Excavations at Tell Sabi Abyad

Prehistoric investigations in the Balikh Valley, northern Syria

edited by

Peter M. M. G. Akkermans

Balikh Valley Archaeological Projects
Monograph 1

1989

TABLE OF CONTENTS

PREFACE AND ACKNOWLEDGEMENTS

This report intends to give a detailed, and to a large extent exhaustive, account of the first season of excavation at Tell Sabi Abyad, a site of the 6th millennium B.C. in the Balikh valley of northern Syria. The excavations lasted from May 4 to July 4 1986 and were conducted by P.M.M.G. Akkermans under the auspicies of the University of Amsterdam's Archaeological Mission to Syria, directed by Prof.Dr. M.N. van Loon. Further fieldwork at Tell Sabi Abyad is planned and will no doubt alter many of the views put forward in the present volume.

The investigations at Tell Sabi Abyad would not have been possible without the help of numerous people and organisations. First of all, I would like to thank my teacher, Maurits van Loon, for his continuous and unreserved encouragement, advise and guidance. I am also greatly indebted to the other authors of this report: Marie Le Mière, Lorraine Copeland, Bram van As, Loe Jacobs, Johanna Geerlink, Loes van Wijngaarden-Bakker, Willem van Zeist, Wilhelmina Waterbolk-van Rooijen and Inge Rossmeisl. The drawings were made either by the authors, by Bob Donker or by Ben Claasz Coockson. Photographical work was done by Michiel Bootsman and Fred Gijbels. Jan Hartmann played an important role in the statistical processing of the data. Jan Boerma provided us with the necessary maps and carried out a preliminary analysis of the obsidians from Tell Sabi Abyad. Hylke Buitenhuis took care of the bones in the field, whereas Gert-Jan de Roller did the same for the plant remains. I am indebted to Odette Haex for her assistance in the preparation of this report. I am particularly grateful to Bert Houben, who did the typesetting. In addition I would like to thank the following persons for their help, advise, comments or the sometimes endless discussions in the field and at home: Sytze Bottema, Hans Curvers, Monica Dütting, Joris van Haaften, Annabel Lazaro, Ron Leenheer, Fritz Lüth, and Diederik Meijer. Ans Bulles corrected the English texts. I wish to thank Ilse van Pinxteren for her patience and continuous support.

I must express my gratitude to the Directorate-General of Antiquities of the Syrian Arab Republic for kindly permitting us to work at Tell Sabi Abyad and rendering us all necessary assistance. I especially wish to thank Dr. Afif Bahnassi and Dr. Adnan Bounni. Mr. Murhaf Khalaf, director of Antiquities in Raqqa, represented the Syrian authorities on the spot and has been a most helpful adviser.

The investigations at Tell Sabi Abyad are supported by the Foundation for Archaeological Research, which is subsidised by the Netherlands Organisation for Scientific Research (NWO). Further financial support was provided by the Albert Egges van Giffen Instituut voor Prae- en Protohistorie, the Foundation for

Anthropology and Prehistory in the Netherlands, Ant. Schröder B.V., Chemimex B.V. and some private sponsors. During the 1986 season, accomodation and other facilities were provided by the Dutch team working at the nearby site of Tell Hammam et-Turkman. My sincere thanks to Dr. Maurits van Loon and Dr. Diederik Meijer, directors of the excavations at Tell Hammam et-Turkman. The Albert Egges van Giffen Instituut voor Prae- en Protohistorie, Amsterdam, provided the necessary facilities for processing the results of the excavation and to prepare the present publication.

Albert Egges van Giffen Instituut
voor Prae- en Protohistorie

Amsterdam, July 1988

Peter M.M.G. Akkermans

THE CONTRIBUTORS

P.M.M.G. Akkermans
Albert Egges van Giffen Instituut voor Prae- en Protohistorie (IPP), Singel 453, 1012 WP Amsterdam, the Netherlands.

A. van As
Instituut voor Aardewerk-technologie, Reuvensplaats 4, 2300 RA Leiden, the Netherlands.

L. Copeland
Institute of Archaeology, University of London, 31-34 Gordon Square, London WC1 H0 PY, England.

J. Geerlink
Albert Egges van Giffen Instituut voor Prae- en Protohistorie (IPP), Singel 453, 1012 WP Amsterdam, the Netherlands.

L. Jacobs
Instituut voor Aardewerk-technologie, Reuvensplaats 4, 2300 RA Leiden, the Netherlands.

M. Le Mière
Maison de l'Orient, Université Lyon-2, 7 Rue Raulin, F69007 Lyon, France.

I. Rossmeisl
Van Oldebarneveldtstraat 89/3, 1052 JX Amsterdam, the Netherlands.

W. Waterbolk-van Rooijen
Biologisch-Archaeologisch Instituut (BAI), Poststraat 6, 9712 ER Groningen, the Netherlands.

L.H. van Wijngaarden-Bakker
Albert Egges van Giffen Instituut voor Prae- en Protohistorie (IPP), Singel 453, 1012 WP Amsterdam, the Netherlands.

W. van Zeist
Biologisch-Archaeologisch Instituut (BAI), Poststraat 6, 9712 ER Groningen, the Netherlands.

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES

Chapter I

RESEARCH OBJECTIVES AND STRATEGY

By Peter M.M.G. Akkermans

A. THE BALIKH VALLEY PREHISTORIC PROJECT

The excavations at Tell Sabi Abyad I are part of a regionally oriented research project aimed at clarifying the nature of prehistoric human occupation in the Balikh valley of northern Syria in general, and of such occupation during the Halaf period in particular. The Balikh valley is very suitable for prehistoric research. The Holocene flood plain is rather narrow and bordered by Pleistocene terraces, thus forming a largely homogeneous geographical and ecological unity (Mulders 1969; Boerma, in press). Due to its central geographical position, the valley may have been of great importance in terms of communication. On the one hand the valley forms a natural north-south route of contact between the Turkish hinterland and the Syrian Euphrates region, whereas on the other hand the southern fringe of the dry-farming zone, which crosses it, forms part of the east-west passage between the Levant and Mesopotamia (Mallowan 1946:115; Copeland 1979:253). Human settlement in the Balikh valley has a long history. The Pleistocene terraces bordering the Balikh flood plain have yielded traces of Palaeolithic occupation near Jisr Chnine (Cauvin 1970; Hours 1979), but the most numerous remains of human occupation date from the Holocene period. Lorraine Copeland already considered the valley to be of great importance during the 7th to 4th millennia B.C. (Copeland 1979, 1982) and during our 1983 Balikh survey we found ample evidence to support this view (Akkermans 1984). However, little is known on the nature of the earliest settlements in the area, or about their relationships with contemporary sites in other regions. Thus, our general research objectives are directed towards the acquisition of information bearing on these items.

Our specific research interests are the nature and development of **Halaf** society in the Balikh area. Until recently, remarkably little attention had been given by archaeologists to the study of the Halaf period, despite its possible importance as an intermediate stage between village economies and early state formation. Within a relatively short time Halaf cultural traits spread over the northern portion of the Fertile Crescent, thus representing the first widespread cultural horizon in the Near East (LeBlanc and Watson 1973:117). In surveys the easily recognizable Halaf pottery had been found on the surface of many sites.

Chapter I

RESEARCH OBJECTIVES AND STRATEGY

By Peter M.M.G. Akkermans

THE BALIKH VALLEY PREHISTORIC PROJECT

The excavations at Tell Sabi Abyad I are part of a regionally oriented research project aimed at clarifying the nature of prehistoric human occupation in the Balikh valley of northern Syria in general, and of such occupation during the Halaf period in particular. The Balikh valley is very suitable for prehistoric research. The Holocene flood plain is rather narrow and bordered by Pleistocene terraces, thus forming a largely homogeneous geographical and ecological unity (Mulders 1969; Boerma, in press). Due to its central geographical position, the valley may have been of great importance in terms of communication. On the one hand the valley forms a natural north-south route of contact between the Turkish hinterland and the Syrian Euphrates region, whereas on the other hand the southern fringe of the dry-farming zone, which crosses it, forms part of the east-west passage between the Levant and Mesopotamia (Mallowan 1946:115; Copeland 1979:253). Human settlement in the Balikh valley has a long history. The Pleistocene terraces bordering the Balikh flood plain have yielded traces of Palaeolithic occupation near Jisr Chnine (Cauvin 1970; Hours 1979), but the most numerous remains of human occupation date from the Holocene period. Lorraine Copeland already considered the valley to be of great importance during the 7th to 4th millennia B.C. (Copeland 1979, 1982) and during our 1983 Balikh survey we found ample evidence to support this view (Akkermans 1984). However, little is known on the nature of the earliest settlements in the area, or about their relationships with contemporary sites in other regions. Thus, our general research objectives are directed towards the acquisition of information bearing on these items.

Our specific research interests are the nature and development of **Halaf** society in the Balikh area. Until recently, remarkably little attention had been given by archaeologists to the study of the Halaf period, despite its possible importance as an intermediate stage between village economies and early state formation. Within a relatively short time Halaf cultural traits spread over the northern portion of the Fertile Crescent, thus representing the first widespread cultural horizon in the Near East (LeBlanc and Watson 1973:117). In surveys the easily recognizable Halaf pottery had been found on the surface of many sites.

Also in excavations Halaf ceramics and other features often appeared, but in most cases the appearance of Halaf remains was an accidental feature not incorporated into the original research objectives.

Our first knowledge on Halaf material culture resulted from the soundings at Yunus/Carchemish by Woolley in 1912-1913 and from the excavations at Tell Halaf by von Oppenheim between 1911 and 1929 but, until recently, the most substantial body of information on Halaf stemmed from Mallowan's excavations at Arpachiyah (Woolley 1934; von Oppenheim and Schmidt 1943; Mallowan and Rose 1935). After Mallowan's pioneering work at Arpachiyah, for a long time only few excavations were carried out which focused on the Halaf period (here we may point e.g. to Banahilk, excavated in the early 1950's (Watson 1983)). In recent years, however, there seems to be a growing interest in Halaf society. A number of new excavations in Iraq, Turkey and Syria have yielded a wealth of data on Halaf material culture and settlement organisation. For Iraq we may point e.g. to the re-excavation of Arpachiyah (Hijara 1980) and to the large-scale Russian excavations at Yarim Tepe II and Yarim Tepe III (see e.g. Merpert and Munchaev 1969 and their later reports in *Sumer*). For Turkey we may refer e.g. to Gerikihaciyan (Watson and LeBlanc 1973) and Cavi Tarlasi (von Wickede 1984; von Wickede and Misir 1985), and for Syria we may mention e.g. Tell Aqab (Davidson and Watkins 1981) and Shams ed-Din (Azoury et al. 1980). Although these newly excavated sites have yielded highly valuable information on Halaf society, a major disadvantage is that they remain for the larger part isolated settlements, that is to say not isolated in terms of settlement distribution but isolated in terms of investigation. In most cases archaeological work is confined to the site solely, whereas its environmental and cultural setting on a regional scale is neglected. Within the scope of our prehistoric project in the Balikh valley, it will be attemped to avoid this wholly site-oriented approach and to relate the individual settlement to the overall settlement system. Of course, this approach is not new; here we may refer, for example, to the excellent work of Braidwood et al. in Iraq (Braidwood and Howe 1960; Braidwood et al. 1983) and to the work of Hole et al. in the Deh Luran (Hole et al. 1969; Hole 1977).

Our prehistoric investigations in the Balikh valley focus on chronology, settlement pattern and ecology of local Halaf society. Specifically our project should deal with the following problems:

1. The date and the nature of the introduction of Halaf culture in the Balikh valley. When does Halaf appear in this region and how does it relate to local Late Neolithic societies? Is Halaf here a foreign or an indigenous development?

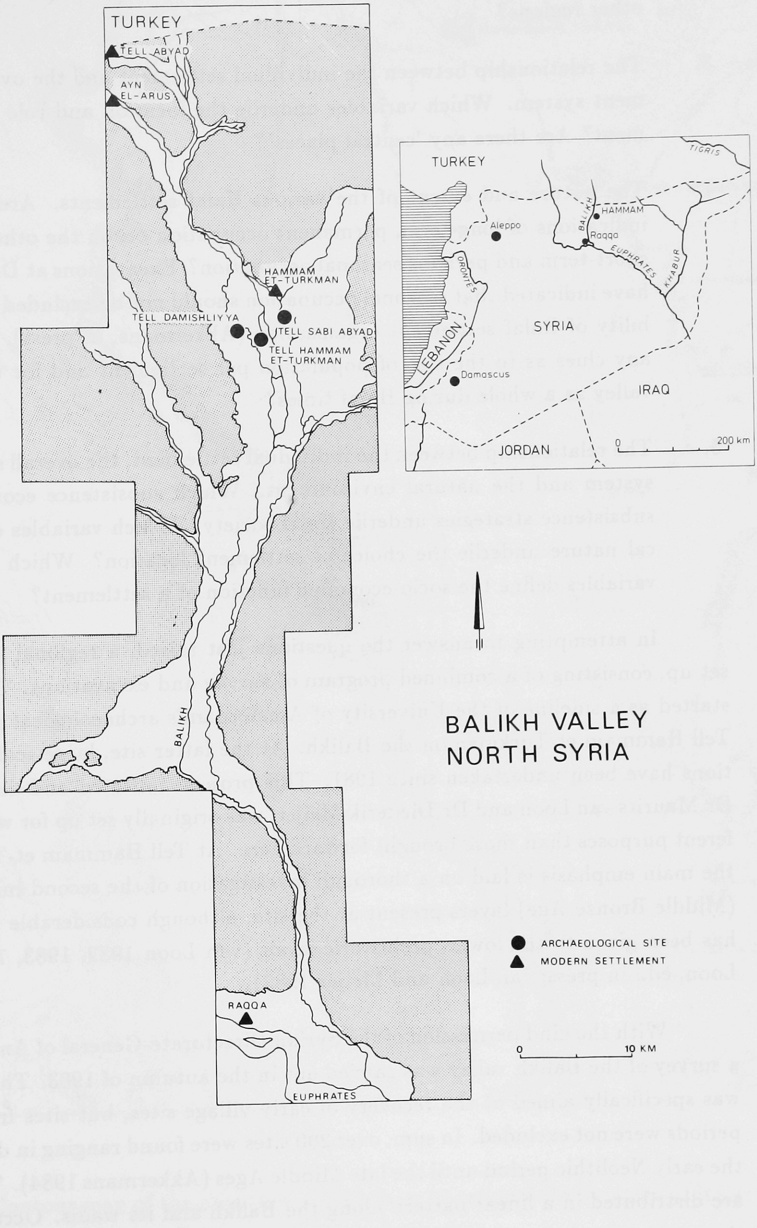


Fig. I.1. Map of the Balikh valley with (inset) its location in Syria.

2. The duration of Halaf occupation in the Balikh valley (i.e. the construction of a local chronology). Are there any indications as to the development of a 'local Halaf'? How does Halaf in the Balikh valley relate to Halaf in other regions?

3. The relationship between the individual settlement and the overall settlement system. Which variables underlie the location and role of a settlement? Are there any 'central places'?

4. The nature and extent of the various Halaf settlements. Are there any indications of long-term, permanent occupation or, on the other hand, of short-term and perhaps seasonal occupation? Excavations at Damishliyya have indicated that seasonal occupation should not be excluded as a possibility of Halaf settlement organisation (Akkermans, in press). Are there any clues as to the size of population per settlement and for the Balikh valley as a whole during Halaf times?

5. The relationship between the individual settlement, the overall settlement system and the natural environment. Which subsistence economy and subsistence strategies underlie Halaf society? Which variables of ecological nature underlie the choice of settlement location? Which ecological variables define the socio-economic function of a settlement?

