the beginning of the 6th millennium B.C. That means that the burial should be attributed to the population of the Qarunian industry. Traces of these people are known from at least four sites located at nowadays deserted area of the Fayum depression lying to the north of the modern

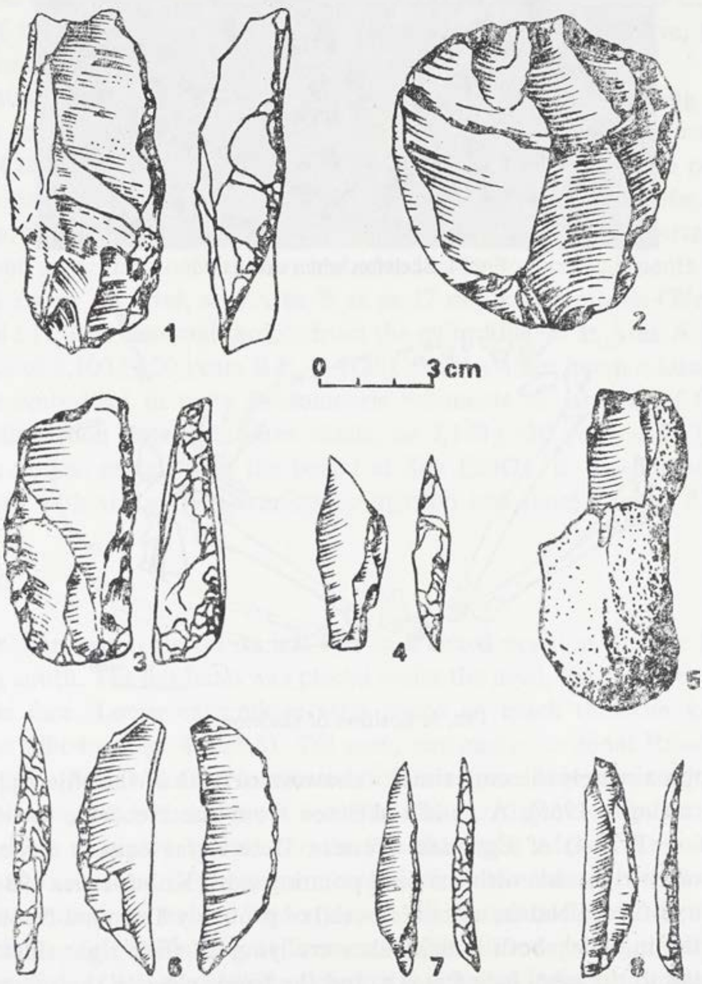

FIG. 6. Stone artifacts of Qarunian industry

Lake Qarun. These are as follows: E29H1, E29G1, E29G3 and Bahr El-Malek 4. People of Qarunian industry placed their campsites close to the water edge along beaches of the fossil lake. The sites are usually formed by small artifact concentrations of a diameter ranging from 20 to 50 m. One of the sites comprises several separate concentrations of archaeological material. Qarunian stone assemblages are typologically quite consistent. Oligocene flint from a nearby Gebel Qatrani mountain ridge was used almost exclusively for tool manufacture. The blade technology was common. The blades were struck from single platform cores. For the retouched tools, the most characteristic is a high frequency of backed blades, bladelets and microblades; somewhat lower indices one obtains for retouched blades and flakes, notches and denticulates. Typical end-scrapers and burins are lacking (Fig. 6). From the inventories assembled at sites E29G3 and E29G1 (from which the burial dealt with here originates), simple bone points and harpoons made of modified catfish jaws are also known. Site E29H1 also yielded some grinding stones and grinders.

Location of camp sites at lake shores and enormous quantities of fish remains found there allow us to state that the major subsistence activity of the Qarunian population was a large scale fishing.

The lake was practically an inexhaustible source of fish. In those times its diameter varied from 80 km to 60 km. The lake was several times larger than the modern remnant of it – the Lake Qarun. It is hard to determine whether a large scale fishing was the permanent occupation of the Qarunian people camping along lake shores, or only a seasonal activity. Some bones of gazellas, hippopotamus and wild cattle, infrequently found at the mentioned sites, point to some hunting while grinding implements indicate perhaps gathering of food plants. The lack of special pattern of the teeth attrition observed in the skeleton also points toward a rather diversified diet; however, even very extensive and long lasting consumption of fish is not able to cause special pattern of teeth wear.

The skull

State of preservation

Bone tissue is well preserved with practicaly intact compacta. The right half of the skull vault (the skull was lying on its left side) bears traces of long lasting exposure to erosion caused by sand particles – it is of yellow-white colour, polished with occasional shallow pits in places where compacta has been partly removed by attrition. No single bone has been preserved intact. The largest fragments are halves of parietal bones, on the average fragments are several centimeters in diameter. Most breaks were freshly caused by excavation and transport, so the skull has been quite easily reconstructed. Preserved fragments are: an almost complete frontal bone, complete both parietal bones, upper part of the lower nuchal line, squamous and mastoid parts of both temporal bones, large fragment of left zygomatic bone, fragments of alveolar arches of the maxilla and almost complete mandible (only the right condylar and small part of the middle of the corpus are lacking). Summing up: the vault is practically complete and the existing fragments of facial skeleton, fortunately enough of rims of orbits and nasal aperture to give an impression of their size and shape and allow basic measurements to be taken. All fragments fitted well enough to allow a reliable reconstruction of the vault and face.

Craniometry

All measurments were taken and indices calculated according to the standard technique (Martin and Saller 1957).

Table 1

Craniometric data

Diameters

g-op	178	eu-eu	129	co-co	106?	ft-ft	96
zy-zy	132	au-au	120?	ast-ast	105	mf-ek	40
mf-mf	26?	h.of orb.	32?	nas. br	26	n-ns	43?
n-pr	62	n-gn	110	ba-b	125?	mst-mst	96
po-v	105	n-b	111	b-L	106	L-i	63
g-i	170	n-i	165				

Arches

n-b	122	b-L	122	L-i	68	au-au	310
n-i	315	skull circumference through g and op					500?

Indices

breadth-lenght	72.5	upper facial	47.0
nasal	60.5	orbital	80.0
fronto-parietal	74.4	fronto-zygomatic	72.7
total face	83.3	height^x-lenght	59.0
		height^x-breadth	81.4

x - auricular height

Diameters of the mandible

total lenght	114	go-go	110?	go-gn	98
max. ramus breadth	44	gn-id	35?		
min. ramus breadth	37	condylar height			64
coronoid height	58				

Cranial capacity

Lee-Pearson´s formula for female	948 ccm
Manouvrier´s formula for female	1,048 ccm
facial angle n-pr to Frankfort plane	83^o

The above craniometric data may be qualitatively interpreted as follows (Table 1): The skull is small, braincase long, broad forehead, broad face, intermediately high orbits, very broad nose and mesognatic face. Visual examination of the skull corroborates this formal description based on values of measurments and indices.

Cranioscopy

The vault of the skull is small, gracile in the norma verticalis (Fig. 7), its shape is brisoides with marked postorbital construction and well visible zygomatic arches provided they were preserved), in the norma occipitalis the skull has a definitely

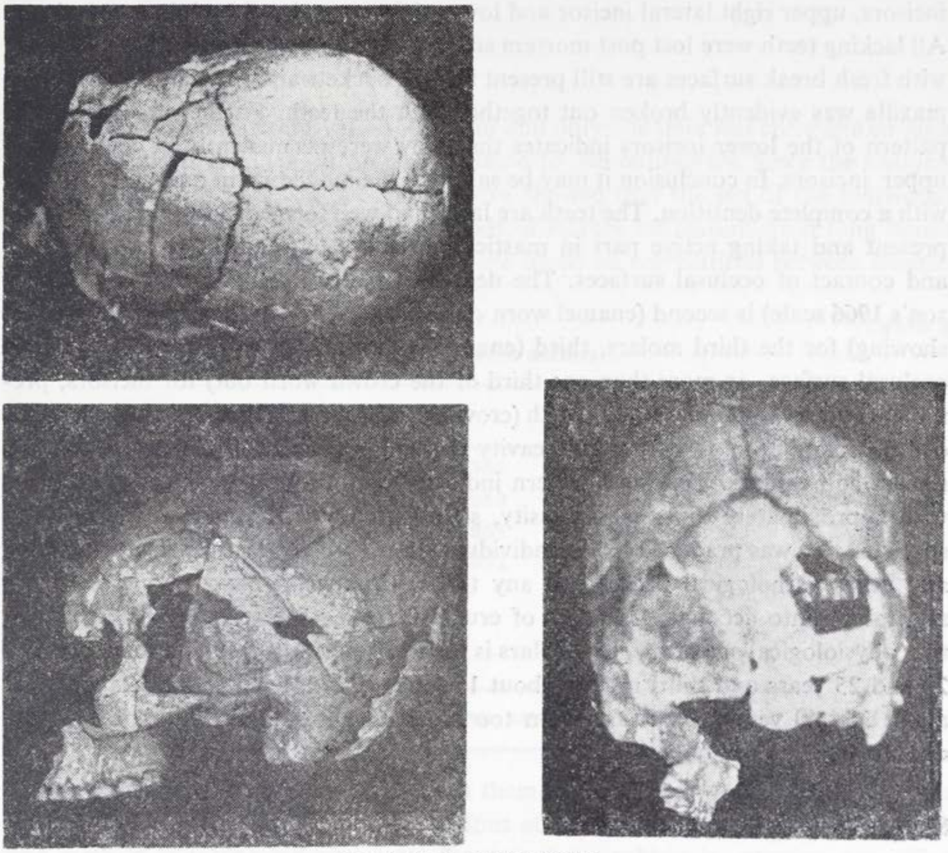

Fig. 7. Skull of Site E29G1

pentagonoid shape, in the norma lateralis the most important features are low, long sloping forehead and relatively short but broad parietal bones. Their combination results in location of the vertex in the posterior part of the vault and lack of any vertical flattening. Both temporal and nuchal lines are very slightly marked, and despite the sloping forehead, brow ridges are weak and glabella markedly stands out from the frontal bone. The face, as may be inferred from the preserved fragments, is broad, with medium size (relatively to the whole face) orbits and broad nose, apparent prognathism and marked alveolar prognathism, large jaws and teeth. No particularities such as additional sutures, deformations, scars, openings, asymmetry, etc., were observed. General impression is that of a small delicate head and face with rather large jaws and low forehead.

Dentition

Almost complete dentition is preserved. The only exception are upper central incisors, upper right lateral incisor and lower right central and both lateral incisors. All lacking teeth were lost post mortem since in case of lower incisors parts of roots with fresh break surfaces are still present in their sockets and the central part of the maxilla was evidently broken out together with the teeth. Furthermore, the wear pattern of the lower incisors indicates that they were permanently in contact with upper incisors. In conclusion it may be said that the individual in question had died with a complete dentition. The teeth are large and well formed, all four third molars present and taking active part in mastication, this being indicated by their wear and contact of occlusal surfaces. The degree of teeth wear (according to Gustafson's 1966 scale) is second (enamel worn on all the occlusal surface, islets of dentine showing) for the third molars, third (enamel completely worn out from the whole occlusal surface, or more than one third of the crown worn out) for incisors, premolars and second molars and fourth (crown almost completely worn out, secondary dentine filling up most of the pulp cavity showing on the occlusal surface) for first molars and canines. The wear pattern indicates that all groups of teeth were used with approximately the same intensity, so no pronounced and long lasting food specialisation was practiced by the individual. There are no traces of dental caries or any other pathological process on any tooth. Comparing wear of various teeth and taking into account their ages of eruption (Miles 1963) it may be concluded that physiological age of the first molars is about 30 years, of second molars between 20 and 25 years and third molars about 15 years giving thus age of the individual about 35 - 40 years. Teeth are worn too much to allow useful odontometric observations.

Sex

Female. Estimated on grounds of generally gracile morphology, slightly marked muscular attachements, sharpness of upper rims of orbits. Mastoid processes are rather large in comparison to modern female ones, there are also present retromarginal processes on zygomatic bones that, formally treated, are indicators of male sex. However, since these are very remote results of maleness occuring via larger mechanical demands put upon certain anatomical features in usually stronger males, it cannot be excluded that with dolichocephalic and mesognatic cranial morphology mechanical stresses put upon anatomical features in question even in a "weak" female were large enough for giving them a male form.

Age

About 40 years (35 - 45 years). Established on the basis of teeth (wear and involutionary changes in roots) and suture obliteration: all sutures completely obliterated endocranially, ectocranially partial obliteration of the sagittal and lambdoid suture.

Estimation of stature

The state of bones preservation was poor and only one tibia was complete enough for measuring its total length which amounted to 346 milimeters. Since the analysis of the skull of the skeleton presented above showed that the sex of the individual was most probably female, several methods of stature estimation from long bones of females were applied. All the methods are based on correlations between lengths

Table 2

Stature estimations according to various authors

Author/s		Sample	Stature cm
Trotter and Glèser	1952	whites	162.0
Trotter and Gleser	1952	blacks	157.4
Depertuis and Hadden	1951	whites	162.8
Depertuis and Hadden	1951	blacks	159.6
Telkkä	1950	whites	160.0
Pearson	1899	whites	156.2
Rollet	1899	whites	159.5
average of the above seven estimates			159.6

of bones and stature, differences between them are not great resulting mainly from differences between samples used by various authors for construction of standards and method of taking measurments. Stature of the subject in question according to various methods indicates Table 2.

It may be concluded that the stature of the female from the Fayum was about 160 cms, *i.e.*, above the average for the majority of modern females from various populations (those averages oscillate around 155 cm in the 19th century, and only in the 20th century have risen above 160 cms). However, it is well within the normal range of variation for various populations. Hence the female was of quite normal stature, probably slightly above average for a population to which she belonged since the change in stature between prehistoric times and 19th century was not a significant one.

Comparison with other populations

It must be emphasized that any comparison of a single specimen to populations gives approximate and often dubious results as to its affiliation to any of the populations. It is due to the fact that in human populations individual variability within one population is usually greater than variability between averages for various populations. It may then happen, and very frequently it actually does, that an individual originating from a given population is most similar to average characteristics of some other human group. The only thing possible is to compare an individual with several sets of averages characterizing various populations and conclude that the individual in question is most similar to an average member of such and such population. This statement is mainly of descriptive value and, though suggestive, does not provide sound basis for concluding upon its actual origin.

The female skull from site E29G1 has been compared by means of the standard Penrose method with summary data for prehistoric North African skeletal remains (Chamla 1978) and two sets of data pertaining to modern Negroes (Górny 1957) and Australian aborigines (Milicer 1955). M. C. Chamla (1978) has collected all known to date information upon skeletal materials covering the period from Epipalaeolithic to Protohistoric times excavated in the North Africa. Material has been divided into groups with respect to its territorial origin (eastern and western groups) and cultural affinity (Capsian, Iberomaurusian, Capsian-Neolithic). From among these groups those territorially closer (eastern) were taken for comparisons with the skull in question. Negro and Australian materials are collections of skulls stored in the Institute of Anthropology of the Polish Academy of Sciences in Wrocław and originate from Uganda and the entire territory of Australia. In comparisons was also included the largest and territorially and chronologically closest, well

Table 3

Distance computed for Fayum skull and other female skull series
(Penrose method)

Skull series	1	2	3	4	5	6	7	8
1. Fayum E29G1	-	0.84	0.86	0.88	2.23	2.89.	1.01	1.27
2. Wadi Halfa	0.52	-	1.64	1.53	0.89	1.00	1.04	0.64
3. Negro, Uganda	0.71	0.75	-	0.33	2.34	3.83	0.33	0.75
4. Australian aborigines	0.88	1.18	0.20	-	1.93	3.16	0.40	0.89
5. Capsian	1.43	0.78	0.71	1.07	-	0.37	1.24	0.73
6. Iberomaurusian	1.24	0.47	1.06	1.42	0.21	-	2.38	1.55
7. Neolithic	1.01	0.78	0.18	0.40	0.45	0.75	-	0.22
8. Tunisia protohistoric	1.20	0.34	0.34	0.81	0.32	0.49	0.16	-

studied series of data upon Wadi Halfa "Mesolithic" people (Greene and Armelagos 1972).

The Penrose distances computed for 10 diameters usually employed in analysis of the braincase, face, nose and orbits are as follows: above the main diagonal are given $C_H^2=\frac{\sum z^2}{n}$ distances below diagonal $C_p^2=\frac{\sum z^2}{n}-\left(\frac{\sum z}{n}\right)^2$ distances (z – differences between compared values expressed in standard deviation units, n – number of characters compared – Table 3).

It may be seen that the skull in question shows the closest affinity to Wadi Halfa, modern Negroes and Australian aborigines being quite different from Epipalaeolithic materials of Northern Africa usually labelled as "Mechta type" and "protomediterranean type". In analysis of an Early Neolithic mandible from Nabta Playa in Egypt (Henneberg et al. 1980) we have found the same affinity to modern Negroes. Comparing 5 metric characters of female mandible from E29G1 site with the same characteristics of the Nabta mandible by means of the Penrose method we find a similarity between the two specimens, $C_H^2=0.76$, $C_p^2=0.30$, standarized on standard deviation for North Africa given by Chamla (1978).

Since during the present analysis Penrose distances between series used for comparison were obtained, it is interesting to analyse briefly affinities between them. The simplest way is to use a symmetric diagram as proposed by J. Czekanowski, *i.e.* grouping the series together on the basis of the smallest distances between them (Table 4).

Table 4

Symmetric diagram grouping female skull series on the basis of the smallest distances between them
(Czekanowski method)

Skull series	4	3	7	8	2	5	6
4. Australian aborigines	+	+	+	−			
3. Negro, Uganda	+	+	+	−			
7. Neolithic	+	+	+	+			
8. Tunisia protohistoric	−	−	+	+	−		
2. Wadi Halfa				−	+	−	−
5. Capsian					−	+	+
6. Iberomaurusian					−	+	+

+ denotes the closest relationship (smallest distance).
– denotes second closest relationship (next to smallest distance).

Since there are some methodological controversies concerning the validity of the Penrose method for comparisons between group means, and because in the above analysis data on female skulls were only used, it seems advisable to revise the analysis between the same groups taking into account the data for male skulls and submitting them to the statistically flawless method of D^2 distances of Mahalonobis computation. Here are D^2-s for males of our groups and Czekanowski's diagram ordered in the same way as for females (Table 5 and 6).

Results obtained with both methods with respect to both sexes are in mutual agreement.

Conclusions

Summing up the above discussion we may conclude that the burial found at site E29G1 of the Northern Fayum Desert should be related to fishermen of Qarunian industry living on the shores of an Early Holocene lake about 8,000 years ago.

Table 5

Distances computed for male skull series by method of Mahalonobis D^2 distances

Skull series	2	3	4	5	6	7	8
2. Wadi Halfa	–	19.2	24.6	30.1	30.8	22.3	21.5
3. Negro, Uganda		–	7.6	37.0	40.2	8.9	9.9
4. Australian aborigines			–	32.4	35.7	14.4	13.7
5. Capsian				–	0.4	14.9	11.7
6. Iberomaurusian					–	16.9	14.3
7. Neolithic						–	1.7
8. Tunisia protohistoric							–

Table 6

Symmetric diagram grouping male skull series on the basis of the smallest distances between them
(Czekanowski method)

Skull series	4	3	7	8	2	5	6
4. Australian aborigines	+	+	–	+			
3. Negro, Uganda	+	+	+	+			
7. Neolithic	–	+	+	+			
8. Tunisia protohistoric	+	+	+	+		+	–
2. Wadi Halfa		–					
5. Capsian			–	+		+	+
6. Iberomaurusian				–		+	+

+ denotes the closest relationship.
– denotes second closest relationship.

The woman buried there was in general more modern than the "Mechta" classic materials (Iberomaurusian and Capsian of the present analysis). The "Mechta" people were not morphologically similar to Neolithic and later people, who in turn are similar between themselves up to modern times despite their territorial dispersal. It seems that this fact is not due as much to the common origin of these human groups as to the more or less uniform course of human evolution during the Late Pleistocene and Holocene. This evolution is characterized by main trends of gracilization, dental reduction and brachycephalization due to gradual development of cultural adaptive mechanisms (Henneberg 1983) and it is evident in the affinities analysed here: robustly built types stick together being opposed to more gracile ones with Wadi Halfa occupying an intermediate position. The female skull from E29G1 site seems to occupy equally intermediate position: it is already gracile but still posseses large teeth and heavy jaws and shape of its braincase is dolichocephalic. Slanting forehead is also a link with earlier populations. Summing up, there is no logical possibility of establishing purely populational, not to mention "racial", affinity of the studied skull, but it may be stated that it is in general more modern than "Mechta" classic materials and if its similarity to some modern people should be established, then it could be described as resembling modern negroids. This is by no means equivalent to stating that the skull in question belongs to the Negro. The main reason for this statement is that during Terminal Palaeolithic/Neolithic times there were no modern Negroes anywhere in Africa since they simply had not evolved yet. Similarity between the jaw of the studied specimen and the jaw from Nabta Playa, as well as relation of the skull to Wadi Halfa female skulls point toward a continuity of population along the Nile and in the Western Desert, but still more material is required to support the idea that some 10 - 5 thousand years B.C. this continuity of peopling of the Nile Valley and its surroundings reached down to the very springs of the river in subsaharan Africa.

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RUDOLPH KUPER

The Eastern Sahara from North to South: data and dates from the B.O.S. Project

Shortly after the first Dymaczewo conference in September 1980 an interdisciplinary archaeological research project was started in the Eastern Sahara by a group of scholars and students from the universities of Cologne and Berlin. Until 1984 four expeditions of altogether 15 months' duration were made into the Libyan Desert of Egypt and Northern Sudan. During that time more than 400 prehistoric sites have been recorded, at 142 of which excavations have been carried out.

This project, entitled "Besiedlungsgeschichte der Ost-Sahara" (B.O.S.) is funded by the Deutsche Forschungsgemeinschaft (DFG), its main subject being the history of human settlement in the Eastern Sahara with special emphasis on the interdependence of cultural and economic adaptation, and the changing climate during the last 10,000 years (Kuper 1981). Within this general scope, essential topic of research is the neolithization, but also the later occupation of the area and its relations to the historical development in the Nile Valley.

At the beginning of our fieldwork the Gilf Kebir in Southwest Egypt and the Wadi Howar in Northern Sudan were chosen as research areas, because they represent ecological niches within different geographical settings providing favourable living conditions lasting longer than in the surrounding areas. Furthermore, their geographical position – the one in the most arid part of the entire Sahara, the other at its southern fringe already close to the Sahel zone – do represent different climatic conditions: one is lying in the reach of possible winter rains, the other might receive summer rains. The actual frontier between the two might be located in the Selima Sandsheet, approximately along the present borderline between Egypt and Sudan. This geographical situation and the possible shifting of that climatic limit during the Holocene should have influenced the prehistoric development in that part of Northern Africa at a large scale. In addition, far reaching cultural contacts have to be taken into account as well as the fact that the climatic conditions of the two research areas selected are not representative for the Eastern Sahara in general, especially not for the great plains.

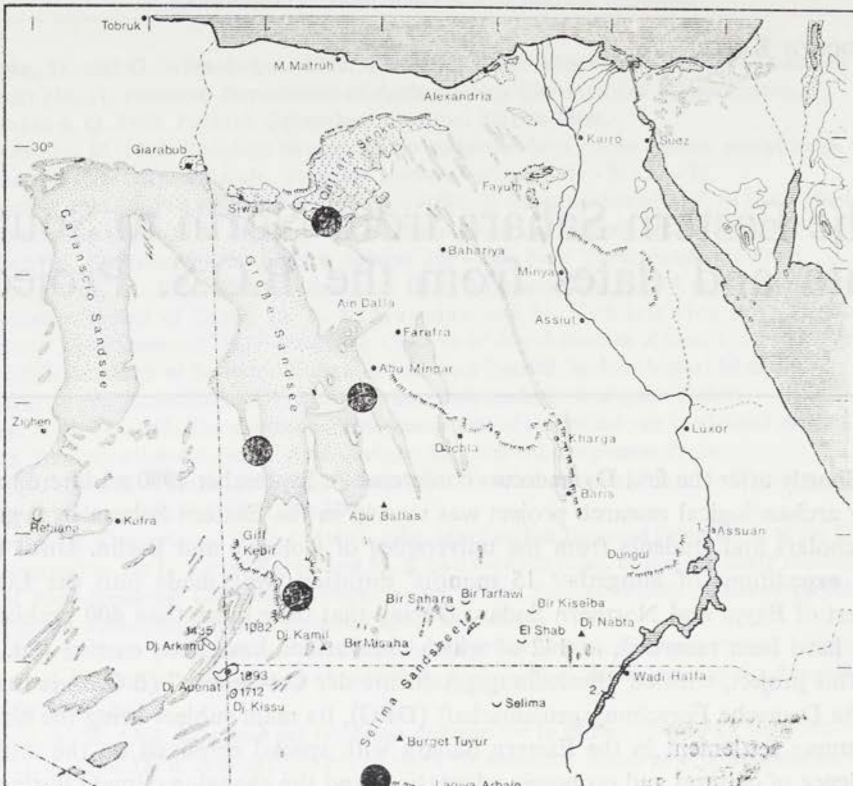

FIG. 1. Map of the Eastern Sahara showing the main research areas of the B.O.S.-project: Qattara/Siwa, the eastern and western Great Sand Sea, the Gilf Kebir, the Laqiya area and the Wadi Howar. The cross marks the position of the Makurian (?) fortress

For this reason later fieldwork has concentrated on establishing a chronological sequence for a transect of more than 1,200 kilometres, from the coastal region in the north to the Sahel zone in the south. Five different areas have been investigated in detail along this transsect at a distance of 300 to 350 km from each other: The Qattara/Siwa area, the Great Sand Sea and the Gilf Kebir plateau in Egypt, and in Northern Sudan the area west of Laqiya Arbain and the Wadi Howar (Fig. 1). In addition, the Selima Sandsheet, the Abu Ballas area and – if once possible – the Uweinat mountain should be subject of furthei research.

Starting from the North, some preliminary fieldwork has been done in the Qattara/Siwa area near Sitra (Cziesla, this volume). More extensive excavations, however, were carried out at the eastern and western margins of the Great Sand Sea. At both sites the onset of occupation could be placed into the first half of the seventh millennium B.C. (Klees, this volume). Further south in the Gilf Kebir two playa sites offered geological sections up to 10 metres high, one of them containing undecorated pottery dated to the 6th millennium B.C. On the playa surfaces rich archaeological material, including well worked ceramics, indicates intensive occupation between 4,000 and 3,000 B.C. (Schön, this volume). This period is also well represented west of the oasis of Laqiya Arbain in Northern Sudan, in particular in Wadi Shaw, where also pottery of the Khartoum type was discovered. The greater part of the archaeological material in that area, however, belongs to the third and second millennium B.C., with the pottery indicating close relations to the Nubian Nile Valley (Schuck, this volume). In the Wadi Howar extremely rich sites, containing abundant pottery, well preserved faunal remains and also bone harpoons apparently represent the complete sequence from the "Aqualithic" up to historical times (Richter, this volume). Evidence from a more recent phase in the history of Wadi Howar was discovered in 1984 during a reconnaissance trip from Rahib Wells to the Nile and back, proving that the course of the wadi does not end at Djebel Rahib as shown on all existing maps, but that it has to be regarded – as Berlin geologists had already concluded from satellite imagery – as a former, and the northernmost, greater tributary to the Nile. It might have played an important role as a corridor between Central Africa and the Nile Valley as late as the Christian period in Nubia. Evidence for this comes from a large stone fortress discovered some 100 kilometres west of the Nile where the wadi joins the river just opposite Old Dongola, the capital of the Christian kingdom of Makuria. Some architectural features of the enclosure, 120 × 200 metres wide, with walls of up to four metres high, strongly resemble Christian fortresses along the Nile and suggest its importance as a control post at a main migration route into the Nile Valley.

Although none of the excavated sites has been evaluated definitively so far, some preliminary statements may be presented: A North-South trend observed during the earlier periods seems to have been replaced by a regional development with prevailing West-East connections, obviously due to the influence of the above mentioned climatic dividing line between summer and winter rains. On the other hand, the role of the Selima Sandsheet as a cultural buffer, as now suggested by this absolute desolate area of thousands of square kilometres of flat sand, seems not to have existed even during Later Neolithic times. This is demonstrated for example by the comb impressed herringbone ornament, typical of the pottery of the fourth millennium B.C. in the Gilf Kebir, which also occurs about 400 kilometres further southeast in the Laqiya area. There it persists until 2,000 B.C., combined with a specific decoration of little knobs that are well represented in the Wadi Shaw material which clearly shows relations to the Kerma culture in the Nile Valley, but also to the Gilf and Uweinat mountains in the West. For the same period similar far reaching connections can be demonstrated by the distribution of the special form of a grinding stone, named the "Gilf type", that is abundant in the Laqiya area but also occuring as far north as the Great Sand Sea. So, for the earlier part of the Holocene wet phase the discovery of typical wavy line sherds in the Gilf Kebir, up to now their northernmost occurrence in the Sahara, was not unexpected, since in the Selima Sandsheet, too, some Khartoum related pottery was found. That their wide-spread distribution is related to a northward shift of the climatic belt favouring the Sudanic environment, is demonstrated by a site near Abu Ballas in the Western Desert of Egypt, where Khartoum ceramics, rock engravings of giraffes, and also giraffe bones have been found as far north as the latitude of Aswan and Kufra, *i.e.* more than 1000 kilometres north of their present habitat. In the north, the Great Sand Sea might have been a barrier to the related ecocomplex. However, at the western fringe of the Sand Sea in the so called "silica glass area" pottery does occur with comb decoration mostly executed in the rocker-stamp technique that strongly recalls southern parallels. On the other hand some sherds from this site apparently are of the same manufacture, but undecorated and characterized by a flat, notched rim. This form, again, has its parallels in the eastern part of the Sand Sea at the site of Lobo, that otherwise is linked to the Egyptian oases and even to the Nile Valley by a strong component of flat retouched stone artefacts. It remains an open question if the two kinds of ceramics are resulting from the influence of the one kind upon the other, or if they represent different periods, since radiocarbon dates from both sites accumulate beetween 7,000 and 4,000 B.C.

Up to 1984 more than 200 radiocarbon dates from the Eastern Sahara were available. For its eastern part they originate from Fred Wendorf's Combined Prehistoric Expedition (Wendorf and Schild 1980; Wendorf *et al.* 1984), for the more western region from the B.O.S.-excavations (Table 1) supplemented by some dates from Fekri Hassan's fieldwork around Siwa (Hassan 1978). Going through these dates it becomes obvious that certain periods yield more dates than others. Most striking is a lack of data between 5,000 and 5,500 B.C., a hiatus also known from the Near East that has been attributed there to an increasing drought.

For a more detailed analysis of the radiocarbon dates a computer programme was applied that demonstrates a 99% age probability of the available data summarized in one curve. Separate calculation of these curves for single research areas

Table 1

Radiocarbon dates from the B.O.S. excavations in the Egyptian Western Desert (as of 1984)

Area	Site	Date b.c.	Lab. No.	Material
QATTARA/SIWA	Sitra 83/11	4.340 +- 65	KN 3222	C
	Sitra 83/12	4.890 +- 65	KN 3223	C
GR.SANDSEA	Lobo 81/55-1	6.700 +- 80	KN 3186	C
		5.950 +- 75	KN 3017	C
	Lobo 81/55-2	4.400 +-500	KN 3140	C
		4.210 +- 65	KN 3141	E
		4.12o +- 60	KN 3142	E
	Lobo 81/55-3	4.230 +- 65	KN 3198	E
	Lobo 81/55-5	5.840 +- 65	KN 3357	C
	Willmann´s Camp 81/61	6.910 +-300	KN 3102	C
		6.650 +-700	KN 3395	C
		6.250 +-300	KN 3359	C
		5.050 +-250	KN 3396	B
		4.110 +- 65	KN 3197	E
	Willmann´s Camp 81/62	3.320 +- 60	KN 3018	C
ABU BALLAS	Mudpans 83/39	6.200 +-100	KN 3401	C
GILF KEBIR	Wadi el Akhdar 80/7-1	7.420 +-215	KN 2879	C
		5.750 +- 60	KN 2878	C
		5.720 +- 75	KN 2934	C
		3.830 +- 80	KN 2935	C
		3.720 +- 75	KN 2882	C
	Wadi el Akhdar 80/7-2	3.660 +- 60	KN 2936	C
	Wadi el Akhdar 80/7-5	3.220 +- 70	KN 2880b	C
		3.110 +- 55	KN 2880a	C
	Wadi el Akhdar 80/12-1	3.470 +- 65	KN 2881a	C
		3.410 +-210	KN 2881b	C
		3.200 +-125	KN 2933	C
	Wadi el Akhdar 8o/14	2.200 +- 55	KN 3173	E
		2.000 +- 55	KN 2926	E
		1.910 +- 60	KN 2925	E
	Wadi el Akhdar 80/15-2	3.300 +-140	KN 3104	C
	Wadi el Akhdar 80/32	4.560 +-220	KN 3191	C
	Wadi el Akhdar 81/2	3.490 +- 60	KN 3106	C
	Wadi el Akhdar 81/4	3.850 +-450	KN 3358	C
		3.720 +- 65	KN 3016	C
		3.700 +-130	KN 3381	C
		3.550 +- 60	KN 3187	C
	Wadi el Akhdar 81/8	3.990 +-230	KN 3176	C
		3.480 +- 65	KN 3103	C
GILF KEBIR	Wadi Bakht 82/13	6.250 +-500	KN 3096	C
		6.030 +- 90	KN 3095	C
		4.130 +-420	KN 3179	C
	Wadi Bakht 82/15	3.230 +- 60	KN 3079	C
		3.120 +- 60	KN 3149	C
	Wadi Bakht 82/16	2.870 +- 60	KN 3098	C
	Wadi Bakht 82/18	2.930 +-390	KN 3182	C
	Wadi Bakht 82/19	2.820 +-130	KN 3184	C
	Wadi Bakht 82/21-2	4.650 +-300	KN 3410	C
	Wadi Bakht 82/22	4.200 +-200	KN 3328	C
SELIMA SANDSHEET	Djebel Kamil 80/63-2	5.190 +-160	KN 3175	C
	Bir Misaha 83/29	3.650 +-150	KN 3355	B
	Bir Misaha 83/30	4.350 +- 80	KN 3412	C

C – charcoal; B – bone; E – ostrich eggshell.
All dates come from the radiocarbon laboratory of the Institut für Ur- und Frühgeschichte der Universität zu Köln (Dr. J. Freundlich) and are not calibrated and not corrected

shows a remarkable correspondence in particular by a peak a 6,000, and other maxima around 7,000 and 4,000 to 5,000 B.C. This is most obvious for the Egyptian part of the research area. So far there are not yet enough data available from the Wadi Howar, and in Wadi Shaw the latest period is over-represented by the oasis-like settlement during the second millennium B.C.

The five areas chosen in the Western Desert of Egypt show so clearly corresponding intervals that they can be summed up into one curve (Fig. 2), in spite of the fact that they are distributed over a distance of almost eight hundred kilometres, or at least 7 degrees of latitude, covering the Mediterranean area as well as the above mentioned zone of Sudanic influence. In addition the weight of the results is strenghtened by the circumstances that they come from different geographical situations – from the wide plains as well as from the Sand Sea or the Gilf mountains – and originate from different research teams, different kind of dating material, and different radiocarbon laboratories.

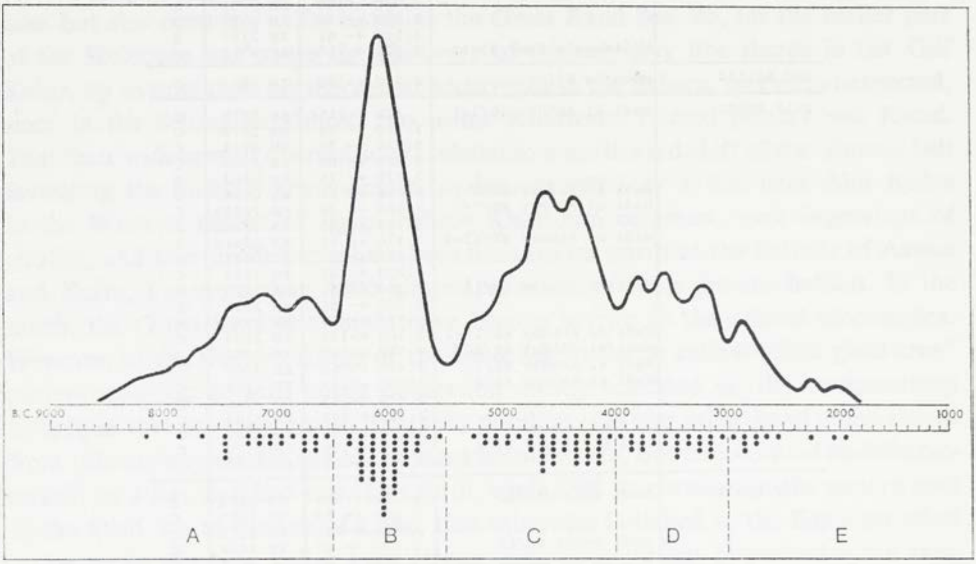

FIG. 2. Radiocarbon curve calculated from 145 dates from the Western Desert of Egypt representing the age probability of human settlement during the Holocene

Even if further evidence might modify these conclusions, five phases of occupation of the Egyptian Sahara may already be defined, the limits of which are to be drawn at about 6,500, 5,5000, 4,000 and 3,000 B.C. Disregarding the impact that future calibration might have on this sequence, for practical purposes a preliminary numbering of the intervals by the letters A to E is proposed. How far this radiocarbon sequence coincides with an archaeological one – from the Epipalaeolithic, to the Early-, Middle- and Late Neolithic to the Protohistoric – will depend on further research. For the time being it seems reasonable to avoid the well known terminological difficulties.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

ERWIN CZIESLA

Sitra and related sites at the western border of Egypt

This is a preliminary report on a short prehistoric survey of the southern region of the Qattara Depression carried out in the spring of 1983. It was undertaken in view of the realization of the Qattara-Energy-Project which is to cover large regions of the planned evaporation lake. For this reason the Egyptian Antiquities Department encouraged the interdisciplinary research of the "Besiedlungsgeschichte der Ost-Sahara" (B.O.S.) project to examine this area. It constitutes the northern most part of a planned archaeological North-South transsect through the Eastern Sahara (Kuper 1981).

Today this area, including the Siwa Oasis is still provided with a permanent supply of water and the living conditions there can be regarded as sufficient. It had its importance already in the Pharaonic times. Yet in prehistoric times this north--western part of Egypt – from the great Oasis of Siwa in the west, including the oases of Gara, El Araq and El Bahrein, to Sitra in the east – had also offered favourable living conditions and witnessed a recurring or permanent settlement in different stages of its cultural development.

The region concerned is of key importance for studying the connection between cultural provinces of Northern Africa and the Near East. Siwa and the related oases might have had connections with the Levant, the Nile Valley, the Maghreb, and the southern part of the Egyptian Sahara (Hassan 1976). It was managed to prove some of these statements during our short survey.

In spite of its interesting geographical situation the archaeological field-work in this area began very late. Before the First World War H. W. Seton-Karr and O. Bates collected some artefacts in the Siwa region (Fakhry 1973). In 1918 C. Willett-Cunnington handed over some surface finds to the museum in Alexandria and Cambridge (McBurney and Hey 1955). From 1974 to 1976 F. Hassan and his associates carried out two field-campaigns in the region to the west of Siwa and in the Oasis of Gara (Hassan 1976; 1978). During these seasons some 35 sites were examined and a number of radiocarbon dates were obtained from them. These range from the 8th to the 5th millennium B.C. A gap of nearly 800 years, between 5,700 and 4,900 B.C. has to be noted (Close 1980; 1984). In the 1970's the Combined Prehistoric Expedition examined the northern part of the Qattara Depression (V. Haynes, personal communication). In the region up to the edge of the depression seems to lack archaeological remains. Since sedimentation is still active in this area, they can be assumed to occur at a considerable depth. In some natural sections a few prehistoric remains mixed with Roman pottery could be registered. Judging from the former archaeological investigations it can be concluded that prehistoric sites in this area are rare.

It could be observed during the 1983 campaign that in the immediate neighbourhood of the present oases the sedimentation is still in process and the former shore-lines are being covered by dunes of the expanding Great Sand Sea. In this region the undisturbed sites cannot be possibly expected. On the way from Siwa to El Araq the surface accumulations of artefacts are rare. In contrast to this, the raw-material deposits – a dark-brown variety of chert – were noted several times. In an area where G. Steindorff in 1900 entered the oasis depression of El Araq for the first time (Steindorff 1904), a large surface-site with numerous notched pieces was recorded (Site 83/04). The first important camp-site was registered two kilometres southwest of the Sitra lake. On a flat "inselberg" a small stone-circle and many artefacts were examined (Site 83/09). The flakes of this site are dihedral faceted by flat, nearly invasive retouches. All artefacts show conchoid scars as a result of thermal strain. A large number of stemmed, bifacially retouched arrow-heads and leaf-shaped points are also part of this artefact concentration (Fig. 1: *1 - 4*).

The most important sites discovered during our survey are situated five kilometres to the north of the Sitra lake, in a flat undrained basin situated on a limestone plateau (Site 83/11 and 83/12). In this basin, still overgrown with low grass and bush vegetation, an extensive settlement area of some 1,000 by 500 metres was found. Straight away "Steinplätze" (Gabriel 1977), flake-middens and areas of different tool-assemblages were noted. The different activity areas were clearly separated and seemed not to be disturbed. The excavation even showed that parts of a narrow and limited knocking-pile were still embedded in the sediment. A total of three test excavations were carried out and four "Steinplätze", which yielded sufficient charcoal for radiocarbon-dating, were investigated.

Following is a short description of the Sitra-sites.

Site 83/11 (southern area)

In an area of 50 m² some 96 artefacts, all longer than 2 cms, were collected. The percentage of modified artefacts – 42% – is extraordinarily high and it seems that a group of tools was formed for a special task. Most of the tools are bifacially invasive retouched, extended leaf-points (Fig. 1: *5 - 8*). In addition, some retouched

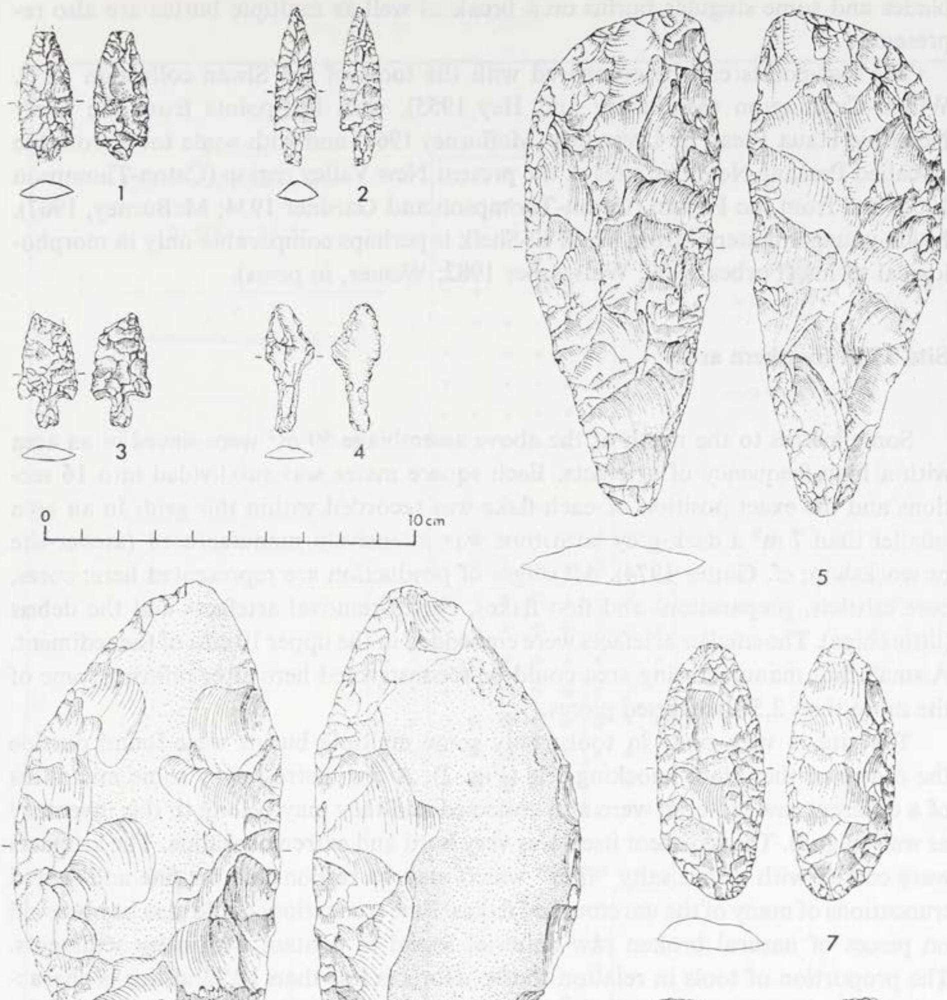

FIG. 1. Artefacts from the surface-site 83/09 (southwest of the Sitra lake)

1 - 4: **Stemmed, bifacial arrow-heads. The artefacts had been seriously damaged before and after retouching by thermical strain**

Artetacts from the site 83/11, southern area (north of the Sitra lake)

5 - 8: **Bifacial leaves**

blades and some singular burins on a break as well as multiple burins are also represented.

The leaf-points can be compared with the tools of the Siwan collection of C. Willett-Cunnington (McBurney and Hey 1955), with leaf-points from the Early Neolithic Haua Fteah in Cyrenaica (McBurney 1967) and with some tools from the so-called Peasant-Neolithic sites of the present New Valley region (Caton-Thompson 1952) and from the Fayum (Caton-Thompson and Gardner 1934; McBurney, 1967). Much younger material from Wadi El-Sheik is perhaps comparable only in morphological terms (Forbes 1900; Weisgerber 1982; Weiner, in press).

Site 83/11 (northern area)

Some metres to the north of the above assemblage 59 m^2 were sieved in an area with a high frequency of artefacts. Each square metre was subdivided into 16 sections and the exact position of each flake was recorded within this grid. In an area smaller than 7 m^2 a dark-grey hornstone was intensively manufactured (atelier-site or workshop; cf. Ginter 1974). All stages of production are represented here: cores, core tablets, preparation- and first flakes, cortex-removal artefacts and the debris (little chips). The smaller artefacts were embedded in the upper 10 cms of the sediment. A small flint manufacturing area could be reconstructed here after refitting some of the more than 2,500 analysed pieces.

The site is very poor in tools; only some multiple burins were found outside the centre of the intact knocking-pile (Fig. 2). A few metres away some microliths of a different raw material were also collected and they may belong to this inventory as well (Fig. 3). The sediment itself was very hard and extremely saline. The artefacts were coated with a thin salty "film" which may be responsible for fine and scared truncations of many of the unretouched flakes. Fine truncations could also be observed on pieces of natural broken raw material found in contact with salty sediments. The proportion of tools in relation to the débris is less than 1% and this is characteristic of a "production-area" (in contrast to a "working-area"), as represented for example by the area with the leaf-points (Site 83/11; southern area) and the following test excavation (Site 83/12).

Site 83/12 (burin-site)

On 58 m^2 of this site some 429 artefacts were excavated. The composition of this inventory is a result of the above specialized activities. The scatter pattern was not as distinct as on the flake-midden but the frequency of burins is here remarkable.

The distances of refitted artefacts provide information about how intact the excavation area is (Fig. 4). Here, the refitting lines have on the average the length

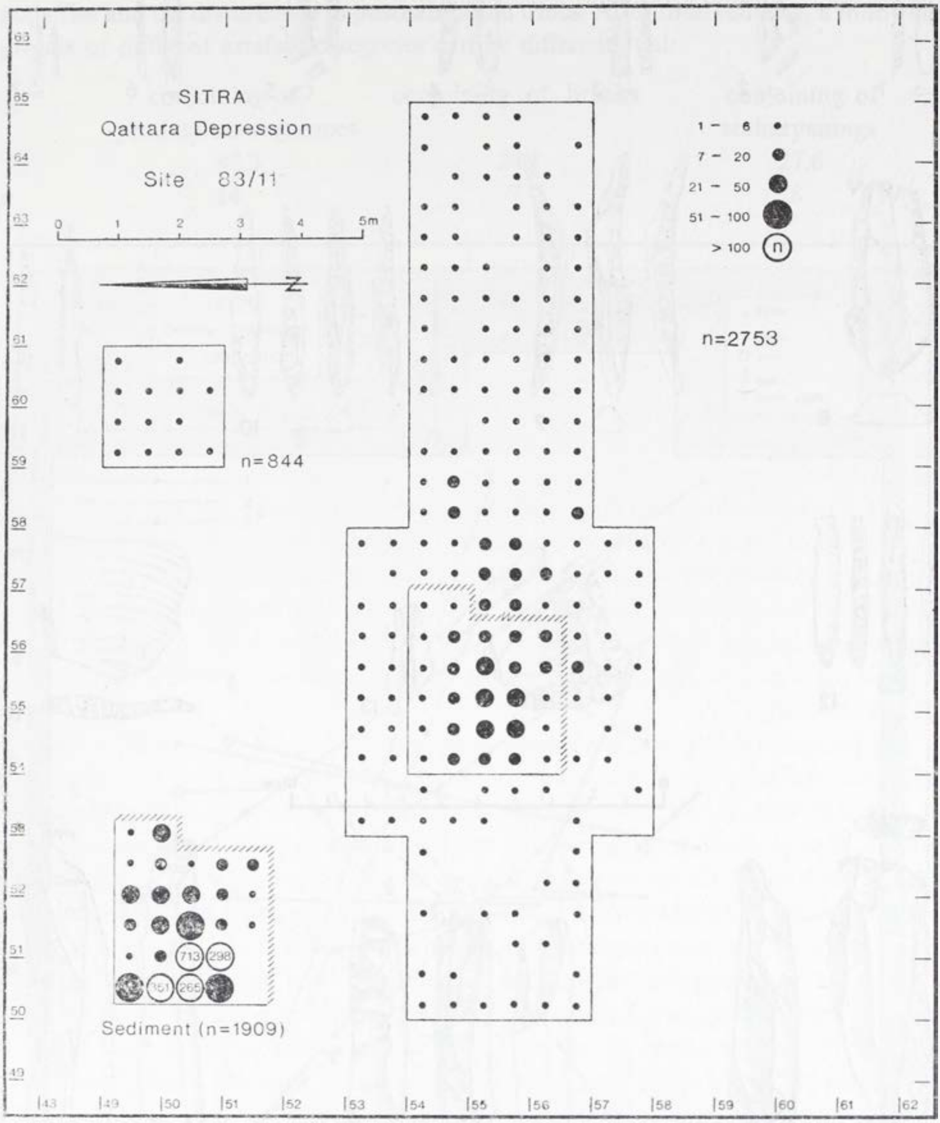

FIG. 2. Distribution of artefacts on the site 83/11, northern area (north of the Sitra lake). Surface collection and excavated area (below on the left) embedded in the hard and saline sediment

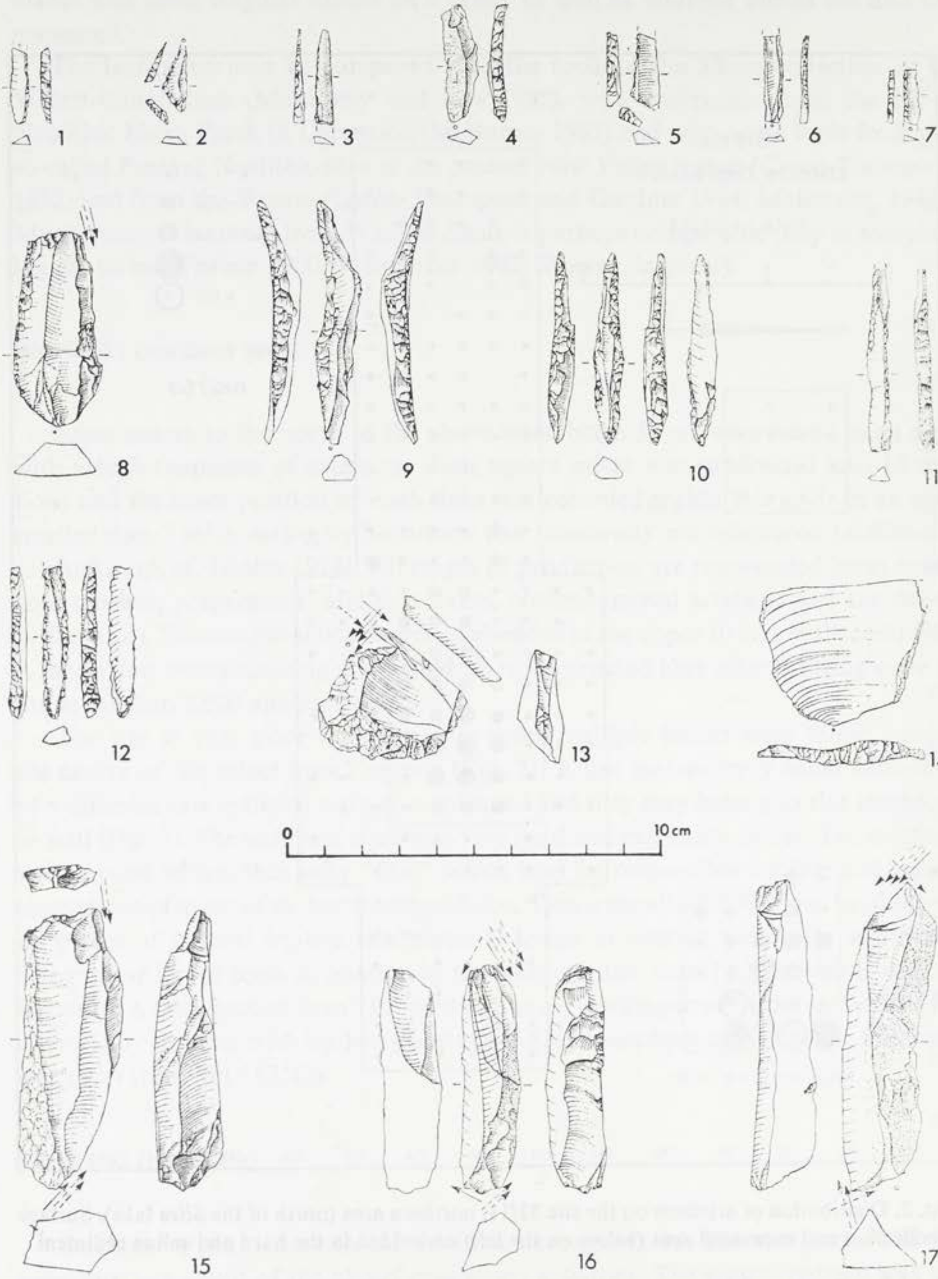

FIG. 3. Artefacts from the surface-site 83/11, northern area (north of the Sitra lake)

1, 3, 4, 6, 7, 11: Backed bladelets; *2, 5*: Elongated triangles; *8, 13, 15 - 17*: Burins; *9, 10, 12*: Bifacially retouched borers; *14*: Core-tabelet of 1 to 2 metres. But also 25% of the refitted pieces have been scattered at a distance of more than four metres. This seems to be the result of both the intensive habitation activities and the disturbance in posthabitation times. After total refitting, a following groups of different artefact-categories can be differentiated:

	conjoining of production-sequences	conjoining of breaks	conjoining of resharpenings
%	48,3	24,1	27,6
n	14	7	8

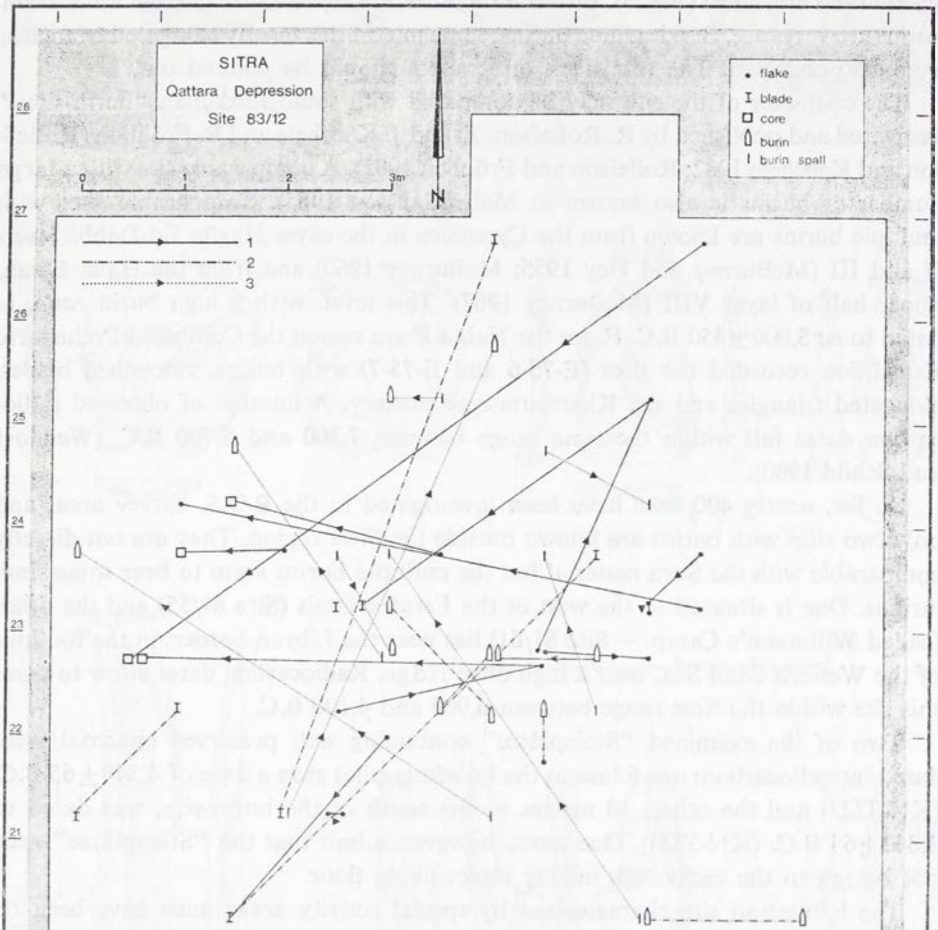

FIG. 4. Distribution of all conjoining artefacts from the surface-site 83/12 (north of the Sitra lake)

Symbols for the refitting of artefacts

1: Conjoining of production-sequences; *2*: Conjoining of breaks; *3*: Conjoining of resharpening-spalls

The manufacturing of flakes and blades was of lesser importance at this site. The conjoining of burin resharpening-spalls is very important and gives information on the character of the site (*cf.* Cziesla 1986). The most important tools here are the burins which represent 45% of the modified artefacts. These tools were very much stained-in and had suffered much abrasion. The number of resharpening-spalls (together 63 spalls) is very high. Some of the burins might be seen as cores for the production of bladelets. Multiple dihedral burins are numerous. Sometimes both ends of the blade were used as striking platforms; for example broken tools were used in this way. During the final elaboration stage the burins are very much fractionized and short (Fig. 5). Burins on a break are represented too, but truncation burins are very rare. Besides these burins, some microliths, mostly elongated triangles, were also collected. The total lack of scrapers should be pointed out.

The character of the site may be compared with some Jordanian "burin-sites" excavated and published by R. Rollefson, Z. and J. Kaechele and B. Fröhlich (Rollefson and Kaechele 1982; Rollefson and Fröhlich 1982). A comparable site with a large number of burins is also known in Mali (Gaussen 1965). Comparable sites with multiple burins are known from the Cyrenaica in the caves Hagfet Ed-Dabba levels II and III (McBurney and Hey 1955; McBurney 1960) and from the Haua Fteah, upper half of layer VIII (McBurney 1967). This level, with a high burin *ratio*, is dated to *ca* 5,000 ± 350 B.C. From the Nabta Playa region the Combined Prehistoric Expedition recorded the sites (E-75-6 and E-75-7) with burins, retouched blades, elongated triangles and the Khartoum-type pottery. A number of obtained radiocarbon dates fall within the time range between 7,300 and 5,700 B.C. (Wendorf and Schild 1980).

So far, nearly 400 sites have been investigated in the B.O.S. survey area, and only two sites with burins are known outside the Siwa region. They are not directly comparable with the Sitra material but the multiple burins seem to bear some similarities. One is situated to the west of the Farafra Oasis (Site 81/55) and the other (called Willmann's Camp – Site 81/61) lies near the Libyan border, in the foothills of the Western Sand Sea, near a high dune ridge. Radiocarbon dates allow to place this site within the time range between 6,900 and 4,100 B.C.

Two of the examined "Steinplätze" containing well preserved charcoal were dated by radiocarbon: one (close to the knocking-pile) gave a date of 4,340 ± 65 B.C. (KN-3222) and the other, 18 metres to the south of the burin-site, was dated to 4,840 ± 65 B.C. (KN-3223). One must, however, admit that the "Steinplätze" need not belong to the excavated, mostly intact living floor.

The habitation site characterized by special activity areas must have been repeatedly inhabited for a long period. The different stone artefact scatters and site formation are the results of a permanent or recurring settlement. The extensive sites near the Sitra lake are of no exception. Another survey of this area is planned for the spring of 1985. One hopes that further investigation of this region will yield more detailed information about the history of settlement of North-Western Egypt.

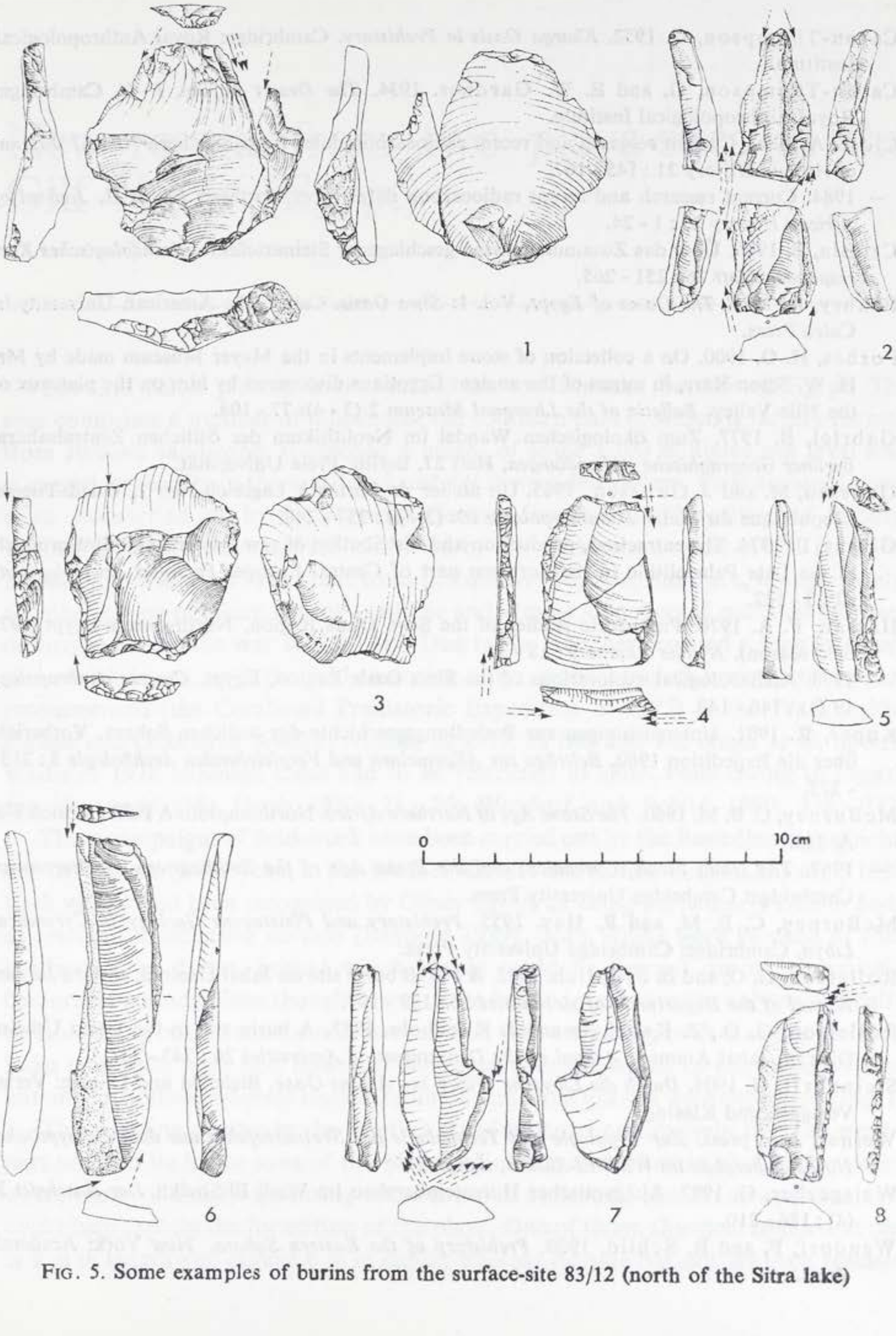

FIG. 5. Some examples of burins from the surface-site 83/12 (north of the Sitra lake)

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

WERNER SCHÖN

New results from two playa-sites in the Gilf Kebir (Egypt)

The Gilf Kebir plateau is situated at the southwestern borders of Egypt. The area comprises a number of tablelands, the southern part of which is largely formed from Jurassic sandstone. It reached a height of some 1,100 m above sea level and is rugged, especially in the south and east, by steep-sided valleys. First archaeological work was carried out by the Eleventh German Innerafrican Expedition of Almasy, Frobenius and Rhotert in 1933, followed by Oliver Myers as part of the Bagnold-Mond Expedition in 1938. Apart from preliminary reports, there are, unfortunately, no other major publications yet available and almost all collected material has been destroyed during the war 1939 - 1945. Due to the war there ensued a long interruption which lasted until the mid-seventies, when archaeological investigations were recommenced (the Combined Prehistoric Expedition of 1975) in the Wadi Bakht, Pachur and Gabriel in Wadi el Akhdar in 1977, El Baz and Mc Hugh *et al.* in both Wadis in 1978 although these had to be restricted to short visits owing to logistic considerations (Mc Hugh 1982: 21 - 26; Wendorf and Schild 1980: 216 - 222).

Three campaigns of field-work have been carried out by the Besiedlungsgeschichte der Ost-Sahara (BOS) team in the Wadi el Akhdar and in the Wadi Bakht since 1980. Both valleys had been recognised by Oliver Myers as being particularly rich in finds, as revealed in intensive surveys (Bagnold 1939). Both Wadis were blocked at their headwaters by dunes, behind which playas could be formed during climatically favourable periods. Even though they seem to have contained water only periodically, suitable living conditions seem to have arisen, thus attracting both man and animals. Lake sediments were not, however, deposited over the whole of the enclosed area, but only in hollows whereas elsewhere fluvial sand and gravels were deposited (Fig. 1).

The mapping of sites in the Wadi el Akhdar shows conclusively that the greater part of them lie in the area of the playa sediments in the lowest part of the valley, where the periodically appearing water could be collected. Certain recorded sections could help explain the formation of the playa. One of them, the most important one, is 9 m in length and almost 6 m in depth, whereas its base has not yet been reached.

Hammerseismograph measurments suggest a thickness of sediment of over 15 m. Little structural arrangement visible in isolated lenses and lines of gravel as well as in disappearing or interrupted strata suggests highly localized and short-lasting periods of sedimentation; there are no indications at all of longer lasting periods of humidity (Pachur and Röper 1984: 252). Above the layer marked A, one can recognize

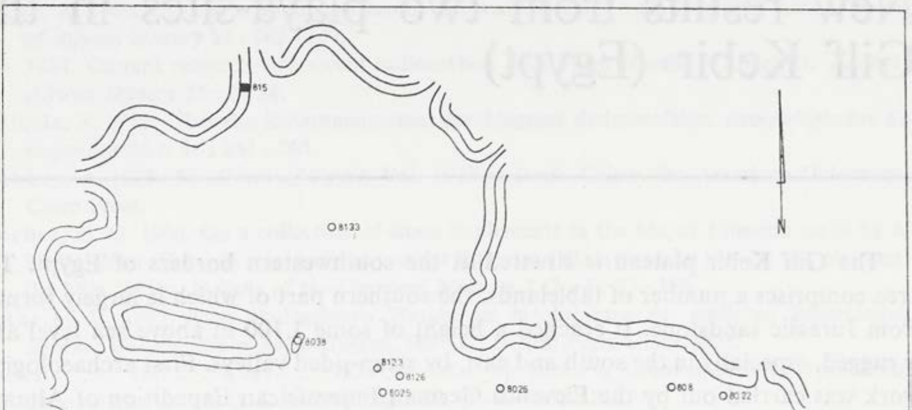

FIG. 1. Map of Wadi el Akhdar

1: Excavation; *2*: Survey

an inconsistency clearly resulting from fluvial action. The overlying sediments are plainly distinguishable from the clayey-silty playa by means of a higher sand content. According to the dating we have here a sedimentation of over 4 millennia. Particularly interesting was layer D, with two dates of around 7,700 b.p., which contained numerous sherds of an undecorated ceramic type.

The first finds in this area were discovered by Gabriel in 1977 (Kuper 1981: 231 - 238). There followed an attempt to present a sequence of settlement in the Wadi el Akhdar. 23 sites have been excavated and additionally a large number of single finds and observation have also been made. All artefacts are being recorded following a descriptive feature analysis as ordinary typological classification did not seem to be applicable. The observed technological facts could help to establish a more detailed classification of the material and allow wider comparisons, which by now do not appear possible. Important details will be expected from the analysis of the "internal structures" of the sites and their ecology; those, however, are beyond the scope of this paper.

In the western part of the valley floor artefacts of the Aterian lie upon a low hill measuring some 500 by 300 m, apparently without any recognisable concentration on the surface. There appear bifacial points, Aterian-points and small Levallois-cores.

The succeeding assemblage is represented by a possibly Epipalaeolithic site. The concentration had been partly exposed by a natural ditch. It involves the production of long, narrow and very regular blades. "Crested blades" and "core tablets" show a napping technique, which cannot be observed elsewhere in the Gilf Kebir. Truncations, shouldered bladelets, and a long and narrow triangle occur among the artefacts (Fig. 2: *20 - 27*). Unfortunately, there is no datable material available from this site, and the number of retouched pieces is very small (Kuper 1981: 243 - 244, Fig. 16 - 17). An approximately 30 cm thick, sandy find-layer on site 81/4 could be dated by two samples to about 5,700 b.p. Certain reassemblages prove that we are dealing with an uniform find layer. Two compact concentrations of 3 by 3 m and 5 by 4 m have been excavated. The raw material comprises 99 % quartzite, fine grained, coloured variations were prefered.

There are hardly any pieces larger than 5 cm. Bladelets were predominantly produced and modified into lunates by the application of microburin technique. Further retouched types are rare and occur only as individual pieces (Fig. 2: *1 - 19*). For the greater part of the 23 investigated sites we are dealing with exposed concentrations of artifacts usually larger than 5 m in diameter. According to the hitherto obtained radiocarbon dates, the majority of these sites may be placed between 5,500 and 5,000 b.p. The conditions of preservation for pottery and bones are extremely bad, and due to strong winds even pieces of stone smaller than 2 cm are nearly absent.

Since the stone-assemblages from all these sites are very similar, we can take the surface material from site 81/4 as an example. The remains of the hearth lie within a large concentration of artefacts of 10 by 15 m. It is, of course, possible that material from different layers was accumulated by eroding agencies, but as yet there have been no indications to support this thesis. The raw material consists in 98 % of quartzite, as in the case of the valley floor. Large pieces often larger than 10 cm, are predominant and they display mostly more or less regular retouched edges.

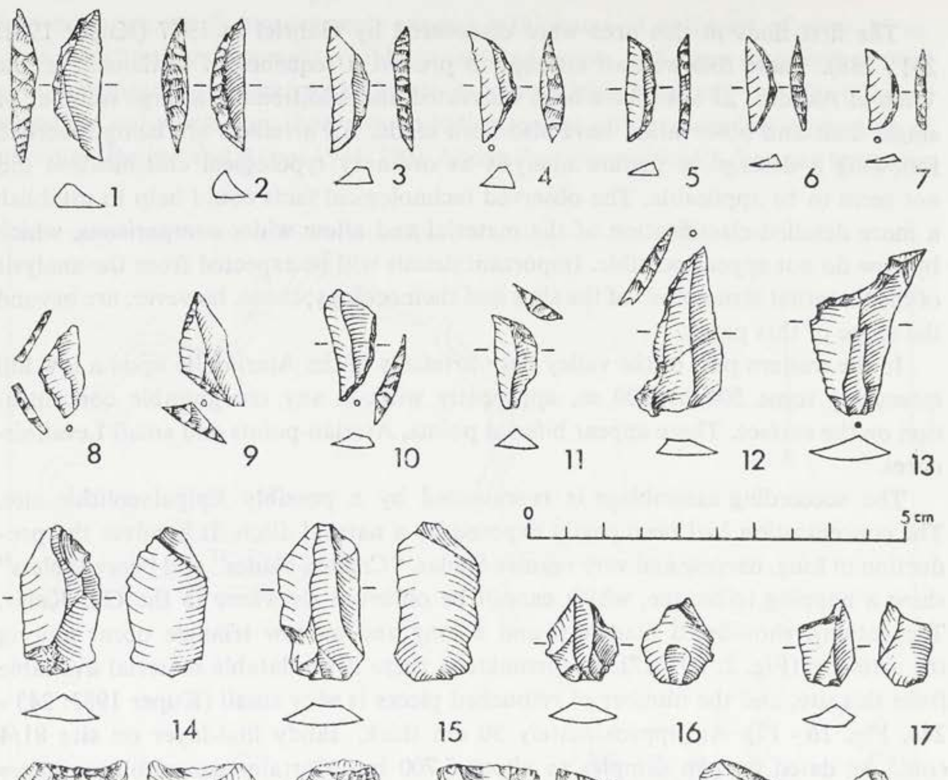

FIG. 2. Site 81/4

1 - 7: Lunates; *8*: Triangle; *9 - 11, 13*: Truncations; *12*: Accidental production of microlith; *14 - 17*: Microburins; *18, 19*: Cores;

Site 81/7-4

20: Triangle; *21, 22*: Truncations; *23*: Shouldered bladelet; *24*: Crested blade; *25*: Core-preparation-blade; *26, 27*: Blades.

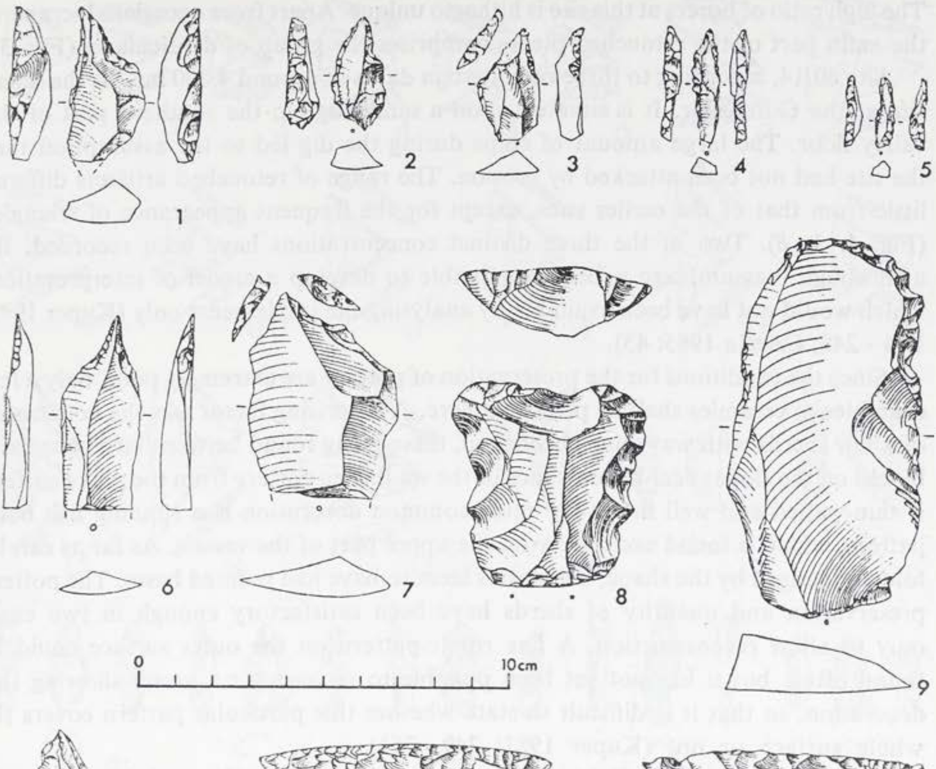

FIG. 3. Site 81/4

1 - 7: Perforators; *8, 9, 12*: Denticulates; *10*: Retouched blade: *11*; Scraper

The high ratio of borers at this site is hitherto unique. Apart from occasional scrapers, the main part of the retouched pieces comprises the group of denticulates (Fig. 3).

Site 80/14, according to three radiocarbon dates of around 4,300 b.p., is the latest site at the Gilf Kebir. It is situated upon a sand ridge in the southern part of the valley floor. The large amount of chips during the dig led to the assumption that the site had not been attacked by erosion. The range of retouched artifacts differed little from that of the earlier sites, except for the frequent appearance of triangles (Fig. 4: *1 - 8*). Two of the three distinct concentrations have been recorded. By a thorough reassamblage it became possible to develop a model of interpretation, which would not have been available by analysing the implements only (Kuper 1981: 244 - 248; Cziesla 1985: 43).

Since the conditions for the preservation of pottery are extremely poor, only a few examples of ceramics shall be presented here. A surprising factor was the occurrence of a few sherds with wavy line decoration, these being found between large quartzite blocks on the slopes near the entrance of the wadi. The pottery from the playa surface is thin-walled and well fired. The most common decoration is a running fish bone pattern, which is found exclusively on the upper part of the vessels. As far as can be told and judged by the shape, the vessels seem to have had pointed bases. The pottery preservation and quantity of sherds have been satisfactory enough in two cases only to allow reconstruction. A fine ripple-pattern on the outer surface could be found often, but it has not yet been possible to reconstruct a vessel showing this decoration, so that it is difficult to state whether this particular pattern covers the whole surface or not (Kuper 1981: 249 - 251).

The situation at Wadi Bakht is as follows: The stone artifacts of the playa sediments correspond considerably to those of the Wadi-el-Akhdar. The situation on the blocking dunes is obviously different, since these are covered with artifacts which evidently do not appear as recognizable concentrations. In one excavated area immediately beneath the completely barren sand of recent origin a fossile soil horizon has been recovered. In the upper part of this layer appeared the remains of a living floor some 20 cm thick, in which among other finds a broken yet complete ostrich-egg was found. The existence of an intact find area can be proved also by the reassembling of two burin-spalls. Hitherto only a small part of the material has been analysed. Microliths made from blades are predominant; trapezoids and triangles with straight and concave edges as well as a few lunates have been found. Borers occur in different forms, scrapers and other large tools are rare (Fig. 4: *9 - 35*). The only radiocarbon date for this complex is around 6,600 b.p. No corresponding material is known from the Wadi el Akhdar.

Within the assumed chronological framework this material may be placed between the possible Epipalaeolithic site 80/7 - 4 and the small complex with lunates from site 81/4 from the Wadi el Akhdar. The radiocarbon dates from Gilf Kebir suggest intensive settlement activities between 6,000 and 4,700 b.p. The dates for the Wadi Bakht tend to be somewhat younger than those from the Wadi el-Akhdar. Three

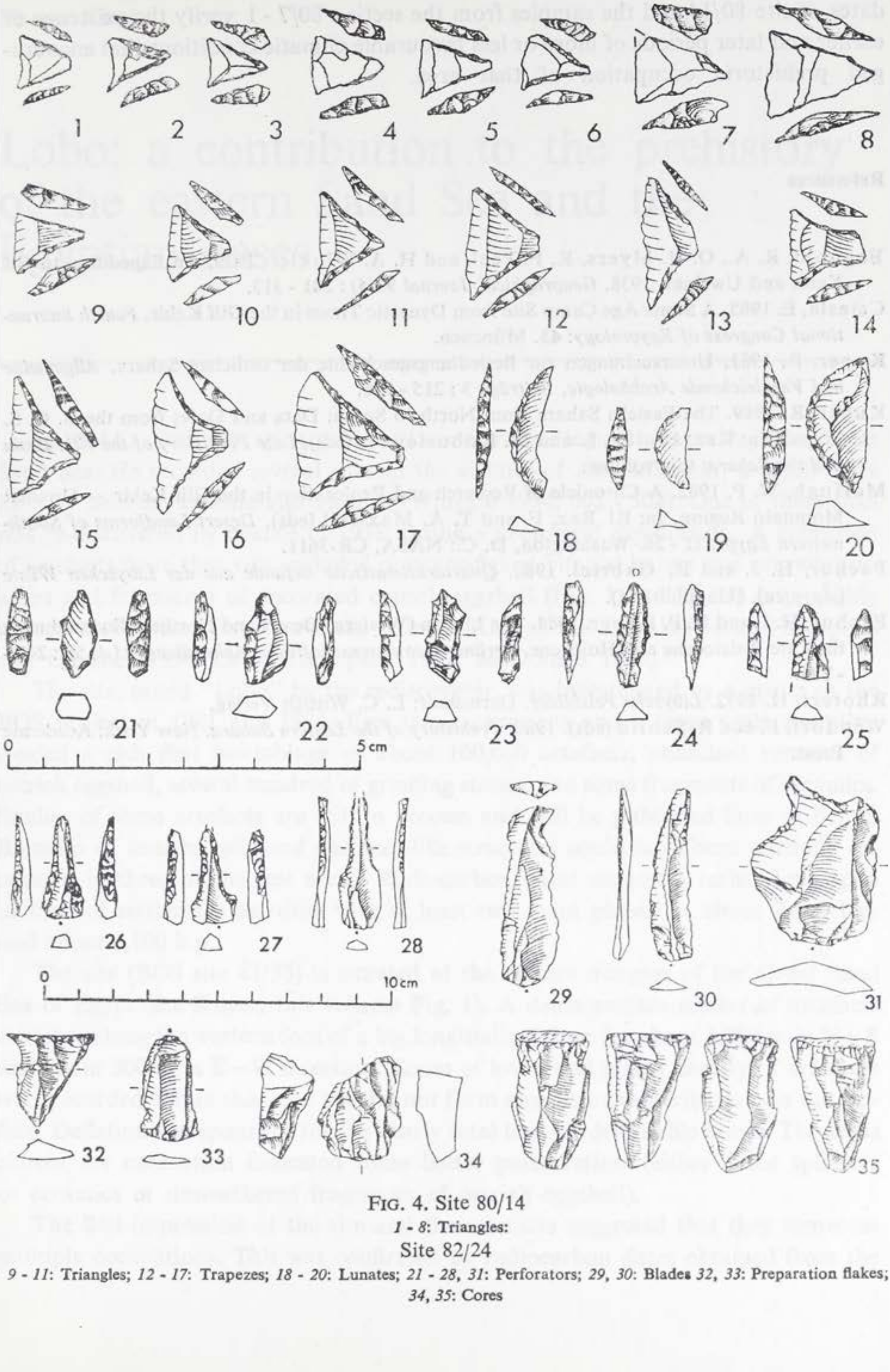

FIG. 4. Site 80/14

1 - 8: Triangles:

Site 82/24

9 - 11: Triangles; *12 - 17*: Trapezes; *18 - 20*: Lunates; *21 - 28, 31*: Perforators; *29, 30*: Blades *32, 33*: Preparation flakes; *34, 35*: Cores dates of site 80/14 and the samples from the section 80/7 - 1 verify the existence of earlier and later periods of more or less favourable climatic conditions that encouraged prehistoric occupation of that area.

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FRANK KLEES

Lobo: a contribution to the prehistory of the eastern Sand Sea and the Egyptian oases

In 1934 Lt. Ordre Wingate published some archaeological objects from the Great Sand Sea. He recorded several sites in the vicinity of Abu Minquar, a small oasis halfway between Dakhla and Farafra (Wingate 1934: 302 - 304). One of these sites was re-discovered by chance in 1978 during a geological exploration. A collection of artefacts from that visit included pressure-flaked bifacial knives and arrowheads, adzes and fragments of decorated ostrich eggshell (Fig. 1 and 2) and is probably related to sites from Fayum and the Oases of Kharga and Dakhla (Caton-Thompson and Gardner 1934; Caton-Thompson 1952; McDonald 1982).

The site, called "Lobo" by the rediscoverer, was investigated by a group of the BOS project in 1981 and 1983. Five test excavations and a large scale sampling yielded a rich flint assemblage of about 100,000 artefacts, abundant remains of ostrich eggshell, several hundred of grinding stones, and some fragments of ceramics. Studies of these artefacts are still in process and will be published later in detail. Remains of hearths, pits and two well-like structures could have been partially excavated in three of the test areas. Radiocarbon dates suggest a rather long span of time of settlement activities with at least two main phases at about 7,800 b.p. and about 6,100 b.p.

The site (BOS site 81/55) is situated at the eastern margins of the Great Sand Sea of Egypt (see Kuper, this volume Fig. 1). A dense surface scatter of artefacts stretches along the western foot of a big longitudinal dune for about 1,200 m in N–S and about 300 m in E–W direction. Zones of lower and higher density of artefacts were recorded within this area but did not form any distinct distribution on the surface. Deflation is responsible for the nearly total lack of identifiable bones. The areas chosen for excavation indicated some better preservation (either bone splinters or ceramics or unweathered fragments of ostrich eggshell).

The first impression of the site and the artefacts suggested that they represent multiple occupations. This was confirmed by radiocarbon dates obtained from the

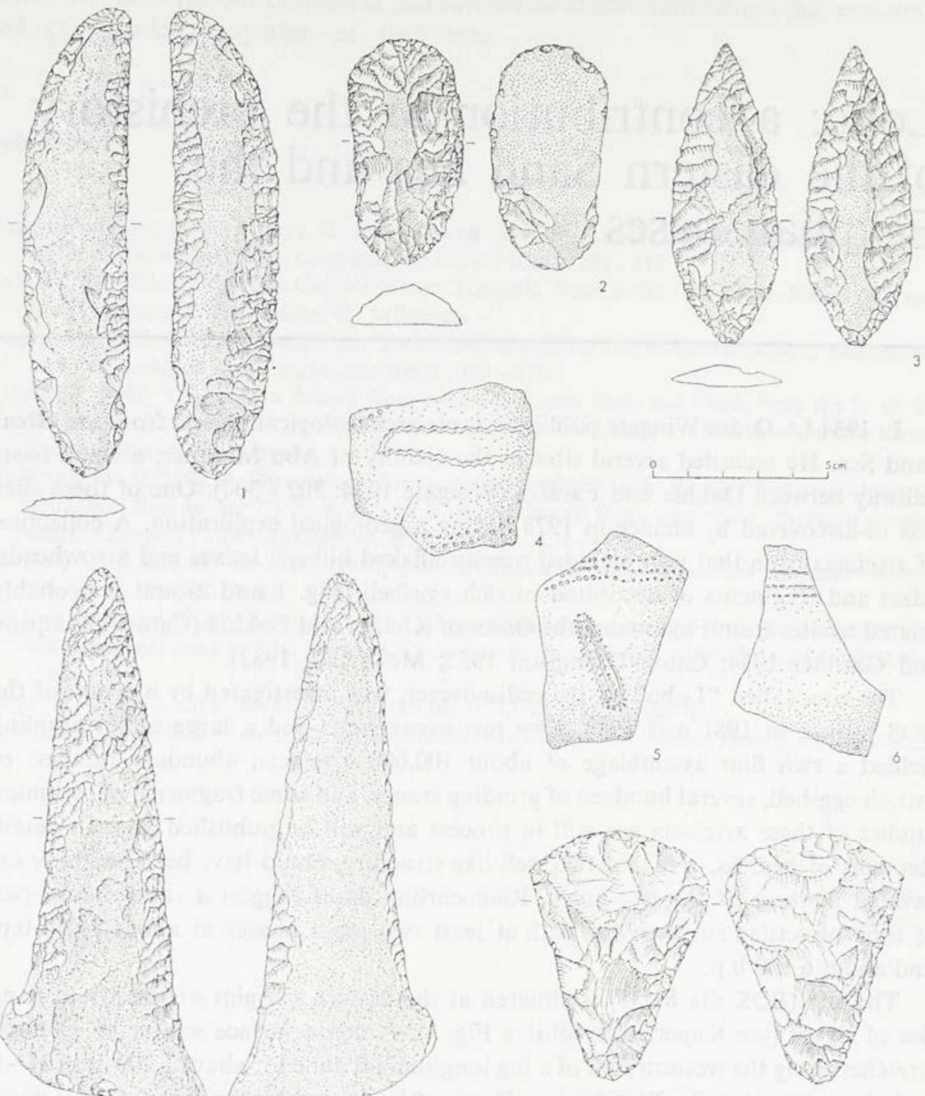

FIG. 1. Lobo, area 81/55

1 - 3, 7, 8: Flint artefacts; *4 - 6*: Ostrich egg shell

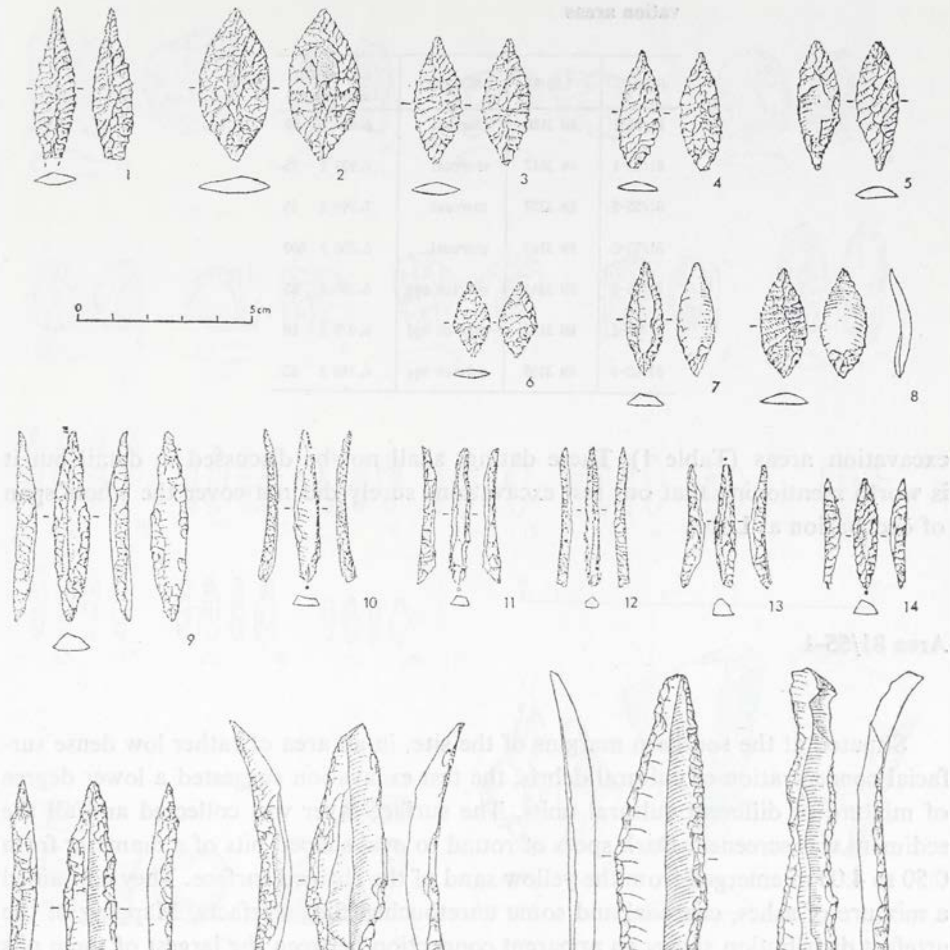

FIG. 2. Lobo, area 81/55. Flint artefacts

Table 1

Lobo. Radiocarbon dates from the excavation areas

AREA	LAB-NR	MATERIAL	b.p. - DATE (uncorrected)
81/55-1	KN 3186	charcoal	8.650 ± 80
81/55-1	KN 3017	charcoal	7.900 ± 75
81/55-5	KN 3357	charcoal	7.790 ± 65
81/55-2	KN 3140	charcoal	6.350 ± 500
81/55-2	KN 3141	ostrich egg	6.160 ± 65
81/55-2	KN 3142	ostrich egg	6.070 ± 60
81/55-3	KN 3198	ostrich egg	6.180 ± 65

excavation areas (Table 1). These datings shall not be discussed in detail but it is worth mentioning that our test excavations surely did not cover the whole span of occupation at Lobo.

Area 81/55-1

Situated at the southern margins of the site, in an area of rather low dense surfacial concentration of cultural debris, the test excavation suggested a lower degree of mixture of different cultural units. The surface layer was collected and all the sediment was screened. Dark spots of round to oval shaped pits of a diameter from 0.50 to 4.00 m emerged from the yellow sand of the cleaned surface. They contained a mixture of ashes, charcoal and some unretouched flint artefacts. Mapping of the artefact distribution shows an apparent connection between the largest of these pits and a cluster of tools.

The tool assemblage is clearly dominated by scaled pieces, small double backed perforators and retouched flakes (Fig. 3). The number of scrapers, denticulates and retouched blades is quite low. No burins and geometric microliths could be identified. Arrowheads are represented by several stemmed points. In the debitage flakes are predominant. Though there is a considerable amount of chips, the number of cores is very low and they have been strongly reduced. Some of them have been used as scaled pieces at last. As far as we can say from some surveys, the raw material, mainly nodular chert is not to be found in the close proximity of the site but had to be transported possibly from the escarpment about 40 km away. Far-reaching transport can be assumed for rare materials like desert glass, fossil wood and quarzite.

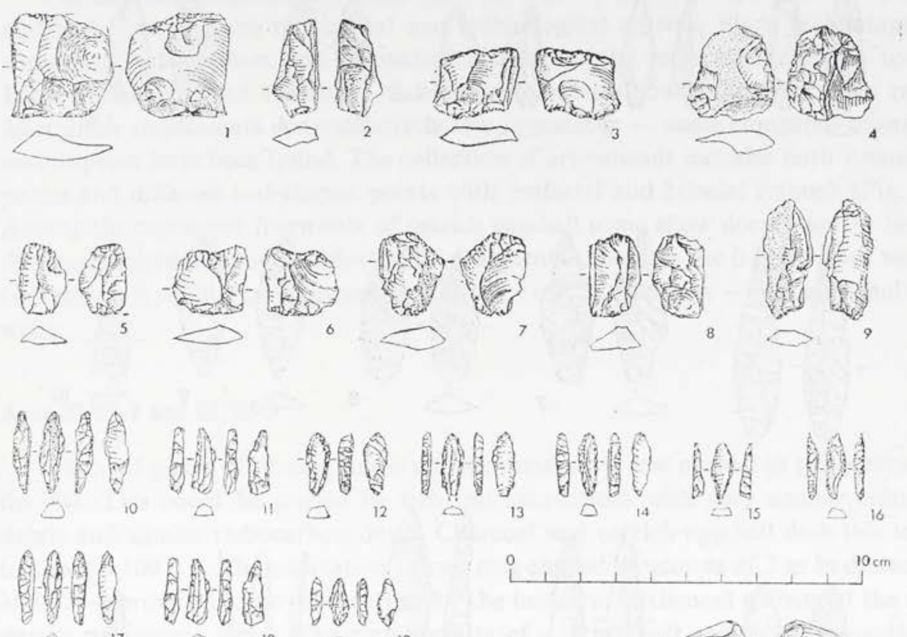

Fig. 3. Lobo, area 81/55-1. Flint artefacts

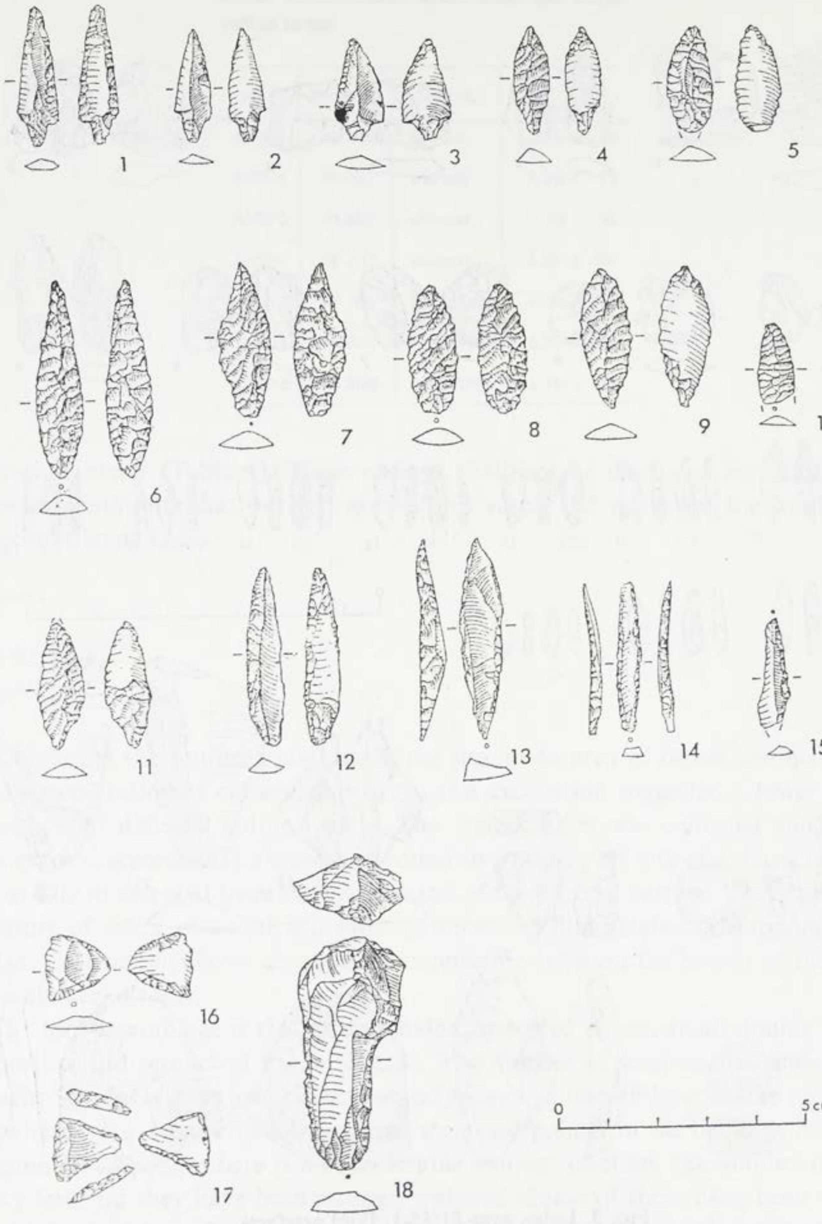

FIG. 4. Lobo, area 81/55-5. Flint artefacts

Area 81/55-5

The flint implements differ from those of 81/55-1 not in the proportion of raw materials, but in some typological and technological aspects. Blade technology is common. Scaled pieces and retouched blades are the most characteristic tools. Backed bladelets and retouched flakes are numerous, burins and scrapers rare. Microlithic implements occur relatively few in number – some elongated triangles and trapezes have been found. The collection of arrowheads includes both stemmed points and different leaf-shaped points with unifacial and bifacial retouch (Fig. 4). Among the numerous fragments of ostrich eggshell some show decoration – lines, dots and incised ornaments. Most of the fragments should be the fragments of water containers. A small trench proved the existence of a series of pits – probably shallow wells.