In attempting to answer the questions just raised, a regional study was set up, consisting of a combined program of survey and excavations. This study started as a sideline of the University of Amsterdam's archaeological project at Tell Hammam et-Turkman on the Balikh. At the latter site, large-scale excavations have been undertaken since 1981. This project, initiated and directed by Dr.Maurits van Loon and Dr.Diederik Meijer, was originally set up for wholly different purposes than those brought forward here. At Tell Hammam et-Turkman, the main emphasis is laid on a thorough investigation of the second millennium (Middle Bronze Age) layers present at the site, although considerable attention has been given to the lower, prehistoric levels (van Loon 1982, 1983, 1985; van Loon, ed., in press; van Loon and Meijer 1983).

With the kind permission of the Syrian Directorate-General of Antiquities, a survey of the Balikh valley was carried out in the autumn of 1983. This survey was specifically aimed at the recovery of early village sites, but sites from later periods were not excluded. In sum, over 200 sites were found ranging in date from the early Neolithic period until the late Middle Ages (Akkermans 1984). The sites are distributed in a linear pattern along the Balikh and its wadis. Occasionally they appear in clusters (see Akkermans 1988). An astonishingly large amount of

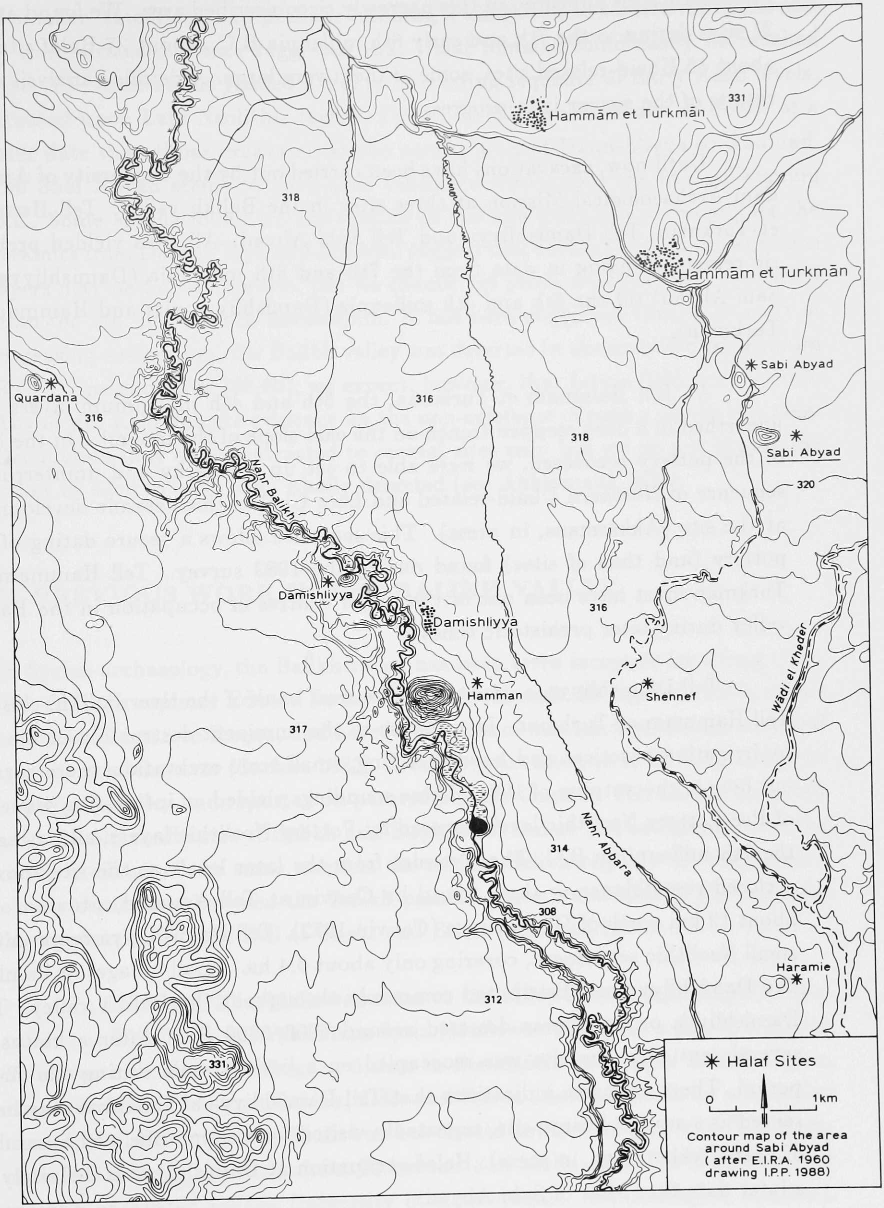


Fig. I.2. Contour map of the area west of Tell Sabi Abyad and the location of Halaf sites in the immediate surroundings of the site.

prehistoric sites appeared in this narrowly circumscribed area. We found at least 21 sites dating to the 7th and early 6th millennia B.C., about 27 Halaf sites and about 15 Ubaid-related sites, some of them very large. A detailed analysis of the results of the survey is in progress.

Until now, excavations have been carried out by the University of Amsterdam Archaeological Mission at three sites in the Balikh valley: Tell Hammam et-Turkman, Tell Damishliyya and Tell Sabi Abyad. All sites yielded prehistoric remains ranging in date from the 7th and 6th millennia (Damishliyya and Sabi Abyad) till the 5th and 4th millennia (Damishliyya pits and Hammam et-Turkman).

At Tell Hammam et-Turkman, the 5th and 4th millennium layers were unearthed in a deep stepped trench on the east slope of the mound. On the basis of the pottery recovered, we were able to set up a lengthy and uninterrupted sequence of Northern Ubaid-related and Late Chalcolithic ceramic development at the site (Akkermans, in press). This sequence allows a secure dating of the pottery (and thus of sites) found during the 1983 survey. Tell Hammam et-Turkman must have been one of the major centres of occupation in the Balikh valley during later prehistoric times.

Tell Damishliyya is situated on the west bank of the river Balikh, close to Tell Hammam et-Turkman. In response to the imminent destruction of the site by irrigation practices and house-building, small-scale excavations were carried out here in the autumn of 1984. These soundings yielded an interesting sequence of Pre-Pottery Neolithic levels covered by Pottery Neolithic layers, all dating to the 7th millennium B.C. The ceramics from the later levels at the site showed a closed resemblance to those found by Cauvin at Tell Assouad, situated only about 12 km north of Damishliyya (Cauvin 1972). Tell Damishliyya represents a small Neolithic settlement, covering only about 0.4 ha. Small villages or hamlets like Damishliyya are distributed commonly throughout the Balikh valley. Tell Damishliyya probably was deserted around 6000/5900 B.C. After a hiatus of several centuries, the site was reoccupied on a limited scale during the Halaf period. There are some indications that Tell Damishliyya at this time may have served as a seasonal camp site, repeatedly visited for a short time over a number of years (Akkermans, in press). Halaf occupation at Damishliyya is definitely of a later date than that of Sabi Abyad.

At Tell Sabi Abyad excavations were undertaken in the spring of 1986 (Akkermans 1987). This site was selected for excavation for several reasons. The main were that a) on survey evidence we thought that Sabi Abyad might represent a permanently occupied and central Halaf settlement, surrounded by a number of smaller 'satellites', and perhaps fulfilling a kind of local service function, and b) that surface evidence suggested that Halaf remains could easily be reached here. The excavations yielded a highly interesting sequence of Early Halaf levels, situated upon Late Neolithic layers. These Neolithic remains are no doubt of a later date than those excavated at the nearby sites of Damishliyya or Assouad. Tell Sabi Abyad seems to have been inhabited throughout the 6th millennium B.C. Some sherds found on the surface of the site and closely resembling the ceramics from Damishliyya and Assouad suggest that earlier (i.e. 7th millennium) layers may be found here too, but we cannot yet prove a continuous occupation from the 7th into the 6th millennium. It has been suggested that as a result of increasing desiccation, the Balikh valley was deserted in the early 6th millennium B.C. (Copeland 1979:268-69); we expect, however, that future field work at Sabi Abyad will yield definite evidence for the non-existence of such a gap in this area. Occupation may have contracted to several sites only but we do not expect the valley as such to have been wholly deserted (see Akkermans 1988).

B. PREVIOUS WORK IN THE BALIKH VALLEY

In Syrian archaeology, the Balikh valley has been *terra incognita* for a long time. The German explorer Eduard Sachau travelled through the region in 1879, on his way from Harran to Raqqa, and noted a number of mounds both on the east and west bank of the river (Sachau 1883). Over 40 years later, in 1925, W.F. Albright visited the valley and reported on painted pottery found at Tell Zaidan (situated near the old confluence of Balikh and Euphrates) and at Tell as-Saman (near the modern village of the same name in the middle Balikh region). He suggested a close resemblance between the Balikh painted pottery and that of the southern Mesopotamian sites of Tell al-Ubaid and Eridu (Albright 1926).

In the late 1930's, Mallowan came to the valley after completing his excavations at Tell Brak in northeastern Syria (Mallowan 1946). In a six week season Mallowan executed soundings at 5 sites in the middle and upper Balikh region, viz., tells Mefesh, Aswad, Sahlan, Jidle and Ibn as-Shehab (the latter site is also named "Tell Hammam" by Mallowan but should not be confused with Tell Hammam et-Turkman, situated about 20 km south of Mallowan's Tell Hammam and recently excavated by the University of Amsterdam's Archaeological Mission). At Tell Jidle, the lower levels 8-7 yielded material which may be placed in the late fourth or the early third millennium B.C. Truly prehistoric remains were found in trenches at Tell Mefesh and Tell Aswad, whereas flint implements closely resembling those of Aswad were also found at Ibn as-Shehab, but apparently in a disturbed context (Mallowan 1946:138). At Mefesh, traces of a rectangular building appeared, built of rather large mud bricks. Near this structure a number of circular "corn bins" were uncovered, also built of mud bricks (ibid.:126). Ubaid-related pottery was found in association with these architectural remains. Mallowan considered these ceramics to be of a "hybrid" nature: although clearly of Ubaid derivation, they showed Halaf influence (ibid.:128-29). On the top of the mound at Tell Aswad, Mallowan found traces of a rectangular building which he considered to belong to the Halaf period. On the basis of an ox skull found across the threshold of a doorway, he suggested this building might have served as a shrine (ibid.:124).

For a long time, Mallowan's soundings have remained the only sources of archaeological information for the Balikh area. In 1954, Dossin and Rihaoui surveyed the valley but, except for a short note, no account of their findings in the region is available (Rihaoui 1969:83). In 1969, a French team directed by J. Cauvin undertook a survey of the Balikh and the adjacent Jezirah regions (Cauvin 1970). On the terraces bordering the Balikh flood plain near Jisr Chnine a number of Palaeolithic sites was found. The lithic assemblages were of late Acheulean tradition but already showed Levallois influence (Cauvin 1970; Malenfant 1976). In the Balikh valley itself, only a few places were visited by Cauvin, two of which were not known before: Khirbet al-Bassal and Tell Rijliye. Both sites yielded Halaf pottery on the surface. At Khirbet al-Bassal brown-burnished pottery also appeared, together with fragments of stone vessels. The latter have been compared with examples from Jarmo (Cauvin 1970:287). Nevertheless, the site which apparently most attracted Cauvin's attention was Tell Assouad (Mallowan's Aswad), for in 1970 a stepped trench was laid out on the north slope of the mound (Cauvin 1972). This sounding revealed a sequence of eight Neolithic occupation levels, numbered I to VIII from top to base. Remarkably enough, pottery appeared only in the lower levels VIII-VII (to be dated around 6600/6500 B.C., see Cauvin 1974) whereas the upper levels VI-I yielded no ceramics at all! Another curious fact is that the Pottery Neolithic levels showed no traces of architecture whereas the Pre-Pottery Neolithic layers yielded mud-brick remains. It is, however, doubtful whether these surprising finds from Assouad give a correct picture of Neolithic developments at the site. Probably the absence of pottery in the upper levels and of architectural features in the lower levels is due to sampling procedures (Le Mière 1979:40). At Damishliyya, situated only about 12 km south of Tell Assouad, we found a sequence of Pre-Pottery Neolithic and Pottery Neolithic layers, all marked by mud-brick architecture but with pottery solely in the upper levels. These ceramics closely resemble those of Assouad (Akkermans, in press).

Halaf pottery was only found by Cauvin on the surface of Tell Assouad. No such ceramics appeared in the trenches laid out and no link to Mallowan's rectangular building of supposed Halafian date could be established. Copeland (1979:269) has suggested that Mallowan's building was in fact Neolithic and older than the Halaf pottery found at the site (a view which is also held here).

More recently, in 1978 a French-British team directed by P. Sanlaville surveyed the Balikh area. Palaeolithic remains were found in the lower Balikh, in the same region from which Cauvin, about 10 years before, reported the presence of some late Acheulean sites (Hours 1979). In the Holocene flood plain of the Balikh, a number of early sites was visited, eight of which were not known before. These sites range in date from the late 7th to the 4th millennium B.C. (Copeland 1979, 1982). Coarse pottery and flint implements dating from the 7th millennium B.C. were found at two sites, whereas Halaf and Ubaid ceramics were found at six other sites. Except from one place (Tell Mounbateh), which is thought to have been occupied throughout the whole Halaf period, the majority of the newly discovered sites is considered to belong to the later part of the Halaf period or to a Halaf-Ubaid transitional phase. The main importance of this 1978 survey is that it was the first which truly acknowledged the importance of the Balikh valley in prehistoric times.

TELL SABI ABYAD: THE SITE AND THE SETTING

By Peter M.M.G. Akkermans

A. DESCRIPTION OF THE SITE

Tell Sabi Abyad ('mound of the white boy') is located in the upper Balikh region of northern Syria. The site is situated about 2 km south of the modern village of Hammam et-Turkman, near the road from Raqqa to Slouk, at about 50^0 90'N, 45^0 20'E and approximately 320 m above sea level. The site is part of a group of four mounds dating back to the 7th and 6th millennium B.C. A small '*Flachsiedlung*' dating to the late 2nd millennium B.C. is also attested here. The cluster of prehistoric mounds, apart from Tell Sabi Abyad, consists of two probably Pre-Pottery Neolithic sites and one Halafian mound. Nowadays, the latter site is used as a graveyard for the inhabitants of Hammam et-Turkman and thus is almost completely covered by modern graves. A few such burials are also found in the northwestern part of Tell Sabi Abyad.

Among local villagers the whole cluster of sites is known as Khirbet Sabi Abyad. For reasons of convenience and to avoid any confusion, we have numbered the various mounds from I to V. Henceforth in this work Sabi Abyad stands for Tell Sabi Abyad I.

The prehistoric mounds are situated in a linear north-south pattern at short distances of eachother. The location of the mounds suggests that the Nahr et-Turkman, a branch of the Balikh, originally took its course along the complex. Nowadays, the Nahr et-Turkman flows at a short distance west of the Sabi Abyad mounds. It should, however, be noted that the course of the Nahr et-Turkman is frequently modified for irrigation purposes by local villagers of Hammam et-Turkman.

Tell Sabi Abyad I is the largest of the prehistoric mounds. The site measures about 240 x 170 m at its base (about 4.1 ha) and rises between 5 and 10 m above the surrounding fields. Actually Tell Sabi Abyad I is not one coherent mound, but a cluster of at least four small mounds which have merged through time (Fig. II.2). The oldest remains so far are found on the north side of Tell Sabi Abyad I. Excavations on the northeastern rise of Sabi Abyad have yielded Late Neolithic remains immediately below the surface. Since virgin soil has not yet been reached, the date of the earliest occupation at Sabi Abyad is not known

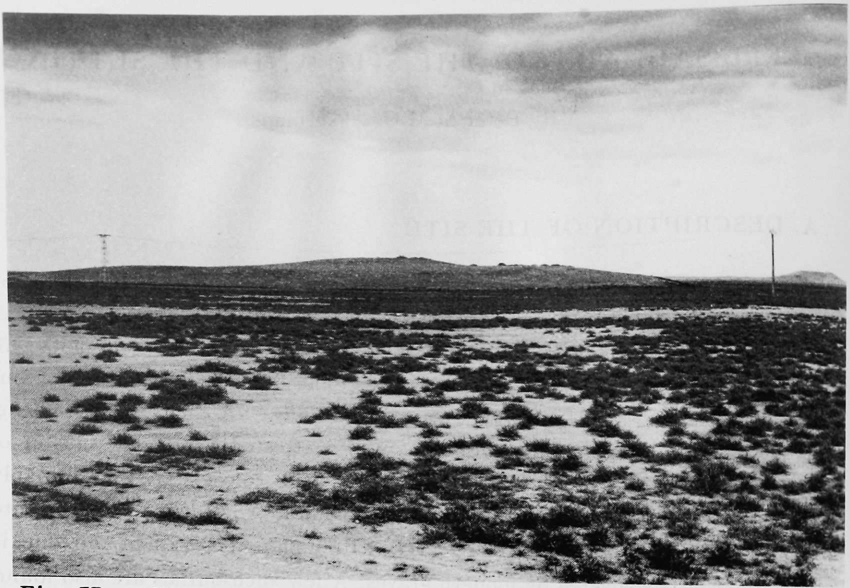


Fig. II.1. View of Tell Sabi Abyad from the northeast.

yet. However, some ceramics found on the surface show close affinities to pottery from the nearby sites of Tell Damishliyya and Tell Assouad (Akkermans, in press; Cauvin 1972), thus suggesting a date in the second half of the 7th millennium B.C. for this earliest occupation. Late Neolithic remains comparable to those unearthed in the northeastern area were also found in the southeastern part of Tell Sabi Abyad I. However, here the Late Neolithic strata have been covered by an accumulation of Halaf levels over 3 m thick. Nowadays both the northeastern and the southeastern mounds are about 5 m high, but apparently in Neolithic times a considerable difference in tell heights existed. Halaf occupation at Sabi Abyad seems to have been concentrated in the originally lower southeastern part of the site.

Towards the end of the 6th millennium B.C. Tell Sabi Abyad I seems to have been deserted, and it was not before the end of the 2nd millennium B.C. that parts of the site were reinhabited. The new settlement probably occupied an area of about 100 x 100 m on top of the lower prehistoric remains. The present evidence from Sabi Abyad suggests that these late 2nd millennium occupation levels and their associated erosion debris largely account for the filling of the depressions between the various small prehistoric mounds, thus giving the site its present rather flat and coherent appearance.

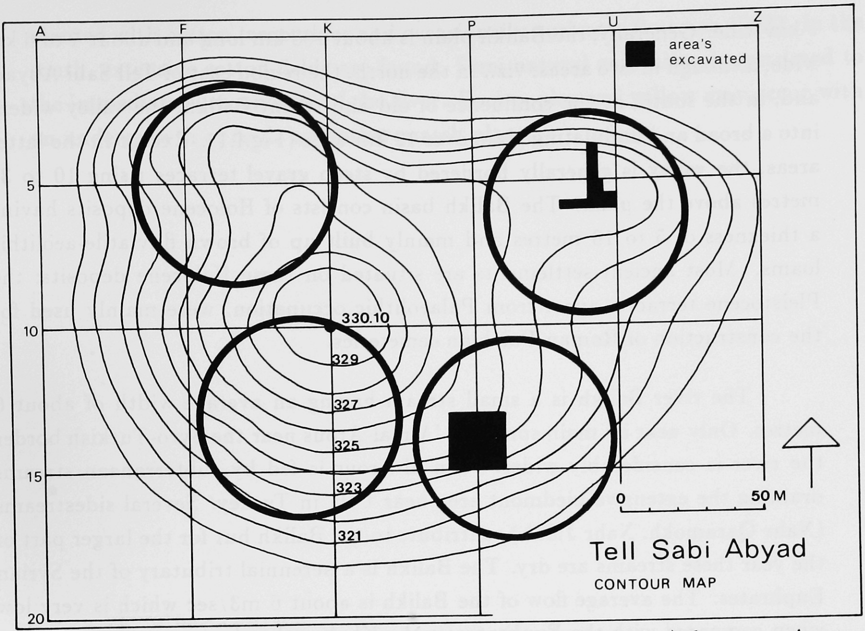


Fig. II.2. Contour map of Tell Sabi Abyad I with (in circles) the approximate location of the single mounds.

In 1978 a French-British team surveyed parts of the Balikh valley, thereby visiting the Khirbet Sabi Abyad complex (Copeland 1979, 1982). Four mounds were found but only two were shortly described: 'Tell Subhi Abiad I' (which is the present burial mound of the village of Hammam et-Turkman or, in our terminology, Tell Sabi Abyad IV) and Tell Subhi Abiad II (which is our Tell Sabi Abyad I). From both sites Halaf and particularly Ubaid material is reported. The latter is, however, definitely absent from the Khirbet Sabi Abyad complex. Apparently some coarsely and simply decorated Halaf sherds were erroneously taken for Ubaid pottery. An important Northern Ubaid-related settlement, Tell Hammam et-Turkman, is found at only five km southwest of Sabi Abyad (van Loon 1983, 1985).

B. THE NATURAL SETTING

The Balikh valley was formed at the start of the upper Pleistocene. Originally, the Balikh in its lower course flowed to the west, following the wadi al-Fayd into the Euphrates valley. Due to tectonic movements along the Euphrates fault towards the end of the upper Pleistocene, the Balikh changed its course to the east, thereby cutting through Euphrates deposits and creating a floodplain about

1 km wide. Generally, the Balikh plain is about 100 km long and about 4 to 6 km wide, although in two areas, viz., in the north, the region east of Tell Sabi Abyad, and, in the south, at the confluence of old and recent Balikh, the valley widens into a broad and undulating plain over 12 km wide (Fig.I.1). Except in the latter areas, the valley is generally bordered by steep gravel terraces rising 10 to 30 metres above the plain. The Balikh basin consists of Holocene deposits having a thickness of 5 to 10 metres and mainly built up of brown fluviatile-aeolithic loams. Most ancient settlements are situated on these Holocene deposits; the Pleistocene terraces, apart from Palaeolithic occupation, were mainly used for the construction of Roman-Parthian cemeteries.

The river Balikh is a small stream having an average width of about 6 metres. Only near its main spring at 'Ain al-Arous near the Syro-Turkish border the river is considerably wider. 'Ain al-Arous is fed by subterranean streams draining the extensive piedmont area near Urfa in Turkey. Several sidestreams (Nahr Qaramokh, Nahr Julab) contribute to the Balikh but for the larger part of the year these streams are dry. The Balikh is a perennial tributary of the Syrian Euphrates. The average flow of the Balikh is about 6 m3/sec which is very low when compared with the Euphrates or the Khabur that have an average flow of about 840 m3/sec and 50 m3/sec, respectively. Only after the winter rains the flow of the Balikh may increase to about 12 m3/sec (Mulders 1969; Wirth 1971). Nowadays, in summer large parts of the Balikh are completely dry. The Balikh plain is drained by numerous channels and wadis, some of which are very large. Occasionally, a diffuse river pattern occurs, dividing the water of the Balikh over numerous channels and thus creating a highly inaccessible, often swampy area (cf. Mallowan 1946).

The Balikh valley has an arid, steppe-like climate marked by a low annual precipitation and very high evaporation. Summers are dry and hot. The rainy season starts at the end of October and may last until April. A large part of the precipitation comes from heavy rain storms and cloud bursts, and most rain of a month may easily fall within 24 hours (Mulders 1969:18).

The Balikh valley roughly lies between the 200 and 300 mm isohyets. The average annual rainfall varies from 183 mm at Raqqa on the Euphrates to 275 mm at Tell Abyad near the Syro-Turkish border. Nowadays, the crucial 250 mm isohyet, running east-west somewhere near the confluence of Balikh and its main tributary wadi Qaramokh, divides the valley into two zones of widely different land-use. The northern parts of the Balikh valley, including the region around Sabi Abyad, are suitable for dry-farming but in the south agriculture necessitates irrigation. The present-day valley is almost entirely used for agricultural purposes. In the north, wheat and barley are the main crops. Irrigated fields are planted with cotton, vegetables and occasionally apricots (Bottema 1983). In the south, extensive cotton fields are found. Semi-natural vegetation is restricted to the immediate surroundings of the river. Here poplar and willow may occur with an undergrowth of reeds and other marsh plants.

[illegible] is generally bordered by [illegible] gravel terraces rising 10 to [illegible] the plains. The Balikh basin consists of Holocene deposits [illegible] [illegible] metres and mainly [illegible] of brown fluviatile sedim[illegible] [illegible] settlements are [illegible] Holocene deposits; [illegible] [illegible] from Palaeolithic [illegible] were mainly used [illegible] [illegible] Roman cemeteries.

[illegible] having an average width of about [illegible] [illegible] the Syro-Turkish border [illegible] [illegible] stream [illegible] [illegible] [illegible] part [illegible] [illegible] Syria [illegible]

[illegible] with the discharges of the Khabur [illegible] average [illegible] about [illegible] and 50 m3/sec, respectively. Only after [illegible] flow of the Balikh may increase to about 12 m3/sec (Mulders [illegible] Wirth [illegible] Nowadays, in summer large parts of the Balikh are completely [illegible] The [illegible] plain is drained by numerous channels and wadis, some of which are very [illegible] Occasionally, a diffuse river pattern occurs, dividing the water of the Balikh [illegible] numerous channels, and thus creating a highly inaccessible, [illegible] swampy [illegible] (cf. Mallowan 1946).

The Balikh valley has an arid, steppe-like climate [illegible] low annual precipitation and very high evaporation. Summers are dry and hot. The rain[illegible] season starts at the end of October and may last until April. A large part of [illegible] precipitation comes from heavy rain storms and cloud bursts, and [illegible] rain [illegible] a month may easily fall within 24 hours (Mulders 1969:18).

The Balikh valley roughly lies between the 200 and 300 mm isohyets. The average annual rainfall varies from 183 mm at Raqqa on the Euphrates to [illegible] mm at Tell Abyad near the Syro-Turkish border. [illegible] the [illegible] 250 mm [illegible] running east-west somewhere near the confluence [illegible] Balikh and its [illegible] [illegible] divides the valley [illegible] of widely [illegible] [illegible] The [illegible] parts of the Balikh [illegible] [illegible] are [illegible] for dry farming, but in the south agriculture [illegible] [illegible] irrigation. The present day valley is [illegible] mainly used for agricultur[illegible] [illegible] wheat [illegible] are the main crops. Irrigated fields [illegible]

Chapter III

TELL SABI ABYAD: STRATIGRAPHY AND ARCHITECTURE

By Peter M.M.G. Akkermans

A. THE AREAS OF EXCAVATION

As can be seen in Fig. III.1, excavations were carried out on both the northern and southern parts of Tell Sabi Abyad I. A small test trench (P10) was laid out in between; this trench was dug to a depth of over 1.20 m and yielded solely late 2nd millennium occupation debris. No doubt this trench was situated in the depression between the prehistoric northeastern and southeastern mounds. As a result of late 2nd millennium occupation and subsequent erosion this depression was gradually filled and hidden from view.

At present, two main prehistoric periods are distinguished, covering the later part of the 6th millennium B.C. (5300 - 5000 B.C.) and termed Late Neolithic and Early Halaf, respectively. This terminology may cause some confusion since our 'Late Neolithic' actually is not the latest Neolithic phase; the latter is considered to be represented by the Halaf culture. Although it has been suggested (Mellaart 1970, 1981; Copeland 1979) to define painted pottery societies like Halaf as 'Chalcolithic', I here follow Braidwood and Howe (1960), thereby considering Halaf settlements like Sabi Abyad as advanced farming villages (see also Redman 1978:177). Moreover, the excavations at Tell Sabi Abyad gave evidence of a close relationship between the Late Neolithic and Early Halaf periods, the characteristic traits of the latter period probably being a local outgrowth of earlier Late Neolithic features.

The northeastern part of Sabi Abyad is characterised by a flat bulge rising about 5 m above the surrounding fields. The northern slope is relatively steep but the mound slopes gently in an easternly and particularly southernly direction. A test trench 3.5 m wide was laid out down the northern slope (T4), supplemented by a partly excavated 9 x 9 m square (T5) and a test trench 2 m wide (S5) on the summit of the mound.

The test trench T4 yielded scanty traces of Halafian architectural features only in the topmost strata 1 and 2. The larger part of this trench, however, seemed to contain a thick accumulation of Halafian debris layers, resting on a similar Late Neolithic debris accumulation. The evidence suggests that this part of Sabi Abyad was used as a dump for a long time.

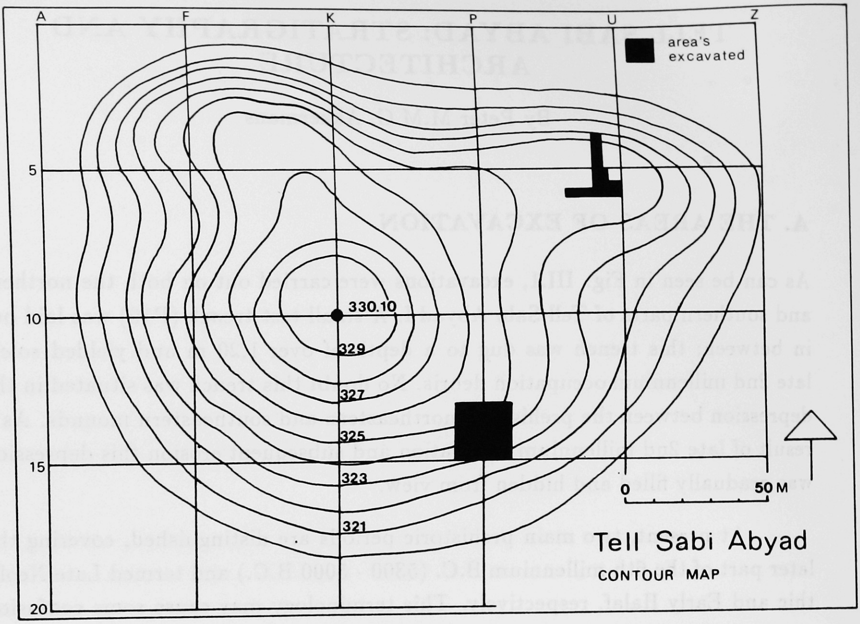


Fig. III.1. Contour map of Tell Sabi Abyad I with (in black) the area's excavated.

The neighbouring square T5 yielded Late Neolithic remains immediately underneath the top soil. Here Halaf material was only found in the mixed top soil layer. Probably the Halaf remains have completely eroded on this part of the site. The virtual absence of substantial Halaf remains suggests that the northeastern part was a marginal area of the Halaf settlement at the site. In the northeastern area Halaf occupation apparently contracted near the slope of the mound, thereby leaving the lower Late Neolithic mound largely intact. The sloping Halafian layers have extended the dimensions of the northeastern area considerably. The original Late Neolithic mound in this area seems to have been much smaller.

Our main efforts in 1986 were concentrated on the southeastern part of Tell Sabi Abyad where four 9 x 9 m squares were opened (O13, O14, P13, P14). Here Halaf occupation levels appeared immediately below the surface, but in squares O13 and O14 these Halaf strata had been heavily disturbed by late 2nd millennium building activities. Virtually no such disturbance was noted in squares P13 and P14. In order to fulfill our research objectives and to use our funds effectively, it was decided to focus attention on the latter trenches.