Area 81/55-2 and 81/55-3

A second phase of occupation is concentrated on a low mound in the centre of the site. This could be proved by two test excavations with very similar cultural debris and similar radiocarbon dates. Charcoal and ostrich eggshell date this level to about 6,100 b.p. The excavation of two ring-shaped structures of 2 m in diameter at 81/55-2 provided some explanation for the intensive settlement activity at the site during prehistoric times. The ring consists of a grey, well cemented fine-grained salty silt. The inner part of this circle is filled with different sandy layers. The trench shows a continuation of the ring structure for more than 2 m below the surface. The silty material there is replaced by a clearly defined band of manganese and ferrocrete concretions. Several similar structures could be documented on the top and on the slopes of the mound. Most probably they are vents of fossil springs or wells, one of the rare sources of permanent water for that region of the Sand Sea during different periods of the Holocene.

The cultural debris of area 2 and 3 look quite similar. They include ostrich eggshell fragments with many beads in different stages of preparation, grinding stones, most of them of a flat circular shape and some sherds of a lightbrown handmade pottery with an organic temper. The associated lithic artefacts include bifacial and unifacial retouched elements like arrowheads, fragments of knives and flaked adzes. Backed elements are as common as microliths, mostly triangles and trapezes (Fig. 5). Raw material is similar to the areas mentioned before, except for a slightly higher percentage of quarzite.

Area 81/55-6 and 81/55-7

The artefacts of these areas are still awaiting analysis. No hearths and other features could be recorded.

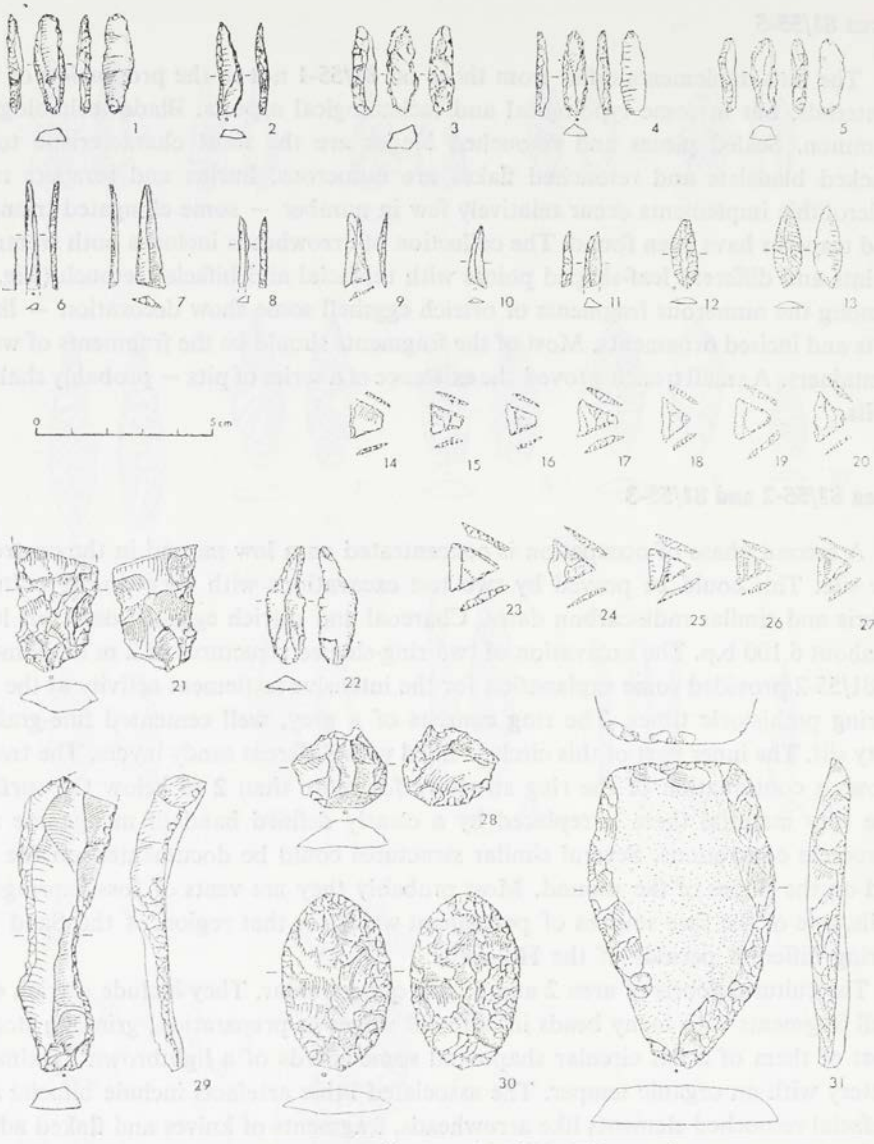

FIG. 5. Lobo, areas 81/55-2 and 81/55-3. Flint artefacts

The site of Lobo was of great importance for the region because there existed a permanent, not seasonal water source and as S. Kröpelin suggested (personal communication) also salt mining might have played an important role during the occupation. It seems to be rather complicated to define the different cultural units because of multiple occupation at that open air site, but the rather long span of settlement activities at the area shows that at least the outskirts of the Great Sand Sea offered favourable living conditions during different periods of the Holocene (see also E. Cziesla, this volume). The existence of fossil springs at Lobo suggest a remarkable higher local water table during these times. Another 15 Epipaleolithic and Neolithic sites in the vicinity of Lobo and several other sites and hearths in the central parts of the Sand Sea could be recorded during a reconnaissance trip by R. Kuper and K. Bokelmann in 1981 showing that this vast dune area cannot be regarded as a frontier line preventing cultural contacts between the Maghreb and the central Sahara to the Egyptian Oases and further to the Nile and vice versa.

Cultural relations to the Oases and the Fayum can be found in elements of typological similarity especially of the younger phase represented by the bifacially worked pieces and also by the ceramics (F. Wendorf, personal communication). It is still an open question if these artefacts either represent western influences during the formation of Neolithic and Predynastic cultures of the Nile Valley or point to an extension of these cultures as far west as the Great Sand Sea. The radiocarbon dates from Lobo show a slightly earlier date than these from Fayum.

The results of this relatively limited work at Lobo seem to be promising for future work that may give some new information about the origins and external relations of the Neolithic cultures of the Nile Valley.

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favourable living conditions during different periods of the Holocene (see also E. Cziesla, this volume). The existence of fossil springs at Lobo suggest a remarkable higher level water table during these times. Another 15 Epipalaeolithic and Neolithic sites in the vicinity of Lobo and several other sites and findspots in the central parts of the Sand Sea could be recorded during a reconnaissance trip by R. Kuper and E. Schulz in 1981 showing that this vast dune area cannot be regarded as a frontier line preventing cultural contacts between the Maghreb and the central Sahara to the Egyptian Oases and further to the Nile and vice versa.

Cultural relations to the Oases and the Fayum can be found in elements of typological similarity especially of the younger phase represented by the bifacially worked pieces and also by the ceramics (F. Wendorf, personal communication). It is still an open question if these artefacts rather represent western influences during the formation of Neolithic and Predynastic cultures of the Nile Valley or point to an extension of these cultures as far west as the Great Sand Sea. The radiocarbon dates from Lobo show a slightly earlier date than those from Fayum.

The results of this relatively limited work at Lobo seem to be promising for future work that may give some new information about the origins and supraregional relations of the Neolithic cultures of the Nile Valley.

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IAN EDWARDS and COLIN A. HOPE

A note on the Neolithic ceramics from the Dakhleh Oasis (Egypt)

In 1978 the Dakhleh Oasis Project[1] commenced its first survey season of the Dakhleh Oasis in the Egyptian Sahara, and at the time of writing has finished its seventh field season.[2] Amongst numerous sites discovered by the Project are a series which can be ascribed on the basis of their lithic technology to the Neolithic period.[3] These sites can be divided broadly into two groups based upon the presence or absence of pottery, differences between them also being detectable in the lithic technology and faunal remains.[4] It is the ceramic material from the latter type of Neolithic site which forms the subject of this communication.[5] Our intention here is to present simply a brief review of the ceramic assemblage as we know it to date, focusing upon some of its more interesting features. A description of the principal pottery fabrics which have been isolated will be found after this general discussion.[6] No attempt will be made to discuss the distribution of the various types throughout the oasis as the detailed examination of all of the surface collections has not been

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[1] Colin A. Hope, since the inception of the Dakhleh Oasis Project, has been co-investigator responsible for the study of the ceramics and kiln sites discovered by the Project. He is currently Research Fellow in Ancient History at Macquarie University, North Ryde, New South Wales, Australia. Queries concerning the material outlined in this paper may be addressed to him there. Ian Edwards, Senior Lecturer in Ceramics at the Victoria College, Burwood Campus, Melbourne, Australia, is adviser to the project on ceramic technology.

[2] The Project is a Canadian venture sponsored jointly by the Society for the Study of Egyptian Antiquities and the Royal Ontario Museum under the direction of Anthony J. Mills.

[3] Descriptions of the sites and accounts of the artefacts they have yielded can be found in the reports on the Project by Churcher 1980, 1981, 1982, 1983; Hope 1979, 1980, 1981, 1983; MacDonald 1980, 1981, 1982, 1983; and Mills 1979, 1980, 1981, 1982, 1983, 1984.

[4] For a discussion of this two – phase Neolithic in the Oasis see particularly MacDonald 1982: 123 - 133.

[5] The Neolithic ceramics from Dakhleh were to have been the subject of a paper delivered in absentia for the present authors at the 1984 conference which this volume commemorates.

[6] The general comments are by Hope and the description of the fabrics by Edwards.

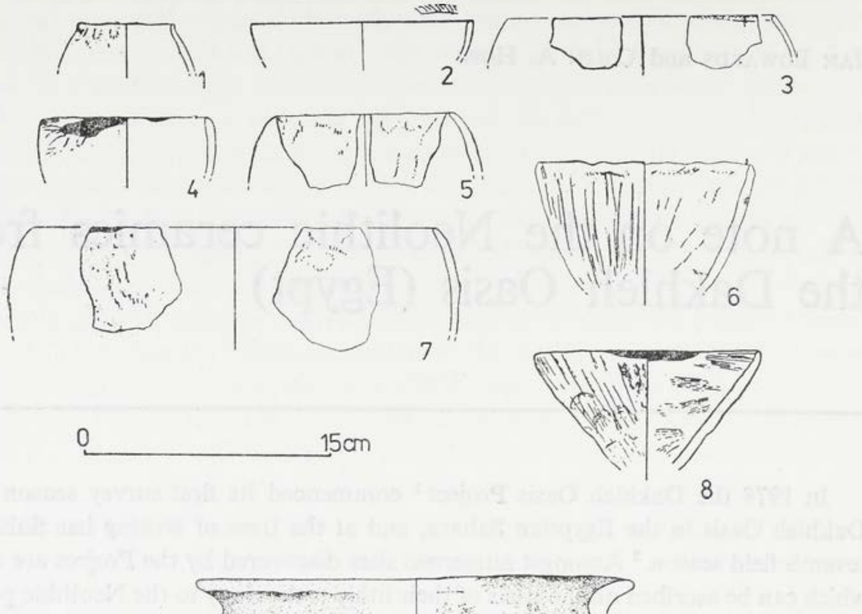

FIG. 1. Dakhleh Oasis. Neolithic ceramics
9: Rim diameter = 22.2 cm

completed. It is perhaps needless to point out that any conclusions drawn in this discussion are of a preliminary nature and may need modification or revision in the light of future research.[7]

While a fairly wide range of hand-made pottery fabrics [8] has been isolated amongst the collections made so far, there appear to be four fabrics which characterise the material:

[7] For preliminary discussions of the Neolithic ceramics see Hope 1979: 191 - 192, 1980: 286 - 287, 1981: 237, 1983: 142 - 144.

[8] The term ,,fabric" is used to refer to a combination of raw clay, any natural or artificially added temper and the physical characteristics after firing.

a) A rough sand-tempered fabric which is fired orangish-brown in colour with grey cores occuring; the surfaces are coarse and its appearance is very gritty.

b-d) Three fabrics which are distinguished by reference to the size of shale inclusions they contain, *i.e.*, fine *b*, medium *c*, and coarse *d*. They are fired a wide range of colours from grey to pale yellowish-cream depending upon the amount of lime they contained and its bleaching effect upon the iron in the body. Paler surfaces are a feature of some examples of these fabrics, against which the shale particles stand out with colours ranging from grey to red and even green. A variant of *c* has been identified in which a vitrified grey core occurs. All of these fabrics contain quartz.

The four fabrics are undoubtedly of local manufacture, their petrology coinciding exactly with that which would be expected from clays developed within the geomorphological environment of the oasis.[9] While the surface of these fabrics received a thin wash of red ochre, which occurs plentifully in the oasis, the surface modifications which characterise the material were executed either with a sharp, hollow reed, the potter's fingers or exposure to reducing conditions.

The occurrence of a blackened rim band, usually of irregular size, though occasionally terminating at a fairly even line inside the vessel, is a common feature of Dakhleh Neolithic ceramic assemblages. It occurs on a series of deep conical bowls (Fig. 1: *4*, *8*) and deep restricted bowls (Fig. 1: *7*) and possibly some small restricted jars, most commonly made from the sand-tempered fabric but also in the shale tempered fabrics. In combination with this or on their own may be found a row of thumb impressions below the rim (Fig. 1: *1*) and/or vertical or oblique striations (Fig. 1: *8*) probably produced by the potter running his or her fingers over the surface of the vessel and exerting pressure while doing so. These features only occur on the exterior of vessels. Vertical or oblique striations sometimes occur on bowls which lack a blackened top (Fig. 1: *6* and 2: *1*).

A wide variety of incised decorative motifs or scratchings may be observed on open, shallow or deep bowls, and occasionally on deep restricted bowls, made from the fine to medium shale-tempered fabrics. These motifs include incised rim notches (Fig. 2: *1* - *3*), which may also occur on vessels made from sand-tempered fabrics (Fig. 1: *2* - *3*), cross-hatching, punctates in either horizontal or vertical rows and pendant triangles filled with punctates between horizontal lines (Fig. 2: *4* - *8*). The majority of the sherds with this type of decoration were found on a site near the present capital of the oasis Mut, at site 31/405-G6-1. The morphology of the bowls decorated with these more elaborate designs differs from that of those with the blackened tops, surface striations and simple rim notching or scratching. The former are predominantly straight-sided open forms while the latter have convex sides, are deeper, either open or slightly restricted and generally coarser. The two types occur together on certain sites.

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[9] For reports on this see Churcher 1980, 1981, 1982, 1983; and Brookes 1983.

The majority of the forms are bowls or deep basins. There does not appear to be any difference in the general morphology of decorated and plain types of the coarser vessels, while that of the finer, more elaborately decorated bowls appears to be peculiar to that style. It is possible that the latter possessed flat bases while the former

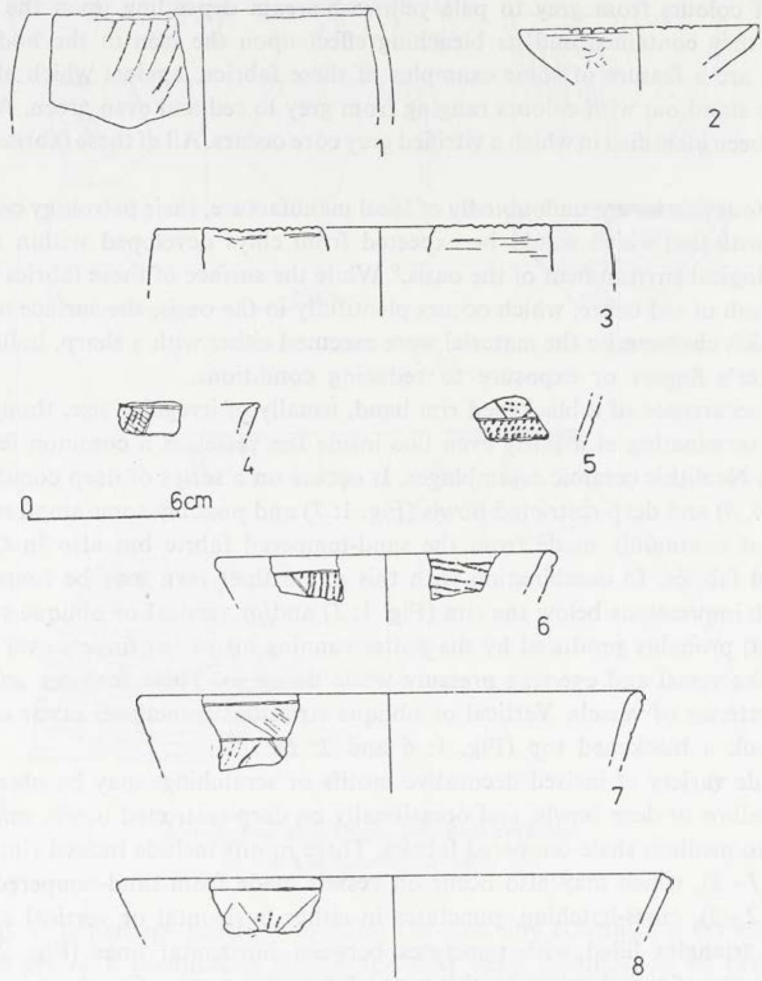

FIG. 2. Dakhleh Oasis. Neolithic ceramics

seem to have had round or pointed bases. Rim types differ also, with flat-topped or rounded rims occurring on the elaborately decorated bowls (Fig. 2: *6 - 8*) and tapering pinched rims on the coarser bowls and jars (Fig. 1: *1*, *4 - 8*).

Very few fragments have definitely been identified as being from jars. The few that have attest globular or ovoid shapes with little or no neck formation (Fig. 1: *1*). Exceptions to this are provided by two of the very few vessels it has been possible to reconstruct (Fig. 1: *9* and Fig. 3). One (Fig. 3) is a small round-base jar with a short neck and globular body made in a sand-tempered fabric. The surface is rough with some straw impressions while the upper neck and rim are decorated with a band of incised cross-hatching; two holes puncture the neck. These were apparently made before firing and may have served to enable the jar to be suspended. Such holes are encountered not infrequently, mostly executed after firing.

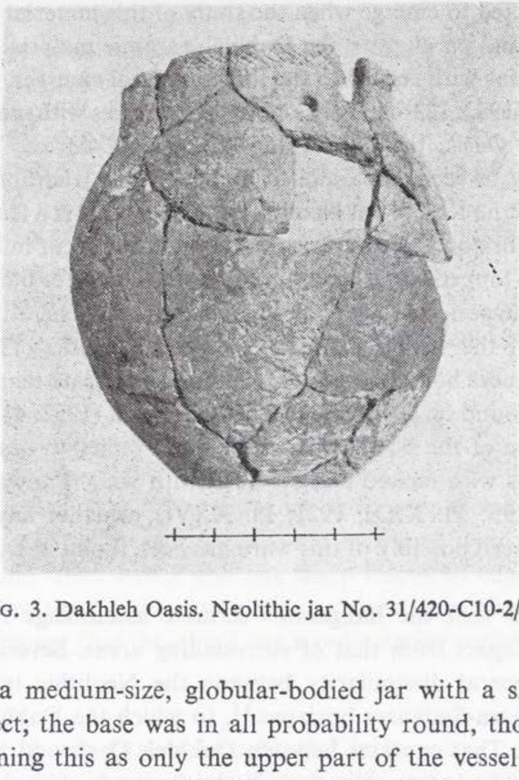

FIG. 3. Dakhleh Oasis. Neolithic jar No. 31/420-C10-2/1

The second is a medium-size, globular-bodied jar with a short neck (Fig. 1: *9*). The rim is direct; the base was in all probability round, though there is some uncertainty concerning this as only the upper part of the vessel was reconstructed from the many fragments into which the vessel had broken when found in 1985. The jar is made from a dense quartz-tempered, brown fired fabric and its body is covered with an impressed matting pattern. While this may be purely decorative it is possible that it results from the vessel having been formed using a basket to support and shape its wall. The latter is extremely thin for the size of the jar and very regular.

This jar was found on the surface of site 30/450-B4-1 in the south-eastern part of the oasis. The site has yielded examples of the common black-topped and coarse bowls described above but also a small collection of very interesting sherds in fine wares. These may be summarised as follows:

a) Sherds in a sand-tempered, brown or grey fired fabric with compacted surfaces from open bowls;

b) Two rim sherds which join, from a small closed vessel, made from a very dense, grey fired fabric tempered with very fine sand. They have a deliberate black top, below which the surface is fired red; the interior is grey;

c) One sherd from a black-topped bowl which has a red slip on the exterior;

d) A rim sherd from a shallow bowl in a dense, grey fired fabric;

e) A sherd from a bowl in black-fired fabric, compacted inside and out.

These pieces illustrate something of the diversity of the indigenous ceramic repertoire which is expected to emerge when the study of this material is complete.

In attempts to find parallels to the Dakhleh ceramic material a situation similar to that which pertains with regard to the lithic material emerges. With regard to the latter, Mc Donald (1982: 123 - 133) has noted similarities with material from Kharga Oasis and Dungul Oasis, the Nile Valley and North Africa. The occurrence of blackened tops may be seen as paralleled by the Nilotic tradition and incised decoration characterises the Khartoum Neolithic and in general is a feature of the Sahara-Sudanese ceramic horizon.[10] However, major differences occur in both of these areas. The Dakhleh black-topped vessels are very rarely red coated or burnished as are those from the Predynastic period in Egypt and their exterior is generally rough or striated; the morphology of the vessels from the two regions differs. The incised designs of the Sahara-Sudanese horizon are generally more elaborate than those from Dakhleh, as were those found on sherds by Caton-Thompson (1952: 41, Fig. 5) in Kharga.

Whilst the shape of the bowls with incised and punctate designs is reminiscent of black ware bowls with incised designs filled with white known from the Naqada I period (Petrie 1895: Pl. XXX; 1921: Pl. XXVI), whether any connection exists is uncertain. One sherd possibly of this ware has been found in Dakhleh (Hope 1980: 287, Pl. XVIIa).

It would appear that the indigenous ceramic assemblage from the Neolithic in Dakhleh stands apart from that of surrounding areas. Several researchers have pointed out the general dissimilarity between the Neolithic in the north-eastern Sahara and the Sahara-Sudanese horizons[11], to which the Dakhleh ceramics apparently bear witness. That contacts between Dakhleh Oasis and the Nile Valley did exist is indicated by finds from the oasis in the form of a few sherds from one site of distinctive black-topped, red coated and polished ware of Late Predynastic date and the black-fired sherd with incised designs referred to above. In addition to these mention should be made of a fragment from a fish tail blade found on the top of the escarpment above Teneida at the eastern end of the oasis and a bowl of late 'P' ware which was found by Caton-Thompson (1952: 40, Pl. 121: 5) in the Bulaq Pass near Kharga. It is possible that the few sherds from site 30/450-B4-1, described

[10] Similarities between material from Dakhleh and the Wadi Bakt sites in the Gilf el-Khebir may exist, see McHugh 1975: Fig. 5. The present author has not, at yet, been able to examine this possibility fully.

[11] See discussions by Clark 1980, Smith 1980, and Wendorf and Hassan 1980.

above with compacted surfaces, red slips and black tops may have been produced as a result of this contact, though this point will require much further investigation.

Finally, the frequent association of hand-made Neolithic ceramics in the oasis with material of late Old Kingdom date should be referred to, indicating the continuation of local ceramic traditions despite the Egyptian occupation of the oasis throughout the Old Kingdom.

Specific comments on some examples of Dakhleh Oasis Neolithic pottery

Examples of fabric *a*: sherd with "sand" tempering

1. This sherd is extensively tempered with fine water-worn quartz sand, iron stone and shale. The sherd is rough and "sandy" to the touch; reddish exterior surface; grey blue core; some pink on the interior surface; grey blue on the lip; sherd emits a metallic sound when struck; vitrification has begun; some magnetite is present (sherd attracts a magnet slightly).

2. Same description as above but with finer inclusions and the sherd surface is more friable.

Examples of fabric *b*: sherds with fine "shale" inclusions

1. Very limey – some surface lime observed (secondary re-growth); inclusions include lime impregnated "shale"; water-worn quartz particles (of medium size); vitrification has begun; this sherd is pinkish-red in colour with a grey core; sherd emits a metallic sound when struck and has sharp fractured edges.

2. As for above but the sherd is an even grey colour throughout.

3. As for above except that this sherd has a red exterior surface, grey core and a grey interior surface.

Examples of fabric *c*: sherds with medium "shale" inclusions

1. Sherd has a grey-blue core; a pale yellowish-pink outer surface and a grey inner surface; both platey "shale" inclusions and fine red iron-stone fragments are present. Vitrification has begun and the sherd has sharp fractured edges and emits a metallic ring when struck.

2. As for above but the sherd exibits a greater degree of vitrification.

3. Similar to above but not vitrified to the same degree, sherd fabric has a "flakely" quality.

Variant of fabric *c*: sherd with medium "shale" inclusions

1. Sherd has a grey core and extensive vitrification; red slip is present on the exterior and interior sherd surfaces; the black lip treatment appears to be carbon impregnation; the sherd has a metallic ring when struck and sharp fracture edges.

Example of fabric *d*: sherd with coarse "shale" inclusions

1. Sherd has an open textured fabric with coarse shale inclusions and a partially vitrified body; the sherd has a blue-grey core, a patchy blue and pink exterior surface and a pink interior surface; some magnetite is present as the sherd attracts a magnet.

Comments on the firing of these sherds

1. The presence of some magnetite in sherds of fabric *a* and fabric *b* confirms a firing temperature of 825°C. The presence of magnetite and the grey blue cores in the other sherds suggest heavy reduction firing conditions. The metallic ring of most of the sherds and the extent of the vitrification present in these sherds suggest a firing temperature in the 900°C range. The presence of a high concentration of lime compounds in these fabrics is attested to by the extensive lime re-growth observed on some of the sherds. This lime would have acted as a strong flux and encouraged vitrification at temperatures of about 900°C under reducing conditions. It is proposed that these sherds have come from pots which were fired in a set of conditions which could be described as a "proto-kiln" event, *i.e.*: the pots were placed on a smouldering bed of fuel, (*e.g.* dung) and then more fuel was heaped up over them, thus resulting in a heavy reduction firing atmosphere. A reasonable degree of heat conservation due to the fuel heaped up over the stack of pots would have occurred. As the fuel (dung) finally burnt away the oxygen from the surrounding air would give a pink to red colour to any exposed surfaces of the pots, as it changed the ferrous iron compounds (greyish-blue) to ferric iron compounds (pinkish-red).

2. These sherds have come from pots which have been well made by hand and well fired. All appear to have come from medium to small pottery vessels with the exception of the example of fabric *d* which appears to have come from a large storage jar or bowl.

3. The black rim treatment on the bowl-rim sherds in fabric *a* and the variant of fabric *c* appears to be the result of the pots being taken while still glowing red hot, from the "firing event" and being placed lip down on a shallow bed of husks or straw, thus causing heavy reduction and carbon impregnation at the rim zone.

Some general observations on the development of Neolithic pottery

The striking feature of the earliest pottery making in Egypt and the Levant in the Neolithic Period is its extremely rapid development. Based on investigations by Franken and Kalsbeek (Institute for Pottery Technology, University of Leiden 1972/3) and Edwards and Franken (I.P.T. Univ. Leiden 1984) it is now proposed that man's earliest pottery making in both Egypt and the Levant was not the hesitant work of primitive experiment, but rather the competent work of craftspersons who were heirs to extant bodies of common knowledge about:

1. Clay, clayey soils and clay soil temper mixtures which were commonly used in the making of mud bricks, clay slurries for roofs, floors and the lining of storage pits.

2. The form of domestic vessels made of stone, plaster, sun dried clay, skins, reed baskets and wooden containers.

3. The making and using of fires for heating and heat treating, *e.g.* for the fire hardening of the wooden points of weapons and implements, the heat treating of flint and chert to improve its flaking qualities, the hardening of the clay lining of storage pits dug into house floors by lighting fires in them and the heat treating of limestone and or shell to make lime

4. The use of ochres and coloured mineral earths for painting.

5. The use of smooth stones for burnishing the surfaces of floors and storage pits to improve their durability and general convenience.

6. The calcining of lime and gypsum to form plasters.

Franken (private communication, 1984) proposes that "pot making", in which shapes were readily formed from soft plastic clay and then turned into hard stone-like vessels by placing them in a fire would have readily appealed to people in the Neolithic period for whom ground stone vessels were very valuable and took so long to make.

The innovation of pottery making however can only be said to have been successful when the process could be repeated at will. When this stage was reached the production of pottery burgeoned because pot making processes tend to encourage not only mass production but mass production of a more-or-less standardized repertoire of forms.

Not only is pot making proposed as a natural extension and application of the knowledge and skills of the aceramic period, but also it is seen as a part of a broadening of the technology of fires and the creation of permanent and useful changes in substances by heating. One of the earliest of these heat induced changes used by man was probably that of heat treating chert to make it flake more readily. The use of fire to turn limestone and shell into lime and gypsum into plaster of paris apparently came much latter but preceded pot making in most areas. However the early smelting of copper which followed the innovation of pot making clearly owes much to the early pot firing technology.

Although the representative sherd collection commented on here is far too small to rely on for support of these general propositions, the wider ongoing studing of the Dakhleh pottery carried on by Hope does suggest support for these propositions.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

DIANE L. HOLMES

Inter-regional variability in Egyptian Predynastic lithic assemblages

Introduction

The last overview of lithic artifacts from Predynastic Egypt was written by Elise Baumgartel and published in 1960. Her work was based on material from excavations carried out in the period from the end of the 19th century until the outbreak of the Second World War. The excavators included scholars such as Petrie, Brunton, Quibell and Caton-Thompson. Little in the way of field research pertinent to Predynastic studies was undertaken again until the late 1960s, and since then there have been a number of teams excavating Predynastic sites.

The aim of my research has been to evaluate material from some of this more recent fieldwork and to weld it on to information I have obtained from some of the earlier excavations. In the process, I have been developing an appropriate classification scheme. My focus has been on the ordinary stone tools from settlement sites rather than the more elaborate forms found in cemeteries, although I have found I cannot ignore cemetery material entirely.

It has been clear for a long time that places in the north of Egypt, such as the Fayum and Merimde have produced collections of lithic artifacts which are quite different from those from Predynastic sites in Upper Egypt. The earlier scholars gave one the impression that the Predynastic of Upper Egypt was one homogeneous entity. My current research is showing that this is not strictly true, that there are certainly some differences between various lithic assemblages. I shall illustrate this inter-regional variability by describing and comparing three collections representing Badari, Nagada and Hierakonpolis (Fig. 1).

Three Predynastic sites in Upper Egypt

Badari: Area 3000/6

Brunton excavated a number of settlement sites in the Badari district in the 1920s (Brunton and Caton-Thompson 1928), and I have examined material from these sites in the Petrie Museum in London. In this paper, I shall refer to one settlement

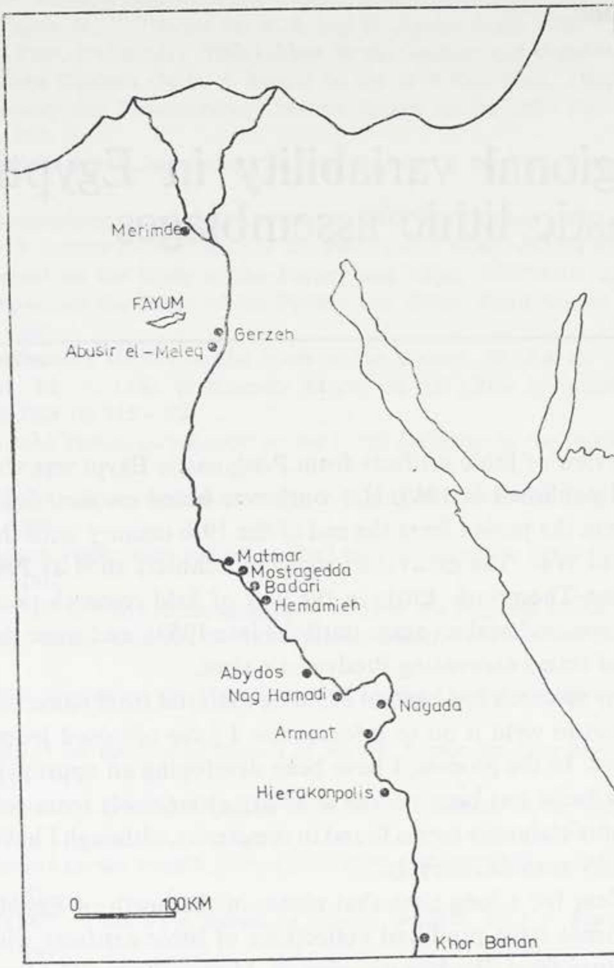

FIG. 1. Location of sites mentioned in the text

area, Spur 6 or Area 3000/6. My analysis of all the data I have collected for the Badari village areas is not yet complete, but Area 3000/6 seems representative of the collections.

Apart from obvious pieces such as bifacial knives, Brunton describes the stone tools as "flint flakes", but in fact the most striking aspect of his collections is that they consist mainly of tools made on good, regular blades; there are hardly any flake tools.

It may be thought that material from such old excavations is so biased as to be worthless. Bias certainly exists, but nevertheless, I have still found this material to be useful, and the presence of small, unretouched bladelets, and occasional refitting blades gives one some confidence in the material. The mere presence of certain categories of artifact is often significant, as will be seen later.

Nagada: Site KH3, Area X/XI

Several seasons of excavations in the Nagada area have been carried out under the direction of Fekri Hassan since 1978, with a preliminary survey season in 1975 - 6 by Hassan and T. R. Hays (Hays 1976). There are several settlement sites in the region, site KH3 being one of the most thoroughly investigated. For making comparisons, I shall consider the lithic data for site KH3 Area X/XI, which is fairly representative of the Nagada sites.

Hierakonpolis: Locality 29, Square -10L10 (Level 1)

The third assemblage I shall consider comes from level 1, square −10L10, Locality 29 at Hierakonpolis. Excavations were carried out at Locality 29 in 1978 and 1979 by Michael Hoffman (1982). McHugh (1982) studied the lithic artifacts from Structure II, Locality 29, which is in the 10×10 m square (−17L13) adjacent to square −10L10. I have examined the material from square −10L10, and found that there do not appear to be any significant differences between the lithic artifacst from this square and those from the square containing Structure II. In both, the predominant tool classes are scrapers, burins, and notches and denticulates.

Dating

Although the sites considered here are not strictly contemporary, I do not believe the variation in the lithic artifacts seen between the three sites to be chronologically significant. Site KH3 is dated to *ca* 3,750 B.C., and Locality 29 to *ca* 3,500±60 B.C. (Hassan 1984: 13). The assemblage from site KH3 at *ca* 3,750 B.C. is mostly similar to that from South Town (also in the Nagada area) dated to *ca* 3,450 B.C. What differences there are will be touched on later.

It is difficult to assign precise dates to the Badari village areas. A clue to their age is provided by the stratified site of Hemamieh in the same area (Brunton and Caton--Thompson 1928; and my own observations of the Hemamieh collection in the Petrie Museum). In the lower levels, flakes and flake tools are common. Blades soon appear, but it is in the upper (Gerzean) levels where they predominate suggesting that the material from the Badari settlement areas is relatively late. However, whatever their absolute age, the lithic collections form a consistent industry.

A comparative assessment

The major lithic categories

Since the collection from the Badari Area 3000/6 represents a somewhat biased sample only limited statements can be made concerning the major lithic categories (Table 1). The mere presence of good blades, crested blades, and blade and bladelet

Table 1

Frequencies and percentages of the main lithic categories at three Predynastic sites in Upper Egypt

Lithic categories \ Sites	Badari, Area 3000/6 n	Nagada, Site KH3 Area X/XI n	%	Hierakonpolis Loc. 29 (−10L10) n	%
Primary flakes	0	628	11.7	220	6.8
Primary blades	2	109	2.0	22	0.7
Secondary flakes	3	3078	57.1	1802	55.9
Secondary blades	132	826	15.3	459	14.2
Debris	0	(only weight recorded: 63494g)		332	–
Cores	6	176	3.3	38	1.2
Core rejuvenation pieces	2	42	0.8	11	0.3
Crested blades	1	0	0.0	0	0.0
Burin spalls	0	92	1.7	99	3.1
Axe preparation flakes	1	30	0.6	0	0.0
Quartz debitage	0	0	0.0	15	0.5
Other debitage	0	0	0.0	91	2.8
Tools	330	407	7.6	468	14.5
Total	477	5388	100.1	3557	100.0

Percentages calculated excluding debris.

cores indicates a developed blade technology. This contrasts with the Nagada site where none of the blades are very regular, although they account for 15.3 per cent of the assemblage. The blades (or a better term would be "flake-blades") are really long flakes produced in the same manner as the ordinary flakes, that is by direct percussion with a hard hammer. There was no separate, special technology involved in their production. The cores are flake cores and there are no crested blades.

The percentage of blades at the Hierakonpolis site, Locality 29, appears similar to that at KH3 Area X/XI (14.2% compared with 15.3%). Actually this is a relatively high percentage for the Nagada area. The blade percentage for KH3 Area B for example, is 5.2. However, the Hierakonpolis blades are true blades, although they are unlike those from Badari. The Hierakonpolis blades are generally smaller. They have a mean length of 35.3 mm compared with a mean of 71.5 mm for Badari. The same trend is seen in the mean widths and thicknesses. There also appear to be some differences in the platform characteristics of the blades. The Hierakonpolis blade platforms tend to be more irregular in shape than those of the Badari blades.

One interesting similarity is the presence of small blades or bladelets at both Hierakonpolis and Badari which have a very glossy appearance and are often of slightly unusual shades of colour. I suspect this represents heat treatment. No such glossy bladelets occur at Nagada.

Flakes form the predominant category at both Nagada and Hierakonpolis. Although I do not have any data on the flakes from Locality 29, they appear similar to those from Nagada. They are small (a sample from Nagada has given a mean length of 34.4 mm), broad, and appear to have been produced by a hard hammer percussion technique. As noted above, the cores from the Nagada are all flake cores, and most of the cores from Locality 29 are flake cores. Only three pieces from Badari, Area 3000/6 can be classified as flakes, but they are relatively elongate and are clearly by-products of the blade technology. Some tools are made on large flakes, but to what extent flakes and flake technology occurred in the Badari district I am unable to discern from the museum collections.

Of the three sites, only Locality 29 has produced any quartz debitage, where it accounts for 0.5 per cent of the assemblage. Apart from this exception, the raw material in all regions is flint.

The tool classes

The main tool classes (Table 2) in the Badari, Area 3000/6 collection are scrapers, truncations, backed pieces and sickle blades. The predominant classes at KH3 Area X/XI are scrapers, burins, notches and axes, and at Locality 29 the assemblage conains a relatively large number of burins, with scrapers and notches forming the next largest categories.

To what extent the tool frequencies for the Badari collection are representative of the original tool assemblage is conjectural. It seems likely that a number of tools such as notches, denticulates and some burins would have been made on small, unremarkable flakes which were not collected. Nevertheless, the importance of the collection, biased though it may be, is that it shows that tools on true blades formed a conspicuous part of the original assemblage, and the presence of certain classes and the absence of certain others are important in making comparisons with assemblages from other areas.

I am undertaking a detailed comparison of the tool asesmblages from several Predynastic settlement sites in Egypt. Unfortunately, space does not permit me to give many details for the three sites under consideration. I shall, however, discuss the scrapers and burins in a little depth to show that while various assemblages may all contain significant numbers of a certain tool class, there the similarity may end. The specimens of the class from one locality may have little in common with those from another site. The "scraper" class is a case in point for the current inter-site comparison.

Scrapers form an important group at all three sites, but they are not alike at all three locations. Essentially, all the KH3 scrapers are made on flakes, a few being made on flake-blades. At Locality 29 only slightly more scrapers are made on flakes than on blades. At Badari, however, although slightly more scrapers are made on blades than on flakes, there seems to be a clear separation of scraper forms. Those made on flakes and blades from Nagada and Hierakonpolis seem to represent a continuum of forms. At Badari there are endscrapers on blades and scrapers that are circular or oval in plan, and made on large, broad flakes or, in some cases, core tablets.

Numerically, burins form the most important tool class at both KH3 Area X/XI and Locality 29, while at Area 3000/6 they constitute only a few per cent, although this lower frequency may reflect a bias of the collection. Most of the KH3 burins are made on flakes (60.0%; 27.7% on flake-blades). At Locality 29, most burins are made on blades (56.3%), while 29.2% are on flakes. Single burins on breaks are important at both Locality 29 and KH3, although they are more abundant at Hierakonpolis (37.5% *vs.* 20.0%). The KH3 burins are notable for their frequency of dihedral forms (29.2% compared with 4.2% at Locality 29), and lack of multiple burins. At Locality 29, multiple burins account for 6.3 per cent of the burins.

Table 2

Frequencies and percentages of the main tool classes at three Predynastic sites in Upper Egypt

Sites / Tool classes	Badari, Area 3000/6 n	%	Nagada, Site KH3 Area X/XI n	%	Hierakonpolis Loc. 29 (−10L10) n	%
Scrapers	44	13.5	63	15.5	23	5.6
Burins	16	4.9	112	27.5	145	35.1
Notches & denticulates	6	1.8	58	14.3	33	8.0
Perforators	13	4.0	11	2.7	10	2.4
Grand percoirs	0	0.0	3	0.7	0	0.0
Microdrills	0	0.0	0	0.0	8	1.9
Truncations	55	16.9	16	3.9	19	4.6
Backed pieces	26	8.0	0	0.0	6	1.5
Sidescrapers	1	0.3	2	0.5	5	1.2
Sickle blades	44	13.5	0	0.0	0	0.0
Knives on blades	16	4.9	0	0.0	0	0.0
Glossy bladelet tools	19	5.8	0	0.0	0	0.0
Planes	1	0.3	6	1.5	0	0.0
Transverse arrowheads	0	0.0	0	0.0	4	1.0
Concave-based points	3	0.9	0	0.0	0	0.0
Winged drills (incl. fragments)	0	0.0	0	0.0	14	3.4
Axes	0	0.0	24	5.9	0	0.0
Other bifacial tools	17	5.2	2	0.5	21	5.1
Miscellaneous/other	7	2.2	26	6.4	7	1.7
Unidentifiable tool fragments	5	—	0	—	55	—
Retouched pieces	57	17.5	84	20.6	118	28.6
Total	330	99.7	407	100.0	468	100.1

Percentages are calculated excluding retouched pieces.

Notches and denticulates are fairly abundant at KH3 and Locality 29. Since many are made on unremarkable flakes in both assemblages, it seems likely that many occurred at Badari but were not collected and hence the low percentage for Area 3000/6.

At Area 3000/6, sickle blades, truncations and backed blades form important classes (13.5%, 16.9%, and 8.0% of the collection respectively), and are made on good blades, while they are minor or non-existent categories at Locality 29 and site KH3. Sickle blades, however, do seem to have some chronological significance. Although there are no sickle blades at KH3 or Locality 29, they form 3.4 per cent of the tool assemblage at South Town, and have been found in very late Predynastic (Nagada III) levels in the Hierakonpolis region (Hoffman, pers. comm.).

Also present at the Badari site are "knives on blades" and "glossy bladelet tools". Both these categories are absent from Locality 29 and site KH3, although knives on blades are known from graves and South Town in the Nagada area (Petrie and Quibell 1896: 57, Pl. LXXIII: 68, 71), and the prehistoric cemetery worked by Quibell and Green (1902: 48, Pl. LXI: 3 - 6) in the Hierakonpolis region.

"Glossy bladelet tools" is a provisional group consisting of small tools made on regular bladelets which have a glossy appearance. They are mostly truncated at one end and/or are neatly retouched along part of one edge. Unretouched glossy bladelets have already been considered, and although unretouched examples occur at Hierakonpolis, the tools seem limited to the Badari region.

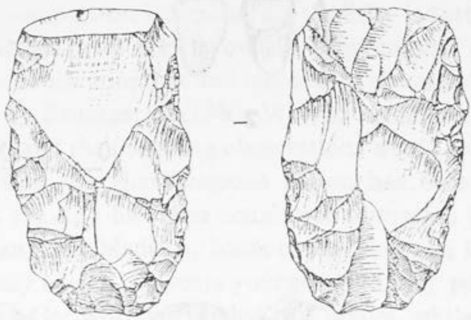

FIG. 2. Nagada. Axe with tranchet flake scar

Of the three localities considered here, only Area 3000/6 has produced any concave-based projectile points, but they are known in the Nagada (Petrie and Quibell, 1896: 56, Pl. LXXII: 58; and specimens recovered during the recent fieldwork in the Nagada area by Hassan) and Hierakonpolis regions (two are figured by Quibell 1900: 8, Pl. XXIV: 12, 12a, for the temple area at Hierakonpolis).

Equally, there are tools present at the Nagada site which are absent from Area 3000/6 and Locality 29. Grand percoirs occur at KH3 Area X/XI, and although several examples are known from the settlement site of Armant (Huzayyin 1937: 212 - 214, Pl. LVIII: 38 - 43, LXIV: 32 - 37) there are none recorded for the Badari or Hierakonpolis areas.

Axes form a distinctive class at site KH3, and in the Nagada region in general (Fig. 2). The typical Nagada axe is U-shaped with parallel or slightly divergent sides, and the axe bit is frequently prepared by the removal of a tranchet flake. No such axes were found at Locality 29 or in the Area 3000/6 collection. However, there is a photograph of a good tranchet axe from a jar burial in the Hierakonpolis report by Quibell and Green (1902: 48, Pl. LX: 13), and I have come across three axes in the

Henri de Morgan collection, catalogued as from the "Kom el-Ahmar middens", in the Brooklyn Museum. In the Area 3000/6 collection, there is one axe preparation flake, and there are further such flakes from other Badari settlement areas. Their presence suggests that the manufacture of axes with the bit prepared by the tranchet technique was known, but I have not encountered any axes in the Badari collections. However, there are two poor axe specimens from Hemamieh (Brunton and Caton-Thompson 1928: Pl. LXXXI: 96, LXXXIII: 162). There are also some axes from the Matmar and Mostagedda areas just to the north of the Badari district which Brunton also explored, and these are shown in the plates of his reports (Brunton 1937: Pl. XXVI - XXVIII; 1948: Pl. VII, XVII: 73). The main distribution of Nagada-type axes, as Huzayyin (1937: 210) pointed out in 1937, is between Nag Hamadi and Armant. Beyond these limits, the axe does not seem to have been a common implement.

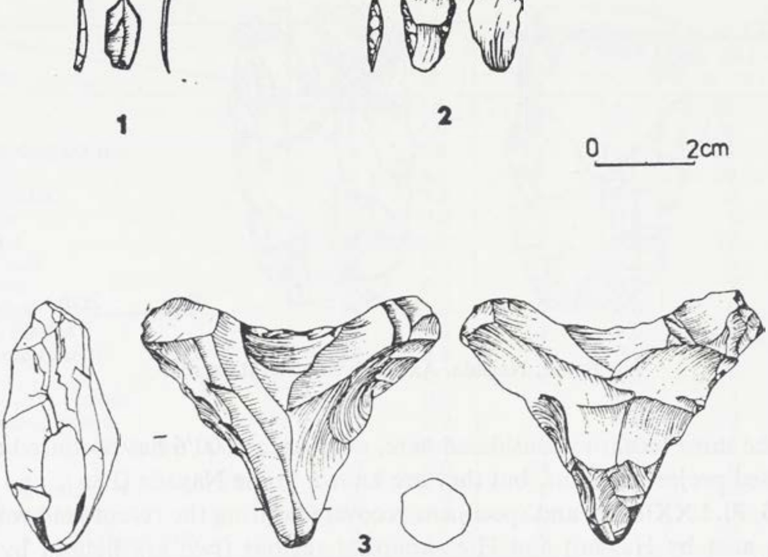

FIG. 3. Hierakonpolis, Locality 29, square −10L10

1: Microdrill; *2*: Transverse arrowhead; *3*: Winged drill

Microdrills and winged drills occur at Locality 29, but not in the Nagada or Badari areas. Microdrills (Fig. 3 : *1*) are small perforators on bladelets, and are also known from elsewhere in the Hierakonpolis region (Quibell and Green 1902: 11 - 12; Butzer, 1959) and at a Predynastic settlement site in the Abydos area (Peet 1914: 3, Pl. IIIa).

Winged drills (Fig. 3 : *3*) are bifacially worked, Y-shaped implements. Five complete specimens and several fragments came from sqaure −10L10 at Locality 29. Two are recorded for the adjacent square. They are described as "tribranch flints" by

Quibell and Green, who figure four from the temple site (Quibell and Green 1902: 39, Pl. XXIV: 24 - 27). Although there are no winged drills in the Badari collections, in both "Matmar" and "Mostagedda" there are plates which appear to show these implements (Brunton 1937: 81, Pl. XXVIII: 67, 70 - 71; 1948: 21, Pl. VII: 51 - 53).

Locality 29 has also produced four transverse arrowheads (Fig. 3 : *2*), and further examples are known from tombs in the Hierakonpolis area (Hoffman 1982: 51, 53). Only one specimen has been found in the Nagada area (from site KH3 Area B). The only other Predynastic examples I can find reference to are three specimens from grave 1066 at Abusir el-Meleq (Scharff 1926: 48, Pl. 30), and several from the cemetery at Khor Bahan, south of Aswan (Reisner 1910: Pl. 62).

Blade technology and elaborate tool forms

The above comparison indicates that the lithic industries from the Hierakonpolis, Nagada and Badari areas display quite a large number of differences. One common trend, however, is the adoption and increase in the use of blade technology. This was also observed by Baumgartel (1960: 34) who assigned the manufacturing of blades to the Gerzean, and the following observations would seem to support her view.

Locality 14 in the Hierakonpolis region has been dated to 3,625±150 B.C. (Hassan 1984: 15), and has been considered Amratian (Hoffman 1970: 214). It has not produced any true blades or blade cores (Hoffman 1970: 100, 122). Yet Locality 29, which is only about 100 years younger (and may perhaps be considered transitional Amratian-Gerzean) has yielded true blades, while in the Archaic levels at the Kom el-Ahmar are frequent high quality, true blades and blade tools. Indeed, Hoffman (1970: 100) has noted that "There is some indication ... that true blades became common only after the Amratian period in the Hierakonpolis area. In fact, the peak of both frequency and quality of manufacture of true blades appears to occur in the Archaic period".

While there are no true blades from site KH3 (which may be considered Amratian), true blades and blade tools do occur at South Town (Gerzean).

The settlement site of Hemamieh has already been mentioned. The Badari village areas are considered relatively late Predynastic based on the evidence from this site where blades do not occur at all in the lower levels but eventually appear and increase in abundance until most common in the Gerzean levels.

Again, despite differences between the ordinary stone tool assemblages from these three areas, there are certain tools which not only occur in all three regions, but also appear identical and absolutely standardized. The Predynastic cemeteries in the Badari and Nagada areas have produced ripple-flaked knives and fishtails (Brunton and Caton-Thompson 1928: 50, 51, 61, Pl. XXIX : 3, XXXIV : 1, XLVIII : 6, LVII : 1; Petrie and Quibell 1896: 58, Pl. LXXIII : 61 - 63, 65 - 66, LXXIV : 86), and fishtails are known from mortuary contexts in the Hierakonpolis region (Quibell and Green 1902: 50, Pl. LXIV : 9; Hoffman 1982: 42). These elaborate tools are also known from other cemeteries along the Nile Valley from areas in the north, such as Harageh (Engelbach 1923: Pl. VII : 2 - 4), Abusir el-Meleq (Scharff 1926: Pl. 29), and Gerzeh (Petrie *et al.* 1912: Pl. VII : 12), to Khor Bahan in Nubia (Reisner 1910a: 122 - 123; Reisner 1910b: Pl. 62b: 11, 14).

Summary

In this paper, I have indicated that assemblages of Predynastic settlement stone tools from three areas in Upper Egypt are in many respects quite different from each other. The Badari area, as represented by the collection from Area 3000/6, is characterized by an abundance of true blades and blade tools, notably scrapers, truncations, backed pieces and sickle blades. The Nagada region, here represented by the assemblage from site KH3 Area X/XI, has a flake industry with an abundance of scrapers, burins, notches and denticulates, and axes, and the Locality 29 asesmblage from Hierakonpolis shares with Nagada an abundance of scrapers, burins, and notches and denticulates, but it lacks axes, and instead has implements like microdrills and winged drills. It is also characterized by having both flake and blade technologies. Yet the cemeteries in all these areas, and indeed along the Nile Valley from Gerzeh to Khor Bahan, have produced elaborate tools such as fishtails and ripple-flaked knives. The inter-regional variability observed in the settlement lithic assemblages may be viewed as local idiosyncratic variation. The ordinary stone tools for everyday use were probably manufactured locally, while elaborate stone tools, such as the ripple-flaked knives, may have been made by craft specialists (Holmes 1984) in workshops at one or a few locations in Egypt, and distributed through trade, or some other mechanism of exchange, along the Nile Valley.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

SAVA P. TUTUNDŽIĆ

The problem of foreign north-eastern relations of Upper Egypt, particularly in Badarian period: an aspect

The importance of the west-east axis is considerable for the consideration of the development and character of prehistoric Egypt. It has been until recently relatively ignored due to the dominating and thus partially seductive interest for relations along the Nile axis. In addition to this, western Egyptian relations cannot be fully understood without the awareness of the eastern relations and vice versa.

The understanding of the development of Chalcolithic Upper Egypt depends to a considerable degree on the knowledge of the origins and the nature of the Asian influence, since these eastern relations were of specific importance for the development in question. These connections, and the role played by the populations living on the Red Sea coast, contain latent explanations of some aspects of the development of Chalcolithic Upper Egypt and, in an indirect sense, not only of it but also of the pre- and proto-historic Egypt as a whole.

There are now more indications of the existence of a direct, most probably *via* Red Sea, connections between Upper Egypt and the Sinai Peninsula not only during the Gerzean but also during earlier periods, in particular the Badarian. These are the import of native copper or copper objects in addition to turquiose from the Sinai into Badarian Egypt, something the latest research on the Sinai confirms to a considerable degree; the possibility of an early appearance of sea navigation speaking in general as early as the Mesolithic, a case that has been demonstrated by analysis of obsidian; considerable closeness of the Sinai and Upper Egyptian Red Sea coasts; a certain existence of traces similar to the Badarian culture on the Eastern Desert sea coast, *etc.* However, a definite proof is still lacking, a fact which should be attributed to the very nature of the phenomenon of sea communication which is hard to grasp, particularly when it is not a question of an island, as is this particular instance; to highly inadequate archaeological field investigations outside the valley and to an incomplete application of strictly scientific methods to the relevant material. Underwater research in the Upper Egyptian coastal region, in the so-called Red Sea channels and their lateral "openings" and directions towards the Sinai coasts and its narrow gulfs, have not as yet been planned, as far as we know, while an adequate survey which would cover the Eastern Desert with its coastal belt again has not been carried out, in spite of the fact that results obtained hitherto such as, for instance, those given by G. W. Murray and F. Debono, offered more than encouraging data in this direction.

The elements for and against the existence of Upper Egyptian direct, most probably maritime connections with the Sinai and in the final consequence with its Asian hinterland during the Badarian and Amratian periods have been presented in a longer article (Tutundžić, forthcoming) the scope of which would not fit into the framework of a symposium. However, we present one of its aspects here, *i.e.* a complex phenomenon which in this case plays at least a twofold role. This is the appearance of a far earlier use of copper in Upper Egypt than was the case in the north, *i.e.* the long duration of Neolithic cultures in the Egyptian North parallel with the existence of the Chalcolithic in the South.

There are not many authors, however, who have even raised the question of the reason for a considerable delay in the use of copper in North Egypt in spite of excellent communications between the two parts of the same country. The actual existence of this problem was seen, after W. C. Hayes (1965) also by B. G. Trigger, who touched up on it some sixteen years ago in a similar way to that of the preceding author (Trigger 1968: 68). However, it does not appear to us today – after the discovery by B. Rothenberg's expedition, of the exploration of native copper in the south-western Sinai in Wadi Ba'ba, made by Elatians (Rothenberg 1979: 138) – that this phenomenon of delay unavoidably indicates that the use of copper in the Upper Egyptian Valley came about independently of south-western Asia. In addition, it appears that the ways of exchange between Egypt and the Sinai lead roundabout the potential intermediatory of the so-called Lower Egyptian Neolithic.[1] It could hardly be the case that the inhabitants of Upper Egypt in the Badarian period from its beginning, and maybe even before (Tutundžić, forthcoming), obtained turquiose from southwestern Sinai, *i.e.* the vicinity where traces of exploitation remained without repercussions on the advance of their own use of copper at the onset of the same period. It seems that an early use of turquoise occuring in the area of native copper was a decisive moment for the early start of using this metal by the Badarians by whom it was, characteristically, appreciated as jewelry. As Baumgartel (1960 : 1) cautiously noticed, even if native copper had been located in the Eastern Desert "it would not prove that it was in Egypt that the use of copper was first discovered" or, we would add, that its use in Upper Egypt began independently of the Sinai. A conclusion recently presented and well argumented by Beit Arieh (1980: 61), that the Ghassulian exploitation of turquoise in the south-western Sinai, northeast of Serabit El-Kadim, was

[1] The possibility of importing copper and the knowledge of its use from Asia – explicitly from the Arabian Peninsula – *via* the Red Sea into the early Badarian Egypt has been briefly mentioned, as far as we know, only by Arkell and Ucko (Arkel and Ucko 1965: 150; Arkell 1975: 12, 30).

"destined mainly for Egypt" and not for the northern hinterland of the Peninsula which was at the time chalcolithised, and in spite of smaller quantities of this semi--precious stone in the Eastern Desert, should be applicable to a considerable degree to the earlier exploitation of copper in the Sinai as well. It seems that the phenomenon supposed by Beit Arieh was more or less a repetition of the practice valid in the same area in respect to copper. Of course, comparative chronology plays an important role in the problem of relations between the Badarian Egypt and the Elatian Sinai. Their contemporaneity has been still argued (Rothenberg *et al.* 1979: 238; Rothenberg and Ordentlich 1979: 233f).

Previously, particularly before Rothenberg's discovery in Wadi Ba'ba mentioned above, one could logically suppose that the earlier use of copper in Upper Egypt as compared to Lower Egypt was because copper ore existed in the Eastern Desert (Trigger 1968: *loc. cit.*; Baumgartel 1960: *loc. cit.*). However, it is not certain that copper ore does not occur in the Lower Egypt. As it will be noted, there existed links of the North Egyptian Neolithic settlements not only with the Mediterranean but also with the Red Sea coast and on the direction of the latter is Gebel Ataqa whose supposed copper ore (*cf.* Nibbi 1979: 42) was used within the Maadi culture (Hayes 1965: 122). Yet, generally, alongside the exchange of small quantities of copper it was the spread of the idea of the use of copper, first of all of native (Wertime 1973: 876, 880, 885), and then perhaps the idea of obtaining it from ores, that was the crux of the matter. The latter idea originated in Egypt from the use of native copper nodules, in connection with other needed experiences, or was transmitted from south-western Asia where the use of copper ores had appeared earlier. It is characteristic here that the idea of the use of copper, as it appears, was not introduced into North Egyptian cultures by the Badarians and probably also not by the Amratians and not by land *via* the Sinai – at least during the Badarian period. The reasons are to an extent clear and complementary. This phenomenon, lasting at least till the time of El-Omari settlement, was a consequence of poor relations which existed between the Egyptian southern and northern cultures, poor development of the use of copper in the South and its direct relations with Asia.

There is a noticeable lack of traces of copper objects in the North Egyptian cultural assemblages till the time of El-Omari, or till the beginning of Naqada II in Upper Egypt. Even the pottery find of the "cashe fields" at Sedment, now re-studied and shown to have belonged to a period between El-Omari and Maadi, is not, it appears, accompanied by even a single trace of copper (Williams 1982: 213f), although on the ground of that find one cannot draw far-reaching conclusions regarding copper use. It is hard to accept that transport of native copper by the Lower Egyptians, or *via* their territory, was not accompanied by their own use of copper, in particular if such a transit was practised over a longer period of time. Even if one could suppose that the copper objects have been overlooked in the North Egyptian Neolithic sites, such objects would most probably occur very rarely. Such a restricted ownership of copper, obtained through direct exchange, would hardly be sufficient to make a local redistribution possible. Exchange over long distances does not necessarily leave traces in the region of transit. But in this case there is no question of such an exchange. The Lower Egyptians would have found themselves in the position of proportionally close receivers and givers, *i.e.* carriers, or, in the final consequence, their territory would have been the stage of direct transport of copper to the Badarians. Red Sea shells at Fayum A and Merimde Beni Salame settlements (Hayes 1965: 95, 116), originating probably from the Gulf of Suez if not obtained in the exchange from the South (which is far less probable) demonstrate that their inhabitants too, directly or indirectly, had connections with the north-eastern Egypt; a trade route for copper along the Suez Isthmus and the northernmost part of the Eastern Desert would not have remained unknown. The tradition of the imports of Red Sea shells into North Egyptian cultures was continued at El-Omari (Debono 1948: 567, 568; 1956: 338).

It could be expected that the amount of imported goods or raw materials decreased with the distance from place of their origin (Renfrew 1975: 46 - 51). On the assumption of overland transport from the Sinai Peninsula, the Neolithic sites of North Egypt are closer to the copper and turquoise deposits in the Sinai than the region of Asyut; they would be in the so-called contact zone. In addition to this, it is logical to suppose that the intensity of exchange decreases with the pasisng into foreign cultural zones. This phenomenon, for instance, was noted in the case of the exchange of obsidian (Renfrew *et al.* 1968: 329), although it should be borne in mind that the easternmost Lower Egypt may not have been under the control of native Neolithic inhabitants.

Regardless of the real causes and the reasons for the lack of traces of copper objects in the North Egyptian cultural assemblages during and after the El-Omari episode, which we can now but surmise, it seems rather certain that the beginning of the Chalcolithic period (not in the sense of the cultural stage but in the sense of the presence of copper tools) in Upper Egypt appeared considerably earlier than in Lower Egypt. It is true that especially in the Badarian times, the eastern Lower Egypt (the Delta), had not been yet well known and it is not clear yet whether it was at all inhabited to any greater extent during this period (Trigger 1968: 71 - 72)[2]; still, the excavated part of the El-Omari site may present a general characteristics of the North Egyptian cultural groups, the preceeding as well as the one of its own time, in respect of the use of metal. Thus, the factor of the so-called negative evidence is somewhat lessened. Until we have not a single site contemporary to the Badarian in the Eastern Delta, *i.e.* until this area is not archaeologically clear, the lack of copper objects in Lower Egypt contemporary to the Badarian culture before the appearance of the Amratian cannot serve as a proof of direct relations with the Sinai. However, it would appear that this phenomenon may be taken as one of the indications of the existence of

[2] Butzer himself, who in the first place on the ground of geological investigation supports the opinion that the Delta could be inhabited in prehistory, adds that because of several reasons it could be „underdeveloped" and that it is possible that it was the region of endemic malaria (Butzer 1976: 94, 96).

direct, most probably Red Sea contacts of the Badarians and perhaps even the Amratians with the Sinai, and in the final consequence its hinterland.

Two phenomena: a lack of knowledge of copper in the Neolithic of the Lower Egypt and its simultaneous use in Upper Egypt, and loose contacts between the two parts of Egypt at this time, appeared in the situation of a lack of crucial differences in the ecological conditions, and the geographical barriers between these two parts of Egypt. To the contrary, they are linked by the Nile Valley and by a perfect waterway which, in addition, runs against the wind. But the inhabitants of the Middle Egyptian Valley in the Badarian period had no definite motivation to develop their contacts with Lower Egypt. They had enough arable land and even pastures, and the North had no special trade attractions since it was not in a position to supply raw materials which were available for the Badarians from the east.

The Upper Egyptian by-passing the sphere of the Lower Egyptian Neolithic complex, and developing a direct connection with the Sinai – overland *via* the north-eastern part of Egypt or more probably *via* the Red Sea route, or both ways – caused, in consequence, the deepening of the differences in the development between the Neoli thic of Lower Egypt and of the contemporary Badarian culture in Upper and MiddleEgypt.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

KRZYSZTOF M. CIAŁOWICZ

Predynastic mace-heads in the Nile Valley

The present study is mainly concerned with the Predynastic mace-heads found in the cemeteries and the settlements dug up in the Nile Valley, and published in the reports of excavations and general studies on the period in question (*cf.* also Ciałowicz 1987). The other group of items, comprising the objects which were bought, found during some hotch-potch excavations or were some chance finds, is preserved in various collections scattered throughout the world. As regards the chronology, their value is of minor importance; however, from the typological point of view they are a valuable supplement of the materials yielded by excavations proper. During the research made on a large scale by contacting many world museums and by direct collecting of the published material we managed to gather more than 400 items coming from the Nile Valley. Most of the Predynastic mace-heads known now constitute the basis of the present study.

The Predynastic mace-heads have been divided into four principal types, but in particularly well-founded cases smaller groups or variants have been distinguished. As concerns the relative chronology, the generally accepted division into the cultures of the Predynastic period is followed here. In relation to the Nagada culture, Kaiser's system of relative chronology (1956; 1957) has been adopted.

As has been already mentioned above, the mace-heads were divided into four types:

1. Conical mace-heads. The items included in this group were till now most frequently named as disc-shaped mace-heads. The proposal of changing their name results from the fact that the majority of them resemble an upturned cone rather than a disc, whereas the items coming from the Sudan have more disc-like shapes.

2. Conical pear-shaped mace-heads. The shape of this sparsely represented type is intermediate between conical and pear-shaped mace-heads, till now specified by some research workers as flat-topped.

3. Pear-shaped mace-heads. The traditional terminology has been kept here. The objects included in this group are more or less spherical, oblong, round or oval in their longitudinal and cross-section.

4. Double-pointed mace-heads. This group comprises oblong mace-heads, most of them pointed on both ends, infrequently with rounded ends.

As has already been said, over 400 items were gathered; among them 130 come from 100 more or less precisely dated graves. The mace-heads found in the settlement are dated less precisely. Both groups constitute the basis of further considerations and yielded characteristic specimens which could help to specify the chronological problems in particular.

Conical mace-heads

This is the most numerous type of mace-heads in the Predynastic period. The analysis of the material has allowed me to distinguish among them three principal groups:

a) Convex-topped mace-heads (Fig. 1 : *1*). The items belonging to this group are characterized by a shape similar to a disc. In most cases the upper and lower surfaces

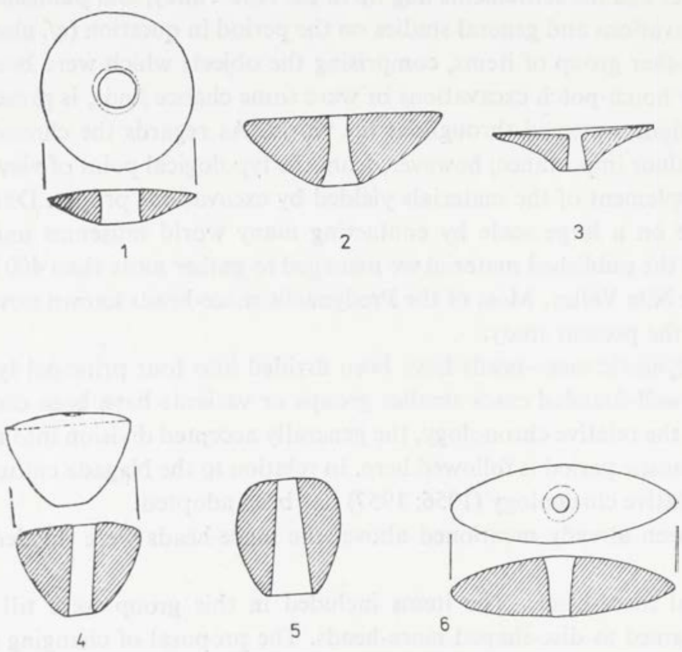

FIG. 1. Mace-head types

1: Convex-topped; *2*: Flat-topped; *3*: Concave-topped; *4*: Conical pear-shaped; *5*: Pear-shaped; *6*: Double-pointed

are convex, and the sharp edge is formed in the middle or three-fourth up their height and not on the top like in many conical mace-heads. Until now 14 items or their fragments have been recognized. All of them are made of hard stone. 13 items were excavated in the Sudan, at the sites at Shaheinab, Kadero and Kadada (Arkell 1953, Figs. 15 - 17; Krzyżaniak 1978: 159 - 172, Fig. 4; Geus 1981, Fig. 12a). The remaining object was found on the surface in the Fayum Oasis (Caton-Thompson and Gardner 1934: 33, Pl. XXX: 3). The group seems to be the oldest variety of conical mace-heads in chronological and typological terms. It was probably from these that the varieties of conical mace-heads, characteristic of Naqada I - IIa periods, evolved.

b) Flat-topped mace-heads (Fig. 1 : *2*). The earliest precisely dated items belonging to this group come from a man's grave at el-Amrah dated to Naqada Ib (Randall-MacIver and Mace 1902 : 16, Pl. X, 6). The overwhelming majority of examples come from the graves dated to Naqada Ia-Ic, so it seems that the flat-topped mace-heads are very characteristic of this period. They also appear in the Naqada IIa period, but their popularity definitely decreases. They were found first of all in mens' graves, and only exceptionally in women's graves. They were frequently broken before being put into graves and some of them are certainly models.

c) Concave-topped mace-heads (Fig. 1 : *3*). This group of conical mace-heads is the most numerous in the archaeological material. The earliest dated items derive from the Naqada Ia (Peet 1914 : 15, Pl. XXVII) but most of them can be dated to the Naqada Ic-IIa periods of which they seem to be the most characteristic. Sometimes they, too, were broken before being put into graves. However, this occurred in a relatively smaller number of cases than in the group described above.

Recapitulating the information concerning the conical mace-heads it can be stated that they were invented on the territories of the present Sudan where they were employed as a weapon. From there the tradition of using them was transferred to Upper Egypt. Here, in the first stage of Naqada culture, they still functioned as a weapon proper after having been fitted with a handle of bone or wood (group b); later they became almost exclusively an element of grave equipment (a considerable amount of items included in the group c), as models only, not as weapons.

Conical pear-shaped mace-heads

This type of mace-heads (Fig. 1 : 4) is rather rare in the archaeological material. They are found first of all in the Neolithic cultures of the Sudan, in small number at Fayum A and at the beginning of stage I of the Naqada culture. The items derived from the sites at Shaheinab and Kadero seem to be the oldest examples (Arkell 1953 : 49, Fig. 14; Krzyżaniak 1978 : 167, Fig. 3 - 6). Made of hard stones, they are squat with a flattened, slightly convex top. Similar items are known from Kom W at Fayum (Caton-Thompson and Gardner 1934 : 33, Pl. XXX: 2) and from the grave 130 at Qau dated to Naqada Ia-b (Brunton and Caton-Thompson 1928, Pl. XXX). Arkell repeatedly suggested that this type of mace-heads had evolved from the ochre grinders and that from those in turn conical mace-heads had been formed (Arkell 1955 : 32, 35, 1975 : 34, 38; Arkell and Ucko 1965 : 149). He also found that one of the fragments included in this group and excavated at Mostagedda could be linked with the Badari culture (Arkell 1975 : 34, 38). However (and this is also acknowledged by Arkell), the mace-heads of type 1a are undoubtedly contemporary with those of type 2, a statement confirmed by the identical ceramic vessels found together with them. The possibility of the use of these maces by the Badari people ought to be decidedly declined. No example of mace-head is known from the graves dated reliably as coming from this period, and the fragment from Mostagedda is a loose find and cannot be precisely dated. But the existence of the type in question both in the Sudan and the Fayum Oasis is of interest. It can be one more proof of a connection between so distant territories. On the contrary, in the Naqada culture the discussed type of mace-heads seems to appear sporadically and only in its earlier stage, at the latest until the beginning of Ib.

Pear-shaped mace-heads

This is the second type of Predynastic mace-heads (Fig. 1 : *5*) as far as popularity is concerned. In the Nile Valley they occur in the Merimde culture and in the second stage of the Naqada culture. Lack of variety of forms and dominant characteristics have made it possible to distinguish their variants. A small group of knobbed mace-heads is the only exception. It is important to stress the existence of pear-shaped mace-heads in the Merimde culture, the oldest in the Lower Egypt; this is considered by many research workers as the proof of the Merimde culture connections with the South-Western Asia. Later they appear in the stage IIa of the Naqada culture, and till the period Naqada IId2 they occur almost exclusively as grave equipment. The only exceptions are some mace-heads found in Nubia in the rich graves dated to the Naqada III (Firth 1912 : 193; 1927 : 206), and the mace-heads from the same period excavated at the Abusir el-Meleq cemetery (Scharff 1926 : 48). It seems, however, that most of them are models made solely to be put into graves. One mace-head found at the Gerzeh cemetery is also very characteristic (Petrie *et al.* 1912 : 21, Pl. IV : 2). It is evident that the pear-shaped mace-heads were used by the Upper Egyptians to the south of Assiut. The knobbed mace-heads seem to be peculiar to the Naqada III. They are decorated with stylized or more naturalistically treated heads of animals and humans, and they are certainly models or symbols of power. It should be emphasized that in the Naqada IId the function of maces was distinctly changed. They ceased to be weapons and became symbols of power. At that time they must have been put into the graves of tribal chiefs, rare and the most exposed to plunder; for this reason there are practically no graves with mace-heads known from that period. The graves from the Early-Dynastic period show the existence of a similar custom: the maces are found only in the graves of royal necropolis at Abydos.

Double-pointed mace-heads

The items found in the precisely dated graves indicate that this type (Fig. 1 : *6*) of mace-heads appears exclusively in the Naqada IIa stage. It seems that the occurrence of double-pointed mace-heads can be linked with a final stage of the Naqada I (Amratian) culture. An additional element supporting this statement is the decoration of some items in the form of engraved representation of animals (scorpion, crocodile) made in the manner typical of this period (hatched silhouettes).

Finally, it seems worth pointing out that the graves with different types of mace--heads in their equipment are almost totally absent. Out of 100 published graves with mace-heads only one contained types 1, 3 and 4 occuring together (grave H 23 at Mahasna; Ayrton and Loat 1911: 21, 32). In two graves types 1 and 4 were found (grave 88/17 at Bahan: Reisner 1910: 126; Grave B 102 at Abadiyeh: Petrie 1901: 33); in another two, types 1 and 3 (graves 1401 and 1488 at Naqada: Petrie and Quibell 1896: 23 - 29) were encountered.

The following conclusions can be drawn from our studies of the mace-heads:

1. The occurrence of type 1a (conical, convex-topped) and 2 (conical, pear--shaped) is almost exclusively known on the territory of the Sudan and in the Fayum Oasis; this may testify to some connections between the Sudanese Neolithic and the Fayum A, referred to earlier by Arkell on the basis of different data (Arkell and Ucko 1965 : 147).

2. The origin of the conical type took place on the Upper (main) Nile.

3. Most of the flat-topped mace-heads (group 1b) occur in the Naqada Ia-Ic and concave-topped (group 1c) ones occur mainly in the Naqada Ic-IIa.

4. The pear-shaped mace-heads ceased to serve as weapons at the end of the Naqada IId period.

5. The knobbed mace-heads appeared in the third stage of the Naqada development.

6. The double-pointed mace-heads occurred only in the Naqada II period.

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LECH KRZYŻANIAK

Recent archaeological evidence on the earliest settlement in the eastern Nile Delta

Until recently, the prehistory and earliest history of the eastern Nile Delta was as little known as that of the rest of the Delta. A change for better occured with the mounting of the Munich East-Delta Expedition (MOE), organized by Dietrich Wildung in 1978, and the subsequent execution of its programme. It should be emphasized that the programme aims at investigating the archaeological information dated to the Predynastic and Early Dynastic periods originating from the whole of the Eastern Delta; it comprises excavations, surveys and work on the archaeological material that has been excavated but so far never published. Large-scale excavations by MOE are being conducted since 1978 at a Late Predynastic-Early Dynastic cemetery at Minshat Abu Omar where some 342 graves have been excavated in the course of the first six seasons, 1978 - 1984 (Wildung 1981; 1984; *cf.* also Leclant 1978 : 350 - 351; 1980 : 356 - 357; 1982 : 59 - 60; 1983 : 472).

The survey that has been so far carried out by MOE, took place in 1982 in the vicinity of the site at Minshat Abu Omar and in 1982 on selected sites in the eastern Delta (*cf.* Leclant 1983 : 472). Parallel to this field-work was the continuing recording of Predynastic and Early Dynastic finds which had been excavated by Egyptian archaeologists in the past but which have never been published, and which now are kept in the local museums and reserves; the recording work took place in 1981. It is hoped that MOE will be able to continue the study of field-notes and finds registers of these excavations and that subsequent publication of these sites will follow.

It is believed by the present writer that, despite the early stages of this research, a presentation of the results obtained so far by MOE in the course of the survey and documentation work may be beneficial for other researchers working on the prehistory and early dynastic archaeology of the Delta [1].

[1] I would like to express my most sincere thanks and gratitude to Professor Dr. Dietrich Wildung, director of MOE, for inviting me to participate in the research of MOE and for his permission to publish the results of the survey and documentation work so far carried out by MOE. I would also like to express my deep gratitude to Karla Kroeper for her help during the preparation of this paper.

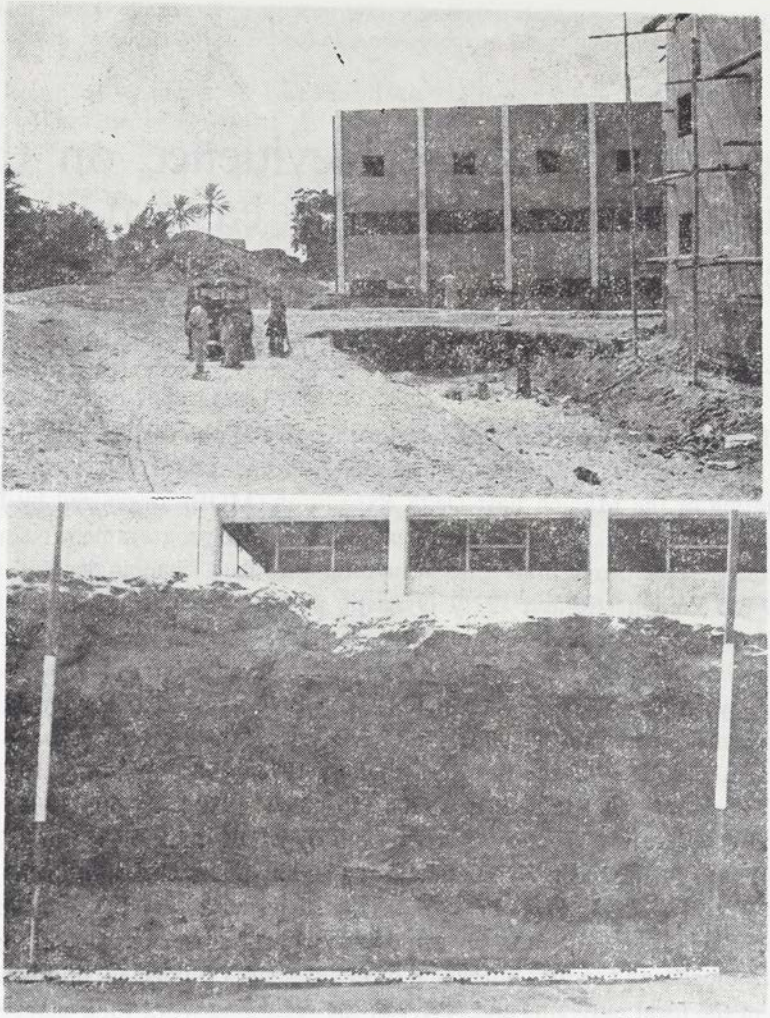

FIG. 1. Survey in the eastern Nile Delta (September 1981)

Top: Localizing the man-made section through the settlement deposit of the Dynastic age at El-Huseiniya (construction site at the Predynastic cemetery); *Bottom*: Recording the section

In the course of a survey carried out in 1981 in the vicinity of the site at Minshat Abu Omar (*markaz* El-Huseiniya), an area of some 25 square kilometres was investigated. In total, eleven localities, mostly situated on rises and hills, including sand hills (turtlebacks) called *geziras* by the local inhabitants, were visited, and their local surfaces, natural and man-made sections through the soil, and pits, investigated (Fig. 1). No archaeological material was found at the following seven localities[2]:

[2] The names of localities (villages, towns, *etc.* and topographical features are given in this paper according to their graphic form given in the sheets of the 1 : 25,000 Map of Egypt, 1951 (2nd edition).

1. Tell Umm Efein (Omm Maafin, Umm' Afen)
2. Geziret (Gezira) Su'ud
3. Kafra el-Medina (Tell el-Medina, Ezbet Ibrahim Husein Omar)
4. Geziret (Gezira) Ileiwa
5. Ezbet (Gezira) Amid
6. Ezbet Tell el-Daqiq
7. Geziret (Gezira) Barad (Barada)

At four localities in this area archaeological features and other surface material were found and recorded:

1. Tell el-Ginn
2. Tell Zinein (T. el-Zinein)
3. Tell Tamlikh (T. el-Tamlikh)
4. Tell el-Biheim

The archaeological remains at these sites consisted of dwelling walls built of mud bricks, red burned bricks, granite column bases and rose granite columns (Tell el-Ginn), sherds of glass, copper coins, potsherds (including those of Terra sigillata ware), lumps of limestone slag and remains of glass manufacturing; all these sites date to the Roman period and are not the subject of this paper [3]. No archaeological material of pre-Roman date has been found so far in the course of the survey made by MOE in the vicinity of Minshat Abu Omar.

The survey and recording programme carried out by MOE in the eastern Delta beyond the vicinity of Minshat Abu Omar concerned only the Late Predynastic and Early Dynastic sites. Due to the state of preservation and accessibility, however, a full survey could be effected only at Ezbet el-Tell. The recording of unpublished finds from earlier excavations took place in the Huriya (Ahmed Orabi) Museum in Zagazig and in the Ismailia Museum. All finds of the Predynastic and Early Dynastic periods exhibited in these museums (they possessed no reserves in 1981) were recorded: all were photographed and described on individual MOE cards and most of them were drawn. The following seven sites from the eastern Delta were the subject of the survey and/or recording:

1. Tell el-Ginn
2. El-Huseiniya
3. Gezira Sangaha
4. Tell Samara
5. Beni Amir
6. Ezbet el-Tell
7. El-Beidha

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[3] Tell es-Saaba Banat, which consists of an extensive Ptolemaic and Roman settlement and a cemetery located on the gezira mound of Minshat Abu Omar, should also be taken into account when describing the late historic settlement in this area.

FIG. 2. Tell el-Ginn (?)

1: Slate; *2*: Pottery; *3 - 5, 9 - 14*: Calcite; *6*: "Grauwacke"; *7*: Basalt; *8*: Diorite. Different scales

Tell el-Ginn. *Markaz* El-Huseiniya

Geographical coordinates: 32°02′30″E and 30°55′18″ N

This is a sandy hill (*gezira*) of *ca* 9.6 hectares (*ca* 40 feddans) in surface area, elevated *ca* 9.5 m a.s.l. and 5.15 m above the surrounding cultivated alluvium [4]. Two large pits excavated in the hill seem to be the remains of an earlier digging for sand, apparently for construction purposes (personal communication by the local inhabitants). Although only the Roman age remains were seen on the surface of the hill during the survey (granite columns and bases, potsherds, glass *etc.*) it is reported that this site yielded Early Dynastic finds (Bietak 1975 : 99, footnote 364a) and that some of the "archaic" finds (stone- and pottery vessels and palettes) now exhibited in the Ismailia Museum originate from a cemetery at this site (personal communication by the late Labib Habachi in 1978). Local inhabitants interviewed by MOE recalled seeing "groups of stone- and pottery vessels" which had once been found deep in the *gezira* sand of the hill. Altogether, 19 stone vessels, 1 pottery vessel and 1 palette presumably originating from Tell el-Ginn were recorded by MOE in the Ismailia Museum (Fig. 2). Almost all are marked in the register book of this museum as "Hehya, June 1952", *i.e.*, after locality of a local antiquities dealer well known in the eastern Delta in the 50s and 60s Abd er-Rahman Sadiq. The authenticity of this site as regards these Early Dynastic finds should be the subject of future studies.

Bibliography: Bietak 1975 : 99 - 100, footnote 364a, fig. 12.

El-Huseiniya. *Markaz* loco

Geographical coordinates: 31°54′22″ E and 30°51′43″ N

The site is situated on a sand hill (*gezira*) of *ca* 1.26 hectares (*ca* 3 feddans). The foot of the hill is 5 m a.s.l. and rises to 2.5 - 3.0 m above the surrounding cultivated alluvium. The site is situated near the place investigated by Petrie (1888 : 4 - 37) and is now built over by the Secondary School for Boys. Numerous finds excavated at a Late Predynastic-Early Dynastic cemetery are now exhibited in the Huriya Museum in Zagazig and further finds from this site are stored in the reserve of the Egyptian Antiquities Organization (EAO) in Tell el-Basta, Zagazig (previously in San el-Hagar). According to the personal communication of Mohamed Abd el-Hag from the Inspectorate of EOA in Zagazig in 1981, two seasons of excavations directed by Ibrahim Kamil took place at this site in 1965 - 1967 and as a result an "archaic" cemetery containing some 60 graves was found. The finds from these excavations exhibited in the Huriya Museum in Zagazig – some 30 objects in all – were recorded by MOE; they consisted of 17 stone veseels, 4 pottery vessels, 1 palette, 56 flint knives and small implements of bone and stone (Fig. 3 - 4). In the autumn of 1983, the present writer was shown several more finds from this site which had just been excavated by Magdy Saad Salib, then the Inspector of EAO in Faqus.

Gezira Sangaha (Sanaga)

A sand hill (*gezira*) of huge dimensions situated *ca* 14 km to the north of Abu Kebir. It rises up to 12 m a.s.l. A Late Predynastic cemetery is reported (see bibliography) in this locality. However, the members of MOE were not able to localize the position of such a cemetery during their brief visit in 1982. The huge dimensions of this hill – *ca* 3.5×1.0 km – clearly requires extensive fieldwork.

Bibliography: Bietak 1975: 106, footnote 401, 100, fig. 12; Fischer 1958 : 86.

Tell Samara. *Markaz* El-Simbillawein

15 km to the north-east of El-Simbillawein and some 22 km to the north-north-west of Abu Kibir. This may be the "Fundort S" ("Fundplatz S") reported by Müller (1979) where some Early Dynastic finds have been excavated. An inspection by members of MOE in 1982 revealed that

[4] The heights a.s.l. in this paper are given according to the data in the 1 : 25,000 Maps of Egypt, 1951 (2nd edition).

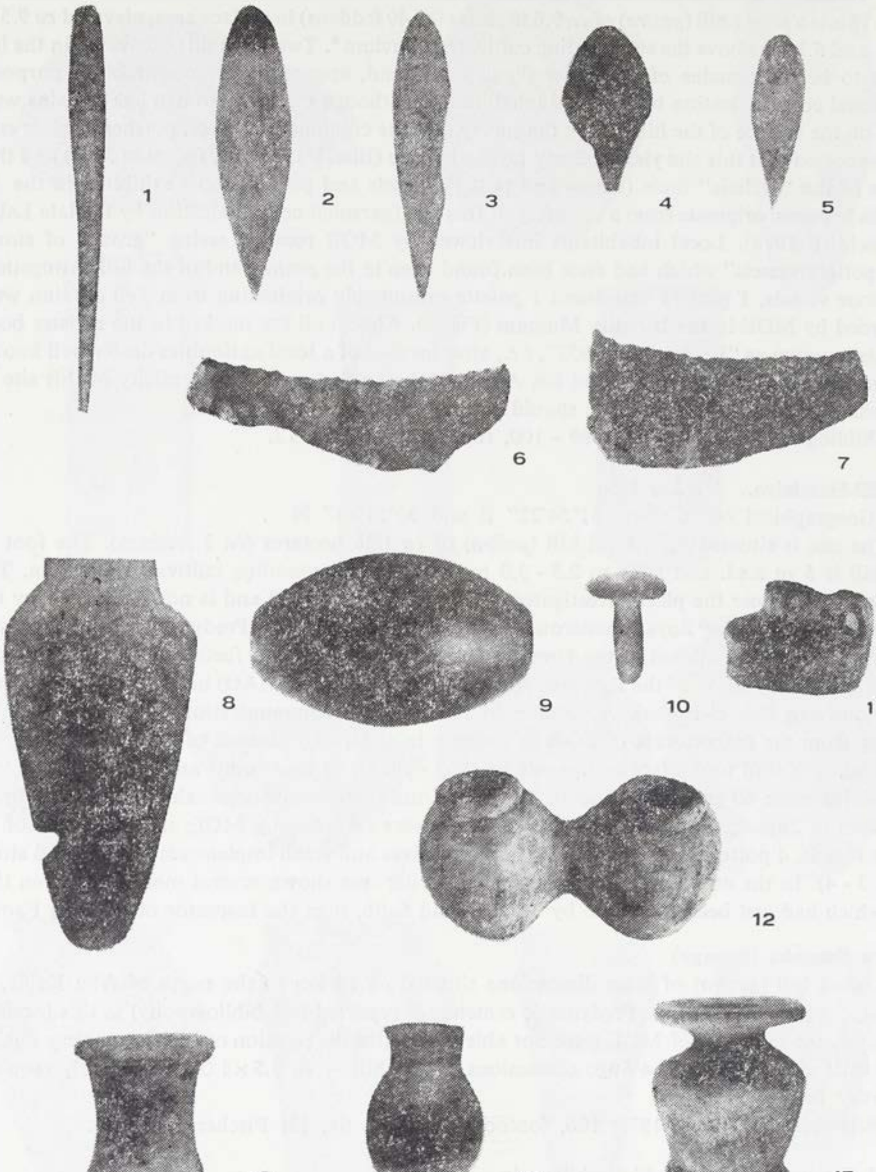

FIG. 3. El-Huseiniya

1 - 5: Bone; *6, 7*: Flint; *8*: Slate; *9*: Basalt; *10, 12 - 15*: Calcite; *11*: Faience. Different scales

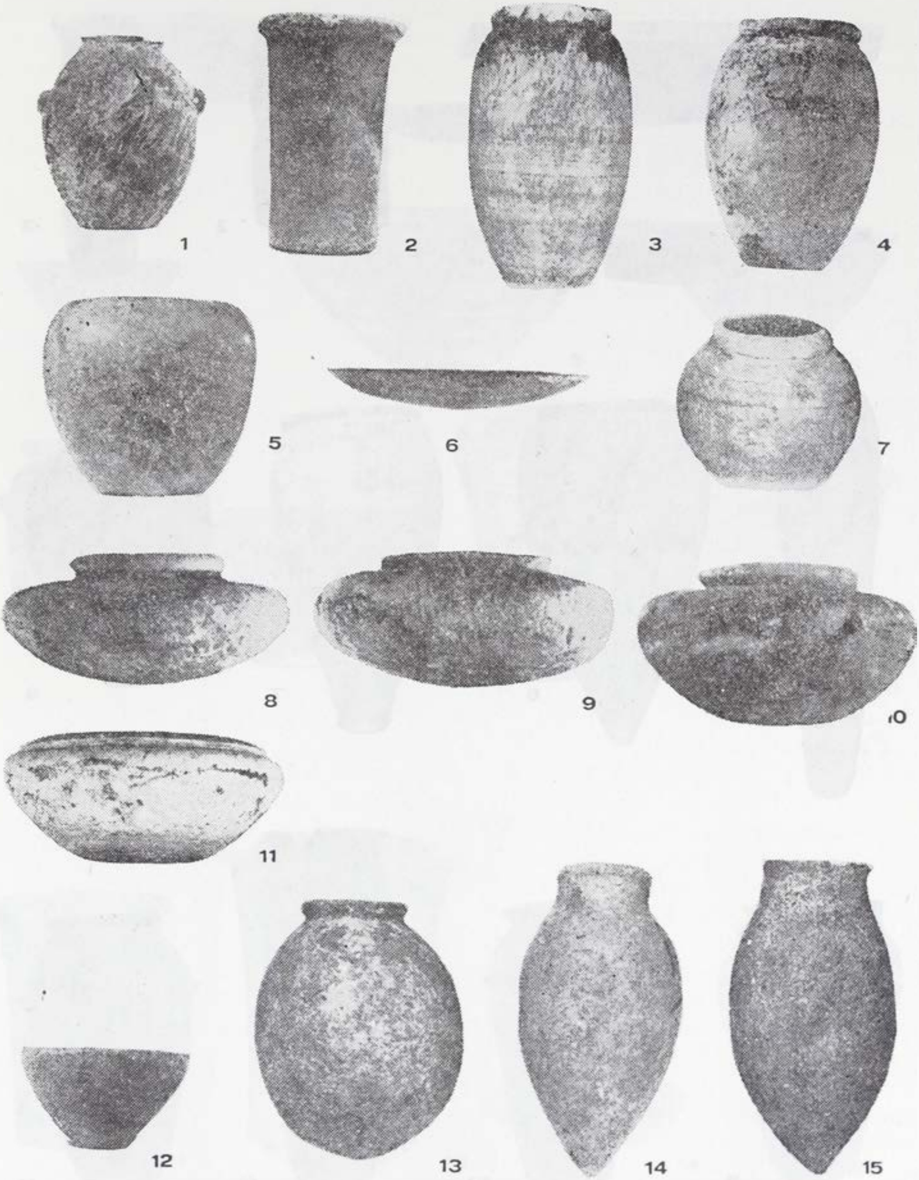

FIG. 4. El-Huseiniya

1: Sandstone (?); *2 - 11*: Calcite; *12 - 15*: Pottery. Different scales

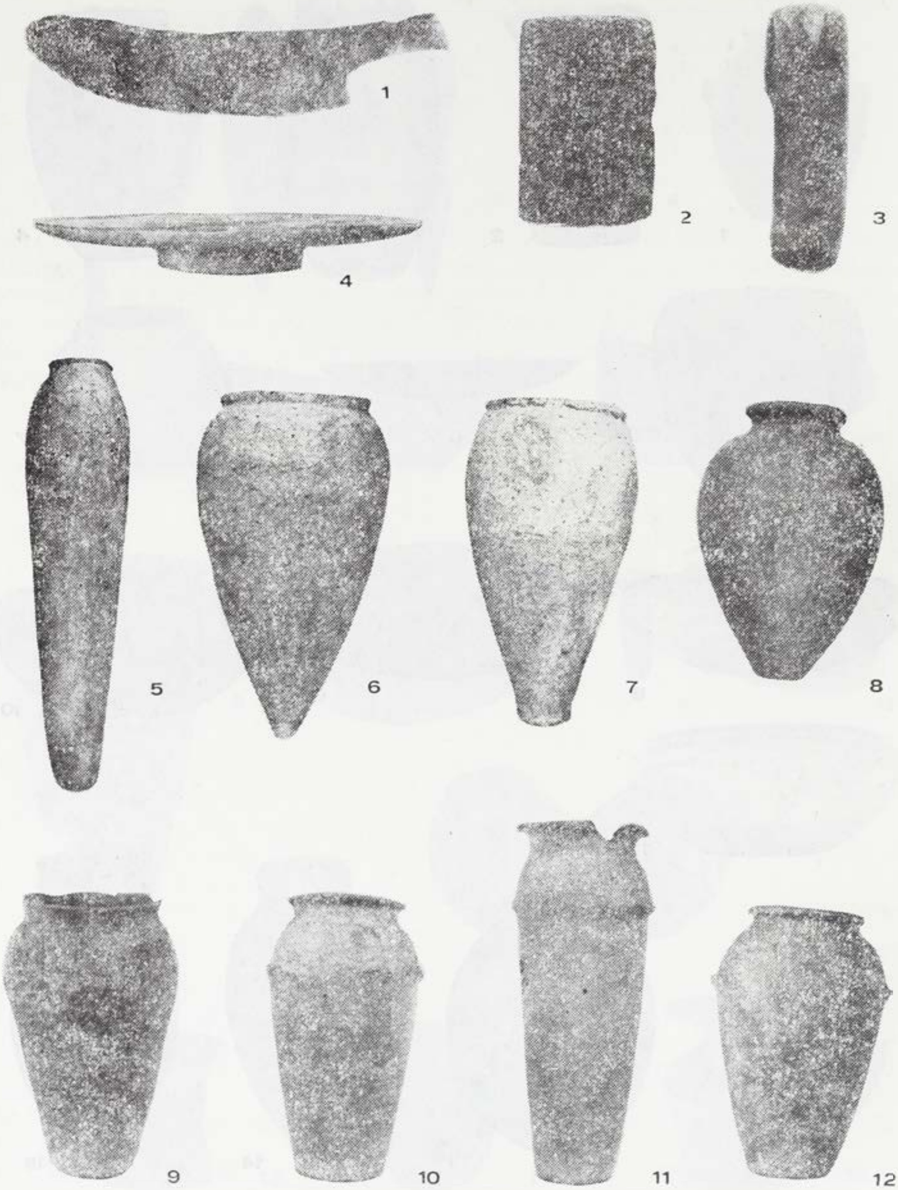

FIG. 5. Beni Amir

1, 3: Flint; *2*: Basalt; *4*: Calcite; *5 - 12*: Pottery. Different scales

FIG. 6. Beni Amir

1 - 3, 8: Slate; *4*: Diorite; *5, 9 - 12, 14, 15*: Calcite; *6*: Granite; *7*: Basalt; *13*: Limestone (?). Different scales

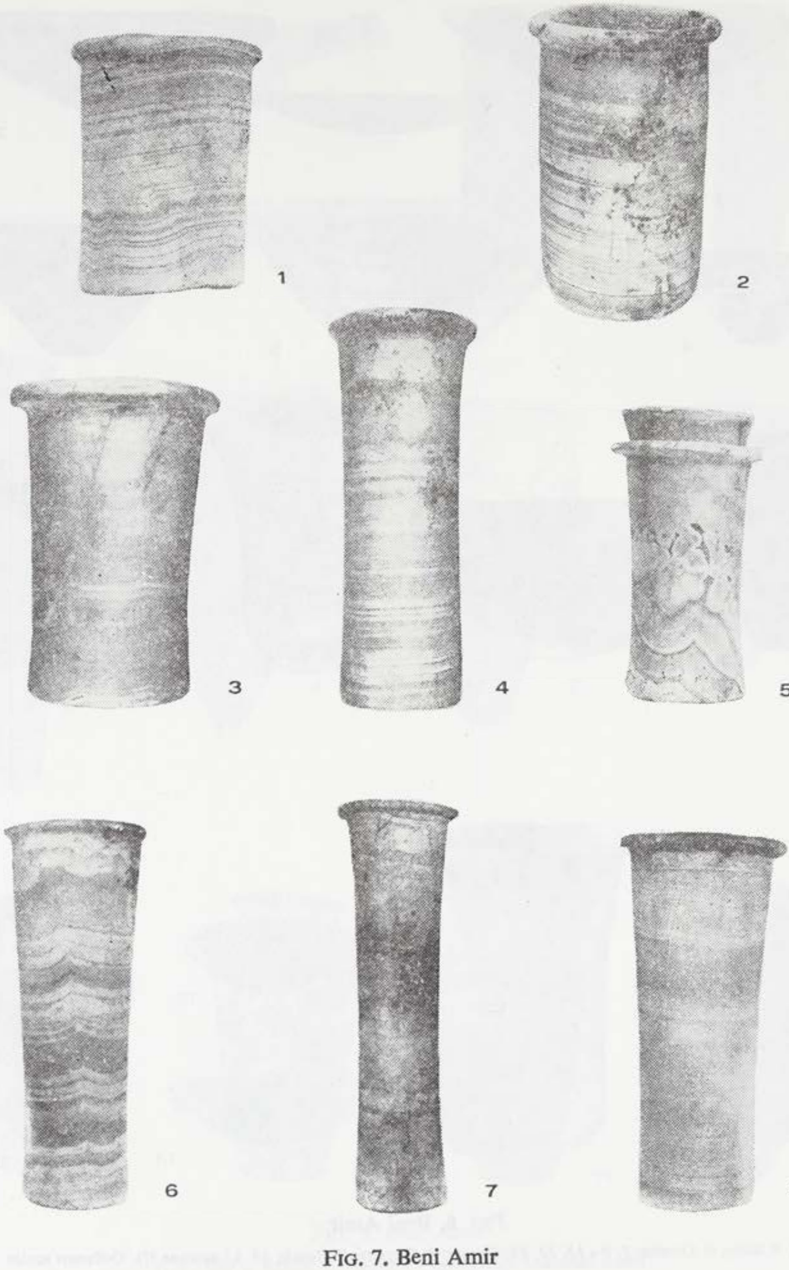

FIG. 7. Beni Amir

1 - 8: Calcite. Different scales

a Late Predynastic site is situated at this locality on a silt and sand hill measuring several hundred meters in diameter, which is now being used as a Moslem cemetery. Late Predynastic potsherds, fragments of stone vessels (among them a high-quality slate bowl) and flint implements (among them sickle bladelets) may indicate the existence of both a settlement and a burial ground on this hill.

Bibliography: after Müller (1979): Fischer 1958; Leclant 1977 : 236; Müller 1974 : 215 - 216; 1975; 1976a : 225 - 227; 1976b : 28 - 30, 35 - 37.

Beni Amir (Amer). *Markaz* Zagazig

Geographical coordinates: 31°33′50″ E and 30°35′30″ N

According to the personal communication by Mohamed Abd el-Hag from the Inspectorate of EAO in Zagazig in 1981, two different cemeteries – A and B – of "archaic" date once existed in this locality, situated 10 km to the east of Zagazig. Both sites had been located on sand hills (*geziras*) of *ca* 1.26 hectare (3 feddans) each. The foot of both hills is elevated 8 m a.s.l. and both rise up to *ca* 1.5 m above the surrounding cultivated alluvium. At the time of the inspection of the locality by members of MOE in 1981, the sites were built over by dwellings and gardens, and, therefore, totally destroyed. According to Mohamed el-Hag, the first cemetery was excavated by Moheddin Abd el-Atif in 1955 - 1958 and by Mohamed Mussalami and Mounir Basta in 1967. In the course of their fieldwork some 50 graves were found. Bietak (1975 : 99, footnote 362) had an opportunity to take a look at the finds register book (kept in the Inspectorate of EAO in Zagazig) of the excavations by Mounir Basta and Mohamed Mussalami in 1967. The finds from these excavations are now partly exhibited in the Huriya Museum in Zagazig and are stored in the reserve of the EAO in Tell el-Basta, Zagazig (previously in San el-Hagar). Altogether, 36 pieces of finds from Beni Amir were recorded by MOE in the Huriya Museum in Zagazig in 1981. They consisted of 24 stone and 9 pottery vessels, 1 stone plate and 2 flint knives (Fig. 5 - 7).

Bibliography: Bietak 1975 : 99 - 100, footnote 362, fig. 12; Leclant 1973 : 395; 1976 : 278 - 279.

Ezbet el-Tell (El-Tall, Kufur Nigm, El-Khudariya, Tell Aga). *Markaz* El-Ibrahimiya

Geographical coordinates: 31°36′04″ E and 30°45′47″ N

In April 1982 the *tell* of the site was composed of two *koms* (one of them cut through by a road) of *ca* 3.5 hectares in total, situated some 230 m away from each other. The *tell* is situated *ca* 2 km to NNE of the villages of Khudariya and Kufur Nigm, on the western side of the Bahr Moweis. The more northernly, irregularly shaped *kom* – A, of *ca* 19,700 square metres, rises to 2.9 m and the southernly one – B, of *ca* 15,100 square metres, to 3.4 m above the level of the sourrounding cultivated alluvium. It was not possible to determine whether the koms rest on the gezira sand. They are built up of the typical settlement-type sebakh containing poshterds and flint implements (among them the sickle bladelets). The potsherds collected from the surface of both koms seem to bear features typical for the Early Dynastic and Old Kingdom ceramics (among them a potsherd with an incised drawing of a boat was found). It seems that both koms may be the remains of an originally much larger body of settlement remains. According to Bietak (1975 : 106) and Mohamed Abd el-Hag (personal communication in 1981 and 1982) the site was excavated by Iskander Asad, Rashid Noër and Naguib Faraq in 1961 and 1962, during two seasons lasting two month each, and by Hamdi Youssif and Mohamed Abd el-Hag himself, in 1978. Both the Old Kingdom and perhaps Early Dynastic settlement remains (two *koms*) and a Terminal Predynastic-Early Dynastic cemetery had been excavated in the course of this fieldwork. (It was not possible to localize the exact excavation site of either the cemetery and/or the settlement). Some 300 graves were excavated in a cemetery which was situated – according to the information received from the local gafir of the EAO – in the northern part of Kom A. The finds from these graves, so far unpublished, are now housed in the Huriya Museum

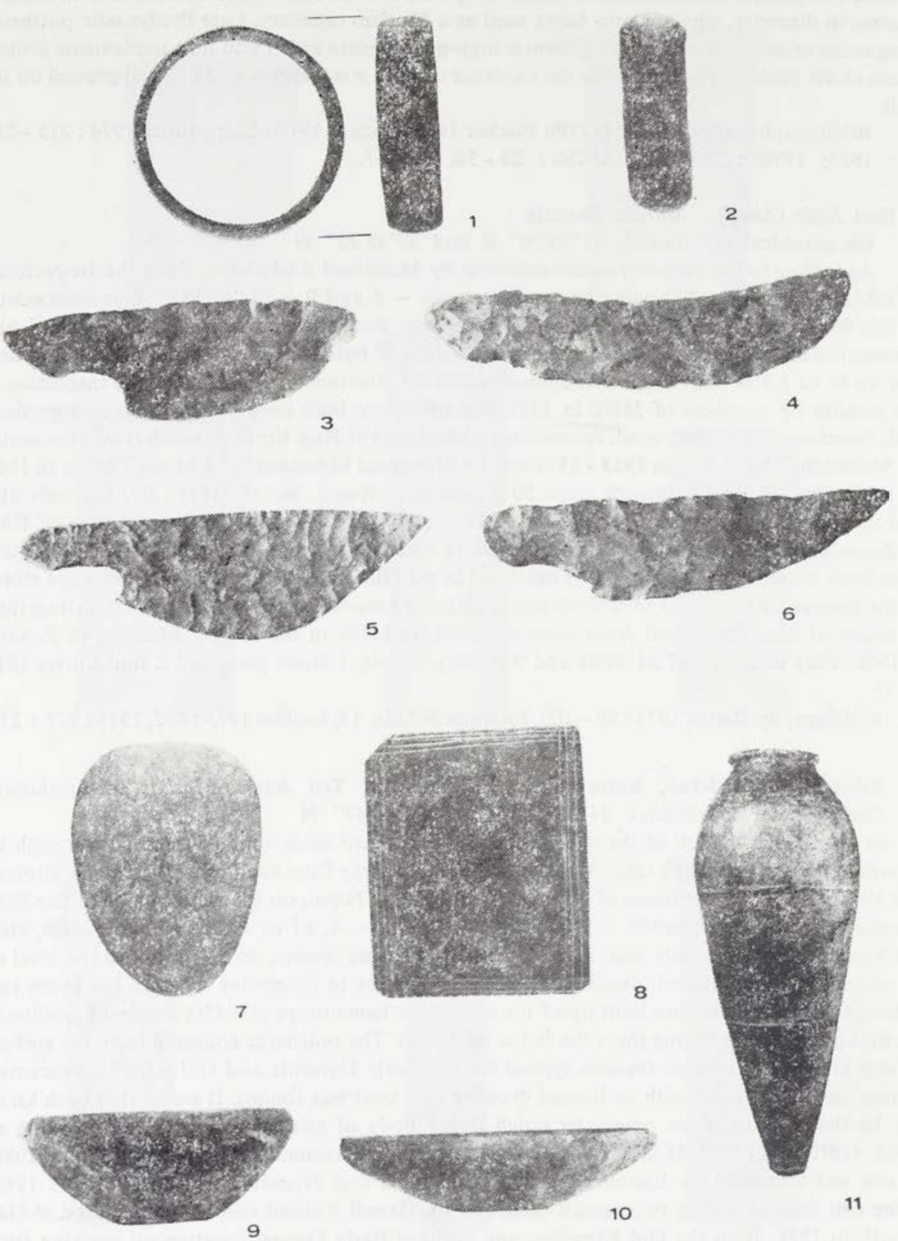

FIG. 8. Ezbet el-Tell

1, 7, 8: Slate; *2 - 6*: Flint; *9*: Diorite (?); *10*: Calcite; *11*: Pottery. Different scales

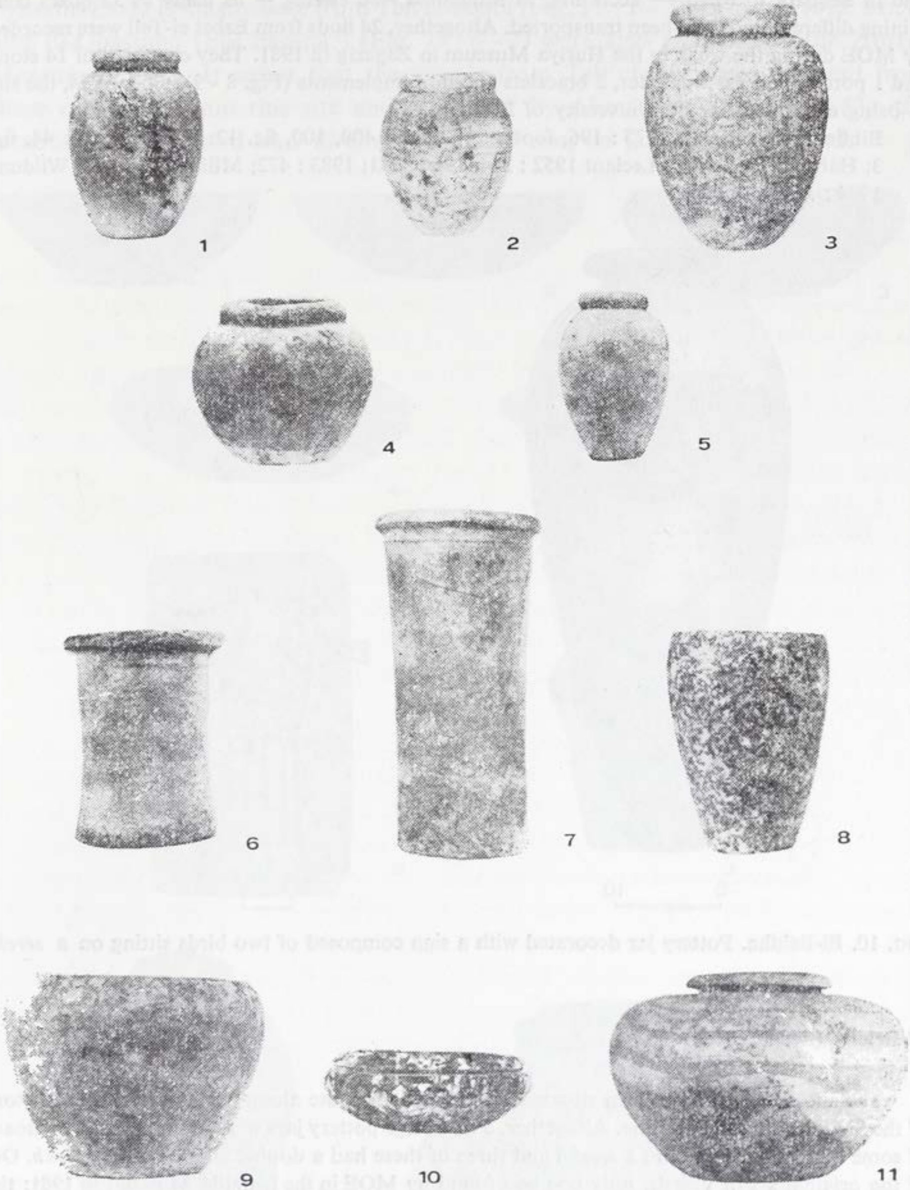

FIG. 9. Ezbet el-Tell

1 - 7, 9, 11: Calcite; *8, 10*: Diorite. Different scales in Zagazig, in the reserves of the EAO in Tell el-Basta, Zagazig (previously in San el-Hagar) and in Saqqara to where – according to Mohamed Abd el-Hag – as many as 52 boxes containing different finds had been transported. Altogether, 24 finds from Ezbet el-Tell were recorded by MOE during the work in the Huriya Museum in Zagazig in 1981. They consisted of 14 stone and 1 pottery vessels, 2 palettes, 2 bracelets and flint implements (Fig. 8 - 9). Since 1984, the site is being excavated by the University of Zagazig.

Bibliography: Bietak 1975 : 196, footnote 399 and 400, 100, fig. 12; Fischer 1963 : 44, fig. 3; Habachi 1962 : 439; Leclant 1952 : 244; 1964 : 341; 1983 : 472; Müller 1966 : 11; Wildung 1984 : 269.

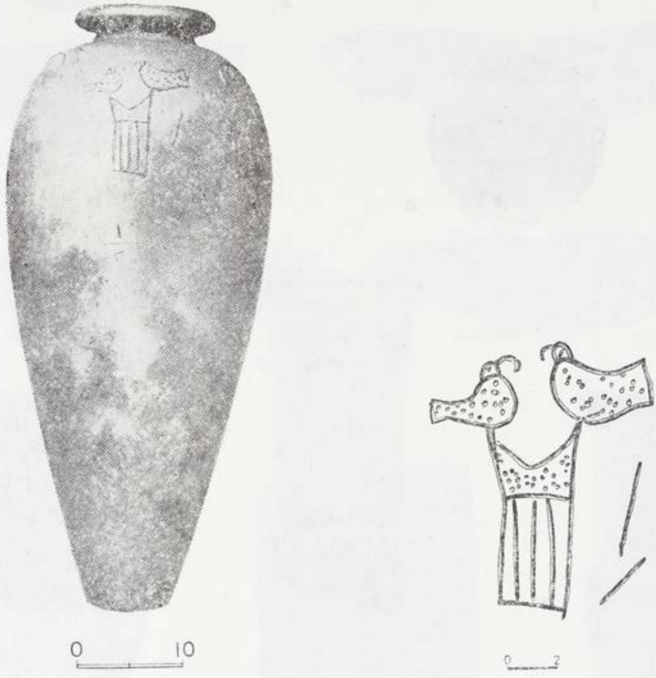

FIG. 10. El-Beidha. Pottery jar decorated with a sign composed of two birds sitting on a *serekh*

El-Beidha (Bedah, Béda)

The site seems to have been situated on the ancient route along the Mediterranean littora of the Sinai leading to Palestine. Altogether, 5 or 6 large pottery jars were found, possibly a hoard of some kind. Four jars bore a *serekh* and three of these had a double falcon on the *serekh*. Out of the original set of vessels, only one was found by MOE in the Ismailia Museum in 1981; the place of storing of the other remains unknown to the present writer. The larger pottery jar, decorated by two groups of three half-bows under the rim, bears an incised sign composed of two birds sitting on a *serekh* (Fig. 10). Kaiser and Dreyer (1982 : 263, Abb. 14 : 1 - 3, 12) date it – together with other examples from this site – to the earliest stage in the development of *serekh* forms in Egypt. The pot is marked in inked hand-writing as "Bedah 1928".

Bibliography: Clédat 1914.

It may be worth adding that several stone vessels and a palette of the Late Predynastic-Early Dynastic date from Tell el-Basta (Fig. 11 : *1 - 5*), El-Amid (Fig. 11 : *8*) and El-Ghassana (El-Chasana?) (Fig. 11 : *6 - 7*) were also recorded in the Huriya Museum in 1981. It seems that the vessels from Tell el-Basta are different from those excavated from this site and published by Ahmad el-Sawi (1979 : 63); the localities of El-Amdid and El-Ghassana have not, so far, been identified.

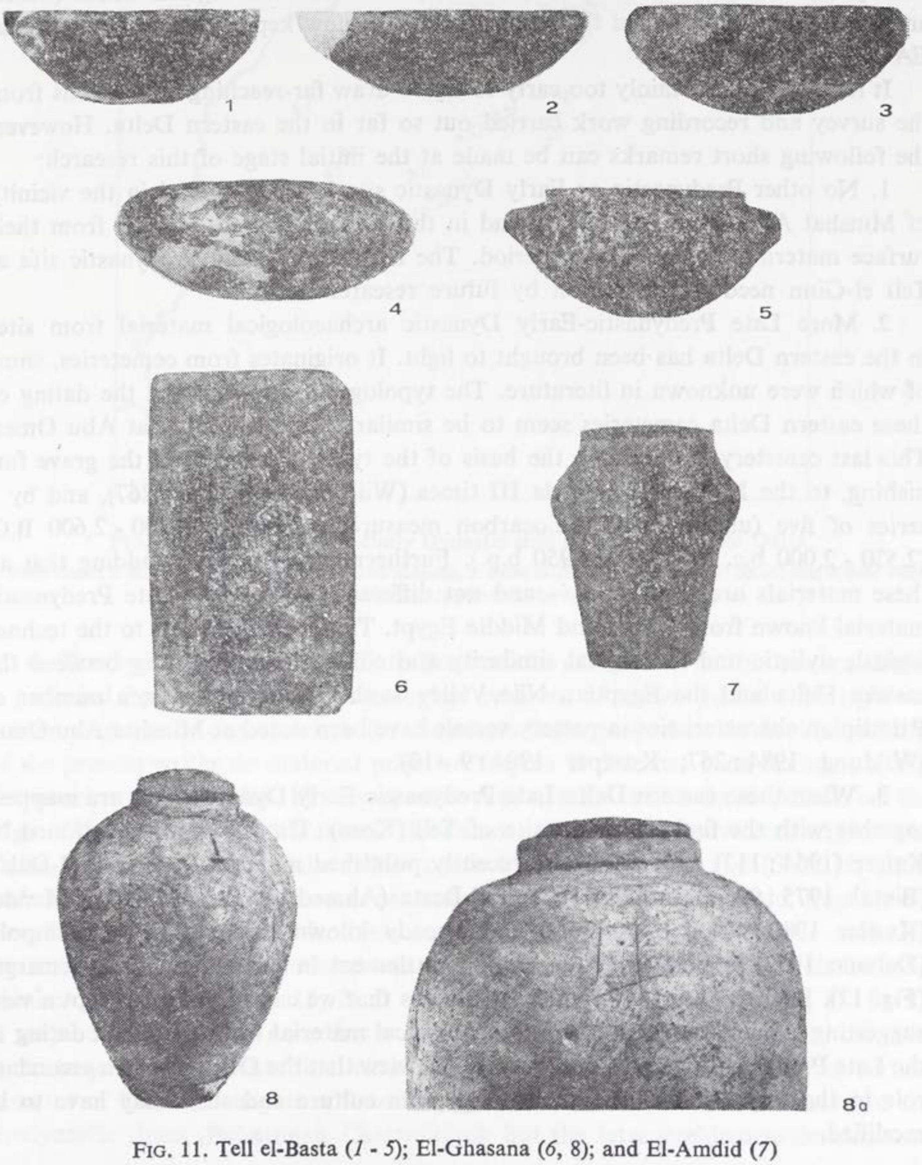

FIG. 11. Tell el-Basta (*1 - 5*); El-Ghasana (*6*, 8); and El-Amdid (*7*)

1: Black stone; *2 - 5*: Diorite; *6*: Slate; *7*: Red-brown stone; *8 - 8a*: Pottery. Different scales

It should be kept in mind that in the course of the recording programme of the museum collections in the eastern Delta, only individual finds have been documented and the actual grave assemblages (complete grave furnishings) have not yet been reconstructed. This makes premature any attempt at a comprehensive study of the typology and chronology of this material and of the respective graves and cemeteries in which they were found. A further step in the programme of MOE will be an attempt to consider the contents of the field notes and finds register books (which are written in Arabic) from the earlier fieldwork, now kept in the archives of the EAO.

It is, therefore, certainly too early to try to draw far-reaching conclusions from the survey and recording work carried out so far in the eastern Delta. However, the following short remarks can be made at the initial stage of this research:

1. No other Predynastic or Early Dynastic site has been found in the vicinity of Minshat Abu Omar. All sites found in this area are dated, judging from their surface material, to the Roman period. The reality of a Late Predynastic site at Tell el-Ginn needs confirmation by future research.

2. More Late Predynastic-Early Dynastic archaeological material from sites in the eastern Delta has been brought to light. It originates from cemeteries, some of which were unknown in literature. The typology of artefacts and the dating of these eastern Delta cemeteries seem to be similar to that of Minshat Abu Omar. This last cemetery is dated, on the basis of the types of finds from the grave furnishing, to the Naqada II-Naqada III times (Wildung 1984 : 265 - 267), and by a series of five (unpublished) radiocarbon measurements to *ca* 3,300 - 2,600 B.C. (2,530 - 2,000 b.c. or 4,480 - 3,950 b.p.). Furthermore, it is worth adding that all these materials are similar to – and not different from – the Late Predynastic material known from Upper and Middle Egypt. This seems to point to the technological, stylistic and ideological similarity and close contacts existing between the eastern Delta and the Egyptian Nile Valley at that time. However, a number of Palestinian characteristics in pottery vessels have been noted at Minshat Abu Omar (Wildung 1984 : 267; Kroeper 1984 : 9 - 10).

3. When these eastern Delta Late Predynastic-Early Dynastic sites are mapped, together with the finds from the site of Tell (Kom) Tinnis already mentioned by Kaiser (1964 : 112) and with more recently published material from Tell el-Dab'a (Bietak 1975 : 99, footnote 363), Tell el-Basta (Ahmed el-Sawi 1979 : 63), Mendes (Kessler 1980 : 404, bibliography) and already known evidence from Heliopolis (Debono 1952), a picture of the earliest settlement in the eastern Delta emerges (Fig. 12). In the light of this evidence it seems that we can no longer accept a view suggesting a lack or scarcity of archaeological material from the Delta dating to the Late Predynastic times. Consequently, the view that the Delta played a secondary role in the formation of the ancient Egyptian culture and state may have to be modified.

FIG. 12. Late Predynastic-Early Dynastic sites in the eastern Nile Delta

1: Kom Tinnis; *2*: Mendez; *3*: Tell Samara; *4*: Gezira Sangaha; *5*: Ezbet el-Tell; *6*: Tell el-Basta; *7*: Heliopolis; *8*: Beni Amir; *9*: Tell ed-Dab'a; *10*: Huseiniya; *11*: Minshat Abu Omar; *12*: Tell el-Ginn

4. The appearance of these Late Predynastic cemeteries in the eastern Delta is preceded by the lack of archaeological evidence of earlier periods. This phenomenon seems to be characteristic for the whole Delta proper: to the best knowledge of the present writer no material prior to Naqada II date has been found so far in the interior of the Delta. However, such sites are known to have existed on the edge of the Delta. *E.g.*, at Merimde Benisalame situated on the western edge of the Delta, Early and Middle Palaeolithic artefacts have been collected (Schmidt 1980) and Early Neolithic settlement excavated (Eiwanger 1984). Lithic implements described as Palaeolithic, Neolithic and Predynastic had been earlier collected from the surface of the south-eastern edge of the Delta and of the Wadi Tumilat (Junker *et al.* 1930 : 7, 9 - 15, Pl. 3 - 13; Schott *et al.* 1932 : 41, 45 - 54, Pl. 8 - 9). It may be interesting to note that a somewhat similar situation existed in the later prehistory of the northern Sinai closely neighbouring the eastern Delta. The earliest remains of human occupation found so far in the northern Sinai are dated to the Predynastic times (Palestinian Chalcolithic), but the later prehistoric development

reached its peak in the Terminal Predynastic-Early Dynastic (1st Dynasty) times (Egyptian "Protodynastic", Palestinian Early Bronze Age I - II), with an evident acme during the 1st Dynasty times (Oren 1979 : 183 - 185).

Despite the fact that more early sites have been located in the course of the fieldwork by MOE it is still not certain whether the above picture of the earliest settlement in the eastern Delta reflects the objective reality or if it is only the result of our ability to locate and explore the prehistoric sites in this part of Egypt. Our insights accumulated during the fieldwork in the eastern Delta seem to suggest the second factor as being responsible for the present state of research on the earliest settlement in the Delta.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

Isabella Caneva, Marcella Frangipane and Alba Palmieri

Recent excavations at Maadi (Egypt)

The Joint Research Project in Maadi resumed excavations on the Late Predynastic site in 1977 and up to 1984 seasons of field-work have been carried out.

The previous excavations by Menghin, Amer and Rizkana (Menghin 1936; Menghin and Amer 1932; Rizkana 1952) had left a rather limited area of the large settlement unexplored in its eastern part. It was also the only one in this part of the site which had not been damaged by other disturbances. The aim of resuming the work at Maadi was to rescue what remained of a site now seriously threatened with total destruction and, at the same time, to obtain samples for an analysis of the stratigraphy and for the palaeoecological and palaeoenvironmental studies.

The investigated settlement deposit consists of a low mound sloping southwards and cut away on the opposite side. A topographic grid was established on the mound which was subsequently excavated on the area of 380 square metres. In the area of the maximum thickness of the deposit its stratigraphy was characterized by the superimposition of two building levels, the most substantial of which rested on the virgin soil (*gebel*) and which was superimposed by a series of dumping layers with occupation floors interposed.

The building levels consisted of the remains of huts delimited by walls built of posts and probably also of other perishable materials which may be documented by traces of burnt floors and by the presence of parts of the wooden posts found in situ. Such dwellings seem to correspond considerably to those known from the previous excavations. In the base level traces of four huts were discovered, one about ten metres apart from the other. One of them seems to have been built shortly after the other three. This, together with the successive use of this area for dumping refuse probably originating from other dwellings, suggests a diachronic occupation of the entire site with a shift of the occupied areas within the settlement. On the hut floors small fireplaces were found, in some cases together with sunken pithoi and small storage pits, which confirm the already known data from this site which point to the existence of household storing (Fig. 1). Both inside and outside the huts

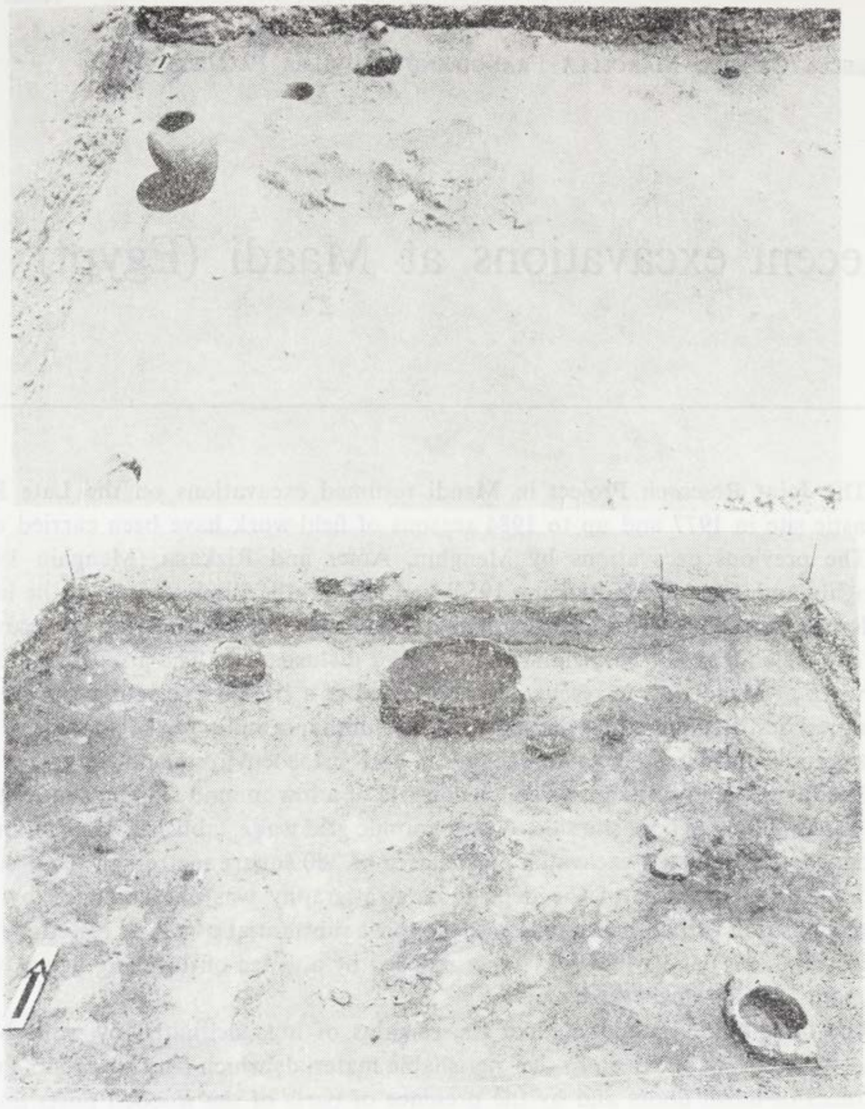

FIG. 1. Maadi. Remains of huts

numerous complete pots were found, covered with a sandy layer accummulated after the abandonment of the area. An infant burial below the floor of one of the dwellings documents a different funerary custom from the use of cemeteries situated to the south of the settlement.

In an area between two huts a considerable heap of ashes with charred vegetal material was found (Fig. 2). It included the remains of different wheats (*Triticum monococcum*, *T. dicoccum*, *T. aestivum*, *T. spelta*), barley (*Hordeum vulgare*) and pulses such as peas (*Pisum* sp.) and lentils (*Lens culinaris*). The variety of cultivated plants already recognized in the small sample analyzed so far sheds new light on the Late Predynastic agriculture.

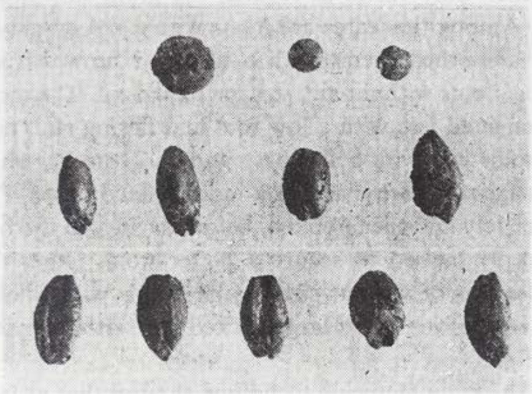

FIG. 2. Maadi. Charred seeds

Besides plant cultivation the inhabitants of Maadi also depended on animal husbandry. According to the preliminary report on the animal remains from Maadi provided by S. Bökönyi (1985), the most favoured species were the caprovines (mostly sheep) followed by pigs and cattle.

Domestic animals also included dogs and donkeys; the occurrence of the latter is the earliest evidence of the domestic donkey in Africa. The inhabitants of Maadi complemented their diet with the flesh of wild animals, especially fish, turtles and birds.

Four radiocarbon dates made on charcoal were recently provided by the Laboratorio per la datazioni con il C-14 dell'Università di Roma „La Sapienza" and are calibrated by both the MASCA (Ralph *et al.* 1973) and the Klein system (Klein *et al.* 1982). These measurements (Table 1) date only the earliest level at Maadi

Table 1

C-14 dates from Maadi

Lab. ref.	14 C age BP	Calibrated age MASCA	Calibrated age (Klein et al)	13C %
R-1425	4860±70	3620 : 3735 BC	3385 : 3865 BC	-25
R-1426	4680±70	3380 : 3580 BC	3185 : 3750 BC	-24.3
R-1427	4900±70	3655 : 3760 BC	3400 : 3880 BC	-26.5
R-1428	4890±70	3650 : 3750 BC	3395 : 3875 BC	-25.5

and, therefore, do not contradict the idea that the occupation on the site terminated later, at the end of the 4th millennium B.C.

The pottery is characterized by a fairly wide range of shapes and by a chaff-tempered paste which only varies as regards the grain size and the frequency of mineral inclusions. Among the wares are items with a red or red-orange slip, either burnished or only smoothed, items with a black or brownish slip and generally burnished, as well as items without any surface treatment. The most common forms are the ovoidal, elongated jars with a low foot and flaring rim, usually red-slipped, and the more globular jars with a flat base and short neck, which always have a black burnished surface and are made of a more refined paste. The foot of the red jars was made separately and then applied, before drying, to the bottom of the vase, the latter being deeply incised to secure a better weld. Other forms can also be mentioned such as bowls of various sizes, large basins with thickened rims underlined with rows of impressions, and large necked jars, although the latter appear to be less common (Fig. 3).

Observation of the manufacturing technique showed that at least the most common vessels such as red and black jars were first hand-made and then finished by modelling the rim and the base on a slow wheel. This manufacturing process

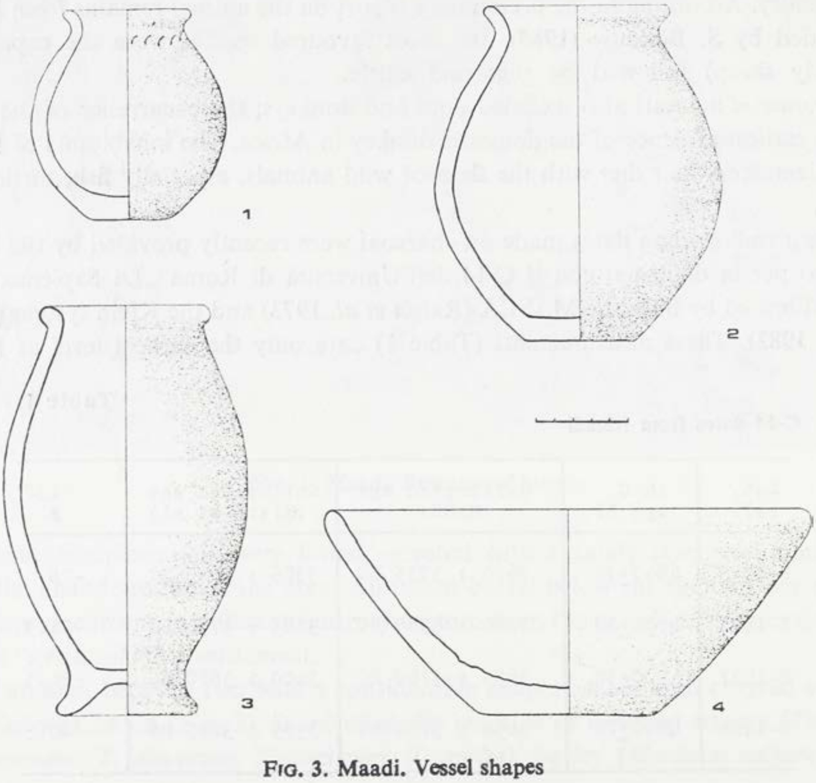

FIG. 3. Maadi. Vessel shapes

together with the uniformity of both the shapes and paste seem to point to a pottery production by specialized craftsmen.

A single sherd bearing a wavy-handle confirms the presence of imported pottery of the Palestinian type.

Participation of Maadi in a wide network of communication, including the Levant and reaching northern Syria, is also suggested by the occurrence of the well-known fan scrapers made of tabular flint which were abundantly found at such sites as

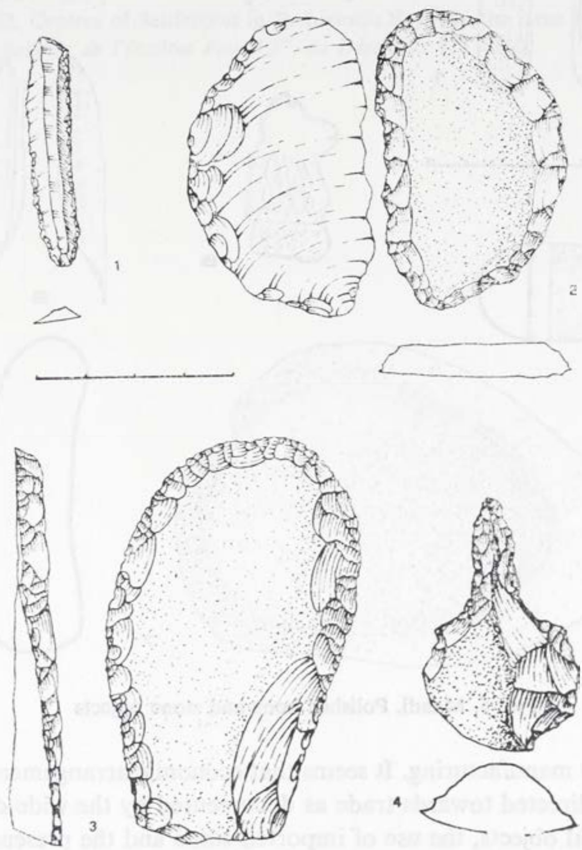

FIG. 4. Maadi. Lithic industry

Arad or the late-Uruk centres on the Middle Euphrates (Habuba Kabira, Jebe Aruda). Except for very rare blades, the Maadi tool kit, however, is never made of tabular flint. It consists mostly of borers and scrapers made on flakes or blades struck from fairly small pebbles (Fig. 4). Other tools include objects made of bone: points, spatulae, combs, *etc.* (Fig. 5), metal and polished stone such as spindle whorls, mortars and pestles as well as the typical basalt and alabaster vases.

In conclusion, the Maadi site reveals a marked craft specialization in different sectors of activities such as metallurgy, lithic industry, stone vase production and,

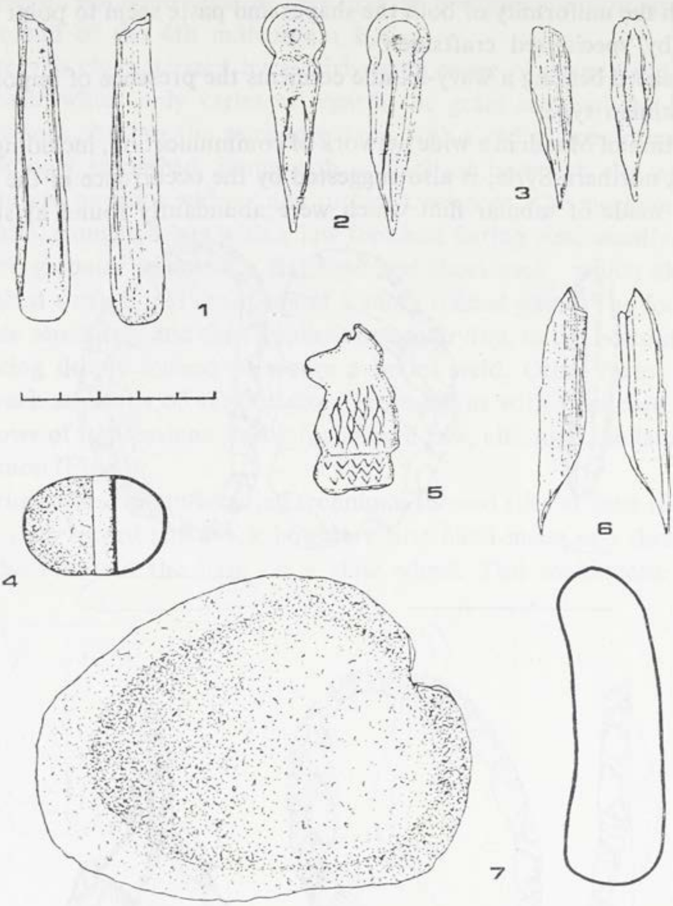

FIG. 5. Maadi. Polished bone and stone objects

above all, pottery manufacturing. It seems that economic arrangement of the Maadi community was directed towards trade as documented by the wide diffusion of fan scrapers and metal objects, the use of imported stone and the presence of imported pottery. An important part of the economic activity was the specialized manufacturing of pottery, characterized by a mass-production of certain kinds of containers.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

CLAUDIO BAROCAS, RODOLFO FATTOVICH and MAURIZIO TOSI

The Oriental institute of Naples expedition to Petrie's South Town (Upper Egypt), 1977-1983: an interim report

The archaeological expedition of the Instituto Universitario Orientale to Upper Egypt started the field-work in the autumn of 1977 in the Naqada region, encompassing the western bank of the Nile and the gravel plain along the Thebaid plateau between Ballas and Naqada. The Naqada region offers relevant archaeological information for the study of the formative period of the Egyptian State as regards the density of settlement, the wealth of the burials as well as the monumental buildings in Predynastic and Early Dynastic times. The impressive discoveries of W. H. Flinders Petrie at the site of Ombos (Nubet), J. E. Quibell at the site of Ballas and J. de Morgan at the site of Naqada at the end of the 19th century were first to point to this area as one of the cores of the Egyptian cultures through the 4th millennium B.C Since then the main stream of information available has been to a great extent confined to burials and associated furnishings, whereas the lack of any substantial settlement excavation has constrained the growth of evidence. The intention of the I.U.O. project is to obtain this kind of information.

It seemed most appropriate to begin our project as a detailed re-investigation concentrated on the most impressive Predynastic site found in Upper Egypt: the South Town. The selection was then made quite independently of any tactical consideration and, in particular, of the site's present state of preservation.

The project aims in three directions:

1. Analysis of the topography, geomorphological setting and state of preservation of the early site;
2. Re-collection of a broad spectrum of data on resources, their exploitation and craftsmen's production in the Predynastic settlement;
3. Studies on the degree of social complexity reached by the Naqadian social group in the late 4th millennium B.C.

Six seasons of field-work have taken place so far (autumn 1977, spring 1978, autumn 1979, winter and autumn 1982, autumn 1983), involving the survey of the entire compound of the South Town and Nubet, the excavations of buildings on the eastern margin of the South Town and a geomorphological survey mainly monitored to ascertain local post-depositional processes of erosion.

Description of the site

The site named the South Town appears today as a dense concentration of artefacts with very few structures; it thus bears the effects of the activity of sebakhim diggers. It is located on the lowest elevation of the gravel terrace, about 4 km to the west of the village of Zawaydah. It was originally explored by Petrie in 1896; he excavated a large cemetery with about 2000 graves in the vicinity and part of the settlement. After Petrie's excavations the site was examined by J. de Morgan in 1897 who made some surface collections, and by Loret and Gaillard in 1907, Kaiser and Butzer in 1958, Hays in 1976 and Fekri Hassan since 1978.

The area we were able to assign to the Predynastic settlement of the South Town is about 152 m N-S and 105 m E-W, rather eliptical in shape, and approximately extending over a surface area of 1.6 ha. Its surface is strongly affected by erosion and almost reduced to a deflation pavement of artefacts, while very little mounding has actually been taking place. As a result, the solid surface is extremely rich in terms of artefacts concentration, but very little context is available for any degree of spatial correlation. Probably, as a consequence of discoveries made by Petrie in the burial ground, its state of preservation had been further deteriorated by farmers searching for graves, which apparently took place the very day after Petrie's departure (according to his own witness). In more recent times some houses were built by farmers and further soil was removed through pitting to provide construction materials.

Both geomorphological research and archaeological observations have been facilitated by the great number of actual and refilled pits that shape all its surface. Artefacts are paved over different sedimentary formations that grade towards the alluvium exposing different kinds of surfaces. These areas are well visible against the whitish surface of natural sediments.

Surface evidence has been integrated by a number of small trenches dug at different spots at the eastern and southern limits of the site. As a result we may safely assume that notwithstanding the ubiquitous disturbances that occurred all over the site, its original shape and size have been basically preserved. Pit digging by farmers has taken place always in restricted areas and although it turned over the whole of the archaeological deposit, it moved the heavier materials over a small distance only. Historical and recent Nile floods have not reduced the deposit on its eastern edge. This was particularly evident on the W–E excavations section (northern face) prolonged a few meters into the alluvial plain.

The archaeological deposit is reduced to a sherd pavement that follows the hump-like layout of the gravel tongue, thickening at the western end, towards an ancient streambed where we could recover the only cultural series of some stratigraphical significance (ZWEA). From an archaeological point of view the South Town is then best approached as a surface site, considering how little can be said about its sedimentary history. The basic indicator for variability in human occupation have become pits and other alterations of the surfaces, and particularly the conglomerates at the eastern side of the site. To create minimal opportunities of recovery we have centered our research strategy on the recording of these alterations in their chronological, morphological and functional variability.

1979, 1982 and 1983 test excavations

In 1979, to investigate better the highly disturbed deposit, we carried out the excavation by two test trenches close to the eastern and western limits of the black-earth deposit, in the central part of the site. In 1982 and 1983 the eastern trench was enlarged in order to study the plan of the postholes found here in the previous season. The test trenches were excavated to meet our requirements for the reconstruction of the economy of the Predynastic site. Priority has thus been given to the sampling of the plant and animal remains and the excavations have been oriented towards total recovery through soil screening and floatation.

The whole area of the South Town has been covered by a 2×2 m grid system oriented to the north, resulting in a network of squares labelled with the alphabetic code of four letters. The first two – ZW – are recurrent and indicate the sites name – Zawaidah. ZW is followed by the area indication: E for the eastern side and W for the western side. The last letter indicates the 2×2 m square counted left-to-right, from A to Y, to cover a total area of 10×10 meters.

The western trench ZWW, extended N–S for 2×8 m, was excavated on the southern edge of a recent pit deeply cut into the upper lime deposit. In this trench plant and animal remains were abundant, with only little mud-brick and clay remains. Here the midden lies on the top of the upper lime deposit and non-organized alterations of its surface were evident, suggesting that the desert-facing western edge of the settlement was mostly utilized as a dumping ground, located at some distance away from the clusters of dwellings.

The eastern trench ZWE, originally intended to extend over an identical surface in E–W direction starting from the eastern edge of a deep ditch cut into the gravel of the lower lime deposit, had been progressively expanded in 1982 and 1983 with a total surface of about 300 sq m. The main morphological feature in this trench was the terrace built of basal conglomerate and yellow silt forming the ground on which traces of architectural structures were recognized. The area excavated revealed an archaeological deposit only a few centimeters thick. A number of round postholes and other artificial features, aligned in different directions were brought to light, suggesting the existence of wood and clay buildings on the eastern edge of the site.

Stratigraphy of the South Town

Layers of the Predynastic settlement were accumulated on the black earth which was superimposed on the lime and gravel of the Plio-Pleistocenic formations.

The stratigraphy of the site consists of a total of seven layers. Three of them are part of the natural formation. At the bottom is a hard yellow lime 2 to 4 m thick, underlying the whole archaeological compound and identified as a part of the Neo-Nilotic formation related to the last interpluvial phase and superimposed by the thick Dendera gravel. On the top of this layer there is a 0.25 to 1 m gravel sediment followed by a red lime formation now less than 1 m thick. Due to the uneven morphology of this topsoil, heavily affected by erosion, the archaeological deposit was accumulated on the surface of all three types of soils.

In the test excavation ZWE five different stratigraphic layers were recorded, from the top to the bottom:

1. Reddish brown soil, rich in artefacts and faunal remains, 5 - 10 to 50 - 60 cm thick, representing the disturbed archaeological deposit;

2. Red soil, with less disturbed archaeological deposit, 10 to 40 - 50 cm thick; it is the layer rich in architectural remains, mainly wattle- and-daub imprints and mud-bricks;

3. Grained dusty brown soil, with a few potsherds and lithic tools only slightly embedded in it; it formed a kind of crust, about 2 cm thick, covering the yellow lime and basal conglomerate over the wide parts of the trench;

4. Yellow silt, without any artefacts, forming a compact layer in the southern and western part of the trench; it represents the virgin soil of the site;

5. Basal conglomerate, with pebbles of probably fluvial origin, forming the basal sedimentary unit of the whole terrace; it is clearly visible in the central and northern part of the trench.

Chronology

In the absence of samples suitable for the radiocarbon dating from well defined stratigraphical layers, it was the study of the pottery that has been used to build the chronological frame of different cultural phenomena recorded on the site. For this purpose the potsherds from the different layers of selected squares in the two main trenches were examined in detail during 1979 and 1982 seasons, and systematic surface collections from different areas regularly distributed over the whole surface of the site was carried out in 1983.

Despite its discrepancies, Petrie's descriptive system was used in chronological studies in order to maintain a link with the sequence system – S.D. – used in dating the tombs from the graveyards to the west and south of the South Town. This sequence in fact still represents the basic chronological reference for the Predynatic town. Yet, the absence of any complete vessel prevented us from following in a proper way the S.D. system both in its original and modified versions. Some large potsherds were, however, tentatively identified with the Petrie's pottery types.

It was assumed that some classes of pottery are diagnostic of the main phases in the Predynastic period, as Petrie, Kaiser and Kemp have pointed out. The C, D, and L wares in particular appear to represent the Naqada I, II and III phases respectively. The P and B ware appears to be typical mainly of the Naqada I and IIa-b The R ware seems to be characteristic of the Naqada IIc-d and III phases. Moreover, the general review of occurrence of the individual classes of pottery in the Predynastic tombs from Upper Egypt has made evident that the average frequency of P and B wares decreases from the Naqada I to the Naqada III times and the average frequency of R and L wares increases from the Naqada II to Naqada III times. A similar trend in the number of varieties of P, B, R and L types had been already emphasized by Petrie. Finally, attention was paid to the fact that vessels with fabric similar to R and L classes continued to be made into the Early Dynastic and Old Kingdom times.

For these reasons the study of the potsherds was mainly devoted to: 1. Identification of the main classes occurring on the site; 2. Testing their relative frequency on its surface and at different levels of the trenches; 3. Recognizing the rim shapes comparable to the types in the Petrie's Corpus.

It was then attempted to place the individual sectors of the site within broader chronological sequence of the predynastic period on the basis of the frequencies of occurrence of the classes of ware in each square as well as attempting the S.D. date of some larger potsherds.

In 1979 and 1982 twenty squares in ZWW and ZWE were examined. The most striking element found in them was a very high frequency of the utility ware (R) ranging from 69.91 % in ZWW.A.1 to 54.77 % in ZWE.WE.3. It confirmed our initial impression that this ware was the most common kind of pottery occurring on the surface of the site. At first sight this situation seemed to be anomalous when compared to the general trend of the frequencies of the classes of ware found in the tombs. Recent evidence from Jebel el-Tarif and at Hierakonpolis has revealed, however, that it was typical in the Predynastic settlements. It was then assumed that the utility ware might be regarded as a material lacking chronological validity. Only the different frequencies of P/B and L potsherds, and the possible occurrence of C and D fragments, were therefore maintained as chronological indicators.

The chronological evidence suggested at that stage that the South Town was inhabited during the whole Naqada period. The higher frequency of P/B sherds and the occurrence of C sherds in the ZWW area supported the hypothesis, that the western and central sectors of the site were mainly occupied in Naqada I - II periods. The very high frequency of L sherds in the ZWE area suggested, on the contrary, an occupation of this part of the site in Naqada III and /or the early Dynastic times.

Such hypothesis was tested in 1983 by means of a systematic surface collection over the whole site. 51 smaller squares located at the SW corner of individual 20 × 20 m squares forming the basic grid covering the site were examined in that season. The analysis of the collected potsherds is still in progress. The preliminary review of the different frequencies of the classes of ware has confirmed, however, the general trend observed in ZWW and ZWE. At the same time it has become possible to recognize a major concentration of Early Dynastic potsherds in the northern and northwestern part of the site, which was excavated by Petrie, and of Pharaonic pottery (Middle to New Kingdom) occurring along the southeastern edge of the site, confirming earlier statement of Petrie.

At the present stage of research the three main periods of habitation can be recognized at the South Town: 1. Predynastic occupation, corresponding to the whole surface of the settlement; 2. Early Dynastic occupation, centered in the northern half of the site; 3. Dynastic occupation probably contemporary to Nubet, located in the southeastern part of the site. It also seems that during the Predynastic period the settlement gradually shifted from the western side of the site to the edge of the present low desert.

Architectural evidence

The identified man-made features on the surface of the ground include: 1. Postholes; 2. Notches and grooves; 3. Pits of different size; 4. Heaps of mudbricks; 5 Undefined structure.

1. Postholes. About 200 postholes dug in the basal conglomerate and the yellow lime have been found in ZWE. Their sizes range from 3 × 3 × 2 cm to 40 × 46 × 27.5 cm. Some of them are clearly arranged along the axes of E – W and N – S direction and might be the remains of structures. Most of the holes, however, do not exhibit any clear arrangement and probably are the remains of structures built in different periods and thus superimposed.

2. Notches and grooves. They are a) swallow-tailed notches, b) linear grooves, c) regular cuts in the sediment. At least the swallow-tailed notches may be contemporary with the holes. They might be attributed to enforcements of the walls.

3. Pits of different sizes. They are shallow, conical and roughly oval. Their function is still uncertain.

4. Heaps of mud-bricks. They are scattered along a main E – W axis in ZWE and probably represent the remnants of a collapsed wall; the size of the bricks ranges

from $8 \times 7 \times 6$ cm to $19.5 \times 12 \times 12$ cm. They rest directly on the basal conglomerate and the red soil filling a ditch at the western side of ZWE.

5. Undefined structure. A roughly round ditch, 110×115 cm wide and 20 cm deep, is visible in the northern part of the terrace formed by the basal conglomerate in ZWE; it was originally paved with small blocks of oxidized clay, ranging from $8 \times 7 \times 3$ cm to $20 \times 11 \times 4.5$ cm in size.

The extentions of the excavations, both at ZWE and ZWW, is still too limited to have provided any house plan or sufficient set-up of features for a functional interpretation of different parts of the settlement. It seems, however, that two phases of construction can be distinguished in ZWE, as Petrie has already pointed out. The first one is represented by the arrangements of postholes and the wattle-and-daub clay imprints which seem to be the remains of the clay dwellings dated to the Predynastic period. The second phase is represented by the heaps of mud-bricks probably of Pharaonic age.

"State authority" devices

To detect evidence for the state authority devices we have followed examples recently provided by researchers working on contemporary periods in South-Western Asia and Nubia. Thus we were searching for clay sealings on room-locking devices, vases, doors, leathers, packages as well as clay counters and, ultimately, records written on tablets. To our surprise a dozen of broken pieces of a light-coloured compact clay moulded over door-pegs, gags, pots and other objects have been found both at ZWW and at ZWE, in the latter in the red soil mixed with the slided remains of the wattle-and-daub dwellings. At ZWW they were found both in the thick coat of sherds and in the lower dusty red soil. We may describe them as almost ubiquitous.

It seems that the rooms of dwellings in the South Town were locked with similar peg-and-string device which was adopted in Southern Mesopotamia from Early-Middle Uruk (about 3,500 - 3,000 B.C.) and used from northern Syria to Eastern Iran by the end of the 4th millennium B.C. Considering the present device evidence from the South Town we may state that a similar system of the control of stored goods and their shipment was adopted at the same time in Upper Egypt. As compared to the Mesopotamian and the Iranian evidence of the Jemdet Nasr times (3,200 - 2,900 B.C.), the sealings of South Town bear very rarely impressions of seals. Out of some 300 *bullae* found, only half a dozen bear clear signs of having been sealed. They were signed with cylinder seals and only two of them have been well preserved. One of them was found placed on a wooden peg, the other on a pot rim that had been topped by a piece of cloth. Both seals reproduce rows of animals of the type known from the ivory handles of the flint knives typical for the Late Predynastic times. This is the first record of this kind found in the South Town and it seems to place the evidence from the South Town within the context of the incipient Egyptian State.

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FEKRI A. HASSAN and RICHARD G. MATSON

Seriation of predynastic potsherds from the Nagada region (Upper Egypt)

Introduction

Ceramic collections from Predynastic settlement sites in the Nagada region consist almost exclusively of sherds. The sherds are on the average, small (about 25 sq cm) and are not suitable, except in a few cases, for reconstructing vessel shapes. Accordingly, the majority of the sherds cannot be dated using the seriation scheme known as sequence dating – a system developed to seriate complete vessels from graves (*e.g.*, Petrie 1900, 1901, 1920; Kaiser 1956, 1957; Baumgartel 1965; Kemp 1982) We present here the results of a preliminary analysis of collections of ceramic sherds from settlements using multidimensional scaling showing that, given a large sample size and a sampling strategy minimizing functional variability, a temporal order of the collections can be achieved. We show, in addition, that multidimensional scaling can provide a means for detecting intrasite temporal variations and can thus contribute to an understanding of the occupational history of sites and their spatial pattern of growth.

The ceramic collections

Collections were obtained from Sites KH7, KH3, KH1, KH6, KH4, South Town, and North Town in the Nagada region, Upper Egypt (Fig. 1). The collections were mostly from the surface or near the surface. Three surface collections were obtained from Site KH7 (Table 1). A total of 822 sherds was collected consisting of 159 sherds from Area 1, 161 sherds from Area 2, and 502 sherds from Area 3. The areas were 5×5 m in size.

Collections from Site KH3 consist of ceramics obtained during excavations in four different areas of the site: Area B, Area V, Area X, and Area VIII. The total from the three top levels in Area B is 1,108 sherds compared with 1,789 sherds from Area V, 8,595 from Area X, and 159 from Area VIII. At Site KH6, one area (Area 1) of 10×10 m yielded 109 sherds. Another area (Area 2), also measuring 10×10 m, yielded 365 sherds. The collection from KH1 consists of 698 sherds obtained from spot samples from various parts of the site. Collections from Site KH4 were obtained from two areas, Area N in the northern part of the site and Area C in the central part of the site. Each of these areas is 10×10 m. The collection from Area N totals 807 sherds compared with 726 from Area C. Collections were also made from immediately below the surface at both areas providing additional samples of 177 sherds from Area C and 106 sherds from Area N.

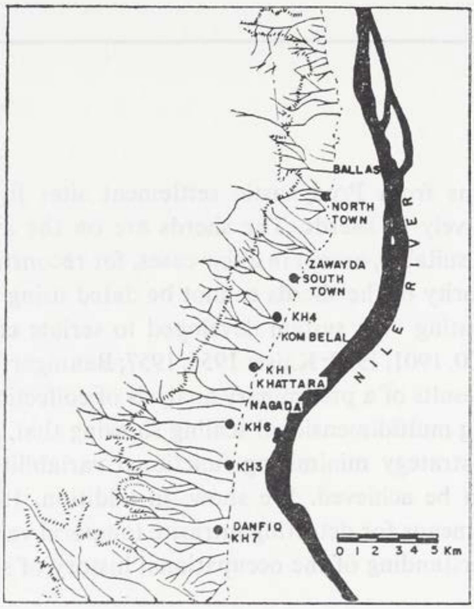

FIG. 1. Location map of Predynastic sites in the Nagada region

At South Town, eight collections were made from 5×5 m units from the center of 25×25 m site quadrates. A total of 9,521 sherds were collected. At North Town, collections were obtained from four parts of the site. Each of the areas measured 5×5 m. A total of 4,390 sherds was obtained. The total number of sherds collected from all sites is 29,375. The collections were obtained in order to assess the possibility of the utility of using Predynastic sherds for temporal ordering. The study was undertaken as an exploratory study since quantitative data on Predynastic ceramics are lacking. Some of the problems that had to be evaluated were the size of an adequate sample, the correspondence between surface and subsurface samples, functional variability.

Table 1

Frequency of ceramic types in Predynastic Nagada settlements

Sites	Total No. of sherds	P #	P %	B #	B %	R #	R %	O #	O %	D #	D %	Misc. #
KH7, SC1	159	66	(41.5)	8	(5.0)	84	(52.8)	1	(0.6)	0	0	0
SC2	161	89	(55.3)	8	(4.7)	64	(39.8)	0	0	0	0	0
SC3	502	244	(48.6)	25	(5.0)	231	(46.0)	1	(0.2)	1	(0.2)	0
KH3, Area B												
Level 1	273	99	(36.3)	45	(16.5)	129	(47.3)	0	0	0	0	0
Level 2	447	151	(33.8)	71	(15.9)	225	(50.3)	0	0	0	0	0
Level 3	388	126	(32.5)	72	(18.6)	190	(49.0)	0	0	0	0	0
KH3, Area V	1789	622	(34.8)	271	(15.1)	896	(50.1)	0	0	0	0	0
KH3, Area X	8595	2582	(30.0)	1265	(14.7)	4748	(55.2)	0	0	0	0	0
KH3, Area VIII	159	60	(37.7)	22	(13.8)	77	(48.4)	0	0	0	0	0
KH6, Area 2	365	123	(33.8)	27	(7.4)	213	(58.5)	1	(0.4)	0	0	1
KH6, Area 1	109	26	(24.1)	16	(14.8)	65	(60.2)	1	(0.9)	0	0	1
KH1	698	210	(30.1)	54	(7.7)	430	(61.6)	1	(0.1)	3	4	0
KH4, Area C, Surface	726	255	(35.1)	-	(0.0)	471	(64.8)	0	0	0	0	0
KH4, Area C, Subsurface	177	44	(24.9)	11	(6.2)	122	(68.9)	0	0	0	0	0
KH4, Area N, Surface	807	270	(33.5)	27	(3.3)	505	(62.6)	0	0	0	0	5
KH4, Area N, Subsurface	106	31	(30.4)	3	(2.9)	68	(66.7)	0	0	0	0	4
South Town												
18	2157	73	(3.4)	6	(0.3)	2017	(93.5)	54	(2.5)	7	(0.3)	0
25	1655	80	(4.8)	1	(0.1)	1514	(91.4)	56	(3.4)	4	(0.2)	0
33	1355	137	(10.1)	4	(0.3)	1212	(89.5)	0	(0.0)	1	(0.1)	1
38	948	67	(7.1)	10	(1.1)	859	(90.6)	12	(1.3)	0	(0.0)	0
43	1110	122	(11.0)	0	(0.0)	971	(87.5)	13	(1.2)	4	(0.4)	0
45	982	60	(6.1)	1	(0.1)	861	(87.7)	56	(5.7)	4	(0.4)	0
47	1013	171	(16.9)	6	(0.6)	829	(81.9)	0	(0.0)	7	(0.7)	0
54	301	4	(1.3)	1	(0.3)	295	(98.0)	0	(0.0)	1	(0.3)	0
North Town												
SC4	840	7	(0.9)	1	(0.1)	483	(58.9)	324	(39.5)	5	(0.6)	20
SC1	1061	52	(4.9)	2	(0.2)	998	(94.2)	6	(0.6)	1	(0.1)	2
SC2	868	160	(18.5)	8	(0.9)	689	(79.6)	9	(1.0)	0	(0.0)	2
SC3a	1374	70	(5.1)	5	(0.4)	1275	(92.8)	24	(1.7)	0	(0.0)	0
SC3b	247	14	(5.7)	1	(0.4)	229	(93.0)	2	(0.8)	0	(0.0)	1

P: Polished red; B: Polished black (from black-top polished red or polished black); R: Rough; O: Orange (decorated Late or wavy handled) D; Decorated. Percentages are calculated excluding miscellaneous.

The required sample size is primarily dependent upon the proportion of various ceramic categories or number of attributes and the degree of accepted reliability balanced against time and effort. Our initial impressions indicated that main classes recognized by Petrie (*e.g.*, Polished Red, Rough, *etc.*) were potentially time-dependent. Using these categories it was found that a sample of 177 sherds (KH4, Area C, Subsurface) yielded an estimated frequency of Rough sherds within $\pm 7\%$ of that of the parent target population at a confidence interval of 95%. With a larger sample size of 696 (KH4, Area C, Subsurface) the estimate was within $\pm 3.5\%$ at the same level of confidence. The largest samples obtained provided an estimate of $\pm 1.5\%$. Thus, samples that are less then 500 sherds may be considered inadequate. Accordingly, collections from various parts of Site KH7 consisting of 159, 161, and 502 sherds were combined to arrive at a sample size of 882 sherds. The samples from Site KH3, Area VIII (159 sherds) and that from South Town, Area 54 (311 sherds) are too small to be adequate for seriation. We may note here, however, that subsurface samples from Site KH4 consisting of small collections of 177 and 106 sherds showed a similar frequency of ceramic categories (Table 1).

Correspondence between surface and subsurface collections was also tested at Site KH3B. Collections from the top three levels (5 cm each) at Area B (Table 1) revealed that there is no significant difference between the levels. A Chi-Square of 1.824 was obtained for a level of confidence of 0.05.

Investigation of the spatial distribution of ceramic sherds at KH3, Area X indicates that units measuring 2×2 m show a wide range of variation resulting from differences in activities, disposal, and randomness. Thus, samples for the purpose of seriation must be obtained from a sufficiently large area to obliterate the effect of functional variability. An area of 10×10 appears to serve that purpose in the present case. In the future, eight to ten collections from 2.5×2.5 m units chosen at random 25×25 m quadrates should be attempted to ensure that variations resulting from differences of activity or disposal are minimized.

At Site KH7, functional or disposal variability is minimized by combining the collections from the three areas of the site. Collections from Areas B, V, and X from Site KH3 are from sufficiently large areas. The effect of functional variability in these collections is considered low. Collections from Site KH4 are from 10×10 m areas and are thus considered suitable for temporal ordering. The collection from KH6 is marginally suitable. The collections from South Town and North Town are from 5×5 m units. The possibility of variations resulting from functional disposal differences is possible. Accordingly, in the future, random samples from large grid units should be obtained.

Methods

Graphic seriation and computerized multidimensional scaling techniques were used to order the collections. The major types used for seriation include Rough (R), Polished Red (P), Black polished sherds presumably from the Black-top Polished Red pottery type (B), Orange sherds (O) which may be derived from Late, Wavy-handled, or Decorated pottery, and Decorated sherds (D) from Decorated pottery. We also used three rim types of Rough sherds to carry out a number of different seriations using metric multidimensional scaling (Principal co-ordinate analysis, Torgerson 1958; Gower 1971) to plot the archaeological components. We report on three different analyses using percentages of the four pottery classes and one using rim types to create matrices of city-block distances (average absolute differences: Sneath and Sokal 1973). These city block distances were then treated as if they were euclidean distances (they are metric) and scaled metrically. The fast graphical technique devised by Meighen (1959) and modified by Ascher (1959) was also used to assess its utility for rapid exploration.

Meighen's method consists of using the three categories. The categories used here were the most common classes: 1. Polished Red; 2. Black Polished sherds, presumably from Black-topped Red Polished and Black Polished pottery; and 3. All other types. The percentage of each of the types is calculated and plotted on a ternary diagram. Following Ascher (1959) the percentage of two categories (here Black Polished and Red Polished sherds) are used to generate a binary plot. The points are then fitted to a best line. The order of the points, assuming that the variations of data express a linear function of time should reflect their order through time. The adequacy of the seriation can be judged by reference to available radiocarbon dates. The validity of a certain is also related to other factors. According to Dunnell (1970), seriation will not reflect perfect chronological order unless all units included in the seriation, belong to the same cultural tradition, and come from the same area. The collections used here are from the same region, within a total distance of 20 km, and are of the same Predynastic cultural tradition. The requirements for the duration of the units may practically be phrased in terms of the duration of the unit as not much greater than of their time difference (Marquardt 1978). Since the collections come from limited spatiotemporal units of the sites, it is very likely that the time spans they represent are less than those separating them and that they are comparable.

Results and discussion

The results of graphic seriation (Fig. 2) show a clear separation between a group of sites including KH3, KH7, KH1, KH6, and KH4 and another consisting of South Town and North Town. There also appears to be some order within the two groups,

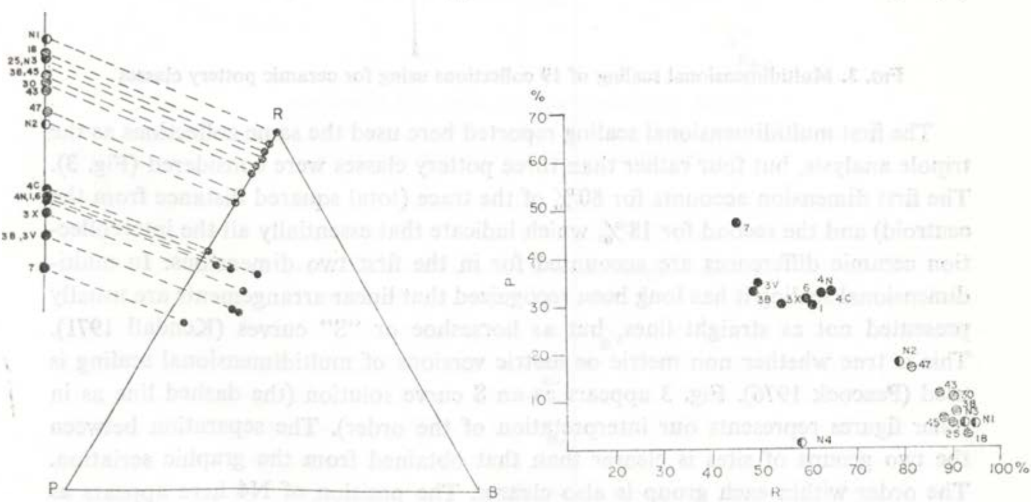

Fig. 2. Results of graphic seriation of ceramic collections from Predynastic sites in the Nagada region: a triple-pole (ternary) diagram and a binary diagram

The notation for the sites in this and other figure sis as follows: *1*: KH1; *3*: KH3; *4*: KH4; *6*: KH6; *7*: KH7; *18, 25, 30, 38, 43, 45, 47*: South Town; *N1, N2, N3, N4*: North Town.

although there are some collections that have no clear position, and the position of Collection 4 from North Town (N4) is uncertain. The first group has a frequency of Polished Red pottery equal to or greater that of Rough Pottery. At South Town and North Town the frequency of Rough Potsherds far exceeds that of the Polished Red sherds.

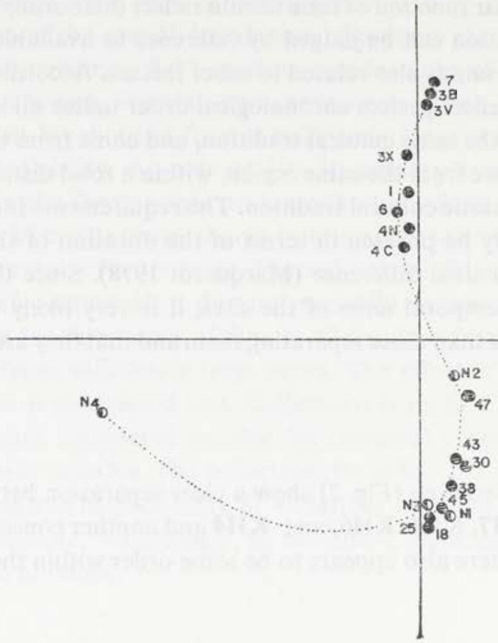

FIG. 3. Multidimensional scaling of 19 collections using for ceramic pottery classes

The first multidimensional scaling reported here used the same collections as the tripole analysis, but four rather than three pottery classes were considered (Fig. 3). The first dimension accounts for 80% of the trace (total squared distance from the centroid) and the second for 18%, which indicate that essentially all the intercollection ceramic differences are accounted for in the first two dimensions. In multidimensional scaling it has long been recognized that linear arrangements are usually presented not as straight lines, but as horseshoe or "S" curves (Kendall 1971). This is true whether non metric or metric versions of multidimensional scaling is used (Peacock 1976). Fig. 3 appears as an S curve solution (the dashed line as in other figures represents our interpretation of the order). The separation between the two groups of sites is clearer than that obtained from the graphic seriation. The order within each group is also clearer. The position of N4 here appears as younger than other collections from North Town. The difference between N4 and the other collections from North Town may well be indicative of both temporal and functional differences. Both North and South Town represent incipient urbanization. The transformation related to rapid urbanization may account for an accelerated rate of change in ceramics. We suspect that the exceptionally high content of Orange pottery may very well be related to functional changes related to advanced urbanization.

The group consisting of collections from North Town and South Town are temporally younger than other collections. The two sites have traditionally been regarded as Nagada II or Gerzean. The dating is supported by the sequence dates of ceramic collections from the central area at North Town and South Town which indicates a late Predynastic occupation equivalent to Kaiser's Zeitstufe IIcd. Sequence dates on ceramics and other artifacts from Site KH3 indicate that KH3 belongs to Kaiser's Zeitstufe IIab and Kemp's Group I. The radiocarbon age determinations (Hassan 1984) also indicate that the west-central area at South Town dates to 3,440 ± 70 B.C., and that the sites of the first group are older; KH3 dating to 3,830 ± 75 B.C., KH1 to 3,795 ± 75 B.C., and KH6 to 3,715 ± 90 B.C. (these dates are tree-ring calibrated weighted averages). It thus may be concluded that the first group belongs to an early Nagada group dating to about 3,850 - 3,650 B.C. (based on a range given 2 standard deviations of average age estimates from sites KH3, KH6, and KH1) compared with a late Nagada group dating to about 3,580 to 3,300 B.C., based on dates from South Town.

In order to mitigate the possible functional/activity-related variability and to reduce sampling error, we ran a further analysis with the collections grouped into eight larger collections each from one of the sites (Fig. 4). In this analysis the first

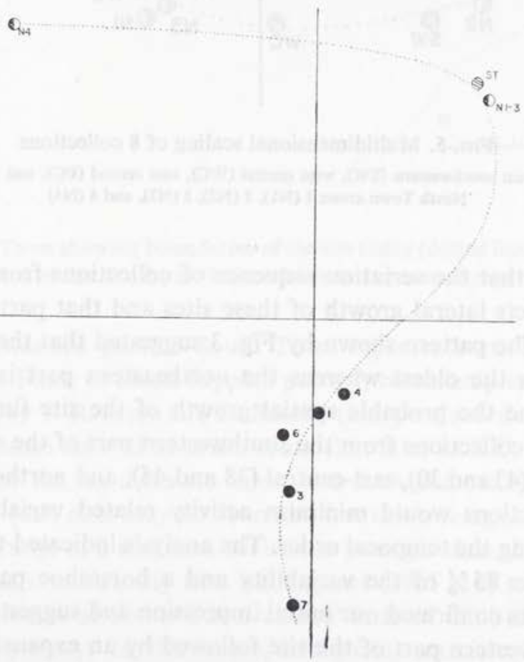

FIG. 4. Multidimensional scaling of 8 collections and 4 pottery classes

dimension accounted for 67% and the second 30% of the squared distance from the centroid. A horseshoe or S shaped curve is again shown with N4 at one end the KH1 - 7 sites at the other end. The sequence of the KH1 - 7 sites runs: KH7, KH3, KH6, KH1, KH4, North Town (Areas 1, 2, and 3), South Town and North Town Area 4 (the northernmost area at that site). North Town 4 was treated separately because of its exceptionally high content of Orange (Late) pottery (Table 1).

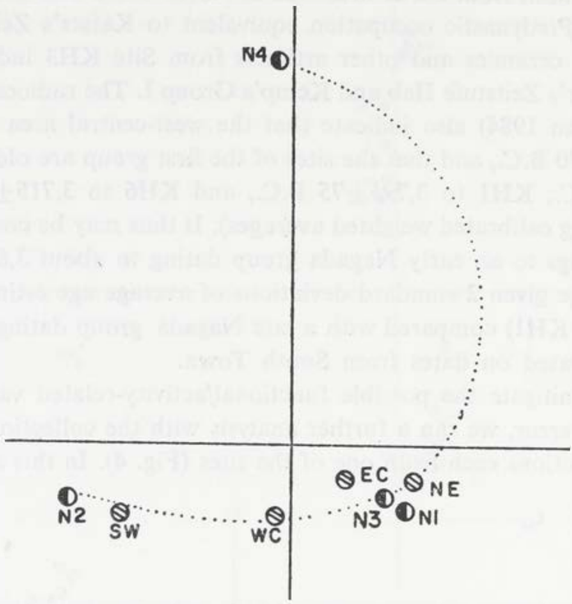

FIG. 5. Multidimensional scaling of 8 collections

South Town areas: southwestern (SW), west central (WC), east central (EC), and northeastern (NE)
North Town areas: 1 (N1), 2 (N2), 3 (N3), and 4 (N4)

We suspected that the seriation sequence of collections from South Town and North Town reflects lateral growth of these sites and that parts of these sites are of different age. The pattern shown by Fig. 3 suggested that the southwestern part of South Town is the oldest whereas the northeastern part is the youngest. We decided to examine the probable spatial growth of the site further by combining the order of large collections from the southwestern part of the site (collection (47), west-central area (43 and 30), east-central (38 and 45), and northeastern (25 and 18). These large collections would minimize activity related variability and sampling error, thus clarifying the temporal order. The analysis indicated that the first dimension accounted for 85% of the variability and a horseshoe pattern was obtained (Fig. 5). The results confirmed our initial impression and suggested an early occupation in the southwestern part of the site followed by an expansion into the central area and finally into the northwestern area (Fig. 6).

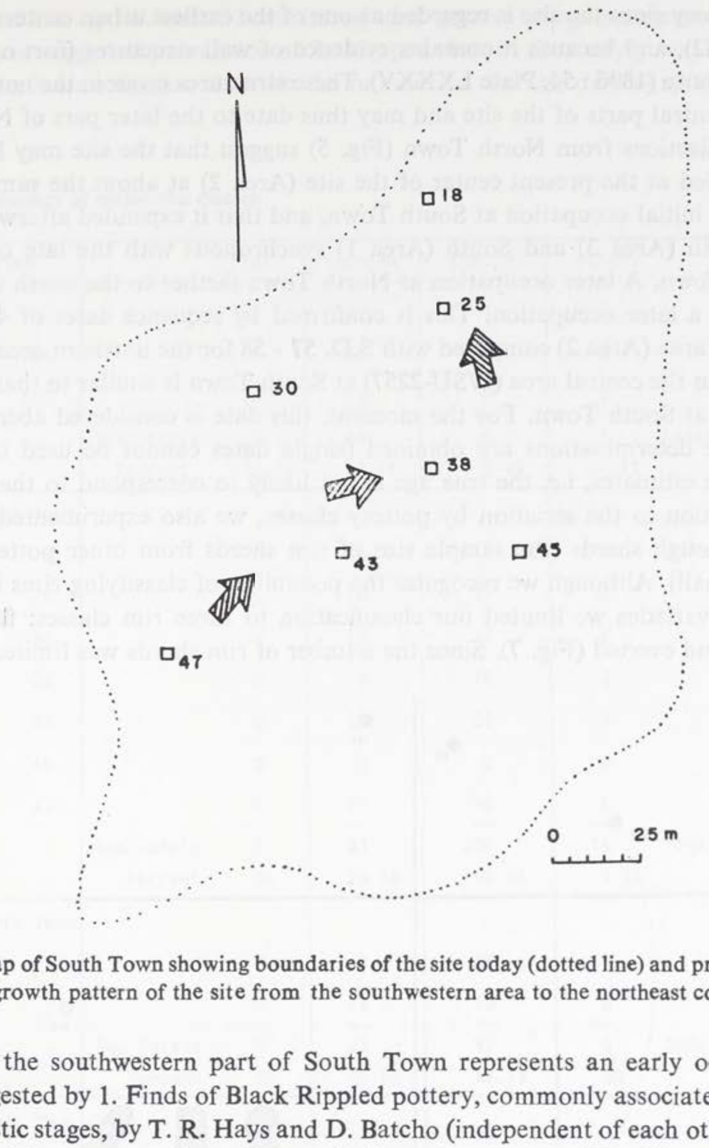

FIG. 6. Map of South Town showing boundaries of the site today (dotted line) and probable spatial growth pattern of the site from the southwestern area to the northeast corner

That the southwestern part of South Town represents an early occupation is also suggested by 1. Finds of Black Rippled pottery, commonly associated with early Predynastic stages, by T. R. Hays and D. Batcho (independent of each other); 2. Estimation of the sequence date of ceramics from that area at S.D. 44 compared with S.D. 52 or later for the northeastern area; and 3. A radiocarbon date (Tx-2465) of 3,845 ± 140 B.C. (this date may be aberrant, but the true age may be close to the younger limit of a range at 2 standard deviations younger than the mean, *i.e.*, about 3,550 B.C.). It is also noteworthy that Baumgartel (1965 : 16) suspected that there was an early occupation at South Town on the basis of the presence of sherds of White Cross-lined pottery. In the future, additional ceramic collections and more radiocarbon dates should be obtained in order to refine the model of site developmental history since the site is regarded as one of the earliest urban centers in Egypt (Kemp 1982), and because it contains evidence of wall structures (fort or palace?) noted by Petrie (1896 : 54, Plate LXXXV). These structures occur in the northeastern and east-central parts of the site and may thus date to the later part of Nagada II.

The collections from North Town (Fig. 5) suggest that the site may have been first occupied at the present center of the site (Area 2) at about the same time as that of the initial occupation at South Town, and that it expanded afterwards both to the north (Area 3) and South (Area 1) synchronous with the late occupation at South Town. A later occupation at North Town farther to the north represents apparently a later occupation. This is confirmed by sequence dates of 46 - 48 for the central area (Area 2) compared with S.D. 57 - 58 for the northern area (Area 4). A date from the central area (WSU-2257) at South Town is similar to that from the older area at South Town. For the moment, this date is considered aberrant until further age determinations are obtained (single dates cannot be used to provide narrow age estimates, *i.e.* the true age is not likely to correspond to the mean).

In addition to the seriation by pottery classes, we also experimented with rim types of Rough sherds (the sample size of rim sherds from other pottery classes was too small). Although we recognize the possibility of classifying rims into many types and varieties we limited our classification to three rim classes: flat-topped, rounded, and everted (Fig. 7). Since the number of rim sherds was limited, a larger

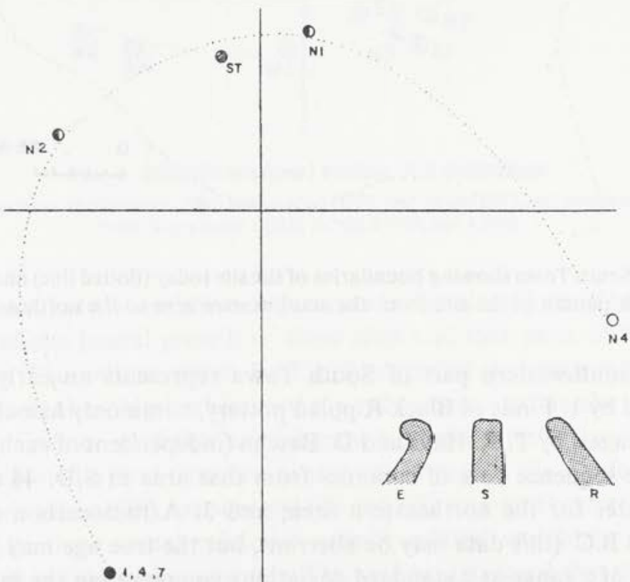

FIG. 7. Multidimensional scaling of three rim classes of Rough Pottery

E: Everted; S: Straight; R: Rounded
1, 4, 7: Sites KH1, KH4, and KH7 from Early Nagada group; *ST*: South Town area; *N1*, *N2*, and *N4*: North Town areas 1, 2, and 4

number of rim types would have introduced greater sampling error. Our initial impressions suggested prevalence of flat-topped rims in the early group and everted rims in the later ceramics. Because the number of rim sherds was small (Table 2),

Table 2

Frequency of major rim classes

Sites		Flat	Rounded	Everted	Others	
KH1		13	20	4	0	
KH4		8	36	1	0	
KH7		6	3	0	1	
	Sub Totals	27	59	5	1	Total 92
	Percent	29.3%	64.1%	5.4%	1.1%	
South Town						
18		0	6	42	0	
25		0	16	37	2	
30		0	15	37	7	
38		0	9	16	2	
43		0	20	29	3	
45		0	0	5	0	
47		0	27	40	0	
	Sub Totals	0	93	206	14	Total 313
	Percent	0%	29.7%	65.8%	4.5%	
North Town						
1		0	9	28	0	
2		0	14	19	0	
	Sub Totals	0	23	47	0	Total 70
	Percent	0%	32.9%	67.1%	0%	
North Town						
4		20	10	16	0	Total 46
	Percent	43.5%	21.7%	34.8%	0%	

the frequencies from Sites KH1, KH4, and KH7 were combined as was South Town. The results of this scaling show another horseshoe with the first two dimensions accounting for 100% of the squared distance. Again we see an order from the early Nagada group (KH1, KH4, KH7) to South Town and the main part of North

Town, and finally to the northern part of North Town (N4). This latter area has by far the largest percentage of everted rims (40 %). Therefore we suggest that stylistic attributes of rims may be useful in future seriations of Predynastic pottery.

Summary

Seriation of collections of potsherds from Predynastic settlements in the Nagada region using multidimensional scaling indicates that this approach to relative dating is promising. The preliminary results indicate that the sites may be ordered into an early Nagada group consisting of sites KH3, KH7, KH4, KH1, and KH6 and a later group consisting of South Town and North Town. The later group is equivalent to Nagada II or Nagada IIcd of Kaiser. This sequence is also confirmed by radiocarbon dates and sequence dates. The seriation also suggest that South Town as well as North Town expanded horizontally from earlier occupations smaller than their present size (this has interesting implications for settlement analysis and demographic estimates). At South Town the earliest occupation was at the southwestern area. The results also indicate that South Town and North Town were for the most part contemporaneous, but an occupation post-dating South Town is noted in the northern area of North Town. A preliminary evaluation of the potential of the frequency of rim types of Rough sherds in seriation also suggests that it is a promising method. We are encouraged by these preliminary results and anticipate that further work will provide a better understanding of the history of settlements and settlement growth patterns in the Nagada region. Similar applications in other regions may also prove profitable.

Acknowledgements

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

MICHAEL ALLEN HOFFMAN

A stratified Predynastic sequence from Hierakonpolis (Upper Egypt)

Introduction

This paper presents a preliminary report on the discovery of a stratified archaeological sequence spanning the early Archaic through Predynastic periods (*ca* 2,900 - - 4,000 B.C.) at the site of Hierakonpolis (also known as Nekhen or the Kom El-Ahmar) in southern Upper Egypt. The 1984 excavation season lasted from January 22 through March 15 and was designed to complement our long term, regional study of the Hierakonpolis area by providing direct stratigraphic confirmation of the local Predynastic sequence and geological insights into the nature and extent of floodplain settlement and riverine activity at that time.

Objectives

Our objectives for the 1984 season were: 1. To determine the depth and approximate horizontal extent of Predynastic archaeological deposits under the Archaic-Old Kingdom town of Nehken; 2. To test the feasibility of conducting controlled excavations below the groundwater table in the modern alluvium; 3. To develop a stratigraphically and empirically based regional chronology that would tie together the extensive desert, Predynastic settlements and cemeteries we explored in previous seasons; 4. To link directly the Predynastic and Dynastic archaeological sequences; 5. To determine the sedimentological and environmental factors affecting Predynastic settlement in this portion of the Nile floodplain.

Methods

Archaeological investigations concentrated in a ten meter square, 10N5W, in the early historic town of Nekhen, where my 1969 excavations had located clearly Protodynastic (Naqada III) pottery and architecture (Hoffman 1970; 1972). In addition to careful stratigraphic excavations in 10N5W, limited cleaning in adjacent squares 9N5W and 9N4W helped clarify architectural problems related to the Predynastic occupation, notably the existence of a large, Naqada II/III town or palace wall.

The archaeological sequence from 10N5W was supplemented by three geological trenches dug along a canal between Nekhen and the desert's edge and a transect of 22 cores as well as 4 special cores taken in each corner of 10N5W. Time does not permit discussion of geological and sedimentological findings, but a detailed report is available in Hoffman, Hamroush and Allen (1987).

Square 10N5W was first cleared of the dense Halfa grass and thick salt encrustations which had accumulated since our 1969 excavations. Next, grid points were re-checked with reference to cement monuments established in 1967 to insure the accuracy of theodolite mapping and leveling. A temporary datum of zero was established on stake 11N5W and later related to absolute elevation ASL (81.90 m). The precision of such levels is especially crucial for our objective of studying the relationship between buried Predynastic archaeological deposits and mid Holocene Nile flood heights. All mapping of features and artifacts within 10N5W was done by reading azimuths with a Nikon Wild-type theodolite placed over stake 10N5W and by chaining distance with a cloth-nylon composition tape and plumb bob.

After cleaning 10N5W, a core was drilled by hand in each corner to determine the approximate depth and sequence of underlying cultural deposits. Depth from the existing archaeological surface (*ca* 1 m below adjacent ground surface) was calculated by measuring the augur handle before and after a new boring was made. All readings were then related to both modern, adjacent ground surface and absolute elevation ASL. Soil and artifact samples from each core were hand sorted on the spot by staff archaeologists and geologists. When collapse of the core hole due to groundwater erosion threatened to contaminate a sample, that sample was discarded and a new one taken after cleaning out the hole. Each augur cut produced a sample between 12 and 20 cm in depth and about 10 cm in diameter. Enough sherds were recovered to indicate a normal chronological sequence extending back, possibly to Badarian times (*ca* 4,000 - 5,000 B.C.?). The four cores in 10N5W indicated that the desired, stratified Predynastic deposites were present, gave us a rough idea of their total thickness (about 4 m) and allowed us to monitor fluctuating groundwater levels. Additional coring from south to north across Nekhen indicated widespread Predynastic occupation buried under the modern floodplain and suggests that our previous estimates of population size for this period were too conservative.

Subsequently, our primary goals at 10N5W were to establish a reliable stratigraphic sequence and obtain a maximum amount of architectural and spatial information before the groundwater forced us to restrict our excavations to a small sondage that could be kept dry by pumping. To accomplish these goals, all walls and floors were carefully cleaned to their 1969 condition (Halfa roots notwithstanding) and architectural units and features re-mapped and then excavated with attention to detail. Of especial interest were the latest, historic building phase (Archaic) and some minor intrusions (New Kingdom – Ptolemaic) in the southernmost part of the square. Once it was determined that the latest major structures in 10N5W were probably First Dynasty (*ca* 3,100 - 2,900 B.C.) and no later than Second Dynasty (*ca* 2,900 - 2,700 B.C.), it was possible to work back systematically to earlier, prehistoric levels. Significantly, there were no architectural or stratigraphic breaks between early historic and late prehistoric phases (*i.e.*, between Archaic and Protodynastic, Naqada III) or, for that matter, within the Predynastic sequence (from Naqada III through Naqada I or I/II). To faciliatate recording, the square was subdivided into a number of excavation units reflecting cultural or pedological features and into four quadrants (adjusted to allow for architectural units). Additional balks were used within the square to complement the stratigraphic information provided by the profiles on the four sides of the larger square.

As in past seasons, all ceramic and stone artifacts and faunal remains were analyzed and quantified according to standarized, multivariate methods (Hoffman *et al.* 1982). Despite the apparent lack of macro-botanical remains comparable to those from our desert sites (El Hadidi 1982), extensive floatation samples were taken but yielded only carbonized wood.

The dirt from most features and every level of the sondage was sifted through 1/4 inch mesh. In the lower levels of the sondage it was possible to water sieve using excess runoff from our pump. In some instances, in the upper, Protodynastic (Naqada III) levels, because of the heavy, moist clay soils, the very large artifact sample and the high degree of attention possible through slow excavation, some units were not screened.

A major aim of this season's research was to conduct controlled excavation below the groundwater table. Given the implications of this technique for future stratigraphic research in the Nile Valley, a brief discussion of our field procedures is in order. It was originally hoped to excavate a large area using heavy duty mud and sludge pumps and either a well point or a stepped moat system designed to slowly lower the water table and provide maximum horizontal and vertical control. It was assumed that this technique could work up to 1.5 m below the groundwater table. Several circumstances forced us to revise this strategy. First, coring showed at least 4 m of Predynastic deposit (3 to 3.5 m of which were under water). Second, water pressure was stronger than anticipated. Third, our pumps, generously donated by Peabody-Barnes, Inc. of Ohio, arrived late in the season. Fourth, because of a shortage of research funds, it was impossible to keep the pumps running all night. Thus, every morning our sondage bore increasing resemblance to a swimming pool.

Despite such problems, the techniques we developed proved successful. By selecting a reduced area for our deep sondage and by placing a deep sump next to it, we were able to dig in arbitrary levels over 1 m below the groundwater table. Initially, to stabilize the sump and prevent collapse of the saturated deposits, a 50 gal. steel drum, open at both ends and with numerous holes punched in its sides, was driven down almost to the base of ceramic bearing deposits (*i.e.*, nearly to the lowest levels reached by coring). Later, another 50 gal. drum was placed on top of the first, lining the entire sump pit. Because it was impossible to pump after working hours due to a shortage of funds, water rose in our sondage every evening, causing some collapse of our profiles. Consequently, every morning before excavating commenced and after pumping the sondage dry, we removed all collapse to prevent contamination of our stratigraphic samples.

The sondage began inside a triangular shaped Protodynastic room measuring approximately 5.40 m × 4.80 m × 2.50 m. It was subsequently reduced to an area 2.75 m × 2.60 × 1.60 m to accomodate the sump and finally finished as a rhomboid 1.30 × 1.10 m on its sides and 0.35 m × 0.70 m on its ends. Despite the ever decreasing area forced by the need to buttress against groundwater-induced collapse, the ceramic samples are sufficiently variable and well stratified to trace the principal periods of Predynastic occupation back to the late Amratian or transitional Amratian-Gerzean period (Naqada I or Naqada I/II). To give an idea of the size of the ceramic sample, a total of 10,631 body sherds were recovered from the sondage, 171 of which came from the lowest level. Because of constant soil wetness, it was impossible to recover features or detect minute soil changes in the lowest levels of the sondage. Fortunately, both the stratigraphic profiles and the ceramic sequence indicate no major intrusions or discontinuities. After excavation, the sondage was backfilled to prevent collapse.

In summary, we were successful in using pumps to allow controlled stratigraphic excavation of sub-groundwater archaeological deposits in the modern Nile alluvium at Nekhen. Our only regret is that we were unable to reach the bottom of those deposits. Fortunately, we now know that this objective is feasible and hope to resume deep probings at a future date.

Results

After almost two months of fieldwork, we have achieved the following results during the 1984 season at Hierakonpolis: 1. Through auguring and coring we have established the existence of about 4 m of stratified Predynastic settlement deposits under the Archaic levels at Nekhen and the surprisingly wide extent of those buried deposits under the modern floodplain; 2. The use of special heavy duty mud and sludge pumps has enabled us to excavate over 1 m below the groundwater table and maintain stratigraphic control; 3. We have directly linked Dynastic and Predynastic levels at Nekhen – a site known to have played a major role in the initial political of unification of Egypt and the attendant transition from prehistory to history; 4. We have recovered a large and stratified ceramic sequence spanning Protodynastic (Naqada III, *ca* 3,100 - 3,200 B.C.), Gerzean (Naqada II, *ca* 3,200 - 3,500 B.C., Fig. 1) and a portion of the Amratian (Naqada I, *ca* 3,500 - 3,800 B.C.) periods and have preliminary indications of underlying Badarian and Neolithic levels; 5. We have identified and recorded two superimposed Protodynastic (Naqada III)

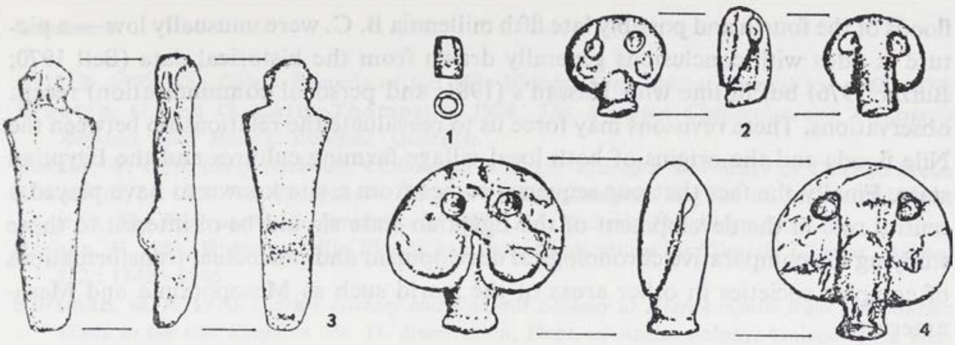

Fig. 1. Hierakonpolis. Special finds from the north-central section, Level 3, 10NSW, Naqada II/III

1: Banded white and gray serpentine barrel bead (find 156 - 5, Reg. 419); *2*: Black diorite "bucranium" or elephant amulet (find 156 - 4, Reg. 419); *3*: Ceramic figurine (find 156 - 1, Reg. 417); *4*: Banded white and gray serpentine "bucranium" or elephant amulet (find 156 - 3, Reg. 419). All objects 1 : 2

house floors and an adjacent large town or palace wall of Protodynastic-Gerzean (Naqada II/III date, *ca* 3,300 - 3,200 B.C.). This information is especially valuable because it complements our earlier research with Predynastic settlement plans and house types in nearby low desert sites and demonstrates, once more, that post molds and wall trenches can be found in Egypt (if only one knows how-to look for them!); 6. We have established the outlines of mid-Holocene erosional and desposi-tional events in the local floodplain after *ca* 5,000 - 4,000 B.C. Specifically, the site of Nekhen was founded on a topographic high created by the deposition of sands and gravels at the mouth of the Wadi Abul Suffian. Concurrently, it seems as if the Predynastic period and hypothesized local Neolithic (*ca* 5,000 - 3,100 B.C.) were characterized by low average annual Nile floods and that the border of the low desert was somewhat closer to the Nile than at present. Finally, it is possible that a branch of the Nile flowed near the site of Nekhen but further fieldwork is required to test this hypothesis.

Significance of the research

This year's findings at Hierakonpolis provide the first direct stratigraphic link between Dynastic and Predynastic periods ever found at a major archaeological site in Egypt. It is also the first time since Caton-Thompson's 1924 excavations at Hemam-mieh (Brunton and Caton-Thompson 1928) that a well-stratified succession of super-imposed Predynastic components have been recovered from a settlement site. Our work demonstrates conclusively that many large Predynastic sites still lie deeply buried in the Nile floodplain and that, with appropriate excavation techniques, these can yield valuable data. Geologically, our reseaech suggests that the Nile floods of the fourth and possibly late fifth millennia B. C. were unusually low – a picture at odds with conclusions generally drawn from the historical data (Bell 1970; Butzer 1976) but in line with Hassan's (1981; and personal communication) recent observations. These revisions may force us to reevaluate the relationship between the Nile floods and the origins of both local village farming cultures and the Egyptian state. Finally the fact that our sequence comes from a site known to have played a central role in the development of the Egyptian state should be of interest to those studying the comparative chronological development and processual transformations of complex societies in other areas of the world such as Mesopotamia and Mesoamerica.

Acknowledgements

First, our thanks go to the Egyptian Antiquities Organization for sponsoring under its auspices our work at Hierakonpolis. Our research was made possible through a grant from the U.S. National Science Foundation and residual funds from the Smithsonian Institution, PL 480 Foreign Currency Program (Office of Fellowships and Grants) administered by the American Research Center in Egypt. A timely preservation and conservation grant was provided by the Chase National Bank through the American Research Center in Egypt. Our ability to work successfully near and below the water table is due to a generous contribution of two pumps from Peabody Barnes, Inc. of Mansfield, Ohio. Room and board while in the field was kindly provided by the Egyptian Ferrosilicon Co.; this allowed us to stretch our funds beyond all reasonable expectations, and it nearly doubled our budgeted field time. We would like to thank these agencies and companies for their generous and timely assistance and the personnel of the following organizations for numerous personal and professional courtesies; The Egyptian Antiquities Organization (Dr. Ahmed Kadry, Director), the Egyptian Ferrosilicon Co. (Mr. Mamdouh Bayoumi, President), the American Research Center in Egypt, and Chicago House, Luxor.

We dedicate our work this year to the memory of Dr. Labid Habachi, who remained until the very end a steadfast friend of our expedition and a source of aid and encouragement.

The members of our 1984 staff included the following individuals without whose hard work none of our discoveries would have been possible: B. Adams (egyptologist, ceramicist, registrar), H. Barakat (archaeo-botanist), R. Greenlee (photographer, archaeological technician), H. Hamroush (geochemist, geologist), J. Long (assistant director, archaeologist, lithic analyst), J. McArdle (archaeozoologist, physical anthropologist), G. Quadis (inspector for the Egyptian Antiquities Organization), M. Trad (egyptologist, toponymist, registrar). We were also fortunate in having the temporary services of R. and H. Jaeschke of Chicago House, Luxor, consulting on matters of preservation and conservation.