Here a complex Halaf sequence over 3 m thick could be established, immediately preceded by Late Neolithic occupation levels. No true gap in occupation between the Late Neolithic and Halaf periods is indicated.

On the southeastern mound, Late Neolithic levels were only reached in square P14. In other squares excavation was limited to Halafian levels only. As time ran out at the end of the season and no definite clue as to the ultimate duration of Halaf on this part of Tell Sabi Abyad had yet been found, it was decided to limit the actual area of excavation to a 2 m wide trench along the east section of square P14. In this way, we cut through the Halaf strata and thus reached the underlying Late Neolithic levels. These Late Neolithic remains are closely related to those exposed on the northeastern part of Tell Sabi Abyad (square T5) and probably date from the middle and first half of the 6th millennium B.C. The Late Neolithic levels unearthed thus far at Tell Sabi Abyad are definitely of a later date than those found at the nearby sites of Damishliyya and Assouad which can both be placed in the later 7th millennium B.C. (Akkermans, in press; Cauvin 1972).

In this progress report stratigraphy and architecture of each square of excavation are presented separately, although we try to show relationships between various strata in various squares whenever possible. All strata are numbered in order of excavation, i.e. from the top downwards. The various strata will, however, be discussed in order of accumulation, i.e. from the earliest to the latest.

B. EXCAVATIONS IN THE NORTHEASTERN AREA

B.1. TRENCH T4

Stratum 4

The lowest stratum reached in square T4 is marked by an accumulation over one meter thick of rather homogeneous soft brown loam, sloping to the north. No features or substrata could be recognised. This loam deposit was covered by various thin layers of ashes and reddish burnt earth, also found in the neighbouring square T5. Relatively few artifacts and bones were recovered from this loam deposit. The pottery wholly consisted of Late Neolithic wares identical to those found in square T5. The nature of this loam deposit is not yet clear. Stratum 4 differed in soil consistency and soil texture as well as kind of artifacts from the next stratum 3.

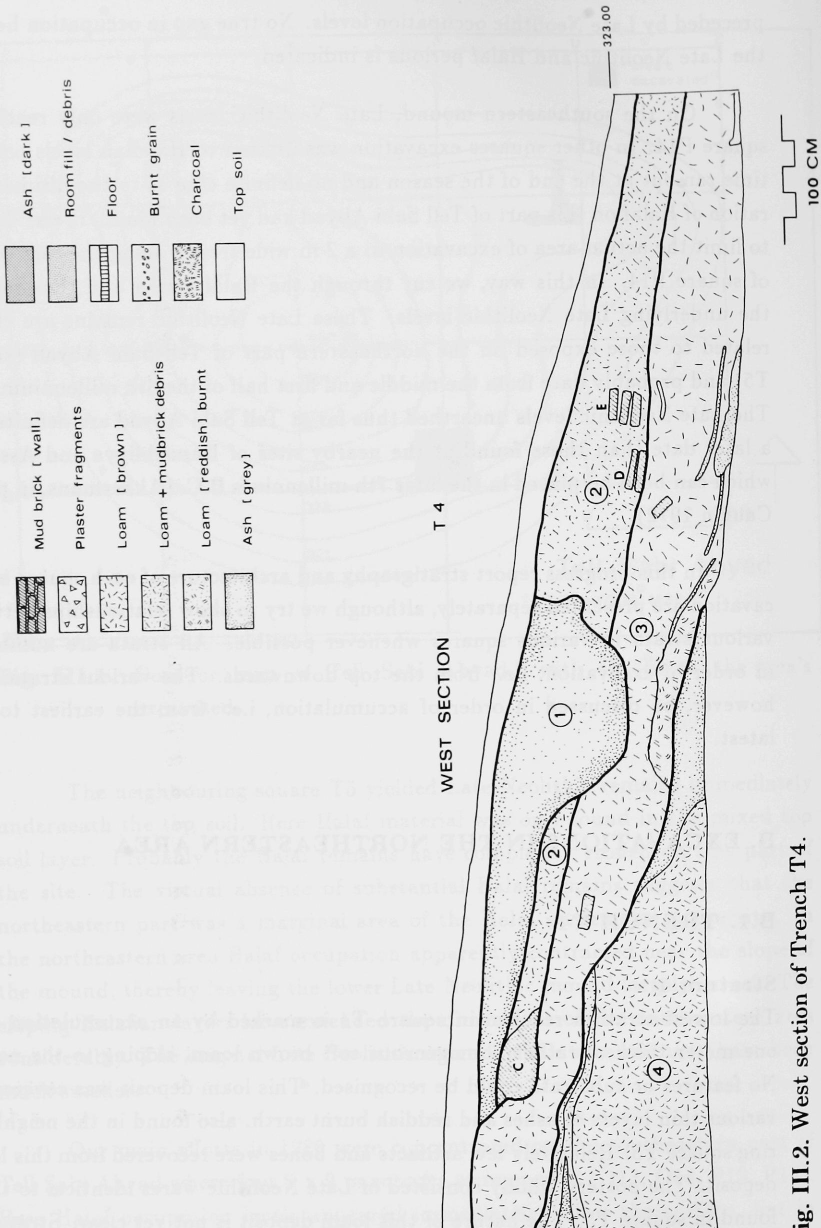


Fig. III.2. West section of Trench T4.

Stratum 3

Halaf remains accumulated upon the lower, stratum 4, loam deposit and the associated ash lenses and burnt soil layer. No features are ascribed to stratum 3. The lower part of stratum 3 is marked by soft ashy soil: an ash midden is partly covered by a heap of reddish burnt, mud brick-like material (decayed mud bricks?) which in turn is followed by thin lenses of dark ash. Without a sharp distinction this soft ashy soil is covered by hard brown loam intermingled with ashy spots. Here mud bricks and mud-brick fragments appeared. Some basalt grinding slab fragments and a few bone spatula fragments were found as well. Interestingly enough, the upper part of stratum 3 yielded rather large quantities of pottery whereas the ashy lower part contained but few ceramics. A small pit had been dug from stratum 3 into the lower Late Neolithic stratum 4. This pit had a diameter of ca. 50 cm and a depth of about 30 cm. It was filled with dark ash.

Stratum 2

Stratum 2 in trench T4 is marked by a gently sloping surface upon which hard brown loam and mud-brick debris accumulated up to 70 cm thick. A large part of stratum 2 had been disturbed by a pit dug in from the upper stratum 1. Various walls seem to have been erected upon the stratum 2 surface. Wall C represents a wall stump oriented east-west. Its irregular shape may be due to weathering. No single mud brick could be detected. Further north and slightly down the slope two features (D and E) built of mud brick were present. Unfortunately, neither feature was recognised during excavation; they only appeared when the west section was prepared for drawing. Feature D seems to represent a mud-brick wall ca. 34 cm wide and preserved to a height of only two bricks. Immediately next to this wall D more mud-brick traces (E) appeared, but we have our doubts whether this feature truly represents an in-situ wall; more likely these bricks represent fallen remains of wall D.

Stratum 1

This stratum is marked by a large pit varying in depth from about 20 cm near the south balk to about 70 cm in its northwestern range. The exact dimensions of this pit could not be eastablished due to the limited extent of trench T4, but its length (north-south) seems to be at least 6 m. This pit was entirely filled with light-grey ashes. At a time when this filling was largely completed, an oven (A) was built in the pit area (ashes were found underneath, around and above this oven A). Oven A was oval-shaped and measured about 65x50 cm. It appeared immediately underneath the top soil and was preserved only to a very limited height. Wall fragments belonging to it were found immediately adjacent. No floor could be ascribed to this oven. Large quantities of Halaf pottery and bones were recovered from stratum 1. Most of the pottery indicated heavy weathering, suggesting a long exposure to the elements. Probably this area was used as a dump. Various small finds came from the ash pit: a bone spatula fragment, a basalt grinding slab fragment, a flat and rounded pierced stone, and a painted female figurine of baked clay.

B.2. SQUARE T5

Stratum 2

Stratum 2 in square T5 is marked by a thick accumulation (over 50 cm) of soft ashy loam. In the northwestern quadrant reddish burnt and crumbly soil appeared (which was also noted in trench T4). Traces of an oven-like feature (D) appeared, surrounded by burnt mud-brick fragments and dark ash. Since only the upper part of this feature D has been exposed by our 1986 excavation and since no pertaining floor has been found yet, nothing can be said about the associations of feature D. In the southwestern part of square T5 possible traces of walls appeared.

Stratum 1

Stratum 1 starts with the construction of a rather large oven (B), built up in coils. The oven had a diameter of about 1.35 m and a wall thickness of ca. 5 cm. It had been rebuilt once. The lower oven had been levelled and a new oven was constructed at exactly the same spot. This new oven was slightly smaller, with a diameter of about 1 m. It was preserved to a height of ca. 20 cm. Immediately west of this oven B a wall (A) was found, built of reddish mud bricks (stretchers only). The width of this wall was ca. 22 cm and its length was 2.80 m. It was oriented northeast-southwest. The area immediately east of wall A was marked by reddish-brown wall debris. No traces of an adjoining wall were found. Perhaps wall A served as a kind of wind shield.

B.3. TRENCH S5

Trench S5 was dug only to a limited depth. Excavations here yielded no architectural remains. The trench is marked by soft soil intermingled with ashy spots and is related to stratum 1 in square T5. Rather few finds, all of Late Neolithic date, were recovered from trench S5.

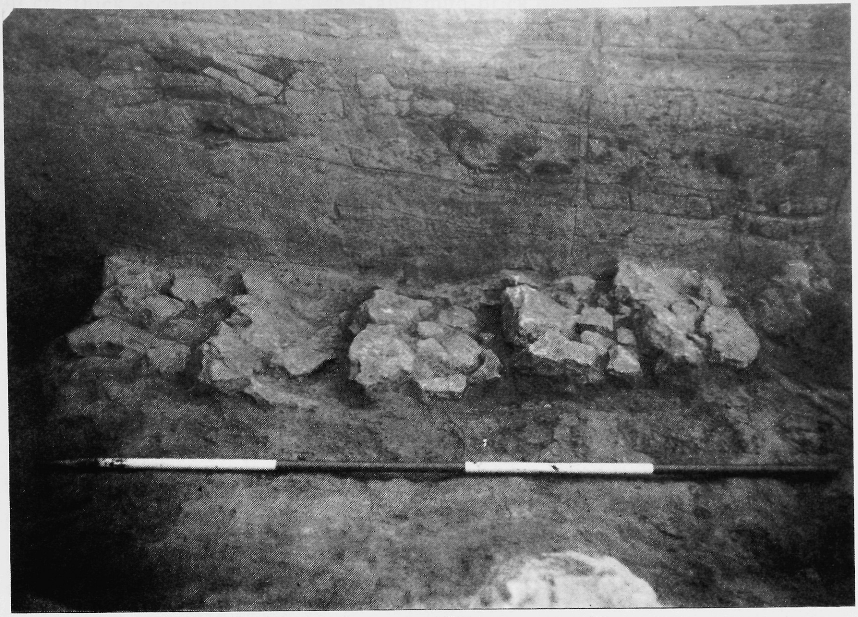


Fig. III.3. Stone foundation in square P14, stratum 11.

C. EXCAVATIONS IN THE SOUTHEASTERN AREA

C.1. SQUARE P14

Stratum 11

Stratum 11 represents the earliest stratum excavated until now on the southeast mound. This stratum was uncovered in a very limited area only in the 2 m wide test trench along the east section of square P14. The total area of exposure was about 8 sq.m.

Stratum 11 was marked by a carefully constructed stone wall or, rather, stone foundation AB (see Fig. III.3). This foundation, oriented NNW-SSE and built of rather large hewn boulders (up to 40 cm in length), was ca. 2.20 m long and at least 80 cm wide (the exact width could not be established since part of this foundation was hidden in the east balk). Most remarkable was the step-like construction of this foundation wall. Stone foundation AB was surrounded by ashy loam. Stratum 11 (including at least a part of foundation wall AB) was covered by a ca. 4 cm thick lens of grey loam (perhaps a floor level belonging to stratum 10).

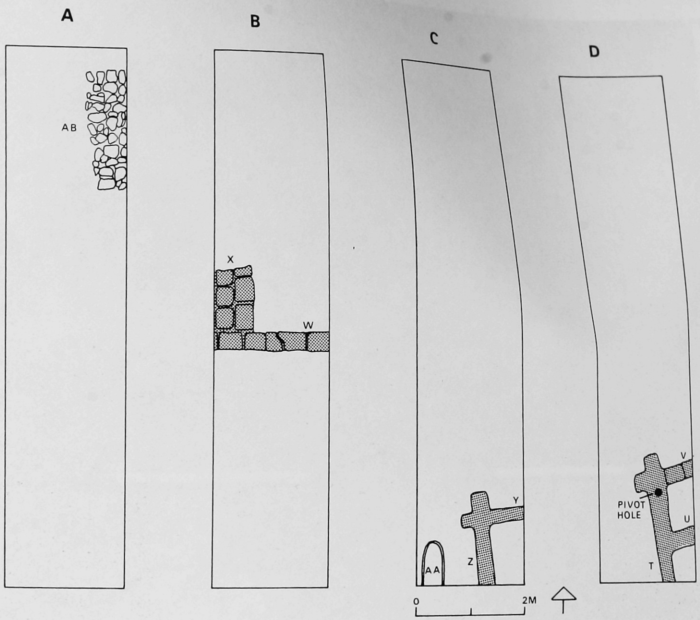


Fig. III.4. Architectural remains in the test trench along the east section of square P14. A: stratum 11. B: stratum 9. C: stratum 8. D: stratum 7B.

Stratum 10

Stratum 10 consisted of a ca. 35-50 cm thick accumulation of dark loam, mixed with ash and both burnt and unburnt mud-brick fragments. Like the lower stratum 11, this stratum 10 could be traced only over a very limited area in the test trench near the east section (area of exposure: ca. 7 sq.m). Two substrata can be distinguished: the lower consisted of a thin greyish loam lens (perhaps representing a floor) covering the stratum 11 remains; it was followed by a ca. 15-25 cm thick layer of debris. In this debris a pivot-stone appeared amidst fragments of a large storage jar. The upper substratum started with a ca. 4-8 cm thick lens of greyish loam (probabaly a floor), slightly sloping to the south and covering the lower debris layer. This lens of greyish loam was in turn covered by a 20-25 cm thick layer of debris, largely identical in consistency to the fill of the lower substratum. No architectural features were ascribed to this stratum 10.

Stratum 9

Remains of stratum 9 could be traced over a larger area (about 29 sq.m) and consised of two mud-brick walls (W and X) surrounded and covered by a ca.

40 cm thick accumulation of ashes and mud-brick debris. The stratum 9 layer sloped gently in a southernly direction (i.e. following the course of the tell slope). Wall W was oriented east-west and was preserved to a height of at least four courses of mud bricks. Wall W stood perpendicular to wall X. The latter was at least two mud bricks wide (see Fig. III.4). Its northern part seems to have been destroyed. Both wall W and wall X were built of bricks measuring about 35/45x35x8/10 cm. South of wall W mud-brick debris was found which no doubt stems from the collapsed upper part of wall W. Most interesting was the area north of wall W. Here large quantities of dark ash appeared, mixed with numerous fragments of mud bricks. This area gives the impression of intensive burning but for the moment it remains unknown whether this resulted from a true fire at this particular spot or from the dumping of ashes and other occupational debris.