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JOANNA AKSAMIT

The gold handle of a fishtail dagger from Gebelein (Upper Egypt)

In 1900, at Qena, J. E. Quibell purchased a set of predynastic objects for the Cairo Museum. The dealer [1] insisted that he had bought them from a peasant living in the vicinity of Gebelein. Among other items, the set included a flint fishtail dagger with a gold handle [2] (Cairo, Egyptian Museum 34210). It was published by Quibell a year later (Quibell 1901).

The dagger (Fig. 1) is the most peculiar object in the set. The handle consists of a downward broadening shank, whose crooked tips enfold a flint blade, to which it is fastened with three rivets. The decoration engraved on both sides of it is similar to patterns painted on Decorated pottery. On one side (Fig. 2), there is a boat with two cabins, an animal standing on the front cabin and a standard placed on the back cabin, as well as a motif usually described as a "tree" (*e.g.*, Keimer 1934 : 189 - 190). On the opposite side three women standing one by another, also on a boat, are engraved. One of the women handles a fan-shaped object. The oars of the two boats are engraved on the upper edge of the handle.

Already Quibell (1901) had made a mention of the possible inauthenticity of the handle; it seemed strange to him that its two parts were soldered and that the handle was fastened to the flint blade with rivets. Yet, despite that, he apparently believed it to be authentic.

For many years to come, the handle was regarded as a close analogy of patterns painted on Decorated pottery (Capart 1905 : 69; Newberry 1913 : 136; Vandier 1952 : 549). Baumgartel (1960 : 5 - 6) was first to point out the few peculiarities of its decoration. According to her, the most strange features include the snake-like bend of one of the women's hand, the form of a fan-shaped object held by this woman which seems to be a transformation of another motif known from Decorated pottery,

[1] According to the *Journal d'entrée* his name was Girgis.

[2] *Journal d'entrée* No. 34210, *Catalogue Général* (Curelly 1913: 272, Pl. XLVII), No. 64868, length 30 cm.

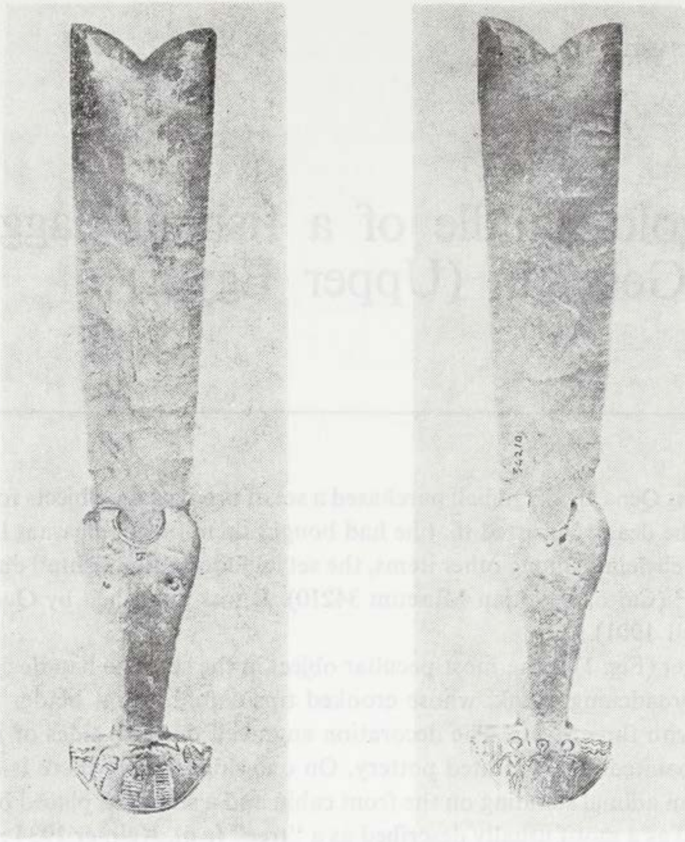

FIG. 1. Gebelein. Fishtail dagger with a gold handle

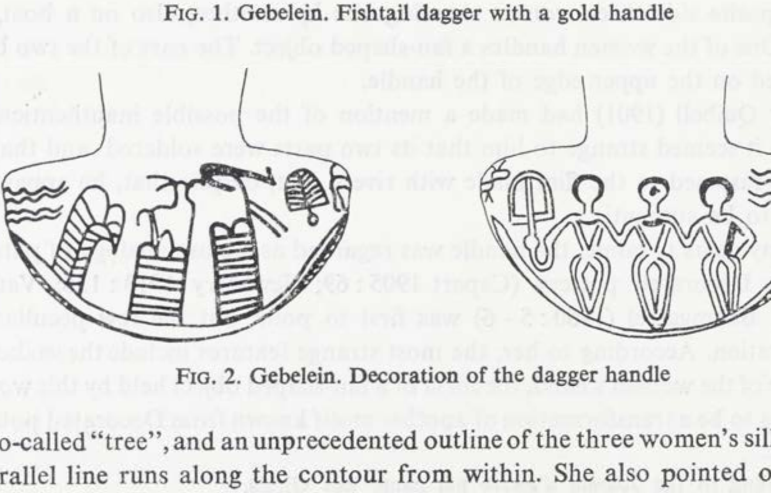

FIG. 2. Gebelein. Decoration of the dagger handle

the so-called "tree", and an unprecedented outline of the three women's silhouettes – a parallel line runs along the contour from within. She also pointed out the odd appearance of the animal standing on the cabin of the boat. It hardly has any legs at all; instead, three horns are visible on its head.

A few other pecularities of the decoration may be added to Baumgartel's description: a "double" prow decoration, with no formal analogy elsewhere, a markedly higher back cabin of the boat, and distorted proportions of the three women's silhouettes. A similar group occurs on a vessel formerly in the MacGregor Collection (MacGregor 1922: No. 1754, Pl. LIII) [3] and on a famous Decorated vessel in the Metropolitan Museum of Art (*e.g.* Baumgartel 1960: Pl. XIII : 1 - 3). The differences are easy to detect. There, the women's heads are much larger, their necks are shorter, their linked arms appear to reach their waists rather than to end halfway their torsos. The women's silhouettes represented on the handle are strikingly schematic: the geometric precision with which their linked arms are depicted is particularly noteworthy; additionally, their hips are too round and their legs too short in comparison with their torsos. The "fan" is disproportionately big, almost twice the size of the woman's head. On the vessel from the MacGregor Collection, one of the women also handles an object that might be a fan. Yet it is relatively smaller and the method of depiction is different: radial crosspieces can be seen within, and the hand by which the object is handled is bent at an acute angle.

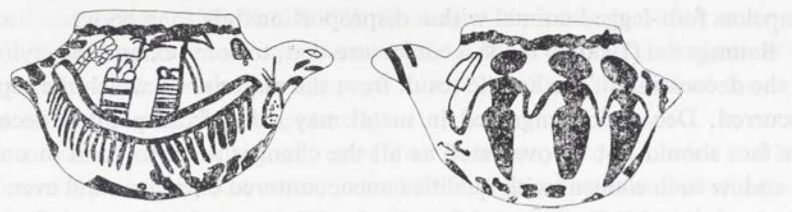

FIG. 3. Decorated vessel from the MacGregor collection, now in a private Swiss collection

A private Swiss collection also includes a bird-shaped vessel (Fig. 3), formerly in the MacGregor Collection, too (MacGregor 1922 : No. 1756; 5000 Jahre 1961: No. 12; Schlögl 1978: 20, Pl. 16a, b) [4], with a decoration almost identical with that on the handle in question. There, the preserved features include the apparent oddities of the handle: the unnatural bend of the hand of the woman holding a fan and the somewhat higher back cabin. The decoration is somewhat coarse and awkward, yet with more traits of authenticity than in the case of the handle. The prow decoration of the boat corresponds to forms known from other relics and the animal depicted on the front cabin can be easily identified.

[3] This is the only example I know of red on buff decoration on a vessel of this shape. This is a usual form of stone vessels and their imitations (*cf.* von Bissing 1913: 45, Nos. 2145, 2146, Pl. II).

[4] Schlögl's (1978: 20) analogy of the shape of the vessel (Petrie 1920: Pl. XXIV: 12) is probably the result of a misprint as the vessel is fish-shaped. The other specimen published by Petrie (1920: Pl. XXV: 5) is rather an analogue of the Bassel vessel. *Cf.* Murray 1911: 43, Nos. 28, 29, Pl. XXIII: 28 - 29.

What is more important, however, is that the decoration present on the two relics is almost identical. Although at the first glance scenes painted on Decorated pottery may seem uniform and monotonous, no two vessels of this type have figural representations with identical elements as is the case here. The repertory of individual decorative elements and their layout are never repeated, whereas, on examination of the vessel and the handle, one may gather an impression that the vessel was not unknown to the maker of the decoration of the handle. The pattern seems "calqued", especially every stroke of the standard runs exactly the same way on both objects.

Moreover, all the slightly odd features of the decoration of the vessel are grossly exagerrated on the handle: the somewhat blurred prow decoration is split into two and presented as if with a knowledge of the rules of perspective, the thick undulating lines above the bird's tail are transformed into four strikingly regular waves, and the bend of the hand with a fan, which, though odd on the vessel, might have resulted from a wish to depict a strange gesture, is quite unnatural on the handle. On the vessel, the rear cabin of the boat seems higher mainly because the crosspieces are packed more closely; in fact, however, the difference in height is insignificant. The bird painted on the front part of the vessel (hardly recognizable on Fig. 3, left) has become a small, shapeless four-legged animal with a disproportionately long body.

Baumgartel (1960: 6) made a conjecture that, to some extent, the stylistic oddities in the decoration of the handle result from the material on which the representation occurred. Decoration engraved in metal may differ from painted decoration. Yet the fact should not be overrated as all the changes seem to bend in one direction: to endow each element with qualities unencountered elsewhere and even Baumgartel admits that engraving in metal does not explain the snake-like arm of one of the women. Moreover, one can hardly agree that the double outline of the silhouettes is the result of engraving in metal because there is no obstacle to depicting painted figures in the same way.

The most difficult problem to settle, however, is the shape of the handle. This is the only thus shaped handle of a fishtail blade. Yet a dagger found at el-Amrah which does not belong to the fishtail type (Randall-McIver and Mace 1902: 23, 40, Pl. VI: 1 : 2, described as a copper one in the publication and found to be made of silver when cleaned – Baumgartel 1960: 9) has an ivory handle almost identically shaped. This is the only analogue of the Gebelein handle as regards the shape[5]. One can hardly surmise that the former was a model for the latter as the el-Amrah dagger was found (in a grave, though a plundered one) roughly at the time when the Gebelein dagger was purchased, and published one year after the publication of Quibell's (1901) paper.

[5] The object found at Hierakonpolis (Quibell and Green, 1902: 50, Pl. LXIV: 7) may be a fragment of a similar handle. In the publication it is described as a fragment of a fan handle. Perhaps the semicircular lines on the blade of another, copper dagger also found at el-Amrah (Randall-MacIver and Mace 1902: 20, Pl. X: 5; Baumgartel 1960: Pl. II: 9) are traces of a similar handle.

As regards the other two gold handles of flint knives known, the handle of Djer knife (Needler 1956) was made by wrapping gold foil round the tip of the flint blade, and the thickness of another knife, also in Cairo (Quibell 1904; 1905: no. 14265)[6], is likewise only slightly bigger than that of the blade, whereas the handle of the Gebelein dagger is rather heavy and massive. Hence, contrary to Quibell's (1901) assertion, it does not seem plausible that it was made only of a thin gold sheet. But if the handle had been made of solid gold, too great quantity of this metal would have been necessary. Probably it is only gold-covered.

The fastening of the handle to the fishtail blade, by means of three rivets, is also without parallel. The handle of the silver el-Amrah dagger is fastened with one rivet. It is beyond doubt that at least the middle rivet passes through the blade of the Gebelein dagger because it is not possible that the blade could end just after getting between the two parts of the handle, and it cannot be exluded that the two side rivets do not pierce the blade because of its getting narrower or being notched at this point. But no other fishtail blade bears traces of fastening a handle in such a way. None has any holes at the pointed end and boring such a hole in flint would have been a serious technical problem in predynastic times. Clay models of fishtails from Hierakonpolis (Quibell and Green 1902: Pl. LXVIII: 2) carry such holes, but they were undoubtedly used for suspension of small-sized models. Most probably the hole in the only metal fishtail blade known (Ayrton and Loat 1911: Pl. XIX: 5), had the same function because of its run from edge to edge.

There is much to indicate that, whatever their function, fishtail blades had handles of different type: string was wound round their pointed ends and Petrie found such a blade with traces of string at Nagada (Petrie and Quibell 1896: 41).

In comparison with the handle of the el-Amrah dagger, the proportions of the Gebelein handle are markedly distorted: the shank is longer and the tips clasping the blade are relatively smaller and less hooked. Baumgartel (1960: 6) also pointed out that the handle is too small in comparison with the blade and does not cover the edges which are left unfinished.

As has been mentioned above, the dagger in question comes from purchase. The dealer insisted that it had been found in a grave with three other flint knives, a stone knife with a fragment of an ivory handle, a wooden staff, a vessel with boats painted on it, and a wooden bedstead with legs shaped like bull's feet[7]. The chronological inconsistency of these objects is noteworthy: furniture with legs shaped like bull's legs does not precede the First Dynasty, while vessels with painted boats are typical of Nagada II. It is not very plausible, therefore, that the above mentioned objects were

[6] Its decoration is figural, but without human silhouettes. It is the only one mentioned by Maspero (1910: 518; 1915: 299) as an analogue of the handle of the Gebelein dagger.

[7] The relics purchased by Quibell feature in *Journal d'entrée* under 34210 - 34217; there are as many numbers as objects, but the stone knife and its ivory handle bear separate numbers. *Journal d'entrée* makes no mention of the bedstead.

found in one grave. This does not necessarily provide evidence against the authenticity of the dagger [8], although it does add to doubts around it. Yet, even though the authenticity of the fishtail blade raises no doubt, which also applies to the flint knives purchased at the same time, the vessel with painted boats has not been published and I have had no access to it either [9]; the wooden staff and the stone knife, as observed by Davis (1981: 36, note), could also be forgeries.

It is not without significance that the object in question comes from the vicinity of Gebelein. Many very strange objects including, among others, a group of vessels painted red on buff like Decorated pottery, but with very peculiar decoration (el-Yakhy 1981: Fig. A: 3, 9, 12, 13; Waite 1951: Pl. 14; Widmer 1968), come from the area. The three women standing on the boat without cabins are reminiscent of the scenes painted on some of them (*e.g.*, Widmer 1968: Fig. 2). The authenticity of these vessels and other objects has not been definitely settled, but their decoration is so distinct that if they were authentic, one could speak of a local convention of decorating vessels and other objects (Kantor 1944: 122, el-Yakhy 1981: 83). Yet there is more ground for believing that the peculiar decoration is a modern addition to genuine predynastic vessels (Brunton 1934; Crowfoot-Payne *et al.* 1977; Bourriau 1981: 40). It is very probable that new predynastic relics were produced and genuine objects additionally embellished with painted or engraved ornaments in order to increase their price in a centre operating near Gebelein at the turn of the 19th century. Davis (1981: 36, note) has recently pointed out the need for a re-examination of all relics originating from the area.

There is much to indicate that the pattern engraved on the handle might have been copied from the decoration on a vessel now in a private collection in Switzerland. We have no data as to the provenance of the vessel, but the MacGregor Collection included many, also genuine, objects purchased at Luxor and its vicinity. But if the copying had taken place in the predynstic period, this would have been the only known case of such practices.

One should not insist that every relic with slightly untypical qualities is a forgery. One may only speak about qualities departing from, or inconsistent with, the characteristics of the given period. The decoration of the handle bears many traits of the latter group.

It seems to be beyond doubt that the fastening of the handle to the authentic fishtail blade took place in modern times. In this case also soldering of the two parts of the handle considered strange by Quibell (1901) would not have been unlikely. But the shape of the handle is the foremost argument in favour of its authenticity,

[8] Scharff (1929: 146; 1931: 44) mentions instances of relics of unquestioned authenticity having been quoted to come from one grave although, because of their chronology and type, they could not have been found together.

[9] *Journal d'entrée* No. 34216. It does not feature in the *Catalogue Général* (von Bissing 1913) although the volume was published thirteen years after the purchase of the set and comprises numbers beginning with 39.

though not necessarily in favour of the authenticity of the decoration. Without through technical investigation it is not possible to establish the authenticity of the handle. Yet one should be aware of the possibility that not only the fastening of the handle to the blade, but also the decoration took place in modern times in the mentioned centre near Gebelein.

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TADEUSZ DZIERŻYKRAY-ROGALSKI

Sur la paléodemographie de l'oasis de Dakhleh (Egypte)

La première mention de l'oasis de Dakhleh faisant partie du groupe appelé „Sept oasis de l'Égypte ancienne" remonte à l'an 1447 av. n. e. Cette oasis est alors connue sous le nom de Kenmet et reste en contact étroit avec Diospolis Parva (Kenmet of Diospolis Parva). Une information suivante, dans l'orde chronologique nous est fournie par une stèle datèe à env. 945 av. n. e. D'autres informations concernent plutôt non pas une seule mais deux oasis voisines, c'est-à-dire Khargueh (Wah el-Khargeh – the Outer Oasis) et Dakhleh (the Inner Oasis). Des mentions ultérićures remontent à l'époque de la XXVI^{e} dynastie et du I^{er}s. av. n. e. Ces informations, néanmoins, ne sont que fragmentaires.

L'isolation naturelle de deux oasis, et surtour de Dakhleh, très peu accessible, sont à l'origine du fait que l'Europe n'en a paris connaissance qu'au début du XIX^{e} s. (Drovetti 1819/1820; Edmondstone 1822).

Bien que nous sachions que Dakhleh était habitée depuis le Paléolitique et plus tard, durant l'epoque pharaonique entière, les informations plus détaillées sur sa population font toujours défaut. Cependant, des liens multioles l'unissaient à l'Égypte bien que de nombreuses invasions ainsi que des mouvements migratoires n'aient pas épargné cet endroit isolé.

Jusqu'à maintenant, aucunes recherches démographiques n'étainet poursuivies dans l'oasis de Dakhleh. En 1907, l'anthropologue Aleš Hrdlička étudiait les habitants de Khargueh, localité voisine, mais rien ne prouve qu'il état arrivé jusqu'à Dakhleh (Hrdlička 1912).

En 1977, l'Institut Français d'Archéologie Orientale du Caire (I. F. A. O.) a entrepris des fouilles envisagées à une échelle importante, dans l'oasis de Dakhleh, aux environs de la ville de Balat.

La région de Balat située dans la partie orientale de l'entrée à l'oasis peut se prévaloir de deux sites importants, datant de l'epoque de la VI^{e} dynastie (Ancien Empire). L'un d'eux est la ville d'Ain Aseel qui etait complètement enfouie sous le sable, l'autre, à 2 km de distance, c'est la nécropole de Qila'el-Dabbeh, au l'oa trouvé des tombes de gouverneurs de l'oasis de la meme époque. Ces sites ont été découverts et datés par Ahmed Fakhry lors de ses fouilles de prospection en 1971 et 1972.

Depuis 1977, j'ai pu participer aux fouilles à Balat sur l'invitation de l'I.F.A.O. Mon travail consistait à examiner le matériel osseoux découvert lors des fouilles archéologiques effectuées dans l'enceinte de la nécropole Qila'el-Dabbeh.

En dehors du matériel deja étudié j'ai examiné les squelettes en provenance du mastaba désigné comme M II CD. C'étainent des ossements datés au II^e s. av. n. e., c'est-a-dire à l'époque ptolémaique. Ces tombes étaient partiellement détruites et pillées encore dans l'Antiquité, et les ossements déplacés et, en partie, brûlés. Toutefois, j'ai pu distinguer dans ce matériel 71 individus et ensuite déterminer sur place leur sexe et âge au moment du décès; j'ai effectué egalement d'autres observations qui sont présentées séparément.

Le groupe en question était composé de 30 hommes, 14 femmes, 17 enfants, ainsi que de 10 individus dont il était impossible de déterminer le sexe. L'examen préliminaire m'a permis de constate que les individus inhamés appartenaient à la variété blanche, avec seulement une addition minime de la variété noire.

Bien que nous ne disposions pas de données nous permettant d'affirmer que le groupe en question peut etre considéré comme une représentation de la population de l'oasis de Dakhleh d'alors, nous pouvons, toutefois, partant du matériel réuni, en tirer des conclusions démographiques préliminaires. La répartition de l'age au moment du décès des individus de plus de 20 ans est présenté dans la table au I ci-dessous:

Tableau 1

L'age au moment du décès des individus de plus de 20 ans

Age	Hommes		Femmes	
	n	%	*n*	%
20 - 29	1	3,3	2	15,4
30 - 39	5	16,7	4	30,8
40 - 49	8	27,7	4	30,8
50 - 59	5	16,7	1	7,7
60 - 69	4	13,3	–	–
70 - 79	7	23,3	1	7,7
80 et plus	–	–	1	7,7
Total	30	101,0	13	100,1

In tableau 1 démontre la plus grande mortalité chez les hommes attait à l'âge de 40 - 49 and et chez les femmes, à l'âge de 30 - 49 ans.

La moyenne artithmétique de l'age des hommes au moment du décès est de 53,4 ans (SD$=$14,98, $E_x=1602{,}50$, $E_x^2=92106{,}25$); celle des femmes – de 43,1 (SD$=$18,61, $E_x=604{,}00$, $E_x^2=30561{,}00$).

La quantité de matériaux est encore frop faible pour en tirer des conclusions univalentes, toutefois, les moyennes sont assez élevées (surtour chez les femmes). Cela peut témoigner d'une situation économique satisfaisante ou encore d'une position sociale privilégiée des membres du groupe inhumé dans le site M II CD. Il semble que c'est cette derniére supposition qui soit la vraie.

La moyenne arithmétique du groupe d'enfants est de 6,6 ans (SD = 5,03) ce qui naturellement est insuffisant pour interpréter ce phénoméne. Nous savons que les ossements de nourrissons et de petits enfants se consevent toujours moins bien. Souvent, les enfants sont inhumés dans des endroits autres que les adultes (ce qui n'a pas eu lieu dans notre nécropole).

Nous voulons attirer l'attention sur la moyenne d'age élévee de 10 individus de sexe indéterminé. Elle est de 64,8 ans ($SD = 7{,}68$, $E_x = 647{,}50$, $E_x^2 = 42456{,}25$). Ce groupe a été isolé de l'ensemble du matériel – son âge a été déterminé à partir de mandibules. Si nous pouvions déterminer le sexe de ce groupe, cela aurait permis à élever considérablement la moyenne d'age aussi bien des hommes que des femmes.

En ce qui concerne le matériel découvert dans des piéces extérieures du Mastaba II, il date probablement de l'Époque Saite (XXVI[e] dynastie). Ceci résulte du fait qu'en Égypte ancienne, les endroits où l'on inhumait les morts, étaiaient traditionnellement utillisés durant de longues périodes ce qui veut dire que dans un endroit reconnu comme nécropole, les inhumations se faissaient pendant des siécles entiers. Dans ce cas précis, la nécropole de l'Oasis datant de l'Ancien Empire est restée cet endroit où les inhumations se faisaient durant les époques éloignées du moment de son établissement. Sous les dynasties ultérieures, on a même utilisé la superstructure d'anciens tombeaux de gouverneurs de l'Oasis, en l'adoptant à des besoins courants. Souvent, on pratiquait des ouvertures dans des parois en bruques pressées qui se trouvaient dans les couches supérieures et ainsi on obtainait une nouvelle tombe.

C'est dans les couches supérieures du Mastaba II que l'on a découvert, au cours de la III[e] campagne de fouilles de l'I.F.A.O. de 1978/1979, les squelettes de plusieurs centaines d'individus, datant, selon toute probabilité, de l'Époque Saite. Les squelettes trouvés le plus bas étaient intacts et couchés dans une position antomique. Par contre, la couche de dessus présentait les crânes aussi bien que d'autres ossements mêlés les uns aux autres et même en partie détériorés par des pillards de tombeaux, très actifs en Égypte.

J'ai étudié une partie seulement du grand nombre de squelettes actuellement découverts dans le Mastaba II. Les mensurations anthropologiques et la description des ossements ont permis de fixer à 93 le nombre d'individus qui ont été examinés. Nous tenons à souligner que ce n'est qu'un tiers sinon un quart du matériel fourni par le Mastaba II.

L'analyse embrasse les squelettes désignés selon l'endroit précis de leur découverte, et notamment:

1. Salle 2 (II)
2. XIII G1 Salle 3
3. Salle 4
4. G1 (XII) G3 Salle C

5. XII G3
6. G2 XIII
7. XIII G1 Couloir Ouest
8. Couloir Est

Etant donné que le matériel ne pésente pas de différences particuliéres, nous avons effectué les calculs pour le groupe entier.

La structure de l'âge des individus présentés dans le tableau 2 est trés interessante.

Tableau 2

L'âge des individus du Mastaba II Balat 1978

	Hommes		Femmes	
	n	%	*n*	%
jusqu'á 20 ans	–	–	2	5,1
20 - 29	2	6,2	11	28,2
30 - 39	7	21,9	8	20,5
00 - 49	4	12,5	6	15,4
J0 - 59	12	37,5	6	15,4
60 - 69	3	9,4	2	10,3
70 et plus	4	12,5	2	5,1
Total	32	100,0	39	100,0

La tableau II démontre que la plus grande mortalité chez les hommes tombait à l'abe de 50 - 59 ans. Les femmes mouraient plus jeunes, à l'àge de 20 - 39 ans. La moyenne arithmétique de l'âge des hómmes au moment du déces était de 49,9 ans (SD=14,825; $E_{\bar{x}}$=1599,0), celle des femmes étant de 39,8 ans (SD= 16,449; $E_{\bar{x}}$= =1551,5). Les données cidessus peuvent témoigner d'une situation économique satisfaisante des habitants de l'Oasis de Dakhleh. Par contre, il nous est impossible d'etablir la classe sociale à laquelle appartenaient les individus inhumés dans le Mastaba II. Si c'etaient des représentants d'un groupe au pouvoir (privilégié) alors ce type de la structure d'âge serait plus justifié. On peux mentionner également que l'inhumation qui nous intéresse était collective. Les dépouilles ont été rangées de facon serrée, l'une à coté de l'autre, dans les salles et les couloirs. Si nous rejettions la supposition suivant laquelle nous sommes devant une sorte de catacombe, c'est-à--dire l'endroit où les morts étaient rangés de manière assez serrée, nous serions amenées à admettre que les dépouilles y ont été dépossés à une même époque, p. ex. au moment de épidémie, calamité, guerre, etc.

Dans ce meme groupe, nous avons identifié 14 enfants dont la moyenne arithmétique d'âge était de 6,1 ans (SD=5,884; $E_{\bar{x}}$=85,5), ce qui d'ailleurs ne dit pas grand'-chose.

Nos considérations ne font pas état des six squelettes trouvés en dehors des chambres du Mastaba II, dans son voisinage immédiat. L'un des squelettes, désigné comme XIII F- possédait une stèle bien conservée avec inscription faisant penser à la tombe d'une femme de l'Ancien Empire, tout de même il n'y avait là que les restes d'un homme d'env. 50 - 55 ans, ainsi que ceux d'un enfant de 3,5 ans. En ce qui concerne les squelettes de la Chapelle 1 (homme d'env. 65 - 70 ans, femme de 20 ans env.), celui de la Chapelle 2 (homme de 30 ans env.) et un autre de la Chapelle 3 (femme de 22 ans) leur origine est, à mon avis, également incertaine. Probablement ce sont les squelettes d'individus inhumés ultérieurement dans ces tombes dont les stèles sont restées inchangées.

Il est intéressant de comparer cette structure d'âge et les moyennes arithmétiques d'âge au moment du déces avec celles du groupe découvert dans le site M II CD datant de l'Époque Ptolémaique. L'examen préliminaire du caractère anthropologique de ce groupe nous incite à le ranger dans la couche provilégiée (régnante) sans cependant en avoir la certitude absolute. Dans ce groupe composé de 43 individus, la plus grande mortalité chez les hommes a été constatée dans la classe d'âge de 40 - 49 ans, donc elle concernait les individus plus jeunes par rapport au groupe faisant objet de la communication. Il n'en était pas de meme s'il s'agit de l'âge des femmes – la plus grande mortalité y est constatée à l'âge de 30 - 49 ans. Ces données ne sont citées qu'à titre d'information et il n'est pas recommandé d'en tirer des conclusions plus générales, car ce ne sont pas encore des résultats définitifs. Nous aimerions copendant attirer l'attention sur le fait que la moyenne d'âge au moment du décès de la population ptolémaique est plus élevée de 3,5 ans que celle de la population saite. Ceci concerne aussi bien les hommes que les femmes. Néanmoins, on peut remarquer que la différence entre la moyenne arithmétique d'âge des hommes et celle des femmes et la même dans les deux groupes est élèvée à env. 10 ans. Cet état de choses est dû, en premier lieu, aux décès des individus âgés de plus de 70 ans, becaucoup plus nombreux dans la population ptolémaique par rapport à la population saite (le pourcentage d'hommes du groupe ptolémaique décédés à l'age de 70 ans et plus, est presque deux fois plus grand que dans le groupe saite, le pourcentage des femmes – presque trois fois).

Nous tenons à souligner encore une fois que ce ne sont que les résultats d'examens d'un tiers sinon d'un quart du matériel osseux trouvé dans les tombes découvertes dans la superstructure du Mastaba II. L'étude ultérieure des squelettes en question nous permettra d'en savoir plus en ce qui concerne leur âge au moment du décès, et peut-etre meme d'expliquer le caractère de cette inhumation collective, et déterminer son caractère.

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d'une femme de l'Ancien Empire, tout de même il n'y avait là que les restes d'un homme d'env. 50–55 ans, ainsi que ceux d'un enfant de 1,5 ans. En ce qui concerne les squelettes de la Chapelle 1 (homme d'env. 65–70 ans, femme de 20 ans env.), celui de la Chapelle 2 (homme de 30 ans env.) et un autre de la Chapelle 3 (femme de 22 ans) leur origine est, à mon avis, également incertaine. Probablement ce sont les squelettes d'individus inhumés ultérieurement dans ces tombes dont les cadres sont restés inchangés.

Il est intéressant de comparer cette structure d'âge et les moyennes arithmétiques d'âge au moment du décès avec celles du groupe découvert dans le site M 11 CD datant de l'époque Prédynastique. L'examen préliminaire anthropologique [illegible] que ce groupe [illegible] à la [illegible] (définitive) [illegible] cependant [illegible] le groupe composé de 43 individus, la plus grande mortalité chez les hommes a été constatée dans la classe d'âge de 40–49 ans, mais elle concernait les individus plus jeunes par rapport au groupe faisant objet de la présente étude. Il n'en était pas de même s'il s'agit de l'âge des femmes — la plus grande mortalité y est constatée à l'âge de 30–39 ans. Ces données ne sont citées qu'à titre d'information et il n'est pas recommandé d'en tirer des conclusions plus générales, car ce ne sont pas encore des résultats définitifs. Nous attirerons cependant notre attention sur le fait que la moyenne d'âge au moment du décès de la population prédynastique est plus élevée de 3,5 ans que celle de la population [illegible]. Cela concerne aussi bien les hommes que les femmes. Néanmoins, on peut remarquer que la différence entre la moyenne arithmétique d'âge des hommes et celle des femmes [illegible] groupe est élevée à env. 10 ans. [illegible] on, par exemple, [illegible] l'âge de plus de 70 ans, [illegible] dans la population prédynastique par rapport à la population [illegible] le pourcentage d'hommes [illegible] à l'âge de 70 ans et plus [illegible] que deux fois plus grand que dans le groupe [illegible].

Nous [illegible] d'un [illegible] trouvés dans les tombes [illegible] dans la superstructure du Mastaba. [illegible] leur âge au moment du décès, et [illegible] de cette inhumation [illegible], et déterminer son caractère.

[illegible]

[illegible], 1938. [illegible], Torino.
[illegible], A. 1922. [illegible], London.
[illegible], A. 1914. [illegible], Washington D.C.

LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

ALESSANDRA NIBBI

Some remarks on two very early but enduring symbols in ancient Egypt

After a very great number of excellent scientific papers dealing with the prehistoric remains of the Nile valley and its neighbouring deserts, it may interest some of us to look at a few examples of the representational art from the protohistoric and early dynastic periods in the Nile valley in which we see some faces and racial types representing the enemies of Egypt. We believe them to have lived in the mountains along the valley and in the delta of the Nile. It is certain that some of the faces we see on the ancient Egyptian reliefs are those of the descendants of the people who left their artifacts and their bones, as well as those of their domesticated animals, in the regions we have been discussing at this symposium (Fig. 1).

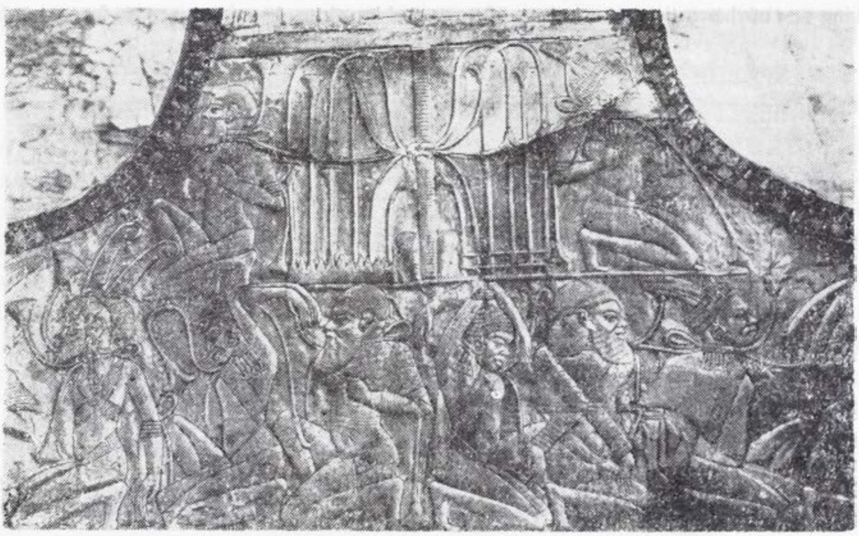

FIG. 1. An ancient Egyptian relief showing human types characteristic for different areas neighbouring Egypt. From one of the chariots from the tomb of Tutankhamun, the decorative elements is a group of foreigners (Photo from collection of Howard Carter's photographs of the tomb; courtesy Griffith Institute, Ashmolean Museum, Oxford)

It is fitting that we should begin by looking at some objects from Hierakonpolis, the prehistory of which has been studied in recent years by Michael Hoffman (1982) with regard to its historical sequence by means of a series of carbon dates and a close study of some of the finds (Hassan 1984). Our interest here centers on two objects which we usually consider to be of "protodynastic" date, namely the Hierakonpolis macehead and the decorated vase from the same site, both objects now in the Ashmolean Museum. It is striking that the symbols found on these two objects recur with apparently the same significance during the three thousand years of the pharaonic period.

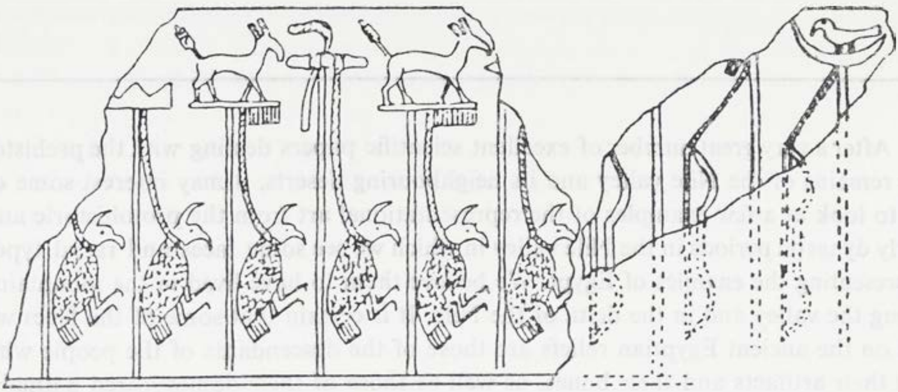

Fig. 2. A detail from the top of the Hierakonoplis macehead (now in the Ashmolean Museum) showing one of the earliest associations of bows and lapwings, hanging by ropes from standards (see Quibell 1900: Pl. XXV and XXVIc)

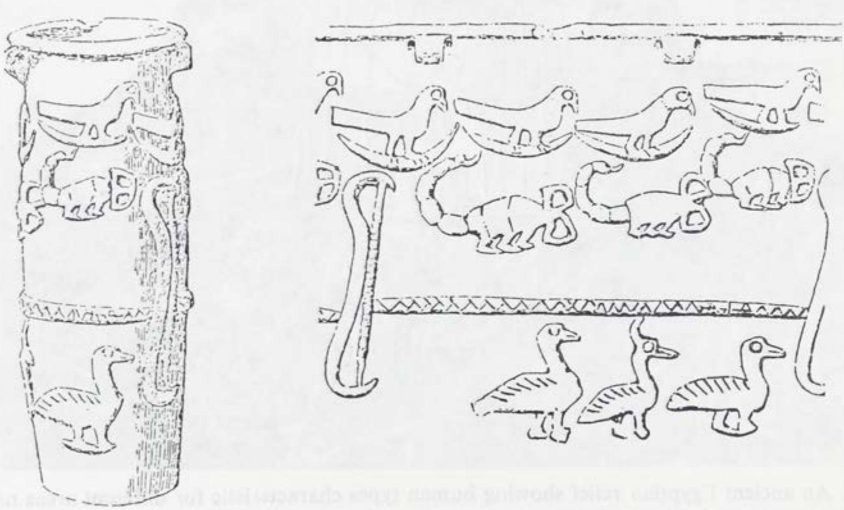

Fig. 3. The figures on the Hierakonpolis vase (Ashmolean Museum). The bow weapon, which remained a symbol of the enemies of Egypt throughout the pharaonic period, is present together with lapwings (crested plover) as well as the same bird without the crest

On the Hierakonpolis macehead we find a row of lapwings hanging by the neck with a row of bow weapons hanging in the same way alongside them (Fig. 2). Clearly these must be symbols for two groups of people, who in this way are shown publicly to be punished. From this same context we have the vase showing not only the lapwing and the bow weapon, which are used as symbols on the macehead, but also other birds and the scorpion which probably represented other groups of people (Fig. 3).

The lapwing (*Vanellus cristatus* or crested plover or peewit, because of its call) has as its physical characteristics its crest, its rounded wings and squared-off tail and a short beak which slightly curves downwards. Its colouring is mainly black and white with some dark green. The lapwing is a migratory bird which inhabits open mud flats and lays its eggs on nests made of reeds and marshland plants in damp ground.

FIG. 4. Three seals from the palace of Amenophis III portraying the most common position of the ancient Egyptian iconography of lapwings: crouching, usually over a nest with human arms raised, over a clump or swamp of papyrus. Knowing as we do that papyrus will only thrive in still water, it is clear also from the textual material that this bird is to be associated with the delta (seals from Hayes 1951: Fig. 25h, 28vv, and 28ww)

In the ancient Egyptian iconography, the lapwing is most often associated with papyrus and is frequently shown hovering over it (Fig. 4, and Hayes 1951: 168f). This means that the Egyptians themselves associated it with swamplands, because, as we all know, papyrus will only grow in water which does not change its level (Nibbi 1975: 12, 52), and therefore not along a river with an annual flood. The natural habitat for the lapwing could best be provided in Egypt by those areas of the ancient delta which retained the Nile water in its depressions throughout the year because the banks of the Nile proper, further upstream, would soon drain after the inundation each year, leaving them too dry to attract this bird. Yet we have to remember that the Egyptian delta not only contained hundreds of mounds up to the end of last century (Nibbi 1983: 71), but was also probably quite heavily wooded in certain areas (Fig. 5, and Nibbi 1981a, and 1981b).

An early palette fragment shows this bird hovering over a boat, again connecting it with water (Fig. 6). It is therefore not surprising that the early Egyptologists understood it to symbolize the people of the delta, which has remained substantially acceptable today. But that is not to say that the lapwing people were the ordinary

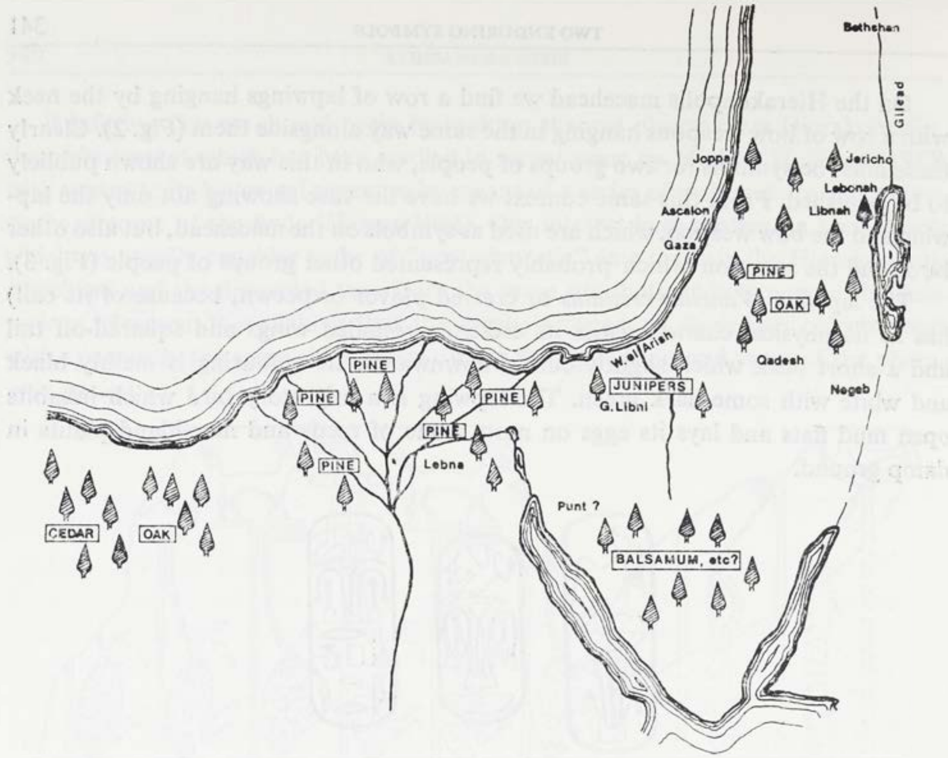

FIG. 5. Map showing the sources of timber in the north of Egypt and along its borders (see Nibbi 1981: Chapter 1 and 1985: *passim*)

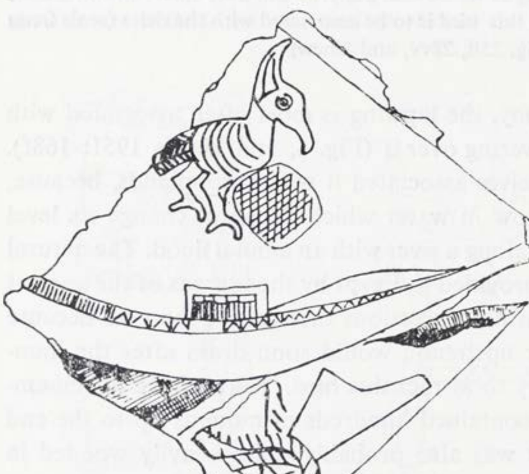

FIG. 6. Fragment of an early palette showing one of the earliest portayals of lapwings hovering over a boat (see early dynastic material in Asselberghs 1961: Pl. XC, no. 159, and bibliographical notes on pp. 336 - 337)

FIG. 7. A stylized drawing of the overlapped wings of the crested plover as a means of immobilizing it (see Gardiner 1947 : 101)

citizens of Egypt, as has become the general acceptance for this bird, called *rḫj.t* in the texts. The iconography shows this bird at all times as being held in submission, either by having its wings crossed over each other thus obliging it to squat down and preventing it from walking or flying away (Fig. 7) or by having its tail feathers tied together (Fig. 8). Sometimes both these impediments are shown to have been imposed upon it. Furthermore, I believe that both the textual and the archaeological evidence shows that the delta was not a part of Egypt proper during the pharaonic period, but a hostile territory inhabited by a number of foreign peoples (Nibbi 1975: 7 - 34; 1982a: 27 - 32; 1982b: 51 - 60).

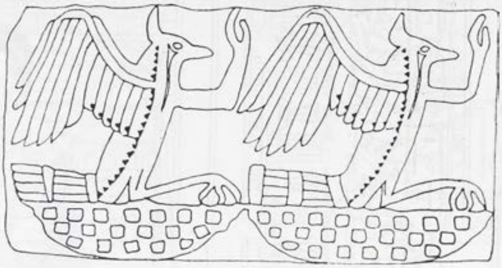

FIG. 8. A group found at Medinet Habu, among which we find the foreign enemies of Egypt (including scene in our Fig. 18). It is clear from the tightly-bound tail, overlapped wings and marked edging down its side, as though representing the "Libyan" tunic, that this bird represents the foreign western delta settlers in subjection (Daressy 1911: 49 - 63)

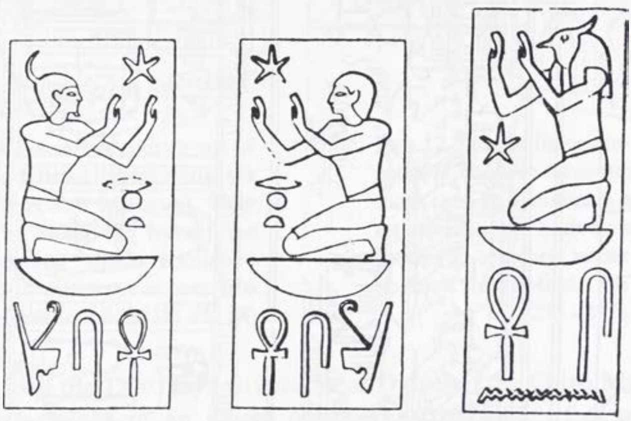

FIG. 9. Details from reliefs from Abydos in which the lapwing or *rḫj.t*-bird is shown as a human being, labelled as such, similarly squatting over a basket, with arms raised in the usual way (see Abd el Hamid Zayed 1962: 115f)

Where it is important that the *rḫj.t* or lapwing people be identified, they are portrayed with a crest on their head and often with a beard as well (Fig. 9) (Zayed 1962: 115f and 8; Wallis Budge 1899: I). This makes it certain that they should never be considered as the ordinary citizens of Egypt. Only foreigners are ever shown bearded in the ancient Egyptian reliefs and paintings.

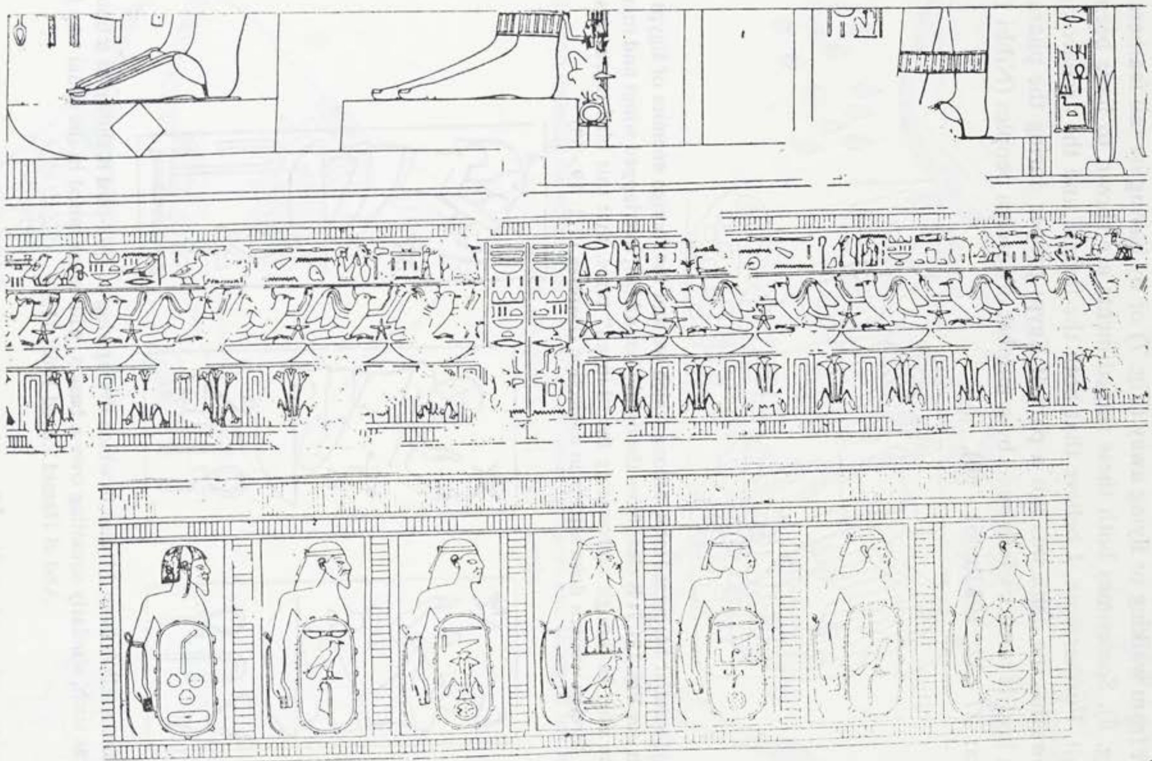

FIG. 10. The tomb of Kheruef is an excellent example from the time of Amenophis III of the alternation of the frieze of Nine Bows and the rows of *rḫj.t*-birds, though communicating the same idea of subjection of the foreign people (after Oriental Institute, University of Chicago 1980: Pls 24 - 26, 48, 49)

However, the most common representation of this bird in the ancient Egyptian iconography is as a frieze at the base of a statue or a scene, at the feet of the Pharaoh or below them (Fig. 10, Oriental Institute 1980, Pl. 25). The lapwing is always shown in a squatting position over his basket, perhaps intended to signify a nest and the settling down of a migrant foreigner. A Middle Kingdom text which we call the Prophecy of Neferti (Helck 1970: 25f) speaks poetically of a foreign bird "which will breed in the delta marshland, having made its nest beside the *rmṯ.w*", the latter meaning *men* in general.

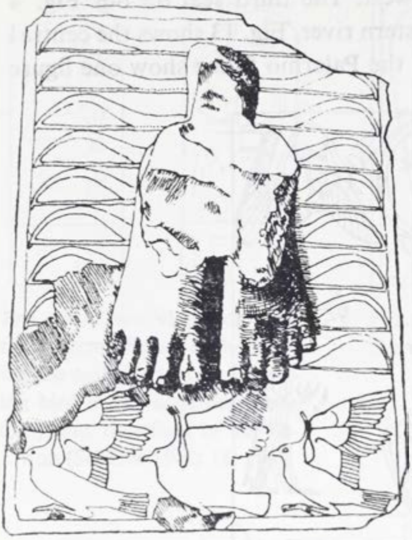

FIG. 11. One of the earliest portrayals of the lapwings and bows together on the statue of Djoser (Cairo Museum). They are shown to be under the feet of the pharaoh, a position which continued to be portrayed in this way for over two millennia (see Firth *et al.* 1935: Pl. 58)

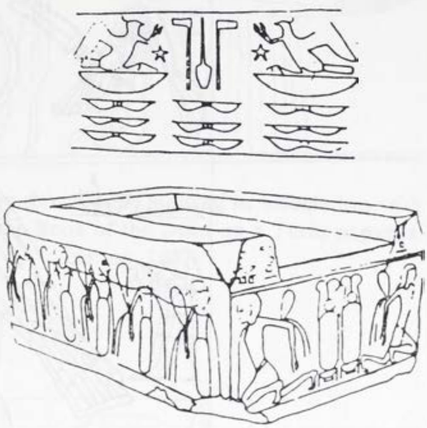

FIG. 12. On the limestone base of Nectanebo II (Louvre Museum) we still find, more than two millennia after the earliest representations, both bows and lapwings portrayed together, under the feet of the pharaoh (see Musée du Louvre 1981: 275 - 277)

On the base of the Third Dynasty statue of Djoser in the Cairo Museum (Fig. 11) we find three lapwings in an abject position in front of his feet while nine bows are painted under them, an iconographic pattern which recurs many times in statues of pharaohs throughout the dynasties and may be found again on the base of a statue of Nectanebo II in the Louvre Museum, dating to nearly three thousand years later (Fig. 12). Occasionally, as in the wooden statuette of Amenophis III in the Berlin (West) Museum, we find nine men as enemy types with bound arms placed in the same traditional position of the bows on the stand under the feet of the Pharaoh. When the nine prisoners are portrayed under the feet of the Pharaoh instead of the nine bows, we are shown both bearded and non-bearded types suggesting that the

Nine Bows comprised all the enemies of Egypt, including the people of the delta. This is confirmed in fact when the names of the nine traditional enemies are listed in the texts from the Eighteenth Dynasty onwards (Vercoutter 1947; 1949).

The recurring pattern of lapwings and Nine Bows in the iconography suggests a close and fundamental relationship between the two. It may be that the lapwings, in representing the foreign immigrants in the delta, constituted the largest and most important of the nine enemy groups, demanding individual and special attention.

There are many clues in the iconography and the texts that suggest that we must associate the *rḫj.t* or lapwing people with the west. The third seal on our Fig. 4 shows them to symbolize good wine from the western river, Fig. 13 shows the central figure to symbolize the west, the inscriptions on the Palermo Stone show one figure

FIG. 13. Lapwings shown on the top register, bearded and crested, squatting low on the ground and associated with the large figure of the west at the centre (from Wallis Budge 1899: Colour Plate I)

with a knife across the neck of this bird, while another speaks of the western nomes in conjunction with this bird (Fig. 14) and a Turin Papyrus also portrays him in conjunction with a western nome (Fig. 15).

It is a well-known fact that the Graeco-Roman world referred to the regions they knew west of the Nile as Libya. All scholars will agree that in late times textual references to Libya either referred exclusively to the western delta or included it (Yoyotte 1961: 142f).

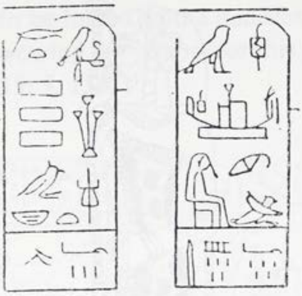

FIG. 14. Two vignettes from the Palermo Stone both showing the early portrayal of lapwing bird in the squatting position, and therefore in subjection (Schäfer 1902: 16, 19)

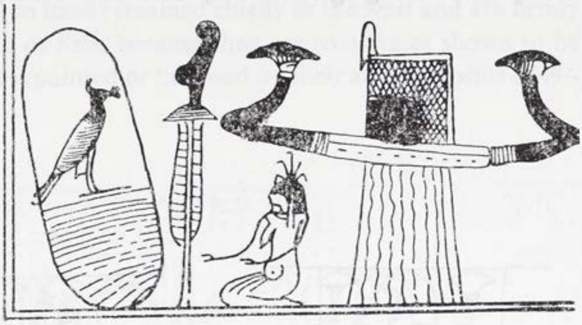

FIG. 15. Vignette showing the lapwing in association with the west (from the Book of the Dead on a Turin papyrus cat. no. 1837)

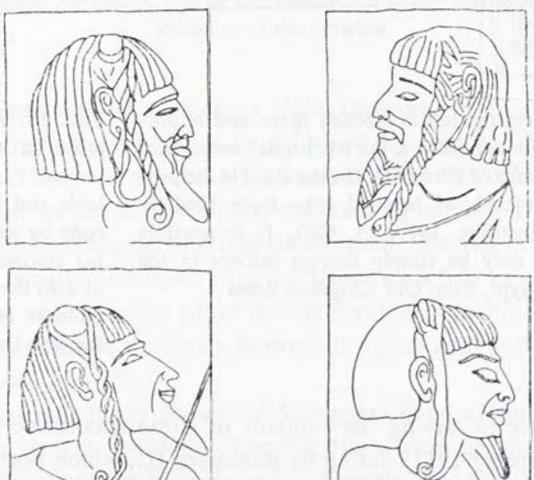

FIG. 16. Details of "Libyan" heads, with their sidelock and all bearded, which may simply be the portrayal of the non-Egyptian inhabitants of the western delta, symbolized in the iconography by the lapwing (from Oriental Institute, University of Chicago 1970: Pl. 129)

The ancient Egyptian texts identify the Libyans by the name of *ṯḥnw* in the Old and Middle Kingdoms and by *r3bw* in the New Kingdom. Both of these names are associated with some very distinctive characteristics, namely a hair style with a short fringe in front, a sidelock which was either curled or plaited and short hair at the back (Fig. 16). They are bearded and are shown in all periods to be wearing wide bands which cross over each other in front of their torsos (Fig. 17). Their formal dress seems to be a mantle or tunic revealing an all-over pattern on it, always with a very marked edging which may have been a fringe (Fig. 18).

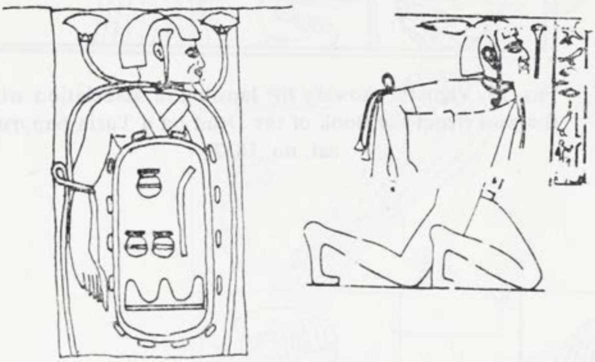

FIG. 17. A figure on the left is labelled *ṯḥnw* and is portrayed as one of the Nine Bows, the traditional enemies of Egypt (from the tomb of Kheruef). On the right is the portrayal of the same foreigner labelled *r3bw* from Medinet Habu (Oriental Institute 1970: Pl. 600). It is possible that these people may be simply foreign settlers in the western delta of Egypt, from Old Kingdom times

FIG. 18. A typical representation of the figure with so-called "Libyan" tunic, sidelock and beard. The papyrus rope by which he is tied shows his connection with the delta as also the tattooed sign of the goddess Neith of Sais on his leg (see Daressy 1911: 49 - 63)

We are fortunate in having the remains of some decorative faience tiles from Medinet Habu (Daressy 1911) dating to Ramesses III, which portray in colour and careful detail the dress and appearance of the enemies of Egypt. Among these it is easy to recognize the *ṯḥnw* or *r3bw*, that is, those Libyans who were wearers of the sidelock. We know for certain that another group of Libyans, the *Meshwesh*, did not have this hair style (Oriental Institute 1970: Pl. 600 A). Our Fig. 19 here shows each of these groups portrayed separately, each bound with papyrus, among other prisoners bound with the so-called plant of Upper Egypt. In this scene from Medinet Habu, we see our western Libyan with the sidelock wearing a tunic, whereas the *Meshwesh* Libyan is wearing the crossed bands in his torso. The *Meshwesh* Libyan is wearing the long hair which seems to be traditional in the representation of *ṯḥnw* Libyans in the Old Kingdom. The *Meshwesh* in late times were associated with the whole of the delta (Yoyotte 1961: 122 - 141), whereas the western Libyans or wearers of the sidelock, our *r3bw*, seemed to have remained chiefly in the west and are firmly to be linked to the goddess Neith of Sais, because they are sometimes shown to be wearing the symbol for this goddess painted or tattooed on their arms (Lepsius 1849 - 59: 3, 136a).

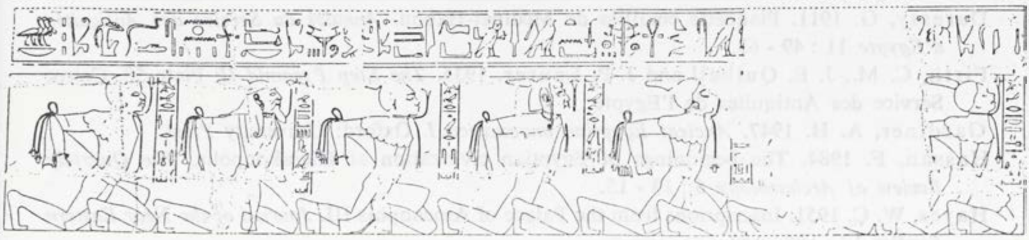

FIG. 19. The traditional ethnic groups, their names in front of them, among the attackers of Egypt during the Ramesside period, the so-called Sea Peoples (from Medinet Habu; Oriental Institute, University of Chicago 1970: Pl. 600; see also Nibbi 1985: 310 - 317). Two of these peoples, the Meshwesh and the Rabu are inhabitants of the western delta, the Rabu being the human manifestation of the lapwing

Among the faience tiles from Medinet Habu showing details of enemy foreigners, we find some portraying the lapwing or *rḫj.t*-bird (*cf.* Fig. 8). Here remarkably we find some extra markings on this bird. He has a kind of sidelock portrayed from his eye downwards and we see a very clearly marked zig-zag line from his crest to his tail as though it were an edging to a mantle or tunic. Bearing in mind that the *ṯḥnw* or *r3bw* Libyan is usually portrayed with a feather in his hair as a symbol of hostility to the Pharaoh (as were also the other hostile foreigners in Fig. 19), we cannot but be struck by the remarkable similarity between the portrayal and the western Libyan type, our Figs. 8 and 18 - 19.

We must accept that many groups of foreigners lived along the bordering hills of the Nile valley and in the delta. The Egyptian texts name many enemies, but chiefly symbolized them as the Nine Bows, or, it seems, also as a frieze of immobilized lapwings, pacified into submission and reverence towards the Pharaoh. Among the best representations of these enemies is our Fig. 1, which is a decorative scene on a chariot from the tomb of Tutankhamun, in which we find a very great number of enemy foreigners portrayed in defeat.

It is therefore necessary to emphasize that while the lapwing or *rḫj.t*-bird was accepted by Jacques Pirenne (1934) to signify the ordinary people of Egypt and has maintained that meaning as the result of the indifference of scholars to this problem, we must carefully look at the facts as they are. The identity of this bird is an important key to the interpretation of many documents (Nibbi 1987) and scenes from ancient Egypt.

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ACHILLES GAUTIER

A general review of the known prehistoric faunas of the Central Sudanese Nile Valley

In a paper presented in 1980 at the Dymaczewo Symposium we attempted to evaluate what we thought was known about the Quaternary mammals and archaeozoology of Egypt and Sudan (Gautier 1984a). The data for the Nile region in the Central Sudan were then still very scanty and far from precise. The present paper read at the second Dymaczewo conference gives a summary of the faunal data obtained since then and their general significance.

Detailed research on the faunal assemblages of Central Sudanese sites was started in 1977, when the author was invited by L. Krzyżaniak to study the faunal samples from Kadero. The research program now includes:

Early Khartoum:
- Khartoum Hospital (*cf.* Arkell 1949); preliminary faunal analysis (Bate 1949); re-analysis of the fauna (Peters 1986);
- Saggai (*cf.* Caneva 1983); detailed faunal analysis (Gautier 1983);
- Umm Marrahi (not published excavations by the Department fo Archaeology, University of Khartoum); preliminary faunal analysis by the author.

Khartoum Neolithic:
- Shaheinab (*cf.* Arkell 1953); preliminary faunal analysis (Bate 1953); re-analysis (Peters 1986); new excavations (Haaland 1981); preliminary faunal analysis (Tigani el Mahi 1982), re-assessed by the present author;
- Kadero (*cf.* Krzyżaniak 1984); preliminary faunal analysis (Sobociński 1977; Gautier 1984b); detailed faunal analysis (Gautier in preparation);
- Geili (*cf.* Caneva 1984); preliminary faunal report (Gautier 1983). More faunal material from the earlier excavation seasons has now become available and has been included;
- Nofalab, Umm Direiwa, Zakiab (Haaland 1981); preliminary faunal analysis (Tigani el Mahi 1982) re-assessed by the present author;

– Kadada (*cf.* Geus 1984); detailed faunal analysis of part of the site (Gautier 1986a).

These sites are representative of the Holocene archaeological sequence spanning approximately the period 8,500 - 4,500 B.P. (Caneva *ibid.*: 153; Haaland *ibid.*:57; Geus *ibid.*) during which pastoralism was adopted in the Central Sudanese Nile Valley.

The program is carried out with the aid of various colleagues. T. Pain (London) helped with the identification of some of the molluscs. W. Van Neer (Leuven) included the ichthyofauna in his project on archaeoichthyology of Africa (see this volume). F. de Broin (Paris) identified the turtle remains and has been invited to write a general paper on the turtles from various prehistoric sites in Egypt and the Sudan. D. Mathiessen (Gainesville) prepared preliminary identifications of the birds.

Results so far obtained are summarized in Table 1. An important change in the identifications of the older samples of Shaheinab should be stressed. The work by Tigani el Mahi (*ibid.*) and Peters (*ibid.*) has established beyond doubt that the so-called African buffalo (savanna or forest type) from Shaheinab is in fact domestic cattle. Both large and small livestock are therefore present at that site, which does not represent a case of incomplete adoption of pastoralism as has been intimated in the literature. Moreover, there is no evidence for a dwarf goat at the site, though both sheep and goat are undoubtedly present.

As the table shows, the list of animals found is fairly impressive, especially if one considers that some groups have not been listed specifically. Thus the marine molluscs comprises various species: *Engina mendicaria*, *Conus coronatus*, *Nerita polita*, *Cypraea* spp. The ichthyofauna is in most cases quite voluminous and the total number of families or species found exceeds a dozen. The frequency distribution of the turtles appears rather haphazard, but the remains found belong to at least five species, mostly freshwater ones. The avifauna is very restricted in most sites but the number of families or species present is comparable to that observed for the fish. Most of these birds appear to be resident forms.

In evaluating the faunal spectrum found and the individual assemblages, attention should be drawn to several facts. First, sample bias distorts the composition of the older samples. This is due to very selective sampling or a rather careless storage after study, a deplorable fact that happens much too often (even in large, highly reputed institutions!). As a result larger animals predominate in the Khartoum and older Shaheinab collection; moreover some material from these collections may have been mixed. Second, the Geili assemblage is very much distorted by differential destruction of smaller and less dense bones. Third, the polygenetic origin of most archaeological faunas should be clearly recognised.

We have introduced the concept of taphonomic groups to separate in an explicit way the different components of archaeological assemblages on the basis of death-to-discovery history of the animals concerned (*cf.* Gautier 1986b). The Central Sudanese assemblages contain essentially five such groups:

Table 1

Prehistoric faunas from the Central Sudanese Nile Valley
(fragment counts)

ANIMAL GROUP	SITE	Kha	Sag	Mar	Sha	Gel	Kro	Nof	Dir	Zak	Kad
Marine molluscs (Eastern coast)		-	7	1	F(a)	-	F(b)	-	1	-	F(b)
Freshwater molluscs	Small gastropods	R	R	R	F	R	R	R	1	R	R
	<u>Pila wernei</u> (+<u>Lanistes carinatus</u>)	F	F	F	F	F	F	F	R?	F	F
	Small bivalves	R	R	R	R	R	R	-	-	-	R
	<u>Aspatharia</u> spp.	R	R	R	F	R	R	R	-	R	R
	<u>Mutela nilotica</u>	R	R	R	R	R	R	R	-	-	R
	<u>Etheria elliptica</u>	R	R	R	F	R	R	R	R	R	R
Landsnails	<u>Limicolaria cailliaudi</u>	F	F	R	F	F	F	F	R	F	F
	<u>Zootecus insularis</u>	F	R	R	F	R	R	R	R	R	R
	other small landsnails (c)	R(c)	-	-	-	-	-	-	-	-	-
Freshwater fish	siluroid (catfish), lungfish, Nile perch, Tilapia etc.	F	F	F	+710	±250	34	389	28	1652	±1470
Amphibians	(Frogs/toads)	-	-	-	-	-	-	-	-	-	27
Reptiles	Turtle(s), mainly freshwaterspecies (<u>Trionyx</u> etc.)	F	92	R	F	33	-	-	-	-	23
	Nile monitor (<u>Varanus niloticus</u>)	±32	297	R	F+17	35	73	2	23	14	97
	Rock python (<u>Python sebae</u>)	±24	38	R	F+9	8	8	4	29	60	1
	Nile crocodyle (<u>Crocodylus niloticus</u>)	±10	14	-	R+1	5	-	-	-	5	16
	Unidentified	-	-	-	84	-	-	57	47	143	6
Birds		12↗	15	-	111	2	13	-	-	2	43
Wild mammals	Small monkey, probably grivet monkey (<u>Cercopithecus aethiops</u>)	-	3	-	5	1	1	-	-	-	1
	Hare, probably Cape hare (<u>Lepus capensis</u>)	-	-	-	10	-	11	-	-	-	42
	Ground squirrel (<u>Euxerus erythropus</u>)	-	-	R	4	-	5	-	-	-	1
	Larger gerbil? (<u>Gerbillus pyramidum</u>)	-	-	-	-	-	-	-	-	-	44
	Tatera gerbil (<u>Tatera robusta</u>?)	-	-	-	-	-	4	-	-	-	2
	Field rat (<u>Arvicanthis niloticus</u>)	4	-	-	-	-	-	-	-	-	16
	Multimammate rat (<u>Praomys ?natalensis</u>)	1	-	-	-	-	-	-	-	-	-
	Lesser jerboa (<u>Jaculus jaculus</u>)	-	-	-	-	-	30	-	-	-	-
	North African porcupine (<u>Hystrix cristata</u>)	6	4	-	20	-	4	-	-	-	6
	Marsh cane rat (<u>Thryonomys swinderianus</u>)	4	20	-	-	-	-	-	-	-	-
	(Small) unidentified rodents	-	-	R	2	-	F	-	32	-	7
	Jackal, probably golden jackal (<u>Canis aureus</u>)	1	28	?	4	2	27	-	-	-	5
	African wild dog (<u>Lycaon pictus</u>)	-	-	-	-	-	-	-	-	-	-
	Honey badger (<u>Mellivora capensis</u>)	-	1	-	4↗1	1	11	-	-	-	2
	Genet (<u>Genetta</u> sp.)	-	-	-	2	-	-	-	-	-	-
	African civet (<u>Viverra civetta</u>)	1	1	-	1	-	-	-	-	-	-
	Medium viverrid (<u>Herpestes ichneumon</u>/<u>Atilax paludinosus</u>)	6	21	-	-	-	1	-	-	-	1
	Lesser mongoose (<u>Herpestes sanguineus</u>)	-	-	R	2	-	-	-	-	-	1
	Banded mongoose (<u>Mungos mungo</u>)	2	-	-	-	-	-	-	-	-	1
	Small unidentified carnivores (d)	1	7	-	2	-	2	-	-	-	-
	Striped hyaena (<u>Hyaena hyaena</u>)	1	-	-	1	-	-	-	-	-	-
	African wild cat (<u>Felis silvestris</u>)	2	9	-	2	-	13	-	-	-	7
	Medium sized cat, mainly caracal (<u>F. caracal</u>)	2	13	-	-	-	10	-	1	-	3
	Leopard (<u>Panthera pardus</u>)	1	2	-	2	-	-	-	-	-	3
	Lion (<u>Panthera leo</u>)	2	1	-	4	-	-	-	-	-	-
	Aardvark (<u>Orycteropus afer</u>)	-	1	-	-	-	1	-	-	2	-
	African elephant (<u>Loxodonta africana</u>)	1	1	-	13	2	2	-	-	-	5
	Equid (<u>Equus</u> sp.)	1	-	-	-	-	-	-	2	2	-
	Black and/or white rhinoceros (<u>Diceros bicornis</u>/<u>Ceratotherium simum</u>)	5	-	-	79+2	-	-	-	?	-	1
	Warthog (<u>Phacochoerus aethiopicus</u>)	32	29	-	23+3	-	7	-	55	8	4
	Hippopotamus (<u>Hippopotamus amphibius</u>)	29	7	R	13↗+11	14	9	2	-	2	15
	Giraffe (<u>Giraffa camelopardalis</u>)	1	4	-	72+4	8	5	-	-	-	18
	African buffalo (<u>Syncerus caffer</u>)	117	53	-	-	4	-	-	-	-	-
	Bushbuck (<u>Tragelaphus scriptus</u>)	3	-	-	-	-	-	-	-	-	-
	Sitatunga (<u>T. spekei</u>)	2	-	-	-	-	-	-	-	-	-
	Greater kudu (<u>T. strepsiceros</u>)	-	1	?	10	3	}48	-	-	-	14
	Tiang (<u>Damaliscus lunatus</u>) and/or hartebeest (<u>Alcelaphus buselaphus</u>)	36↗	23	R	-	7	-	-	-	1	15
	Large antelope, mainly roan antelope (<u>Hippotragus equinus</u>)	9	64	R	2+2	-	-	-	-	1	-
	Large antelope	-	-	R	15↗+1	-	-	-	1	12	-
	Medium sized antelope, mainly kob (<u>Kobus kob</u>)	284	951	R	+2	11	11	-	1	3	2
	Bohor reedbuck (<u>Redunca redunca</u>)	15	-	R	27+3	-	-	-	-	-	37
	Waterbuck (<u>Kobus ellipsiprymnus</u>)	4	1	-	-	-	-	-	-	-	-
	Medium sized antelope, probably redfronted gazelle (<u>Gazella rufifrons</u>)	-	-	-	5	6	5	-	-	-	-
	Large gazelle, probably dama (<u>G. dama</u>)	-	-	-	4	-	-	-	-	-	-
	Small antelopes, mainly oribi (<u>Ourebia ourebi</u>)	16	648	R	10+3	13	171	11	11	-	108
Domestic or wild	Jackal or dog	-	-	-	12	-	-	-	10	14	11
	Large bovid (antelope, buffalo or cattle)	-	-	-	139	32	-	1	-	-	-
	Small bovid (antelope, sheep or goat)	-	-	-	-	24	74	1	53	-	169
Domestic	Dog (<u>Canis lupus</u> f. <u>familiaris</u>)	-	-	-	8	-	-	-	-	-	43
	Cattle (<u>Bos primigenius</u> f. <u>taurus</u>)	-	-	-	9+32	11	1244	12	106	172	665
	Sheep/goat (<u>Ovis ammon</u> f. <u>aries</u>/<u>Capra aegagrus</u> f. <u>hircus</u>)	-	-	-	59+1	11	193	11	23	39	275
Total identified mammals		589	1929	-	542/165	150	1090	37	295	254	1522

Kha: Khartoum Hospital; Sag: El Saggai; Mar: Umm Marrahi; Sha: El Shaheinab; Gel: El Geili; Kro: Kadero; Nof: El Nofalab; Dir: Umm Direiwa; Zak: El Zakyab; Kad: El Kadada. For references see the Introduction to the accompanying paper. (a): in later Neolithic context; (b): mainly in graves; (c): *Pupoides senaariensis, Trochonanina* sp.; (d) The Khartoum Hospital fauna may include zorilla (*Ictonyx striatus*), that from Shaheinab an otter. F: frequent; R: rare; ↗: probably originally much higher in the sample than the number given which is based on the specimens found back in the stored material by Peters (1986); +: precedes the number of specimens identified by Tigani el Mahi (1982) from the second excavation at Shaheinab; }: groups remains which could not be differentiated.

1. Consumption offal: this is a major group comprising *Pila wernei*, fish, reptiles, birds, most of the wild animals, livestock;

2. Remains of animals used but not consumed. Clear examples are the Eastern Coast gastropods brought to the Central Sudan for personal adornment. For several other animals no definite decision can be made (*e.g.* python, carnivores);

3. Remains of carcasses of domestic animals not used as food; containing in our case only dog;

4. "Pene-contemporaneous" intrusives, comprising, no doubt, some amphibians and such rodents as gerbil, tatera, field rat, multimammate rat. Small landsnails such as *Zootecus insularis* belong also in this group, as well as *Limicolaria cailliaudi* which we think colonized the sites and thrived on them because of the lush vegetation;

5. Late intrusives. These are animals which come to the site long after it has been occupied. This group comprises some of the small rodents, which show a lesser degree of fossilisation *s.l.* (*e.g.*, the jerboa remains at Kadero).

As it stands, Table 1 does not suggest any major break between any of the assemblages except for the fact that in the Neolithic sites (from about 6,500 B.P. onwards) cattle and small livestock are present. For the pre-Neolithic wild fauna we have suggested (*cf.* Gautier 1983) living conditions as found now in the northern drier savannas, with an annual rainfall of some 500 mm and corresponding to a shift of the climatic belts of 400 km; comparable estimates have been made by other scholars (which may have influenced ours!). Some changes in the Neolithic game faunas, not all very certain, are the introduction of hare, the disappearance of marsh cane rat and of kob. For the drastic reduction of the number of kob, a desiccation of the Nile Valley can be invoked, perhaps combined with the effects of human overpredation since kob is a highly territorial species much attached to its home range and therefore very vulnerable, and with competition with domestic stock. Marsh cane rat is an amphibious rodent and its absence in the Neolithic suggests shrinkage of its typical marshy habitat. As to hare, dwindling game resources may have forced people to put this small game on their menu.

Calculations and estimates, not repeated here (Gautier in preparation) indicate that pastoralism with large and small livestock appears to have been a major subsistence activity in all the Neolithic sites. There may, however, exist some differences between right and left bank sites due to the location and catchment areas of these occurrences. Indeed, at Shaheinab and Nofalab, both on the left bank, game and small livestock may have been more important than on the right bank with its expanses of alluvial deposits providing good grazing. Anyhow, as yet none of the Neolithic sites appears to present clear unequivocal evidence for the progressive adoption of pastoralism, nor can we state precisely when and how this adoption began since the archaeological and archaeozoological sequence is very incomplete. The available data can be fitted in a model in which climatic deterioration combined with a possible change in the behaviour of the Nile (more regular flow and restricted flooding) provide an ecological stress factor making the prehistoric gatherers and hunters of Khartoum Hospital, Saggai, *etc.* willing to adopt pastoralism. Pastoralism in itself may have added to the deterioration of ecological conditions forcing people to rely increasingly on livestock as a major resource. This model has been with us, implicitly or explicitly, for some time. It appears plausible, but for the moment we do not see how the available archaeozoological data can do more to establish its ultimate validity; more data and no doubt many more detailed excavations (and re-excavations?) are needed.

Those disappointed with the foregoing may perhaps find solace in the striking discrepancy between the faunal spectra found near the Central Sudanese Nile and those collected in the Nile Valley in Egypt. In Egypt the mammalian assemblage is dominated by hartebeest (*Alcelaphus buselaphus*) and wild cattle (*Bos primigenius*), to which are added some finds of about twenty other mammal species only. As yet, we do not understand well the significance of this marked difference, which we hope to evaluate in detail in our re-appraisal of the archaeozoology of the Wadi Kubbaniya sites (*cf.* Gautier 1987). However, at the moment we are willing to advance the hypothesis that in the past we overestimated the ecological potential of the Egyptian Nile Valley. Vegetation and hence terrestrial life in this region has been for long very dependant on the river Nile and its floods, while in the Central Sudan the buffer effect of the Nile was combined with at least a modicum of rain! Therefore, more so than in the Sudan, fish may have been the only reliable animal resource in prehistoric Egypt that permitted the persistence of hunter-gatherer lifestyles, while elsewhere experiments in domestication were already having their impact. In our view the foregoing emphasizes once more that archaeozoology is basically a comparative discipline in which not only inter-site but also inter-regional comparisons can be very revealing.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

RANDI HAALAND

The Late Neolithic culture-historical sequence in the Central Sudan

Introduction

A research cooperation between archaeologists from the Universities of Khartoum and Bergen, started in 1978 in the area just north of Khartoum and continued in this region until 1980. The work had been concentrated on problems related to adaptation and settlement patterns of the early food-producing communities, the so-called Khartoum Neolithic cultural tradition, 6,000 - 5,000 B.P.

In 1983 survey and excavations were carried out in the Rabak area 230 km south of Khartoum along the White Nile. The individuals participating were Ali Tigani el-Mahi, working on the paleoosteological material, Anwar M. Osman, working on the paleobotanical remains, and the author working on the pottery and lithic material.

The aim of the project in this southern region was to find out if the Khartoum Neolithic tradition extended into this area. We wanted furthermore to see if there were traces of settlements dated later than 5,000 B.P. i.e. from the time from which we have no finds in the Khartoum region.

Alltogether 5 sites were surveyed in this area, and excavations were carried out only on one site, the Rabak settlement. This was because the other sites were badly disturbed by later agricultural activities and erosion. The field-work yielded the following results.

The Rabak site

The Rabak site is located *ca* 3 km to the east of the present flow of the White Nile, on an old bank of the river (Fig. 1). The site is elevated *ca* 3,5 m above the surrounding floodplain. The size of the settlement is *ca* 16,000 square metres (an estimation based on the distribution of the surface material) of which only 18 square metres have been excavated. The cultural deposit was *ca* 60 - 80 cm deep. One square

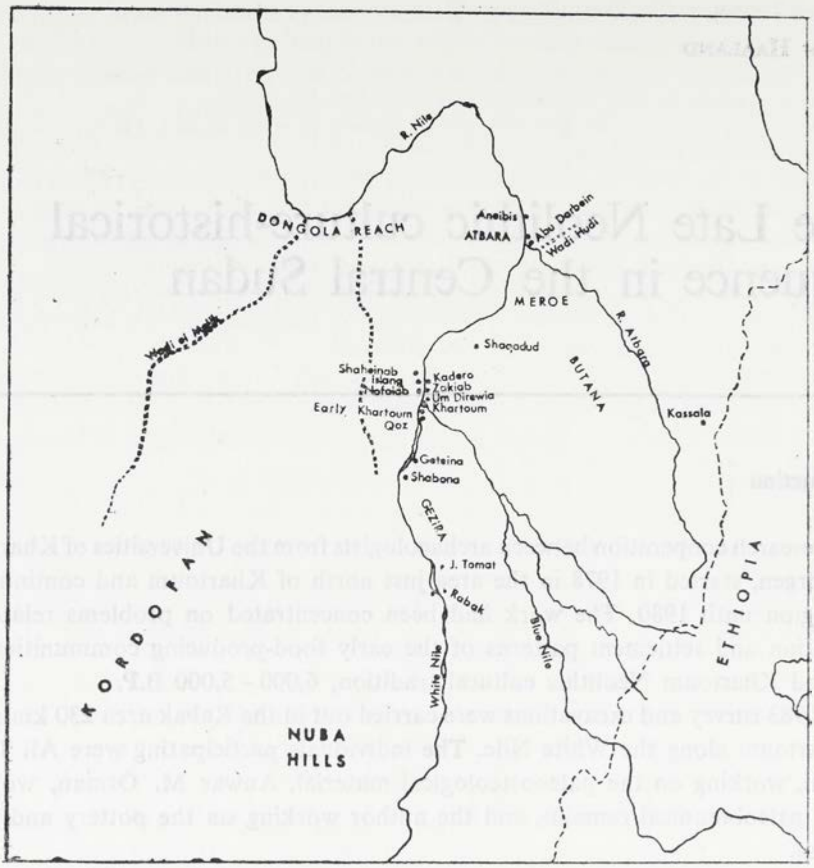

FIG. 1. Archaeological map of the Sudan

(107x/100y) had cultural debris which was 150 cm deep. This was, however, due to a downcutting, and the material indicated a kitchen-midden. It consisted of burnt foodwaste, mainly fishbones (personal communication by Ali Tigani el-Mahi). Since there was no stratigraphy, the occupation debris was excavated by arbitrary levels of 10 cm each. Four radiocarbon dates have been obtained on shell, all from one square (107x/100y). The lowest level (level 15) is dated to 6,020 ± 130 B.P., level 6 is dated to 6,050 ± 100 B.P. (this is where the downcutting starts), level 3 is dated to 5,860 ± 80 B.P., and level 2 to 4,490 ± 100 B.P.

The settlement thus seems to have been inhabited for *ca* 1,500 years. The oldest level is clearly contemporary to the Neolithic sites from the Khartoum area, while the latest date falls in the 5th millennium B.P., when no settlement remains have been found in that area.

Lithic artefacts

Tables 1 and 2 show frequency distribution of the lithic tools found at Rabak. On Table 1 are put up the classified tools according to levels from 2 squares (each square is 2×2 m). The number of standardized tools is very few, and the same types

Table 1

Rabak site. Lithic tools

	Square 107x/100y						Square 111x/100y					
Type	L.4-14	L. 3	L. 2	L. 1	Sum	%	L. 4-6	L. 3	L. 2	L. 1	Sum	%
Convex scrapers	5		2	4	11	13,8	4	2	7	4	17	19,5
Concave scrapers	4		2	2	8	10,0			7	4	11	12,6
Groovers	4	1		1	6	7,5	1	2	2		5	5,7
Borers							1		2		3	3,4
Backed flakes	1			1	2	2,5	1	1	2	1	5	5,7
Lunates		1			1	1,2	1		2	1	4	4,7
Truncations				2	2	2,5		1	1		2	2,3
Retouched flakes	26		3	18	47	58,7	5	6	20	5	36	41,4
Bipolar flakes		1	1	1	3	3,8	3	1			4	4,7
Total	40	3	8	29	80	99,8	16	13	43	15	87	100,0

Table 2

Rabak site. Lithic tools

Type	Quarts	Quartzite	Rhyolite	Other material	Sum	%
Convex scrapers	29	30	3		62	13,2
Concave scrapers	17	12	1		30	6,4
Scrapers	11	12			23	4,9
Groovers	13	4			17	3,6
Borers	8	3			11	2,3
Backed flakes	22				22	4,7
Lunates	19				19	9,1
Truncated flakes	8				8	1,7
Denticulates		1			1	0,2
Retouched flakes	133	105	20	2	260	55,4
Bipolar flakes	12	3			15	3,2
Polished axe fragments				1	1	0,2
Total	272	170	24	3	469	99,9

Except squares 107x/100y, and 111x/100y.

of tools seem to occur from top to bottom. Thus the tools from the remaining 10 square metres were classified together (see Table 2).

Another reason for not classifying these artefacts according to levels was that these areas seemed disturbed by the later Meroitic and Moslem grave digging.

The total number of tools from the 18 square metres excavated at the Rabak site is 624. Scrapers were the most numerous group of tools. Within this group the convex scrapers is the most frequent type. Next come engraving tools, groovers/borers and backed tools/lunates. In general this last group of tools is poorly made on bad quality quartz.

Except for a few bipolar flakes all the artefacts were made on flakes, the blade

Table 3

Rabak site. Potsherds from square 107x/100y (4 square metres)

Type of decoration	Levels 14-4 Nos.	%	Level 3 Nos.	%	Level 2 Nos.	%	Level 1 Nos.	%
1 Dots	36	9,7	27	29,0	17	38,6	14	22,2
2 Vees/dots	2	0,5						
3 Catfish spine	9	2,4	5	5,4	3	6,8	1	1,6
4 Dotted saw tooth	29	7,8	2	2,2	1	2,3	3	4,7
5 Saw tooth			1	1,1	2	4,5	1	1,6
6 Undecorated (wiped)	269	72,3	41	44,0	15	34	19	30
7 Decoration non Khartoum type	13	3,5	3	3,2				
8 Jebel Moya type of decoration			10	10,8	4	9,1	20	31,7
9 Finger nail decoration					2	4,5	3	4,7
10 Others			1	1,1			2	3,1
11 Base	14	3,8	3	3,2				
Total	372	100,0	93	100,0	44	99,8	63	99,8

Levels 14 - 4 are classified together since there is no difference in the ceramics between the different strata. The C-14 dates from these levels indicate the same time period.

technique was not employed. The flaked lithic tools recovered were quite similar to those found in the Neolithic sites in the Khartoum area. The difference lies in the absence of tools such as gouges and grinders. The only polished tools found were a few rubbers and one fragment of a greenstone axe.

Quartz is the most used raw material for the tools, cores and debitage (*ca* 58 per cent). Quartzite is also represented in a relatively high proportion (*ca* 37 per cent). The other type of raw material employed is petrified wood. A most interesting find is the occurrence of rhyolite; alltogether 26 artefacts made on rhyolite were found. These were mostly made into convex scrapers. Rhyolite does not occur in the area, the nearest source seems to be the 6th Cataract area *ca* 300 km to the North.

Pottery material

Table 3 shows the frequency distribution of the different types of decorative patterns used on the pots. The sherds are recovered from square, where all the radiocarbon dates were taken. The pottery from levels 14 - 4 is identical with the Khar-

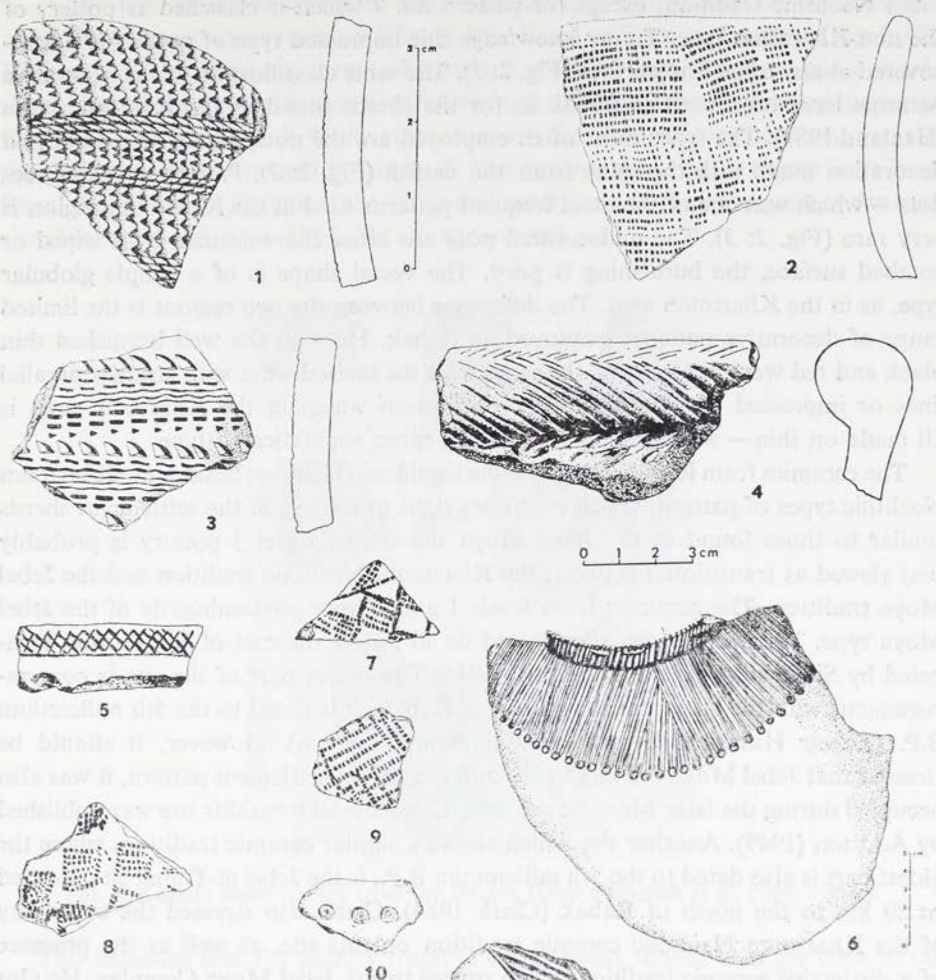

FIG. 2. Rabak site. Pottery sherds

toum Neolithic tradition, except for pattern no. 7 which is classified as pottery of the non-Khartoum type. To my knowledge this impressed type of pottery is not recovered at any other known sites (Fig. 2: *1*). The same classification of the decorative patterns have been used at Rabak as for the sherds found in the Khartoum area (Haaland 1981). The types most often employed are the dots, dotted saw-tooth and decoration made with the spine from the catfish (Fig. 2: *2*). Pattern no. 2 – vees dots – which was one of the most frequent patterns used in the Khartoum region is very rare (Fig. 2: *3*). The undecorated pots are often characterized by a wiped or combed surface, the burnishing is poor. The vessel shape is of a simple globular type, as in the Khartoum area. The difference between the two regions is the limited range of decorative patterns employed at Rabak. Here all the well burnished thin black and red ware are lacking, the same with the incised ware with straight parallel lines or impressed curvilinear design, decoration which in the Khartoum area is all made on thin – walled small vessels of a more sophisticated type.

The ceramics from level 3 indicate some significant changes; besides the Khartoum Neolithic types of pattern, which continues right to the top of the settlement, sherds similar to those found at the Jebel Moya site occur. Level 3 pottery is probably best viewed as transitional between the Khartoum Neolithic tradition and the Jebel Moya tradition. The ceramics from levels 1 and 2 were predominantly of the Jebel Moya type. The Jebel Moya site located *ca* 40 km to the east of Rabak was excavated by Sir Henry Welcome in 1910 - 1914. The oldest part of the site is contemporaneous with the later occupation of the Rabak. It is dated to the 5th millennium B.P. (Zoheir Hassan Babiker, personal communication). However, it should be stressed that Jebel Moya is a large site, with a complex settlement pattern, it was also occupied during the later Meroitic periods. The material from this site was published by Addison (1949). Another site which shows a similar ceramic tradition, where the oldest part is also dated to the 5th millennium B.P., is the Jebel et-Tomat site, located *ca* 50 km to the north of Rabak (Clark 1984). Clark also stressed the continuity of the Khartoum Neolithic ceramic tradition on this site, as well as the presence of a distinctive ceramic tradition which relates to the Jebel Moya Complex. He also sees elements of similarities between this tradition and what he names the Butana industry pottery to the north (Clark 1984).

The potsherds classified here as belonging to the Jebel Moya tradition (pattern no. 8) includes a variety of decorations and different types of vessels, which are all found at the Jebel Moya site. I have so far not classified these into more than one type. They show thick cord impressed rims (Fig. 2: *4*) or an incised rim (Fig. 2: *5*), and pots with a narrow neck decorated with incised lines on the upper part of the body (Fig. 2: *6*). The pots often show roulette type of impressed design (Fig. 2: *7*, *8*, *9*) or other types of impressed design (Fig. 2: *10*). However, the impressed type of decoration is dominating as underlined by Clark for the older levels at the Jebel et – Tomat site (Clark 1973). The shape of vessels is much more varied than compared with the Khartoum tradition.

A new type of sherds decorated with fingernail impression, both on the body and along the rim occur, pattern no. 9 (Fig. 2: *11*, *12*) and with a wiped surface (Fig. 2:*13*). Thsee ceramic types do not seem to be present at Jebel Moya. However, these sherds show clear similarities with ceramics found in the Butana, classified as belonging to the Kassala phase (Figs. 3 - 4). Another common feature between these two areas is the design which is arranged in bands. It also appears that similar sherds have been found in the western Butana at the Shaqadud settlement, in the upper part of the cave site (Mohamed Ali *et al.* 1984, Fig. 4, upper part).

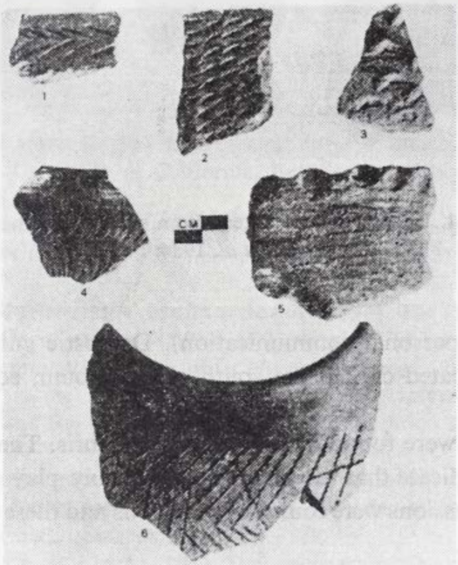

FIG. 3. Kassala phase pottery from the Butana (after Fattovich *et al.* 1984: Fig. 4)

This indicates that the pottery traditions underwent similar changes both in the Butana, from Shaqadud to Kassala and in the area of Rabak (including the Jebel et – Tomat site).

Adaptation

The adaptation of the Rabak people has predominantly been based on aquatic resources. The types of resources exploited did not seem to change from the earliest occupation till the end of the settlement. An analysis of the osteological material is being done by Ali Tigani el-Mahi and when this is completed one will see if this preliminary impression is confirmed.

Besides the aquatic resource exploitation, the Rabak people did some hunting, and domestic animals like cattle were identified from levels dated to 6,000 B.P.

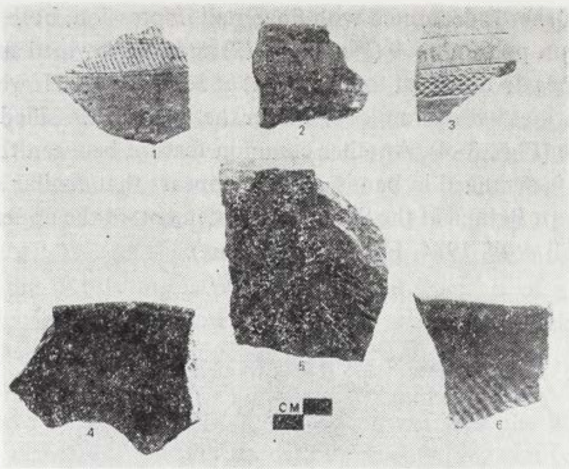

FIG. 4. Kassala phase pottery from sites in Butana (after Fattovich *et al.* 1984: Fig. 5)

(Ali Tigani el-Mahi, personal communication). Domestic animals thus seem to be present at Rabak, located ca 230 km south of Khartoum, equally early as in that area.

No plant remains were found in the settlement debris. The very few grinders recovered on the site indicate that the plant-food probably played a minor role. However, some plant impressions were found on potsherds and these are currently analysed by Anwar M. Osman.

The very large size of the settlement, the wide spectrum of resources utilized with a heavy emphasis on aquatic resources, indicates that Rabak was a site permanently occupied throughout the whole year. However, the presence of cattle might have forced a part of the group inhabiting the Rabak site, to have split up and moved to smaller camps inland to the east. This would probably have been necessary during the rainy season when the plain surrounding the site was partly innundated by the White Nile. In this season one would expect the site to have been swarming with insects due to the surrounding water. The rainfall was much higher during the occupation of the settlement than at present. The rainfall today is 450 mm yearly, while the estimated rainfall 6,000 - 4,000 B.P. would have been higher, probably *ca* 750 mm (Wickens 1982). These east-west types of migrations were hypothesized by Clark for the people inhabiting the Jebel et – Tomat site (Clark 1984). There might also have been north-south movements of people migrating towards the Butana. The basis for these migrations would have been that the Butana probably could be best exploited for a pastoral production in the rainy season, while in the dry season the Rabak area could provide the best pasture. The Rufaa al Hoi tribe practised this type of pastoral movements with cattle and sheep, between the Butana and the Gezira until cotton cultivation put a stop to it recently (Lebon 1965: 116). An indication that these types of north-south movements took place is the presence of rhyolite at the Rabak site. Cultural features such as similarities in ceramics betoeen sites in the Butana and in the region of Rabak (including the site of Jebel et—Tnmat) may have been caused by such movements. More work will be needed to get aw understanding of the cultural relationship between the Butana and the Gezira.

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practised this type of seasonal movement with cattle and sheep, between the Indus and the Quetta and on the cultivation which may have happened seasonally (Lahan 1965: 116). An indication that these types of movement may have taken place is the presence of imports at the Bolan site. Cultural contacts and the similarities in ceramics have been seen in the Quetta area and in the region of Bolan (including the site of Nihal at Tamaru) may have been caused by such movements. More work will be needed to get an understanding of the cultural relationships between the Bolan and the Quetta.

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MAREK CHŁODNICKI

The petrographic analyses of the Neolithic pottery of Central Sudan

In recent years the research on pottery technology has turned more and more in the direction of petrographic analyses. These include the analysis of materials being a potential base for pottery production as well as the mineralogic and petrographic analyses of the products themselves. The goal of these studies is the identification of the place of origin of the pottery, the sources of the materials used in its production and a precise definition of the models of pottery production present in a given community.

As regards the Neolithic pottery of the Central Sudan, we have at present at our disposal a small series of petrographic analyses, but it is to be expected that in the near future this number will increase rapidly. Analyses are being carried out on samples from new sites and at the same time the number of samples from complexes already analysed is growing. The results obtained so far gave rise to new questions which are still to be answered.

So far, the abbreviated results of analyses of the pottery from Shaheinab (Nordström 1972: 80) and Um Direiwa (Nordström 1981: 243) have been published. At our diposal are also the analyses of pottery from the Kadero site. Ten samples were investigated by Fekri Hassan and C. Van West, another ten were analyzed by M. Pawlikowski. Studies of this sort were also carried out for pottery material from Geili and Kadada, but they have not been published yet.

Different approaches to the subject taken by various scientists do not always render the results of their work comparable although they are to some extent complementary due to the emphasis put on various aspects of pottery technology by different authors.

On the basis of available analyses it is possible to determine that the Neolithic communities of the Central Sudan used Nile mud for the production of pottery. Silt formed 60 - 70% of the ceramic paste, although in extreme cases the figure fell to 40% or rose to 80%. The silt was weakened by admixture of sand, and only exceptionally was the pottery made of unweakened material. Predominant in the Kadero material was a sand admixture with grain coarseness up to 0.1 mm, rarely exceeding

0.4 mm, while grains with coarseness more than 1 mm occur only exceptionally (Fig. 1). In Shaheinab the admixture grain coarseness is usually up to 0.25 mm, never exceeding 0.8 mm (Nordström 1972: 80). In Um Direiwa grain coarseness of the admixture rarely exceeds 0.5 mm (Nordström 1981: 243). Variously set limits for particular classes of grain size make a detailed comparison of the granulometric differentiation of pottery from different sites impossible (the same is true for the samples analyzed by F. Hassan and M. Pawlikowski). Nevertheless, it is possible to state that the admixture used in pottery production of all the Central Sudanese Neolithic sites consisted mainly of fine and, at most, medium coarse sand.

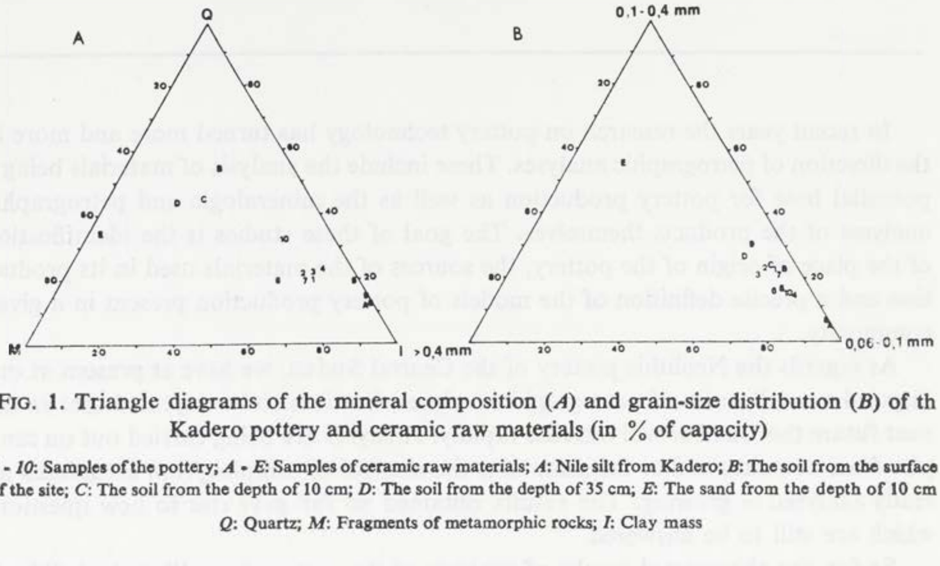

FIG. 1. Triangle diagrams of the mineral composition (*A*) and grain-size distribution (*B*) of th Kadero pottery and ceramic raw materials (in % of capacity)

1 - 10: Samples of the pottery; *A - E*: Samples of ceramic raw materials; *A*: Nile silt from Kadero; *B*: The soil from the surface of the site; *C*: The soil from the depth of 10 cm; *D*: The soil from the depth of 35 cm; *E*: The sand from the depth of 10 cm *Q*: Quartz; *M*: Fragments of metamorphic rocks; *I*: Clay mass

The texture of the ceramic paste is porphyritic with random distribution of grains a characteristic occurring in hand-made pottery. The grains are usually subangular or subrounded in shape. Analyses of soil samples from the Kadero site have shown that the sand used as an admixture may have been taken directly from the surface or from a shallow layer (samples B-D). Probably, three to four parts of mud were mixed with one part of sand.

The mineral most common to the temper is quartz. Feldspar and mica also occur, but in small amounts. Only in the Um Direiwa samples does feldspar occur in amounts approaching quartz contents (Nordström 1981: 243). Mainly it occurs as microline and plagioclase, while mica is identified as muscovite and biotite. Also noted in the pottery is the presence of orthoclase, tremolite schist and hornblende.

As important as the mineral composition and the granulometric definition of the pottery is the attempt to define the ceramic different technological groups which is very helpful in the cultural interpretation of the mineral, the defining of models employed in pottery production and the number of sources of ceramic material.

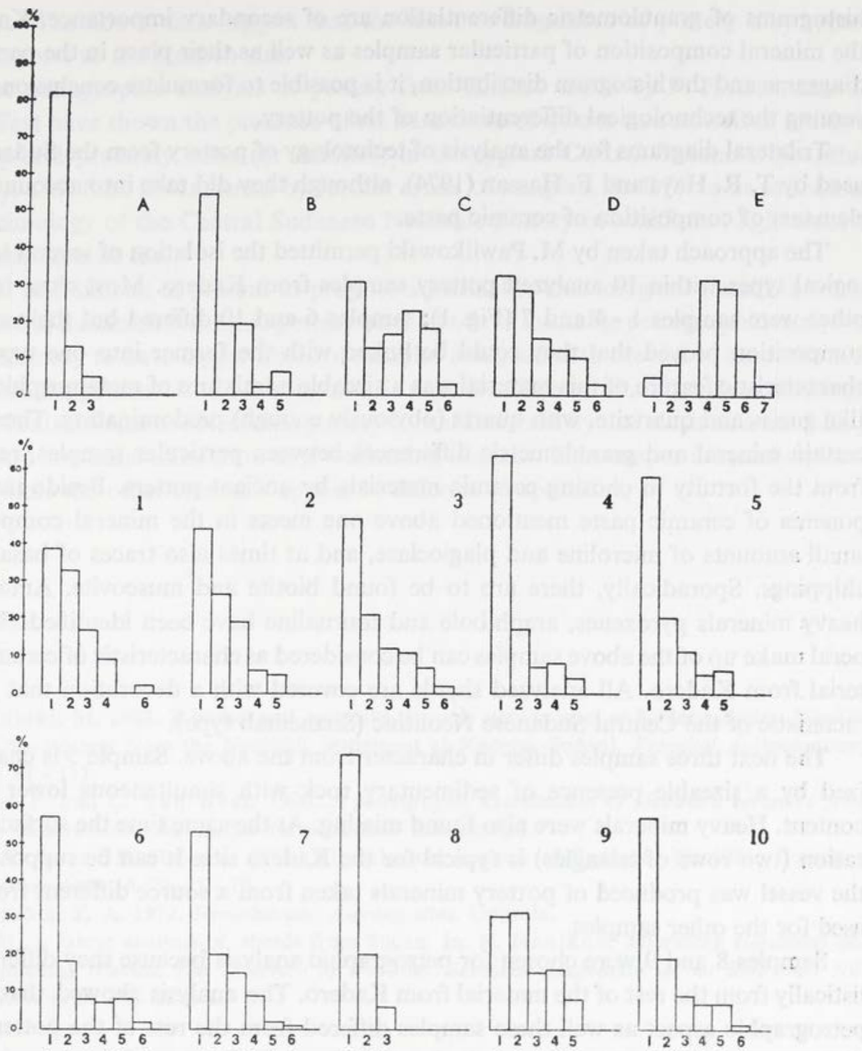

FIG. 2. Results of the granulometric analysis of the samples of pottery and ceramic raw materials from Kadero

1 - 10: Pottery samples; *A-E*: Ceramic raw material samples

Intervals of the admixture thickness

1: up to 0.06 mm; *2*: 0.06 - 0.1 mm; *3*: 0.1 - 0.2 mm; *4*: 0.2 - 0.4 mm; *5*: 0.4 - 1.0 mm; *6*: 1.0 - 2.0 mm; *7*: above 2.0 mm

For technological differentiation of the pottery a good method seems to be the way proposed by M. Pawlikowski. Of basic importance here is the tracing of similarities and differences between particular samples with the help of three mineralogic components and three granulometric groups as seen in the diagram (Fig. 2). The histograms of granulometric differentiation are of secondary importance. Knowing the mineral composition of particular samples as well as their place in the particular diagrams and the histogram distribution, it is possible to formulate conclusions concerning the technological differentiation of the pottery.

Trilateral diagrams for the analysis of technology of pottery from the Sudan were used by T. R. Hays and F. Hassan (1974), although they did take into account other elements of composition of ceramic paste.

The approach taken by M. Pawlikowski permitted the isolation of several technological types within 10 analyzed pottery samples from Kadero. Most close to each other were samples 1 - 4 and 7 (Fig. 1); samples 6 and 10 differed but their mineral composition proved that they could be linked with the former into one type. The characteristic feature of this material was a sizeable admixture of metamorphic rocks like gneiss and quartzite, with quartz (obviously enough) predominating. There exist certain mineral and granulometric differences between particular samples, resulting from the fortuity in chosing ceramic materials by ancient potters. Beside the components of ceramic paste mentioned above one meets in the mineral composition small amounts of microline and plagioclase, and at times also traces of basalt rock chippings. Sporadically, there are to be found biotite and muscovite. Among the heavy minerals pyroxenes, amphibole and tournaline have been identified. The mineral make up of the above samples can be considered as characteristic of ceramic material from Kadero. All analyzed sherds are covered with a decoration that is characteristic of the Central Sudanese Neolithic (Shaheinab type).

The next three samples differ in character from the above. Sample 5 is characterized by a sizeable presence of sedimentary rock with simultaneous lower quartz content. Heavy minerals were also found missing. At the same time the surface decoration (two rows of triangles) is typical for the Kadero site. It can be supposed that the vessel was produced of pottery minerals taken from a source different from that used for the other samples.

Samples 8 and 9 were chosen for petrographic analysis because they differed stylistically from the rest of the material from Kadero. The analysis showed that in the petrographic aspect as well these samples differed from the rest of the pottery. The different character of sample 8 resulted mainly from the fineness of the ceramic paste, which also had a larger content of sedimentary rock fragments, silty-dusty in character. It belongs to a vessel with a plastically modelled band just below the mouth, decorated with a dotted herring-bone pattern, which is a rarity in the Central Sudanese Neolithic pattern.

Sample 9 with a rough surface and impressed with hardly visible pattern different in character from others found at Kadero, has an admixture that differs most from the remaining pottery. These differences are visible in macroscopic examination (Chłodnicki 1982). The sample is characterized by a large admixture of rock fragments identified as being of granite-syenite group, with large amount of perthite – a mineral that does not appear in the remaining samples and analyzed materials from

Kadero. The above data suggest that the last two fragments of pottery may represent imports to the Kadero site.

The petrographic analyses of pottery from Kadero made by F. Hassan and C. Van West have shown the presence of an admixture of quartz and as well of crushed pottery and probably bone (or dahlite?) in the typical Central Sudanese Neolithic pottery. This fact, if confirmed by further series of samples, shall force us to look at the technology of the Central Sudanese Neolithic pottery in a different light than it has been done so far.

It is still difficult at present to propose a justifiable technological classification of the Central Sudanese Neolithic pottery on the basis of available petrographic analyses. It is necessary to have bigger series of samples analyzed with the aid of the same methods. In the present state of research it is possible to determine that the technology of the Central Sudanese Neolithic pottery is characterized by use of silt as a modelling mass and a mineral admixture as a weakening element. This temper is mainly quartz sand, while the other elements appear in different proportions.

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[illegible], M. 1982. [illegible] Kadero [illegible]

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

ISABELLA CANEVA

Typological notes: the Sudanese case

There is an increasingly felt need for a suitable typology of the prehistoric artefacts from the Central Sudan, firstly because of the amount of new finds available for studies on the relative chronology of sites and, secondly, because too many misunderstandings have accumulated as regards the description of the diffusion of such phenomena as the wavy line pottery and bone harpoons. In my opinion this is due to the use of typologies based on morphological stereotypes in classification consisting of elementary lists, both pottery and lithics, where the lack of hierarchy makes us miss the connection between the various elements analyzed.

For instance, none of the lithic typologies takes into account either the flaking procedures and aims as indicated by the waste, or the waste itself as possible ready-made tools. In theory, most scholars agree that retouched tools constitute only a part of the actual tool-kit. However, in practice their work still relies on lists of retouched objects only, with the ensuing risk of failing to seize the total significance of the assemblage.

In this respect, a different analytic approach was used for the material from the Early Khartoum site of Saggai (Caneva and Zarattini 1983). The approach was characterized by a fairly limited list of retouched tools and an extensive assemblage of pieces with sporadically retouched and unretouched flakes. By reconstructing the flaking procedure we thought that, among other things, we had understood the technical importance of what appeared to be the favourite flake shape, *i.e.* a lunate with a well elaborated back. As it appeared, crescentic flakes might have the same function as the retouched lunates. They were retouched apparently only slightly, either to correct the curve or steepness of the back, or the sharpness of the cutting edge. Bearing this in mind, a considerable part both of the body of waste and of what normally is confined to the class of undifferentiated retouched pieces became significant; the lunate was intepreted as the core of the assemblage and this provided us with an indication on how to classify all the retouched pieces without dividing them into *a priori* categories.

The only difference between the two layers of the Saggai settlement concerns the ratio of the lunates. Other lithic types reveal, indeed, a perfect parallelism. We reach the same parallelism, however, if we combine lunates and crescent-shaped retouched flakes thereby accounting for 61.6% in the upper layer and 62.9% in the lower layer. We, therefore, considered the difference in rates of lunates as not significant.

The same way of reasoning was applied to the pottery from Saggai (Caneva 1983) which is usually classified on the basis of decoration omitting other distinctive elements. While the techniques of decoration are more or less correctly studied and described, the basis of any present typology is either the motif or the tool assumed to have been used.

However, in the first case one relies on largely subjective visual impressions, using definitions such as "mat impressions", "dotted lines", *etc.* and, in the second case, one assumes the possibility of listing all the kinds of items which could have been used as tools for decoration. My opinion is that the aesthetic significance of the motifs, as well as the technical relevance of a single, perhaps occasional, tool, are beyond our possibility of evaluation.

Our proposal was therefore not to use these criteria of classification and our preliminary division was based on the technical aspects of decoration. It not only appeared to be more objective but also made it possible to group the operations which were similar for the potter in terms of work input.

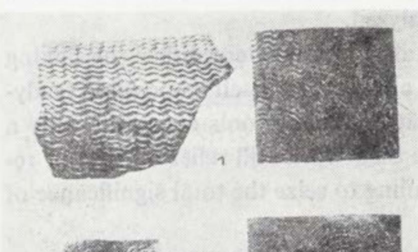

FIG. 1

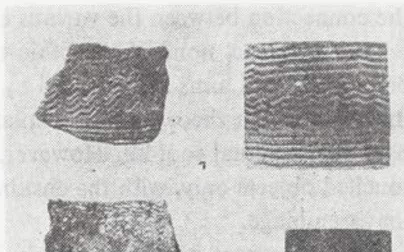

FIG. 2

Mesolithic ceramics from central Sudan: potsherds and laboratory replications

Three categories were thus formed according to the following hierarchy:

1. Technique of decoration;
2. General form of the tool employed;
3. Morphological details of the working edge of the tool, *i.e.* the different motifs.

When applying this system to the Early Khartoum pottery it appeared that there were two basic techniques of decoration: impression with a rocker, both comb and two-toothed tool (Fig. 1: *3*; Fig. 2) and incision with a comb (Fig. 1: *1* - *2*).

The next division took into account the motifs but in terms of their merely indicative value only. It seems to be difficult to classify the variety of patterns and particular decorative effects which are frequently either combined or fading into one another.

Within the rocker patterns a valuable distinction concerns the tool employed, either a double-toothed object (Fig. 1: *3*) or a multi-toothed comb (Fig. 2). The latter shows, however, a great variety of patterns obtained by varying the spacing or direction of the impressions. Among these is the dotted wavy line, for which in the past the authors suggested very complicated production procedures (Arkell 1949; Camps--Fabrer 1966). On the contrary this pattern seems to be easily obtained by the technique of first pivoting the comb on one end until the edge has made a fan of impressions, and then by reversing the movement (Fig. 2: *1*, *3*).

The ratio of rocker technique to the wavy line decoration appears to be a diagnostic stratigraphic element at Saggai, showing a gradual shift towards the predominance of the rocker technique. This can be seen throughout the cultural Khartoum sequence of the Early Khartoum and the Central Sudanese Neolithic cultures. The dotted wavy line decoration has its place in this trend, where it occupies an intermediate position (Arkell 1953; Bailloud 1966).

The situation concerning the Neolithic pottery is more complex. There are basic decoration techniques of this pottery: the rocker and the linear impression and the incision. The rocker, which is the most common technique, has two basis applications, depending on the tool employed: an object with a continuous edge, curved or rectilinear, which can be plain (Fig. 3: *3*) or, more frequently, notched (Fig. 4), or a tool with a two-toothed edge, either thin or thick (Fig. 3: *2*).

The first kind of comb provides innumerable different motifs depending on the number and size of the teeth, including the rows of opposed triangles or v's in which the continuous edge of the tool is interrupted in the middle by a single notch (Fig. 4: *1*).

The second kind of comb produces couples of thin dotted lines which are often wrongly intepreted as linear impressions. The simple linear impression, which is lacking in Arkell's description and documentation (1953), consists of the horizontal application of a comb along parallel lines (Fig. 3: *1*). Hence the patterns usually defined as "dotted parallel lines" can be obtained by means of two different techniques and tools, representing two different approaches to the operation. This differ-

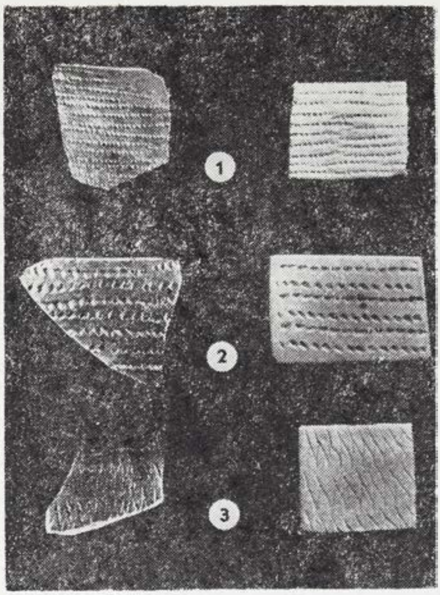

FIG. 3

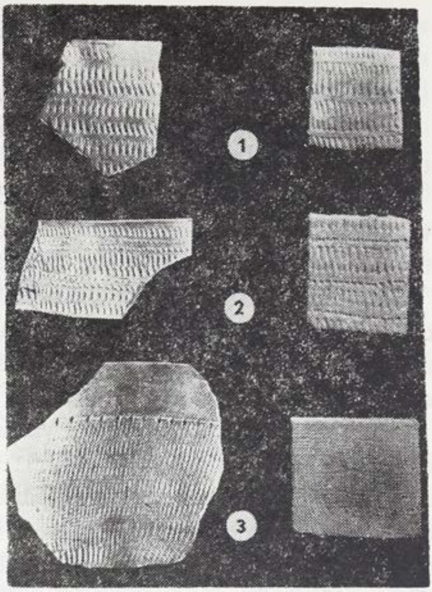

FIG. 4

Neolithic ceramics from central Sudan: potsherds and laboratory replications

ence acquires more significance when we observe that the first technique, with the exclusion of the other, was to become the only impressed decoration to survive in the Late Neolithic of Central Sudan. The gradual disappearence of the rocker comb in favour of the two-toothed tool seems also to be documented by the fact that the Neolithic dotted wavy line is made with the latter technique and no longer with the usual rocker.

In conclusion, if it is true that a final "model" decoration was an aim of any operation, it is also true that this would have been accomplished in several ways: what then becomes significant in order to distinguish one group from another is the procedure through which this "model" was realized rather than the morphology of the final product, often too simple to be distinctive. Thus the reconstructed procedure could give an indication of the operator's gesture in which the quantity and quality of labour, the choice of tools and, finally, the style may be specified.

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AHMED M. ALI HAKEM and ABDEL RAHIM M. KHABIR

Sarourab 2: a new contribution to the Early Khartoum tradition from Bauda site

During the archaeological field-work conducted by the first of the authors, several prehistoric sites have been located in the area north of Omdurman, between Wadi Seyidna and Khor Ed Dishinab (Fig. 1). The chronology of these sites range from the Khor Abu Anga Palaeolithic to post-Neolithic. Some of them have received special attention, particularly those at Jebel Um Marrahi, Nofalab and at the Bauda village. The present report concerns the latter site which drew our attention very early. Abbas S. A. Mohammed has made several test pits in it and obtained valuable information from them. However, due to its importance and because it was endangered by the growth of the Bauda village, where it is situated, it has been decided that more attention should be devoted to it. Thus it became a target of intensive investigation in 1978 by both authors of the present paper.

The site of Sarourab 2 lies on the western edge of Bauda village (which belongs administratively to the Sarourab West region – a conglomeration of villages and hamlets extending along the bank of the Nile for a distance of about 8 km – hence the name Sarourab). It is located on the west bank of the main Nile, some 45 km to the north of the Khartoum Hospital site – a type-site of Early Khartoum tradition (Fig. 2). The site is located on a gravel ridge, about 384 m above the sea level. The area of occupation covers about 75 × 35 m, on E–W line. It seems that it may have extended further eastward before the village was built (Fig. 3). An estimated total area of the site is 2800 sq. m (intensive occupation only). The early settlement was located on the edge of an ancient Nile bank. A total of 51 squares of 2 × 2 m each were excavated, yielding material down to a depth of 0.6 m in most places and exceeding that depth in very few instances.

A large amount of cultural material have been recovered in the course of the testing. The lithic tools (Fig. 4) are made mainly of quartz – about 70 %; other material included sandstone, rhyolite, mudstone, chert and fossil wood. Of the retouched tools, various scrapers amount to 21 %, while other tools include lunates and other geometrics, borers, groovers, etc. The type and amount of debitage recovered points to the fact that the tools were made locally. Altogether 150 ground stone artifacts were found, including one complete stone ring (Fig. 4). The overall assessment is that Sarourab 2 settlement shows close typological affinities with Khartoum Hospital-type stone tools.

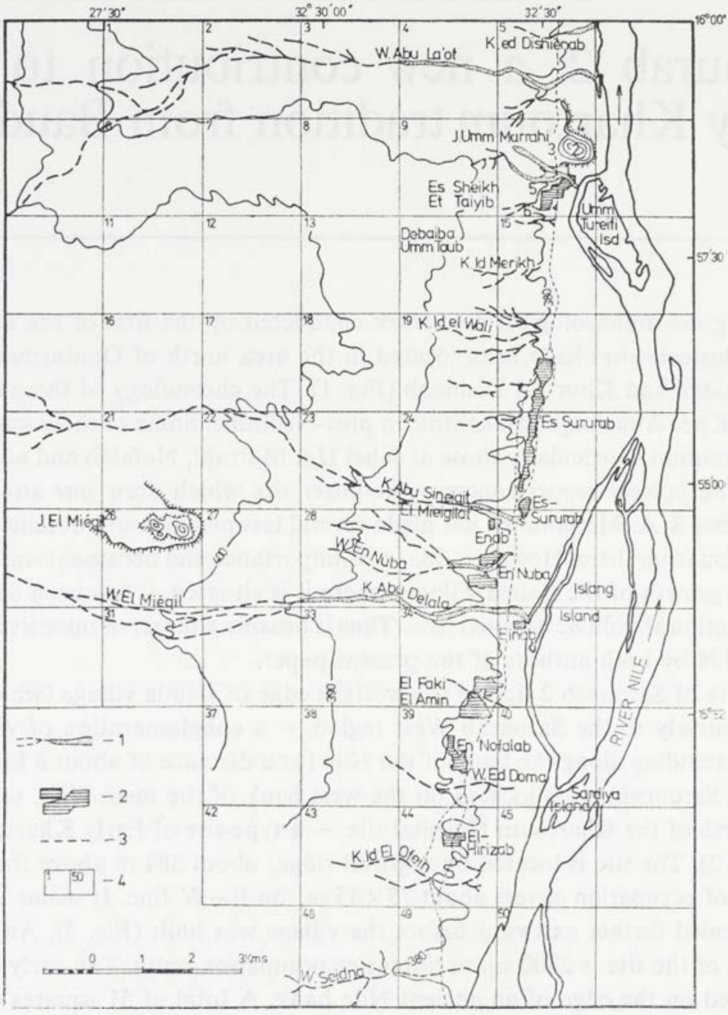

FIG. 1. Map of the western bank of the main Nile between Wadi Seidna and Khor ed Dishienab and the grid system of the concession area of the Khartoum University archaeological field-work

1: Seasonal khor; *2*: Village; *3*: Track; *4*: Survey grid

A total of 4,831 potsherds were collected from all test-pits, including bases, rims (Fig. 5) and body sherds. The pottery types and its decoration exhibit typical Early Khartoum tradition, though much cruder and rougher examples are more in evi-

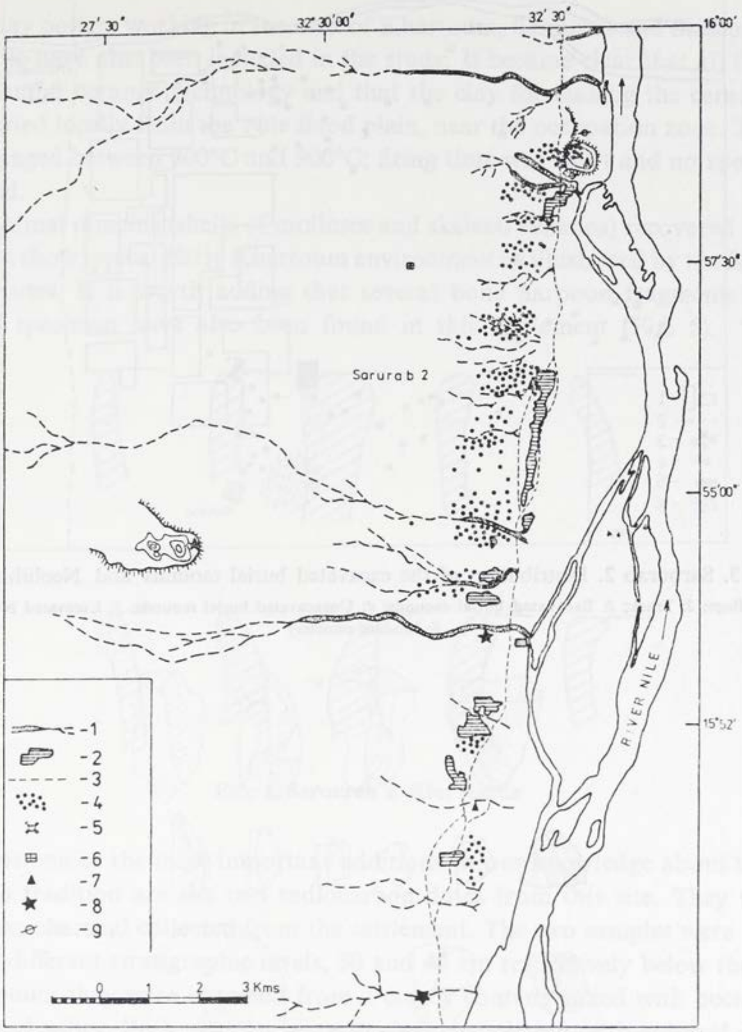

FIG. 2. Archaeological sites within the concession area of the Khartoum University on the western bank of the main Nile

1: Seasonal khor; *2*: Village; *3*: Track; *4*: Meroitic burial mounds; *5*: Meroitic fortress; *6*: Stone building (Debaiba umm-Toub); *7*: Neolithic site; *8*: Palaeolithic site; *9*: Scatter of potsherds

dence at Sarourab 2 site. Specimens from this assemblage have been subjected to further studies in order to shed more light on the ceramic technology of Sarourab 2 and other related sites. Various techniques were used in these studies, including X-ray diffraction, petrographical analysis, standard geothite norm of the fine fraction, and thermogravimetrical analysis. Comparative samples have been taken from the sites of Shaheinab and Shabona. Additionally, samples of clay soil used by the

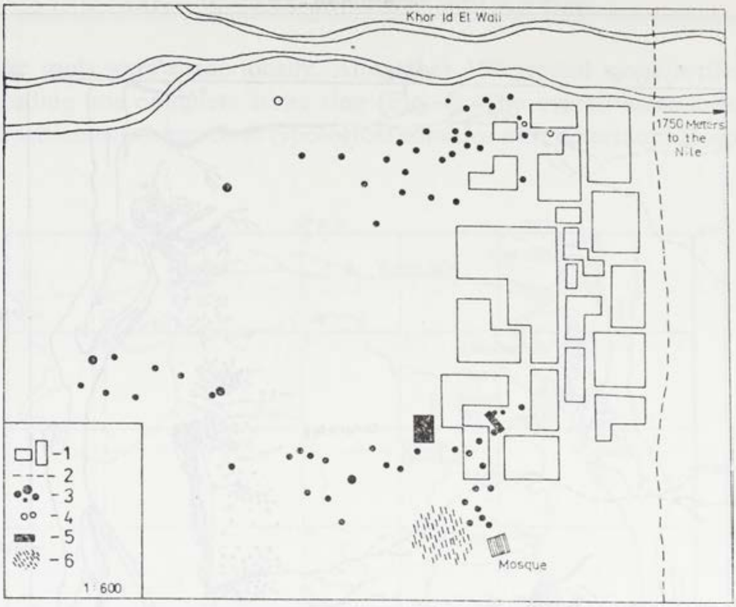

Fig. 3. Sarourab 2. Distribution of the excavated burial mounds and Neolithic sites

1: **Bauda** village; *2*: Track; *3*: Excavated burial mounds; *4*: Unexcavated burial mounds; *5*: Excavated Neolithic site 2; *6*: Modern cemetery

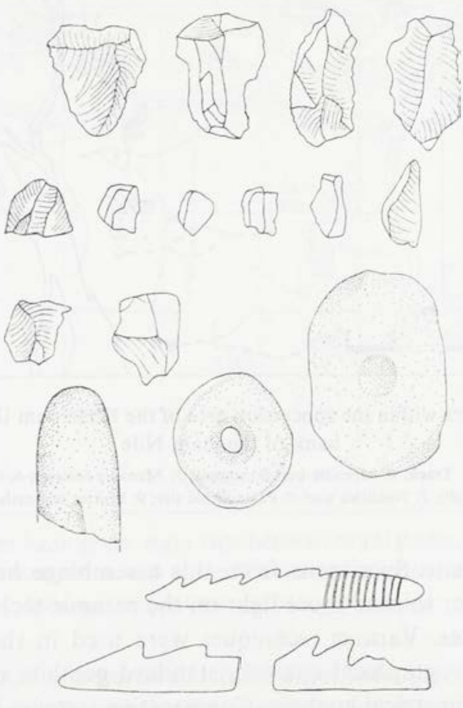

Fig. 4. Sarourab 2. Lithic and bone artefacts

present-day potters working in the area of Khartoum, Sarourab and Shabona on the White Nile have also been included in the study. It became clear that all these sites exhibit similar ceramic technology and that the clay for making the ceramic paste was quarried locally from the Nile flood plain, near the occupation zone. The firing of clay ranged between 800°C and 900°C; firing time was short and no special kilns were used.

The animal remains (shells of molluscs and skeletal remains) recovered from this settlement show typical Early Khartoum environment as illustrated by the Khartoum Hospital sites. It is worth adding that several bone harpoon fragments and one complete specimen have also been found in this settlement (Fig. 5).

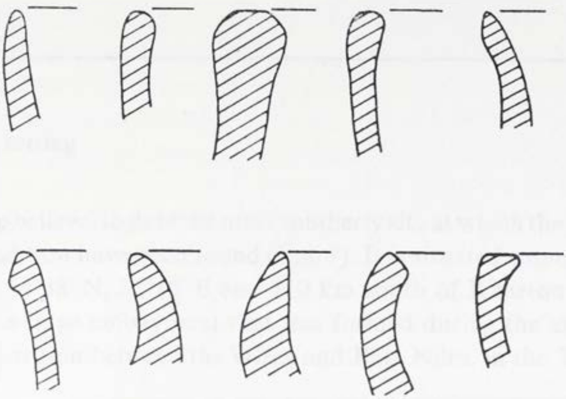

FIG. 5. Sarourab 2. Rim sherds

Perhaps one of the most important additions to our knowledge about the Early Khartoum tradition are the two radiocarbon dates from this site. They were obtained from charcoal collected from the settlement. The two samples were obtained from two different stratigraphic levels, 30 and 40 cm respectively below the surface of the ground; they were obtained from a clayey content mixed with occupational remains and ashes. Both samples were in clear association with cultural material. The first sample (Har – 3476) yielded a date of 9,330 ± 110 and the second (Har – 3475) gave a date of 9,370 ± 110.

It is hoped that other Early Khartoum sites in the area will be investigated in the future and our knowledge about this cultural tradition will accordingly increase.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

J. DESMOND CLARK

Shabona: an Early Khartoum settlement on the White Nile

Palaeoecological setting

Shabona is, we believe, to date the most southerly site at which the Early Khartoum Complex and Tradition have been found (Fig. 1). It is situated some 8 km east of the White Nile at *ca* 14°38' N, 32°16' E and 110 km south of Khartoum. It lies on the northern edge of a large embayment that was formed during the extensive flooding of the Gezira, the region between the White and Blue Niles, in the Terminal Pleisto-

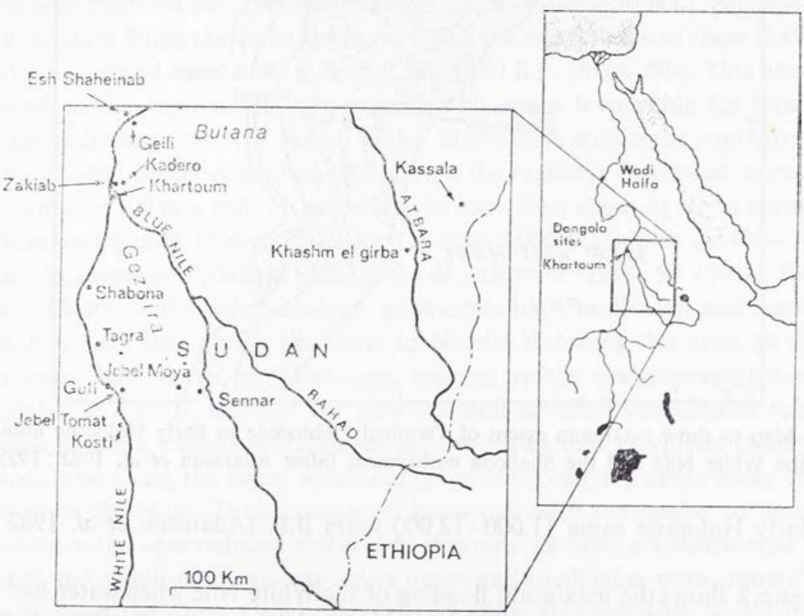

FIG. 1. Map to show geographical position of Shabona and other prehistoric sites on the Upper Nile (after Clark 1984 : 114)

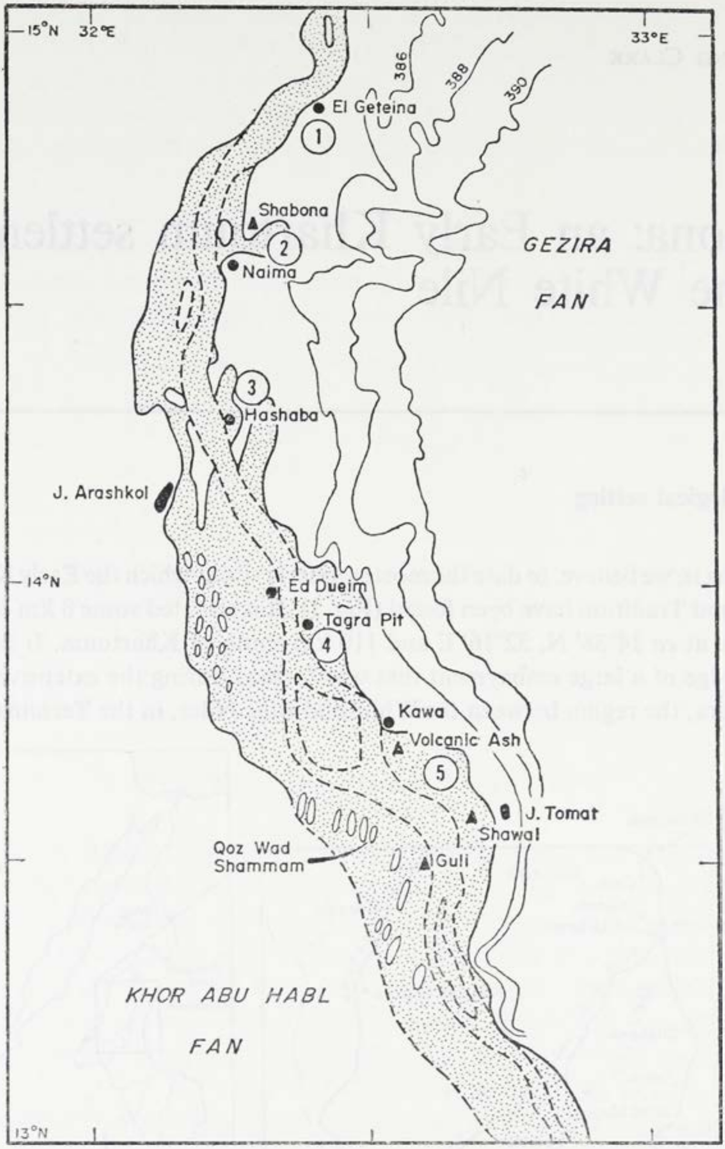

FIG. 2. Map to show maximum extent of Terminal Pleistocene to Early Holocene flooding of the White Nile and the Shabona embayment (after Adamson *et al.* 1982 : 192)

cene/Early Holocene some 11,000 - 12,000 years B.P. (Adamson *et al.* 1982 : 199 - - 209).

Figure 2 shows the maximum flooding of the White Nile when water had begun to flow again from Lake Victoria *ca.* 12,000 B.P. Adamson *et al.* (1982 : 165 - 219) have shown that prior to this time during a period of desiccation probably lasting

18,000 years or more, the White Nile was a highly seasonal river cut off from its water supply from Lake Victoria. At that time sands in the bed were redeposited by wind action resulting in the formation of an extensive area of old sand dunes from the Shabona area northwards to El Geteina.

In addition, at this time palaeo-channels draining from the Blue Nile deposited fine sands and carbonate gravels across the plain and along the eastern side of the White Nile. This extensive aggradation of sands was a factor in limiting the areas later flooded in the Early Holocene when grey clays with freshwater molluscs were deposited betwen 8,000 and 11,000 B.P. on former soil surfaces. At the same time the general flatness of the topography ensured the existence of extensive areas of permanent water and seasonal swamps between the two rivers. At the time of the Early Holocene when Shabona was occupied, the high flood level of the Nile was some 10 - 6 m above present flood level. At Tagra, some 60 km south of Shabona, the 8,000 B.P. Early Holocene clays yielded a broken barbed bone point fragment, together with fish and mammal bone (Adamson *et al.* 1974). It seems likely, therefore, that populations of specialized hunter/gatherers occupied selected sites along the White Nile from the time of the final recession of the pre-Holocene White Nile Lake around the beginning of the Holocene some 10,000 - 11,000 years ago.

The main sand ridge on which the site of Shabona is situated is believed to be a wave-trimmed fore dune which probably originated as a channel bar that later was reworked by wind action (Adamson *et al.* 1982 : 207). Two dates of 7,050 ± 120 B.P. (SUA 298) on *Pila* shell and 7,470 ± 240 B.P. on human bone (SUA 2140) confirm that Shabona was occupied in the mid 6th millennium B.C., perhaps earlier. The upper clays filling the embayment on which the site is situated show that swamp conditions persisted there until at least 2,700 ± 140 B.P. (SUA 299). This was clearly a time when the environment was considerably more favourable for human and animal populations than it is today. Today Shabona is within the southern part of the zone of semi-desert vegetation. Rainfall in the region is somewhat more than at Khartoum *ca* < 200 mm and it is calculated to have been about 2½ times more during the warm and humid Earlier Holocene (11,000 - 7,000 B.P.) with *ca* 400 - 500 mm of rain on average (Wickens 1982 : 39 - 44; Gautier 1983 : 99 - 101). However, on the evidence of the sedimentology, geomorphology, molluscan and mammalian faunas, it is clear that during the Early to Middle Holocene this area, as also that of the main Nile north of Khartoum, enjoyed richer environmental conditions comparable at least to those of the Low Rainfall Savanna with *Acacia* thorn and *Commiphora* bush, extensive grasslands on the plains and evergreen gallery forest and woodland along the river, with swamps in the low-lying areas along the river and between the Niles. These conditons, known as *toich* are similar to those to be seen today in the now reduced *maiya* back-swamps. Grasses are considered to have colonised and stabilised previously active dunes and small lakes were common in the swales between the dunes (Wickens 1982 : 39 - 46). This situation would have put the savanna woodland zone to the southeast also within the range of nomadic hunter/gatherers. Such a situation also supposes a northward shift of the vegetation belt of some 250 km or more during the wettest period.

These then were the conditions when the Shabona site was occupied some 7,000 years ago. For mobile hunter/gatherers with the ability to exploit the different micro--environments offered, this was a very favourable habitat, well stocked with game.

Geology

The geology of the central Sudan has a direct bearing on what raw materials were available to the occupants of the Shabona site and the degree to which they made use of them for the stone tool equipment. The river alluvium and Gezira Plain clays were usually devoid of stone but small pebbles of quartz and, more rarely, chert and chalcedony occur in the swales between the dunes and on deflated surfaces of the sand (Qoz) country immediately north of the site. The nearest outcrops of Nubian Sandstone from which these pebbles were derived, together with ochres, haematite and the sandstone used for upper and lower grindstones, are some 40 km distant to the north on the west side of the river. There are also variable quantities of rhyolite ($\pm 7\%$) and a very rare piece of basalt. The rhyolite is derived from the Sabaloka Gorge area at the 6th cataract *ca* 200 km to the north and the nearest source for basalt is approximately the same distance away. This suggests either a high degree of mobility on the part of the hunter/gatherer group occupying Shabona or the existence of some kind of exchange relationship with other groups.

Site location and stratigraphy

Shabona was surveyed and excavated for some three weeks between 13th February and 10th March, 1973. Those participating were A. B. Smith, D. Stiles and the writer from the University of California at Berkeley and D. Adamson and M. A. J. Williams of Macquarie University, N. S. W., Australia. Their collaboration in this research is here most gratefully acknowledged.

The contour plan of the site (Fig. 3) shows the occupied area to have been the top of the tongue-shaped, old lateral dune that rises some 2 m above the surrounding clays of the embayment. The occupation area was, therefore, initially close to the water. The occupation material is distributed in two areas – a more significant one at the northwest end of the site and subsidiary area to the southeast. Each of the two middens is about 200×130 m or 26,000 m^2 in area though that to the southeast was more deflated. It is, of course, not be to expected that any one time the occupation covered such an extensive area as 52,000 m^2. The site cannot have been

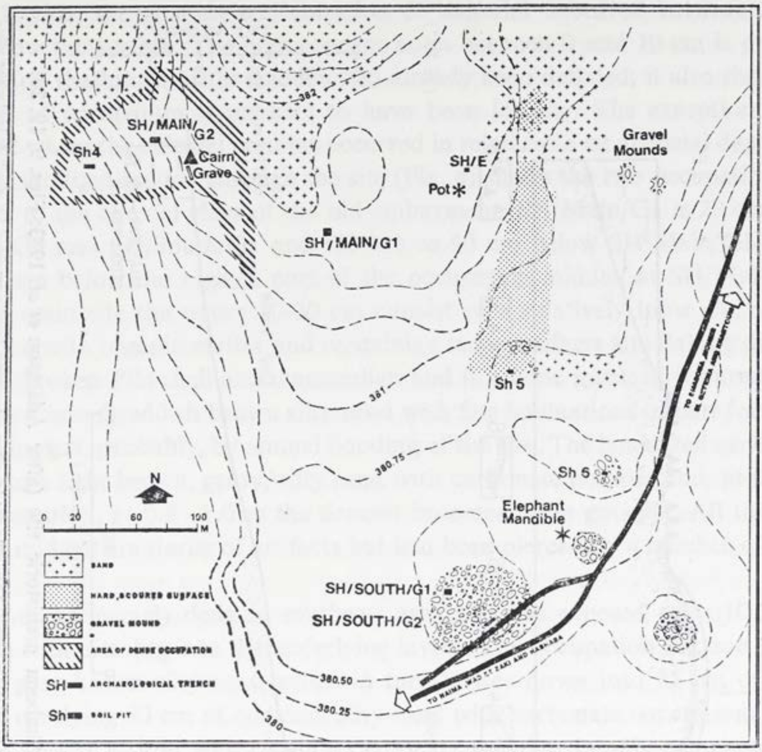

FIG. 3. Plan of Shabona prehistoric site (based on a contour survey by M. A. J. Williams and D. A. Adamson)

occupied continuously throughout the year and, judging by the practices of modern hunter/gatherers, each season's occupation would not have been on the exact place of the previous year's settlement. If the site was occupied sporadically for no more than 25 years it can be expected that occupation debris would cover a considerable area. Surface scatters also occur in the space between the two concentrations so that they may, in fact, have been even more extensive though the amount of deflation that the site has suffered can also be expected to have dispersed material to the extent that the boundaries of individual occupation areas cannot be clearly defined. The heaviest concentration of cultural remains occurs within the area known as the main site, though, here again, the midden has been seriously deflated.

Four areas were selected for excavation on the basis of surface finds – two in what we referred to as the main occupation (SH/G1 and SH/G2) and two in the southeast area (SH/South/G1 and SH/South/G2). These grids were, respectively, 16, 19, 20 and 28 m² totalling 83 m². They were excavated down to a depth coincident with the disappearance of occupation remains.

In most cases the depth of the midden did not exceed 30 cm though, in the case of pits and depressions, artifacts occurred down to a depth of 70 cm. In all the

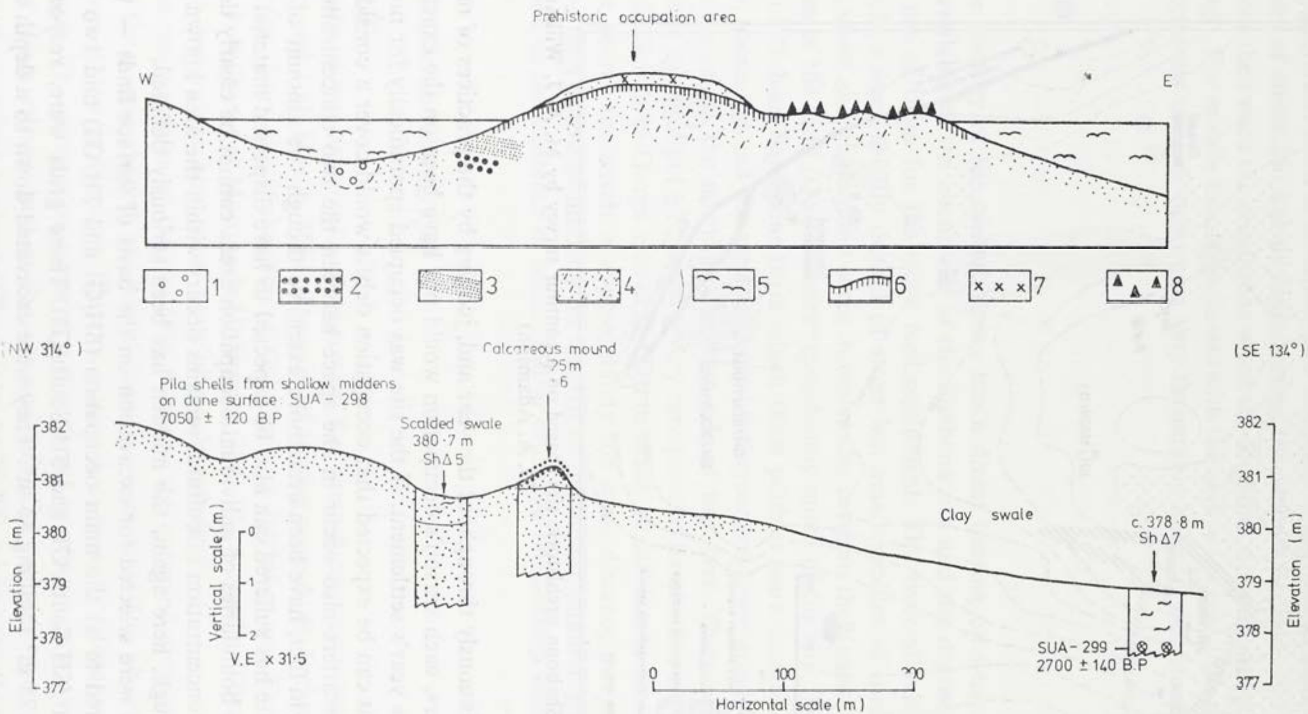

FIG. 4. Generalised stratigraphic sections through Shabona prehistoric site (after Adamson *et al.* 1983: Figs. 9, 19, 20)

1: Fluviatile quartz gravels; 2: Water-rolled carbonate nodules; 3: Stratified fluviatile sands; 4: Fluviatile sands, often micaceous locally resorted by wind; 5: Holocene alluvial and swamp clays; 6: Indurated clayey sand of former surface; 7: Early Holocene shell middens; 8: Lag gravel of carbonate nodules

excavated grids, the greatest concentration of material occurred between 10 and 30 cm below the surface. The high concentration between 0 and 10 cm is probably an indication that much of the midden had already been deflated; it also shows that the period of occupation is unlikely to have been lengthy. The exception is SH//South/G2 where the cultural remains occurred in relation to an artificial depression.

The generalised section through the site (Fig. 4) shows the two occupation areas in relation to the alluvial clays of the old embayment. SH/Main/G1 is 29 cm below SH/Main/G2 and SH/South/G1 and G2 are *ca* 90 cm below SH/Main/G1 or just over a metre below the highest part of the occupation midden at SH/Main/G2.

At the main site the upper 10-30 cm consist of a relatively loose dark brown sand stained with organic matter and containing stone artifacts and flaking debitage, potsherds, broken *Pila* shell and mammalian and fish bone much of it burned. This passes down into a reddish brown silty sand with fine laminations in part formed by wind and in part, probably, by annual flooding of the site. The laminated sand passes in turn into a light brown, gritty, silty sand with carbonate nodules and, at the base of the excavation, at 0.8 - 1.0 m the deposit becomes more gravelly. All the layers below the midden are sterile of artifacts but had been pierced by a number of rodent burrows.

At the more severely deflated southeast area, sections exposed some 10 - 15 cm of midden with pits dug into the underlying layers. The occupation horizon overlies 20 cm of grey brown silty sand which in turn passes down into 25 cm of brown silty sand overlying 30 cm of compact silty sand with carbonate concretions. Below this again occurs a sand with pisolitic carbonate nodules, loosely compacted. The excavation was discontinued at 115 cm below the surface. This section presumably reflects the closer proximity to the water in the embayment with the concentration fo carbonates in the shallow groundwater adjacent to the shore. The stratigraphy in both midden areas shows no significant disconformity, textural and colour changes being such as might be expected from deposition in a generally stable environment.

Features

Shabona produced several interesting features throwing light on the behaviour of the inhabitants. Although no reliable estimate of the number of individuals is possible, it is probable that there were never more than 25 at any one time.

The amount of mammalian and fish bone on the site speaks of the importance of these food resources. Mammalian bone shows human fracture patterns for extracting the marrow. A high proportion of the bone is burnt indicating that it was prepared by roasting, probably in a shallow pit which is the commonest form of cooking meat in many parts of northeast Africa and the Sahara. Much of the fish bone also shows evidence of burning and dumping in shallow pits. At SH/South/G2 were found three circular, saucer-shaped areas *ca* 13 cm in diameter and 5 cm deep filled with baked fish bone and small lumps of burned clay, again suggesting possible cooking methods. Another, larger pit in this grid measured *ca* 60 cm in diameter and 28 cm in depth. It was filled with broken fish bone from medium sized fish, largely unburnt. With this were a few fragments of mammal bone and the tip of a harpoon.

At SH/Main/G2 we found two roughly conical-shaped pits filled with *Pila* shells. The main pit was 1.0 m in diameter and 0.82 m deep. Most of the shells were whole and unbroken and of a large size; none were burned. With the shells were two fragments of a very large harpoon which fitted together. A small amount of fish bone and fragments of bovid bone were also found in the filling of the pit. Some of the *Pila* shells showed a cuneiform cut mark which may have had to do with the preparation of the snails if these were, as we believe, used for food, or, since *Pila* aestivate, these cuts might have resulted from the use of some kind of implement to dig them out of the mud.

A second pit in the same grid was shallower and more irregular – an asymmetric cone in section, measuring *ca* 1.0 m across at the top and tapering to 45 cm at the deepest part. This again contained unburned, whole *Pila* shells, together with several fish, including a complete skull of a catfish (*Clarias*) and mammal bone including, in the soft grey sandy silt matrix, a horn core. The contents of the top 10 cm or so in this pit consisted of fish bone, apparently burnt.

Another feature that time did not permit us to explore in its entirety was a roughly circular depression, 2.0 - 2.5 m in diameter at the top with gently sloping sides down to a maximum depth of 70 cm at the base. Since the stratification at the site is nearly horizontal, we assume this saucer-shaped depression to be artificial, having been dug into the looser, brown, sandy silt lying above the carbonate gravel layer. The filling comprised a grey brown silty sand matrix in which occur small fragments of fish and mammal bone together with some larger pieces of bone, especially in the bottom, numerous sherds of coarse vegetable- tempered pottery and some quartz tempered sherds. Worked stone is conspicuous by its scarcity. All this material lay at all angles in the section indicative of rapid filling. The use of the depression is unknown. It could have been a rubbish pit. On the other hand, it could be the base of a dwelling, sunk, as is so often the case, a little way into the ground.

Adjacent to SH/South/G1 was found a nearly complete elephant mandible and a large ulna; probably of a hippopotamus. Presumably these animals died or were killed at the site, since it is unlikely that the bones, particularly the elephant mandible, would have been carried in from any distance.

Burials

The last feature to be dealt with here are the burials. Five of these were found, all eroding, and mostly very fragmentary due to deflation. There were also two further collections of fragmentary long bone remains from the surface. The two most complete burials from SH/South/G1 were full-length inhumations, one facing east, the other facing west; no grave goods accompanied the burials. There was no evidence that these burials were introduced though this might not have been unexpected in such a loose deposit. A radiocarbon date of 7,470±240 B.P. (SUA 2140), however, confirms the contemporaneity without any doubt. The other burials were so badly eroded that the position of the bodies was impossible to assess except in one case (SH/Main/G2) where the body appeared to have been flexed. All appear to have been buried in very shallow graves. The skeletal remains have been studied by Tamara McAuley and Christine Tennant of the University of California, Berkeley. Their findings are summarised below.

The remains came from 3 adult males, 1 sub-adult male and 3 adult females. They represent a population with a long and narrow cranium with normal to marked occipital bun, a robust face with moderate to pronounced prognathism and rectangular orbits; the mandible is also robust with features indicating "masticatory stress". The Shabona people compare well with the robust population of the Upper Nile during Terminal Pleistocene and Early Holocene times as seen from Nubia and from sites further south and that has been described as early Sudanese Negro stock. The individuals at Shabona appear to have been relatively healthy with only one case of dental caries and alveolar abcessing, one istance of trauma – a healed rib – and one of osteoarthritis of hand and foot. Pronounced occlusal wear is a feature, however, due no doubt to the nature of the diet and, in particular, to grit resulting from grinding plant materials. One of the females also shows evulsion of the upper incisors, a well-known practice among north African populations of this time.

Stone industry

The artifact remains studied by Debra Autry and the writer fall into four main categories: flaked stone, ground stone, bone artifacts and pottery. There are about 11.2% more potsherds than flaked and ground stone artifacts from the total of all excavated grid squares and surface collections. This may be due to the fact that all stone material had to be carried into the site while some, at least, of the pottery may have been locally made.

Flaked stone artifacts

By far the commonest raw material is quartz obtained from small pebbles from the Late Pleistocene palaeo-channels in the vicinity. The ratios of quartz and other materials by artifact class for SH/Main/G1 showed a preponderance of Wavy Line pottery and for SH/South/G2 which produced a high proportion of poorly fired, vegetable-tempered pottery, showed no significant differences. Quartz reached values of 67% and 78% respectively. Sandstone for upper and lower grindstones reaches 16% and 7% and rhyolite from the 6th Cataract, 9% and 10% respectively.

Other materials – chert, chalcedony, basalt and others – are of minor importance only although the amount of ferruginous stone – limonite, haematite and ochre for pigment – presumably obtained from the Nubian Sandstones on the west bank, reach values of 7% at the SH/Main/G1 grid.

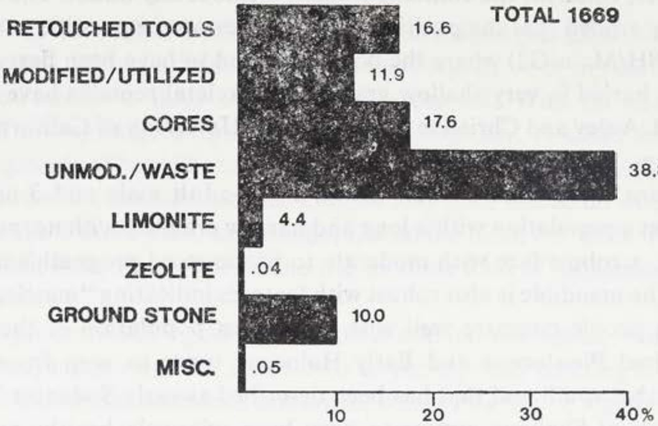

FIG. 5. Shabona. Histogram of all excavated and surface collected stone artifacts

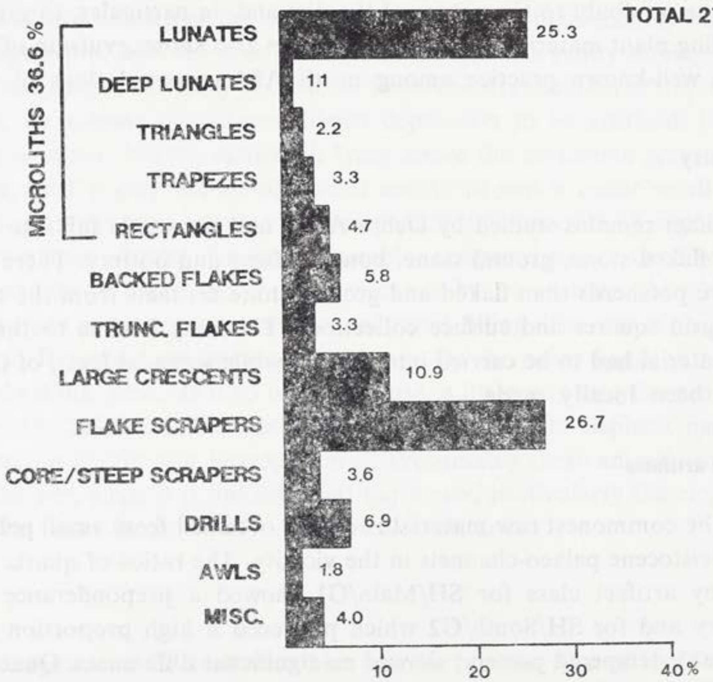

FIG. 6. Shabona. Histogram of retouched stone tools from excavations and surface collections

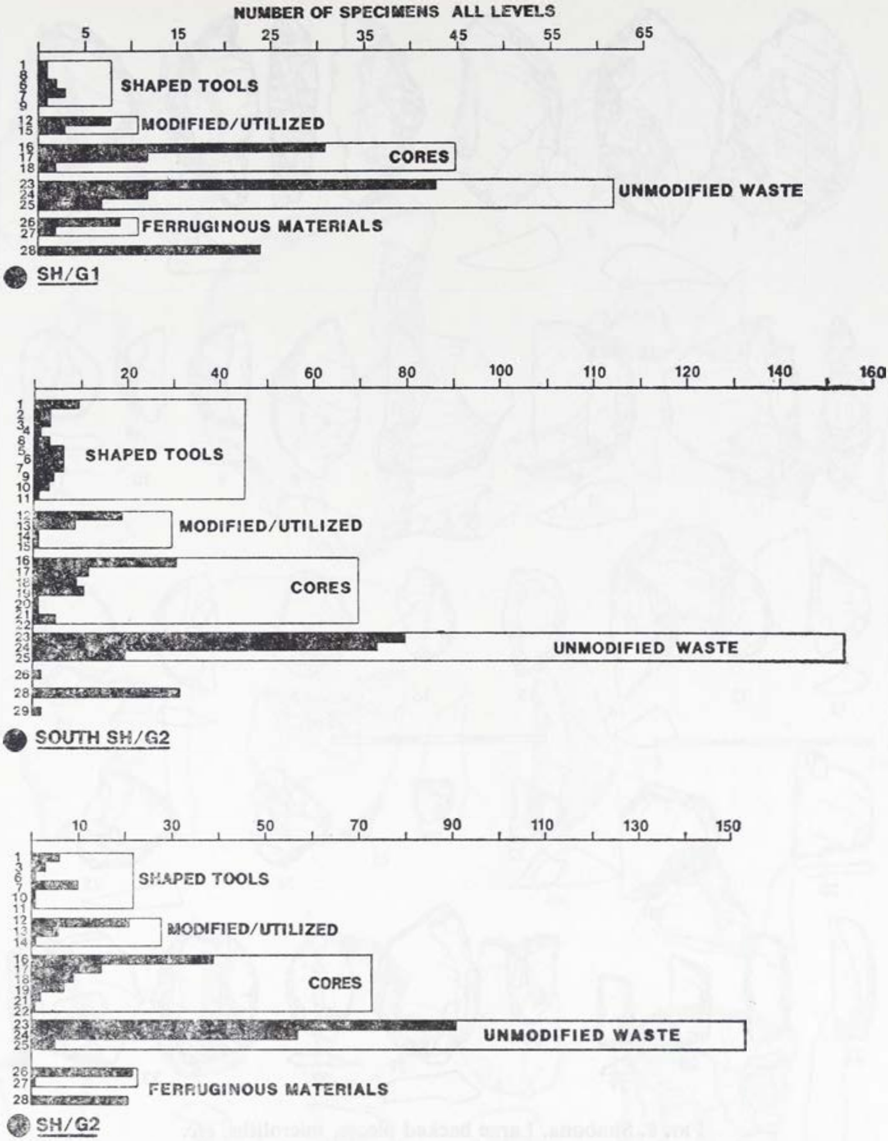

FIG. 7. Shabona. Histograms of breakdown of excavated assemblages from three grids

1: Lunates; *2*: Deep lunates; *3*: Trapezes; *4*: Rectangles; *5*: Truncated flakes; *6*: Large crescents; *7*: Flake scrapers; *8*: Backed flakes; *9*: Core/steep scrapers; *10*: Drills; *11*: Misc. retouched; *12*: Utilized/modified; *13*: *Outils écaillés*; *14*: Pebble fabricators; *15*: Hammerstones; *16*: Single platform; *17*: Double platform, *18*: Multi platform; *19*: Bipolar; *20*: Radial; *21*: Discoid; *22*: Biconical; *23*: Whole flake; *24*: Flake fragment; *25*: Angular waste, *26*: Limonite; *27*: Ochre; *28*: Groundstone; *29*: Celts

The percentages of all flaked and ground stone artifacts recovered are shown at Fig. 5. Cores and flaking waste – almost all quartz – show that manufacture was carried out on the site, whereas some of the other materials were probably

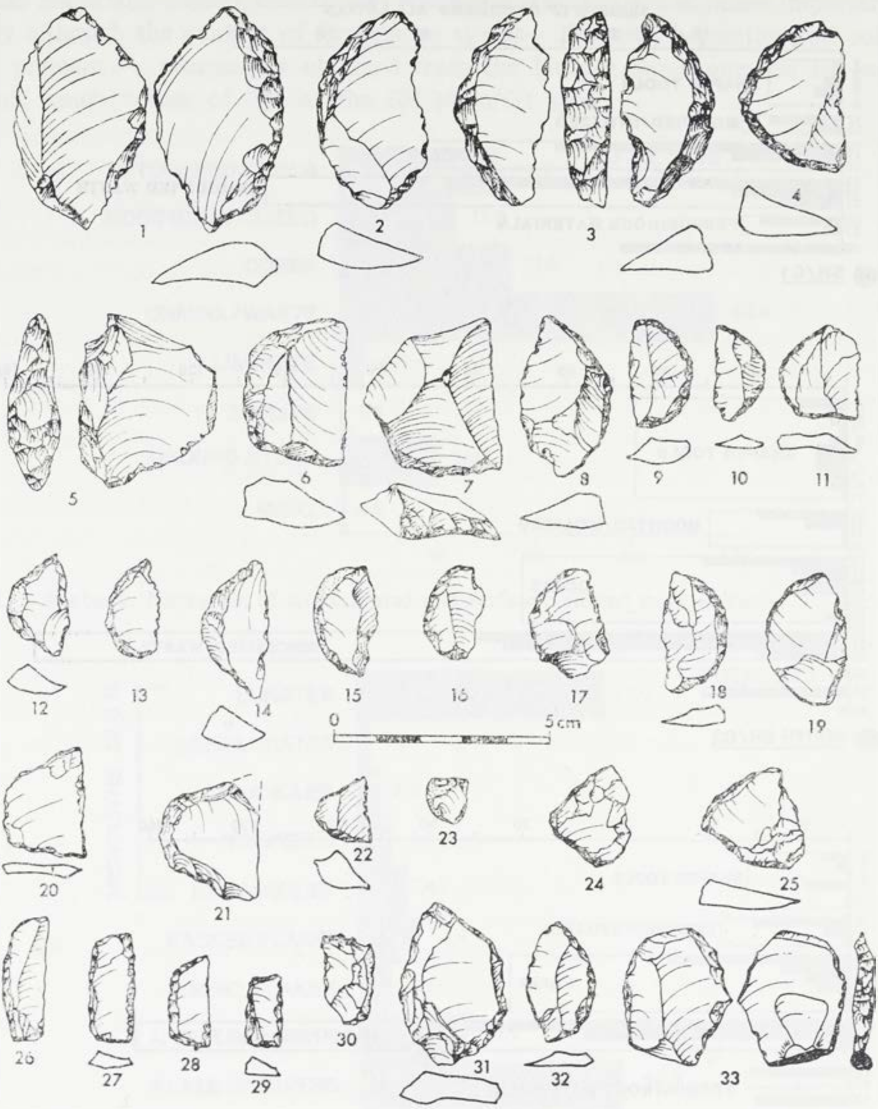

FIG. 8. Shabona. Large backed pieces, microliths, *etc*.

1 - 8: Backed flakes and "large crescents"; *9 - 19*: Lunates; *20 - 23*: Trapezes; *24, 25*: Isosceles triangles; *26 - 29*: Rectangles; *30*: Truncated flake; *31, 32*: Backed flakes; *33*: Backed flake with chamfering scar
1, 3 - 7, 33: Rhyolite; *10, 13, 21, 22*: Chert; *Remainder*: Quartz

carried in in the form of flakes. Cores are mostly single platform pebble cores but opposed platform and radially flaked pebbles are also typical. Retouched tools comprise more than 16% of the total assemblage. Upper grindstones and lower stone fragments are probably an underestimate as one of the features of the site appeared to be the quantity of grindstone fragments present.

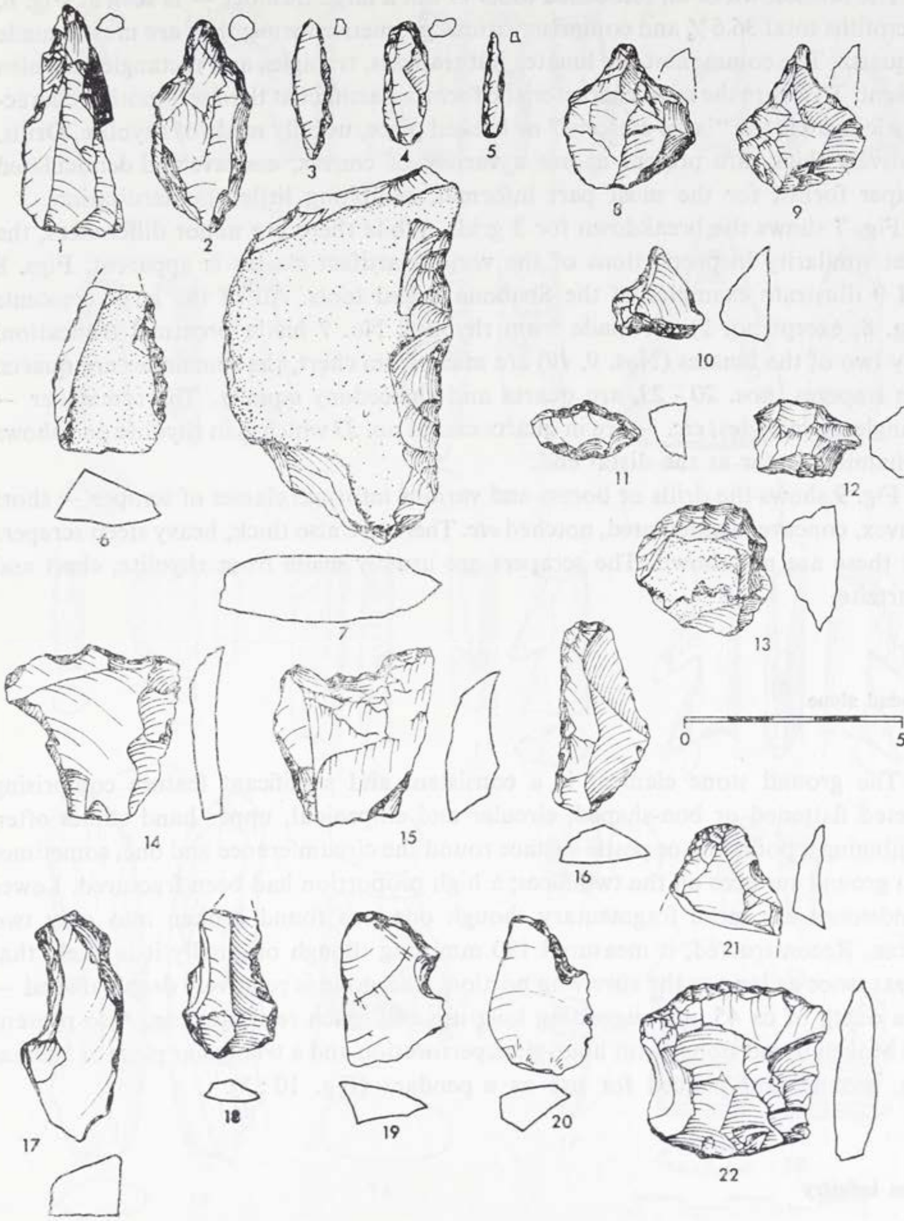

FIG. 9. Shabona. Borers and scrapers

1 - 5, 8 - 10: Borers; *6, 7*: Side scrapers; *11 - 13*: Short convex scrapers; *14, 15*: Denticulated scrapers; *16*: Side and end scraper; *17, 18*: Concave scrapers; *19, 20*: Notched scrapers; *21, 22*: End scrapers
1 - 3, 6, 9, 10, 12, 15, 19 - 21: Rhyolite; *4, 11, 14, 16, 18, 22*: Chert; *5, 8, 13*: Quartz; *7, 17*: Quartzite

The breakdown of all retouched tools – not a large number – is seen at Fig. 6. Microliths total 36.6% and comprise various geometric forms; they are mostly made in quartz. The commonest are lunates but trapezes, triangles and rectangles are also present. These are the most characteristic forms of artifact at the site. Another characteristic form is the "large crescent" or backed piece, usually made of rhyolite. Drills, relatively thick, are present as are a variety of convex, concave and denticulated scraper forms, for the most part informal, exhibiting little standardisation.

Fig. 7 shows the breakdown for 3 grids. While there are minor differences, the great similarity in proportions of the various artifact classes is apparent. Figs. 8 and 9 illustrate examples of the Shabona flaked tools. All of the large crescents (Fig. 8, except no. *2*) are made from rhyolite; No. *7* has a proximal truncation; only two of the lunates (Nos. *9*, *19*) are made from chert, the remainder are quartz. The trapezes, nos. *20 - 23*, are quartz and chalcedony equally. The remainder – triangles, rectangles, *etc.* – are in quartz except no. *33* which is in rhyolite and shows a chamfered scar at the distal end.

Fig. 9 shows the drills or borers and various informal classes of scraper – short convex, concave, denticulated, notched *etc*. There are also thick, heavy steep scrapers but these are not shown. The scrapers are usually made from rhyolite, chert and quartzite.

Ground stone

The ground stone element is a consistent and significant feature comprising faceted flattened or bun-shaped, circular and ellipsoidal, upper hand stones often combining a pounding or pestle surface round the circumference and one, sometimes two ground surfaces on the two faces; a high proportion had been fractured. Lower grindstones are more fragmentary though one was found broken into only two pieces. Reconstructed, it measured 190 mm long though originally it is likely that it was twice as long as the surviving portion. The stone is relatively deeply dished – to a depth of ca 45 mm suggesting long use and much resharpening. Also present are broken bored stones with hour-glass perforation and a triangular piece of haematite, ground and pierced for use as a pendant (Fig. 10 : *7*).

Bone industry

The above assemblage is typical of that associated with the Early Khartoum tradition and the same can be said of the bone industry, a sample of which is shown in Fig. 10. The characteristic, uniserial barbed bone points, all fragmentary from Shabona are present. These showed considerable variation in size from quite small

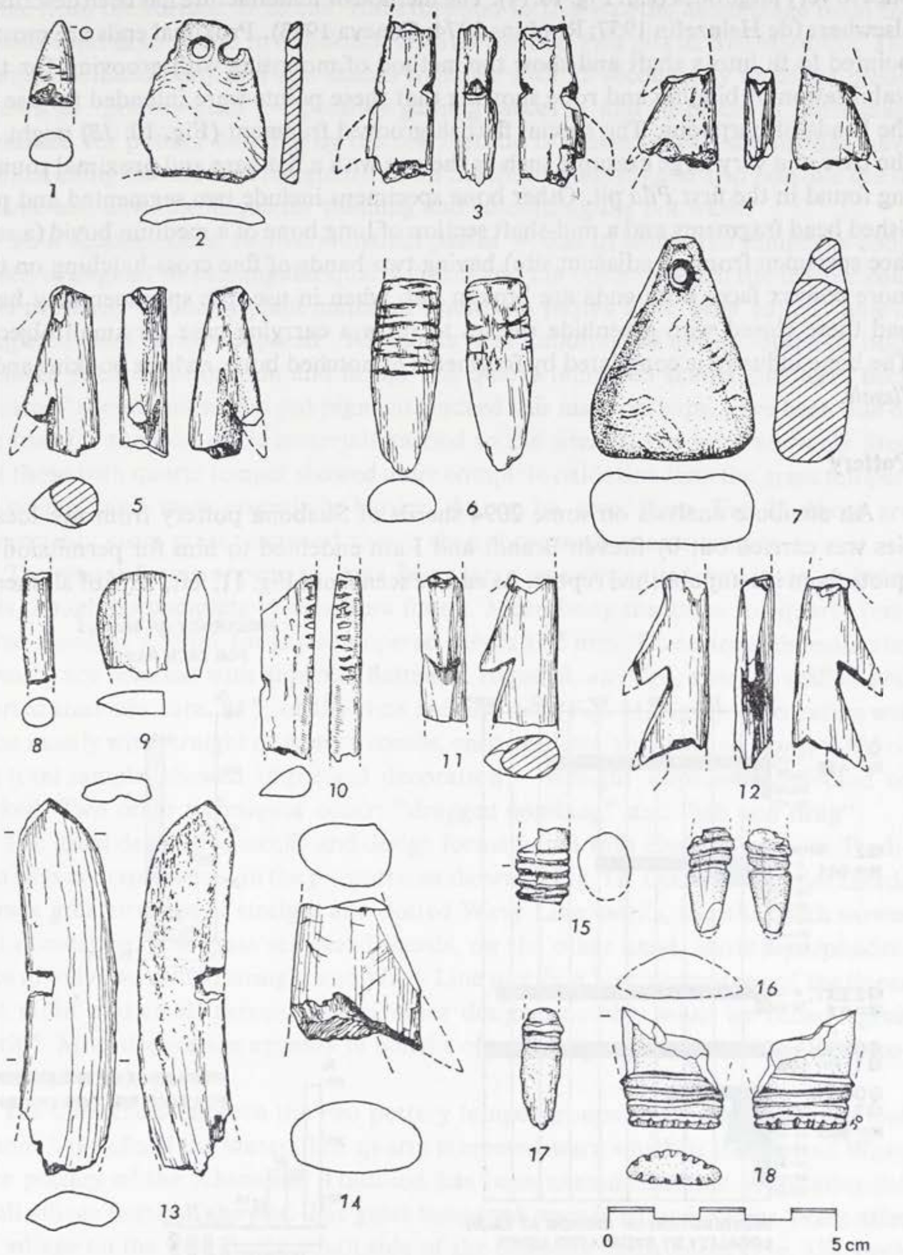

FIG. 10. Shabona. Bone tools

1: Tip of a polished bone point; *2*: Sub-triangular piece of bone with two, possibly three, holes at one end for suspension; *3 - 5, 11, 12, 14*: Mid-sections of uniserially barbed points; *7*: Ground and pierced haematite pendant; *8*: Mid-section of a ground and polished point; *9*: Bifacially ground and polished plaque fragment; *10*: Ground and notched fragment possibly a tally; *6, 15 - 17, 18(?)*: Proximal ends of uniserially barbed points; *13*: Flat *lissoir* with square notch cut into one edge ones to very large ones (*e.g.* Fig. 10:14). The method of manufacture has been described elsewhere (de Heinzelin 1957; Robbins 1974; Caneva 1983). Proximal ends are mostly pointed to fit into a shaft and show the method of mounting with grooving for the stabilisation of binding and rope showing that these points were intended for use as the heads of harpoons. The special flattish grooved fragment (Fig. 10: *18*) might be the base of a very large example such as the one with a flat base and proximal rounding found in the first *Pila* pit. Other bone specimens include two segmented and polished bead fragments and a mid-shaft section of long bone of a medium bovid (a surface specimen from an adjacent site) having two bands of fine cross-hatching on the more convex face. Both ends are broken but, when in use, the specimen may have had these closed with greenhide sleeves to form a carrying case for small objects. The bone industry is completed by fragments of notched bone, awls or bodkins and a *lissoir*.

Pottery

An attribute analysis on some 2094 sherds of Shabona pottery from five localities was carried out by Steven Brandt and I am endebted to him for permission to quote from his unpublished report. As can be seen from Fig. 11, left, 76 % of all sherds

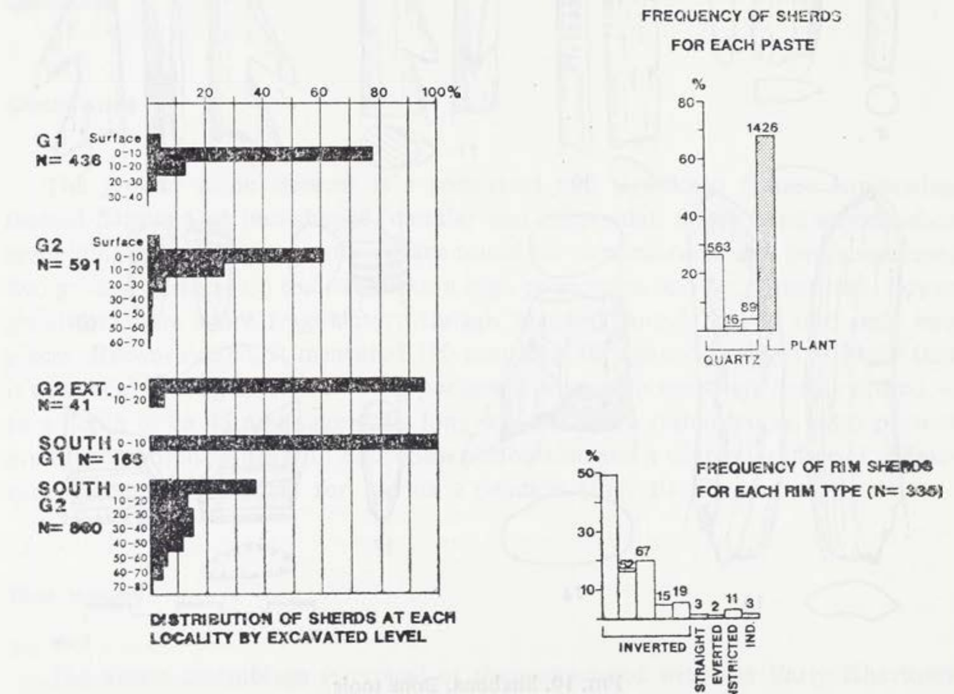

FIG. 11. Shabona. Histograms of sherd depth below surface, frequency of quartz and vegetable temper and frequency of rim sherd type

came from the surface to 20 cm. The exception to this was the assemblage from the possible hut floor found in SH/South/G2 and the two *Pila* pits at SH/Main/G2. The sample included body and rim sherds together with 15 secondarily modified pieces known as "pottery discs" – possibly gaming pieces – and 92 pieces of burnt clay. Evidence for pottery building by the coil method is shown by two sherds that have broken along the coil line. Irregularities on the sherd walls suggest also possible use of paddle-and-anvil technique for thinning and smoothing the pot walls.

Thin sections show two very distinct pastes – one in which the temper is composed of angular to sub-angular quartz grains and the other in which the temper consists primarily of coarse plant material. These two pastes have been called "quartz tempered" and "grass tempered". All sherds were unburnished but smoothed on both surfaces prior to decoration and firing. The quartz tempered sherds may have been "coated" sometimes with a red pigment. Indeed this may, perhaps, have been one of the uses for the iron oxide materials carried to the site. Sherds were unevenly fired but those with quartz temper showed more complete oxidation than the grass tempered pottery and were essentially harder. As can be seen from Fig. 11, there are appreciably more grass tempered sherds than those with quartz temper.

The vessel forms appear to have been large open-mouthed bowls or globular pots though no complete vessels were found. Mean body thickness for quartz tempered sherds is 9.5 mm, for grass tempered sherds 11.5 mm. There are eight main rim types: 5 are inverted with tapered, flattened, rounded, *etc.* lips, straight walled and everted rims are rare. 94% of the rims are inverted (Fig. 11, right). Decoration was done mostly with straight or convex combs, cord roulette and twisted cord, 87% of the total sample showed impressed decoration – straight impression, pivoted or rocked. Two other techniques occur: "dragged combing" and "jab and drag".

The usual decorative motifs and design forms found with Early Khartoum Tradition sites are represented in the proportions shown in Fig. 12. Quartz tempered sherds show a greater range of straight and dotted Wavy Line motifs, together with woven mat decoration. The grass tempered sherds, on the other hand, show a preponderance of only two dotted straight and Wavy Line motifs, a high percentage of the linear mat motif and small percentages of other designs, notably what we called "grub motif". Most decoration appears to consist of one design form that would have covered the whole pot.

The differences between the two pottery temper groups are clearly significant and Brandt has defined the wares. The quartz tempered ware which is the Dotted Wavy Line pottery of the Khartoum Tradition has been named Shabona Ware after the small village north of the site. The grass tempered ware is named Naima Ware after the village on the Qoz on the south side of the Shabona embayment (Fig. 13). Both wares occur at all excavated grids but Shabona Ware is the dominant one at SH/Main/G1 while Naima Ware dominates in one of the Main Site grids and at SH/South/G2. The main differences between the two wares are in temper, vessel thickness, hardness, porosity (29.7% for Naima and 12.6% for Shabona) and decora-

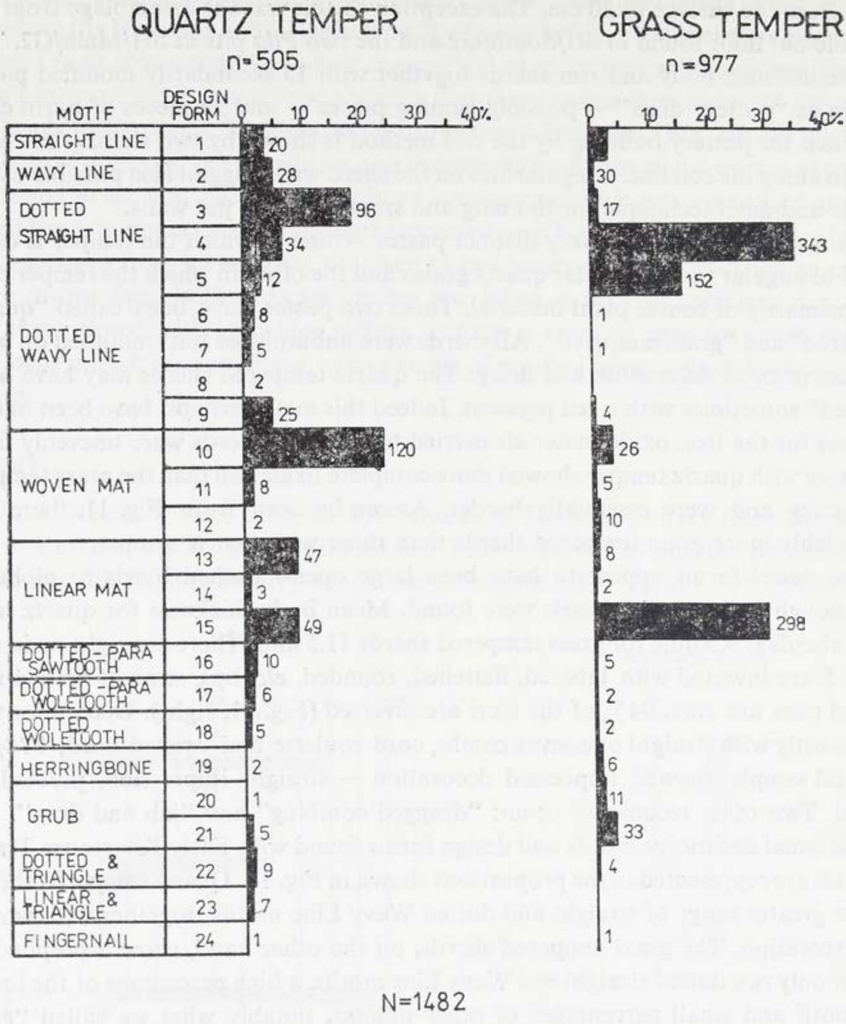

FIG. 12. Shabona. Histograms of frequency of design forms and associated motifs for each temper group (instead of „Woletooth" should be read „Wolftooth")

tion form. Shabona Ware is mainly comb impressed pottery (50% of the entire Shabona Ware sample) and only 17.4% cord impressed. The reverse is the case with Naima Ware where cord impressed sherds represent 75% of the total sample and comb impressed sherds only 11.5%;

The Shabona site is not going to provide the answer as to why these two wares are present and combine as they do. A number of factors could be involved – time, space, function, seasonality, group movement, style and diffusion, for example. There is some slight suggestion that Naima Ware is replaced at SH/Main/G1 by Shabona Ware in the upper levels but it is not possible to be sure. Naima Ware is present at the Early Khartoum type site where Arkell called it "Crude Black-Fracture Basket-like Ware" (Arkell 1949: 88). It does not apparently occur at Saggai (Caneva 1983: 166) to the

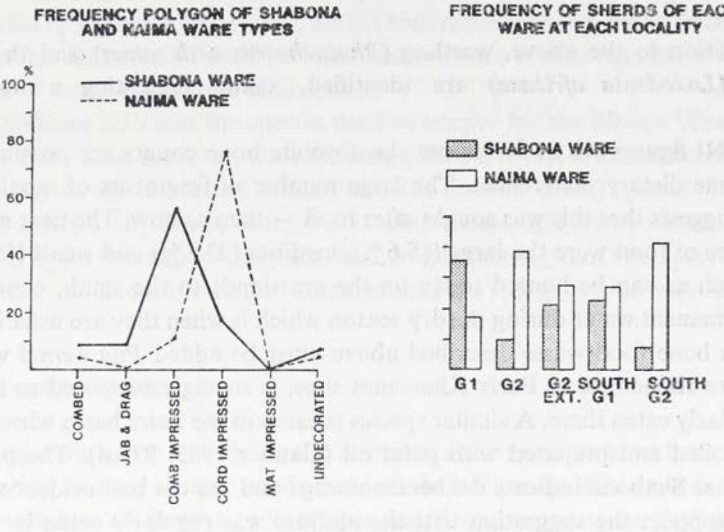

Fig. 13. Shabona. Frequencies of Shabona and Naima Ware sherds at each excavated locality and of decoration types

north of Khartoum and the possibility needs to be considered that the Khartoum area might have formed the boundary between two distinct pottery traditions. It will only be possible to narrow down the contributory factors when data from a number of excavated sites are compared.

Fauna

This has been identified by Andrew Smith. It consists of savanna and riverine animals at the present time associated with the richer habitats – grass plains and woodland savanna to the south.

The largest components of the fauna are the remains of numerous fish and tortoises, not yet specifically identified. With these are remains of *Hippopotamus*, *Varanus niloticus*, lizard, snake (*Mahelya* sp.) and crocodile, all of which emphasise the importance of the riverine resources. Rodents and carnivores are both represented as also is bird bone but these remains are, as yet, unidentified.

Savanna bovids are well represented. In the small bovid range is the oribi (*Ourebia ourebi*). Medium sized are reedbuck (*Redunca redunca*) that occupy grassland close to water and kob (*Kobus kob*): All of these were to be found in the grass plains and never far from water. There is a possibility, however, that the larger reduncine teeth could belong to the Nile lechwe. A large antelope either roan (*Hippotragus equinus*) or waterbuck (*Kobus defassa*), probably the former, suggests the proximity of light woodland. The Cape buffalo, possibly the small sub-species, occupies both plains and forest.

In addition to the above, warthog (*Phacochoerus aethiopicus*) and the African elephant (*Loxodonta africana*) are identified, again suggesting a well watered terrain.

No MNI figures are available but the absolute bone counts are possibly indicators of some dietary preferences. The large number of fragments of monitor lizard (31.7%) suggests that this was sought after food – then as now. The next most common source of food were the large (15.6%), medium (23.8%) and small (15.8%) antelopes such as can be hunted today on the grasslands to the south, concentrating on the permanent water during the dry season which is when they are usually hunted.

To the bone food waste described above must be added *Pila wernei* which, because of its abundance at Early Khartoum sites, is strongly supposed to have been early regularly eaten there. A similar species is eaten in the Zaire basin where they use it twice boiled and prepared with palm oil (Gautier 1983: 93 - 4). The pits full of *Pila* shells at Shabona indicate deliberate storage and are the best evidence we know as yet to support the suggestion that the mollusc was regularly eaten by the Early Holocene population in the central Sudan. Boiling appears to be the best way to extract the snail from its shell and the use of pottery has obvious advantages here. An alternative way of preparation might have been to allow the *Pila* partially to decompose in the pits for easier preparation. *Pila* can be considered to be reasonably rich in protein.

Plant resources

Two sorts of plant remains were recovered. Plant fragments were obtained from using a frothing flotation technique on archaeological deposit from 0 - 20 cm below the surface; these were identified by Dr Jacques-Felix. Carbonised plant remains and plant impressions in potsherds were examined by Ann Stemler and Gerald Wickens.

Remains obtained by flotation do not show evidence of fossilisation and are mostly of arid species existing in the area today. These findings do not accord with the faunal and geomorphological evidence from the site and imply that the remains have worked their way down from the surface in recent times. Moreover, species in the flotation samples do not occur in the Naima Ware temper.

The 59 sherds examined by Ann Stemler showed clearly that grass was used as an organic temper. There is a remarkable uniformity in the dimensions of carbonised grains suggesting that all or most of the organic temper used could have come from a single species of grass. The morphology suggests that the specimens belong to the grass sub-family *Panicoideae*. The grains are the wrong shape for *Eragrostis tef* or *Eleusine corocana* and it is likely that some species of the genus *Digitaria* is involved since the archaeological specimens are very similar in dimension to *Digitaria velutina*. Many species of *Digitaria* grow in the Sudan today, the majority being found in areas receiving a fair amount of rain. The botanical evidence is thus consistent with other indications of moist conditions at Shabona.

It is significant also that the species used as temper for the Naima Ware pottery, which may have been made on the winnowing floors, is not a domesticated or wild relative of any of the important African or Near Eastern cereal species. It is a wild grass but it appears very likely, because of its abundance, that it was collected to grind into flour to make porridge. It may also be noted in passing that two species of *Digitaria* (*D. exilis*, *D. iburua*) were domesticated and are still grown in west Africa.

Economics and technology

The prehistoric group occupying the Shabona site can never have been large and the satisfaction of their dietary needs was based on hunting, fishing and collecting. The shallow nature of the site and variable weathering patterns on the bone imply seasonal occupation as does the fact that the site would almost certainly have been subject to some degree of annual flooding. There is every reason to suppose that the pattern of occupation was similar to that seen today among ethnic groups such as the Nilotic peoples on the Upper Nile to the south. These groups occupy country that the evidence suggests is comparable to that of Shabona at the time it was occupied in the early 6th millennium B. C.

The seasonal activities and movements of these people (*e.g.* Evans-Pritchard 1940), the collecting habits of nomadic pastoralists such as the Zaghawa (Tubiana and Tubiana 1977), and those of the ethnic groups occupying the Gezira before the installation of the irrigation system (Tothill 1948: 770) may best be used as a basis from which to construct a model for seasonal movements and foods of the prehistoric settlement.

Their material culture was well adpated to allowing maximum use of the different habitats from the locality. To mention the most important: harpoons used for fish and aquatic animals would have been equally appropriate for hunting the plains animals. The manner of use is likely to have been similar to that employed by the Nuer, the Elmolo of Lake Turkana and the Kwegu hunting peoples in the Omo valley today who use the harpoon for catching Nile perch (David Turton, pers. com.).

Geometric microliths suggest use as the barbs of spears and/or the cutting heads of arrows. In particular, it may be suggested that the deep crescents and trapezes would have been hafted as some kind of chisel-ended spear or harpoon. Such a weapon as that is shown being used in the statuette of Tutankhamen harpooning hippopotamus, although this has a metal head (Desroches-Noblecourt 1965: Pl. XXV) and was described by Diodorus for hunting hippo "...caught by the united work of many men who strike it with iron spears... wound it repeatedly with a kind of chisel fitted with iron barbs..." (I, 35: 10 - 11; Darby *et al.* 1977: 257). Since most of the large backed and trapeze forms are made from rhyolite, it is possible that this was a sharper, harder and less brittle material for making the cutting head than quartz and so would be more efficient for this dangerous work.

The other important class of equipment are the grindstones and it is clear that wild plant products were an important source of food. Besides grains, fruits and kernels, *Typha* roots and flowers, *Cyperus* roots, waterlily bulbs, tubers, melons, gums, all would have been important in season and would have been made into flour by grinding and cooked with ashes in a shallow hole in the ground as do the Zaghawa (Tubiana and Tubiana 1977: 13 - 28). Termites and honey in season are also certain foods, as among the Azande today (Culwick 1950: 40). The advantages of pottery can be clearly seen and there is every reason to consider the Early Khartoum wares as having been independently invented, an outcome of the need for improved preparation of fish, perhaps, besides drying, to process by pounding and boiling into dried "cakes" as did the Ichthyophagi (Darby *et al.* 1977: 309), to boil to remove the oil as do

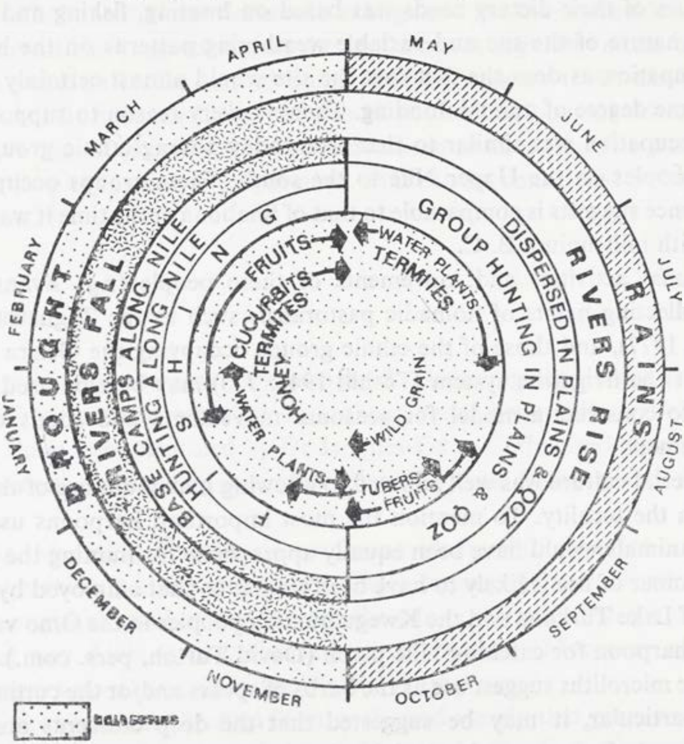

FIG. 14. A model for Early Holocene hunter-gatherer subsistence and seasonal movement in the Central Sudan

the Bozo in the Niger inland delta area (Ligers 1964 I: Plate IX), or in the preparation of *Pila*.

The model at Fig. 14 is based on the ethnographic sources referred to above and the archaeological data (Clark 1984). Only further research will show how close to or how far from the truth it is as an explanation of the way the prehistoric hunting/gathering Sudanese Negroes ordered their lives.

The year is divided into two main parts – the dry season, a time of drought, and the rains. Shabona would have been occupied during the dry season as the flood waters were beginning to recede. Dwellings would have been of reeds plastered with mud. Creeks would have been dammed and fish caught with spears and, possibly, basket traps or simply by reducing oxygen in the water by trampling the mud and so stupifying the fish. Crocodiles and hippos and also elephant were taken from time to time. *Pila* would have been dug out of the mud into which they had burrowed. As bovids began to collect round the permanent water so hunting in the grasslands and *toich* country became more important. Vegetable foods consisted of water plants, cucurbits, fruits and honey collected at the end of the dry season. With the rains, the rise of the Nile and flooding in the *toich* country, the inhabitants of the Shabona base camp would disperse into the hinterland where they would exist by hunting supplemented by using termites and water plants. Most important was the wild grain harvest towards the close of the rains and this would have been collected by the women. Fruits and tubers also became plentiful at this time as the population collected again at Shabona with the onset of the new dry season.

We need a lot more factual evidence before this can become more than a working hypothesis but, if nothing else, it is a base from which to examine more critically what we do know and to plan how and where we can add to this knowledge.

Acknowledgements

The help of the following persons and the opportunity in some cases also to make use of specialist reports as yet unpublished is gratefully acknowledged: Donald Adamson, Debra Autry, Steven Brandt, H. Jacques-Felix, Tamara McAuley, Andrew Smith, Ann Stemler, Christine Tennant, David Turton, Gerald Wickens, Martin Williams.