Stratum 8

Stratum 8 was excavated only in the southern half of the test trench. Stratum 8 indicated a shift in occupation. The larger part of the formerly inhabited area in square P14 now seems to have been deserted and occupation apparently contracted on the tell slope. Here parts of a rectangular building were uncovered, represented by walls Y and Z (Fig. III.4). These were perpendicular to each other; the junction of the walls was marked by buttresses. Traces of plaster were found both on the interior and exterior wall faces. This plaster consisted of a thin white layer (gypsum, ca. 3 mm thick) on a ca. 1.7 cm thick mud layer. Both wall Y and wall Z were built of mud bricks of varying sizes: about 30/35x24/34x6/8 cm. Wall Y had a width of only 24 cm whereas wall Z was 34 cm wide.

Immediately west of wall Z traces were found of a small oblong structure with rounded corners and raised to a height of about 30 cm (feature AA). In view of the dark ash found in it and its ca. 2 cm thick burnt mud walls, this feature probably served as an oven or fireplace. Its width is ca. 42 cm and its length is over 75 cm (part of this fireplace AA is hidden in the south balk).

Stratum 7B

Stratum 7B started with the laying of a thin mud floor upon the occupational debris of the stratum beneath. On this floor various walls were raised (walls T, U, V; see Fig. III.4). In outline and orientation the newly erected building closely resembled the lower, stratum 8, house although the present building was situated slightly more to the north. Walls T and V were the building's supporting walls, marked at their junction by buttresses. The exterior faces of both walls were white-plastered. Wall U represented an interior partition wall. An entrance to the present building was indicated by a small rounded hole (diameter ca. 12/14 cm, depth ca. 3 cm) in wall T near the junction with wall V. Probably this hole

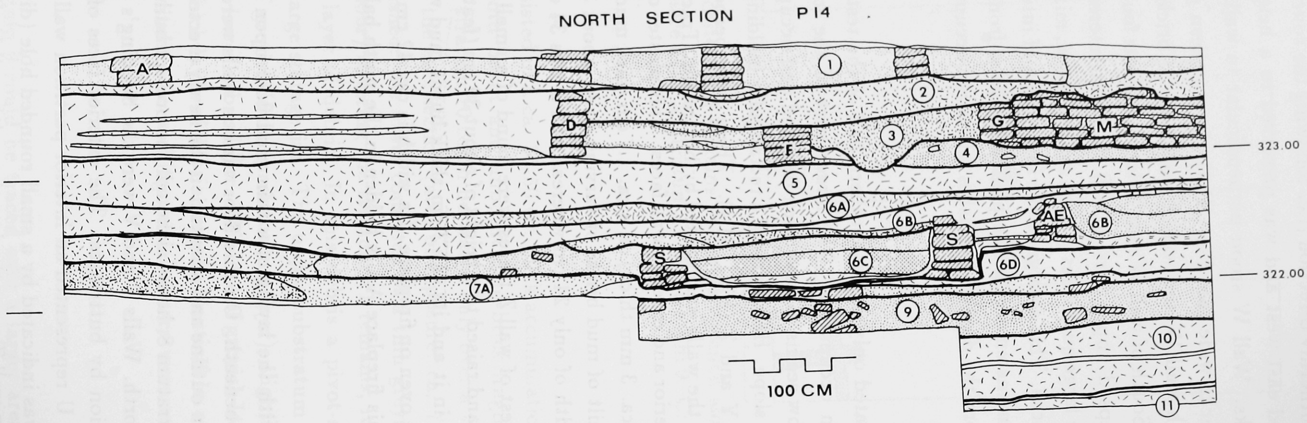


Fig. III.5. North section of square P14. (legend: see Fig.III.2.)

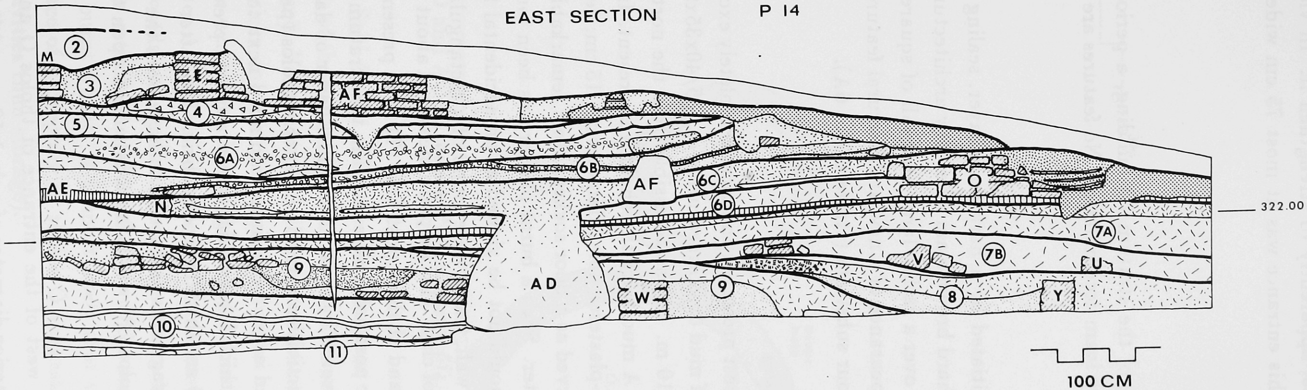


Fig. III.6. East section of square P14. (legend: see Fig.III.2) served as a door socket. The interior of this hole had been covered by unshaped gypsum fragments, apparently to strengthen it. In view of the position of the interior wall U, this entrance was at most 75 cm wide. A mud-brick threshold was present.

Stratum 7A

After the collapse of the stratum 7B building, a period of local erosion set in, marked by a brown loam accumulation. No features are ascribed to this stratum.

Stratum 6

Stratum 6 was initiated by a hard loam layer, sealing the stratum 7A erosion levels. Upon this hard brown loam layer new architecture was founded. Stratum 6 could be traced over a rather large area (all of square P14: 81 sq.m) and was marked by the appearance of a new architectural feature: the tholos. Stratum 6 was divided into four substrata (strata 6D to 6A).

Stratum 6D

Tholos O was the best preserved and most completely excavated stratum 6 tholos. It had been built of mud bricks measuring ca. 35/40x35x9 cm and had an interior diameter of ca. 3.10 m. It was accessible from the northwest through a ca. 80 cm wide doorway. A mud-brick threshold was present. In this threshold a small, tapering and white-plastered hole (diameter ca. 15 cm; depth ca. 9 cm) was found which no doubt served as a door socket. Most remarkable was the burnt interior wall and floor plaster. Such a burnt plaster has been found in *all* tholoi at Sabi Abyad and thus should not be viewed as an accidental feature. On the floor of tholos O, near the wall, traces were found of a rectangular-shaped fireplace with a low vertical kerb of clay. This fireplace measured about 75x50 cm. Immediately west of it a small and shallow post hole (?) was present (diameter ca. 10 cm; depth 5 cm; similar post holes were found in the stratum 6B tholos P). The floor in tholos O was covered by a ca. 2 cm thick layer of dark ash which may have been the result of activities carried out in this tholos (perhaps the fireplace was intensively used and ashes were simply dumped next to it). On this dark ash layer a ca. 10 cm thick layer of light grey ash was present, which in turn was covered by a ca. 10 cm thick layer of debris. The latter consisted of burnt mud bricks and plaster fragments and seems to have been the result of the collapse of tholos O. A new tholos (P) was later constructed upon the remains of tholos O (see stratum 6B).

Immediately west of the entrance of tholos O another tholos (AC) was found. It had an interior diameter of only 1.50 m and it is the smallest tholos

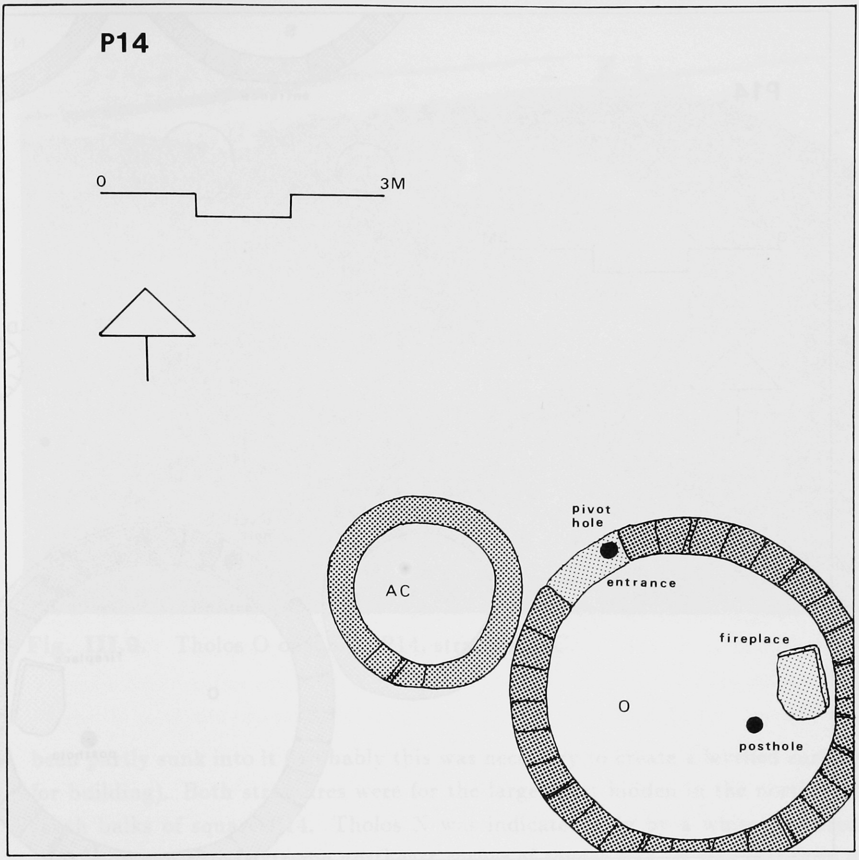


Fig. III.7. Tholoi O and AC in square P14, stratum 6D.

excavated until now at Sabi Abyad. Like the other tholoi at the site it was built of mud bricks. The width of the wall was about 30 cm. The northern part of tholos AC was heavily damaged. No entrance could be established. Large quantities of ash and burnt mud bricks and plaster fragments suggest that the small tholos AC, like its immediate neighbour O, was destroyed by fire. Most interestingly, both tholos O and tholos AC were surrounded by large quantities of burnt wheat, virtually free of field weeds and apparently representing a burnt stock pile. The size of this stock pile is estimated at 2-3 m3. The whole southern half of square P14 showed traces of burnt wheat. It is most likely that this stock came from tholos AC (the presence of a fireplace in tholos O suggests that this structure was used for other activities than storage).

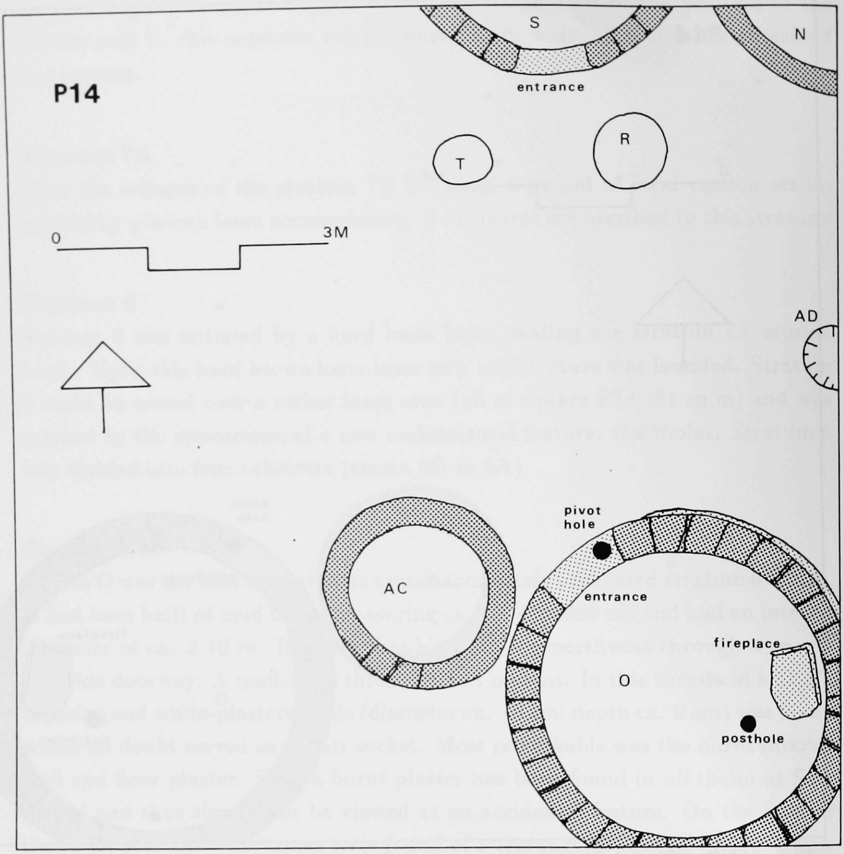


Fig. III.8. Tholoi in square P14, stratum 6C.

Stratum 6C

In the course of time about 15 cm of occupational debris accumulated against the lower part of the walls of tholoi O and AC. A new floor surface was created, but tholoi O and AC remained in use. The exterior wall face of tholos O is at its base partly widened by a ca. 8 cm thick mud pack which may have been added in order to strengthen the tholos base and to protect it against water damage (particularly the bases of mud-brick buildings are easily undercut by rain water and soil moisture, cf. Peters 1972:174; Rosen 1986:11).

Two tholoi (N and S) were newly constructed in stratum 6C (Fig. III.8). Tholos N had been built upon the stratum 6C floor surface whereas tholos S had

Fig. III.9. Tholos O of square P14, strata 6D-6C.

been partly sunk into it (probably this was necessary to create a levelled surface for building). Both structures were for the larger part hidden in the north and south balks of square P14. Tholos N was indicated only by a white-plastered wall fragment in the extreme northeast corner of square P14. It was rebuilt in a later stage (stratum 6B) and apparently the lower tholos had been cleared away almost completely in the course of this rebuilding. West of tholos N traces of tholos S were found. This tholos had been preserved to a height of ca. 40 cm. It was built of mud bricks measuring ca. 35x30x8 cm. The wall exterior had a mud plaster ca. 2 cm thick whereas the interior showed the usual burnt plaster. The tholos could be entered from the south through a 75 cm wide doorway. No door socket or the like was present. The interior diameter of tholos S is estimated at ca. 3 m. The stratum 6C tholoi seem to surround some kind of courtyard. In this court a bell-shaped pit had been dug to a depth of ca. 90 cm (pit AD). Two small white-plastered pits (R and T) were present in front of tholos S. Pit R had a diameter of 75 cm and is only 10 cm deep, whereas pit T was about 50 cm in diameter and about 20 cm deep. White-plastered pits constituted a common feature of the Halaf levels at Sabi Abyad. The reasons underlying the use of gypsum in pits remain unknown. Perhaps these pits were used in preparing food or served as mangers for animals.

The stratum 6C architecture in square P14 seems to have been concentrated in the eastern half of this square. However, mud-brick debris in the square's northwestern quadrant suggests that more architectural remains can be expected nearby.

Stratum 6B

Perhaps after the accidental burning of tholoi O and AC the area seemed to have been levelled and rebuilding of some of the former tholoi ensued. The duration between the substrata need not have been long, since the newly erected structures were built immediately upon the remains of the lower tholoi. Both tholos O and N were rebuilt. Tholos S, although no longer in use, must still have stood to some height.

In order to avoid any confusion, the two rebuilt tholoi are renamed here. Tholos O now becomes tholos P whereas tholos N becomes tholos AE.