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VICTOR M. FERNÁNDEZ

A new Neolithic site near Khartoum

In the month of February 1981, the Spanish Archaeological Mission of the Foundation Durán-Vall Llosera in the Sudan had ended its work in Abri (Northern Province), completing the excavation and record of the Kerma and early Meroitic cemeteries at the site known as Amīr Abdallāh (Fernández 1982; 1984; 1985) and was projecting to continue its investigation of Sudanese archaeology in the vicinity of Khartoum. The Sudan Antiquities Service suggested some Neolithic sites in the area, specially one that was seriously menaced by house construction in Gereif East, at a very short distance, following the telephone line, from the Meroitic cemetery later excavated by Patrice Lenoble of the French-Sudanese unit in Khartoum (Geus 1983: 27; Geus and Lenoble 1983: 26). A short survey and sherd collection was made by the members of the mission on February 18, awaiting the beginning of archaeological work in the next season. Unhappily, financial shortages on the one hand, and the painful illness of Prof. Almagro, general Director of the Mission (that ultimately brought him to death on August 28, 1984) made those plans unfeasible. For the time being, the site is still unexplored, and the purpose of this paper is to present and shortly comment on the finds from our surface survey.

The site is small, and it was already partially eroded three years ago. The sherds were conspicuous in an area smaller than about a thousand square meters, very close to a well delimited kôm of historical date. The site is very probably the same one referred to by Arkell (1953: 108), with the Khartoum Antiquities Service Catalogue No. 4580 and it is known as Hag Yousif (P. Lenoble, pers. communication).

A total of 43 pottery sherds seemed interesting enough to be collected, most of them with impressed or incised decoration, and a representative selection is shown on Figures 1 and 2. The fabric is apparently homogenous in all of them, with mineral temper of small particles of brown quartz and some mica, the fracture colour ranging from reddish to dark brown. The surface treatment is difficult to assess at the outer, decorated face but the inner is normally well smoothed, and sometimes the thin strokes of actual burnishing are conspicuous (*cf.* Arkell 1953: 69; Abbas 1982:

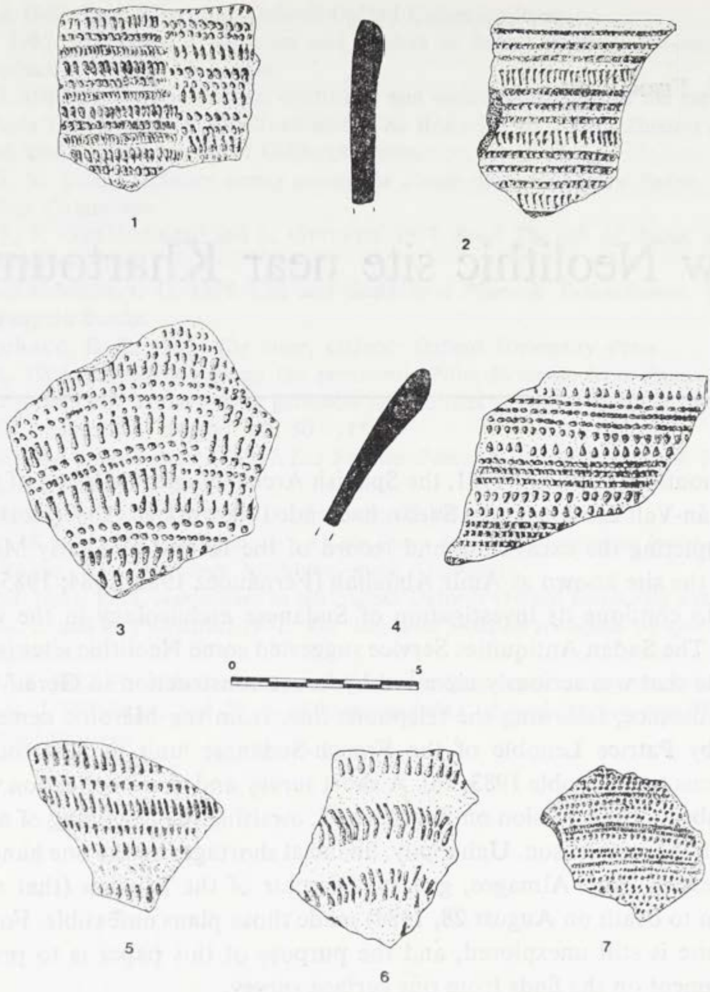

FIG. 1. Gereif East. Neolithic potsherds

79); the sherds with fine incisions show a similar, almost polished surface on both faces. The presence of a red slip is beyond doubt on the latter sherds and on a few plain ones (*e.g.* Fig. 2: *9* only at the external face), while the remainder show a colour similar, though lighter to its fabric. The detected shapes are spheric bowls more or less open, yet one case narrows toward the top (Fig. 2: *9*), a type not registered by Arkell (1953: Pl. 36).

With regard to the decoration, the collected sherds are entirely typical of what has been called the Khartoum Neolithic, or the Gouge Culture, after Arkell's (1953) excavations at Esh Shaheinab, north of Khartoum. Almost all the types of decoration were described by Arkell, but neither the dotted wavy line not the black topped classes were present in the pottery collected on surface in our site.

The most abundant impressed decoration is the combination of straight or curved lines of triangles and lines of dots (20 fragments). The subtypes are: a) one line of triangles and two of dots (2 sherds, Fig. 1: *1*); b) one line of triangles and three of dots (5 sherds, Fig. 1: *2*); c) two lines of triangles and one of dots (4 sherds); d) two lines of triangles and two of dots (8 sherds, Fig. 1: *3*), this type was the favourite at Shaheinab (*cf.* Arkell 1953: 69); e) two lines of triangles and three of dots (1 sherd,

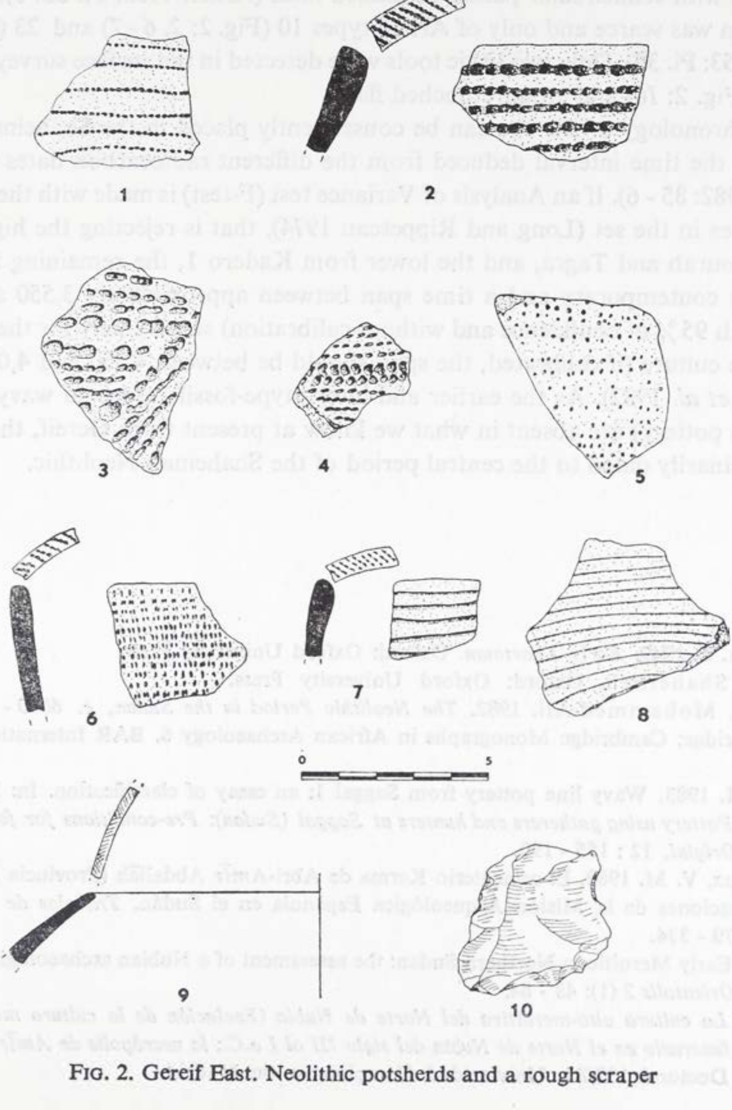

FIG. 2. Gereif East. Neolithic potsherds and a rough scraper

Fig. 1: *4*). Finally, five sherds showed a combination of lines of triangles, that occasionally were seen as true v's as Arkell (1953: 70) remarked (Fig. 1: *5 - 6*).

The example of single lines of dots are less abundant, with seven cases of small dots in straight parallel lines (Figs. 1: *7*, 2: *1*) and only two with bigger impressions (Fig. 2: *2 - 3*); the sherd of Fig. 2: *4* is a combination of both types. Only four sherds (Fig. 2: *5 - 6*) were indisputably impressed with the rocker technique of zig-zag lines of dots, as has been described by Arkell (1949: 83) and Caneva (1983: 169).

There were only five sherds with incised decoration, of broad (2 sherds, Fig. 2: *7*) and fine (3 sherds, Fig. 2: *8*) parallel lines; the example of Fig. 2: *8* is perhaps a part of a bowl with semicircular panels of incised lines (Arkell 1953: Pl. 33: 5). The rim decoration was scarce and only of Arkell types 10 (Fig. 2: *2*, *6 - 7*) and 23 (Fig. 2: *9*; Arkell 1953: Pl. 35). Only two lithic tools were detected in the surface survey, a rough scraper (Fig. 2: *10*) and an unretouched flake.

The chronology of the site can be consequently placed in the Shaheinab phase, that is in the time interval deduced from the different radiocarbon dates available (Abbas 1982: 85 - 6). If an Analysis of Variance test (F-test) is made with the more reliable dates in the set (Long and Rippeteau 1974), that is rejecting the higher ones from Sorourab and Tagra, and the lower from Kadero 1, the remaining five dates appear as contemporary and a time span between approximately 3,550 and 3,300 B. C. (with 95% of confidence and without calibration) seems likely for the flourishing of the culture (if calibrated, the span should be between 4,350 and 4,000 B. C.; *cf.* Klein *et al.* 1982). As the earlier and later "type-fossils" (dotted wavy line and black top pottery) are absent in what we know at present from Gereif, the site can be preliminarily dated to the central period of the Shaheinab Neolithic.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

Elżbieta Promińska

Anthropological examination of human remains from Geili (Central Sudan)

In February 1973 Italian Mission for Prehistoric Research in Egypt and Sudan, headed by Professor Salvatore Puglisi invited T. Dzierżykray-Rogalski and me to examine human skeletons discovered in Geili. These skeletons are only a sample of many skeletons discovered there, dated as far back as Early Khartoum, Neolithic and Meroitic times. Only in 1973 - 1974 34 burials were found there. However, we have had no opportunity to examine this whole material, so I would present only the results of anthropological analysis of ten skeletons examined, just to point to some questions originating from this investigation. The site of Geili consists of a large settlement and cemetery similar to those of Esh-Shaheinab and Kadero, at least for findings coming from the upper two layers (four strata were discovered at Geili).

The graves indicate that the site was used as a burial place already in Early Khartoum times. Skeletons from these graves were found in a strongly contracted position, the same was the position of the Late Neolithic ("protodynastic") burials. Later on, the site was used intensively for Meroitic burial where skeletons were found in loosely contracted position. The position of the skeletons was therefore typical for the burial customs known from the Central Sudan.

It should be emphasized that the sites used as both a settlement and burial ground for many centuries, like these in Geili or Kadero, are situated near the river, but there were probably other conveniences, too.

In seven examined graves 10 individuals were buried. In one grave dated as Early Khartoum (T-16) were two individuals: one male 35 - 40 years old and a child 5 - 7 years old. The male was about 177 cm tall, massively built. His bones were covered with ochre.

In three Late Neolithic ("protodynastic") graves we distinguished five individuals, all females, aged: 60 years, 55 - 60 years, 25 years, 18 - 20 years and 16 - 18 years. In two graves (T-9 and T-10) two persons were buried; in one case (T-21) only one very young woman was buried. In T-9 a woman about 60 years old and another one about 25 years old was buried. In T-10 we found also an older woman 55 - 60 years old buried together with the young one, aged 18 - 20 years.

In Meroitic graves there were three single burials containing two young females (17 - 18 years old and 19 - 20 years old) and one child 9 - 10 years old.

The question arises if this is just a chance that in the Late Neolithic and Meroitic graves only females and one child were found, or it could be a female cemetery?

In Kadero we examined also the Neolithic and Meroitic inhumations. The number of males buried in both cemeteries exceed this of females considerably. In the Neolithic population of Kadero sex distribution of the adults is 70% of males (69.2%) and 30% of females (30.8%). In the Meroitic group this proportion is 60% of males and 40% of females.

More males than females in the Nubian anthropological material is not unusual. Vagn Nielsen (1970) found an excess of males in most groups of Nubian skeletons. This applies to the C-Group (56.2% of males), the Pharaonic group (60.8%) and the X-Group (54.7%). But in the Meroitic group studied by Nielsen there is a small excess of females (amounting to 5.6%). According to Nielsen excess of males is partly caused by the bad preservation of the more fragile bones of females. Strouhal (1977) found in the Sayala cemeteries a clear predominance of males (in Late Roman cemeteries: A – 61,9% of males in C-I – 55.7%, CII – 56%, CIII – even 63.1%). A similar situation was described in the series from the Egyptian fort at Mirgissa, dated to the Middle Kingdom and Second Intermediary Period, where 60.6% of males were found (Billy 1976). In the Meroitic cemetery of Aksha there were 53% of males (Chamla 1967). On the other hand, there are also cemeteries with even proportion of males and females (for example X-Group Wadi Qitna, A-Group in Nielsen's material). According to Strouhal (1977) some cemeteries in the Sudan were reserved for adults, either with both sexes in even proportion or with the predominance of males (warriors?). Other cemeteries were used predominantly by women and children and it could have been so at Geili, but it is necessary to examine all skeletons there to draw such conclusion.

The stature of persons buried at Geili was calculated by Trotter and Gleser method. It was possible to determine this for the male from the grave dated as Early Khartoum; it was a tall man, 177 cm of stature, his bones were massive, thick and strong. It was also possible to calculate the stature of three females from the Late Neolithic graves: this from the grave T-9, 25 years old, was 174 cm tall, another one, about 60 years old, was 160 cm tall, the female from grave T-10, 18 - 20 years old, was 164 cm tall, but her growing was not yet completed as the femur had not yet fused distal epiphysis. From the Meroitic graves we were able to measure the length of bones of only one female 19 - 20 years old (T-6) and she was 162 cm tall, but her growth was not finished either as there were not yet fused epiphyses.

The individuals buried in the Early Khartoum and Late Neolithic graves were all massively built, with thick bones, and tall.

Preserved facial bones indicate that the faces were without or with only slight prognathism, the noses were rather narrow, but the features of mandible were typical for the "Black" variety (especially articular process bent medially) but we are not stating their racial affinities.

In the Late Neolithic graves we also found cases of paleopathology. The female 60 years old from the grave T-9 had immense tartar covering whole teeth. She had also spondylosis, especially of cervical part of vertebral column with two vertebrae completely fused, so her head was barely movable. Extensive spondylosis was observed in lumbar part of vertebral column, too. In bones of limbs we observed extensive changes caused by osteoarthritis.

The same kind of changes showed female 55 - 60 years old from the grave T-10. She had very developed spondylosis of cervical and lumbar part of vertebral column, as well as osteoarthritis in joints of limbs. This kind of changes is typical for the aged individual and in Egypt and Sudan is very frequent. It seems strange that we did not find this kind of paleopathology (or any other pathological changes) at Kadero where we already examined the bones of 52 individuals.

Our data concerning the individuals buried at Geili are incomplete and are not representing the whole population neither from the Early Khartoum, Late Neolithic nor from the Meroitic cemeteries. More material should be examined to elucidate the problem of sex distribution, burial customs (for example, to explain if in the Late Neolithic graves usually two persons were buried together). It would be also interesting to analyse age at death in these populations as well as to study their racial affinities and morphological features. Last but not least, it would be interesting to clear up the question if frequency of spondylosis and osteoarthrosis was really that high among older individuals and if so, to try to explain why it was absent at nearby Kadero?

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WERNER SCHUCK

From lake to well: 5,000 years of settlement in Wadi Shaw (Northern Sudan)

Since 1980 the interdisciplinary research project „Besiedlungsgeschichte der Ostsahara" (B. O. S.) has carried out surveys and excavations in the western desert of Egypt and the northwestern provinces of the Sudan. The main object was the reconstruction of the history of prehistoric settlement in the Eastern Sahara from the end of the Palaeolithic through the historical times, along with palaeoclimatic research (for the general outline of the project, see Kuper 1981). One of the main excavation areas in Northern Sudan was a shallow depression which, in agreement with V. Haynes (1982: 299), is now called Wadi Shaw.

During his trip from Nukheila (Merga) to Selima in 1935 W. B. K. Shaw set up in Wadi Shaw his camp No. 49. Guided by reports of L. E. de Almasy and G. L. Prendergast who had visited the depression two years earlier, he recorded rich archaeological finds in this area (Shaw 1936a: 48).

The wadi is located about 80 km north-west from the oasis of Laqiya Arbain and 180 km south of the Egyptian-Sudanese border. Cutting about 60 m deep into the surrounding plateau it has been disintegrated into several small basins of different size sided by dune-sand, partly covered by slope rubble. The bottom of the wadi is covered with soft drift-sand, but as Shaw had already mentioned (Shaw 1936: 206), locally playa-like sediments could also be noted.

Because of time limit – three weeks and a half of effective fieldwork – only brief surveys and small excavations were carried out in 1982 in Wadi Shaw (Francke 1986) as well as in the adjacent Wadi Sahal (Cziesla 1986; Fig. 1). The richness of sites known from this fieldwork was one of the main reasons for selecting Wadi Shaw for a more detailed research programme which was carried out during two months of fieldwork lasting from the middle of October to December, 1983[1].

[1] Concerning the work in Egypt and Wadi Howar see reports by R. Kuper, E. Cziesla, F. Klees, W. Schön, and J. Richter, this volume.

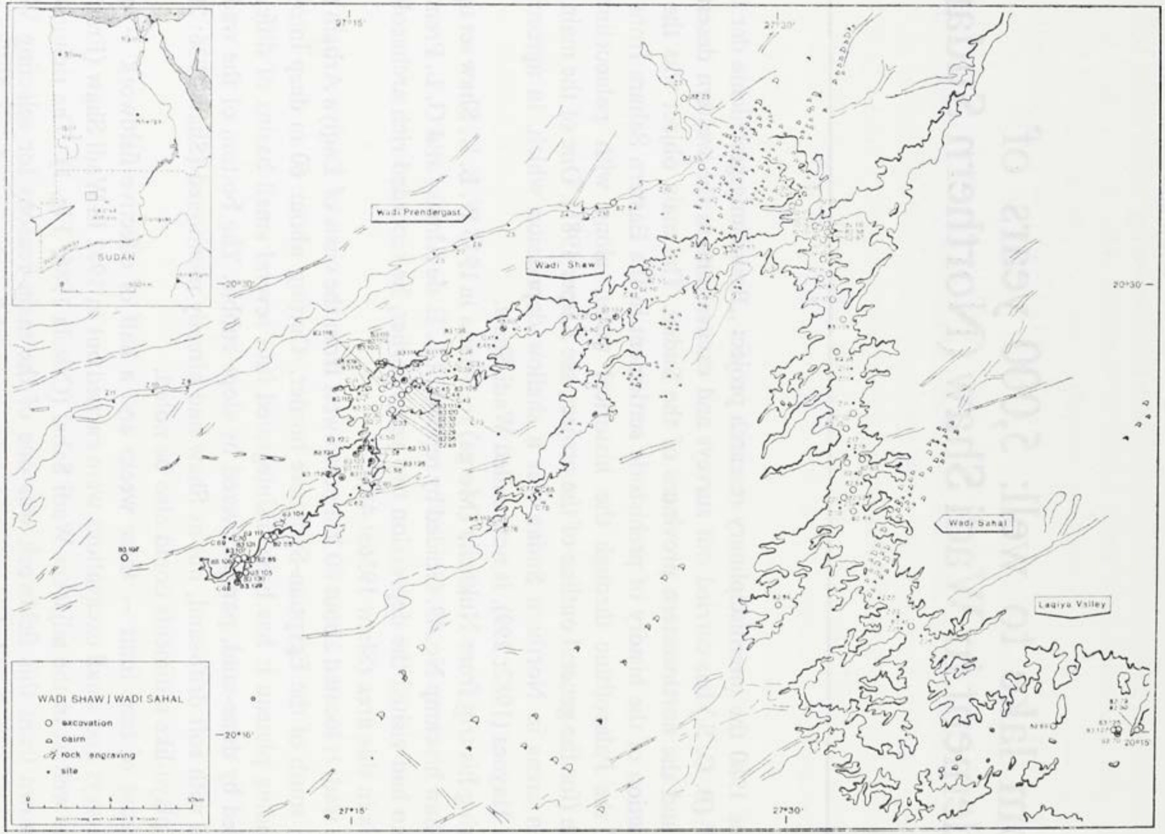

FIG. 1. Map of sites from the Laqiya Area (Northern Sudan)

In this brief report attention will be focused only on some aspects of the settlement and the placing of the succession of prehistoric cultural groups in the Wadi over the 5,000 year period. In other words, the report relates more to the general results of the excavations and surveys rather than to the description and interpretation of individual sites.

While excavations started at those sites which were known from 1982, an overall intensive survey was carried out throughout the Wadi. During this survey a number of sites had been discovered, out of which only some were excavated. Altogether, 90 sites in Wadi Shaw were noted and mapped.

Using a mechanical excavator, the geographers B. Gabriel and St. Kröpelin from the Free University of Berlin had dug out test pits in the packed sediments at four different localities. Although these localities were as far as 30 km apart one from another, they show similar stratigraphical sequences: two limnic accumulations containing shells of various freshwater gastropods, separated by two meters of valley-sand (Gabriel and Kröpelin 1984: 295). The exact dimensions of these lakes are unknown because of the modern sand-sheets masking their boundaries. Radiocarbon dates establish the accumulations to the middle of the 6th and the 5th millennium B. C. (KN 3088 - 5,540±300 B.C.; KN 3086 - 5,010±65 B. C.; KN 3094 - 4,600± K65 B. C.)[2]. These dates seem to coincide with the range of time within which wet and dry phases occurred in the Sahara lasting from 9,000 B. P. to 4,500 B. P. (v. Zinderen Bakker 1972: 18; Sutton 1974: 529).

By far the oldest finds that had been discovered in the test trenches were a sherd bearing a dotted wavy-line decoration (Fig. 2: *12*) together with other artefacts and a molar of an elephant found nearby. The sherd was found in the upper part of the valley-sand separating the two limnic accumulations. That means that the sherd was under the upper lake deposit which could be dated to 4,600 B. C., thus yielding a terminus ante quem for the object. Only a few sherds from other sites could be correlated to this chronological frame; most of them seemed to have belonged to a younger phase of the Khartoum-type ceramics. Quartz predominates in the fabric of these sherds, and organic as well as fine-sand temper appears in only small amounts. Some other sherds, decorated all over the outer surface, remind us of the Early Khartoum-related group. They show dotted wavy-line ornaments on the vessel body. Rims are decorated with short vertical incisions along the outer edge (Fig. 2: *8 - 9*). The wavy-line decoration along the outer edge of the rim decoration of the whole vessel were made by a comb (Fig. 2: *7*, *10*, *11*). The pattern can be described as a cross--hatched herring bone ornament which might be termed "Laqiya-type". The only radiocarbon date for this kind of decoration, obtained from bone, is 4,250±350 B. C. (KN – 3403): site 83/117. After the 1983 excavations sherds with this particular kind of decoration are being now discovered in larger numbers not only in Wadi Shaw but

[2] All radiocarbon dates were processed by the Laboratory of the Cologne University (Dr. J. Freundlich). The dates are uncalibrated.

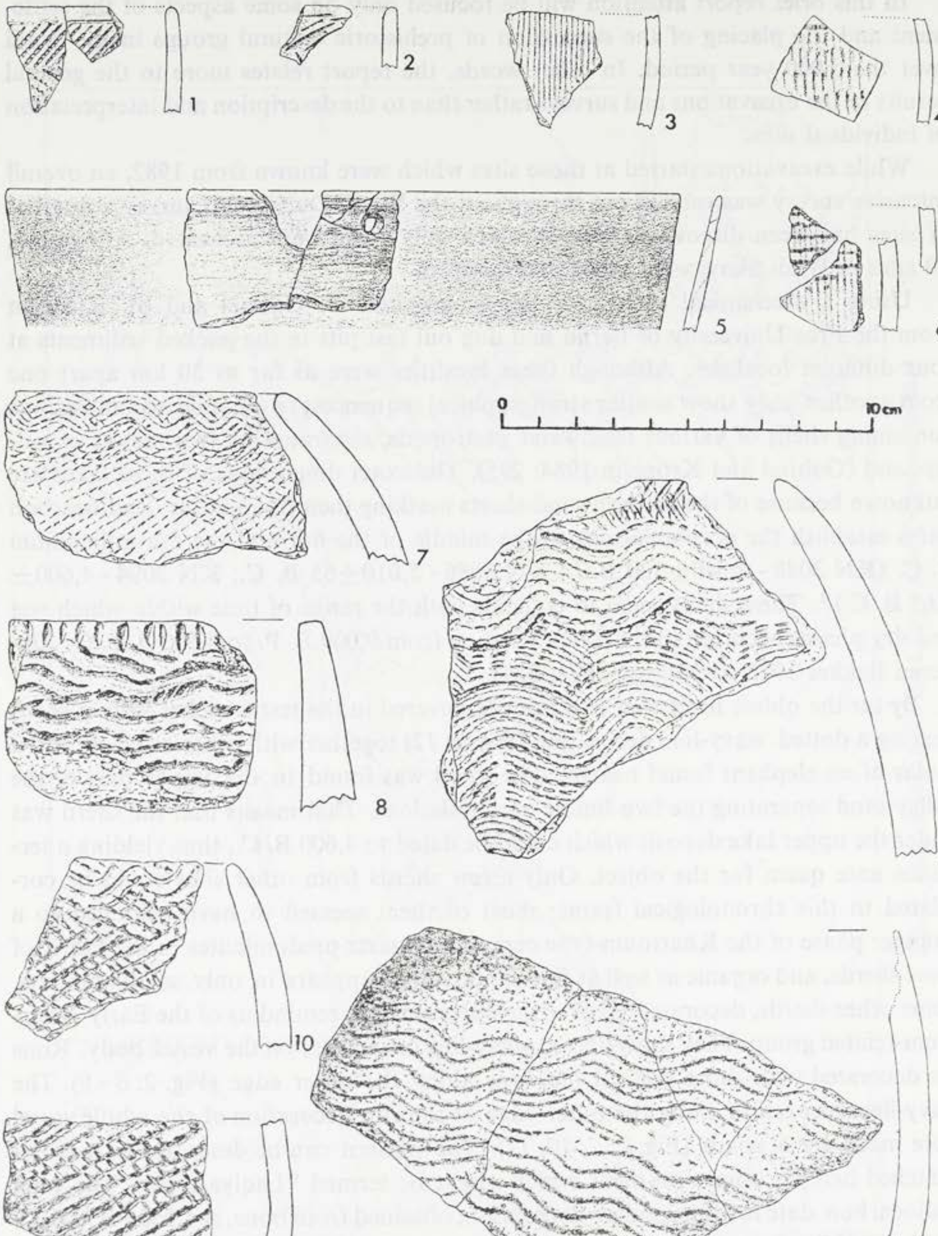

FIG. 2. Wadi Shaw. Potsherds from different sites

1 - 6: Site 82/33; *7, 8*: Site 83/117; *9*: Site 83/111; *10, 11*: Site 82/56; *12*: Site 82/57

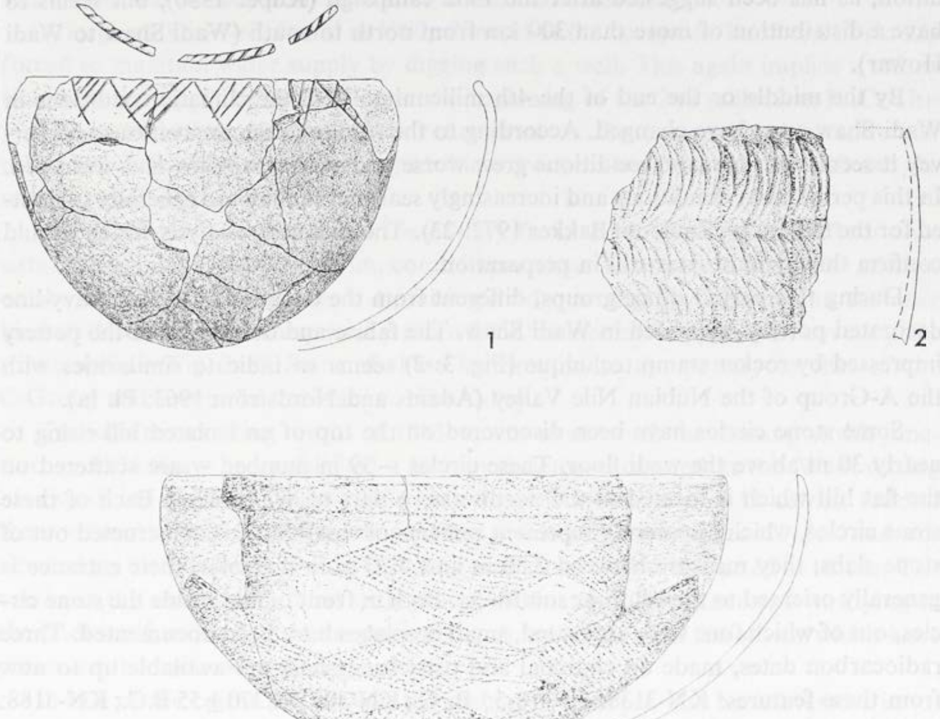

FIG. 3. Wadi Shaw. Potsherds from different sites

1: Site 83/110-9; *2*: Site 83/120; *3*, *4*: Site 82/31 also in Wadi Howar; thus the decoration apparently does not represent a local tradition, as has been suggested after the 1982 campaign (Kuper 1986), but seems to have a distribution of more than 300 km from north to south (Wadi Shaw to Wadi Howar).

By the middle or the end of the 4th millennium B.C. the climatic conditions in Wadi Shaw must have changed. According to the results of the excavations and survey it seems that climatic conditions grew worse and water supplies had dwindled. In this period drier conditions and increasingly seasonal rainfall are generally suggested for the Sahara (v. Zinderen Bakker 1972: 23). The sediment analysis which should confirm this hypothesis is still in preparation.

During this period other groups, different from the complex of dotted wavy-line decorated pottery, appeared in Wadi Shaw. The fabric and decoration of the pottery impressed by rocker stamp technique (Fig. 3: *2*) seems to indicate similarities with the A-Group of the Nubian Nile Valley (Adams and Nordström 1963: Pl. Ia).

Some stone circles have been discovered on the top of an isolated hill rising to nearly 30 m above the wadi floor. These circles – 39 in number – are scattered on the flat hill which is located at the northwestern part of Wadi Shaw. Each of these stone circles, which apparently represent remains of small huts, is constructed out of stone slabs; they measure between 2.80 m and 4.30 m in diameter, their entrance is generally oriented to the south or southwest. Both in front of and inside the stone circles, out of which four were excavated, small fireplaces have been documented. Three radiocarbon dates, made on charcoal and ostrich eggshell, are available up to now from these features: KN-3138: 2,900 ± 55 B. C.; KN-3091: 2,370 ± 55 B.C.; KN-3188: 2,060 ± 60 B.C.

Close to two of the stone circles many lithic artefacts and pottery objects have been found. Because of the fragmentary preservation it was impossible to reconstruct complete vessels; presumably most of the vessels were small flat bowls (Fig. 3: *5*), the majority of which were undecorated. The decorated pieces show different kinds of pattern. A few sherds show a linear decoration with red brown paint (Fig. 3: *4*, *6*). Some rim sherds are decorated with impressions and incisions made by fine-toothed combs; vertical zig-zag lines border an incised line below the rim (Fig. 3: *1*, *2*). Similarly decorated pottery had been found in the archaeological material from different sites in the Gilf Kebir (Wadi el Akhdar, *cf.* Kuper 1981: 236; Wadi Bakht, *cf.* Banks 1980: 308; 1984: 158f). The motif is described as "Dotted Chevron" by K. M. Banks (*ibid.*).

In 1982 the excavations were carried out at archaeological sites situated close to the flat hill, at the wadi floor. At present the sites appear slightly above the surrounding surface and contain pottery, lithic artefacts, bones and storich eggshells, millingstones as well as grinding-stones. During the last campaign it was possible to investigate the stratigraphy nearly 80 cm with different layers of sand and ashes. Although detailed study of the material from the surface as well as from the different layers of this stratigraphy has not been carried out yet, this example indicates that besides the question of simultaneity of many round surface-concentrations, the question of the site reoccupation should be taken into consideration.

A large walk-in-well, found in 1982, shows that the occupants had been obviously forced to maintain water supply by digging such a well. This again implies a reduction in water supply by desiccation at the beginning of the 2nd millenium B. C. This well is located close to the surface concentrations. By comparing decorative elements and radiocarbon datings it is possible to connect both the walk-in-well and the settlements (Francke 1986).

A characteristic decoration of the pottery from the sites on the wadi floor consists of small knobs under the rim, comb impressions and rows of triangular stitches on the body of the vessel (Fig. 3: *4*), raising a ridge around the impressions. Another kind of decoration is a chequered pattern filled with comb impressions, covering the whole surface (Fig. 3: *3*). Some of these features relate the pottery to that of the C-Group and Kerma of the Nubian Nile Valley.

Two other interesting results of 1983 season seem worth mentioning at this juncture: in 1936 Shaw had published a human skeleton excavated in this Wadi during his expedition in 1935 (Shaw 1936a: 48). In 1983 we excavated 11 cairns, four of them without any finds. The cairns could be divided into two different types: one was situated on the plateau near its slopes, and was exclusively constructed of stones. The cracks of the stones were filled with yellow blown sand. The other one was lying in the wadi itself, at the foot of the slope and was made of only a few stones which have preserved the surface from erosion.

In one of the cairns situated on the plateau the corpse was buried almost in an extended position, while in five others the bodies had been placed in extreme contracted position. In three cases the corpses were completely wrapped in a material which was found in a very bad state of preservation; so far it has not been examined but, possibly, it could be leather. Corpses buried in this way – completely wrapped or protected from the top by two leather-skins – had been already excavated in the Nile Valley (Bonnet *et al.* 1982: 21) as well as in the western parts of the Sahara desert (Adrar Bous, personal communication by A. B. Smith). Among the grave goods we found ostrich eggshell beads, in one case used as a bracelet on the right wrist. In another grave three different kinds of beads were excavated: round the neck of the skeleton there was a string of more than 1,900 ostrich eggshell beads, and round the skull there lay small oval-shaped beads made of bone, while some very small green beads, possibly of faience, lay near the pelvis. In one case the deceased wore a nose ring.

In one cairn situated near the slope of the plateau a small broken vessel was deposited but no corpse was found. The vessel is grey-black in colour and decorated by a row of hanging triangles under the rim, filled with three or four diagonal incised lines (Fig. 3: *1*). This vessel obviously bears a strong resemblance to decorated vessels from Kerma (Privati 1978: 131, Pl. III). Ribs were taken from the skeletons for radiocarbon dating. Five of them could be dated to 1,040±120 (KN – 3437), 1,200±180 (KN – 3438), 1,700±150 (KN – 3354), 2,770±300 (KN – 3356), and 6,650±450 (KN – 3353) B.C. The last date relates to the corpse buried in an extended position in the cairn situated on the plateau. Preliminary results of the study of the skeletons which are being examined by Chr. Simon (Université de Genève), concern their age, sex and height. Four of the skeletons are those of males between the ages of 30 and 52 years, and one of a female of *ca* 55 years of age. The height of the deceased ranges from 1.63 m to 1.80 m. The general morphological description suggests an elongated skull with the face medium to long. A definite determination and comparison with other populations is in preparation.

The other discovery worth mentioning here are the rock engravings, found in the Wadi Shaw proper and in one of its branches. They seem to fill the gap between the rock pictures known from Zolat el-Hamad (Newbold and Shaw 1928: 111; Frobenius 1934: 39ff) and the single engraving of a cow from Burget Tuyur. Although all engravings were found on the wind-protected rock sides, they present different stages of preservation. Beside wild animals (such as mufflon, elephant and giraffe), there also appear images of cattle with different horn-types, apparently of different workmanship.

Summarising, it seems to be possible to establish a sequence of settlement history for Wadi Shaw covering a period of more than 5,000 years. Apart from the burial dated to the 7th millennium B.C., the sites with dotted wavy-line decorated pottery belong to the oldest finds in Wadi Shaw. The pottery from other sites could be correlated with the ceramics from sites in the Nubian Nile valley, the Gilf Kebir and the Wadi Howar. No doubt it were particularly the water resources available in different periods (marked by different pottery phases) that made this Wadi attractive to the early inhabitants of the Western Desert. Nevertheless, a complete and exact picture of the sequence of settlements in this Wadi still requires more research in the form of a detailed examination of individual sites as well as comparison with the material from other sites in the western parts of the Sahara and the Nile Valley.

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LATE PREHISTORY OF THE NILE BASIN
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JÜRGEN RICHTER

Neolithic sites in the Wadi Howar (Western Sudan)

Ecological setting

The Wadi Howar is one of the largest wadi systems in Northern Sudan stretching over 1000 km from the Ennedi in the west to the River Nile in the east. The wadi has been surveyed several times but its exact course was not known to previous researchers (Maydon 1923; Newbold 1924; Bagnold 1933; Sandford 1935; Shaw 1936). Recent LANDSAT-interpretation suggested the location of the former river mouth of the Wadi Howar in the Nile Valley south of Dongola (Meissner and Schmitz 1983). Thus the Wadi Howar constituted a natural connection between the mountains of the Eastern Chad and the lowlands of the Nile Basin during periods of favourable climatic conditions (Pachur and Röper 1984).

Field studies by Pachur and his colleagues (Pachur and Röper 1984) attested to fluvial activity based on an autochthonous recharge system with local precipitation during early and mid-Holocene times. Shallow freshwater lakes seem to have characterised the Wadi bed.

Today the Wadi Howar defines the southern frontier of the Libyan Desert against the very northern part of the Sudanese Gizzu grasslands exploited by camel nomad tribes of Northern Darfour. Few nomad families live around some small wells in the Rahib area at present. This position of the Wadi at the outermost border of a nomad civilization can provide a hypothetic model for Laqiya area in prehistoric times (Ziesla 1986; Schuck, this volume).

B.O.S. research programme

The 1980 and 1984 B.O.S. (Besiedlungsgeschichte der Ost-Sahara) campaigns conducted by Rudolph Kuper aimed essentially at the problem of the Sahara-Sudanese Neolithic which, so far, had not been documented in the eastern part of the Libyan

Desert (Kuper 1981; 1986; Gabriel *et al.* 1985). The later Neolithic periods also were an important research subject to the expedition although they had been noticed by previous researchers as well (Bagnold 1933; Newbold and Shaw 1928; Rhotert 1952; Hölscher 1937). 48 out of 120 discovered sites have been excavated, mostly by small test trenches.

Main areas of investigation have been the Wadi Howar valley west of the Djebel Rahib and the southern slopes of the Djebel Rahib in 1980 and the Wadi Howar banks and valley from Djebel Rahib to Djabarona in the West in 1984. Surveys led the expedition to the dune sites east of Rahib Wells, to Dongola (following up the course of Wadi Howar), to the Djebel Tageru and to Mellit in the South (crossing the Gizzu grasslands).

Early ceramic settlements on dune sites

East of the Djebel Rahib (Fig. 1) some fossil dunes have been protected from wind erosion and have therefore been fixed at their original positions by prehistoric living floors, covering their surface with millions of artefacts. Dunes of such parabolic

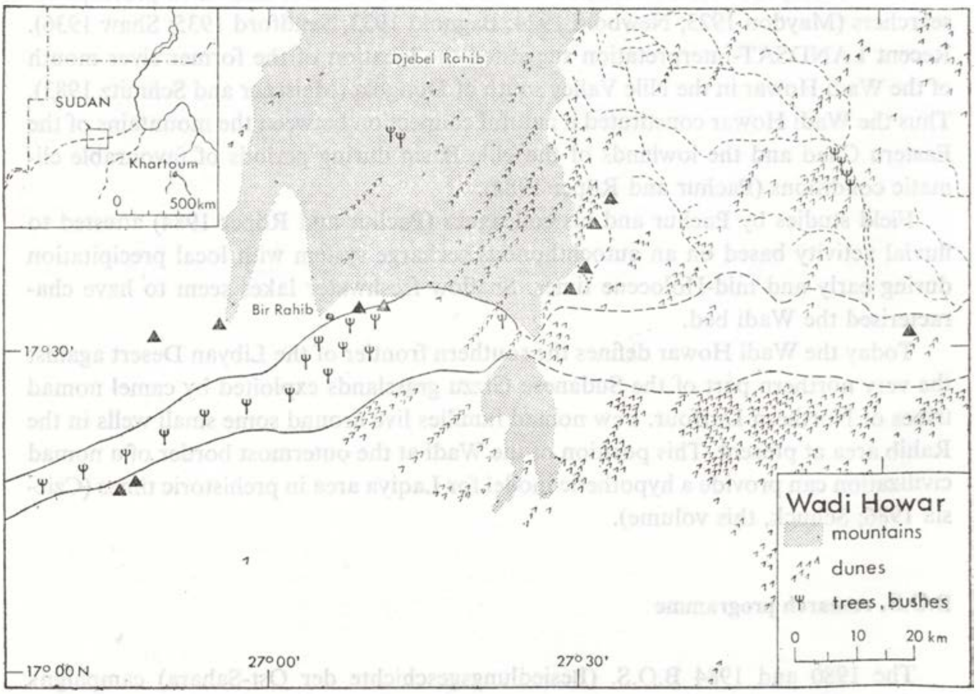

FIG. 1. Wadi Howar. Distribution of Khartoum related and Laqiya Type sites

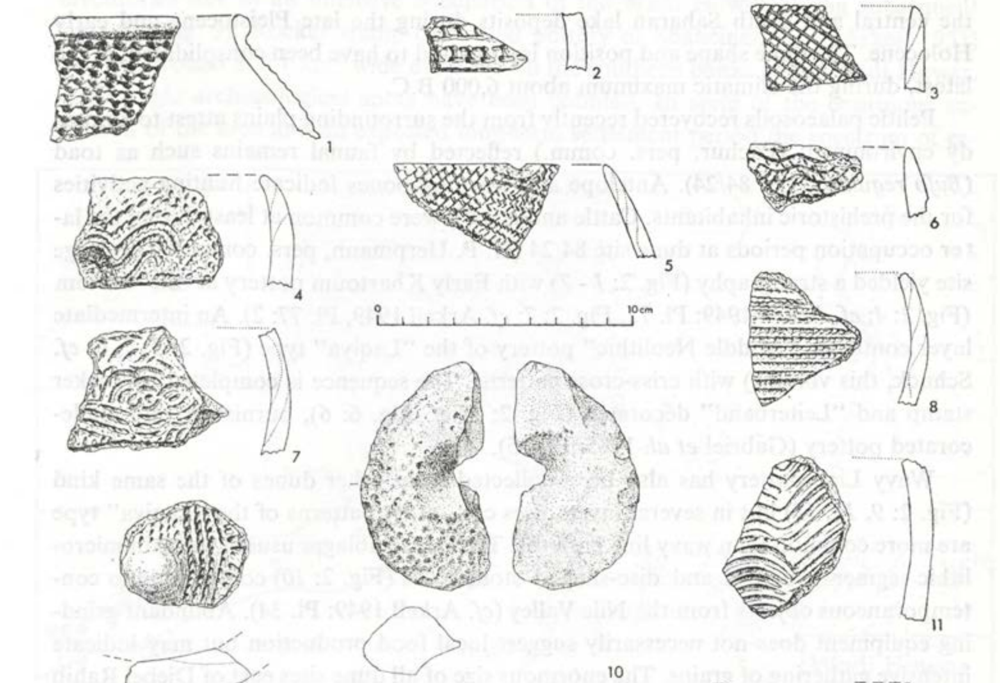

FIG. 2. Wadi Howar

***1, 2*: Site 84/24, upper horizon; *3, 5, 6*: Site 84/24, intermediate horizon; *4, 7*: Site 84/24, lower horizon; *9, 10, 12, 13*: Site 84/50; *8, 11, 14, 15*: Site 80/87**

shape occur during more humid periods with denser vegetation cover. Gabriel *et al.* (1985) related the origin of the parabolic dunes (Parabeldünen) to the main phase of the central and south Saharan lake deposits during the late Pleistocene and early Holocene. The dune shape and position is supposed to have been consolidated, at the latest, during the climatic maximum about 6,000 B.C.

Pelitic palaeosoils recovered recently from the surrounding plains attest to a muddy environment (Pachur, pers. comm.) reflected by faunal remains such as toad (*Bufo regularis*, site 84/24). Antelope and warthog bones indicate hunting activities for the prehistoric inhabitants. Cattle and goat(?) were common at least during the later occupation periods at dune site 84/24 (H. P. Uerpmann, pers. comm.). This large site yielded a stratigraphy (Fig. 2: *1* - *7*) with Early Khartoum pottery at the bottom (Fig. 2: *4*; *cf.* Arkell 1949: Pl. 72, Fig. 2: *7*; *cf.* Arkell 1949, Pl. 77: 2). An intermediate layer contained "Middle Neolithic" pottery of the "Laqiya" type (Fig. 2: *3*, *5*, *6*; *cf.* Schuck, this volume) with criss-cross patterns. The sequence is completed by rocker stamp and "Leiterband" decorated (Fig. 2: *2*; *cf.* Fig. 6: *6*), burnished and undecorated pottery (Gabriel *et al.* 1985: Fig. 5).

Wavy Line pottery has also been collected from other dunes of the same kind (Fig. 2: *9*, *12*, *13*) but in several inventories criss-cross patterns of the "Laqiya" type are more common than wavy line patterns. These assemblages usually contain microlithic segments, pestles and disc-shaped stone clubs (Fig. 2: *10*) comparable to contemporaneous objects from the Nile Valley (*cf.* Arkell 1949: Pl. 34). Abundant grinding equipment does not necessarily suggest local food production but may indicate intensive gathering of grains. The enormous size of all dune sites east of Djebel Rahib can only be understood as a result of frequent, perhaps seasonal, occupation over a long time.

Early and "Middle" Neolithic sites in the Wadi Howar

The river bed of the Wadi Howar itself appears today as a sandy, shallow depression with some trees and bushes. Some kilometers north of the Wadi banks (Fig. 1) Early Khartoum pottery has been found in stratified but disorderly position (site 80/87, Fig. 2: *8*, *11*, *14*, *15*). The site may once have been situated at the shore of a former lake indicated by limnic sediments and freshwater molluscs (*cf.* Kuper 1981: 266). At the nearby 80/73 site similar pottery was accompanied by faunal remains such as hippopotamus, crocodile, some bovids and by catfish and other fish remains. Again freshwater ostracods were present (Kuper 1981: 262).

Combed and dotted wavy line variants are represented in these and other assemblages like in the eponymous site of Khartoum itself (Arkell 1949). An obviously "Middle Neolithic" ceramic facies with criss-cross patterns of the "Laqiya" type is not yet known from the Nile Valley (*cf.* Kuper 1981: 263).

Sites of the above mentioned type show two main patterns of settlement location: either on dunes or along small fossil freshwater lakes.

The Early Khartoum and "Laqiya" type assemblages are followed by abundant inventories due to an intensive occupation of the Wadi Howar during subsequent periods (Fig. 3). Rocker stamp decorated pottery of Shaheinab type (Arkell 1953) has been found at a 1 km^2 wide dune site on the southern banks of the Wadi Howar. 1200 single archaeological spots have been counted. In spite of the enormous extension of the area and an expected long-term settlement period the spectrum of ceramic decoration patterns is very homogeneous: the decoration is usually made by rocker stamp technique arranged either in zig-zag bands (Fig. 4: *4, 5*) or in regular bands of nearly parallel impressions ("Leiterband" type; Fig. 4: *1, 2*). Frequent intermediate patterns (Fig. 4: *3*) make a division between these two groups difficult. The site has been archaeologically documented by systematic surface collections from 270 single concentrations and by some small excavations. Many concentrations of bones and pottery were identified as remnants of former pits being partly destroyed by wind erosion. Numerous complete pits have been excavated as well. A 1.20 m deep pit from 84/13 - 5 contained material from two stratigraphic units: rocker stamp decorated pottery, two transverse arrowheads and an ostrich eggshell bead superposed on an undecorated complete bowl-shaped vessel.

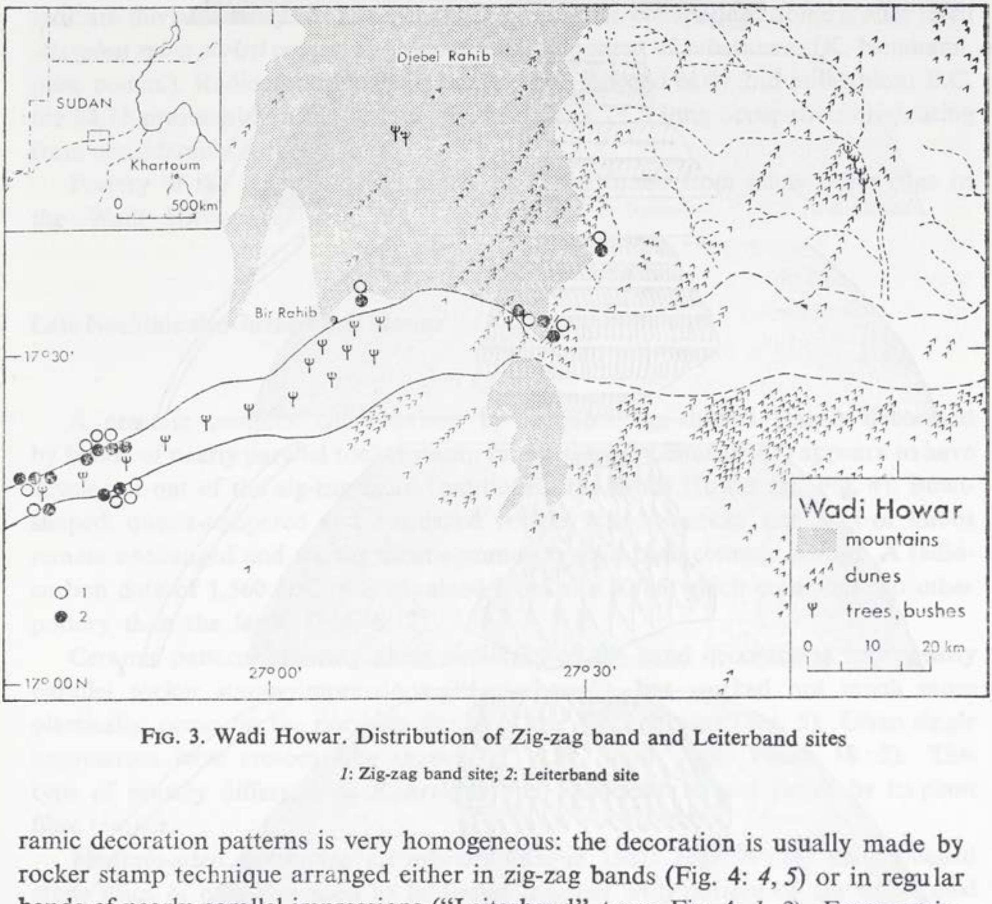

FIG. 3. Wadi Howar. Distribution of Zig-zag band and Leiterband sites

1: Zig-zag band site; *2*: Leiterband site

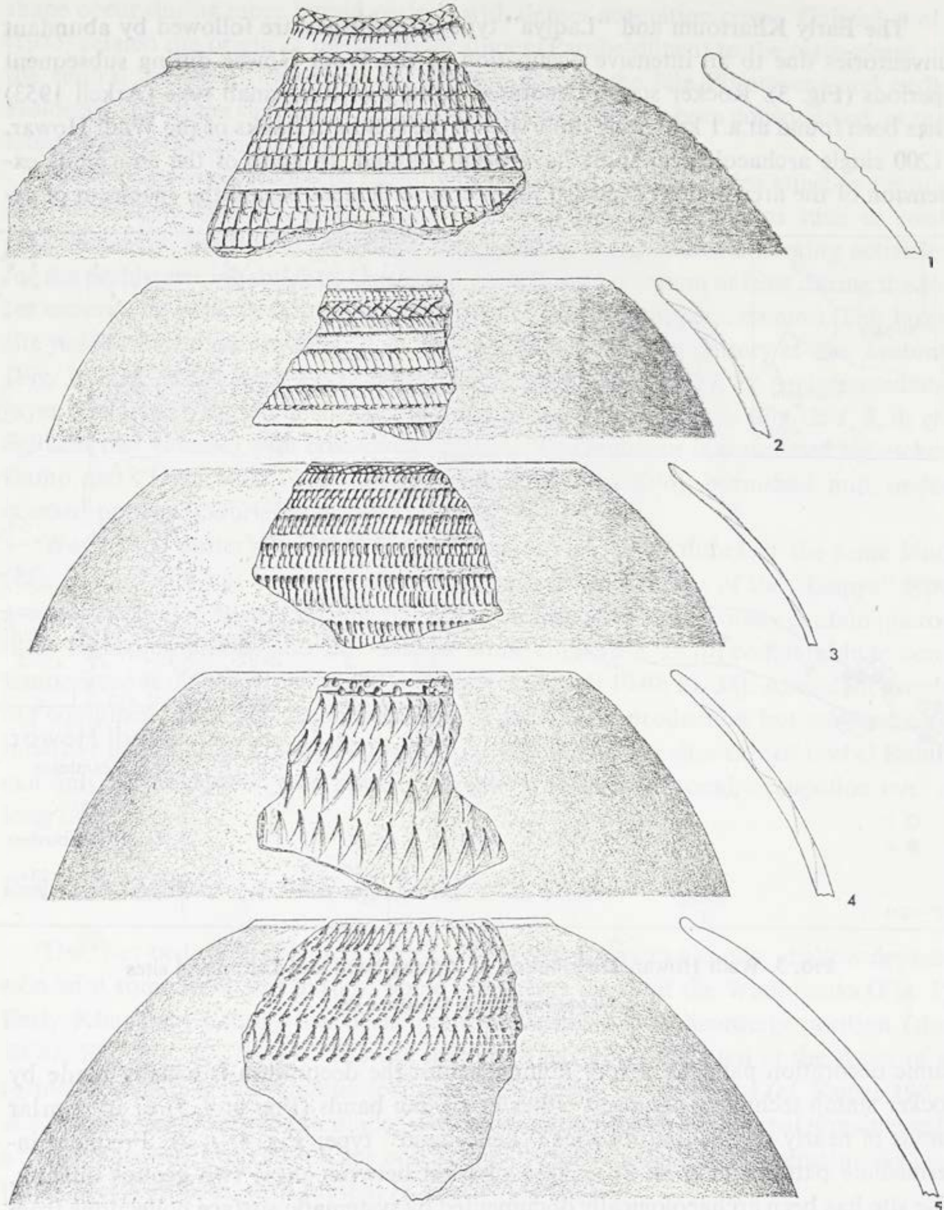

FIG. 4. Wadi Howar. Site 84/13

Rocker stamp patterns from this large site correspond well to equivalents from the eponymous site of the Shaheinab ceramic complex (Khartoum Neolithic or Gouge Culture: Fig. 4: *3*; *cf.* Arkell 1953; Pl. 31: 7, Fig. 4: *4*; *cf. loc. cit.*: Pl. 32: 6, Fig. 4: *5*;

cf. loc. cit.: Pl. 32: 3, 5) north of Khartoum but the range of band ornament variations from 84/13 far exceeds the Shaheinab repertoire. By contrast, the typical Shaheinab gouges are completely absent from the Wadi Howar assemblages. Instead, as a possible woodworking equipment, "Darfour adzes" are usually found here and allover the Eastern Libyan Desert (Kuper 1981; Fig. 43).

Pits and concentrations have revealed numerous faunal remains such as hippopotamus, bovids and other species. Fish bones, particularly catfish and river shells, indicate fluvial activity for this period of prehistoric occupation. Some stones from *Zizyphus spina christi* represent a vegetarian component of subsistence (K. Neumann, pers. comm.). Radiocarbon dates indicating late 3rd and early 2nd millennium B.C. for 84/13 presumably relate only to the late phase of a long occupation originating from considerably earlier times.

Pottery of the type discussed above has been found from many other sites in the Wadi Howar (*cf.* Fig. 3).

Late Neolithic sites in the Wadi Howar

A ceramic complex characterised by frequent egg-shaped vessels decorated by bands of nearly parallel rocker stamp impressions ("Leiterband") appears to have developed out of the zig-zag band tradition in the Wadi Howar (*cf.* Fig. 4). Bowl-shaped, quartz-tempered and burnished vessels with no necks nor lugs or knobs remain unchanged and are the most common type in both ceramic groups. A radiocarbon date of 1,560 B.C. was obtained from site 80/86 which contained no other pottery than the latter (Fig. 6: 2).

Ceramic patterns showing close similarity to the band decorations with nearly parallel rocker stamp impressions ("Leiterband"), but worked out much more plastically, occur on the northern banks of the Wadi Howar (Fig. 5). Often single impressions have crescent-like shapes (*cf.* A.B. Smith 1980: Photo 18 : 5). This type of pottery differs from Khartoum and Shaheinab related facies by its plant fibre temper.

Medium-sized transverse arrowheads (Kuper 1981: Fig. 36 : 14) and polished stone discs of coin size used to be found together with pottery of the mentioned type. Rare iron fragments need not belong to these assemblages.

Pottery with woven-mat decoration is usually tempered by organic material (Fig 6: *1*). This is sometimes accompanied by incised geometric ornaments (Fig. 6: *3 - 5*). and "boutons repoussées" comparable to Nubian C-Group and Kerma patterns. But C-Group pottery as mentioned by Hölscher (1937) and Bietak (1979) now actually seems to be a rather rare phenomenon in the Wadi Howar when compared with the rich, possibly partially contemporaneous occurrence, of the Zig-zag band and "Leiterband" types.

Conclusion

The geographic key position of the Wadi Howar area is reflected by its rich archaeological inventories.

The Khartoum and Shaheinab related pottery provides evidence for connections to the eastern Chad (Tixier 1962; Arkell 1964; Courtin 1969; Gabriel 1981) as well as to the Nile Valley (Arkell 1949; 1953; 1972; Shiner 1971; Krzyżaniak 1974; Caneva 1978) and the Atbara region (Otto 1963; 1964; Fattovich *et al.* 1984). Khartoum related pottery has recently been found as far north as Gilf Kebir (Kuper, pers. comm.). The "Laqiya" type is known from Chad (Arkell 1964; Pl. 45: 2; Courtin 1969) but is more abundant in the Wadi Howar, Wadi Shaw and Laqiya area (Schuck, this volume).

This wide north-to-south distribution of the Khartoum and "Laqiya" type ceramics coincides with Pachur's (Pachur and Röper 1984) hypothesis of disjunct vegetation areas in early-to-mid Holocene Libyan desert which encouraged an inter-oasis mobility for hunters and pastoralists (?). Shaheinab related (rocker stamp) ceramics have very few, and "Leiterband" ware has no comparable specimens north of Atrun. The Wadi Shaw and Laqiya sites have produced A-Group, C-Group, Kerma related

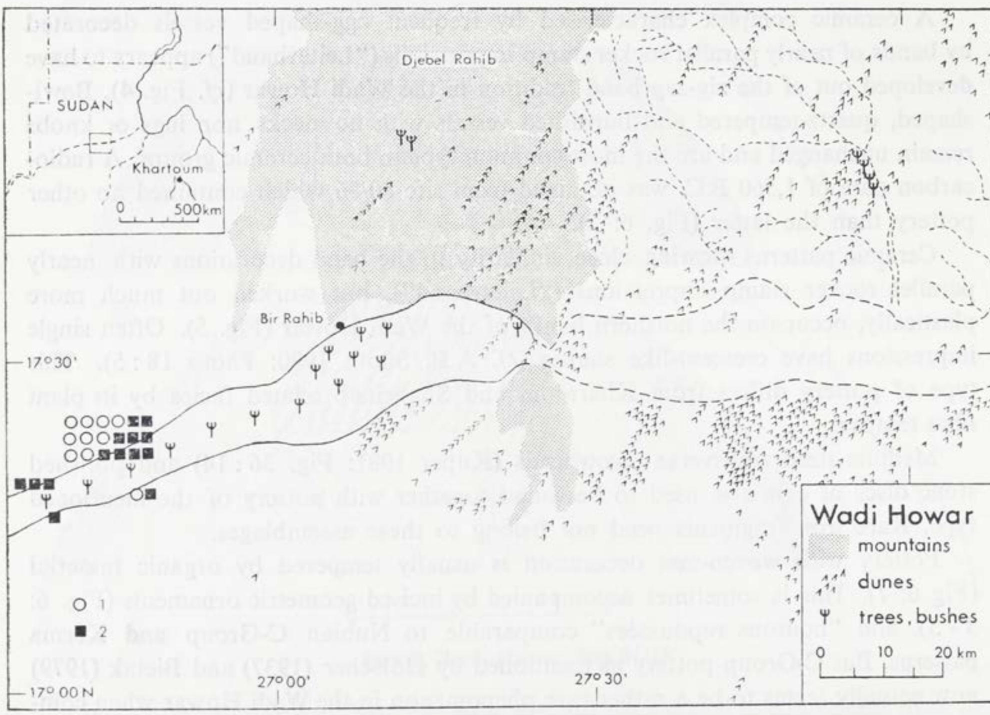

FIG. 5. Wadi Howar. Distribution of sites with plant fibre tempered pottery

1: Plastical Leiterband; *2*: Geometric ornaments

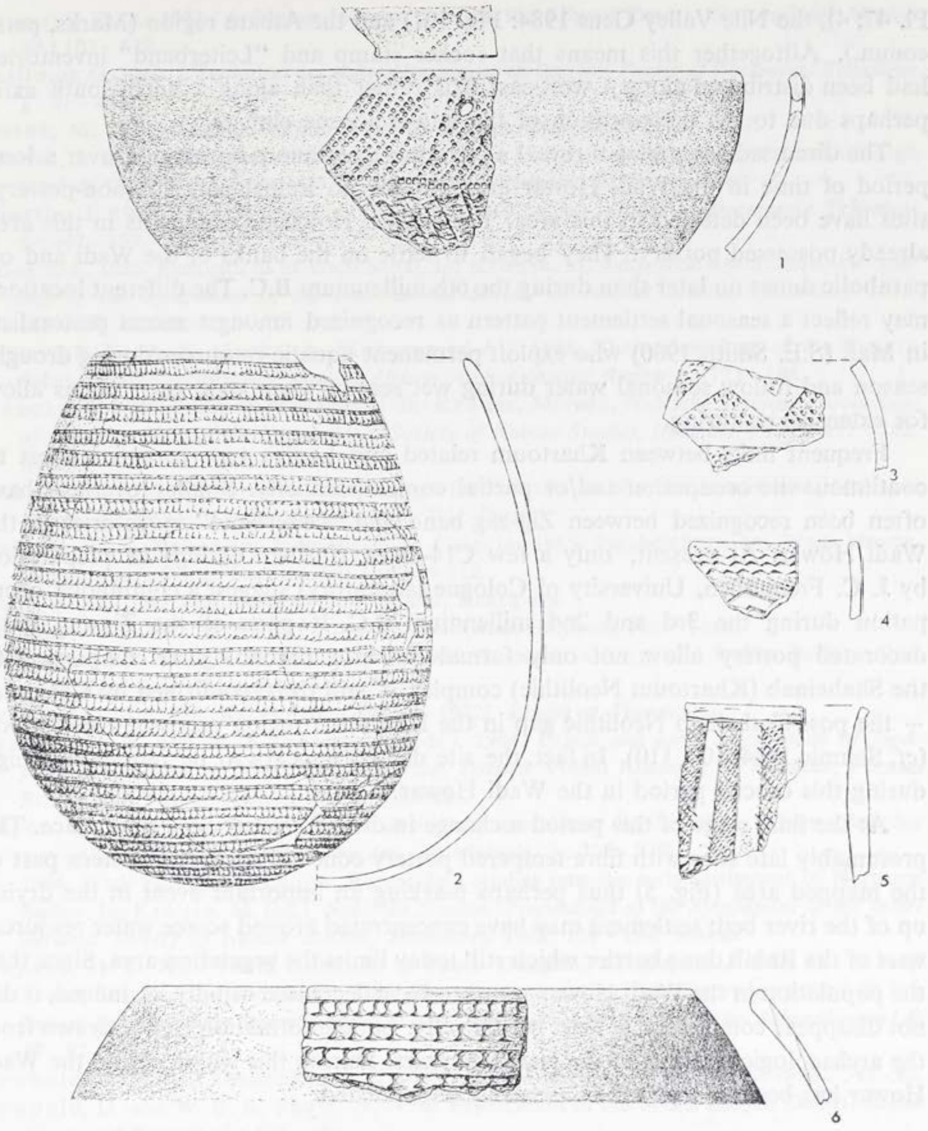

FIG. 6. Wadi Howar

1: Site 84/19; *2*: Site 80/86; *3 - 5*: Site 80/85; *6*: Site 84/13

and other decorations instead (Kuper 1981; Francke 1986; Cziesla 1986; Schuck, this volume).

The abundance of the "Leiterband" ornament at Wadi Howar contrasts its very rare occurrence in the Ennedi Mountains (Bailloud 1969: Fig. 3A; Arkell 1964:

Pl. 47: 4), the Nile Valley Geus 1984: Fig. 101) and the Atbara region (Marks, pers. comm.). Alltogether this means that rocker stamp and "Leiterband" inventories had been distributed along a west-east axis rather than along a north-south axis, perhaps due to the deterioration of the late-Holocene climate.

The discussed assemblages reveal a picture of continuous occupation over a long period of time in the Wadi Howar area. So far no Epipalaeolithic (non-pottery) sites have been detected in this area. The earliest Holocene occupants in this area already possessed pottery. They began to settle on the banks of the Wadi and on parabolic dunes no later than during the 6th millennium B.C. The different locations may reflect a seasonal settlement pattern as recognized amongst recent pastoralists in Mali (S.E. Smith 1980) who exploit permanent aquatic resources during drought season and follow seasonal water during wet season when wide grass plains allow for extensive pasturing.

Frequent links between Khartoum related and Laqiya type ceramics attest to continuous site occupation and/or partial contemporaneity. Similar overlaps have often been recognized between Zig-zag band and "Leiterband" inventories in the Wadi Howar. At present, only a few C14-dates (further datings in preparation by J. C. Freundlich, University of Cologne laboratory) suggest a continuous occupation during the 3rd and 2nd millennium B.C. If parts of the Zig-zag band decorated pottery allow not only formal but also chronological comparison to the Shaheinab (Khartoum Neolithic) complex – still to be confirmed by C14-dates – the post-Shaheinab Neolithic gap in the Khartoum region needs new evaluation (*cf.* Shinnie 1984: 109, 110). In fact, the site density appears to be remarkably high during this crucial period in the Wadi Howar.

At the final stage of this period a change in distribution of sites took place. The presumably late sites with fibre tempered pottery concentrate in the western part of the mapped area (Fig. 5) thus perhaps marking an important event in the drying up of the river bed: settlement may have concentrated around scarce water resources west of the Rahib dune barrier which still today limits the vegetation area. Since then the population in the Wadi Howar seems to have decreased rapidly, if, indeed, it did not disappear completely, at least periodically. Little information can be drawn from the archaeological report of the last 2000 years. During this whole period the Wadi Howar has been – and still is – nearly unpopulated.

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ANTHONY E. MARKS

The later prehistory of the Central Nile Valley: a view from its Eastern Hinterlands

In spite of over sixty years of archaeological research in the Central Sudan, it is striking that there still appear to be some marked cultural hiatuses in the Nile Valley. One, between the radiocarbon-dated Early Khartoum (Mesolithic) and the Khartoum Neolithic, has been closed recently by a series of new dates from Saggai (Caneva 1983), Sorourab (Mohammed-Ali 1984), and from a midden at Shaqadud, in the western Butana (Marks 1984; Marks *et al.* 1985). Another two still remain; that between the end of the Khartoum Neolithic and the Meroitic and the one which falls after the Meroitic period. It is the first of these which is of concern here. At its least, based upon radiocarbon dates, this gap in the Nile Valley extends from about 2,800 B.C. – the latest dates from Kadada (Geus 1983) – to about 650 B.C., representing the earliest radiocarbon dates from Meroe (Bradley 1984): that is, for about 2,000 years (Fig. 1). While in Nubia this period can be filled with various known cultural developments and archaeological manifestations (Adams 1977), within the Nile Valley of Khartoum Province there are exceedingly few published archaeological remains which might fill this gap.

Even if the complex of occupations around Kadada (Geus 1980; 1981) prove to include some localities dating to after 2,800 B.C., as now seems likely, these few occurrences cannot be compared to the over 30 known Khartoum Neolithic sites in the Central Nile Valley. The apparent differences in settlement densities are particularly visible when it is considered that the Khartoum Neolithic (now well dated radiometrically), lasted perhaps no more than 600 years, while the temporal hiatus following it lasted about 2,000!

Based upon known site distributions, the present picture suggests that the Central Nile Valley may have been almost totally abandoned or, at least, saw a major decline in resident population during the 3rd and 2nd millennia B.C. Another possibility exists, however. It is possible that the nature of local adaptation changed sufficiently to bring about a major shift in settlement type and, with it, a marked decrease in archaeological visibility. In addition, one must consider whether the paleogeography

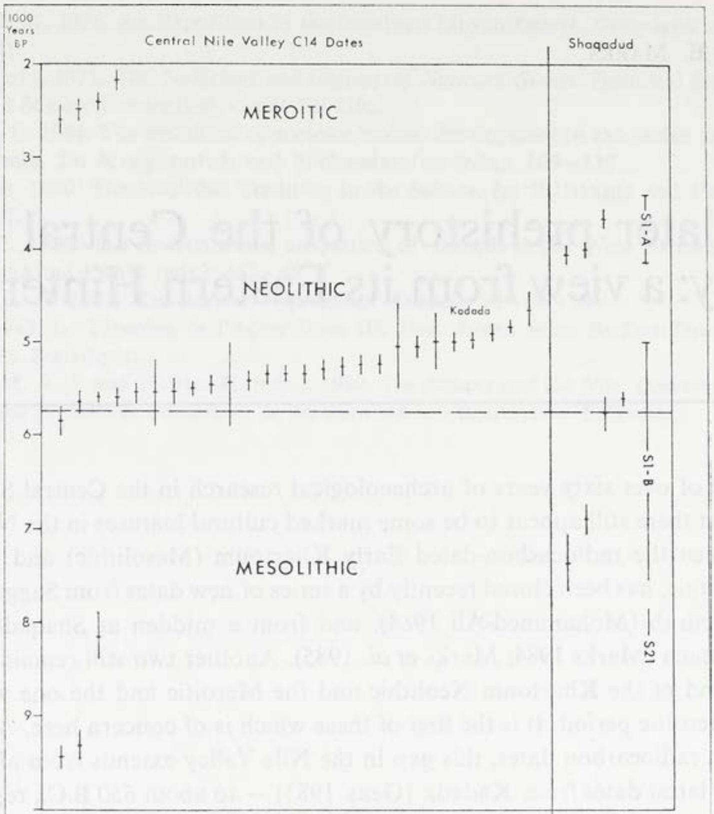

FIG. 1. Radiocarbon dates for the Central Nile Valley and the Eastern Sudan in the later prehistory

of the Central Nile Valley at that time influenced our present ability to locate sites which might have been present. Both of these possibilities, as well as others, need to be considered.

Although a change in settlement type, resulting from a postulated shift to pure pastoralism from a mixed economy, has been recently put forth to account for this seeming paucity of post-Khartoum Neolithic and pre-Meroitic sites in the Central Nile Valley (Haaland 1984), it is suggested that factors other than those mentioned might well account for what we now see. Some of these factors are hinted at from recent excavations in the Butana, to the east of the Nile Valley.

The new information comes from the work of the joint University of Khartoum/ Southern Methodist University Butana Archaeological Project at the site of Shaqadud, located some 50 km southeast of the Nile Valley at Wad Ben Naga (Fig. 2). Ever since Otto's exploratory work there in the early 1960's (Otto 1963; 1964), it has been thought of as a Khartoum Neolithic site (*e.g.* Haaland 1981). In fact, Shaqadud is a complex of sites which center around a small box canyon set into a sandstone plateau. Occupation seems to have begun in the 6th millennium B.C., during the Early Khartoum, and to have lasted, without serious break, until well into the Khartoum Neolithic (Marks and Mohammed-Ali 1984). Stratigraphically, there appears to have been a brief hiatus during the early 3rd millennium B.C., but this ended by at least 2,600 B.C. and occupation continued, without interruption, for another 600 years; that is to the end of the 3rd millenium B.C.

It is this later occupation, limited spatially to the cave and the area directly in front of cave which is of concern today. Shaqadud Cave contains over 3.5 m of cul-

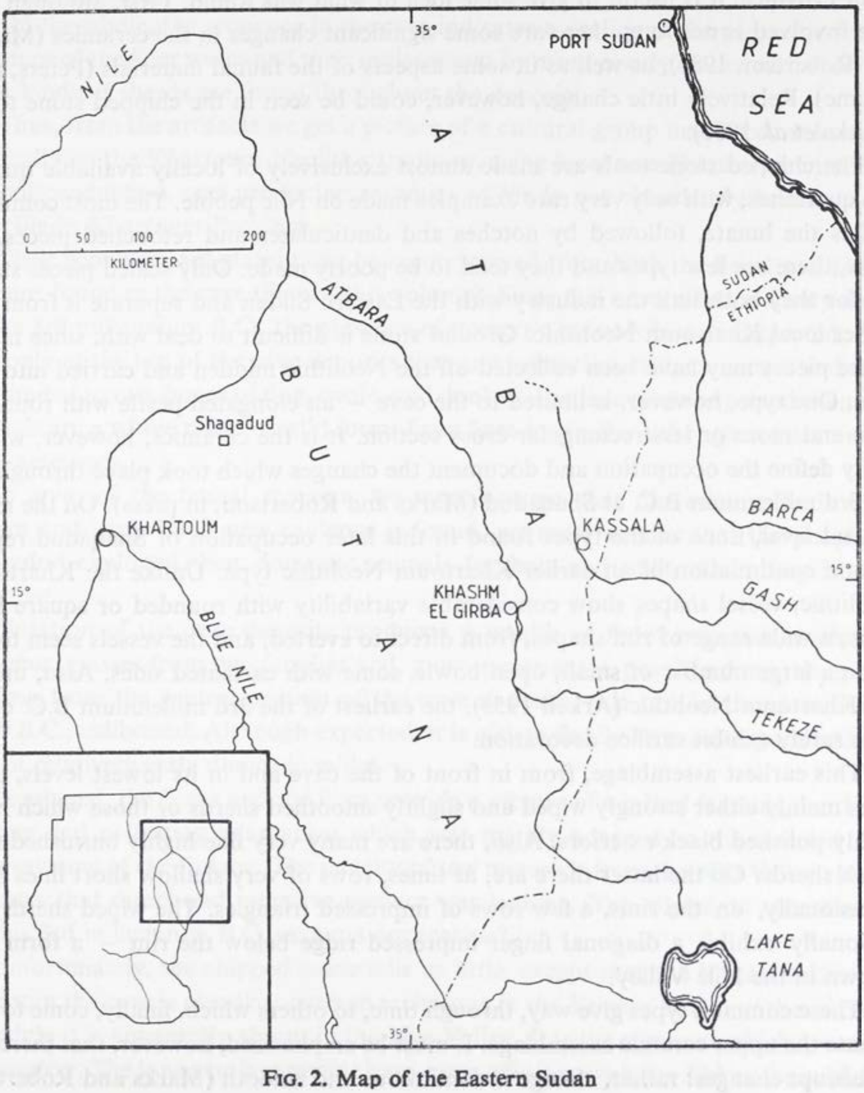

FIG. 2. Map of the Eastern Sudan

tural deposit, while the area in front contains about 1.5 m, as well as a plung pool which probably made Shaqadud so desirable as a locus for occupation. The cave is relatively wide but with less distance from front to back (22 m wide but only 10 m front to back). It appears that considerable rock fall provided an outer wall, as well as a dam behind which a seasonal pond occurred at the very end of the occupation. Otherwise, the cave sediments accumulated very rapidly and the density of artifacts in the cave points to many ephemeral occupations over the 600 years in question (Marks *et al.* 1985).

Since cultural materials from the 3rd millennium B.C. are undescribed for Khartoum Province, it is useful to give some idea of what was found. First, although the time involved is not long, there are some significant changes in the ceramics (Marks and Robertson 1986), as well as in some aspects of the faunal materials (Peters, this volume). Relatively little change, however, could be seen in the chipped stone tools (Marks *et al.* 1985).

The chipped stone tools are made almost exclusively of locally available quartz and quartzites, with only very rare examples made on Nile pebble. The most common tool is the lunate, followed by notches and denticulates and retouched pieces. In short, there are few types and they tend to be poorly made. Only scaled pieces stand out for they both link the industry with the Eastern Sudan and separate it from the earlier local Khartoum Neolithic. Ground stone is difficult to deal with, since many of the pieces may have been collected off the Neolithic midden and carried into the cave. One type, however, is limited to the cave – an elongated pestle with rounded ends and more or less rectangular cross section. It is the ceramics, however, which really define the occupation and document the changes which took place throughout the 3rd millennium B.C. at Shaqadud (Marks and Robertson, in press). On the most general level, none of the types found in this later occupation of Shaqadud represents a continuation of an earlier Khartoum Neolithic type. Unlike the Khartoum Neolithic, vessel shapes show considerable variability with rounded or square bottoms, a wide range of rim shapes, from direct to everted, and the vessels seem to include a large number of small, open bowls, some with carinated sides. Also, unlike the Khartoum Neolithic (Arkell 1953), the earliest of the 3rd millennium B.C. ceramics rarely exhibit surface decoration.

This earliest assemblage, from in front of the cave and in its lowest levels, contains mainly either strongly wiped and slightly smoothed sherds or those which have highly polished black exteriors. Also, there are many very fine highly burnished thin black sherds. On the latter there are, at times, rows of very shallow short lines and, occasionally, on the rims, a few rows of impressed triangles. The wiped sherds occasionally exhibit a diagonal finger impressed ridge below the rim – a form unknown in the Nile Valley.

These common types give way, through time, to others which, finally, come to dominate the upper ceramic assemblage. It must be emphasized, however, that there are no abrupt changes: rather, change is continuous and smooth (Marks and Robertson

1986; in press). The middle and upper levels of the cave can be characterized by a wiped and burnished, unslipped group with rim decorations of incised lines forming chevrons, diamonds, or hachured areas; a fiber tempered group with an ephemeral buff slip; a fingernail impressed group which is unslipped; a streaky burnished group which has a brownish-black to buff slip; a combed unslipped group with parallel incised grooving of the body sherds and with various more complex rim treatments; and, a hachured combed incised group which has zoned parallel incised lines and rim treatments similar to those which are combed unslipped. In addition, there are a number of red slipped types, in which plain red slipped predominates over a cord marked varieties.

On the whole, the sequence in the cave indicates a decline in the proportional occurrence of the finer wares and their replacement by more poorly made ones, although both kinds of sherds are found throughout the deposits.

Thus, from the artifacts we get a picture of a cultural group unrelated, at least ceramically, to the Khartoum Neolithic tradition, using local non-Nilotic raw materials in tool production, and producing ceramics of kinds not abundantly known along the Nile in Khartoum Province.

Their economic adaptation can be reconstructed from both the floral and faunal remains found in the cave (Peters, this volume). Since this occupation is firmly dated to the 3rd millennium B.C., the presence of domestic animals is to be expected. Yet, it is only at the top of the cave deposits that any indication of them occurs and then it is limited to rare bones of dog, cattle, and donkey. In place of the expected domestic animals are a whole range of wild forms from hare to giraffe, although most animals were antelopes.

In spite of the faunal remains, we must assume that domestic animals were known and kept. Until new evidence is found, we must assume that the people at Shaqadud exploited their domestic animals for hair and milk, while they hunted for meat.

Flotation of the cave deposits produced a wealth of floral materials, including *Zizyphus*, grasses from two families and, most importantly, possible domestic millet. Coming from the central portion of the cave deposits, this can be dated to about 2,500 B.C., calibrated. Although expected, it is nice to finally have some good indication of relatively early domestic millet.

Combined, the fauna and the flora provide a picture of a mixed farming, herding, hunting and collecting adaptation which was mainly adapted to the wooded and grass savanna of the Butana. The paucity of raw materials from the Nile Valley clearly indicates that direct and intensive contact was lacking. Yet, where do contacts lie for this 3rd millennium B.C. savanna occupation?

Unfortunately, the chipped stone tells us little, except that the bipolar technique present in the cave is also the common technique in the Eastern Sudan at the same time, while it is apparently absent in the Nile Valley. It is the ceramics which are most informative. The lower cave ceramics have some affinities with the Abkan from Nubia

(Nordström 1972), but until detailed comparisons are made this should be considered unproven. Certainly, our Abkan ceramics at SMU differ significantly from the Shaqadud material, but our samples are small. On the other hand, the diagonal impressed ridge below the rim and the fine, short rows of shallow lines are both typical and characteristic of 3rd millennium B.C. ceramic assemblages in the area between the Atbara River and the Gash Delta (Fattovich *et al.* 1984; Marks and Fattovich, this volume).

The ceramics from the middle and upper levels of Shaqadud Cave continue to exhibit very close affinities in decorative techniques and motifs with contemporary assemblages in the Gash Delta (Fattovich *et al.* 1984) but less so with the somewhat closer Atbara River Valley. Yet, these later ceramics have also been found in the Nile Valley. Intrusive hachured grooved incised sherds (called Pan-grave) were found at Khartoum Hospital by Arkell (1949: Pl. 90, No. 3), and isolated sherds of Shaqadud Cave type ceramics have been reported as atypical sherds from a series of Khartoum Neolithic and Early Khartoum sites (*e.g.*, Arkell 1953; Haaland 1981; Caneva 1983). In addition, some assemblages of them have been noted near the Dal Cataract (Geus 1976) and near Shendi (Geus 1981). Yet, the number and density of such occurrences in the valley are much too low to postulate a Nilotic development of these types. Rather, it appears that these Nile Valley occurrences are the western extreme of what is basically an Eastern Sahel ceramic tradition, associated with a basic savanna adaptation. In this regard, the Nile itself probably held few charms for these people. More importantly, their adaptation called for utilization of a number of resources which might best be exploited in different places at different times. Particularly, the heavy emphasis on hunting steppe forms would not have been adaptive within the Nile Valley and the seeming disinterest in fishing might well have precluded intensive occupation of the Nile Valley, since the Khartoum Neolithic adaptation relied heavily on season fish exploitation (Haaland 1981). Therefore, whatever occupation there was in the valley might have been quite ephemeral leaving little behind, particularly when compared to the large, intensively occupied sites of the Khartoum Neolithic and the Meroitic. Without intensive, systematic surveys, such sites may have been overlooked because of both their paucity and their limited cultural remains.

This model gets some support from sites along the Atbara River dated to the 3rd millennium B.C. where fishing was not an important activity, although it was paramount at nearby sites which were contemporary with the Early Khartoum (Fattovich *et al.* 1984). The 3rd millennium B.C. Atbara river-edge sites, however, are very large and show evidence for intensive occupation. This suggests that the Atbara River area was within the core of this ceramic tradition, while the Nile Valley formed its western border during the 3rd millennium B.C.

The presence of even ephemeral occupations of this eastern cultural group within the Nile Valley raises the question of what happened to those folk who carried the Khartoum Neolithic tradition? The paucity of the eastern type ceramic occurrences indicates that there was neither wholesale replacement of, nor even much pressure on, those who might have been living within the valley. What then happened to them? Although still in need of field testing, it is probable that the people of the Khartoum Neolithic tradition were already gone or were going by the early 3rd millennium B.C. While they may have become true pastoralists for reasons of conflict over land ownership (Haaland 1984), it is equally likely that environmental shifts put massive pressure on their complex adaptive strategies. Of most importance would have been the marked rapid fall in Nile River level beginning just at the end of the 4th millennium B.C. (Hassan, personal communication). Although there was no radical change in percipitation which would have effected the exploitation of plant foods or the availability of grass for grazing, this simple drop in Nile River level would have markedly decreased, if not actually ended, the Khartoum Neolithic people's ability to effectively exploit fish resources after the Nile floods. This alone well may account for their disappearance from Khartoum Province. Given the presence of peoples with a complex mixed economy only 50 km east of the Nile Valley during the 3rd millennium B.C., it seems difficult to accept that a pure form of pastoralism would have developed within the Nile Valley itself.

In spite of all the hypotheses presented here and elsewhere, it will take fieldwork to resolve the question. It is a problem worth resolution.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

ANTHONY E. MARKS and RODOLFO FATTOVICH

The later prehistory of the Eastern Sudan: a preliminary view

The work reported here is an update of that reported in 1984 (Fattovich *et al.* 1984), and results from the combined efforts of two separate archaeological projects, the Joint University of Khartoum/Southern Methodist University Butana Archaeological Project and the Italian Archaeological Mission to Sudan (Kassala), of the Institute Universitario Orientale, Naples. Each had as its goals the elucidation of the history of the eastern Sudan, with specific emphasis upon the interrelationships between environmental change, economic adaptations, and settlement systems. In spite of these similarities in orientation, each group had different foci of interests. The Italian Mission was particularly interested in the later ranges of prehistory and with possible connections between the eastern Sudan and Pre-Axumite developments (Fattovich 1982). On the other hand, the Butana Archaeological Project was most interested in an earlier time frame, particularly focusing on the degree of interaction between the Nile Valley and the eastern Sudan during the Neolithic (Marks *et al.* 1980; 1982). In spite of these different interests, the first few field seasons demonstrated that both groups were working within the same culture area and that cooperation would produce more knowledge than would competition.

By the end of the 1982 field season, it had become clear that, combined, our separate data, derived extensive surveys, test excavations, and preliminary laboratory analyses, pointed to a clear but quite unexpected conclusion: there was a large area of the eastern Sudan in which developod a distinct ceramic tradition, named the Atbai Tradition, which arose during the 5th millennium B.C. and lasted until the 1st millennium A.D. Also, it now appears clear that, although some specific traits can be found in other ceramic traditions, the Atbai Tradition was not significantly influenced by either Nilotic or Ethiopian developments. Moreover, by the middle of the 3rd millennium B.C. it appears that the ceramics of the Atbai Tradition were to be found within the central Nile Valley to the west, and in the Red Sea Hills to the east, covering an area of over 100,000 sq kilometers.

The methodology employed by both projects involved the survey of geographically distinct regions within the eastern Sahel of the Sudan. The Butana Archaeological

Project, in two field seasons, carried out systematic survey and test excavations in two areas: the westernmost area was just fifty km southeast of the Nile Valley, including the deeply stratified midden and cave complex of Shaqadud (Marks, this volume). The second area, 320 km to the southeast, centered around the Atbara River at Khashm et Girba and extended eastward toward the Gash Delta, encompassing an area of about 2,000 sq km of which about 400 sq km have so far been systematically surveyed and sampled (Marks *et al.* 1982).

The Italian Mission, over four field seasons, carried out systematic survey and testing in a 1000 sq km area north and south of Kassala (Fattovich and Piperno 1981; 1982). Brief reconnaissance surveys and testing were also undertaken at the edges

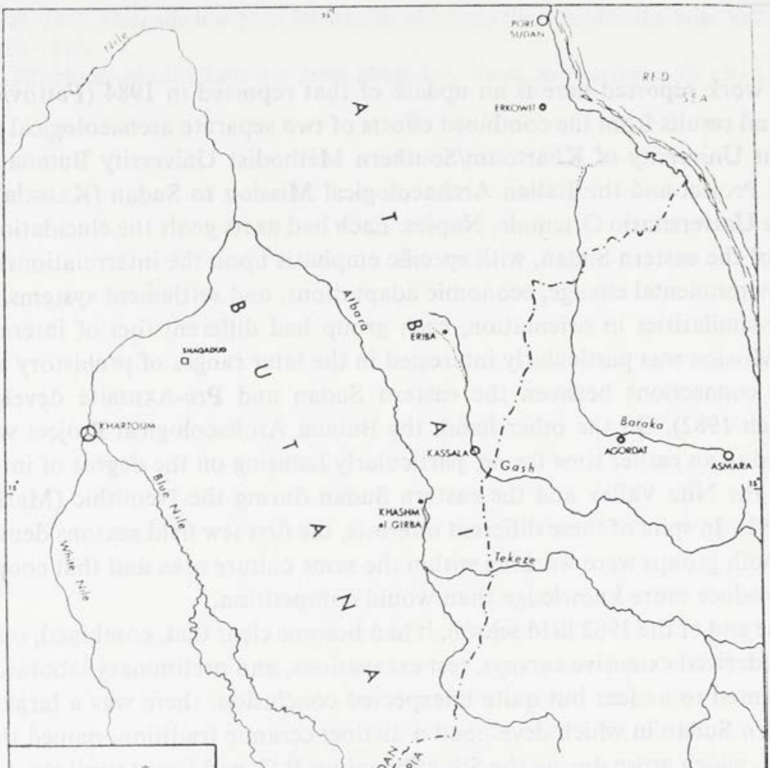

FIG. 1. Map of the Eastern Sudan

of the northern Gash Delta, some 140 km north of Kassala, in the delta proper, as well as in a large area to the west of the delta (Constantini *et al.* 1984).

The area east of the Nile Valley in the central Sudan was basically unknown archaeologically, except for the important Meroitic ceremonial sites in the Western Butana, such as Naga, Basa, and Musawwarat es Sufra. However, reconnaissance surveys had been carried out prior to our present studies; from Crowfoot (1928) through Hintze's Butana Survey (Hintze 1960) to the survey of the Atbara by Shiner and Chmielewski in 1966 (Shiner 1971). These pioneering works indicated that the eastern Sudan held much potential and both of our projects owe a debt to them.

The study area east of the Nile and west of the Ethiopian border is flat, dry grassland with a scattering of acacia trees, cut from south to north by two main drainage systems: the Atbara River which separates the Butana proper from the Atbai; and, the Gash River which cuts through the Atbai at the junction between the grasslands and tree savanna of Western Eritrea (Fig. 1).

Using only the data recovered by the two projects in the Southern Atbai, a preliminary culture-historic sequence has been constructed (Fattovich *et al.* 1984). In this core area of some 2000 sq km over 240 ceramic bearing sites have been located and sampled, while test excavations have been carried out at 17. Although tons of artifacts are all still under study, the broad outline of the Atbai Tradition is clear.

The Atbai Tradition is defined mainly by a time transgressive complex of technological and stylistic components used in the production of ceramics. Most characteristic is the use of combing not only as a means of vessel wall thinning but also as a decorative technique. Other elements are less pervasive but there are numerous types and styles of decorative motifs which are simply unknown in other areas, including interior pattern burnishing, thin bands of parallel, vertical rouletted or impressed lines below rims, and restricted orifice jars with slipped and burnished rims above unslipped, rough, incised bodies. On the basis of ceramic studies, in conjunction with radiocarbon dates, the Atbai Tradition has been divided into a number of temporal phases and geographic groups (Fig. 2). There may well be additional groups discovered for each as field work expands into the marginally known areas covered by the Atbai Tradition. What we now have is merely a small portion of the details of regional development in the eastern Sahel. Emphasis here is placed on the core area.

The occupation of the Atbara River Valley begins well before the appearance of the Atbai Tradition. Within the Holocene, there is evidence for pre-ceramic hunters and fishermen in the Valley beginning at *ca* 8,000 B.C. and continuing until some time during the middle of the 6th millennium B.C. However, the lithic assemblages of these differ markedly from that associated with the earliest ceramic bearing sites and it is likely, therefore, that there was a development break between the pre-ceramic and ceramic occupations.

The earliest ceramic sites in the Atbai represent two different regional groups: one, near Khashm el-Girba, dating to 6,215$\pm$75 B.P. (SMU 1139), has pottery related

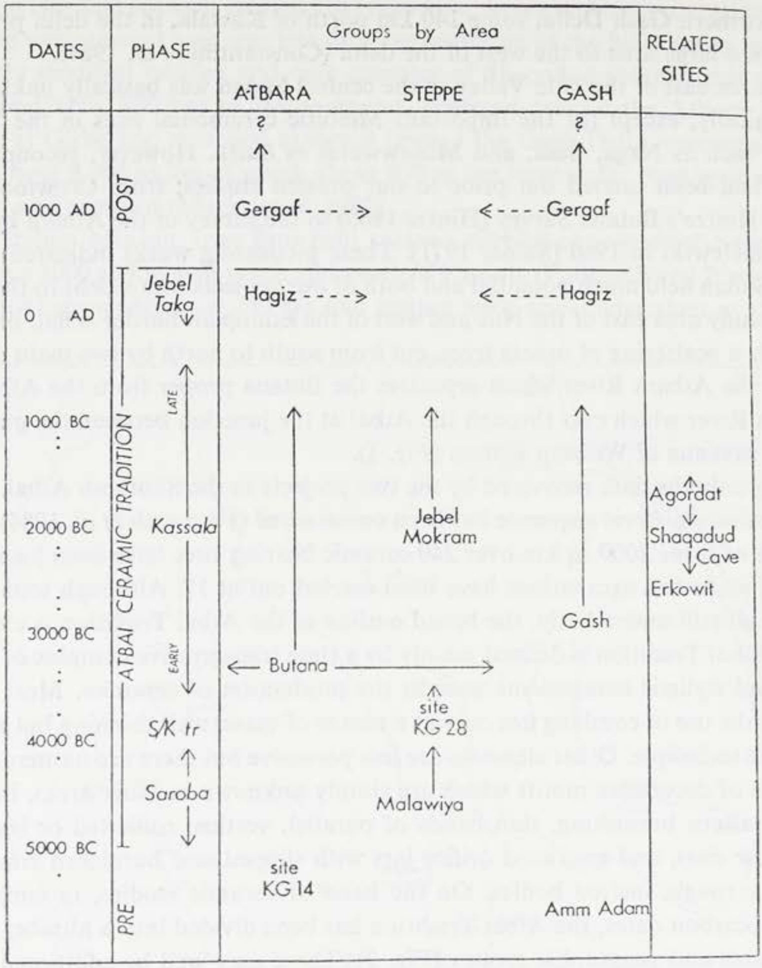

FIG. 2. Radiocarbon dates for the later prehistory of the Eastern Sudan

to the general Khartoum Horizon Style (Hays 1976). However, sites of the Amm Adam group, 140 km north of Kassala, have pottery which is distinct from the Khartoum Style but shares a very distinctive knobbed ware with the group near Khashm el-Girba. It is possible that the Atbai Tradition arose from these groups, since the knobbed ware is found in small amounts in the earliest phase of the Atbai Tradition.

Both groups seem to have had similar adaptations; exploiting both riverine and savanna edge animal resources, from molluscs to large bovids. However, grinding stones are common on the Atbara but absent in the Gash. Systematic survey of over 1000 sq km of the steppe between the Atbara and the Gash failed to reveal a single site of either group.

The earliest phase of the Atbai Tradition, the Saroba, is represented by 10 sites found only on the steppe between the Atbara and the Gash delta. Dated to the middle 5th millennium B.C. (5,644±70 B.P., SMU 1181, and 5,632±B.P., SMU 1285) sites are characterized by an abundance of *Pila* shell, indicating seasonally swampy terrain. The ceramics are mainly a sand-tempered, unburnished, and buff-colored with impressed decorations. These fall broadly within the Khartoum Horizon Style, but lack many of the decorative motifs of Early Khartoum. The most common motif is a zigzag formed by a toothed-comb.

Adaptation was strongly oriented to the hunting of small steppe bovids, warthog, and lizard, although larger mammals were also taken. No macrobotanical material has been recovered, but grinding stones are common. Chipped stone is poor but lip plugs appear. Sites tend to be small, with an average of 5,000 sq m and with limited depth (*ca* 10 cm to 20 cm).

The transitional Saroba/Kassala Phase occurs only at one site located on the steppe which is also associated with concentrations of *Pila*. A radio-carbon date places it at 5,168±67 B.P. (SMU 1193). The transitional nature of this phase is seen in increased site size (20,000 sq m), the presence of both typical Saroba impressed sherds and typical combed sherds, along with hard, burnished, vertically rippled sherds which are unique to this transitional phase. Economic adaptation, however, appears no different from that of the Saroba Phase.

The succeeding Kassala Phase is both the most complex and the longest. Based on eight C-14 dates, ranging from 4,727±154 B.P. (SMU 1201) to 2,755±107 B.P. (SMU 1187), it spans about 2,600 years, from the middle of the 4th millennium B.C. to the beginning of the 1st millennium B.C. The first half of the Kassala Phase is represented by nine sites of the Butana Group and three sites of the Bash Group. The former are located between the western bank of the Atbara River and a point midway between the Atbara and Kassala, while the latter parallel the Gash River, with one near Kassala and two others at the northwestern end of the Gash Delta near Eriba. The distinction between the groups lies in proportional variations of the always common combed sherds and in the presence of some decorative patterns and surface treatments which are limited to one or the other group. In both groups, however, there appear polished axes and maceheads, the latter on imported rocks, as well as other ground and pecked stone, including elongated lip plugs.

The Kassala Phase is characterized by very large sites both along the major drainages and the steppe between them. Site size varies but most are between 8 and 12 hectares and have over 2 m of *in situ* deposits. Test excavations in the two largest (Mahal Teglinos of the Gash Group and KG23 of Butana Group) seem to indicate that at both, large village development was in place prior to the introduction of domestic cattle and small livestock. In fact, at both sites, after introduction, domestic animals played only a minor role for quite some time. Most fauna are small bovids of the type heavily exploited since the Saroba Phase, but the riverside sites indicate a reintroduction of some fishing and the exploitation of riverine animals.

The Kassala Phase can be traced as far north as Erkowit in the Red Sea Hills (Callow and Wahida 1981) and east to the Baraka Valley at Agordat (Arkell 1954). In addition, the cave at Shaqadud contains ceramics strongly linked to the Gash Group (Fattovich *et al.* 1984). This also would seem to apply to small concentrations of ceramics collected in the Nile Valley near the Third Cataract and referred to as Group II by Geus (1976). Thus, by the 3rd millennium B.C., there is evidence for the presence of Atbai Tradition ceramic assemblages from almost the Red Sea into the Nile Valley.

By the end of the Kassala Phase in the 1st millennium B.C., there is a marked decrease in site size, with most sites at less than 5 hectares. Also, faunal remains indicate a heavy dominance of domestic forms and the number and variety of fine ceramics drop dramatically. However, the basic ceramic patterns remain intact, as do the polished and ground stone components.

Contemporaneous with the last half of the Kassala Phase, during the 2nd millennium B.C., is the Jebel Mokram group of over 60 sites located on the steppe. Its ceramics and stone tools differ in detail from those of the Butana and Gash Groups, and it possibly represents seasonal occupations by a group from outside the core area – perhaps Eritrea. The ceramics include thin, combed sherds but the most common pottery is brown, sand tempered, and decorated only on the upper body. Decorations are characterized by deep parallel incised lines associated with burnished rims, as well as by shallow incised crossing lines on unburnished surfaces, both reminiscent of the earlier Butana Group. Although ground stone is not common, flat elongated handstones, polished stone bracelets, and flat mace heads are found. All animal bones are from cattle, and sorghum and millet have been recovered from poorly fired pot sherds.