Tholos P was but fragmentarily preserved: only its floor and small parts of its wall were not destroyed by later (i.e. stratum 6A) building activities. At Tell Sabi Abyad, it was repeatedly observed that although the tholos wall may have largely or even wholly disappeared, the floor has been left relatively undisturbed, thus allowing the reconstruction of the tholos size. Tholos P had an interior diameter of about 3 m. The tholos interior was again burnt whereas the exterior wall face was white-washed. Most interesting was the floor of this tholos P. In its centre was a small stone platform, consisting of various flattened stones partly sunk into the floor, which probably served to support a wooden post. West of this stone platform three small holes were found which are considered to represent post holes. That wood had been placed in these holes was indicated by their filling with concentric circles of dark ash (outer circle) and yellowish-brown fibrous powder (inner circles), representing partly burnt and subsequently disintegrated organic material. These holes had a diameter of ca. 12 cm and were 6 cm deep. Their tapering interior was lined by small sherds, probably to strengthen the sides. In view of their position and limited size and depth, it is clear that these post holes were not used for roof support or the like but served in a room partition. A small separate area was thus constructed within the building. The floor of tholos P was covered by a ca. 5-6 cm thick layer of dark ash and burnt plaster fragments (probably from the destruction of the upper structure of tholos P). Soon after its collapse this tholos was rebuilt (stratum 6A).

Tholos AE could be fragmentarily traced in the northeast corner of square P14 and was built immediately upon the remains of the stratum 6C tholos N. Tholos AE had been preserved to a height of ca. 40 cm. It was built of mud bricks measuring about 35x30x8 cm and had a thick (ca. 8 cm) burnt floor plaster

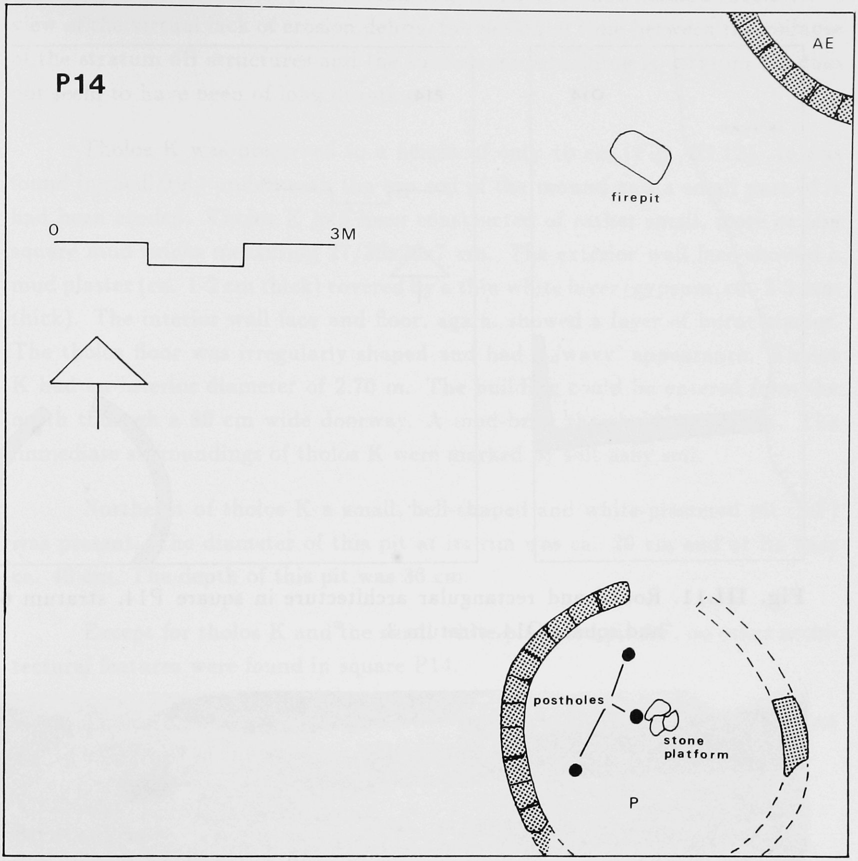


Fig. III.10. Tholoi of square P14, stratum 6B.

carried up onto the tholos wall. The tholos floor and the immediate surroundings of the tholos were covered by ashes and burnt plaster fragments. Tholos AE had an estimated diameter of about 3 m. Tholos AE could be entered from the south (this entrance was virtually altogether hidden in the east balk).

South of tholos AE a thin layer of charred grain was found. Southwest of tholos AE a small rectangular pit was present measuring about 60x40 cm. It had a depth of ca. 10 cm and was filled with dark ash. Probably this pit served as a fireplace.

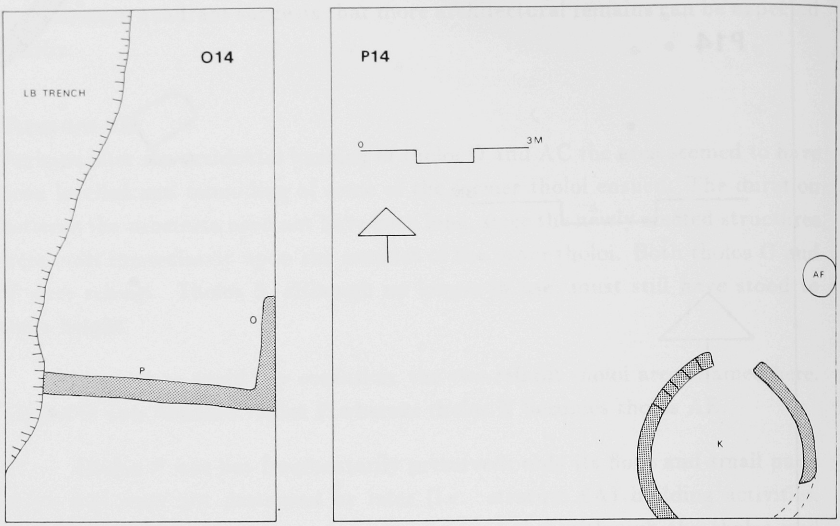


Fig. III.11. Round and rectangular architecture in square P14, stratum 6A, and square O14, stratum 3.

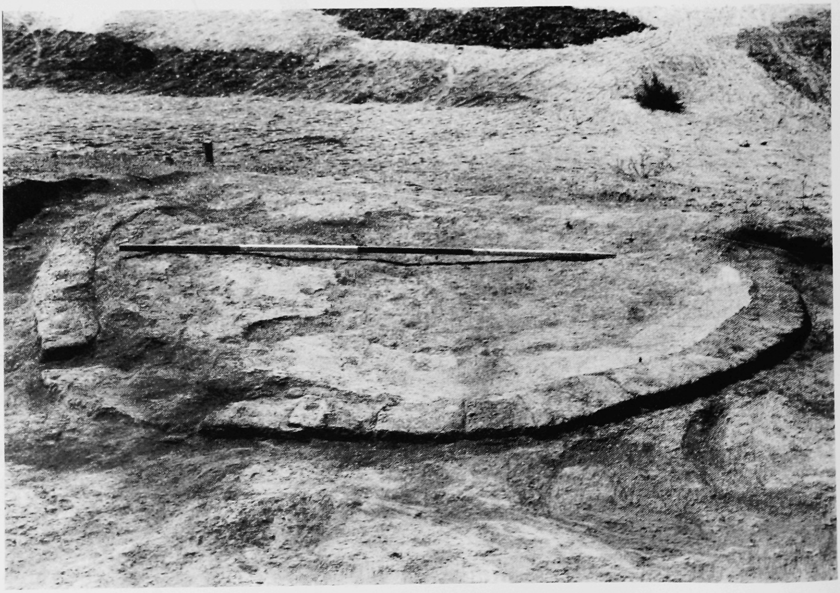


Fig. III.12. Tholos K in square P14, stratum 6A.

Stratum 6A

Stratum 6A was marked by the rebuilding of tholos P. now named tholos K. In view of the virtual lack of erosion debris. the period of time between the collapse of the stratum 6B structures and the subsequent rebuilding in stratum 6A does not seem to have been of long duration.

Tholos K was preserved to a height of only 10 cm (Fig. III.12). It was found immediately underneath the top soil of the mound and a small part of it had been eroded. Tholos K had been constructed of rather small, more or less square mud bricks measuring 27/30x26x7 cm. The exterior wall face showed a mud plaster (ca. 1-2 cm thick) covered by a thin white layer (gypsum. ca. 2-3 mm thick). The interior wall face and floor. again, showed a layer of burnt plaster. The tholos floor was irregularly shaped and had a 'wavy' appearance. Tholos K had an interior diameter of 2.70 m. The building could be entered from the north through a 80 cm wide doorway. A mud-brick threshold was found. The immediate surroundings of tholos K were marked by soft ashy soil.

Northeast of tholos K a small, bell-shaped and white-plastered pit (AF) was present. The diameter of this pit at its rim was ca. 20 cm and at its base ca. 40 cm. The depth of this pit was 36 cm.

Except for tholos K and the small white-plastered pit AF, no other architectural features were found in square P14.

Tholos K in square P14 was probably related to the rectangular feature partly unearthed in the neighbouring square O14 (see Fig. III.11).

Stratum 5

Stratum 5 was indicated by a reddish-brown loam layer varying in thickness from 10-20 cm in the southeastern part of square P14 to over 50 cm in the northwestern area. The nature of this loam deposit is not clear at this moment. Two possibilities are suggested, each having some chronological implications. The first possibility is that this stratum 5 represented a period of erosion of considerable duration. So far, stratum 5 was uncovered in square P14 only. It is unknown whether this loam accumulation covered the entire mound (suggesting a break in occupation) or a part of it only (indicating a local erosion). However, as an alternative, I suggest that this stratum 5 represented a loam deposit intentionally laid down to create a flat and stable area for building. In this view, the chronological distance between this stratum 5 and the next stratum 4 was minimal.

Stratum 4

Stratum 4 (see Figs. III.5 and III.6) started with a 5-15 cm thick accumulation of dark ash, loam lenses, mud-brick debris and burnt plaster fragments (the latter probably being wall debris of a tholos). Architectural features are expected nearby but except for three small white-plastered pits (H, I, J), no such remains were uncovered in square P14. Pits I and J were found close together in the northwest quadrant of square P14. They were oval-shaped and had straight walls which showed a 3-4 mm thick white plaster (gypsum). Pit I had a diameter of about 42 cm and a depth of 32 cm. Pit J showed a diameter of ca. 44/52 cm and had a depth of 30 cm. The third white-plastered pit, H, was found at a small distance of pits I and J and showed a diameter of about 50 cm. Pit H was 20 cm deep.

Stratum 3

Stratum 3 in square P14 is marked by the appearance of rectangular architecture situated upon the stratum 4 remains (see Fig. III.14). The new building, oriented NNE-SSW, was constructed of mud bricks measuring 30/35x30x8 cm. The various walls (D, E, F, G, and AF) stood to a height of about 40 cm. Wall AF was largely hidden in the east balk of square P14 but seemed to have been perpendicular to wall E. A doorway, about 65 cm wide and marked on both sides by buttresses, gave access to a series of tiny rooms. The exact length of these rooms could not be established (only a small part of the building has been excavated yet), but the width varied between 0.90 and 1.40 m. Fallen mud bricks (no doubt the remains of the structure's collapsed upper walls) and other occupational debris filled part of the rooms. Small pits dug out in this room filling suggested that the building, after its abandonment, still stood to some height and was re-used for some kind of undetermined activity. An interesting feature was mud-brick wall D which was 30 cm wide and still stood to a height of about 60 cm. It had been constructed in front of the western facade of the stratum 3 building; coming from the north it curved towards the east and ended approximately near the entrance of the stratum 3 complex. Parts of this wall had been disturbed by the stratum 2 tholos C. Perhaps wall D originally continued to the east. Wall D probably bounded an unroofed area, perhaps a kind of courtyard, in front of the building.

Stratum 2

Stratum 2 started with tholos C (Fig. III.13). This building appeared immediately below the top soil of the mound and consequently had been partly eroded. The preserved wall remains stood to a height of about 15-20 cm. Tholos C was built upon the eroded remains of the stratum 3 complex, the wall stubs of which must still have stood to some height. Tholos C was built of reddish-brown mud bricks, the exact dimensions of which were unknown (due to the badly preserved

Fig. III.13. Tholos C in square P14, stratum 2 (view from the north).

state of the tholos wall). The width of the wall was ca. 30 cm. The exterior wall face was covered by mud plaster ca. 1-2 cm thick which in turn was covered by thin white plaster (gypsum, ca. 2 mm thick). The tholos interior showed the usual greyish-burnt mud plaster. The tholos floor had an irregular and 'wavy' appearance. No entrance to the building could be established. Tholos C had a diameter of 3.20 m.

Remains of stratum 2 were only traced in the northern half of square P14 due to slope erosion. No other architectural features beside tholos C could be ascribed to stratum 2.

Probably stratum 2 in square P14 is related to stratum 4 in the neighbouring square P13.

Stratum 1

Stratum 1 represented the topmost architectural remains in square P14 and was marked by a large rectangular complex oriented north-south (Fig. III.22). Traces of this complex appeared immediately below the surface of the mound. The building had been heavily damaged by erosion (particularly its southern and southeastern part). The various walls in square P14 were standing two to five bricks high and were partly built upon a greyish loam layer. The walls of the building were constructed of crumbly, reddish-brown mud bricks of rather large size: about 40/45x30/36x8/10 cm. The complex consisted of a number of narrow, oblong rooms varying in width from 1.00 to 1.75 m. The exact length of these rooms could not be established in all cases, but seems to vary between 2.00 and 3.00 m. No entrances to the various rooms were found in square P14.

In the largely eroded northeastern area of square P14 numerous fragments of white plaster up to 1 cm thick were found. Similar plaster fragments appeared in the filling of one of the rooms of the same complex, but located in square P13. Probably these fragments were part of the interior wall coating of at least some of the rooms and had fallen down when the building collapsed. Remains of the stratum 1 architecture could be traced on a larger scale in the neighbouring square P13 (stratum 1).

C.2. SQUARE P13

Stratum 6

Stratum 6 was excavated on a limited scale in the western half of square P13 only. No architectural features are as yet ascribed to this stratum. In the northwestern quadrant of square P13 stratum 6 was marked by rather soft brown loam. The southwestern quadrant in square P13 was marked by crumbly reddish-brown soil.

Stratum 5

Stratum 5 started with a ca. 3-4 cm thick loam floor covering the stratum 6 remains. Traces of this floor have thus far only been found in the northwestern quadrant of square P13. Associated with this floor were a large complex of rectangular layout and several tholoi (Fig. III.14). Parts of this complex were also uncovered in the neighbouring square P14 (stratum 3). A chronological difference could be noted in the construction of the various buildings.

In square P13 well-preserved remains were found of a multi-roomed building, oriented NNW-SSE, which, however, seemed to have been largely located in the neighbouring square Q13, unexcavated so far. This building was constructed of thick mud-brick walls (width varying between 50 and 60 cm) on a stone foundation. The walls consisted of longitudinal rows of mud bricks supplemented by half-sized bricks. Commonly large and more or less square mud bricks measuring ca. 35/40x35x10 cm were used. The walls were mud-plastered. The northern and western faces of the building showed an additional white coating ca. 1-2 cm thick.

Traces of white plaster were also found on the interior wall faces. In front of the western facade lay a low white-plastered bench built of two rows of mud bricks on a stone foundation. A ca. 60 cm wide doorway in the west wall gave access to a narrow room (room 21) measuring 1.20 x 3.20 m. Apparently one had to step upon the white-plastered bench in front of the building in order to enter this narrow room.