Finally, there are other groups of assemblages which appear to be relatively recent and lack Atbai Tradition elements, the most common of which has ceramics related to the Fung.

Although the data base from the core area is good, our knowledge of the geographically peripheral zones is less secure. The isolated sites of Shaqadud, Erkowit, and Agordat provide indications but, as yet, no sure answers. In the case of Shaqadud, however, excavations in the midden dating to the 5th and 6th millennium B.C. show that the western Butana was then part of the general Nilotic ceramic tradition (Marks *et al.* 1985). Only by the middle of the 3rd millennium B.C. did the Atbai Tradition replace it. The lack of stratified deposits at Erkowit (Callow and Wahida 1981) and the absence of excavations at Agordat (Arkell 1954) prevent any realistic view of local developments. However, it is expected that the area covered by the Atbai Tradition will vary through time in response both to its own internal dynamics and to developments around its borders.

These border areas are those least known today but there is some indication of contacts with other areas even within the core area. The Pre-Saroba and Saroba

Phases belong, in a general sense, to the trans-Sahel ceramic horizon, represented in the Sudan by the Khartoum Horizon Style.

The knobbed ware of the 6th millennium B.C. Pre-Saroba Phase sites apparently lasts for some time in the north, finally reaching the Nile Valley at Kerma during the 3rd millennium B.C.

During the middle to late Kassala Phase, there are some indications of extra-regional contacts. In the core area, these are very limited. However, extra-regional contact was more intense in the northern and eastern parts of the Atbai Tradition, at Agordat and Erkowit. In the latter, considerable amount of obsidian indicates contact to the south. At Agordat, axes, palettes, and ear-spools are clearly reminiscent New Kingdom Egyptian forms – forms which never reach the Southern Atbai. Thus, by the 2nd millennium B.C. there was considerable contact between the eastern area of the Atbai Tradition and both Ethiopia and Egypt.

Only at the end of the Atbai Tradition in the Jebel Taka Phase do we find some actual sherds of pre-Axumite pottery, as well as some of Meroitic type in the Southern Atbai. Given the oft stated political conflict between Meroe and Axum over the eastern Butana and Southern Atbai, it is striking how little concrete evidence there is for the presence of material remains of either kingdom.

In spite of these examples which may be indicative of extra-regional contact, it is important to realize just how little it all amounts to in the area which we have studied in detail. Only to the east, in the Baraka Valley of Eritrea do such connections seem potentially significant and then, only during the 2nd millennium B.C. For the greater part of its duration, it appears that the Atbai Tradition was almost wholly autochthonous and that by the 3rd millennium B.C. it had spread so far as to replace the Nilotic Tradition in the Central Nile Valley.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

ANWAR A. MAGID

Exploitation of plants in the Eastern Sahel (Sudan), 5,000 - 2,000 B.C.

Since C. Knuth (1826) studied the desiccated fruits, grains and seeds which were recovered from the tombs of ancient Egypt, archaeoethnobotany has captured the interest of scientists in many fields of research such as genetics, botany, agriculture and archaeology. It has contributed immeasurably to our understanding of the evolution, exploitation, early farming and domestication of many of the major food plants (Renfrew 1973: 1).

In respect to the Sudan, archaeoethnobotanical research has not yet been firmly established. In spite of many difficulties, a number of contributions have been made through many but uncoordinated efforts.

A. J. Arkell can be considered the founder of archaeoethnobotanical research in the Sudan. The first botanical material was uncovered while he was excavating the site of Khartoum Hospital (Fig. 1) and a site near Gerif town (Arkell 1949: 108 - 10, Pl. 45, Fig. 3). Floral remains similar to those found at Khartoum site and some other macrobotanical finds were recovered from the Neolithic site of Esh Shaheinab (Arkell 1953: 80, 105).

From the 1960's onwards the state of research has developed considerably. More attention was paid to the plant remains while excavating archaeological sites. This is clearly illustrated in many works such as D. Clark and Ann Stemler (1975), Constantini *et al.* (1982, 1983), M. Hassan (1973), M. Klichowska (1978), L. Krzyżaniak (1978), A. Mohammed Ali (1982), F. Wendorf (1968), R. Haaland (1981) and G. E. Wickens (1975, 1982).

During the past four decades attention has increasingly been devoted to palaeoecological and palaeoeconomic studies. More interest is currently shown in an interdisciplinary approach to archaeozoological and archaeoethnobotanical research in the Sudan. In this paper archaeobotanical data and material culture are treated as equally important in an attempt to reconstruct the economic strategies related to the exploitation of plants in the Eastern Sahel (Sudan) for the period of 5,000 and 2,000 B.C. This region is divided into two areas, namely the Khartoum

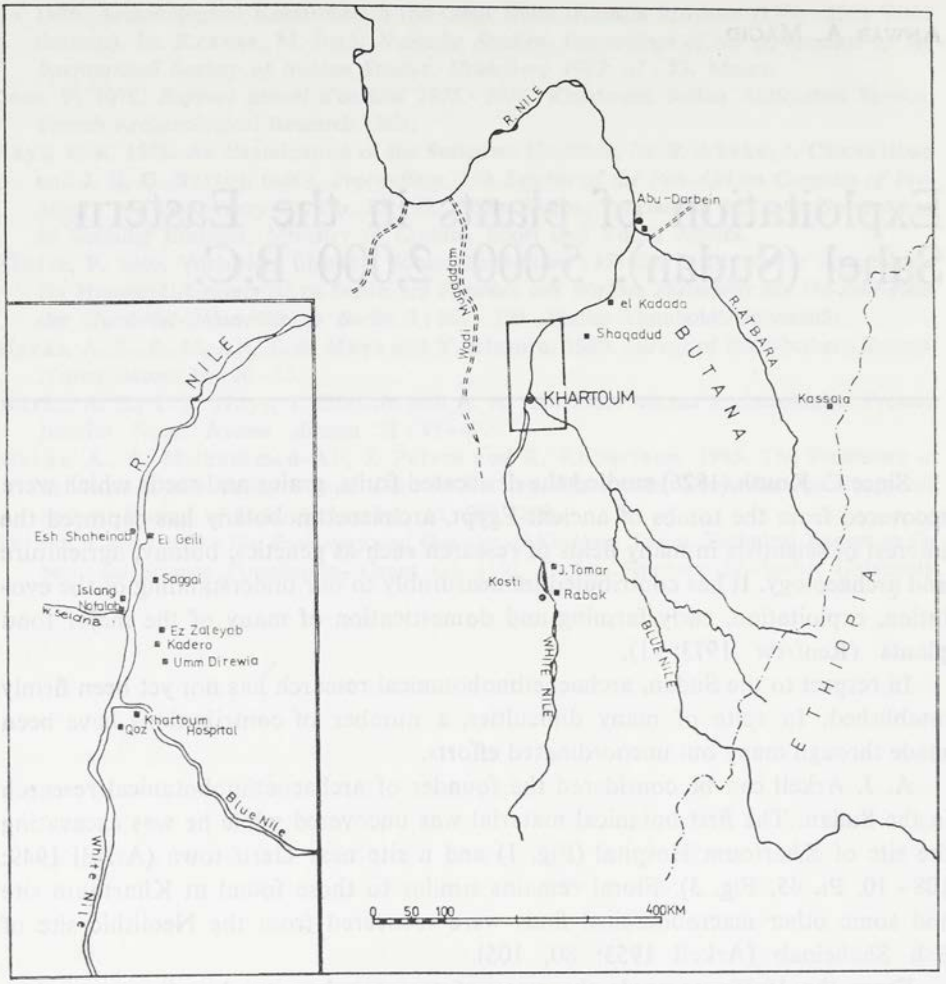

FIG. 1. Map of the Eastern Sahel (Sudan) showing the major archaeological sites in 5,000 - 2,000 B.C.

area (western part) and the Butana area (eastern part), in order to achieve a consistent presentation and interpretation of the data.

Taking into consideration the Khartoum area, nothing is known about the archaeology of the 1000 kilometres between the west bank of the river Nile and the Wadi Hawar (Mohammed Ali, personal communication). For the eastern part of this area, A. J. Arkell started the era of archaeological research (Arkell 1949; 1953). From the 1970's the area has witnessed very active archaeological investigations. Quite a number of sites were excavated, both on the east and west banks of the river Nile (El-Mahi 1982; Caneva 1983; Haaland 1981; Krzyżaniak 1978; Magid 1982; Mohammed Ali 1982, and many others).

One should mention that the data recovered from the sites is too meagre to permit a comprehensive picture of the available food plants. This is particularly true with the oldest site excavated in this area, namely the Khartoum Hospital site. The dates obtained from the Saggai, an Early Khartoum type of site, range between 7,410 ± 100 B.P. and 7,230 ± 100 B.P. (Caneva 1983: 152). The floral evidence recovered there consisted only of mumified (non-carbonized) seeds of *Celtis integrifolia* Lam. Arkell stated that "the fruits of this tree were no doubt gathered and brought to the sites as food" (Arkell 1949: 108 - 109). Plant species similar to those found at the site of Khartoum Hospital were identified from the sites of Esh Shaheinab, Islang and Nofalab situated on the west bank of the river Nile (Arkell 1953: 103; Magid 1982: 90 - 91). In addition, a carbonized shell of *Elaeis guineensis* Thumb. (which was thought to be from somewhere else) and *Zizyphus* sp. were found (Arkell 1953: 80, 105).

The material culture, *i.e.* the pottery and lithic artefacts from these sites is similar. The radiocarbon dates obtained indicate that they were more or less contemporary, ranging between 6,000 B.P. and 5,000 B.P. (Haaland 1981: 55 - 56; Magid 1982: 25 - 26). Although these are about 2000 years younger than the typical Early Khartoum type of sites, practices of collecting naturally growing food plants (*i.e.* fruits of *Celtis* and *Zizyphus* sp.) seem to have been relatively unchanged. It seems that exploitation of plants represented a minor element in the highly specialized fishing and hunting economies which were based on aquatic and terrestrial resources as in the case of the Khartoum Hospital site and with a substantial component of pastoralism based on domesticated cattle supplemented by fishing and hunting for the younger (Neolithic) sites on the west bank. The evidence of wild sorghum, *S. verticilliflorum* Stend. (Stapf.) recovered from Esh-Shaheinab site (Magid 1982: 98) indicates that it was exploited. The domesticated form of this species is at present a staple food plant in the Sudan.

The floral evidence derived from the sites situated on the east bank of the river Nile was derived both from fossil seeds (Krzyżaniak 1978) and from their impressions on potsherds of typical Esh Shaheinab Neolithic pottery (Haaland 1981: 195 - 196; Klichowska 1978: 42 - 43). Fossil seeds of *C. integrifolia* Lam., and *Hyphaene thebaica* (L.) Mart. were found at the site of Kadero 1. Furthermore, impressions of several taxons of *Gramineae* were identified (Klichowska 1978: 43). In the light of these finds, it has been suggested that the occupants of the Kadero 1 site were practising plant gathering and perhaps also the cultivation (Krzyżaniak 1978: 160).

Evidence of seeds of *C. integrifolia* Lam. was reported from all the sites on the east bank except the site of Kadero 2 (Haaland 1981: 195). In addition, evidence of impressions of wild sorghum *S. verticilliflorum* Stend. (Stapf.) was recovered from the sites of Zakyab (5 impressions), Umm Direwia (4 impressions) and Kadero 1 (*ibid*). These results confirm the preceding interpretation that gathering and cultivation of plants were in evidence, but what have been identified as domesticated sorghum *S. vulgare* Pers., is doubtful. A re-examination of the evidence suggests the possibility that the impression is that of unripe seed of *C. integrifolia* Lam. (*ibid*: 196 - 197).

The floral evidence from these sites exhibits a wide variety in comparison with the plant species recovered from the sites on the west bank. All these sites, both from the east and west banks, have similar material culture and to a large extent are contemporary (*ibid*: 55 - 56; Magid 1982: 25 - 26). Special attention seems to have been devoted to exploiting different secies of the *Gramineae* family such as sorghum, millet and fox-tail millet on the east bank. Consequently, cultivation activities were performed on a larger scale. This may be attributed to the availability of alluvial plains that extend to several kilometres inland on the east bank, while the cultivable land on the west bank was and still is limited to the flood-plain, an area only few hundreds of metres wide. Thus, it is reasonable to assume that the occupants of the west bank adopted domestic animals, mainly cattle, as the basis of their adaptive strategies in preference to plant cultivation.

If we now turn to the Butana area, we see that active archaeological research is currently in progress (Constantini *et al.* 1982; Marks *et al.* 1980; 1982). Although the study of the botanical remains recovered from the excavated sites in this area is not yet completed, the results obtained so far will be cited with special emphasis on the data from the Shaqadud cave because the study of the latter is now more advanced than that of the other sites.

The dates obtained from the Shaqadud cave-site indicate that the cultural deposit started to accumulate there 4,200 years B.P. and that the site was abandoned *ca* 3,600 B.P. (Marks *et al.* 1984: 17). The floral remains being studied at present consist of carbonized seeds. The results obtained attest the presence of a variety of species/genera. These include grains of *Pennisetum* sp. (Brum.) Stapf. and Hubbard, one grain of *Sorghum* sp. Stapf., grains of *Panicum trugidum* Forsk., seeds of *Solanum dubium* L., *Setaria* sp., and *Cortolaria* sp. Beside these, fruit-stones and seeds of *Zizyphus* sp. Lam., and *Grewia* sp. (Forsk.) Fiori, were also recovered (Magid 1984: 27 - 28).

The external features of *Pennisetum* sp. closely resemble the cultivated millet grown at present across the belt situated further to the south of Shaqadud. It is not yet certain if the remains are of domesticated plant but their recovery from Shaqadud provides one of the earliest evidence of the species from the Sudan. On the basis of the depth at which these grains were found (1.4 - 2.5 m) they can be dated to 2,500 years B.P. (Marks *et al.* 1984: 20). The earliest evidence of domesticated *Pennisetum* was found at the site of Dar Tichitt in south-central Mauretania dated to 1,000 B.C. (Stemler 1980). The results of the current research dealing with the origins of African cereals suggest that the presumed progenitor of millet was a product of the Sahel zone and that its basic distribution is diffused (Harlan and Stemler 1976; Harlan 1977; Stemler 1980), extending from West Africa to the eastern part of Sudan (Portérés 1976), including the Shaqadud area.

Although the grain of *Sorghum* sp. is very similar to the wild species of sorghum (known as *Adar*), it is not yet possible to identify it to the species level. The area of Shaqadud is, however, within the zone where cultivation of sorghum was supposed to have involved (Harlan and Stemler 1976) (Fig. 2).

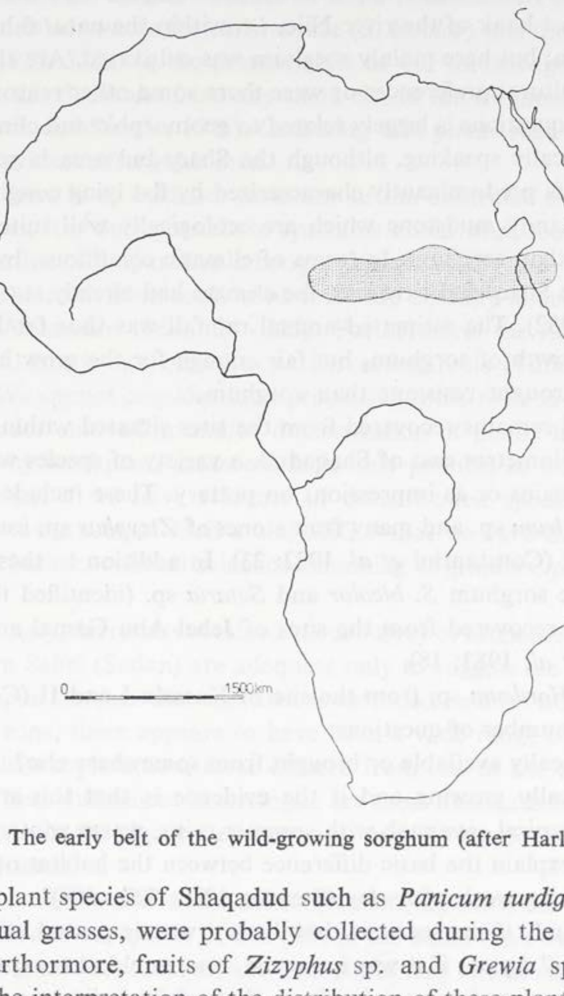

FIG. 2. The early belt of the wild-growing sorghum (after Harlan and Stemler 1976)

Other plant species of Shaqadud such as *Panicum turdigum* Forsk., *Setaria* sp., being annual grasses, were probably collected during the rainy season as food-plants. Furthormore, fruits of *Zizyphus* sp. and *Grewia* sp. were also gathered.

Since the interpretation of the distribution of these plant species within the cultural deposit will involve issues which are not directly related to the theme of this paper, I shall confine myself to the economic implications of the evidence recovered. In this connection, besides the domesticated animals and wild game, it seems that the Shaqadud cave occupants were exploiting plants by pursuing two different but co-ordinated strategies. One of these was plant-gathering as evident in the remains of the fresh and/or dry and sweet edible fruits of *Zizyphus* sp. and *Grewia* sp. The local inhabitants of the area, particularly children, still practise such activities.

The other strategy was the harvesting and probably the rain-cultivation of *Pennisetum* sp.

One may ask why the Shaqadud cave occupants choose to exploit millet and not sorghum since this area lies within the same belt of naturally growing stands of both species? This question becomes more important if we compare this site with the Neolithic sites on the east bank of the river Nile, *i.e.* within the natural habitat for both millet and sorghum; but here mainly sorghum was cultivated. Are these differences attributable to cultural preferences or were there some other reasons?

The answer to these questions is largely related to geomorphic and climatic conditions. Geomorphologically speaking, although the Shaqadud area is part of the Butana clayey plains, it is predominantly characterized by flat lying conglomerates, eroded sandstone and sandy mudstone which are ecologically well suited for the growth of millet rather than sorghum. In terms of climatic conditions, by the time of the occupation of the Shaqadud cave site, the climate had already started to get drier (Wickens 1975; 1982). The estimated annual rainfall was thus far below the requirements for the growth of sorghum, but fair enough for the growth of millet which is much more drought resistant than sorghum.

As regards the floral remains recovered from the sites situated within the same Sahel zone, some 325 kilometres east of Shaqadud, a variety of species were found either as carbonized remains or as impressions on pottery. These include one fragmentary sample of *Hordeum* sp. and many fruit stones of *Zizyphus* sp. found at the site of Kassala I and II (Constantini *et al.* 1982: 23). In addition to these, several impressions of domestic sorghum *S. bicolor* and *Setaria* sp. (identified from cavities in burnt clay) were recovered from the sites of Jebel Abu Gamal and Shurab el-Gash (Constantini *et al.* 1983: 18).

Evidence of barley *Hordeum* sp. from the site of Kassala I and II (Constantini *et al.* 1982: 23) poses a number of questions:

1. Was this cereal locally available or brought from somewhere else?

2. If barley was locally growing and if the evidence is that this area at that time was (as still is) a typical savannah with summer rains, warm winters and hot summers, how can we explain the basic difference between the habitat of this area and that required for the growth of barley (Stemler 1980: 507 - 508)?

3. On the other hand, if we assume that barley was imported, then where could it have come from? Again, if it was imported, one would also expect to find the evidence of other imported material culture that might indicate its origin(s). Is there any such evidence?

4. Apart from the questions of obstacles to transport and/or to communicate between the east of central Sudan and Egypt (Trigger 1965), the latter being the nearest area where barley was naturally growing and from which the earliest evidence of domesticated barley *ca* 4,000 B.C. was found (Stemler 1980), another question arises: why would the occupants of this area have gone in quest of barley when they had stands of naturally growing sorghum? Until more information is provided,

the presence of barley in this area at *ca* 2,000 B.C. will remain questionable. It is not unexpected, however, to find sorghum in this area since it is part of the initial belt of naturally growing sorghum (Harlan 1977: 473); but it is interesting that the species belong to domesticated sorghum dated to the 2nd millennium B.C. Thus they represent the earliest evidence so far of domesticated sorghum in the Sudan and in the initial belt where the earliest race (*S. bicolor*) was thought to be domesticated (Harlan 1977: 375). At the present state of our knowledge there is no similar evidence for this *S. bicolor* from anywhere else in the sorghum belt before 3rd century A.D. (Clark and Stemler 1975). Gathering wild plants such as the fruits of *Zizyphus* is also in evidence from this area.

Since there is no evidence from any of the excavated sites for specialized cultivation tools, it is only possible to speculate about what tools could have been used for cultivation. Comparative ethnographic material from West Africa shows that many of the cultivation tools used there are actually abandoned after the work is finished (Alexander 1969: 124 - 125). Furthermore, the Zaghawa, of west Sudan-east Chad, mostly use branches as harvesting tools (Tubiana and Tubiana 1977: 13 - 25). We cannot consider food processing tools such as grinders and pottery as indicators for cultivation and/or domestication of plants because these tools were also used by food-plant gatherers. It is only possible to associate these with plant domestication if we have evidence of domesticated species in the same context. It is only at the sites of JAG 1 and SEG 9 that we have this combination of both direct and indirect cultural evidence consisting of grinders, pottery and domesticated sorghum.

In summary, the results obtained in our survey of archaeoethnobotanical data from the Eastern Sahel (Sudan) are adequate only to suggest the following:

1. Despite the fact that this area is extended east – west within the same geographical zone, there appears to have been a wide range of adaptive strategies related to plant exploitation; these differed from site to site and from one period to another. These differences in strategies are most likely attributable to the following: a) differences in the physical environment and the landforms; b) progressively accelerating desiccation.

2. Based on the above mentioned (but leaving aside the chronology of the sites) it seems that the occupants of this part of the Sahel zone were quite knowledgeable about their local environments and the options they had as regards the food resources (both fauna and flora) available: these options ranged from hunting, fishing, gathering and exploiting the domesticated animals supplemented by small-scale seasonal cultivation to intensive cultivation and animal and plant domestication.

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JORIS PETERS

The faunal remains from several sites at Jebel Shaqadud (Central Sudan): a preliminary report

The present report deals with the faunal remains collected in three sites at Jebel Shaqadud, excavated by the Joint University of Khartoum/Southern Methodist University Butana Archaeological Project (Marks *et al.* 1982; 1983). The sites are located some 13 km east of Meroitic Naga at the southern end of an irregular, elongate sandstone outcrop, approximately 50 km into the Butana. Most of the remains were obtained from three occupation stages: S-21, a site on the plateau that surrounds the valley of Shaqadud Cave; S1-B, in front of the cave; and S1-A, the cave itself. The C-14 dates, obtained by charcoal analysis, range from approximately 7,400 B.P. for the older deposits (S-21) to ±3,600 B.P. for the younger ones (S1-A, upper unit). More detailed information concerning the geology, lithology, C-14 dates, pottery and botanical remains can be found elsewhere (Magid 1984; this vol.; Mohammed-Ali and Marks 1984; Marks *et al.* 1985; Hays, this vol.; Marks, this vol.).

Most of the molluscs, turtle and bird remains were analysed respectively by T. Pain (London), F. de Broin (Paris) and D. Mathiessen (Gainesville). All other identifications could be made with the aid of comparative collections available to us.

The faunal remains consist primarily of mammalian bone fragments (Table 1). Most of these accumulated through human intervention and can therefore be considered kitchen offal. The Shaqadud site catchment included the adjacent sandstone outcrops, a considerable wadi separated from the Nile by low undulating hills and a part of the western Butana plain. The absence of fish, freshwater turtles such as Nile soft turtle, crocodile, hippopotamus, kob and sitatunga (typical for the Nile, *cf.* Gautier, this volume, Table 1) clearly indicates that the Nile and its alluvial plains were not included in the site catchment. The presence, however, of certain bivalves such as *Aspatharia* suggests some form of contact with the Nile, for this river is the nearest suitable habitat where these clams could be collected.

The faunal sequence at Shaqadud can be divided into two stages. The first comprises S-21 and the midden (except for S-1-B/IV, representing a mixed sample) and reflects hunting-gathering practises. Game animals are dominated by small and large antelopes such as oribi, greater kudu, roan antelope and alcelaphines, as well as warthog, porcupine and giraffe. Turtles and the freshwater gastropod *Pila* were also collected. Except for one incomplete long bone of a goat (S1-B/III), livestock seems to be absent. Two hypotheses can be put forward to explain this isolated find. First, the Shaqadud people may have had connections with pastoralists from whom they obtained a goat. Second (small) livestock was already incorporated in the economy of the site, but it was limited in number and kept mainly for dairy products.

The second stage, confined to the cave, reflects a mixed economy during which hunting-gathering as well as livestock herding were practised. Gazelle and giraffe were hunted most frequently, but large antelopes, porcupine, hare and aardvark were added to the hunters' bag. Livestock never exceeds 15% of the total number of mammalian remains.

The composition of the subsequent assemblages underwent considerable changes in the course of time. On the basis of the ecological requirements of the species encountered, we can assume that between 7,400 B.P. and 3,600 B.P. the Shaqadud environment shifted from a rather humid grass savanna with tree stands, requiring an annual rainfall of some 450 - 500 mm, towards a dry savanna with an estimated average rainfall of 350 mm at the time the cave sediments were deposited. This shift can be ascribed to deteriorating climatic conditions, perhaps combined with the negative effects of livestock on the vegetation.

The faunal spectrum also reflects that the environment provided different resources, enabling people to adopt a diffuse economy *sensu* Cleland (1976). Such economies are characterized by a careful scheduling in time and space to maximize the exploitation of the available resources. However, the available evidence for resource scheduling in time and space is rather inconclusive. We can assume that turtles as well as the freshwater gastropod *Pila* were most easily harvested at the end of the dry season or at the beginning of the rainy one since their habitats were then most easily accessible. Antelope and giraffe hunting may have been especially rewarding towards the end of the dry season when these animals tend to concentrate near water. The presence of large numbers of landsnails such as *Limicolaria cailliaudi* and *Zonitarion* cf. *cailliaudi*, which lived and aestivated at the sites, furthermore indicate that these were probably abandoned from time to time, suggesting scheduling in space.

On the basis of the foregoing, several exploitation models can be put forward to explain the encountered assemblage. The first model sees Shaqadud as a dry season camp, re-occupied for a long period. For the older deposits (S-21, S1-B) *Pila* and perhaps turtle gathering might then represent dry season activities, while game hunting may have been rewarding especially towards the end of the dry season, as mentioned above. The presence of livestock in the younger cave deposits (S1-A) and probably also in the midden (a goat radius) could provide an additional argument for a dry season occupation. If livestock herding would be practised all year round at Shaqadud, the grazing pressure on the vegetation may easily have exceeded its capacity for regeneration, resulting in overgrazing. Prehistoric herdsmen could avoid such ecological disturbance by dispersing during the wet seasons and returning to places where the presence of water is predictable during the dry season. Such an exploitation model suggests the involvement of a Butana based group rather than a Nilotic group, since the latter were probably moving away from the Nile during the wet season (Gautier 1983).

The second model interprets Shaqadud as a wet season camp in which much of the *Pila* and turtle gathering took place at the beginning of the rainy season. Rainfall, moreover, certainly resulted in a rich grass cover and abundant flowering of plants and trees, attractive to hunter-gatherers as well as to pastoralists. If this hypothesis is accepted, Nilotic or Butana based groups could be involved.

The third alternative sees Shaqadud as a site that was regularly re-used for prolonged periods unrelated to the seasonal cycle. The large size of the sites, the thickness of the deposits and the considerable amount of potsherds and lithics could be adduced to defend this view. Moreover, as noted by Gautier (*ibid.*), site permanence does not exclude resource scheduling in the site catchment itself by smaller groups abandoning the settlement from time to time for activities at appreciable distance from it. However, things may have been more complicated and periods of occupation may have changed in the course of time, with, for example, wet seasons occupation or site permanence during the first stage and dry season occupation during the second one.

More detailed knowledge of the ecological requirements, habits and life cycles of the various potential biological resources as well as careful research on other prehistoric sites along the Nile and in the Butana plain are needed to establish which of the proposed exploitation models or combinations thereof is to be preferred.

A comparison of the archaeofaunas from the Central Sudanese Nile (Gautier this volume, Table 1) with those from Shaqadud bears out two important facts. First of all, the Nile environment provided more varied resources because of its higher ecological diversity. This is well illustrated by the importance of fish which are completely absent at Shaqadud. Second, remains of livestock are restricted in the Shaqadud sequence and make their appearance later than along the Nile. If the people occupying Shaqadud were not coming from the Nile, the foregoing implies that pastoralism was adopted later and to a lesser degree than along the Nile. If they were coming from the Nile, we can assume, as has been argued above, that occupation was in the wet season and that the pastoralists relied primarily, if not almost completely, on hunting for their meat supply.

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Table 1

Absolute frequencies of animal remains from three sites at Jebel Shaqadud (Central Sudan), based on specimen counts

ANIMAL GROUP/SPECIES	SITE OR EXCAVATION UNIT	S-21	S1-B				S1-A			TOTALS
			I	II	III	IV	I	II	III	
MARINE GASTROPODS	Strombus gibberulus	1	-	-	-	-	-	-	-	1
	Cowrey (Cypraea annulus or C. moneta)	-	-	-	1	-	-	-	-	1
FRESHWATER GASTROPODS	Pila sp. (including Pila wernei)	FF	F	F	F	R	R	R	-	FF
	Cleopatra bulimoides	-	-	-	1	-	-	-	-	1
FRESHWATER BIVALVES	Aspatharia sp.	-	3	7	5	-	-	-	-	15
	Large bivalve	7	±30	±45	±30	2	3	±15	1	±130
	Caelatura aegyptiaca	-	-	1	-	-	-	-	-	1
	Corbicula consobrina	-	-	-	-	-	1	-	-	1
LAND SNAILS	Zootecus insularis	±120	2	2	3	1	8	3	-	±140
	Limicolaria cailliaudi	F	FF	FF	FF	R	R	R	P	FF
	Zonitarion sp., probably Z. cailliaudi	-	±35	±60	±15	-	-	-	-	±110
AMPHIBIANS	Frogs and/or toads	-	3	17	55	2	-	-	-	77
REPTILES	Terrapin (Pelusios sp.)	-	2?	-	-	-	-	3	-	5
	Hinged tortoise (Kinixys sp., probably K. belliana)	-	-	-	3	-	-	-	-	3
	African spurred tortoise (Geochelone sulcata)	-	-	-	-	-	-	74	-	74
	African spurred? tortoise (Geochelone sp., probably G. sulcata)	-	-	-	-	-	13	-	3	16
	True tortoise (Testudinidae indet.)	-	-	-	-	-	-	1	-	1
	Cape monitor (Varanus exanthematicus)	4	2	2	27	-	1	1	-	37
	Snakes (Serpentes indet.)	1	1	-	6	-	-	-	-	8
BIRDS	Pelican (Pelecanus sp.)	-	-	-	1	-	-	-	-	1
	Clapperton's francolin (Francolinus clappertoni)	-	-	-	1	-	-	-	-	1
	Helmeted Guineafowl (Numida meleagris)	4	1	-	7	-	1	2	-	15
	Dove (Streptopelia sp.)	-	-	-	1	-	-	-	-	1
	Owl (Strigidae indet.)	-	1	-	-	-	-	-	-	1
	Crow (Corvus sp.)	-	-	-	-	-	-	1	-	1
	Birds (Aves indet.)	1	-	-	-	-	-	2	1	4
	Ostrich (Struthio camelus; egg shell fragments)	2	3	3	10	-	19	58	28	123
WILD MAMMALS	Bats (Chiroptera indet.)	-	-	-	2	-	-	-	-	2
	Small cercopithecid (Cercopithecus sp.)	-	-	-	2	-	-	-	-	2
	Hare (Lepus sp.)	-	-	-	1	-	5	7	-	13
	Striped ground squirrel (Euxerus erythropus)	-	-	-	1	-	-	1	-	2
	Nile (grass) rat (Arvicanthis niloticus)	-	-	-	1	-	-	-	-	1
	Large gerbil (Tatera sp.)	-	-	-	2	-	-	-	-	2
	North African porcupine (Hystrix cristata)	4	3	2	25	-	3	24	2(1)	64
	Cane rat (Thryonomys sp., probably T. gregorianus)	2	-	-	-	-	-	-	-	2
	Small rodents	-	-	-	7(2)	-	-	1	1(2)	13
	Medium rodents	-	1	-	2	-	2	-	-	5
	Honey badger (Mellivora capensis)	-	-	-	1	-	-	-	-	1
	Slender mongoose (Herpestes sanguineus)	-	-	-	2	-	-	-	-	2
	Genet (Genetta sp.)	-	-	-	3	-	1	-	-	4
	Medium viverrids	1	-	1	3	-	1	-	-	6
	Striped hyena (Hyaena hyaena)	-	-	-	-	-	-	4	1	5
	(African) wild cat (Felis silvestris)	5	-	-	-	-	2	-	-	7
	Medium felids	-	-	-	4	-	-	-	-	4
	Small carnivores	1	-	-	2	-	1	1	-	5
	Medium carnivores	-	2	-	-	-	-	-	-	2
	Aardvark (Orycteropus afer)	-	-	-	-	-	-	5	2	7
	African elephant (Loxodonta africana)	4	-	-	-	-	-	-	-	4
	Warthog (Phacochoerus aethiopicus)	1	-	-	2	-	-	-	1	4
	Suid(s), probably warthog	5	-	-	4	-	-	-	-	9
	Giraffe (Giraffa camelopardalis)	1(1)	-	2	1	-	2	40(2)	29(3)	81
	Commom bush duiker (Sylvicapra grimmia)	-	-	-	1	-	-	-	-	1
	Oribi (Ourebia ourebi)	11(1)	-	1	8(3)	-	-	-	-	24
	Small antelopes	45(15)	4	5(2)	41(10)	-	3	-	-	125
	Gazelle, mainly red-fronted gazelle (Gazella rufifrons)	-	-	-	-	2	18	43(3)	13(1)	80
	Medium antelopes	6	-	2(1)	6	1	12	28	4	60
	Greater kudu (Tragelaphus strepsiceros)	-	-	-	15	-	-	-	-	15
	Roan antelope (Hippotragus equinus)	3	-	1	-	-	-	-	-	4
	Topi and/or hartebeest (Damaliscus lunatus/Alcelaphus buselaphus)	11	1	-	2	-	-	-	-	14
	Large antelopes	32(4)	1	1	24(4)	1	2(1)	9(1)	1	81
DOMESTIC MAMMALS	Domestic donkey (Equus africanus f. asinus)	-	-	-	-	-	-	-	1	1
	Sheep (Ovis ammon f. aries)	-	-	-	-	-	-	1	-	1
	Goat (Capra aegagrus f. hircus)	-	-	-	1	-	-	-	-	1
	Small livestock (sheep and/or goat)	-	-	-	-	-	-	2	3	5
	Cattle (Bos primigenius f. taurus)	-	-	-	-	-	(1)	4	-	5
WILD OR DOMESTIC MAMMALS	Jackal and/or dog (Canis sp.)	-	-	-	2(1)	-	6	11(1)	4	25
	Small bovids	-	-	-	-	-	4(2)	10	4	20
	Large bovids	-	-	-	-	-	-	5(2)	2(1)	10
TOTAL NUMBER OF IDENTIFIABLE BONE FRAGMENTS		163	22	37	286	6	81	294	82	964

F: frequent; FF: very frequent; R: rare; P: present. Numbers between brackets indicate separately bone fragments derived from subadult (or in a few cases juvenile) animals; they are not included in the first numbers.

LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

ABBAS S. A. MOHAMMED-ALI and SUSAN E. JAEGER

The early ceramics of the Eastern Butana (Sudan)

This paper is based on part of the work conducted within the Butana Archaeological Project which is a joint mission of the University of Khartoum, Southern Methodist University at Dallas and the North Texas State University. In itself the work was based on pioneering surveys conducted earlier by Humboldt University at Berlin in the Western Butana (Hintze 1959), and the Combined Prehistoric Expedition in the Eastern Butana (Shiner *et al.* 1971).

The Butana is a flat featureless plain extending from the Nile to the Abbissinian Plateau, an area *ca* 200 miles wide. Two major water systems, the Atbara and the Gash rivers (Fig. 1), interrupt its topography. Annually, but rather seasonally, these two rivers carry a considerable amount of water and silt from the Abbissinian highlands to the Butana plains. Today the area marks the eastern limit of the Sahel belt within the African continent. The area enjoys a hot climate with an average annual rainfall of *ca* 150 mm.

In the course of the project the archaeology of a large area in the Butana was brought to light and a tentative cultural sequence was established (Marks *et al.* 1982; 1983). In the Western Butana the Midden and the Cave sites of Shaqadud provided a stratigraphic sequence of seven metres of cultural deposits, beginning as early as the 7th millennium B.C. and lasting until the end of the 3rd millennium B.C. (Mohammed-Ali and Marks 1984). In the Eastern Butana the work was more extensive, both in terms of the area covered and the material yielded. Here too, a temporal framework extending from the Middle Pleistocene to almost the present time was constructed (Fattovich *et al.* 1984). Our concern in this paper lies in the nature of the earliest ceramic assemblages of the Eastern Butana and their relation to contemporaneous assemblages further west across the plain, along the Nile.

Investigations in the area have uncovered a number of early ceramic sites along the Atbara, in the steppe to the east and in the Gash Delta. These assemblages have been tentatively assigned to two phases, the Pre-Saroba and the Saroba. Apparently the latter marks the beginning of a long ceramic tradion which lasted into historic times (Fattovich *et al.* 1984).

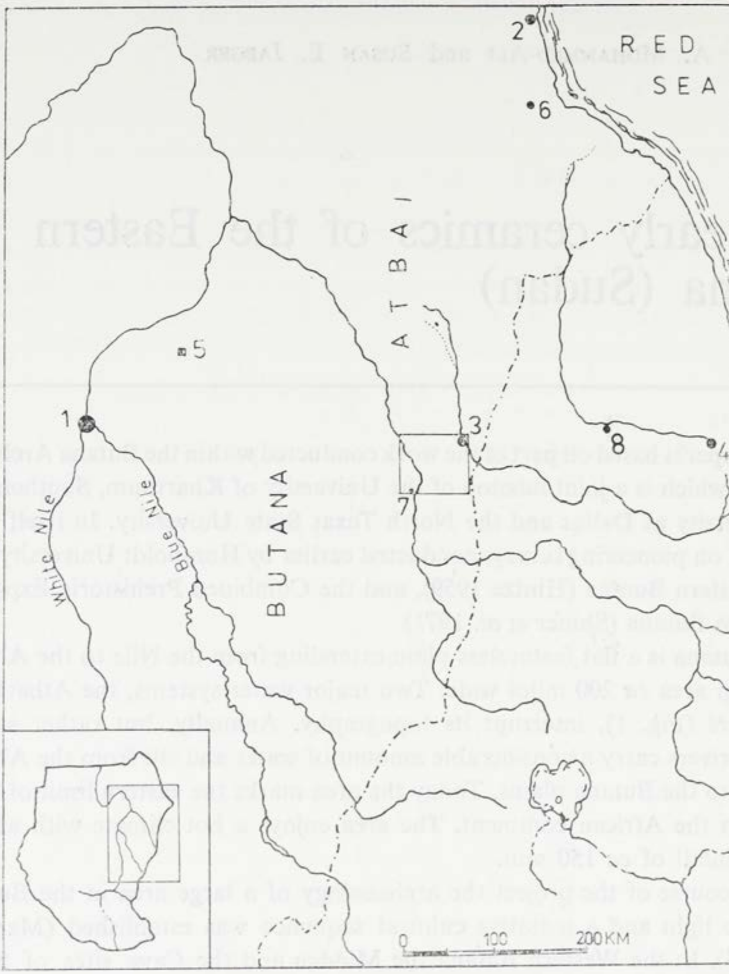

FIG. 1. Map of the Eastern Sudan showing the areas and sites mentioned in the text
1: Khartoum; *2*: Port Sudan; *3*: Kassala; *4*: Asmara; *5*: Shaqadud; *6*: Erkowit; *7*: Kashm el-Girba; *8*: Agordat

The Pre-Saroba Phase so far is represented by two sites: KG55 and KG14, both of which are situated on the west bank of the Atbara river, about 2 m above the present flood plain. KG55 covers an area of *ca* 3,000 sq. m. and KG14 covers an area of *ca* 8 000 sq. m.; both sites are deflated.

The KG55 site did not consist of a midden. Its faunal remains are of wild animals, including fish, crocodile, hippopotamus and a variety of bovids of different sizes, indicating a rich savanna habitat. The lithic sample from this site is too poor to allow any conclusions to be made, but it includes a few elongated backed pieces. The ceramic assemblage consists of two kinds of fabrics, one with a coarse textured paste, heavily tempered with medium sized sand, and the other with a slightly finer textured paste, lightly tempered with fine sand. No burnish or slip was applied to any vessel surface, yet about 15% of the sherds were well smoothed on their exterior surfaces. The primary decorative motif in this collection is vertical and sometimes consists of horizontal patterns of wavy lines. The majority of the decorated sherds are rim sherds, while most of the undecorated sherds are body sherds. Thus, decoration is confined to the upper portion of the vessel. The total sample of sherds is limited but several large pieces were reconstructed, suggesting open vessels, with straight rims and pointed bases. These reconstructions have confirmed that the decoration occurred only on a wide band around the upper portion of the vessel.

The KG14 site revealed 35 cm of cultural deposit. Its faunal remains were well preserved and a wide range of molluscs, reptiles and large and small mammals were recovered. These include *Limicolaria*, *Pila*, crocodile, monkey, jackal, cat and *bovid*, indicating much moister climatic conditions than those prevailing today. A large number of grinding stones were recovered from KG14, but no macrobotanical remains, other than charcoal, were found. The tool-kit includes well made, elongated lunates, backed bladelets, rather informal tools such as notched pieces and denticulates, as well as small series of poorly made scrapers. A charcoal sample provided a radiocarbon date of 6,215±75 B.P. (SMU-1139), thus making KG14 essentially contemporaneous with the late phase of the Early Khartoum tradition (Mohammed-Ali 1984).

The pottery from this site differs from KG55. The fabric consists of fine grained clays, lightly to heavily tempered with fine sand and mica. On a few sherds, inclusions of small grains of crushed iron stone and small clumps of fibrils were found. The majority of the sherds are undecorated and about half are highly smoothed, although not truly burnished. The main decorative techniques employed were impressing and rocker stamping. The primary decorative motifs include dotted straight line and dotted zigzag line. In its format, the decoration was limited to the upper portion of the vessels and it was made in wide-zoned bands. There are vessels with zoned rectangular areas of parallel rows of small knobs of clay, also restricted to the upper part of the vessel. This decoration never occurs in combination with any other motif.

Although distinct, the ceramic assemblages from the two sites share a few features, *e.g.*, smoothed exterior surfaces and decorations limited to the upper body of the vessel, but they differ in almost every other aspect. Overall, both sites seem to represent a mixed riverine wooded steppe adaptation with considerable emphasis on the riverine resources.

The Saroba Phase is currently defined by four sites, (KG10, 13, 94 and 104), while another four sites have been identified but await further investigation. All the Saroba sites are located in the steppe between the Atbara river and the Gash Delta. KG10, KG13 and KH14 occupy areas of about 5,000 sq. m on the average and have middens of maximum depth of *ca* 10 cm. KG94 is the largest Saroba site and occupies an area of about 12,000 sq. m. The faunal material from these sites consists of wild animals, including lizards, warthog and large and small bovids. A high concentration of *Pila* shells indicates seasonal innundation. No botanical remains were recovered but many fragments of grinding equipment were found. The ceramics from these sites are quite uniform. The fabrics consist of fine to coarse grained clays, moderately to heavily tempered with sand. The sand grains vary from fine through medium to coarse. The wares are friable, buff-coloured and unburnished. They are decorated with dotted straight lines and dotted zigzags. The tool types include well made elongated lunates, backed pieces, notches, denticulates and scrapers. A radiocarbon date of 5,644±70 B.P. (SMU – 1181) was obtained from KG10.

When the early ceramic groups of the Eastern Butana are compared with their counterparts on the Central Nile, *i.e.*, the Early Khartoum and the Khartoum Neolithic (Arkell 1949; 1953) certain similarities and differences have been observed. Both groups were adapted to riverine environments during periods of moister conditions, with economies oriented towards hunting, gathering and fishing. The tool-kits are similar in the abundance of grinding implements and backed pieces, but the Pre-Saroba and the Saroba phases lack the stone rings, net sinkers, and bone points of the Early Khartoum. In addition, the raw material for tools utilized on the Nile was mainly quartz, while on the Atbara it was primarily chert and agate, which were locally available.

Similarly to other aspects of the material culture, the ceramics from these two areas exhibit similarities and differences. While wavy line, dotted straight line and dotted zigzag line motifs are found in both, the dotted wavy line and banded motifs are confined only to the Early Khartoum assemblages on the Central Nile. On the other hand, the knobbed decoration of the Pre-Saroba and the format of the decorative motifs of the Eastern Butana in general have no parallels on the Central Nile. The apparent similarity between the Pre-Saroba and contemporary Early Khartoum assemblages disappears between the Saroba and the succeeding Khartoum Neolithic assemblages of the Central Nile.

The Saroba Phase sites have only been found, so far, on the steppe at some distance from the Atbara river, while the Khartoum Neolithic sites continue to be located along the river bank. In addition, compared to the Khartoum Neolithic sites, the Saroba settlements are smaller and have very shallow occupational debris, suggesting a mobile economy and probably a different adaptive pattern to that of the Central Nile. Both the Saroba and the Khartoum Neolithic tool inventories include poorly made scrapers and retouched and backed pieces, but stone rings, flaked adzes and polished gouges are not found in the former, suggesting, perhaps, less wood working. Among the ceramics, all the decorative features, indicative of the Khartoum Neolithic (such as straight lines, triangle patterns, burnishing and/or slipping) are absent in the Saroba assemblages. While the Saroba groups were still hunters-gatherers, those of the Khartoum Neolithic had domestic cattle, sheep and goats. They also exploited fish to a large extent. The differences between these two groups therefore seem to outnumber the similarities.

On the basis of stylistic continuity of certain ceramic design motifs, an evolutionary sequence of the Early Khartoum – Khartoum Neolithic development along the Central Nile, was suggested (Arkell 1949: 115; 1953: 102). The discovery of similar decorative motifs further west in the Sahara resulted in a theory of westward diffusion of these Nilotic traits (Arkell 1949: 115; Hugo 1963; Kennedy 1968: 160; Camps *et al.* 1968); at a later date the theory was reversed (Hays 1971; Mohammed-Ali 1978; 1982). These observed cultural affinities, have been broadly defined as the "Saharan-Sudanese Complex" (Camps-Fabrer 1966) and the "Neolithic of Sudanese Tradition" (Hugo 1963; Bishop and Clark 1967). When the archaeological data from a variety of sites within this "Culture Area" were examined, these concepts were reconsidered and a model of a "Khartoum Horizon Style" was proposed (Hays 1971; 1974).

The theory of the horizon style was first formulated by A. L. Kroeber (1944: 108) as "one showing definably distinct features some of which extend over a large area". Willey and Phillips (1958: 32) characterize the concept as a specialized cultural continuum, represented by a wide distribution of a recognizable art style. Assuming the historical uniqueness of a stylistic pattern and assuming that styles normally change with considerable rapidity, the element of time is reduced to the point where the style serves to equate phases of larger units of culture, otherwise widely separated in space, within that span of time. Willey and Phillips also note that the concept has a limited application, since it presupposes a certain level of aesthetic development. What is meant are highly specialized artifact types, widely traded objects, new technologies, unusual burial practices, or peculiar ritual assemblages. In other words, a horizon style is identified archaeologically by any kind of evidence indicating the rapid spread of new ideas over a wide geographical area.

Our aim here is to examine the validity of the "Horizon Style" concept for Eastern Sudan in the light of the available information on its early ceramic assemblages.

The concept of a "Horizon Style" rests upon two fundamental criteria: 1. A resemblance of certain style groups; and 2. A rapid spread of this style over a wide geographical area. When the ceramic material from Eastern Sudan is examined in the light of these criteria, it becomes obvious that a reevaluation is required.

As for the spread of motifs, those of Eastern Sudan and those of the Central Nile differ in many respects. For instance, in their format those of the Nile cover the entire surface of the pot, while those of Eastern Sudan are confined only to the upper portion of the vessel. Also, the wavy line motifs of the Nile are always placed horizontally while those of Eastern Sudan are often vertically oriented. The rest of the decorative motifs of the Nile such as the dotted wavy line are almost nonexistent in Eastern Sudan. By the Khartoum Neolithic period ceramic motifs on the Nile had become dominated by straight-line, triangle pattern and zigzag lines. These decorative elements never reached Eastern Sudan. In addition, burnishing, which is characteristic of the Khartoum Neolithic, is unknown among the Saroba assemblages.

In regard to the rapid spread, the wavy line motif is evidenced over a long period of time on the Nile, ranging from about 8,000 B.P. from sites on the White Nile (Clark 1973) to *ca* 6,500 B.P. at Sorourab 1 (Mohammed-Ali 1984). This is also confirmed by dates from Saggai of *ca* 7,300 B.P. (Caneva 1983). Further east the site of Shaqadud, 50 km east of the Nile, gave a date of *ca* 7,000 B.P., associated with wavy line pottery (Mohammed-Ali and Marks 1984). Although we do not have a date from KG55, it can only date shortly before the KG14 site (*ca* 6,215 B.P.).

Thus, at the present state of knowledge, the wavy line motif, not to mention pottery making itself, may have been present on the Nile for *ca* 2,000 years before it spread across the Butana to the Atbara river basin. At this time level, at least, Eastern Sudan cannot be linked to the Nile Valley by a "rapid" spread of any ceramic tradition.

How then, if at all, did the Nile Valley and Eastern Sudan become linked to a "Khartoum Horizon Style"? These assumptions were based only upon the broadest cultural affinities. At the Early Khartoum level, these included a riverine oriented adaptation, as well as the common presence of similar techniques and ceramic decoration (*e.g.*, combing, impressing, *etc.*). These, however, are not only too general to constitute a horizon style but also their much later appearance in the Atbara river basin, as opposed to the Nile, indicated a rather slow diffusion of features while a rapid one is rather required for the horizon style. It should be emphasized as well that the Khartoum Neolithic ceramic patterns reached neither the upper Atbara river basin nor the steppe to the east of it. At best, it spread only to the nearer hinterlands of the Nile as seen at Shaqadud. In this regard the limited spread of Khartoum Neolithic ceramic patterns pertains to the Central Nile as well, since all "Khartoum Related" (Marks *et al.* 1968) and "Khartoum Variant" (Shiner 1968) assemblages show no links to this ceramic tradition.

Thus, whatever the validity and utility of the "Khartoum Horizon Style" for the Nile and the areas west of it, it cannot be applied meaningfully to the area to the east of this river.

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RODOLFO FATTOVICH

The late prehistory of the Gash Delta (Eastern Sudan)

Since 1980, the Italian Archaeological Mission to the Eastern Sudan of the Department of African and Arabian Studies, Instituto Universitario Orientale, Naples, has been carrying out a systematic archaeological reconnaissance of the Gash Delta in the Kassala Province. The investigated area includes the whole delta from Jebel Gulsa on the Ethiopian border to Eriba Station and the adjacent plains from Jebel Tukulabab to Shurab el-Gash. Up to now 140 sites have been recorded. They cover a time-span from *ca* 6,000 B.C. to 1,800 A.D. These remains document most of the temporal phases and spacial facies of the historic-cultural sequence of the Eastern Sudan, which was made evident by the combined field-work of the I.U.O. Mission in the Gash Delta and the Joint UoK/SMU Butana Archaeological Project at Khashm el-Girba in the middle Atbara valley (Fattovich *et al.* 1984; Marks and Fattovich 1984).

At present nine main groups of sites can be described: 1. Amm Adam Group (*ca* 6,000 - 4,000 B.C.); 2. Malawiya Group (*ca* 5,000 - 4,000 B.C.); 3. Butana Group (*ca* 4,000 - 1,000/500 B.C.); 4. Gash Group (*ca* 3,000 - 1,000 B.C.); 5. Agordat Group (*ca* 2,500 - 1,500 B.C.); 6. Jebel Mokram Group (*ca* 2,000 - 1,000/500 B.C.); 7. Hagiz Group (*ca* 1,000/500 B.C. – 300/400 A.D.); 8. Khatmiya Group (*ca* 300/400 - 600/700 A.D.); 9. Gergaf Group (*ca* 1,500 - 1,800 A.D.). Moreover, a Christian site (*ca* 1,100 - 1,200 A.D.) and a number of tumuli and other stone structures of early historical and/or later times were identified (Fattovich 1981; 1984a; 1984c; Fattovich and Piperno 1986; Constantini *et al.* 1983; Coltorti *et al.* 1984; Sadr 1984).

A detailed analysis of the collected data is still in progress. Therefore in this paper I shall give some information on the preliminary results concerning the late prehistoric and protohistoric period (*ca* 6,000 B.C. - 400 A.D.).

Amm Adam Group

This group of sites represents the earliest certain evidence of the peopling process of the Gash Delta. It corresponds to the so-called Pre-Saroba sites in the Khashm el-Girba area. Two possible ceramic sites (GS1, JTef 1) were also recorded near Kas-

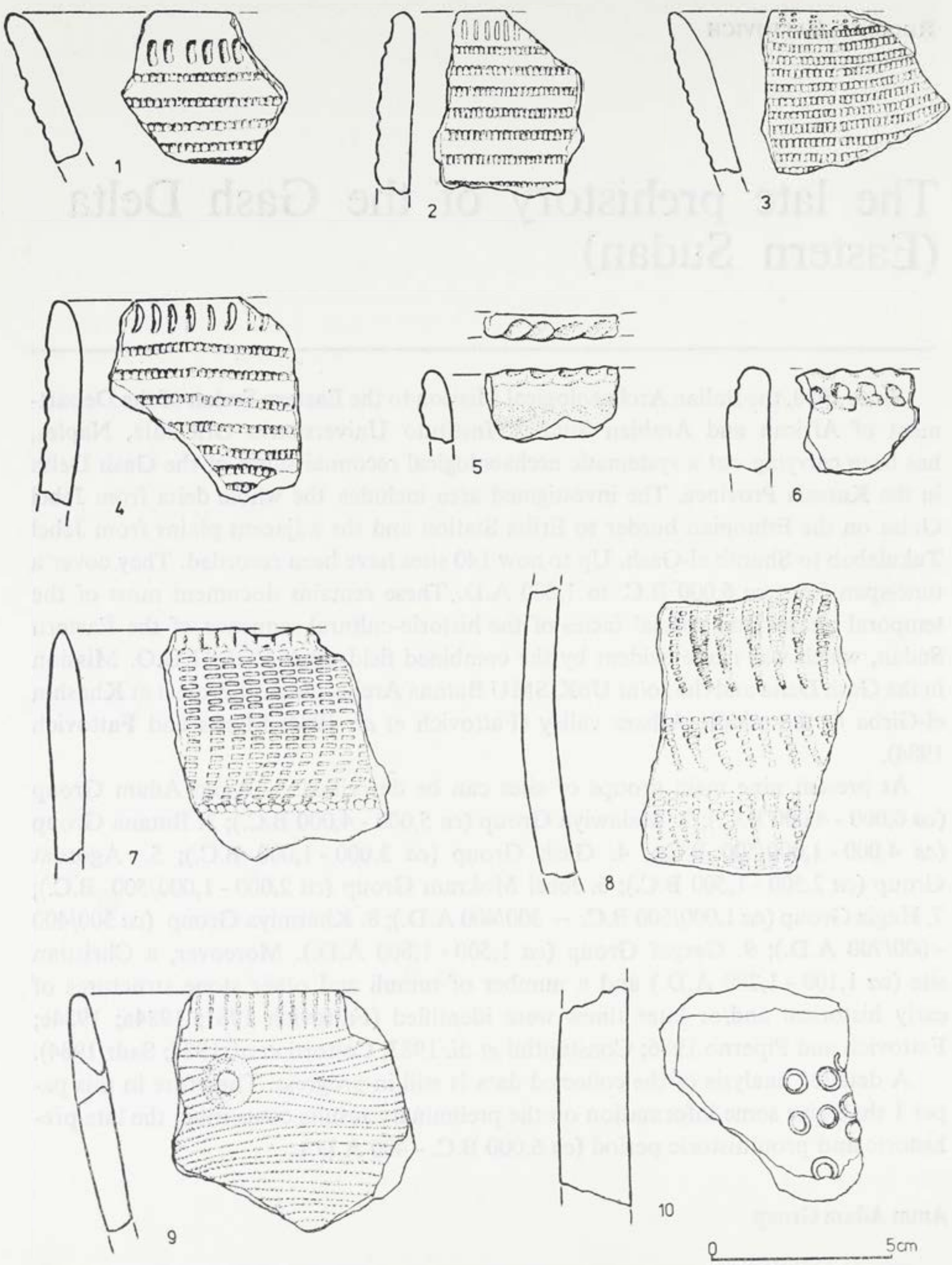

FIG. 1. Amm Adam Group, AAS 1 site. Selected potsherds

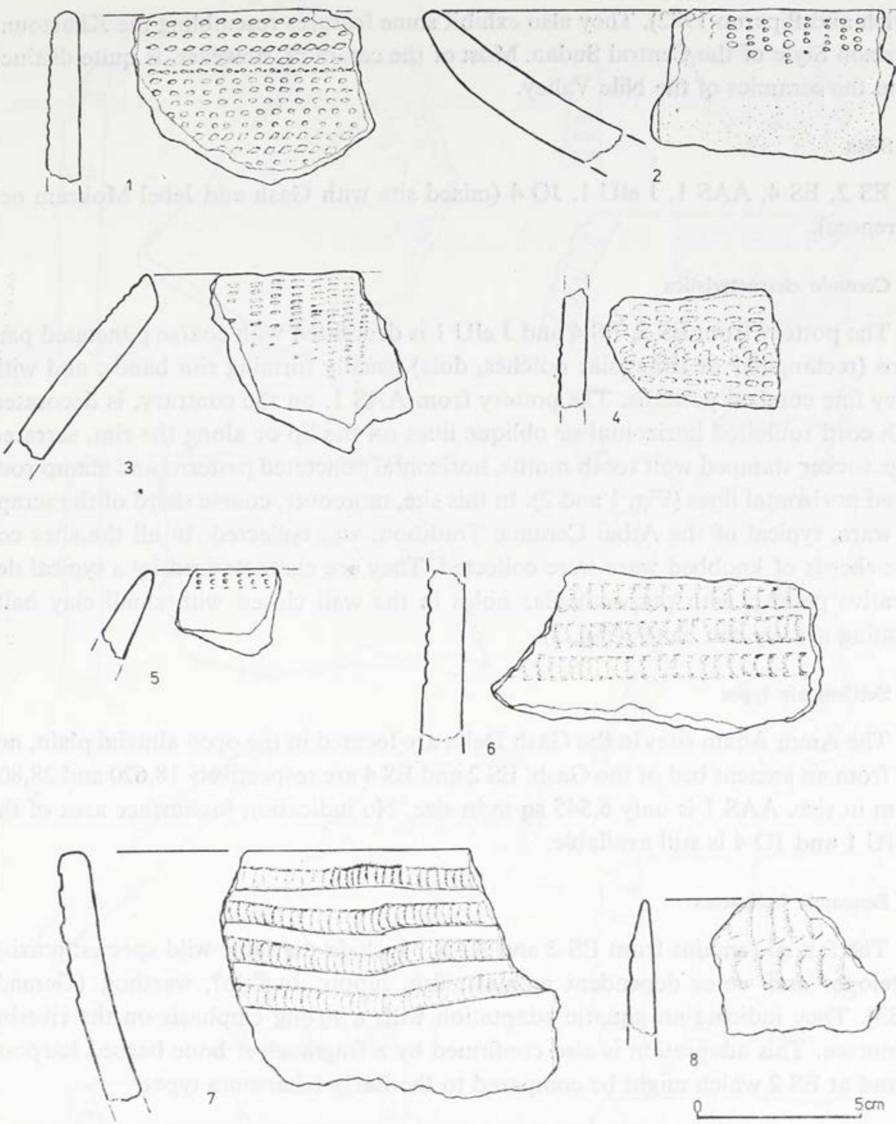

FIG. 2. Amm Adam Group, AAS 1 site. Selected potsherds

sala. They might indicate an older stage of the process in the area, but the evidence is still too scanty for a positive statement.

The area includes three sites in the northern delta and some sites near Jebel el-Ukheiderat and Jebel Ofreik to the west of the delta (Fattovich 1984b). They may be ascribed to two interacting cultural units, linked by the typical knobbed ware (Fattovich and Piperno 1982). They also exhibit some features resembling the Khartoum Horizon Style of the Central Sudan. Most of the ceramics, however, is quite distinct from the ceramics of the Nile Valley.

Sites

ES 2, ES 4, AAS 1, J elU 1, JO 4 (mixed site with Gash and Jebel Mokram occurrences).

Ceramic characteristics

The pottery from ES 2, ES 4 and J elU 1 is decorated with coarse punctated patterns (rectangular or triangular notches, dots) usually forming rim bands, and with wavy line combed patterns. The pottery from AAS 1, on the contrary, is decorated with cord rouletted horizontal or oblique lines on the lip or along the rim, serrated edge rocker stamped wolf tooth motifs, horizontal punctated patterns and stamp rouletted horizontal lines (Fig. 1 and 2). In this site, moreover, coarse sherd of the scraped ware, typical of the Atbai Ceramic Tradition, was collected. In all the sites coarse sherds of knobbed ware were collected. They are characterized by a typical decorative pattern with perpendicular holes in the wall closed with small clay balls forming usually rim bands (Fig. 3).

Settlements types

The Amm Adam sites in the Gash Delta are located in the open alluvial plain, not far from an ancient bed of the Gash. ES 2 and ES 4 are respectively 18,620 and 28,800 sq m in size. AAS 1 is only 6,545 sq m in size. No indication for surface area of the J elU 1 and JO 4 is still available.

Economic indicators

The faunal remains from ES 2 and AAS 1 include the same wild species: grazing antelopes and water dependent animals: fish, hippo, buffalo?, warthog (Geraads 1983). They indicate an aquatic adaptation with a strong emphasis on the riverine resources. This adaptation is also confirmed by a fragment of bone barbed harpoon found at ES 2 which might be compared to the Early Khartoum types.

Comparisons

Some fragments of wavy line pottery with interrupted motifs like the Early Khartoum specimens from Saggai were collected at ES 2. Two fragments of unpatterned punctated ware identical to specimens from the sites of the Malawiya Group in the Khashm el Girba and Shurab el Gash area were found at AAS 1. Knobbed potsherds have been also found in the Pre-Saroba and Malawiya sites to the south, in Early and Middle Kerma assemblages of the central Nile Valley, and at Wadi Shaw and Gilf Kebir in the Lybian Desert.

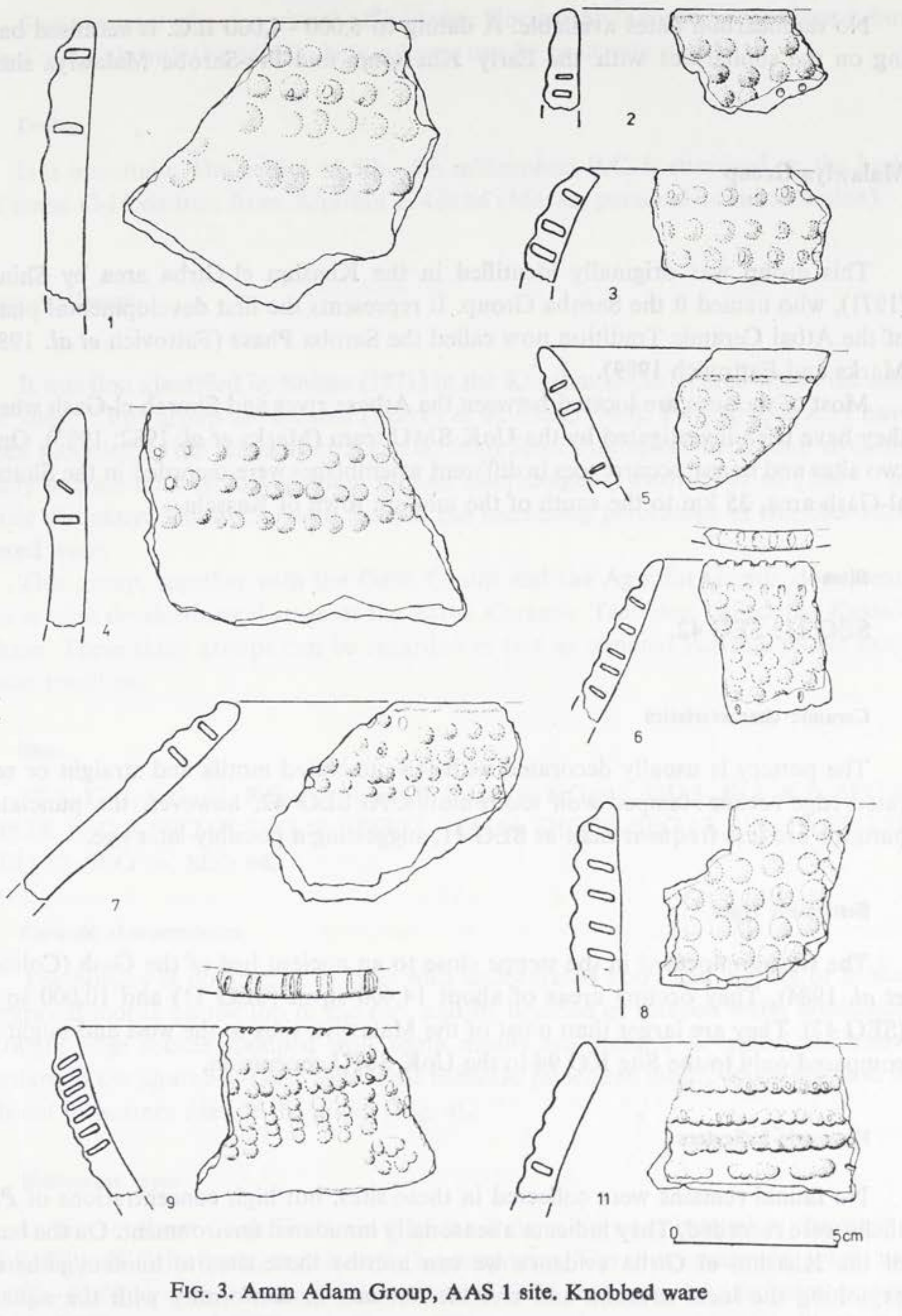

FIG. 3. Amm Adam Group, AAS 1 site. Knobbed ware

Dating

No radiocarbon dates available. A dating to 6,000 - 4,000 B.C. is surmised basing on the similarities with the Early Khartoum and Pre-Saroba Malawiya sites.

Malawiya Group

This group was originally identified in the Khashm el-Girba area by Shiner (1971), who named it the Saroba Group. It represents the first developmental phase of the Atbai Ceramic Tradition now called the Saroba Phase (Fattovich *et al.* 1984; Marks and Fattovich 1989).

Most of the sites are located between the Atbara river and Shurab el-Gash where they have been investigated by the UoK SMU team (Marks *et al.* 1982; 1983). Only two sites and minor occurrences in different assemblages were recorded in the Shurab el-Gash area, 35 km to the south of the modern town of Kassala.

Sites

SEG 11, SEG 42.

Ceramic characteristics

The pottery is usually decorated with jab punctated motifs and straight or serrated edge rocker stamped wolf tooth motifs. At SEG 42, however, the punctated patterns are less frequent than at SEG 11, suggesting a possibly later age.

Settlement types

The sites are located in the steppe close to an ancient bed of the Gash (Coltorti *et al.* 1984). They occupy areas of about 14,400 sq m (SEG 11) and 10,000 sq m (SEG 42). They are larger than most of the Malawiya sites to the west and might be compared only to the Site KG 94 in the UoK SMU concession.

Economic indicators

No faunal remains were collected in these sites, but high concentrations of *Pila* shells were recorded. They indicate a seasonally innudated environment. On the basis of the Khashm el Girba evidence we can ascribe these sites to hunters/gatherers exploiting the local savanna and riverine habitats in conformity with the aquatic adaptive strategy.

Comparisons

Some general affinities with the Khartoum Horizon Style could be mentioned, but no direct link with the Middle Nile cultures can be positively stated.

Dating

It is uncertain. The period of 5th - 4th millennium B.C. is surmised on the basis of some C-14 datings from Khashm el-Girba (Marks, personal communication).

Butana Group

It was first identified by Shiner (1971) in the Khashm el-Girba area where the major sites of this group are located (Marks *et al.* 1982; 1983). Twenty four sites have been recorded in the plains near Kassala, from Jebel Tukulabab to Shurab el-Gash. They include both typical and late Butana assemblages (Fattovich *et al.* 1984). The basic distinctive feature between them is the increasing percentage of the fiber tempered ware.

This group, together with the Gash Group and the Agordat Group, documents the second developmental stage of the Atbai Ceramic Tradition called the Kassala Phase. These three groups can be regarded in fact as regional variants of the same basic tradition.

Sites

JT 1, JT 2, KGar 1, KGar 2, KGar 3, KGar 4, KGar 5, UD 1, K 2, K 8, SEG 4, SEG 6, SEG 8, SEG 10, SEG 12, SEG 13, SEG 14, SEG 16, SEG 17, SEG 19, SEG 21, SEG 37, SEG 56, SEG 64.

Ceramic characteristics

The pottery is dominated by pots with undecorated body and zig-zag or fishtail engraved motifs on the top of the rim, and by brushed or scraped ware. Sometimes straight edge rocker stamped wolf tooth motifs are present. A typical decorative pattern in the Shurab el-Gash area is the fishscale punctated motif, which seems to be absent in western sites of the group (Fig. 4).

Settlement types

In the southern Gash Delta most of the Butana sites are located in the steppe. K 2, JT 1, JT 2, however, are close to the mountains. The sites usually do not exceed 4,000 - 5,000 sq m in size. Only SEG 14 and SEG 56 are large mounded sites, respectively 7,000 sq m and 9,000 sq m in size. They suggest major residential villages sur-

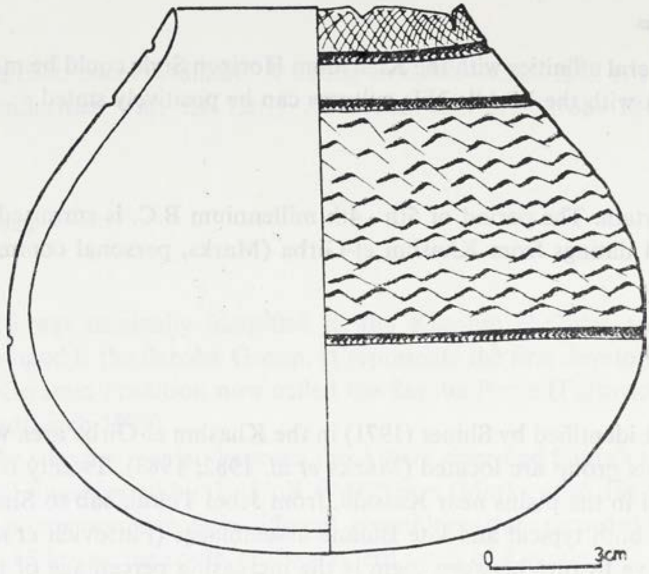

FIG. 4. Butana Group, SEG 8 site. Complete pot

rounded by smaller seasonal settlements and temporary camps. This pattern differs considerably from the one of the western area, where only huge sites of 9 - 15 ha have been found.

Economic indicators

No sure evidence is available as yet. In the Khashm el-Girba area, however, the Butana sites can be ascribed to hunters/gatherers and cattle breeders. The late Butana sites in particular might be attributed to mixed farmers.

Comparisons

The fishscale punctated motif on the pottery from Shurab el-Gash can be compared to a typical decorative pattern on potsherds from Wadi Shaw (Laqiya Oasis) in the Western Desert.

Dating

It is still uncertain. A dating to 4,000 - 1,000/500 B.C. has been tentatively suggested, on the basis of the Khashm el-Girba evidence.

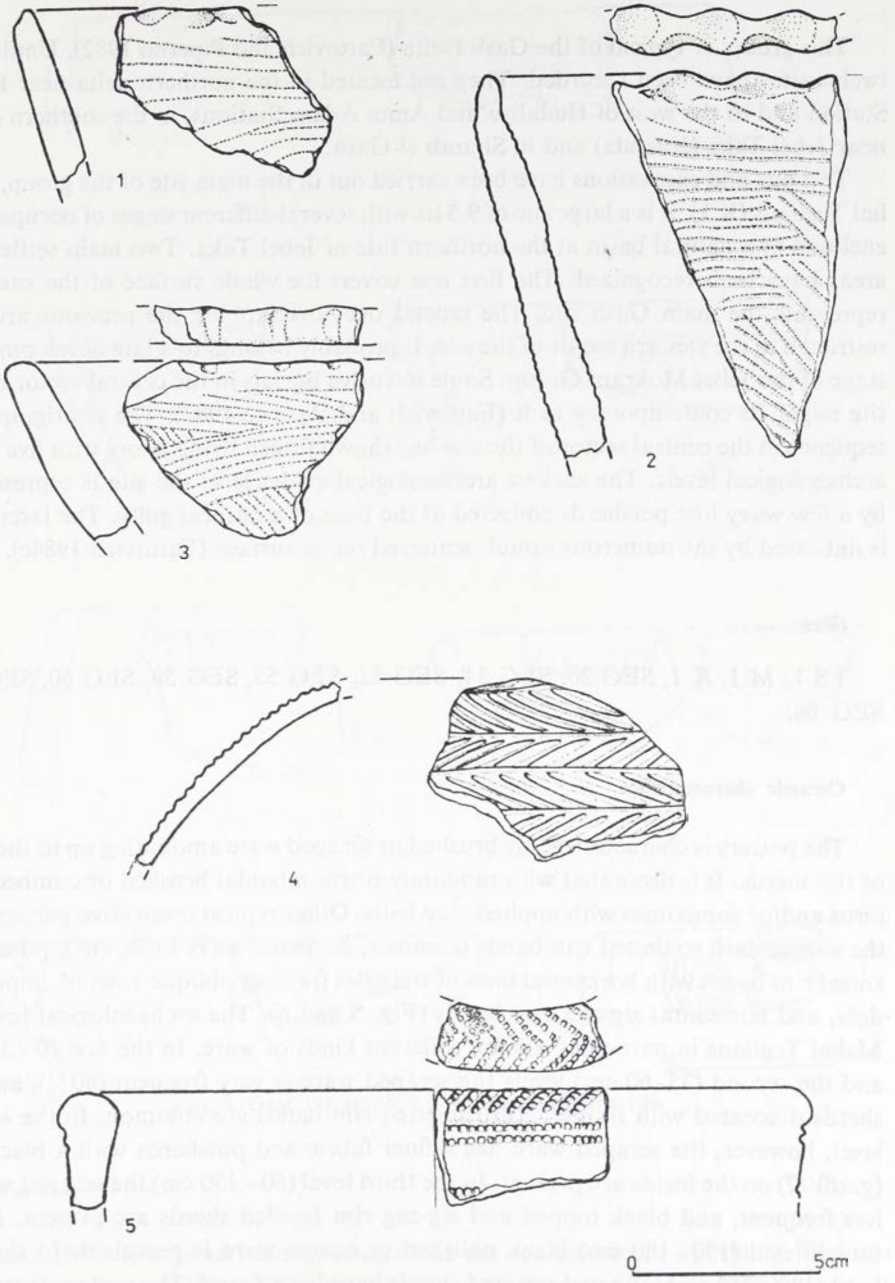

FIG. 5. Gash Group, K 1 site. Selected potsherds

Gash Group

This group is typical of the Gash Delta (Fattovich and Piperno 1982). Until now twelve sites have been recorded. They are located in the northern delta near Eriba Station and to the west of Hadaliya and Amm Adam Stations, in the southern delta near Jebel Taka (Kassala) and in Shurab el-Gash.

Test pits and excavations have been carried out in the main site of the group, Mahal Teglinos (K 1). It is a large site of 9.5 ha with several different stages of occupation, enclosed in a natural basin at the northern side of Jebel Taka. Two main settlement areas have been recognized. The first one covers the whole surface of the site and represents the main Gash site. The second one, overlapping the previous area, is restricted to the western sector of the site. It probably belongs to a late developmental stage of the Jebel Mokram Group. Some intrusive burials in the central sector of the site might be contemporary to it (Fattovich and Piperno 1982). The stratigraphical sequence in the central sector of the site has shown fifteen living floors with five basic archaeological levels. The earliest archaeological evidence at the site is represented by a few wavy line potsherds collected at the base of a natural gully. The latest one is indicated by the numerous tumuli scattered on its surface (Fattovich 1984c).

Sites

ES 1, M 1, K 1, SEG 26, SEG 34, SEG 52, SEG 55, SEG 59, SEG 60, SEG 65, SEG 66.

Ceramic characteristics

The pottery is characterized by brushed or scraped ware amounting up to the 75% of the sherds. It is decorated with randomly or rhomboidal brushed or combed patterns and/or sometimes with applied clay balls. Other typical decorative patterns are the simple dash rouletted rim bands (commas, horizotal wavy lines, *etc.*), punctated zoned rim bands with horizontal lines of triangles framing oblique rows of impressed dots, and horizontal zig-zag rim bands (Fig. 5 and 6). The archaeological levels at Mahal Teglinos in particular exhibit different kinds of ware. In the first (0 - 35 cm) and the second (35-60 cm) levels the scraped ware is very frequent (80%), and the sherds decorated with simple dash rouletted rim bands are common. In the second level, however, the scraped ware has a finer fabric and potsherds with a black slip (graffite?) on the inside are present. In the third level (60 - 150 cm) the scraped ware is less frequent, and black topped and zig-zag rim banded sherds are present. In the fourth level (150 - 180 cm) black polished or coarse ware is prevalent. In the fifth level (180 - 215 cm) only undecorated sherds have been found. The pottery from ES 1 in turn is comparable to the one from the third level of K 1, suggesting a contemporaneity between them.

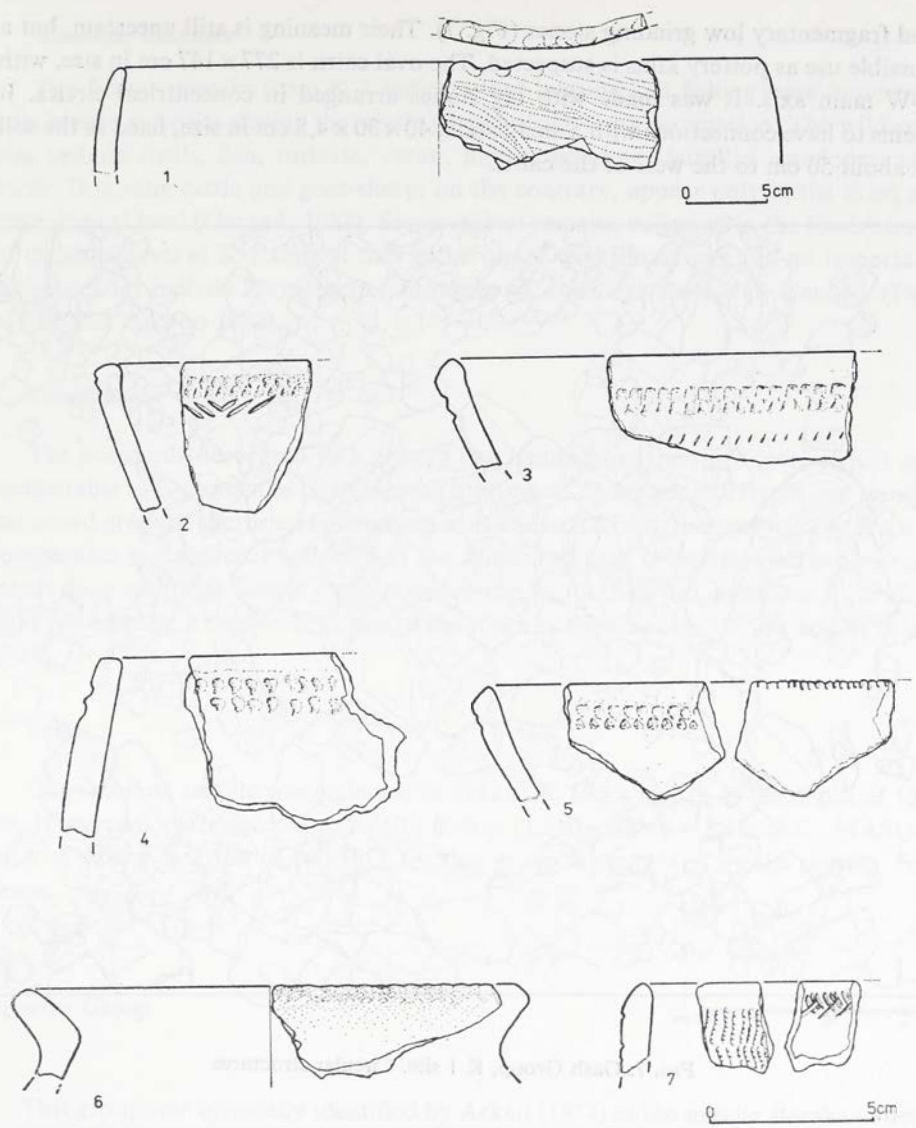

FIG. 6. Gash Group, K 1 site. Selected potsherds

Structures

Stone structures have been discovered in the central sector of Mahal Teglinos (K 1). They belong to the main occupational stage of the site documented by the first archaeological level. They are some circles of stones and an oval cairn. The circles of stones are 80 - 100 cm in diameter. They were originally filled with many upper and fragmentary low grinding stones (Fig. 7). Their meaning is still uncertain, but a possible use as pottery kilns is suspected. The oval cairn is 277 × 147 cm in size, with E-W main axis. It was made with big stones arranged in concentrical circles. It seems to have connections with a small stela, 40 × 30 × 4,5 cm in size, fixed in the soil at about 50 cm to the west of the cairn.

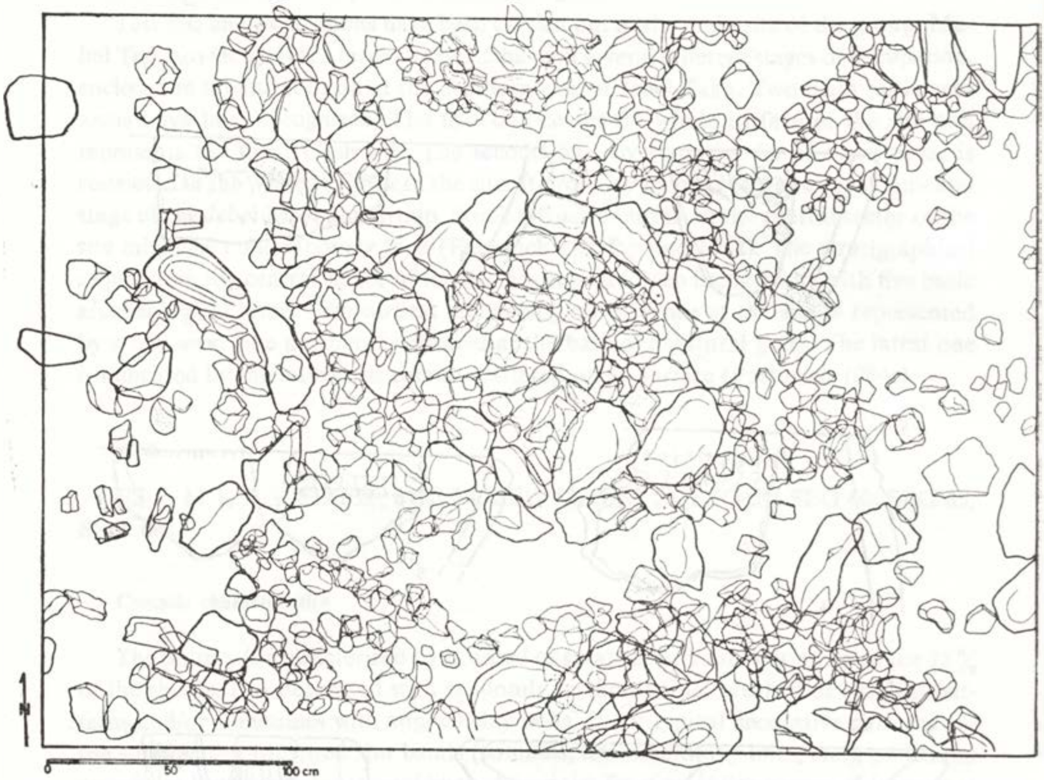

FIG. 7. Gash Group, K 1 site. Circular structures

Settlement types

Most of the sites are located in the open alluvial plains. Only K 1 is located at the base of Jebel Taka. They occupy areas ranging from 5,000 sq m to 95,000 sq m. Usually they are 10,000 - 30,000 sq m in size. The largest sites are K 1 (95,000 sq m) and ES 1 (93,000 sq m). They might reflect large residential villages, temporary settlements and seasonal camps.

Economic indicators

The faunal remains from K 1 indicate that hunting and fishing were important subsistence activities during the whole period of the site's occupation. The wild species include shells, fish, tortoise, varan, hippo, warthog, gazelles, antelopes, and birds. Domestic cattle and goat-sheep, on the contrary, appear only in the third archaeological level (Geraads 1984). Some vegetal remains collected in the lower strata of the third level at K 1 suggest that gathering of wild plants was still an important activity. They include *Zizyphus* sp., *Hordeum* sp. and *Leguminosae* (?) Gen. sp. (Fattovich and Piperno 1982).

Comparisons

The potsherds decorated with zig-zag rim bands from the third level of K 1 are comparable to C-group and Early Kerma specimens. The finger nail impressed sherds, the broad grooved sherds and the coarse coiled sherds from the upper level at K 1 are comparable to potsherds collected in the Shaqadud cave (Northern Butana). Fragments decorated with simple dash rouletted rim bands, like the specimens from K 1, have been finally traced to Erkowit, to the south of Port Sudan (Callow and Wahida 1981).

Dating

One charcoal sample was collected in 1981 at K 1 in a hearth at the depth of 155 cm. It was radiocarbon dated to 3,860 ± 60 b.p. (1,910 ± 60 b.c. = 2,180 B.C., MASCA cal.). A dating to 2,500 - 1,000 B.C. for this group is supported by the pottery evidence.

Agardat Group

This group was originally identified by Arkell (1954) in the middle Baraka valley, where it is represented by four main sites (Kokan, Ntanei, Shabeit, Dundaneit). Two sites in the northern delta can be ascribed to it on the basis of the pottery evidence. They were previously assigned to the Amm Adam Group (Fattovich and Piperno 1986), but this identification is no longer tenable.

Sites

ES 3, M 2. ES 3 only is a settlement site, M 2 is a tumulus, *ca* 20 m in diameter.

Ceramic characteristics

The typical decorative patterns are complex linear carved designs, fishscale punctated motifs, complex rouletted body decors. Scraped ware with applied clay balls and knobbed ware are also present.

Settlement types

ES 3 is *ca* 100,000 sq m in size, but as it had been washed by water, the original surface might have been much smaller. Many stone rings are visible on its surface. This might suggest that the site specialized in rings manufacture.

Economic indicators

The faunal remains indicate that hunting and fishing were still important activities. They include shells, fish, hippo, bovids, antelopes.

Comparisons

The knobbed ware can be compared to the evidence from AAS 1 and Kerma. This might suggest that this kind of ware survived in the northern delta until the late 3rd - 2nd millennium B.C.

Dating

It is uncertain. The affinities with the sites near Agordat and some elements like the Gash Group might suggest a dating to 2,500 - 1,500 B.C.

Jebel Mokram Group

This group was originally identified in the Gash delta (Fattovich and Piperno 1986). It seems to be an intrusive cultural unit, though it shares some common features with the Butana and Gash Groups. In the Gash delta it is represented by forty three sites scattered over the area stretching from Jebel Mokram to Shurab el-Gash. They include both typical and late assemblages. The late ones are distinguished by the increasing frequency of fiber tempered ware. Moreover, they share many features with the late Butana sites in the Shurab el-Gash area, suggesting a certain degree ofinteraction (Fattovich 1984c).

Sites

JM 2, JM 3, GS 3, GS 4, GS 7, GS 8, K 1 NW, K 2, K 10, K 18, K 19, K 20, K 21, JAG 1, AG 1, AG 2, Eg 1, Eg 2, Eg 3, Eg 4, T 1, SEG 1, SEG 2, SEG 3, SEG 5, SEG 7, SEG 9, SEG 15, SEG 18, SEG 20, SEG 22, SEG 27, SEG 32, SEG 35, SEG 40, SEG 43, SEG 47, SEG 48, SEG 50, SEG 53, SEG 54, SEG 58, WG 1.

Ceramic characteristics

Most of the pottery is undecorated. The distinctive decorations include linear carved or combed patterns (channeled ware), simple straight line incised patterns, crossing lines incised patterns (grid incised ware), cord-wrapped paddle stamped patterns (mat impressed ware). The pottery of this group is also characterized by flat horizontal handles and cylindrical lugs decorated with crossed lines on the top (Fig. 8).

Settlement types

Most of the sites are located in the open steppe. Only two sites (K1NW, JAG 1) are close to the mountains. They range from 5,000 sq m to 100,000 sq m in size. They usually occupy an area of 2 - 3 ha, but three measure 6 - 8 ha and one (JAG 1) *ca* 10 ha in size. In many sites it is possible to recognize separated assemblages of materials, which might indicate single compounds of small villages. Only JAG 1, at the base of Jebel Abu Gamal, and K 1 NW may be regarded as large residential sites. At SEG 9 in particular 130 hearths have been recorded over a surface of *ca* 6,000 sq m, suggesting a specialized function (pottery kilns?)

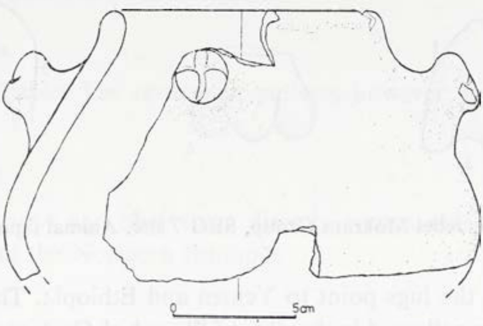

FIG. 8. Jebel Mokram Group, SEG 7 site. Fragmentary pot

Economic indicators

Impressions of domestic sorghum have been traced in clay fragments of hearths collected at JAG 1 and SEG 9, tentatively dated to the late 2nd – early 1st millennium B.C. (Constantini *et al.* 1983). Figurines of animals have been moreover collected in some sites (Fig. 9). Such evidence might indicate a mixed farming subsistence economy.

Comparisons

The grid incised ware and the mat impressed ware can be compared to specimens of the Middle and Classic Kerma in the Central Nile Valley. Some potsherds of mat impressed ware in particular are identical to Middle Kerma fragments from Kerma.

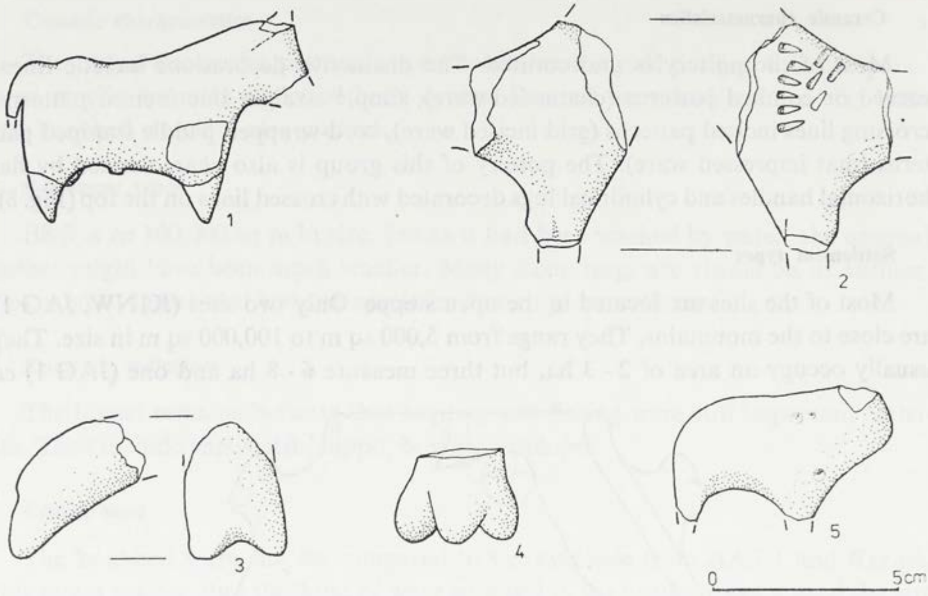

FIG. 9. Jebel Mokram Group, SEG 7 site. Animal figurines

The flat handles and the lugs point to Yemen and Ethiopia. The undecorated, grid tempered orange ware collected in the sites of Shurab el-Gash can be safely compared to the late prehistorical and pre-Axumite ware of Northern Ethiopia. Fragments of channeled ware finally have been traced near the lake Tana ((where they are dated back to the mid-1st millennium B.C.) and along the White Nile.

Dating

It is uncertain. On the basis of the pottery evidence dating to the 2nd - 1st millennium B.C. can be suggested.

Hagiz Group

This group represents the final stage of the Atbai Ceramic Tradition presently named Jebel Taka Phase. It was originally named Jebel Taka Group (Fattovich and Piperno 1986). In the Gash delta it is documeted by seventeen sites scattered over the Jebel Mokram to Shurab el-Gash area.

Sites

K 2, K 3, K 4, K 6, K 9, K 10, K 14, K 15, K 16, K 17, JM 5, SEG 25, SEG 28, SEG 36, SEG 63, KT 1, JE 1.

Ceramic characteristics

The pottery seems to be a coarser development of the Gash Group type. It reminds some pre-Axumite types. The typical decorative patterns include scraped rhomboidal motifs (scraped ware), complex linear carved motifs, thumbnail punctated patterns, simple stamp rouletted rim bands, cord-wrapped paddle stamped decors (mat impressed ware), appliqued knobs and chains.

Settlement types

The sites are located both at the base of the outcrops and in the open plain. They occupy areas between 1,600 sq m and 126,000 sq m, with average size of 2 - 4 ha. In the largest sites, moreover, we can distinguish separate assemblages, which might indicate single compounds of small villages.

Economic indicators

No evidence available. The settlement pattern, however, might suggest a mixed farming economy.

Comparisons

The appliqued knobs and chains are directly comparable to the pre-Axumite decorative patterns of the Northern Ethiopia.

Dating

It is uncertain. On the basis of the pottery evidence, however, a dating to 500 B.C. – 200/300 A.D. might be suggested (Fattovich 1984c).

Any attempt to outline the socio-economic transformations in the Gash Delta during the late prehistory and protohistory is still premature. At the present stage of research, however, it seems that until the 3rd millennium B.C. hunting, gathering and fishing were important components of the subsistence economy. In the late 3rd millennium B.C. domestic animals (cattle, goat/sheep) were introduced into the region. By the 2nd millennium B.C. mixed farmers were probably living in the Gash delta and in the adjacent plains. In the late 3rd millennium B.C., in turn, large residential sites appeared in the area. The contacts with the Nile valley probably started in the 6th/5th millennium B.C. They were more intense during the 3rd and 2nd millennium, and apparently ended at the beginning of the 1st millennium B.C. In the later period there were some possible contacts with the Northern Ethiopia.

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BARBARA E. BARICH

Uan Muhuggiag rock shelter (Tadrart Acacus) and the late prehistory of the Libyan Sahara

During the winter of 1982, the Libyan-Italian Joint Mission for Saharan Research – which operates in the Tadrart Acacus area – undertook new and more extensive excavations in the rock shelter of Uan Muhuggiag, previously excavated by F. Mori and A. Pasa in the 1960's (Mori 1965) (Fig. 1).

The field work (Barich 1978) yielded a settlement where levels belonging to the so-called Bovidian Tadrart Facies are covered by a later horizon with peculiar technological features which, to the best of our knowledge, have not yet been found in other sites of the Acacus Massif. It seems that the site allows us to follow in detail the evolution of the Bovidian aspect as well as to discuss it within the framework of the late prehistory of the whole area.

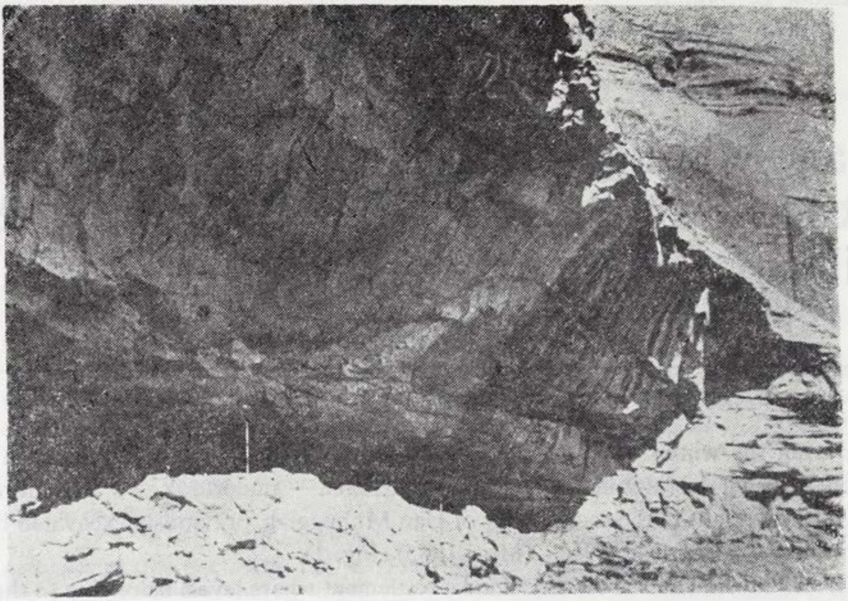
The Uan Muhuggiag Rock Shelter is located in the Central Acacus, on the northern side of the wadi Teshuinat. During the 1960's, it became known owing to the body of paintings found on its walls, in which different styles of the Acacus rock art – Round Heads, Pastoral and Horse styles – have been recognized (Fig. 2 and 3).

As has been pointed out above, at that time A. Pasa excavated two small test trenches in the settlement which yielded some information about its faunal and climatic conditions (Mori 1965: 223 - 227).

In 1982, at the time of new investigations, the cultural deposit was practically still intact: previous soundings, made at the eastern and western edge respectively, had not destroyed it.

A sedimentological observation of the settlement revealed that the upper part of the deposit – which consists of five thin levels – has the form of a compounded *crust* sloping eastwards. The *crust* is thus almost non-existent in the eastern part of the settlement.

Lithic tools and ceramics showing "late" characteristics were collected from this part of the stratigraphic sequence. In one of the excavated trenches (A), the *crust* appeared in direct association with some collapsed sandstones which sealed the underlying levels. Thanks to Pasa's investigations, the beginning of this later stratigraphic



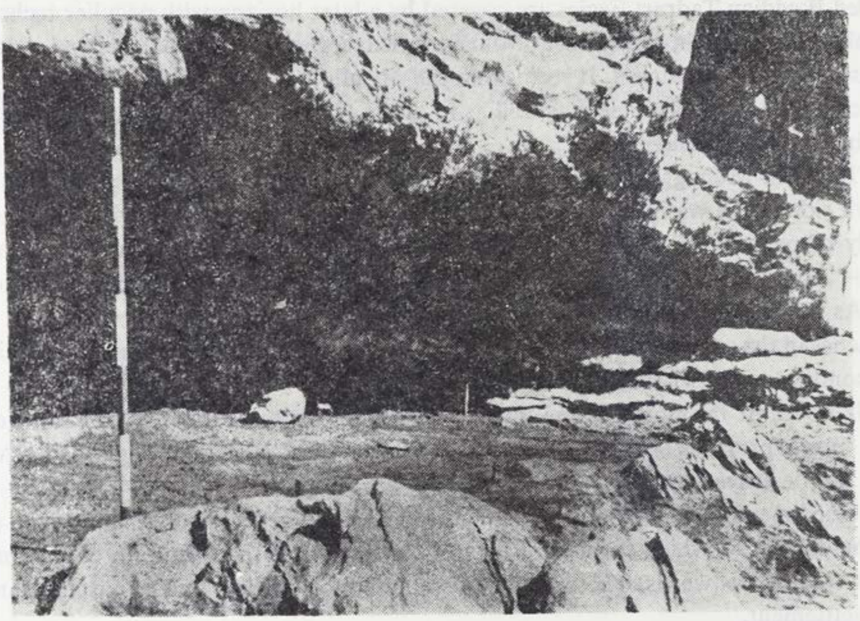


FIG. 1. Uan Muhuggiag (Tadrart Acacus, Libya). Panoramic views of the rock shelter as seen from the wadi

formation may be dated from 4,730 ± 120 B.P. Therefore, the *crust* formation would have been formed during the 5th millennium B.P.

The other trench (B) did not allow to record such an inequivocable interruption of the stratigraphy as that observed in trench A. Its stratigraphy consisted of thin levels, similar to each other and was rich in hearths; this may be an indication of frequent abandonments and re-occupation of the site (Fig. 4). This latter trench in particular allowed us to record a stratification that, starting directly from the rock basement, developed uninterrupted towards the top. Its thin levels were rich in food remains, lithic tools and ceramic sherds. This initial phase of the rock shelter habitation

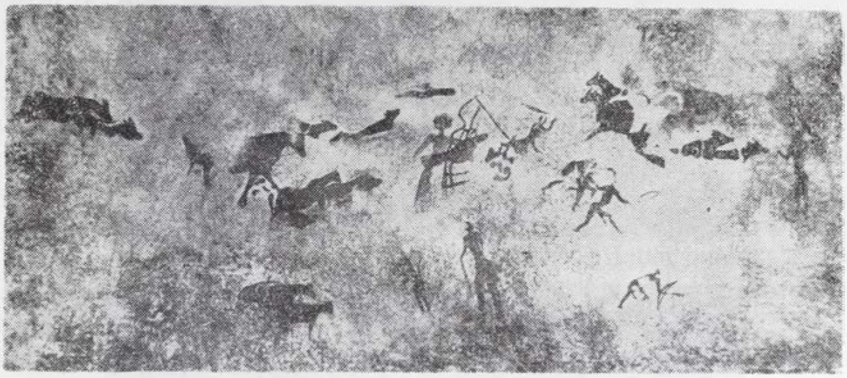


FIG. 2. Uan Muhuggiag (Tadrart Acacus, Libya). Rock paintings belonging to different styles of the Acacus rock art

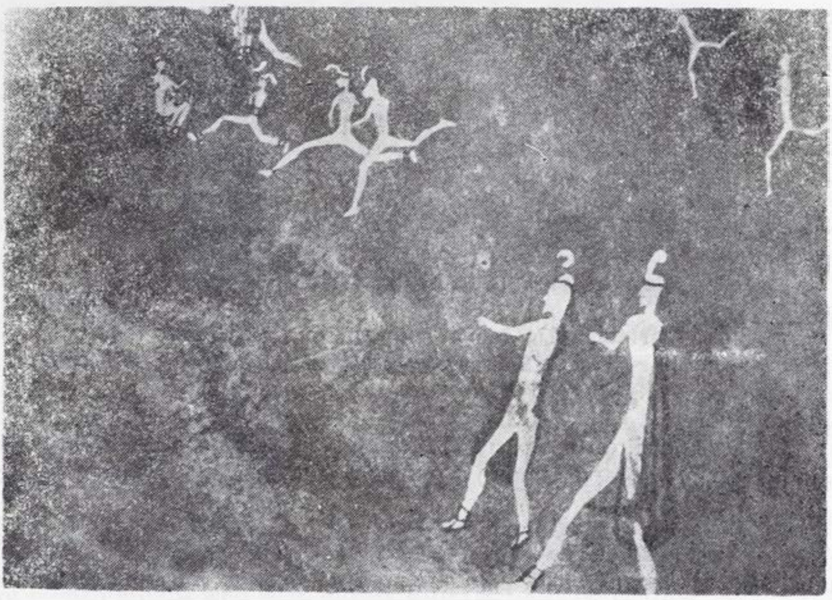


FIG. 3. Uan Muhuggiag (Tadrart Acacus, Libya). Human figures in the "Horse Style"

FIG. 4. Uan Muhuggiag (Tadrart Acacus, Libya). Details of the Trench B during the excavation

would have developed, on the basis of the research by Pasa, starting with the 8th millennium B.P.: a date of 7,438 ± 60 B.P. indicates the chronology of the base of the deposit.

As regards the palinological material, Schulz (1987) provides a diagram of the environmental development which points to an abundance of moisture and, in consequence, of a rich growth of floral species in the period of the habitation.

The study of the faunal samples (Gautier 1987) collected during 1982 indicates the presence, also in the lower levels, of bovines and ovi-caprines, together with wild fauna.

As regards the artifacts, the Uan Muhuggiag pottery yielded by the Lower Horizon (Levels 2, 2a, 2b, 2c and 2d) is abundant and distinct. It seems to be more representative of the technology of a local human group than the lithic industry. This pottery is consistent with the type defined earlier as the "standard dotted pottery" (Barich 1974) which is related to the pastoral inhabitants of the Tadrart Acacus Massif. In view of its early chronology, the site seems to represent an initial phase of this cultural development.

In the Upper Horizon (Levels 1 and 1a), the sedimentation changes and the soil becomes more compact having an admixture of floral remains and cattle dung. However, the hearths are less numerous and artifacts are scarce. Pottery continues to be the most significant component of this deposit. It belongs to a class completely different from that of the Lower Horizon. The paste is "rougher" and "thicker", the colour is red and the surface is usually rough although some polished sherds have also been found. A carinated-type bowl, decorated with dotted impressions on a ribbon, was successfully reconstructed from sherds. Lithic industry is meagre as well as rough, consisting only of sandstone flakes which are either unretouched or with a discontinuous retouch for use as side-scrapers.

Similar to the Lower Horizon, also the Upper one yielded simple artifacts made of bone.

In conclusion, the Uan Muhuggiag development covers a large span of time, from the 8th to at least the 5th millennium B.P. The stratigraphic break, caused by the rock collapse, corresponds to the period of abandonment of the site. Its re-occupation, from 4,730 B.P., carried the characteristics of a developed pastoralism connected with a transformed technology.

Current studies on the later Saharan prehistory recognize the existence of pre-adaptation conditions to food-production during the Early Holocene. The Lower Horizon at Uan Muhuggiag might well represent, in our opinion, this phase of incipient food-production including the exploitation of *Bos* (Gautier 1987).

The outcome of this initial stage in the Tadrart Acacus was a developed pastoral economy based on cattle with "lunate" horns, extensively represented in local rock engravings and paintings. It seems therefore that a change in the original egalitarian society – typical of the hunters-fishers-gatherers – may be assumed from this moment, and accumulation of wealth and emergence of chiefs may be postulated for this period.

The shift to a more developed pastoralism, together with a structural change of tociety, seems to have been caused in this part of the Sahara by a gradual immigration of human groups who were mixing with the local population. As regards this

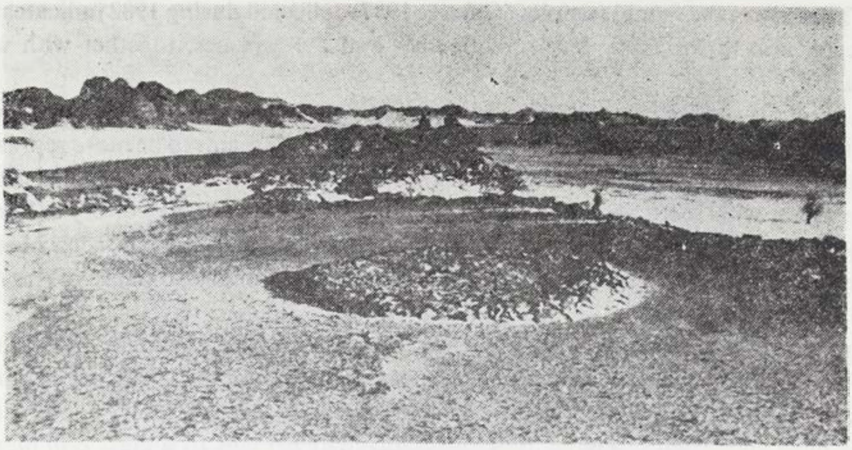


FIG. 5. Tadrart Acacus (Libya). Megalithic building in the Wadi Auis

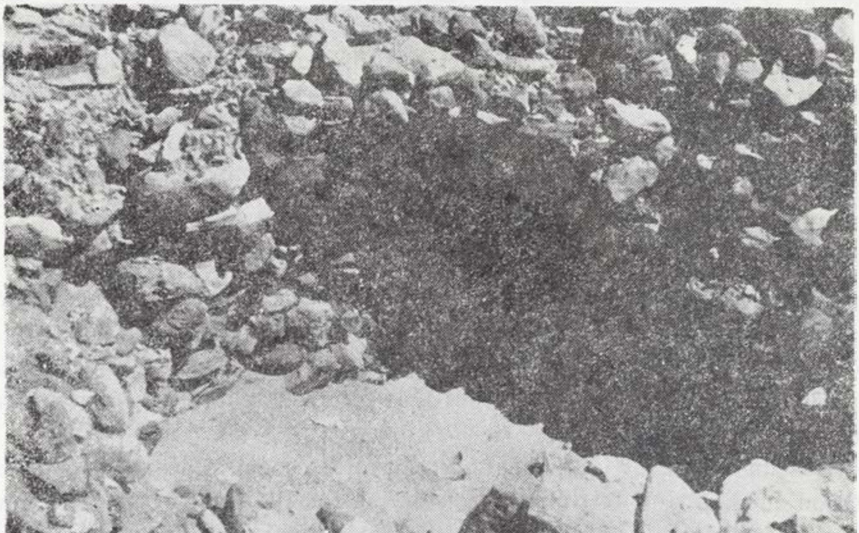


FIG. 6. Germa (Fezzan, Libya). Interior of a tomb in the Royal Cemetery

point, some elements of pastoral Tenerian like gouges and convex-based arrowheads (Hugot 1962) which are also known to be common in the Fayum Neolithic (Caton-Thompson and Gardner 1934) established the Tenere area as the middle ground between the Nile Valley and the western Sahara. At the same time, the Jebel Uweinat paintings indicate some kind of a relationship existing between the Saharan and the Egyptian communities (Puglisi 1976; 1981).

The introduction of the horse and the war-chariot of Aegean origin around the middle of the 4th millennium B.P. (1,500 B.C.), seems to be a better continuation of the traditional links of the Sahara with Egypt. In view of the nomadic character of the "Horse-and-Chariot" men it seems unlikely that archaeological evidence of their passages through the Acacus might be formed, except for the "megalithic buildings" found in strategic positions and occurring on the eastern side of the massif (Fig. 5).

Finally, it is suggested that the Upper Horizon at Uan Muhuggiag yields the evidence, particularly the pottery, of some North-African proto-historic assemblages and human groups. As these immigrants came into contact with the local pastoralists, they brought about a transformation in the structure of the society. The technological superiority might have allowed the Mediterranean groups to take on the role of dominant class, to control the food-production and, perhaps, to organize first trading network. During the 2nd millennium B.C. these nomadic groups succeeded in establishing their control over the entire region of Southern Libya (Fig. 6), organizing it into a state. Evidence for this process may exist in the schematical scene of chariots in the Wadi Zigza, near Garama, indicating a large expansion of white populations in this part of the Sahara (Barich 1984).

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

THIERRY TILLET

La fin des temps paléolithiques dans le Bassin Tchadien nord-occidental

Dans le Bassin Tchadien nord-occidental, il est maintenant possible de superposer, à partir de 40,000 ans B.P., les variations climatiques à la chronologie préhistorique, et l'occupation humaine est directement liée aux fluctuations du climat.

Chronologie paléoclimatique

Au Nord du 13° parallèle, les sables inférieurs de la série des Soulias de M. Servant (1973) indiquent un épisode de remaniement éolien antérieur à 40,000 ans B.P., lié à la formation d'un erg. Cette période aride reconnue partout au Sahara méridional, depuis l'Atlantique jusqu'à l'Océan Indien, correspondrait d'après P. Michel (1973) à une régression marine provoquée par les épisodes froids du Pléistocène récent, contemporains du premier stade du Würm, néanmoins elle reste encore actuellement datée avec peu de précision; il semble qu'elle ait sévi d'environ 50,000 à 40,000 ans B.P. (Durand *et al.* 1983).

Après cette phase de remaniements éoliens de l'*erg* ancien, des dépôts lacustres dûs à une recharge progressive de la nappe phréatique sur les piémonts des massifs centraux apparaissent dès avant 40,000 ans B. P. Ces dépôts qui se retrouvent dans les creux interdunaires de l'erg ancien, caractérisent la phase humide appelée "Ghazalien inférieur". D'après Durand et Mathieu (1980), le maximum lacustre se situerait vers 38,000 ans B.P. et cette élévation des lacs serait expliquée par une diminution de l'évaporation liée à l'arrivée de masses d'air frais depuis le Nord comme le prouve la présence de diatomées psychrophiles dans les dépôts du Ghazalien inférieur (Servant-Vildary 1977). Dans la terrasse de Silémi près de Bilma, un sédiment lacustre comportant une industrie à débitage levallois correspond au Ghazalien inférieur, il est daté approximativement, d'une part par l'industrie et d'autre part, plus précisément, par un calcaire lacustre sous-jacent reconnu ailleurs dans une coupe effectuée dans la terrasse de Silémi. Cette datation obtenue sur un échantillon carbonaté récolté par M. Servant, donne un âge de 33,400±2,500 ans B.P. pour le calcaire lacustre, ce qui permet de dire que le dépôt sous-jacent et son industrie sont antérieurs à cette date.

Après 38,000 ans B.P., les lacs interdunaires du Ghazalien inférieur s'assèchent et va s'installer une phase d'aridité prononcée (aride inter-ghazalien) dont le maximum se situerait, d'après Durand, vers 30,000 ans B.P. Cette phase aride est marquée par des dépôts de sables éoliens sur les piémonts orientaux de l'Aïr, et par une érosion importante dans les sédiments lacustres inférieurs de Silémi.

Après 30,000 ans B.P., apparaît une nouvelle phase lacustre nommée "Ghazalien supérieur", dont le maximum de puissance des lacs interdunaires se situerait vers 22,000 ans B.P. Cette phase humide, qui serait de nouveau la conséquence de la venue de masses d'air frais depuis le Nord, voit le dépôt d'un sédiment fluvio-lacustre dans les dépressions à Bilma. Le niveau fossilifère type "Totou" ou "Ounianga Kébir I" (Coppens 1963) découvert en Ounianga et renfermant *Loxodonta africana*, *Hippopotamus amphibius*, *Lates niloticus* ainsi qu'une grande espèce du suidé, pourrait peut-être correspondre à cette période et les pollens provenant du gisement atérien de Seggedim montrent que l'on assiste alors à l'apparition progressive de la végétation sahélienne (Tillet 1983).

Cette phase relativement humide va être remplacée d'une façon assez rapide par un hyper aride dont le maximum dáridité devait se trouver aux environs de 19,000 ans B.P. Cette phase aride nommée "Kanémien" par Servant (1973) va provoquer l'assèchement des lacs et de puissants remaniements éoliens entraînant eux-mêmes la formation de dunes au Nord du 13° parallèle et peut-être d'*ergs* fossiles dans le Djourab et le Ténéré. Elle est à mettre en parallèle avec l'Ogolien d'Afrique occidentale. Par contre, au Tibesti, la base de la moyenne terrasse se serait déposée dès avant 16,000 ans B. P. et certains enneris auraient eu alors des écoulements permanents (Jäkel 1979), de même un lac d'eaux froides, reconnu dans le cratère du Trou au Natron, est daté de 14,970±400, 14,750±400 et 12,400±400 ans B.P. (Faure 1969).

La nappe phréatique remonte, et des lacs interdunaires se forment de nouveau dès 12,000 ans B.P., époque à laquelle se développent toujours des diatomées psychropiles. Il s'agit du Nigéro-Tchadien inférieur qui prendra fin vers 7,000 ans B.P. et comportera une courte période moins humide vers 10,000 ans B.P. (Servant 1973; Maley 1981).

L'Atérien

Une première phase atérienne a été reconnue près de Bilma, en place dans la terrasse de Silémi. Ici, sus-jacent à un sable dunaire blanc remanié de l'*erg* ancien et comportant, ailleurs dans la terrasse de Silémi, l'Acheuléen ancien à l'état remanié (Tillet 1983), se trouve un sédiment lacustre comportant dans une coupe, deux niveaux: 1. Un niveau inférieur de sables gris solidifiés avec un horizon à industrie abondante (Atérien); cet horizon se retrouve constamment, dans toutes les coupes effectuées sur le site, à environ 372 - 373 mètres et ce niveau pourrait correspondre à un bord de lac; 2. Un niveau supérieur de sables silteux gris, qui pourrait correspondre à une élévation du niveau du lac, qui va recouvrir l'industrie; ce niveau ne se retrouve pas partout dans les coupes.

Cette couche est datée indirectement par un calcaire lacustre sus-jacent daté de 33,400±2,500 ans B.P. et par les sables blancs sous-jacents, ce qui fait que l'industrie, antérieure à 33,000 et postérieure à l'erg ancien, correspondrait alors à la période humide du Ghazalien inférieur.

L'industrie — plus de 5,000 pièces récoltées — à débitage levallois, ne comporte ni pédonculé typique, ni pièce foliacée bifaciale, néanmoins, des pièces à base légèrement rétrécie par encoches alternes témoignent une certaine volonté d'obtenir un pédoncule d'emmanchement. On ne peut s'empêcher de penser, à la vue de cette industrie, à une phase ancienne de l'Atérien, phase qui est d'ailleurs séparée de l'Atérien type Seggedim par l'aride inter-ghazalien.

Le Ghazalien supérieur, se situant entre environ 29,000 et 20,000 ans B.P., voit le développement de l'Atérien type Seggedim (Tillet 1983) ou Adrar Bous. Au Niger septentrional, les gisements sont nombreux, et les plus importants sont: Seggedim au Kawar, Adrar Bous, Izouzaden et Amakon sur la bordure occidentale du Ténéré et Ekouloulef dans le massif de l'Aïr, Au Sud, l'Atérien ne descend pas au dessous du 18° parallèle, ce qui pourrait-être expliqué par le fait que nous sommes là sur la limite septentrionale des grandes étendues lacustres du grand Tchad.

Il suffit d'examiner l'industrie de l'Adrar Bous pous constater la haute technicité des Atériens dans l'art de tailler la rhyolite verte ou le quartzite comme à Chemidour au Kawar, ou même le quartz comme à Izouzaden. Mais cette industrie florissante s'éteind subitement et cette extinction coïncide avec l'arrivée rapide de l'aride Kanémien. Dans l'Aïr, quelques pièces atérennes du site d'Ekouloulef ont été trouvées dans une terrasse dont le niveau est daté au 14C de 18,600±400 ans B.P. (Morel 1981), néanmoins cette date ne saurait être retenue pour l'industrie elle — même puisqu'il semble que celle-ci se trouve à l'état remanié dans ce niveau, quoi qu'il en soit elle ne peut être plus récente et confirme, par conséquent, que l'Atérien du Sahara méridional est antérieur au Kanémien.

Conclusions

Le tableau ci-dessous (Fig. 1) montre les variations climatiques depuis 40,000 ans B.P. corrélées aux périodes préhistoriques. Ainsi on peut s'apercevoir que dans la Bassin Tchadien septentrional, les périodes d'occupations humaines du Pléistocène supérieur sont séparées par des périodes d'abandon plus ou moins importantes.

Ces périodes d'abandon sont directement liées aux phases d'aridité extrême de l'Inter-Ghazalien (vers 30,000 ans B.P.) et du Kanémien (de 20 à 12,000 ans B.P.). Ces phénomènes arides se retrouvent dans tout le Sahara méridional et s'étendent même, vers 17,000 ans B.P., jusqu'aux plateaux éthiopiens et en Afars.

Mais nous savons qu'au centre de la zone anticyclonique Kanémienne, des pluies, d'origine probablement méditerranéenne, tombaient sur les massifs du Tibesti, de l'Atakor et de l'Aïr. Il est donc probable que vers 20,000 ans B.P. les Atériens se soient dirigés vers les massifs centraux sahariens. Et la question qui se

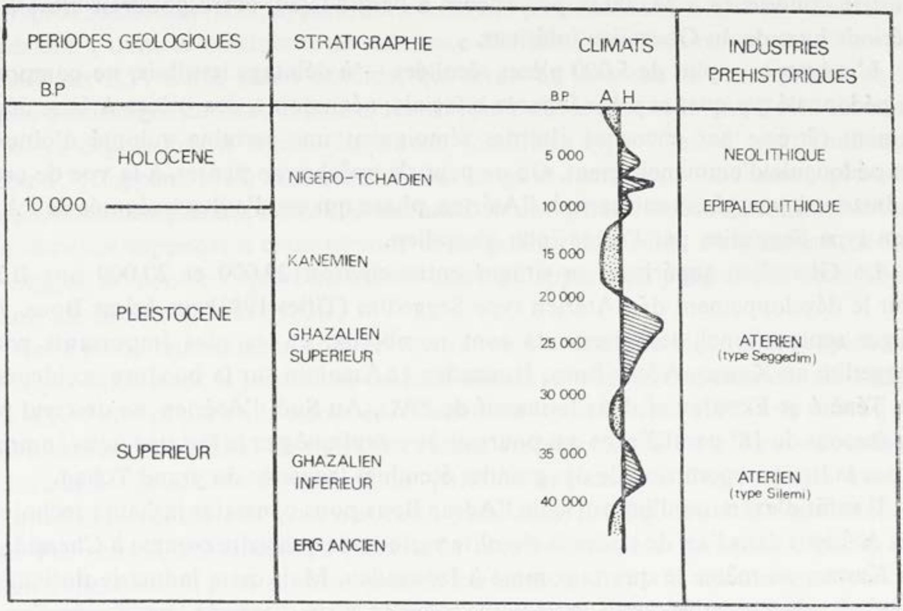

FIG. 1. Les variations climatiques et les périodes préhistoriques dans le Bassin Tchadien depuis 40,000 ans B.P.

posait était de savoir s'ils avaient pénétré les massifs ou s'ils s'étaient arrêtés à leurs pieds? Jusgu'à ces derniers temps, on n'avait pas vraiment trouvé d'Atérien à l'intérieur des massifs centraux sahariens, et cette question se poserait encore si dernièrement un site à débitage levallois comportant des pièces pédonculées et foliacées n'avait été découvert à Ekouloulef, près d'une source au Nord-Ouest du Mont Goundaï dans le massif de l'Aïr.

Je pense que l'Atérien du Bassin Tchadien nord-occidental, plonge ses racines dans le Ghazalien inférieur, c'est-à-dire vers 40,000 ans B.P. et aurait abandonné les régions basses du bassin à la fin du Chazalien supérieur vers 20,000 ans B.P. pour peut-être encore survivre quelques temps à la périphérie des massifs centraux sahariens.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
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JAN JELÍNEK

Saharan Neolithic rock art

During the past eight years I had the chance to visit Libya several times and to study the Saharan rock art in diverse Fezzan localities. The results of this study have thrown some doubt upon the validity of the relative chronology of the Saharan rock art that so far has been frequently used. According to this relative chronology, the earliest rock art comprises carvings and deep engravings of the great "Ethiopian" fauna, sometimes accompanied by human figures, mostly archers (the so-called hunting period). The finest of these carvings – representing pachyderms – are to be found in Wadi Berdjush, west of Murzuk. Leo Frobenius, a German scientist who had visited this area as early as 1932, published in 1937 the results of this observations (Frobenius 1937). In the principal localities of the wadi, in Mathrndush (Frobenius, In Habeter III - IV), El Uarer (Frobenius, In Habeter II) and In Abeter (Frobenius, In Habeter I) he found the most important representations of various animals, human and human-like figures and geometrical signs. Most of these rock carvings were deep and Frobenius, as well as other specialists visiting the wadi after him, held that all these deep carvings were of the same age, no matter whether they represented bubalus, elephants, rhinos, hippos or cattle figures. The rock carvings with bubalus were the "markers" of these early representations and other deep carvings of cattle, men *etc.* were added. No paintings were known from that period and region. Not a single bubalus painting was found until 1958, when Lhote published the first bubalus figure from Tassili painted in a quite different style (in the so-called round-head style), believed to be younger than the known engraved bubalus figures. Characteristic round-head paintings were found in Tassili (Lhote 1958; Lajoux 1962) and in Accacus (Mori 1965). The Negroid influence in their style was well recognized. As a rule only paintings have been described for this round-head "period". Mori was the first to define in 1978 some engravings in Tin Ascigh in Accacus as originating from the round-head period. The famous Tassili paintings of pastoralists with domesticated herds of cattle and other domestic animals were recognized as being of a later period and dated with the help of C-14 as Middle-to-

Late Neolithic. The engraved or pecked figures of horse and camels were dated as post-Neolithic on the basis of our historical knowledge of the introduction of these domesticated animals to the Sahara.

The relative chronology did not take into consideration the regional styles and variations, nor the individual styles of the artists. After studying the principal Fezzanese rock art sites and many other recently discovered galleries, I am convinced that the regional styles and the styles of individual artists played an important role in the Saharan prehistoric rock art. Not only this. We must also bear in mind the fact that some figures were copied in the same period or later, some of them even much later, in a different period characterized by a different art style or styles. Another complication in determining the chronology of the Saharan rock art is the fact that only few specialists have admitted or even considered the coexistence of paintings and engravings in certain periods (Mori 1978).

The Wadi Berdjush rock art galleries represent a single local style in the majority of their earliest rock carvings. The carving begins with a slightly pecked pre-design of the outlines, the figure is then carved and often incised deeper and deeper. Deep carving is a characteristic local feature. This technique was used here for some round-head style and pastoral figures, cattle figures and few masked men. The babulus figures and large Ethiopian fauna are sometimes only slightly engraved, without deep carving. This style and technique does not appear in other regional Saharan rock art centres. In Aréchin (South of Ghat), generally considered to be of the same age as Mathrndush and other Wadi Berdjush localities, the animal and human figures are more simplified and not so deeply carved. In the near Tilizahren localities some of the figures mentioned by Barth (1850), Frobenius (1937) and Pesce (1967) are different in style and are not so deeply incised. We can even compare the bubalus and big pachyderms figures from Wadi Berdjush with Oued Djerat (Lhote 1975) and with North African carvings to notice other important differences. In the North Algerian galleries there are big archaic carvings of animals, represented in side view, with two legs only, whereas in Wadi Berdjush all animals – elephants, bulls, rhinos and bubaluses have always all four legs represented. No doubt, the simplified representation with two legs only is a North African regional feature.

In Wadi Berdjush we can see characteristic peckings and grindings on the rock face in some early figures. In certain cases these grindings have the form of a shallow relief – a very decorative feature, not repeated in other regions. In Dider, in North Tassili, the grinding of early rock art figures is executed in a different style, limited to this site only; it can be the individual style of a single artist. Different technique of grinding the rock face is used in Oued Djerat. In small and isolated localities it is difficult to say whether these special features are the result of isolation or if they represent the individual manuscript of a particular artist.

In Mathrndush (Wadi Berdjush, Jelínek 1984a) we find several examples of figures or whole groups of figures being copied in the same period or later. The group of bovidian cattle figures (Fig. 1) was copied in the same period and in the same rock

FIG. 1. Mathrndush. A herd of domesticated cattle represented in bovidian style. Note the typical composition of figures and heads

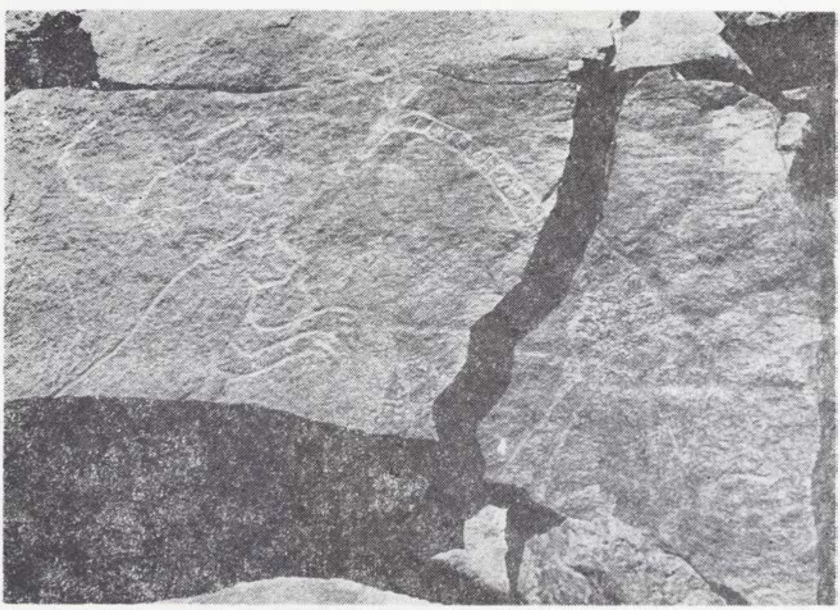

FIG. 2. Mathrndush. A scene with a giraffe and a lion which is copied in the post-Neolithic horse period higher up on the rock face

art style. The lion attacking a giraffe (Fig. 2) from the same locality is an example of a later copy, from the post-Neolithic horse period.

Frequent are also the later additions. The bubalus figure (Fig. 3) in Mathrndush has an additionally engraved pair of horns. A further back-line and a new long, hanging tail had also been added to it. These additions were realized in later bovidian Neolithic times. The human figures are often later additions to earlier animal figures. So, *e.g.*, in In Galgien in Wadi Berdjush we can see a wonderful parade of three elephants engraved in decorative archaic Neolithic style. Over the trunk of the first elephant we can see a human figure with a throwing knife in his hand (Fig. 4); this figure has been added much later, in the post-Neolithic horse period (Jelínek 1984b). Two other human figures, one below the trunk and the other back below the elephant's tail, were added still later, in the camel period. There are other similar examples to be found in the region. The human figures are small, usually situated separately or in groups in front of the animal (elephant, giraffe, bull) or behind it. They accompany the round-head, decorative or bovidian Neolithic figures. There is also a number of additional bovidian and post-Neolithic-style figures (coming from the horse period, or possibly even from the camel period). Such representations illustrating religious or mythological scenes provide evidence that the traditions which were in the ideological background of such representations survived over long periods ranging sometimes from the Neolithic to the historic camel period.

Unfinished pre-designs

We find often unfinished figures at different stages of execution. The first stage is a slightly pecked outline. We find such pre-designs of the evidently very old geometrical signs, as well as of much later figures of the horse period. In order to decide upon the age of such unfinished representations we must carefully observe all details of the technique and also of the subject.

Weathering

The age of the engraving is often determined with the help of the degree of weathering. This method can be used for relative dating, if we compare figures on the same rock face, *i.e.*, figures equally exposed to the weathering effects. The principal weathering factor is sunshine. In places where the rock face is fully exposed to the sunshine, weathering is so advanced that only the post-Neolithic figures have a weak patina, lighter than the rock's surface; earlier figures engraved or pecked in the different times of the Neolithic period are usually of the same colour and show the same degree of weathering as the rock face. This holds for the decorative (bubalus) style, round

FIG. 3. Mathrndush. A bubalus figure of atypical shape, long tail and with additional back line and horns. Bovidian style

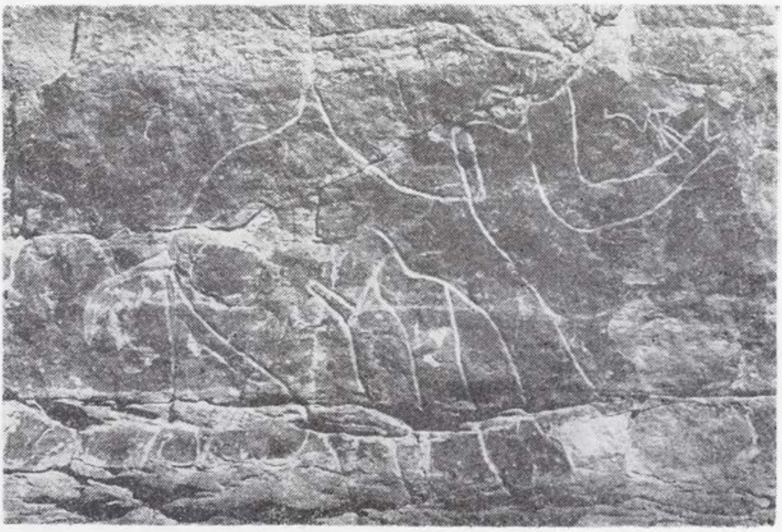

FIG. 4. In Galgien. A decorative elephant figure (bubalus style) with a small human figure (horse period) over its trunk and with two other human figures (camel period) below the trunk and below the tail

head style and bovidian engravings as well. Prehistoric artists preferably selected rocks facing north. Shaded and protected against the sunshine, the artist could work comfortably. Weathering on north-oriented rock faces is definitely slighter than in the open space and its degree can be compared only between the figures on the respective rock face. In such situations there is a well definable difference between the more weathered decorative (bubalus) and round head styles on the one hand, and between the less weathered, later, bovidian style. This fact signals chronological differences among the Neolithic styles. If we compare the bubalus and big wild animal figures with the round head style figures, we do not find any fundamental difference in weathering. We can find differences in weathering when comparing in the same places the decorative bubalus style with some bovidian figures. In other words, the bovidian figures compared with archaic decorative (bubalus) style figures of the same rock face, are sometimes of the same, and sometimes of a lighter weathering degree. This fact can be interpreted as indicating the survival of the bovidian style over a long period. Its earlier figures were contemporary with the decorative (bubalus) style figures. Only further discoveries and comparative studies can definitely solve this problem.

Other important weathering factor is the wind, especially wind carrying sand, *i.e.*, sandstorms. Weathering caused by wind and sandstorms is always heavier in figures situated low, near the riverbed of the wadi, and is lighter in figures situated high up the rocks. There are no rock paintings in Mathrndush or at In Galgien. In fact a light reddish hue covering the engraved figure can be noticed at times, but so far it is impossible to say whether it is a natural rock colour or whether we have to do with remains of prehistoric colour decorating the engraved figure. The post-Neolithic figures, *i.e.*, the horse and camel styles differ from the prehistoric ones not only in their styles but also as regards the degree of their weathering. As compared with the Neolithic figures in the same conditions, their weathering is always slighter.

The coexistence of paintings and engravings in certain periods and ideological continuity

As has been already mentioned above, not a single painting is known in the decorative archaic (bubalus) style. The earliest known paintings belong to the round head style and come from Tassili and Accacus. Mori was the first scholar to try correlating some engraved Accacus figures (Mori 1978, Tin Ascigh gallery) with round head style paintings. This was criticized by Muzzolini (1983). We would like to add some of our observations concerning the round head style paintings and engravings.

Mori excavated in South Accacus at the Fozzigiaren site, a round head period Neolithic layer with Epipalaeolithic pattern of living and with the knowledge of pottery-making (he dated the layer with C-14). The character of both the locality and the finds suggests that these people were settled and lived at about 6,000 B.P.

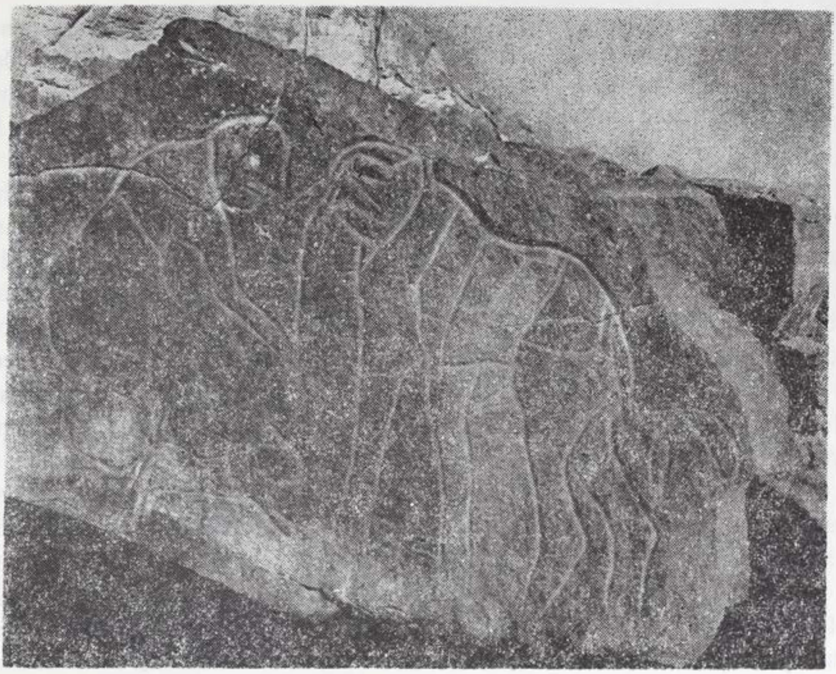

FIG. 5. Mathrndush. Unnatural figures. They have parallels in the round head style paintings in Tassili. The technology of the engraved lines and the size of figures is the same as in early pastoral figures in the same gallery. Only the subject is different

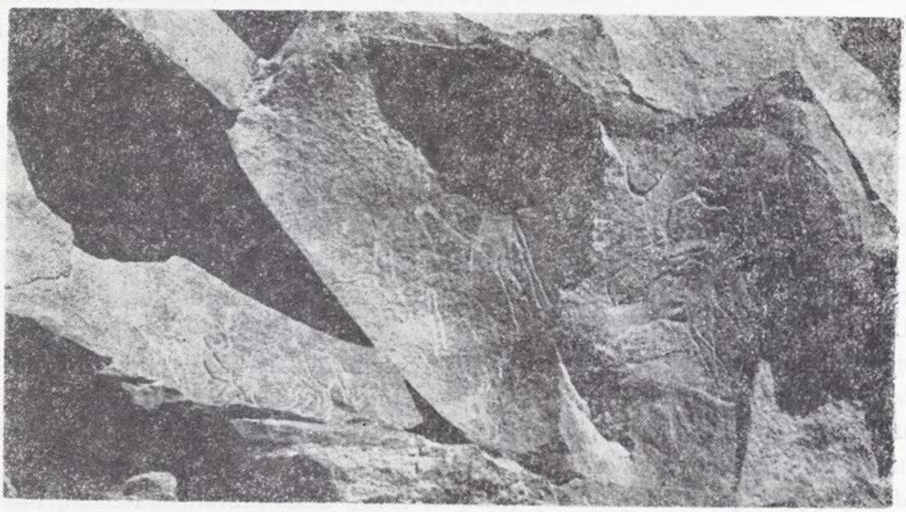

FIG. 6. Expressive, non-realistic figures, fully ground. Round head style. Note the similar shape of a rhino compared with Fig. 7

On the rock face of this locality I found a heavily weathered frieze of animals and a small squatting human figure. The extremely high degree of weathering makes it most probable that the figure come from the Early Neolithic, and can be contemporary with the settlement. I came across similarly heavily weathered round head style paintings also in Wadi Affarh, South Accacus (Jelínek 1982a) alongside with some engraved figures. There are simple human figures, some of them with bull horns and "fish" figures, described by Mori in Wadi Imha, Accacus (Mori 1974) as earliest engravings. All these engraved figures should be regarded as representing "round-head' style. They seem to have a very early dating and the fact that they are without analogy support the suggestion that they belong to the Early Neolithic dated by Mori at $6{,}122 \pm 100$ B.P. Future research will show whether this early dating (and hence the early dating of the rock art of round head style) is a regional affair appearing in south Accacus only, or whether it is a more general situation. So far, the first possibility seems to be more probable. The Affarh example brings together the bull ceremonies of the round head style paintings with engravings of human figures with bull horns. It must be added here that a good example of human figures with bull horns is the well known round head style painting from Tassili (Lhote 1958) where there also occurs a bubalus painting in round head style. All this brings us again to the problem of age of various styles in different regions and the possible survival of some animals (bubalus) in certain areas, while in other areas these animals could be already extinct by that time.

The round head style paintings in Tassili have a markedly mythological and/or religious ceremonial meaning. The figures represented are often unnatural beings or beasts; they are expressive yet not realistic representations.

We find some similar unrealistic representations in some Mathrndush rock carvings. Their size, technique and their degree of weathering in Mathrndush are the same as those of other Neolithic (decorative style bubalus and some bovidian figures) rock carvings (Fig. 5).

Some other examples of unrealistic expressive figures, probably another round head style group, are represented in the form of pecked and ground figures (Mathrndush, Fig. 6: lions, monkeys and giraffes; compare with Wadi Zreida, the rhino at the bottom of Fig. 7, Jelínek 1982c). There is an example of a religious or mythological bull ceremony in the round head style (Affarh, Accacus, Jelinek 1982a) and in Tassili we found a decorated bull figure also painted in round head style (Lajoux 1962). Also at both the Affarh and Tassili sites can be found painted or engraved human figures with horns. In East Tassili (Tin Hanakaten, Aumassip 1978) there is another example of painted bull ceremony (with figures jumping over the bull); in this case they are early bovidian style paintings. It seems worth remembering that in the Neolithic carvings we see mostly bull figures only, and cow figures with udders appear quite exceptionally (Jacquet 1978). Bulls prevail in Fezzan, North Niger, North Chad, Oued Djerat in Tassili, in the North Algerian sites, as well as in some Tripolitanian sites and in North Libya (Tarhuna, see Jelínek 1982b).

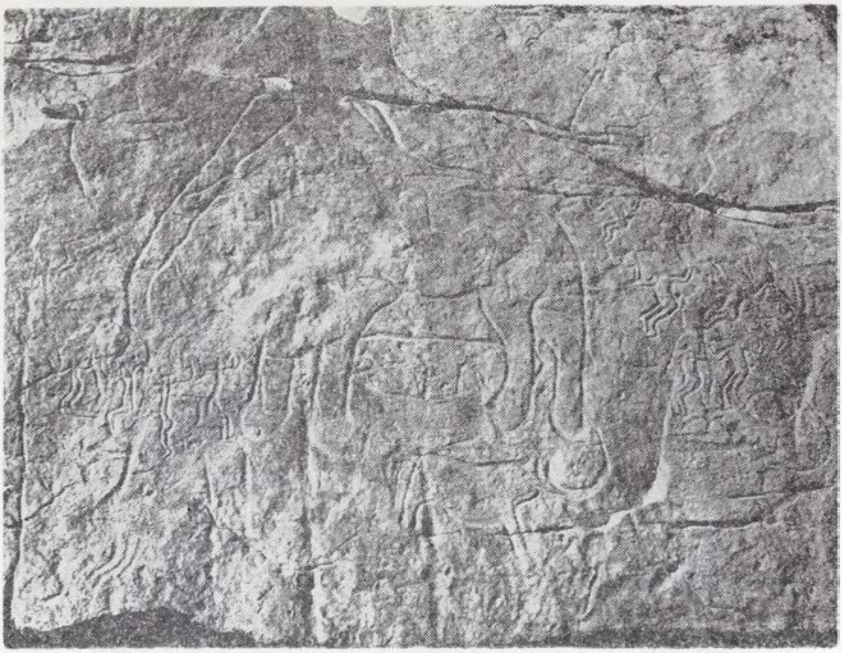

FIG. 7. Wadi Zreida. Complex religious scene with an elephant. Note the characteristic round head style figure of a rhino lower on the rock face. Compare with the rhino in Fig. 6

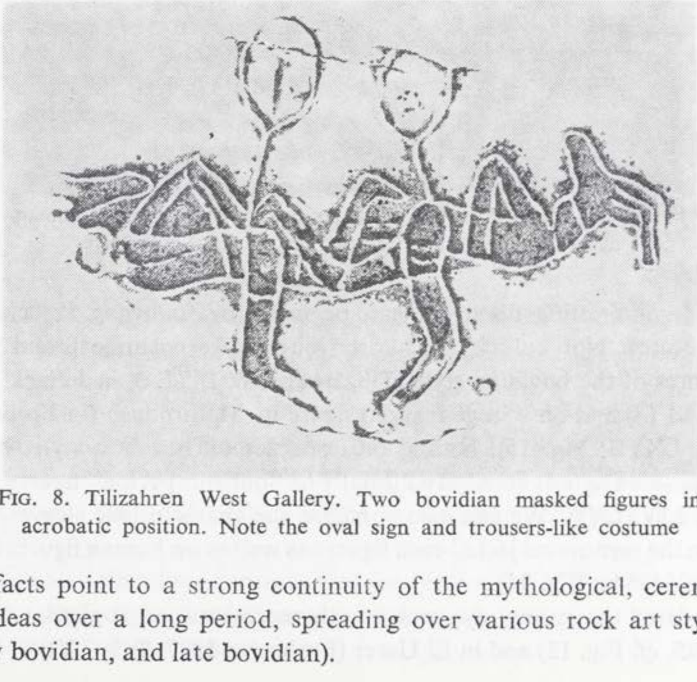

FIG. 8. Tilizahren West Gallery. Two bovidian masked figures in acrobatic position. Note the oval sign and trousers-like costume

All these facts point to a strong continuity of the mythological, ceremonial and religious ideas over a long period, spreading over various rock art styles (round head, early bovidian, and late bovidian).

The masked men compared from diverse Fezzanese localities are different in size; (compare Mathrndush, Frobenius 1937: Tab. LXVII, with our Figs. 8, 9, and 10; Jelínek 1985). The jackal-men are numerous in Wadi Zreida bovidian paintings (Fig. 11, Jelínek 1982c). They are engraved in Tilizahren TE 1, TW 2 (Fig. 12, Jelínek 1985), in Mathrndush (Jelínek 1984a: Figs. 33, 59, Tab. VIII; Frobenius 1937: Tab. LIV) and in El Uarer (Frobenius 1937: Tab. LVI). This demonstrates that both the masked men and the jackal-men are found in the decorative style (the so-called bubalus period) as well as in bovidian scenes.

FIG. 9. Tilizahren West Gallery 1. An ostrich and a masked human figure (bovidian) superimposed on an earlier bull figure

A similar, interesting discovery can be made by following the characteristic costume features. Not only is the short trousers-like costume found with small masked figures of the bovidian style (Tilizahren TW 1, TE 3, in Jelínek 1985: Figs. 8, 10, 13, and 14) and on a large masked figure in Mathrndush (in Frobenius 1937: Tab. LVII, LXVII; Fig. 15), both good examples of bovidian style, but also on several jackal-men figures considered usually as "bubalus period" figures (Frobenius 1937: Tab. LIV, LVI). We can also compare the characteristic sleeves. These can be found on the mentioned jackal-men figures as well as on human figures in Mathrndush (Jelínek 1984a: Fig. 34).

The mode of the animal eye and mouth representation is similar in TW 1/27 (Jelínek 1985, *cf.* Fig. 13) and in El Uarer (Frobenius 1937: Tab. LVI).

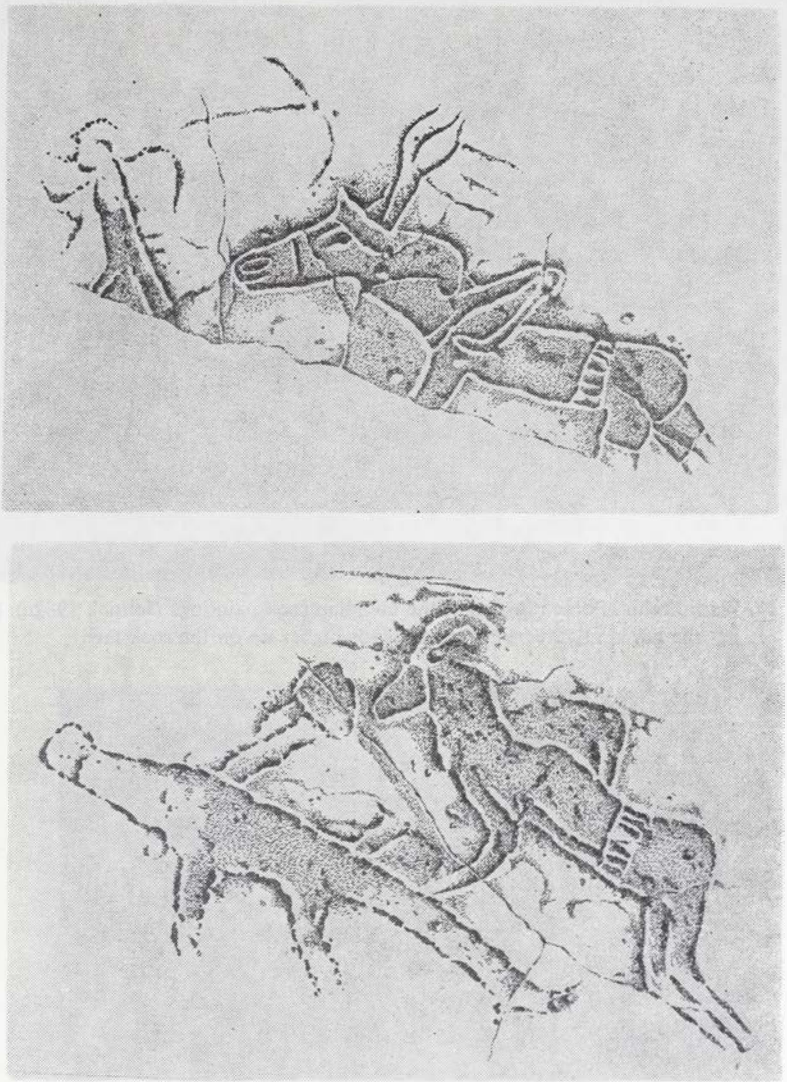

FIG. 10. Tilizahren East Gallery 3. Bovidian human masked figures with characteristic costume

Several bovidian human figures have the apron. In Mathrndush they were considered (Frobenius 1937: Tabs. XLVII, XLVIII) as of the bubalus period age and in Tilizahren (TW 1/27, Jelínek 1985) as bovidian (compare Lajoux 1962: Figs. 162, 163).

All this demonstrate a long continuity of the ideological background in rock art representations and cultural relationship between the so-called bubalus period hunters and the bovidian pastoralists.

FIG. 11. Wadi Zreida. Some remains of the bovidian rock paintings (Jelínek 1982c). Note the human figures with jackal heads higher up on the rock face

FIG. 12. Tilizahren West Gallery 2. The jackal-man with characteristic costume

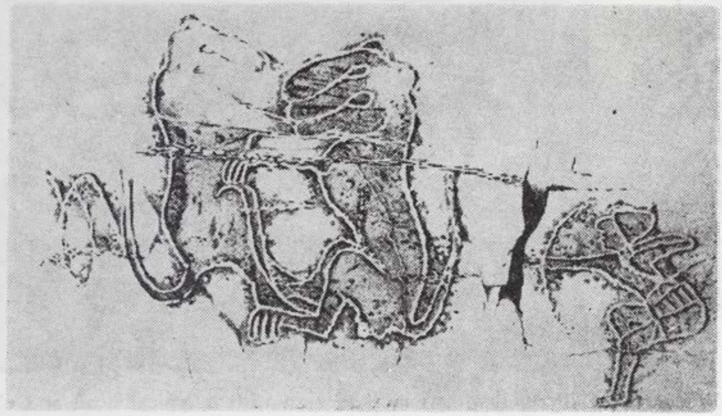

FIG. 13. Two lions with a hunter. Note the trousers-like costume which we find in bovidian figures. Compare the characteristic type of the eye in lion figures with the eye of the jackal-man in El Uarer (Frobenius 1937: Table LVI)

FIG. 14. Tilizahren West Gallery. Two bovidian human figures with head--dresses and with oval signs. Note the trousers-like costume

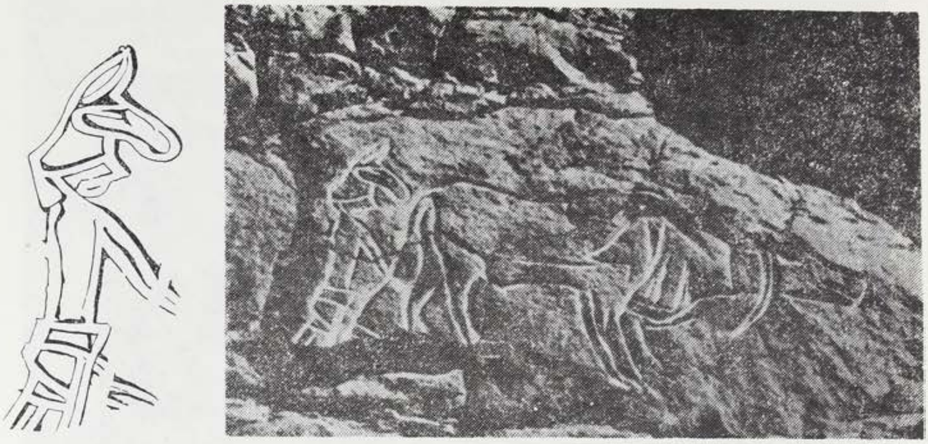

FIG. 15. Mathrndush Gallery. Bovidian masked man with a typical head and characteristic short trousers. Note the deformed type of horn of the bull (after Frobenius)

Relation between bovidian paintings and engravings

In two localities we found bovidian paintings easily comparable with the Tassili paintings. This was in Wadi Zreida near Brak Oasis and in Tilizahren (West Gallery II). In Wadi Zreida it is a large painting of many human and animal figures situated on a large vertical rock face. The human figures are pictured with jackal heads. The animal figures represent mostly cattle and sheep. All these figures are small, of size similar to that of the majority of bovidian paintings in Tassili. The artists often used white and brown colour. One important fact is that in the same wadi, just on the opposite bank, we can see similar engraved and pecked human and cattle figures. No doubt they are of the same style and come from the same period, as documented by their superposition over other engraved and pecked figures.

We found another example of bovidian paintings in a small cave in Wadi Tilizahren, on the cave ceiling. There are three giraffe figures and some other cattle paintings and in terms of their style, size, colour and subject they are all much similar to the bovidian Tassili paintings. Some of them were known already to Frobenius (1937). The above two examples are the easternmost bovidian paintings so far known.

Having found comparable engraved and pecked figures in Wadi Zreida, we also looked for further contemporary engravings in other galleries. We found small human figures, sometimes with animal heads or animal masks in Wadi Tilizahren (West 1, East 3) together with cattle outlines in similar composition as known in the Tassili painted cattle figures and herds, but larger in size (Figs. 16, 17, and 18). Some animal figures are complete, others are represented by heads, and still others by their backlines. We also found this characteristic type of bovidian representation in Mathrndush and among the In Galgien rock carvings of cattle figures, which are bigger in size than the painted figures in Tassili. The size is different, the method (rock carving) is different, but the subject and composition (cattle herds) are the same.

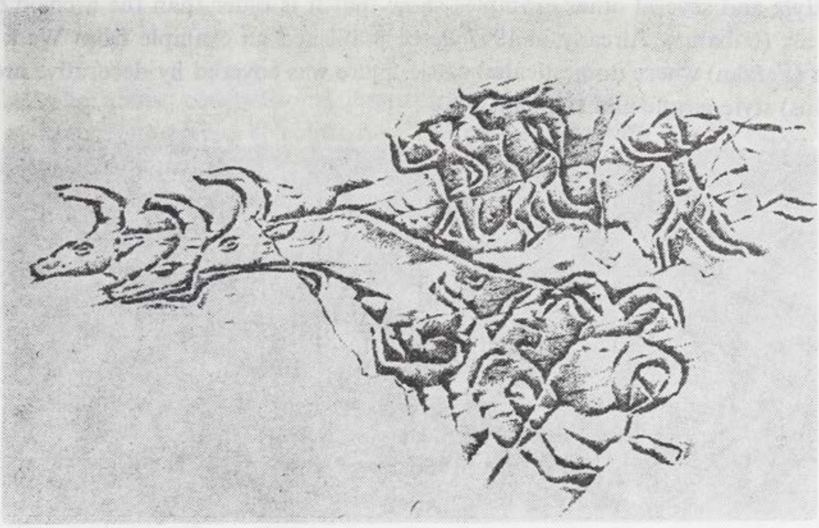

FIG. 16. Tilizahren West Gallery 1. A group of human figures with typical bovidian cattle figures

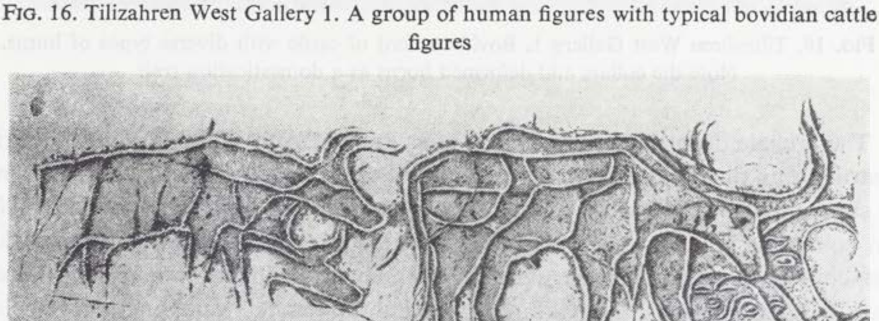

FIG. 17. Tilizahren West Gallery 2. Bovidian herd of cattle with diverse types of horns

The masked figures wearing various animal effigies on their heads (jackal, cattle, elephant) were sometimes small, roughly of the size of the painted bovidian figures in Tassili (compare Tilizahren West 1); sometimes there occur bigger examples (Mathrndush). There are no Negroid features in these figures. The masked figures are evidently humans with masks and the figures with animal heads are most probably mythological figures, not human beings.

If we start our analysis with the economic background of the people responsible for the Saharan Neolithic rock carvings and rock paintings, we can state that the cattle domestication is much earlier than the bovidian paintings from Tassili. Especially in South Accacus (Affarh, Fozzigiaren) domestication co-occurs with the round head style and several other examples show that it is older than the archaic decorative art (bubalus). Already in 1967 Pesce published an example from Wadi Tilizahren (Fezzan) where domesticated cattle figure was covered by decorative archaic (bubalus) style giraffe and elephant.

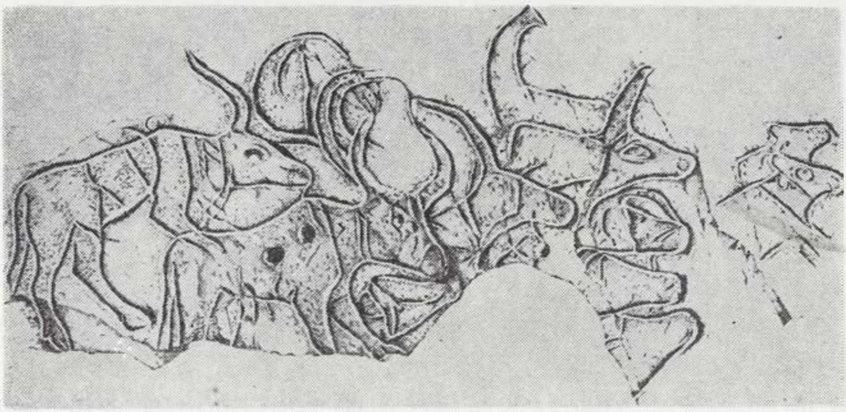

FIG. 18. Tilizahren West Gallery 1. Bovidian herd of cattle with diverse types of horns. Note the collars and deformed horns as a domestication trait

The archaic decorative (bubalus) style as known from Wadi Berdjush localities is earlier than the typical bovidian paintings of cattle figures or herds. This is proved by superimposition, style and sometimes by weathering differences (Jelínek 1985). But some less frequent examples demonstrate that domesticated cattle was here also contemporary or earlier than the wonderful elephant or crocodile figures. Artistic representations, the painting styles and different styles of engravings belong to different populations of hunters or pastoralists. They belong to different racial types – black African (round head style and some bovidian Tassili paintings), Hamitic or North African (bovidian paintings in Tassili or engraved figures or archers in Wadi Berdjush, fund mixed in Tassili, Tin Abaniora type of paintings). Also chronologically there is a marked difference between the post-Neolithic (horse and camel periods) and Neolithic engravings (archaic decorative style, round head style and bovidian engravings) and paintings (round head style, bovidian diverse styles). It seems that the styles are of different age in different areas. Thus, the round head engravings and paintings in Accacus and especially in south Accacus seem to be earlier than the round head style engravings in Wadi Berdjush. It is unlikely that the big wild animals engraved in North Algeria and in Wadi Berdjush or Oued Djerat were contemporaneous. Even if the Neolithic climatic conditions in this part of the

Sahara had been generally better than today, the mountainous Saharan regions were fairly isolated and their cultural development would have been similar but not simultaneous. All this seems to indicate a complex situation.

Summary

All the above observations demonstrate the following:

1. Long time period (Neolithic) of the pastoralists with a very early, well developed cattle breeding.

2. Very early round head style paintings and engravings (probably the earliest, at least in some rock art centers like Accacus).

3. The decorative style (the so-called bubalus period) is contemporary with early pastoralists (at least in Messak).

4. There is an ideological similarity between the pastoralists and decorative style and between late pastoralists and horse period designs.

5. There is an evident difference between the religious ideology of round head style and the pastoralists.

6. The bovidian rock art is represented in Fezzan by numerous rock carvings which differ in size (they are larger) and in technology (they are rock carvings) but their subject and composition is the same as in bovidian paintings.

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LATE PREHISTORY OF THE NILE BASIN
AND THE SAHARA
Poznań 1989

MARK MILBURN

Enigmatic stone objects of the Saharan Neolithic and Post-Neolithic

Microwear study and its limitation

Some, though not all, of the artefacts described are not made of flint. The problem arises as to whether these may ever be regarded as suitable for microwear study, even were their condition adequate. Patination and even slight abrasion, tending to destroy microwear traces rapidly and completely, will have ruined much Saharan material. Very little work is known to have been done anywhere on non-flint tools.

Another setback may be in the general difficulty in obtaining supplies of the same rock used in tool manufacture, since not all flints perforce behave in the same way in terms of damage through use, in order to carry out controlled experiments, using replicated tools. For the above information I am much indebted to D. A. Rowe.

The two basic aims of petrological examination of stone tools, as explained by Cummins (1983: 17), are to identify the products of known factories and to acquire petrological data leading to the discovery of previously unknown sources of raw material. It is depressing to learn that some particularly tantalising non-flint objects, especially apparent fragments of large artefacts occurring as surface finds, can only be identified by typology studies, at a time when these in themselves remain incomplete (*cf.* Hugot 1968: 485, speaking of large enigmatic objects, particularly from the eastern Sahara, suggestive of "coulters" or "ploughshares"). Even traces of wear and/or striations visible with the naked eye (as on much grinding material as well as on ard-tips from Orkney and Shetland) may not be much help, when only a fragment is involved.

Re-use of implements by later populations is another hasard. Here may be envisaged the treatment of a different substance in a quern formerly used for something else. For terminology here used in respect of grinding material component parts see Table 1, which I have kept as simple as possible. Not only the substance treated in this secondary context, but also the method of use of the upper and lower stones in conjunction one with another, may blur and distort existing wear-patterns on

Table 1

Terminology of grinding material

Name	Author	Term here used
Grain-rubber, saddle quern	Curwen 1937	Saddle-quern/saddle quern/quern
Revolving handmill/rotary quern	Curwen 1937, 1941 Bray and Trump 1973	Not used
–	–	Static quern, not transportable, or only for short distances
Handstone Upper stone	Banks 1982 Clark 1973	Upper stone
Lower stone	Curwen 1937 Clark 1973	Saddle quern/quern/static quern, dependent on circumstances
Milling stone	Banks 1982	Saddle quern/quern/static quern, as above
Fixed grindstone Grinding and pounding hollows	Hugot 1981 Camps 1982	Fixed oval or roundish depressions (*i.e.*, not all shown to have been used for grinding/pounding)

Pestles and *mortars* sometimes look identical to *upper stones* and *querns* respectively. Apart from clear-cut pestles and mortars, the identification of a number of objects appears to depend entirely on the opinion of the viewer. Certain texts may also have suffered during translation.

both artefacts. It is also a common occurrence to find lone upper or lower stones, presumably carried far from their original habitat and then abandoned. The use of some upper stones to break up sugar nowadays has been cited by Maître (1972: 135).

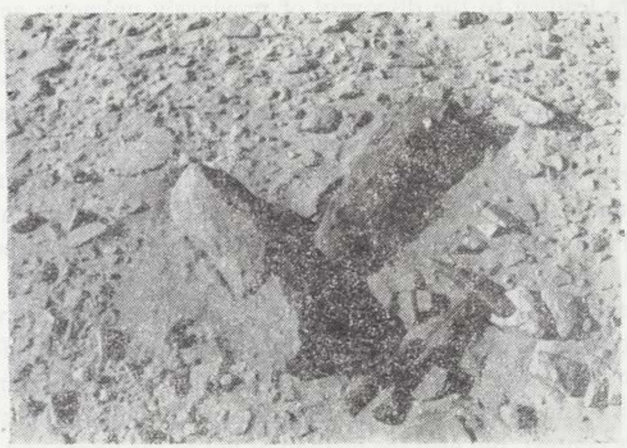

FIG. 1. Western Immidir. Two embryo *rondins de pierre*

We may still be far from the day evidently envisaged by a well-intentioned researcher who came upon a pair of apparent rough-outs of long stone rods ("rondins de pierre") lying adjacent at about 2412N/0225E, being heard to wonder aloud as to whether it might one day be possible to determine: a) the probable shape of the finished produc:ts, and b) the type of tool(s) used to rough-cut the two objects involved (Fig. 1).

Grinding material

In spite of gallant efforts by Roubet (1973) and Amblard (1982; 1984) to standardise French-language nomenclature – the latter author dealing anyway with a single region – I am ignorant of any universal terminology in English (see however Table 1 and Kraybill 1977: 487 - 488).

The existence of two quite different methods of saddle-quern manufacture has become apparent since 1982. The first seemingly involved carving the quern outline in a horizontal or even vertical rock-face, then detatching it from the parent rock for completion (Milburn 1983). The second method was to collect suitably-shaped stone blacks from the hillside and then shape them as required, as at Adrar Madet (1839N/1027E) (Fig. 2). From the number of unfinished examples lying about

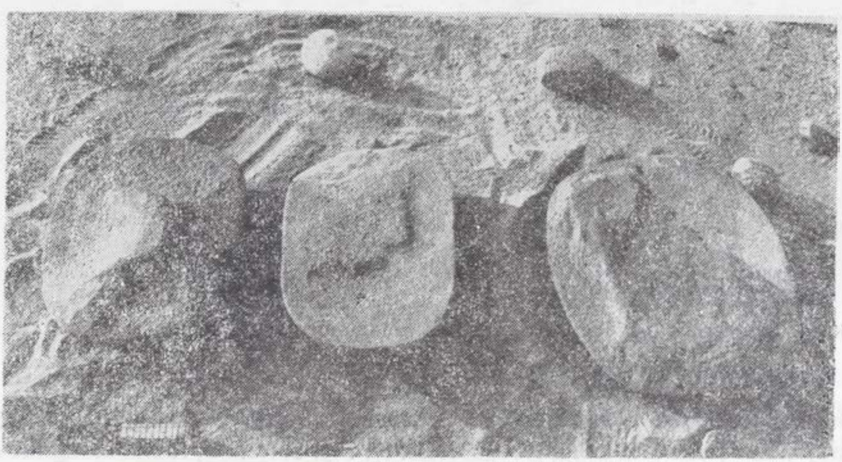

FIG. 2. Adrar Madet. Embryo saddle querns. Behind them are (left) a stone ball and (right) a typical upper stone

it may be inferred that the site was left, once climatic conditions became too severe, a situation also attested by Quéchon and Roset (1974: photos 2 and 3) at nearby Termit. It is thought that Adrar Bous, also in this area, was abandoned around 4,500 B.P. (Smith 1984: 86).

The typology of upper stones used with saddle-querns appears highly complex in some regions (Fig. 3 and 4), though less so in others (Banks 1980: 242 and Figs. 12: 4, 7 - 9; 1982: 17). It is possible that the four types listed around Adrar Bous by Clark (1973: 283) inclusive of pestles, could be further subdivided. Each and every

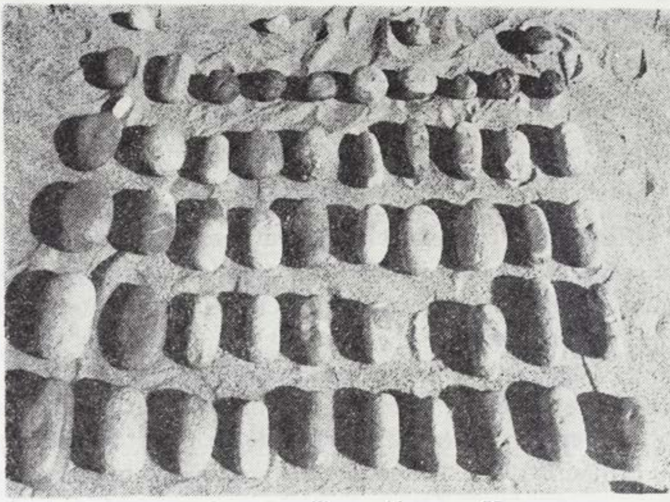

FIG. 3. Southern Tassili-uan-Ahaggar. Upper stones

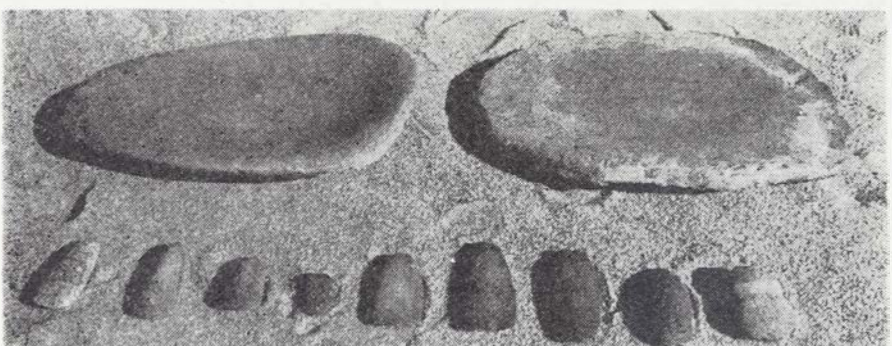

FIG. 4. Southern Tassili-uan-Ahaggar. Two saddle querns and some axes. Note small grooved axe on right

typology risks being thrown into utter chaos by an apparent habit of picking up a handy small stone and using it regardless: *cf.* Fig. 5, item *2*, found alongside item *1*; this latter, when turned over, proved to be a small mortar on whose visible bottom part much hammering shows.

The upper stones illustrated by Savary (1967: Fig. 1) appear to be variations on a single theme and are probably found over a huge area, testifying to a certain unity in method of use. A number of stones in my Fig. 3 bear traces of hammering; *cf.* Brennan (1975: 138) in respect of "anvil or pitted stones" of U.S.A. apparently very similar to those mentioned by Souville (1976: 198 - 199), along with grooved axes found in the Eastern Sahara, as in Morocco and U.S.A. (Brennan 1975: 102). Arkell (1953: 42) associated hammer-stones with breaking up lumps of ferruginous mudstone used for red ochre and similar other stones used for pigment. Some apparent large anvils seen in western Immidir, on what to-day is a particularly inhospitable bare hillside, must await further study before publication.

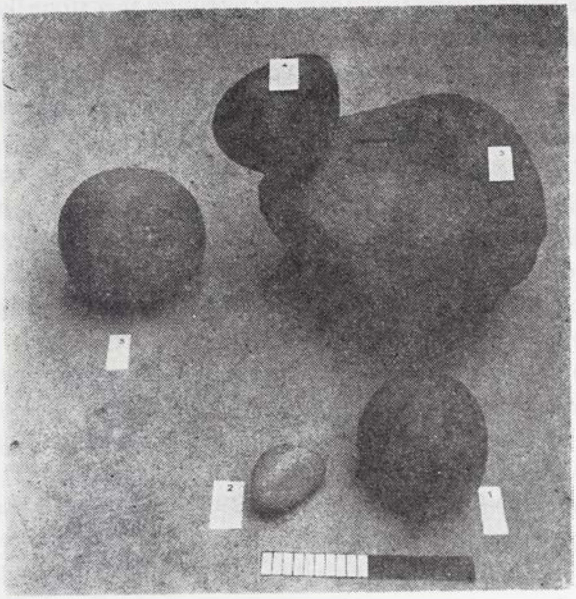

Fig. 5. Enneri Blaka (*ca* 2045N 1243E)

1: Mortar; *2*: Pestle

Tassili-n-Ajjer

3: Static quern; *4*, *5*: Upper stones. Nos. *4* and *5* appear to belong together

We encounter the same problem when dealing with what I have here termed static or non-transportable querns, meaning large, ungainly stone blocks possessed of a grinding surface but not thought to have been produced with the intention of moving them very far, if at all (Fig. 5, item *3*; *cf.* Amblard 1984: 80 and note 48). Some brand-new saddle-querns at Adrar Madet could weigh as much as *ca* 12.5 kg (Milburn 1987), while Huard *et al.* (1968: 641) cite a quern, type not precisely stated, 94 cm in length and weighing 80 kg; *cf.* the same authors (1968: 631) for ideas on transportable and static querns. One interesting suggestion is that "large grinding stones should not be invariably associated with food-processing" (Sordinas 1964: 76), although the statement is related to grinding associated with a present-day activity.

The upper stones for use with static querns, especially those apparently wielded by two hands, sometimes look as though a handy specimen has been picked up, almost regardless of size, just so long as it could be used in conjunction with the flattish upper surface of a suitable stone block, in which a depression would occur through use. Thus both quern and upper stone would take shape through use, rather than from initial selection and manufacture. The same may not apply to many upper stones small enough to be used in only one hand, though a number seem very ungainly and bear marks of hammering and/or single or multiple cup-marks.

In Fig. 5, items *4* and *5* weigh 3.52 and 5.38 kg respectively. Item *4* is heavily hammered at the point closest to the camera: by tilting this stone through about 90° the flattish grinding-surface can be fitted exactly into the cavity in the adjacent quern (item *3*), on which deep peripheral scoring is visible. Certain upper stones seen adjacent to similar static querns are almost round enough to merit being termed "stone balls" (see below).

In respect of upper stones so far mentioned, it remains to be determined by experiment to what degree ever-recurring forms may have been manufactured or prepared, partially or totally. We need to know as well for instance, whether a very irregularly-shaped stone like that shown in Fig. 5, item *2*, could assume regular proportions – or at least a more symmetrical shape – if used in a conventional way over a period.

To date we possess few details of the exact use of fixed oval or roundish depressions in flattish rock surfaces. These are the "fixed grindstones" of Hugot (1981: 604), said by him to be used in some cases for grinding pigments. Camps (1982: 567) calls them "grinding and pounding hollows".

Perhaps we may also include "cup-marks" as having been used for grinding/pounding in some cases: their size and depth can vary enormously. But it remains to be demonstrated which particular cavities in a given flat surface did serve to grind or pound material.

Lhote (1979: 33 - 64) has undertaken a study of a number of such cavities in the Tassili-n-Ajjer, concluding that a number of difficulties exist in determining the uses of the variously-shaped depressions. In August 1984 he informed me as to the unsuitability of a quantity of upper stones for use with them. The widely-differing shapes and sizes may indicate various functions, not yet convincingly explained. Thinking back to all such sites as I have encountered, I cannot recall any at which apparent upper stones were present.

Certain cylindrical shafts, many of them too deep and with a diameter insufficient to permit their use as mortars, are also mentioned by Lhote (1979: 48 - 49). I have seen several within Aïr, but can offer no satisfactory explanation for their presence (Morris and Milburn 1977: 143).

Turning now to the east Algerian stone balls of Savary (1967: Fig. 3) and described as classic equipment on Neolithic surface sites, he shows that five out of six examples in fact possess a lateral ridge, the use of which is not suggested.

Frequent mention has been made of "bolas-stones" in specialist publications, though I have often wondered why such objects – if correctly identified – so often lie amid a profusion of grinding material, albeit lacking Savary's characteristic ridge, though I know of a few specimens which do possess it.

In September 1980 J. D. Clark suggested in conversation their use in sharpening-up querns. He has elsewhere (Clark 1955: 404) mentioned modern Bantu quern-sharpeners, also that such stone balls should not be confused with those occurring in Palaeolithic hunting cultures in which grinding of cereal crops was unknown. The sharpening-up of smooth quern-surfaces, apparently in modern times in Tibesti, is recalled by Huard (1970: 542), although the instrument used for this purpose is not stated. Two of the "stone pestles" illustrated by Zarattini (1983: 234), although seemingly pre-Neolithic, might qualify as "balls".

Bennett and Elton (1898: 10) cite Schliemann as follows in respect of material seen by him at Troy, "rudely cut, nearly globular, stone instruments for flour grinding are very numerous in all the four lower prehistoric cities". An illustration on the same page is stated to show a specimen about 4 inches (*ca* 10 cm) in diameter.

A stone ball is shown beyond the centre embryo quern in my Fig. 2, made of a whitish stone, and there are around one dozen more to be seen in the back two rows of Fig. 3, some of them very rough indeed through long exposure to the elements.

The discs shown by Savary (1967: Fig. 4) remain problematical as to use, though not dissimilar to certain upper stones in size and shape. The type described by Clark (1973: 282) as "flat, double sided ... with near circular plan forms" seems to relate to a variety which I have come to regard as typical of the western Ténéré Tafassasset and especially of Adrar Madet. One such example measured 13.3×11.7 cm, with a thickness varying from 1.0 to 2.0 cm around the centre of the short side. The thinnest part – this being apparently caused by wear – was around the centre of the longest side, suggesting to me that perhaps the object had been held across its longest side and rubbed to and fro at some 90°.

Had this object been a small quern – and certain minuscule specimens seem to exist – the wear should then be at the approximate center rather than at the edges.

Stone sculptures

Sculptured stone objects (Camps 1982: 572 - 574, 577, 581, and Fig. 8: 4) known to date include certain forms unidentifiable in this century, being alien to anything we know, plus others whose "identification" is questionable, to say the very least. The map of their general distribution in the central Sahara is given by Camps (1982: 572), also labelled Fig. 8: 4. Between pp. 552 - 553, a prior "Fig. 8: 4" illustrates a pair of sculptures.

It is possible that a number have found their way into private collections and may never be published (to judge by a recent enquiry from a dealer as to whether I knew of any for sale!).

New or unpublished material known to me includes, first, the object from near Edjeleh (Erg oriental), apparently very roughly made and perhaps atypical or even from a different culture altogether (Souville 1983). Next comes an object looking like the carved head of a serpent, seen by A. Bonnert near Amguid (2630N/0536E) and mentioned to me on 18 June 1983; I understood that it is to be published in *Bullétinde la Société Préhistorique Française.*

The object which I recently published (Milburn 1984a: Fig. 19: 1) comes into the category of "non-identified". Yet I am grateful to A. Nibbi for a suggestion to the effect that its shape recalls that of an Egyptian basket. My own knowledge hardly permits comment one way or another, though I have since been referred by her to various publications, several of which do show objects whose outline is generally similar. While most baskets of which I have seen illustrations have a convex base, *i.e.* the main weight seems to cause a bulge at the bottom centre of each basket, a very few look as though the weight lies at each corner, so that the overall appearance of the base of the basket is concave (*cf.* Naville 1898, Part III: Pl. LXXV, just to left of mast of boat).

"Rondins de pierre"

The use of RPs (Gast 1965; Milburn 1984d), together with stones resembling clubs and other shapes, notably from SE Sahara, remain largely indeterminate, even though employment as "hoes" and "picks" has been suggested and agriculture postulated (Davies 1967: 162; Hugot 1981: 602); compare Amblard (1984: Fig. 192) for a "pick" from Tichitt, south Mauritania.

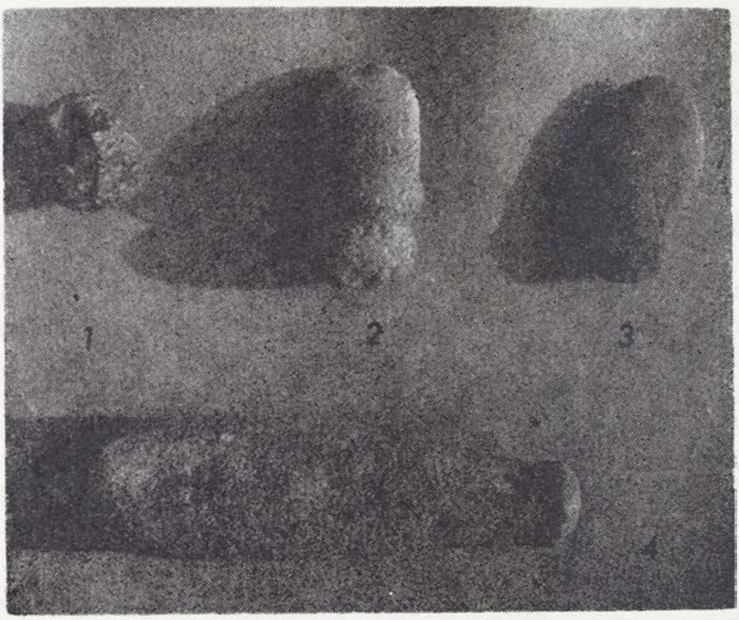

FIG. 6. *1*: **Worn ball;** *2*: **Conventional grooved axe;** *3*: **Unusual grooved axe;** *4*: **Unidentified object** ***à bourrelet***

One interesting observation is by Gautier (1923: 105) who speaks of "tools in polished stone... enormous stone rolling-pins and large bell-shaped mortars of a type well-known to archaeologists, still in use in the Soudan (*cf.* Huard *et al.* 1968: 633, referring to stone pestles formerly used in Soudan) ... used to crush grain ... and also as standing stones on Moslem tombs". This latter use leads me to think that RPs are indeed the stones cited above, since the custom is attested in a number of areas, which could imply that RPs were once quite common. If one interpretation of a rock painting be correct, then a rod (of stone or wood?) seems to be in use in conjunction with a mortar shaped like a thin bucket (Huard 1970: Fig. 3:7).

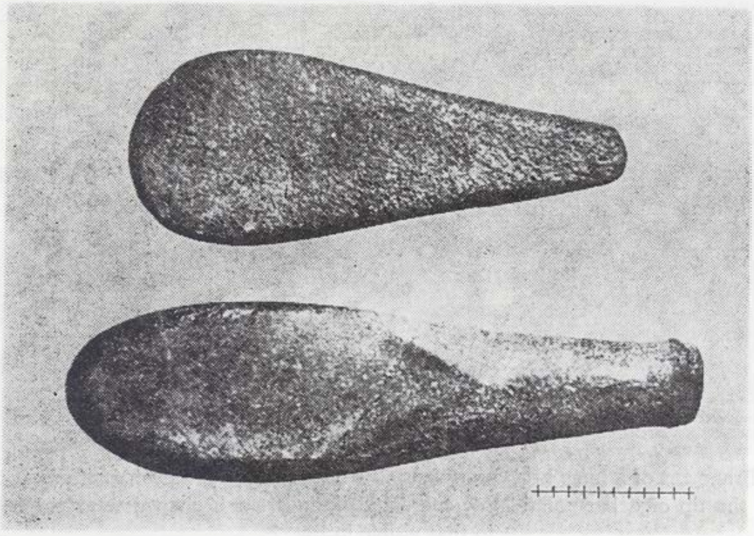

FIG. 7. Two enigmatic objects of SW Ahhagar

The object in Fig. 6: *4* seen near Adrar Mariaou in the northern Ténéré Tafassasset, recalls a club. It is scored and indented in places and has no obvious cutting-edge. The thin end, vaguelly phallic, seems to be the "bourrelet" (pad. cushion) mentioned by Huard *et al.* (1968: 634 - 636); *cf.* an RP of which the sole visible end is clearly phallic (Nilsson and Dauber 1982: photo 14), stated to be found near Temet, not far from Adrar Bous, of which I have tried without success to obtain further details; *cf.* also the "phallic effigy pestle" of Brennan (1975: 127) in U.S.A.

An object possessing this "bourrelet" feature was found about 80 km SW of Silet, Ahaggar, though here all similarity ends. The "bourrelet" is at the far end of what might be termed a handle, terminating beyond this in a flattish ovaloid space, somewhat reminiscent of the upper surface of a saddle-quern. A rather similar object occurring nearby was far more simple in form and lacked the "bourrelet" (Fig. 7).

At the same site as the object shown in Fig. 6: *4* was seen the broken artefact shown in Fig. 8: *1*, evidently only a small portion of what originally existed and in no way an axe or utensil with a sharp cutting-edge. Possibly, however, it may come into the category of what been called "picks" or "hoes" and connected with agrarian practices (Souville 1984: 240); *cf.* Amblard 1984: Fig. 192 and 193.

Leaving aside for the moment the copious material on "outils aratoires" (Huard *et al.* 1968: 637 - 640) and "the earliest agrarian undertakings" in the Chad Sahara (Huard 1970), the RP published in the last Proceedings (Milburn 1984: Fig. 2) has two clearly differing extremities, for which a separate use may be postulated. I have

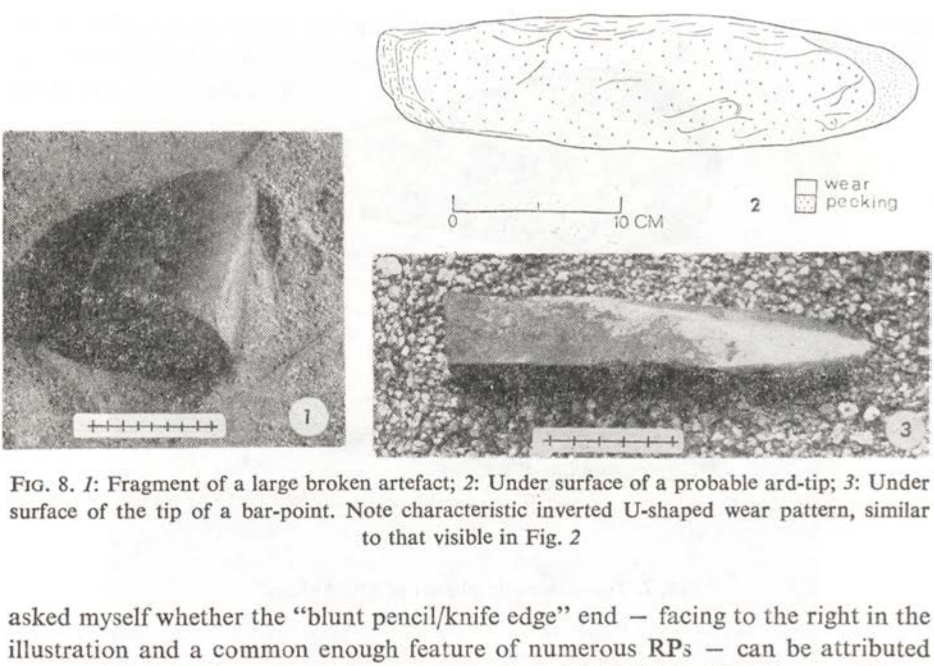

FIG. 8. *1*: Fragment of a large broken artefact; *2*: Under surface of a probable ard-tip; *3*: Under surface of the tip of a bar-point. Note characteristic inverted U-shaped wear pattern, similar to that visible in Fig. *2*

asked myself whether the "blunt pencil/knife edge" end – facing to the right in the illustration and a common enough feature of numerous RPs – can be attributed to intentional shaping rather than to wear, at least initially? Could such wear, if wear it is, be occasioned by resting the RP in a tall mortar and simply pushing it round and round the inner circumference – probably with only one hand – to treat some substance within the mortar?; *cf.* the camel oil mill system (Wilson 1984: 169 - 170).

In an Egyptian mural "on the wall of one of the ancient tombs at Assouan" feature two examples of the "balanced dumb-bell pestle", very similar to many in use to-day in the central and southern Sahara (Bennett and Elton 1898: 89 - 90).

I have certain other questions still unanswered. What, for instance, can be the reason for some RPs having a portion of their length quite flat? Why is a particular form of long stone splinter missing from a flank in some cases? Are cup-marks along the flank of a few RPs functional rather than decorative? (Amblard 1984: Fig. 192; Milburn 1987: Fig. 1).

Ploughing in the southern Sahara?

A single identification of sorghum from an impression on a surface sherd from Adrar Bous provides an intriguing hint that some domesticated plants were known (Smith 1980: 455; 1984: 86), although doubt appears to be felt by Clark (1980: 567) about grain cultivation before 1,100 B.C. It is likely however that further evidence of domestication in the Tilemsi valley, Mali, may become available in respect of second millennium pastoralists (Smith 1984: 89, 92).

If we can accept as hoes the artefacts cited by Huard *et al.* (1968: 639), felt by these authors to be for agriculture rather than for digging up roots, due to their presence in SE Tibesti alongside prolific grinding material, one must emphasise that some root-digging cannot yet be ruled out entirely (*cf.* Bray and Trump 1973: 106). The agrarian tools of Tibesti, we are told, have remained extremely primitive right up to the present day (Huard 1970: 542). Souville (1984: 240), admittedly speaking of a zone of fertile Morocco, is emphatic that grooved axes shaped like picks – of which a number are known from SE Sahara – could have been used as hoes. Their use in the ancient salt industry has also been suggested.

Speaking of Ténéré Tafassasset, one view sees stone hoes as necessarily being used for agriculture. The Ténéré people are not regarded as being nomads, their toolkit being too large and too numerous. "They may have been herdsmen ... they had subsidiary agriculture" (Davies 1967: 162 - 163). A recent opinion suggests environmental conditions making it difficult to maintain herds large enough for subsistence, also that grain cultivation "was practised on a strictly *ad hoc* basis by pastoral peoples taking advantage of an occasional particularly wet season but otherwise relying on their herds and whatever wild game they could obtain ... and on the wild plant foods they collected" (Smith 1984: 90).

The dwellings of makers of the Tenerian industry are thought to have been of an impermanent nature (Clark 1973: 288). Even though this remark appears to be based upon one visit to the western part of the area, I am unaware of any reason to contradict it.

A provisional explanation of Tenerians possessing pottery for many millennia (*cf.* Roset 1983), though lacking proven agriculture, might be to view this as a prelude to "migratory herdsmen and cultivating women" (Haaland 1981), with women potting and et cetera instead of cultivating.

A single find of a probable ard-tip appears to provide another hint of agriculture (Milburn and Rees 1984), albeit perhaps of the *ad hoc* variety above-mentioned. When found, it was seen as no more than a stone rod (RP), similar to others encountered in the area. Hence there was no immediate search for traces of grain *in situ* nor for evidence of soil tillage, and no thought of possible agriculture until some years later.

The object was one of eight inspected, of which seven were rejected out of hand by S. E. Rees, to whom I am indebted for a statement (22.9.1984) to the effect that the wear-marks would be the same on an ard which could be pushed along, rather than pulled. On ard-tips in general see Rees (1979). R. B. K. Stevenson kindly remarked (26.11.1984) that the brittleness of stone bars as compared with wood should have ensured large losses even in sandy soil.

Inspection is invited to the drawing of the under surface (Fig. 8: *2*) and comparison should be made with the characteristic inverted U-shaped wear pattern on the tip of the lower surface of the object in Fig. 8: *3*. This latter, part of a bar-point plough recently in use in Northumberland, exhibits wear indicative of the implement being mounted so that it points slightly to the left, in parallel with other bar-points mounted on the same frame. I thank T. Sharp for bringing to my notice the whole question of the bar-point plough, for explaining its function and for the tip illustrated in Fig. 8: *3*.

My provisional conclusion, as at December 1984, on which I hope to go into greater detail shortly, is as follows. There may have existed people who used ards in the southern Sahara, albeit still so inexperienced in cultivation as to have been taking no intentional steps fortuitously, far less with intent – to bring about conditions necessary for production of true domesticated grain, recognizable as such, along the lines described by Stemler (1980; 1984).

If this in fact be so, then the situation cited by Renfrew (1973: 208) could apply, namely that "cultivated wild grain" was in production, giving rise, some millennia later, to such questions as "how long does a plant have to be cultivated before it becomes domesticated?"

Gouges

There is currently nothing which I can add to remarks already made elsewhere (Milburn 1984c), except to offer an illustration of a couple of gouges from western Ténéré Tafassasset (Fig. 9). The top object is of the type I have termed "parallel--sided" and suggested that it may be particular to the Ténérian and north-east Niger, though I should welcome any indications to the contrary.

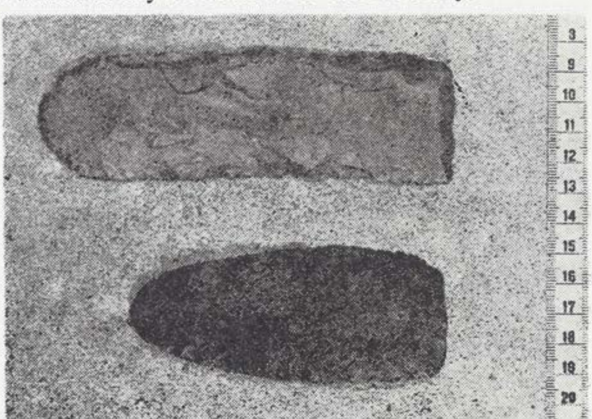

FIG. 9. Two gouges of the Tenerian

Beads

Having recently had occasion to pursue Garamantian shadows far and wide, even as afar as the desert of Goran (though only in literature), I found that a number of cases of the occurrence of the so-called Garamantian emeralds appear to predate the known existence of these highly enigmatic people (Mauny 1956; *cf.* Milburn 1985).

Indications are that the "emeralds" are likely to have been amazonite felspar (Ogden 1982: 92), at any rate those found in Egypt, with no true emeralds being attributable to Garamantian commerce (Monod 1974). In 1972 I found an amazonite bead lying on a Neolithic site at Adrar Bous: it had no more than a trace, at either end, of the start of an attempt to drill it through. If this area was finally abandoned by Ténérian people around 4,500 B.P. (Smith 1984: 86) then this example is likely to belong to the site and to predate the Classical Era.

Such stone may well have come from the famous quarry at Eghei Zumma, Tibesti, visited during this century. I am still unaware as to whether such amazonite has been compared with so-called emeralds found in Punic graves.

The carbuncle is even more mysterious, though cited by classical sources as having been a trade item. One author mentions carbuncles from south Libya (Adams 1984: 304), though I remain entirely ignorant as to the nature of such objects, while presuming at least that a bead was involved, if not a bulky stone unsuitable for piercing.

Stone monuments

A number of types of the so-called "monuments mégalithiques/tombes préislamiques" remain to be shown to have been erected as tombs. Apart from the common "redjems" or stone piles found along ancient routes (Heseltine 1959: 157), some further examples can be named, using where possible the illustrations of Reygasse (1950):

1. Horse-shoe (Reygasse 1950: Fig. 58, "fer à cheval"). His illustration has been printed back to front: the open part of the horse-shoe should face east. This type is ill-named, although the name has stuck;

2. Basket-handle (Not illustrated; "anse de panier"). Is a true horse-shoe in fact, with a curved wall open to east or south-east in most cases;

3. Low multiple rings (Reygasse 1950: Fig. 44, "cercle rituel"). The above three models are all common in Ahaggar in the widest sense. They may well be post-Neolithic;

4. Curved orientated walls (Fig. 10). This type appears to be unknown to date. I am grateful to Th. Monod for the information (4.4.1984) that he has no idea of the significance nor age. An attempt to copy V-shapes (Reygasse 1950: Fig. 70, 72D), near which they sometimes occur, may be involved. They are found, so far as I know, in the areas Ahnet, Asedjrad and western Immidir, hence roughly across the

terrain between the so-called Tanezrouft and Ahaggar trans-Saharan routes. They are often orientated about east, like V-shapes, though not invariably so.

Some V-shapes themselves are highly enigmatic, in terms of why they appear to be a combination of V-shape and axle-shape (Milburn 1981: Figs. 1a and b). The relationship of the axle-shape to the V-shape has also to be determined: the former are somewhat rarer, for instance one unique site contains nine V-shapes and only one axle-shape (*cf.* Milburn 1984).

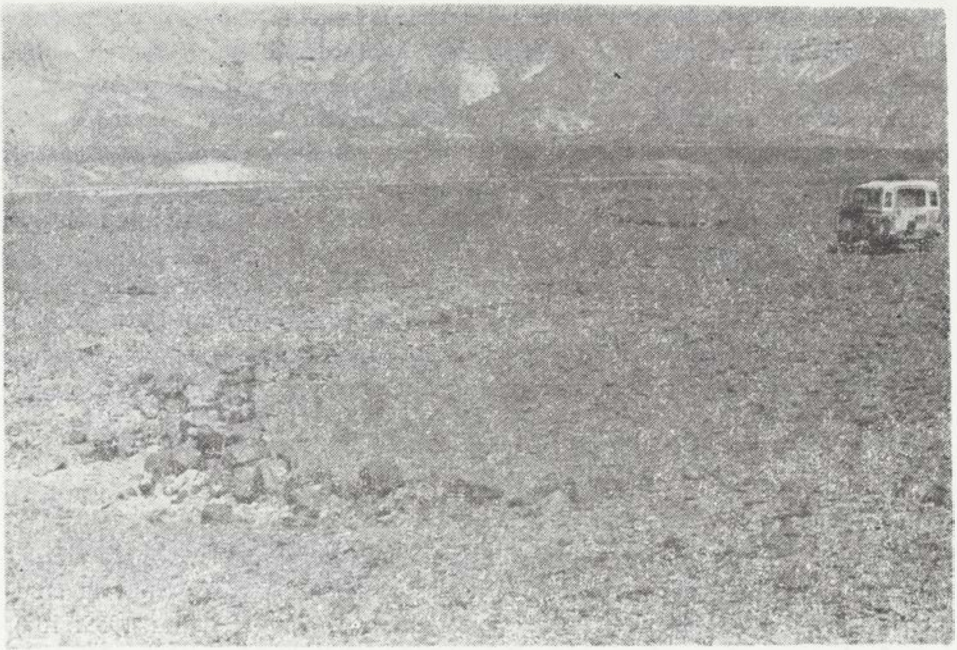

FIG. 10. Curved orientated walls, not known to contain a burial

The language of Reygasse (1950: 56, 61 - 62) compared with that concerning pages 85 - 86 and 88, is hard to fathom. In the former pages he is clearly describing other peoples' excavations and discoveries of V-shapes, plus one apparent axle-shape. In the latter pages, concerning his own work around Abalessa, near Tamanrasset, he talks of "burials covered with paving". There are six illustrations (Figs. 125 - 130), while only two apparent rough V-shapes are shown on the general plan of the "necropolis of Abalessa" in his "Plan no. 5" on page 78. It is not clear how many of the structures are V-shapes nor whether axle-shapes are present: what we do gather (Reygasse 1950: 88) is that he found a skeleton.

All in all, indications are that burials in V-shapes may consist of a single contracted skeleton, lying on the right side, head to south and facing out between the open "arms" of the monument itself, hence about east or south-east.

Conclusion

The above remarks have been kept as brief as possible in complex circumstances, though I hope that they will help serve to set the stage for more detailed observations based on more fieldwork. The area and the subject matter covered are both extremely wide and merely indicate just how little we know of many aspects of pre- and protohistory.

Acknowledgements

Apart from those mentioned above, I wish to thank the following for various helpful remarks and suggestions: B. Barich, G. De Beauchêne, Sir Laurence Kirwan, L. Krzyżaniak, A. B. Smith, G. Souville, and A. Zarattini.

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