Room 21 was marked by a hard loam floor. On this floor three complete and four fragmentarily preserved vessels were found. Near wall AB, opposite the entrance to room 21, a small heap of charred grain was found intermingled with fragments of a coarsely made bin. I suggest that this bin originally contained the cereal remains found. The highly fragile and crumbly state of preservation of the bin did not allow a proper reconstruction. The various fragments, however, indicated a low and wide shape. Next to it parts of a large storage jar appeared. Other finds in room 21 included a flattened pierced stone and a worked bone fragment. Near the room entrance the left mandibula of a large bovine was found. All finds were concentrated in the middle of room 21, on or immediately above the floor. An interesting question is whether these finds were all in situ or not. The complete vessels and the grain bin point to an in-situ context but the fragmentarily recovered ceramics suggest a disturbed situation. Apparently parts of the pottery had already been lost in antiquity, either as a result of erosion or other disturbance after abandonment of the building, or as a result of incomplete deposition (i.e. refuse dumping). Although it cannot be proven yet, we are inclined to consider the finds in room 21 as being in situ.

Room 22, next to room 21, was also marked by a hard loam floor slightly sloping to the south. Upon this floor and built against wall AA a small, oval-shaped oven or, more properly, fireplace (AF) was present. This fireplace had a diameter of about 65 cm and was built up in coils. It was preserved to a height of about 22 cm. Room 22 was filled with rather soft brownish loam (mixed with ashy spots) and mud-brick debris. In contrast with room 21 very few artifacts appeared in this room 22. It was kept painstakingly clean during its period of use. Perhaps aspects of functional use may account for the differences noted between rooms 21 and 22. No passage was present between both rooms.

In square P13, the stratum 5 architecture extends further in a southernly direction. Wall Z had been constructed in the same manner as walls AA-AD and was bonded with wall AA. The southern edge of wall Z was eroded or disturbed. Wall Y was largely hidden in the east balk. It had been erected against wall AA and no bonding between the two was observed. A ca. 50 cm wide doorway was present in wall Y. The location of wall Z in front of this doorway created a kind of portico.

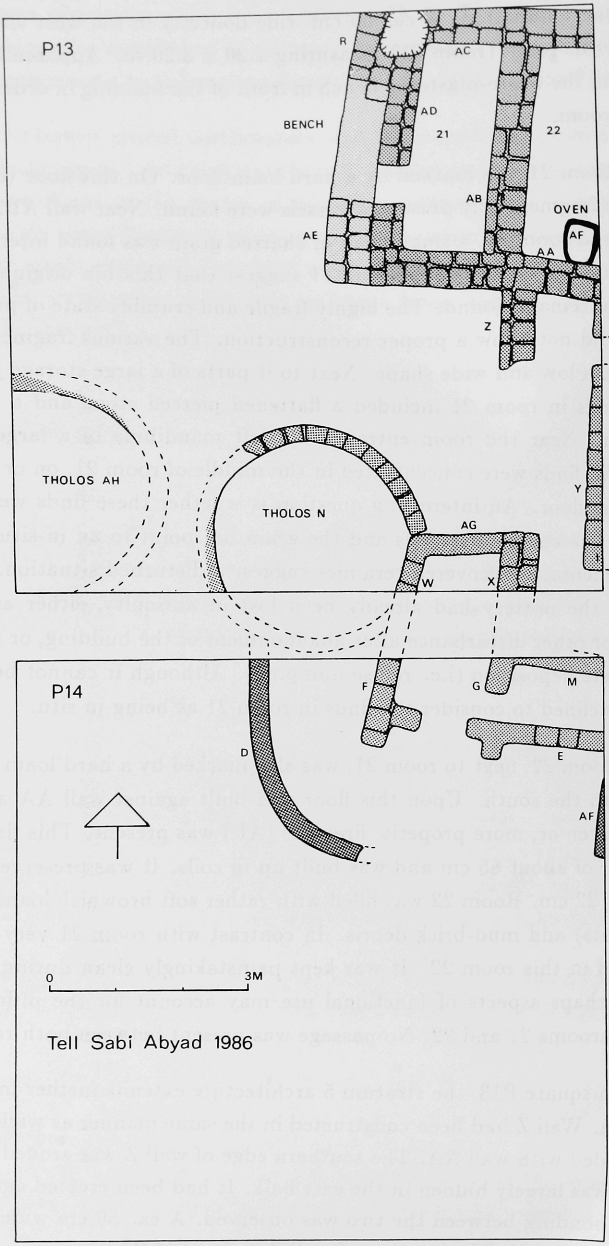


Fig. III.14. Architectural remains of square P13, stratum 5, and square P14, stratum 3.

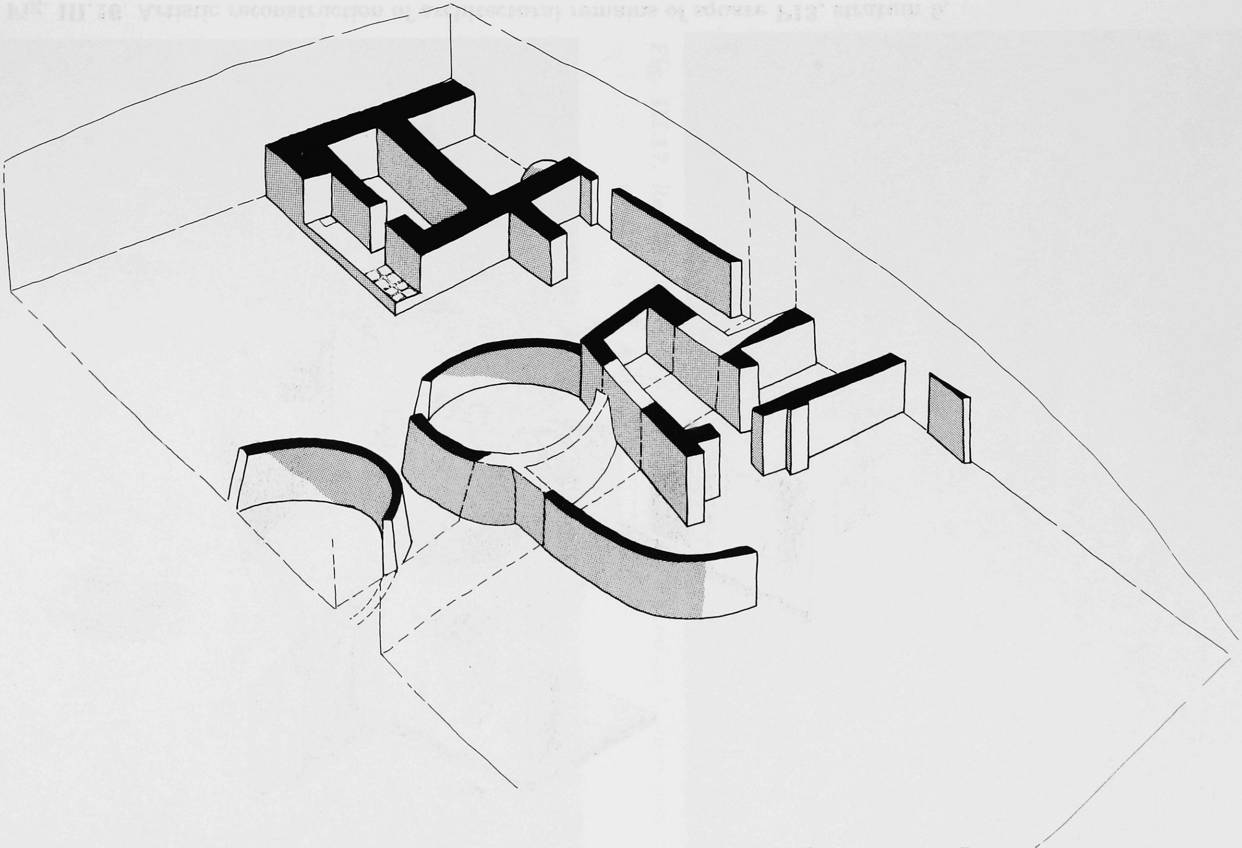


Fig. III.15. Isometric reconstruction of architectural remains of square P13, stratum 5, and square P14, stratum 3.

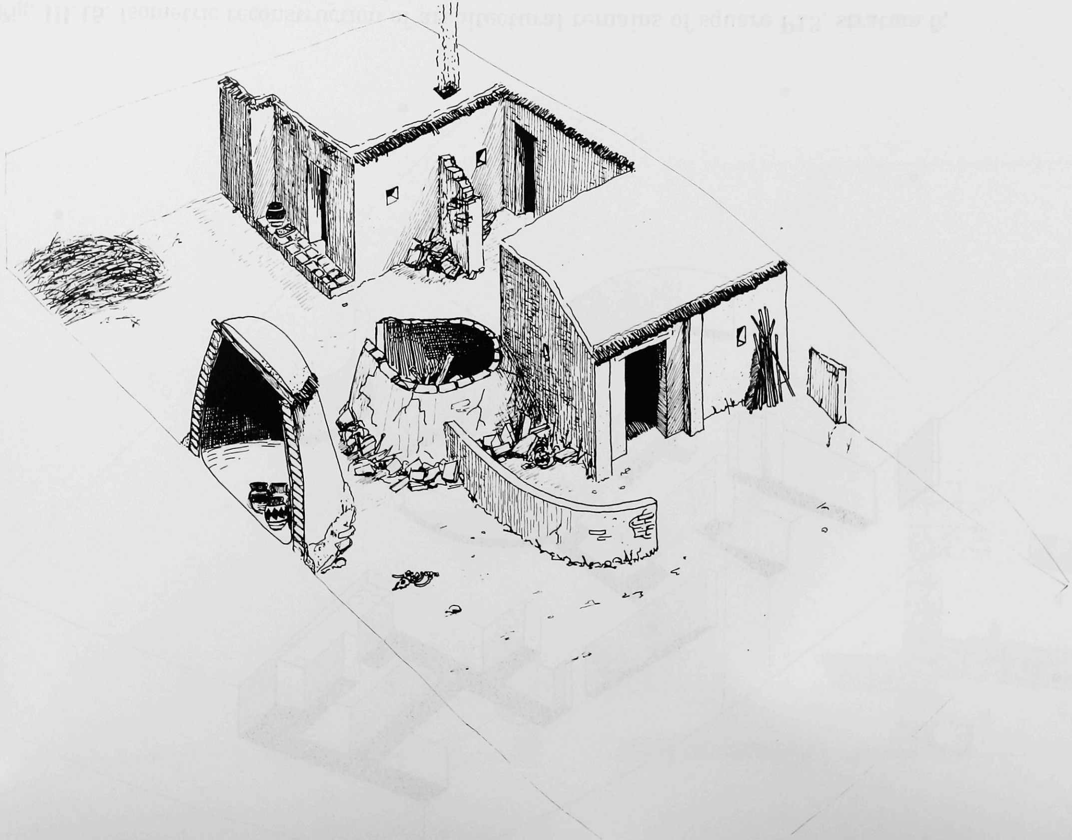


Fig. III.16. Artistic reconstruction of architectural remains of square P13, stratum 5, and square P14, stratum 3.

Fig. III.17. Rectangular architecture in square P13, stratum 5 (view from the west).

Fig. III.18. Rectangular architecture in square P13, stratum 5 (view from the north).

In the extreme south of square P13 wall remains (W, X, AG) were found which could also be traced in square P14 (stratum 3). Like wall Y these walls were added to the main building in square P13 at a later stage. The southern complex was built of small mud-brick walls simply founded on earth: the well-laid stone foundations characteristic of the northern complex were not found here. The southern complex in square P13 was accessible from the north. Again a kind of portico seemed to have been present.

Interestingly enough, the southern complex partly cut a tholos (N), thus clearly indicating a distinction in date of construction. This tholos was already out of use when the southern rooms were built, but must still have stood to a considerable height. West of this tholos another one (AH) was found. Both tholoi were heavily disturbed by later building activities and could only be reconstructed on the basis of fragments of wall and floor.

Tholos N had been built of rather small and square mud bricks measuring ca. 28x24x6 cm. It had an interior diameter of 3 m. Parts of the wall were preserved to a height of almost 50 cm and were already slightly incurving at floor level, thus suggesting a domed roof. This building would only have stood to a man's height. The wall exterior was covered by a ca. 1 cm thick mud plaster which in turn showed a thin white coating (about 2 mm thick). The interior wall face of tholos N carried the burnt mud plaster which was characteristic of all tholoi at Tell Sabi Abyad. The irregularly laid floor gently curved up onto the tholos wall. On the floor an accumulation of fallen mud bricks and plaster fragments was found, no doubt remains of the collapsed superstructure. The present evidence suggests that tholos N was constructed approximately at the same time as the main building in square P13. At a given moment this tholos fell into disuse and collapsed. At the time of construction of the southern complex, remains of tholos N must still have stood to some height, but apparently there was no need to level this structure. Walls W and AG of the southern complex cut the southeastern part of tholos N.

West of tholos N fragments of another tholos (AH) were found. This building had been heavily disturbed by pits of a later date and only parts of the hard-baked floor and wall were recovered. Tholos AH seems to have had approximately the same dimensions as tholos N.

Stratum 4

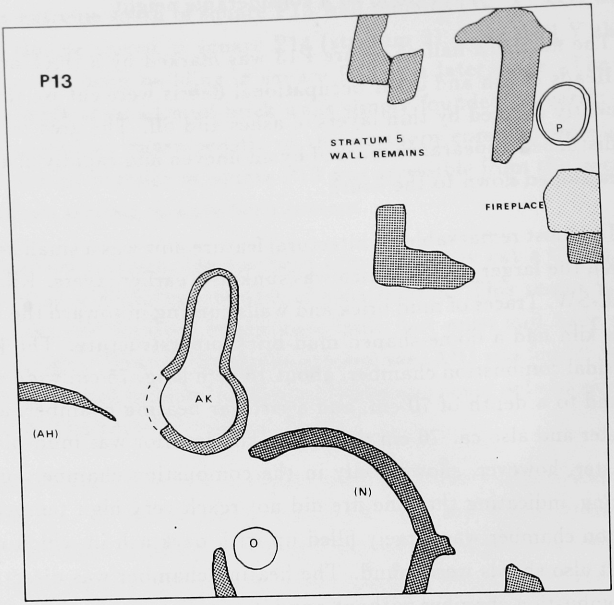
Stratum 4 in square P13 was marked by a completely different outline in architecture (Fig. III.19). The formerly built-up area now seems to have been in use for open-air domestic activities. Pits, ovens and fireplaces were present, but we found no true dwellings. Apparently the residential architecture moved to a nearby part of the mound. Large parts of the decayed stratum 5 architecture, however, must still have stood to a considerable height.

The northern half of square P13 was marked by a thick accumulation of ashes. Heaps of ash and other occupational debris were cut by shallow pits and subsequently covered by thin layers of ashes and fill. The area must have had a highly disturbed appearance marked by an uneven and rapidly changing surface. The area sloped down to the south.

The most remarkable architectural feature now was a small keyhole-shaped kiln (AK), the larger part of which was sunk into earlier layers. Kiln AK was oriented NE-SW. Traces of mud brick and walls curving in toward the top suggested that this kiln had a dome-shaped mud-brick superstructure. The kiln consisted of an absidal combustion chamber, about 160 cm long, 75 cm wide and sunk into the ground to a depth of 70 cm. and a circular heating chamber, about 120 cm in diameter and also ca. 70 cm deep. The kiln interior was mud-plastered. This mud plaster, however, showed only in the combustion chamber superficial traces of firing, indicating that the fire did not reach very high temperatures. The combustion chamber was largely filled up with dark ash in which many animal bones but also sherds were found. The heating chamber was directly connected to the combustion chamber without any intermediate grate or the like. The heating chamber was partly filled up with blackened and heat-cracked stones. An opening was probably present on the western side.

Immediately south of kiln AK remains of the stratum 5 tholoi N and AH must still have stood to some height. In the fill covering the floor of tholos N a shallow, white-plastered pit (O) was dug. This pit O was cylindrical in shape with a flat bottom. It had a diameter of 60 cm and a depth of 20 cm. Its interior was entirely white-plastered. Immediately north of this pit a small area (about 1 sq.m) was covered by an identical white plaster, forming an irregularly shaped surface, the function of which is unknown. It is possible that the remaining wall parts of tholos N defined some kind of reuse as an activity area.

Generally, the southern half of square P13 was characterised by hard brown loam. In sharp contrast with this southern area was the northern part of the square. Wall remains of the lower stratum 5 building still stood, thus creating basin-like areas. The larger part of this northern half of square P13 seemed to have been used for the dumping of ashes and other occupational debris. An open fireplace, probably used only once, was found west of the decayed stratum 5 wall. Here charred twigs of poplar were found in situ. Upon the fill of room 22 of the lower, stratum 5, main building an oven (P) was constructed. Parts of the



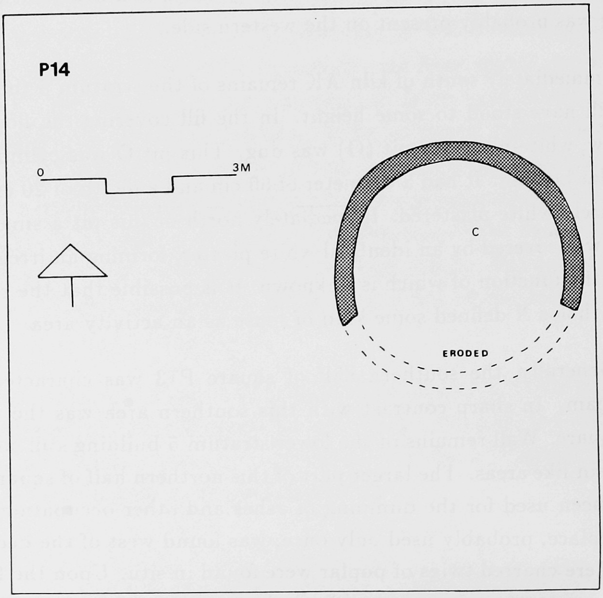


Fig. III.19. Architectural remains of square P13, stratum 4, and square P14, stratum 2.

walls formerly bordering this room 22 still stood to some height and may have acted as a wind shield. At the same time these walls defined a kind of activity area. Oven P was built up in coils ca. 5 cm thick and preserved to a height of about 60 cm. Its diameter was ca. 75 cm at its base. Towards the top the oven wall tapered slightly. The interior showed a smooth but heavily burnt mud plaster. Immediately south of oven P there was a fireplace constructed of both packed mud and mud bricks. Originally this fireplace seems to have formed part of an oven structure, now almost completely ruined. Beside quantities of light-grey ash and reddish-burnt mud-brick fragments, the area surrounding the fireplace was marked by crumbly, reddish-burnt soil which may be the remains of wholly decayed oven fragments. Upon the surface immediately surrounding this oven area several complete or reconstructable jars were found. Also a clay spindle whorl and a basalt pestle appeared. The location and state of preservation of the various objects suggested that they were found in their original context. Surprising was the appearance of a cylinder seal or amulet of slightly baked clay in this oven area. This seal showed some resemblances to late 2nd millennium cylinder seals from western Syria and the Levant and thus must be intrusive in the present stratum. The seal must have been worked down by animal activity.

The stratum 4 remains in square P13 can be related to tholos C found in square P14 stratum 2.

Stratum 3

Stratum 3 in square P13 was closely related to the preceding stratum 4. A continuous accumulation of ashes took place in the northern half of the square. The stratum 5 architectural remains, which had still stood to some height during stratum 4 times, now were wholly covered by occupational debris. Also all stratum 4 features now were out of use and were partly replaced by new structures (Fig. III.20).

Most interesting was structure AI, closely comparable to kiln AK in stratum 4. Unfortunately a part of this feature AI was hidden in the west balk of square P13 and thus its dimensions could not be completely established. The basic outline of the pit-like construction AI, however, seemed to be keyhole-like. Structure AI was oriented E-W. It consisted of an egg-shaped main area, narrowing toward the bottom and enlarged to the west by an oblong antechamber. The latter was marked by straight walls and had a width of ca. 70 cm. The main area had a width of max. 1.20 m and a length of ca. 1.75 m. Like the antechamber, it was sunk into the ground to a depth of 1.20 m. It had a flat, tamped earth floor measuring max. 1.50 x 1.00 m. Both the main area and its antechamber were marked by a hard and smoothed mud-plastered wall. In the main area the mud plaster was partly covered by a thin white plaster. The floor of feature AI (both the main area and its antechamber) was partly covered by medium-sized stones. Amidst these stones lay some animal bones. At a time when feature AI had lost its original function, it was filled by soft brown loam mixed with charcoal particles, sherds and bones. The upper part of the antechamber showed a ca. 30 cm thick accumulation of alternating layers of black and grey ash. The basic outline of feature AI clearly compared to that of the stratum 4 kiln AK and I suggest that structure AI fulfilled a similar role as kiln AK. In case of structure AI, however, no traces of a superstructure were found, which may be due to erosion or levelling after feature AI went out of use. Traces of firing were also absent, which may, however, be explained by the limited exposure of structure AI. Evidence of firing is expected to appear in the antechamber, an area still almost completely hidden in the west balk of square P13.

Structure AI was surrounded by pits of various nature. At least four types of pits could be distinguished:

a) North of structure AI lay two irregularly-shaped, more or less oval pits (AL and AM). Their exact dimensions could not be established since they were partly hidden in the west balk of square P13. Pit AL seemed to vary between 1.30 - 2.00 m in diameter whereas pit AM seemed to be between 1.20 - 1.50 m wide. Both pits had a depth of about 1 m. The bottom of pit AM was covered with stones. It is, however, doubtful whether these stones were part of the original construction. The position and elevation of the various stones suggested that they had fallen or been thrown in at a later stage. Large quantities of charred grain were found in both pits. The rather loose concentration of seeds and their distribution in the immediate surroundings of the pits suggested that these burnt cereals should not be considered as original storage remains but as secondary pit fill. Botanical samples were taken from both pits (see van Zeist and Waterbolk-van Rooijen, this volume). In pit AL, near its opening and sloping inwards, a 1.5 cm thick but broken crust of white plaster appeared, the function of which is unknown. Perhaps this crust was used in sealing the pit.

b) Northeast of structure AI a shallow, slit-like pit (AJ) was found. This pit was ca. 1.60 m long and varied in width from ca. 40 cm at its southern end to ca. 70 cm at its northern end. Its depth was about 20 cm. Pit AJ was filled with black ashes in which charred but well-preserved twigs of ash (*Fraxinus*) were found. Apparently this was the original pit content. Here it should be remembered that the upper part of the antechamber of feature AI was also filled with ashes and perhaps this slit-like part of AJ was used for the same purposes as the antechamber of feature AI. What these purposes actually were remains vague.

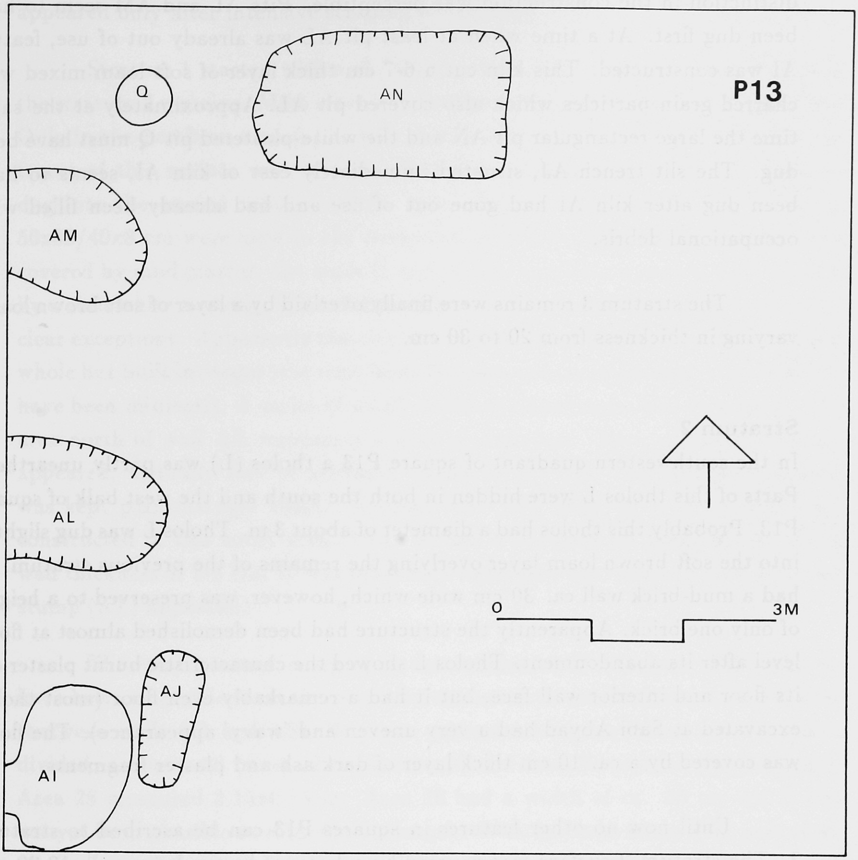


Fig. III.20. Square P13, stratum 3.

c) In the northwestern quadrant of square P13 a small, white-plastered pit or basin (Q) was present. This pit was cylindrical in shape and had a flat base. It had a diameter of 60 cm and was preserved to a depth of ca. 15 cm (the upper part of pit Q seems to have been eroded).

d) East of the white-plastered pit Q a large and more or less rectangular pit was present, named AN. It measured about 2.60x1.50 m and had a depth of about 1 m. It had cut part of the lower stratum 5 features, but generally these lower remains seem to have been spared for some reason (it may have taken too much trouble to remove these wall remains). Pit AN had rather steep and straight walls except at its western side; here pit AN showed a gradual slope.

Although all these features belonged to the same stratum, a chronological distinction in the construction was perceptible. Pits AL and AM seem to have been dug first. At a time when at least pit AL was already out of use, feature AI was constructed. This kiln cut a 6-7 cm thick layer of soft loam mixed with charred grain particles which also covered pit AL. Approximately at the same time the large rectangular pit AN and the white-plastered pit Q must have been dug. The slit trench AJ, situated immediately east of kiln AI, seems to have been dug after kiln AI had gone out of use and had already been filled with occupational debris.

The stratum 3 remains were finally overlaid by a layer of soft brown loam, varying in thickness from 20 to 30 cm.

Stratum 2

In the southwestern quadrant of square P13 a tholos (L) was partly unearthed. Parts of this tholos L were hidden in both the south and the west balk of square P13. Probably this tholos had a diameter of about 3 m. Tholos L was dug slightly into the soft brown loam layer overlying the remains of the previous stratum. It had a mud-brick wall ca. 30 cm wide which, however, was preserved to a height of only one brick. Apparently the structure had been demolished almost at floor level after its abandonment. Tholos L showed the characteristic burnt plaster on its floor and interior wall face, but it had a remarkably even floor (most tholoi excavated at Sabi Abyad had a very uneven and 'wavy' appearance). The floor was covered by a ca. 10 cm thick layer of dark ash and plaster fragments.

Until now no other features in squares P13 can be ascribed to stratum 2. The stratum 2 surface was covered by a layer of brown loam only 10-20 cm thick, upon which in the subsequent stratum a floor was laid and associated architecture was erected. Perhaps the larger part of the area had been levelled before the beginning of the stratum 1 building activities. From the eastern half of square P13, however, there was some evidence that at least in this area no levelling had taken place. Here the various walls belonging to stratum 1 were built on and partly dug into the eroded remains of the lower levels (see the east section of square P13, Fig. III.21).

Stratum 1

Stratum 1 represented the topmost Halaf level in square P13 and was marked by a large rectangular complex, oriented almost north-south. The whole complex, which appeared immediately below the tell surface, was preserved to a height of no more than one to three bricks (except wall AQ, which stood to a height of five bricks). The various stratum 1 walls in square P13 were hard to detect and appeared only after intensive scraping of the area.

Stratum 1 started with a ca. 4-6 cm thick layer of greyish loam overlying the stratum 2 remains. Most stratum 1 features were built upon this grey surface. Only in the northern area (i.e. north of wall AR) and the extreme eastern areas traces of this surface were absent. Here the various walls were built upon or dug into the eroded remains of the strata below. Large bricks measuring up 50x35/40x8 cm were used in the construction of the walls. The wall faces were covered by mud plaster. On walls G and H this mud plaster was in turn covered by a thin white coating. Most of the walls were bonded although there are some clear exceptions. Apparently the complex was not conceived and constructed as a whole but built in stages (the time lapse between the various stages may, however, have been minimal). A series of small rooms or closed areas was excavated. The area north of wall AR represents a kind of courtyard. Here an uneven surface appeared, virtually free of artifacts, bones or the like. Apparently this area was kept painstakingly clean. A small oven (K), built up in coils, had been constructed in this court area. Oven K had a diameter of about 65 cm and a wall thickness of 3-5 cm. It was filled with light-grey ash. West of oven K a wall stump (AT) appeared.

The multi-roomed complex in the southern half of square P13 seems to have been accessible from the north by means of an entrance ca. 1.30 cm wide (between walls AR and AS). Here one entered a long-drawn but narrow space, divided into area 28 (west of the entrance) and area 29 (east of the entrance). Area 28 measured 2.15x0.75 m. Area 29 had a width of ca. 85 cm but it has not yet been possible to establish its length. Whether both areas were part of an originally roofed construction or represented an unroofed enclosure is not known yet. No traces of a floor were found in either area, and at least from area 29 we have evidence of a highly irregular surface. A similarly uneven surface was found in the next area 6. This area, more or less trapeze-like in shape, was accessible from the north through an entrance of the same width as in walls AR/AS.

Area 5, accessible from area 6 through a 1.10 m wide doorway, was marked by a hard and even loam floor. This floor was covered by fallen mud bricks and fragments of bricks (no doubt these are remains of the toppled upper wall parts). Amidst this mud-brick debris numerous fragments of white plaster ca. 1 cm thick were found. Apparently the interior wall faces in area 5 had been thickly plastered.

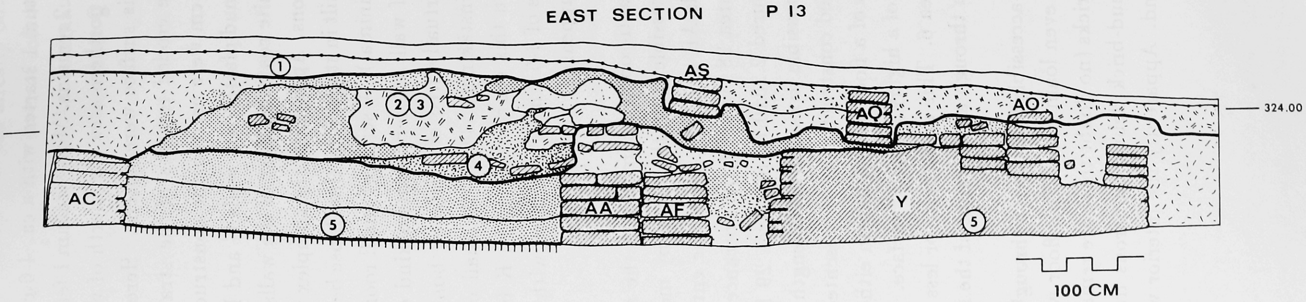


Fig. III.21. East section of square P13. (legend: see Fig.III.2.)

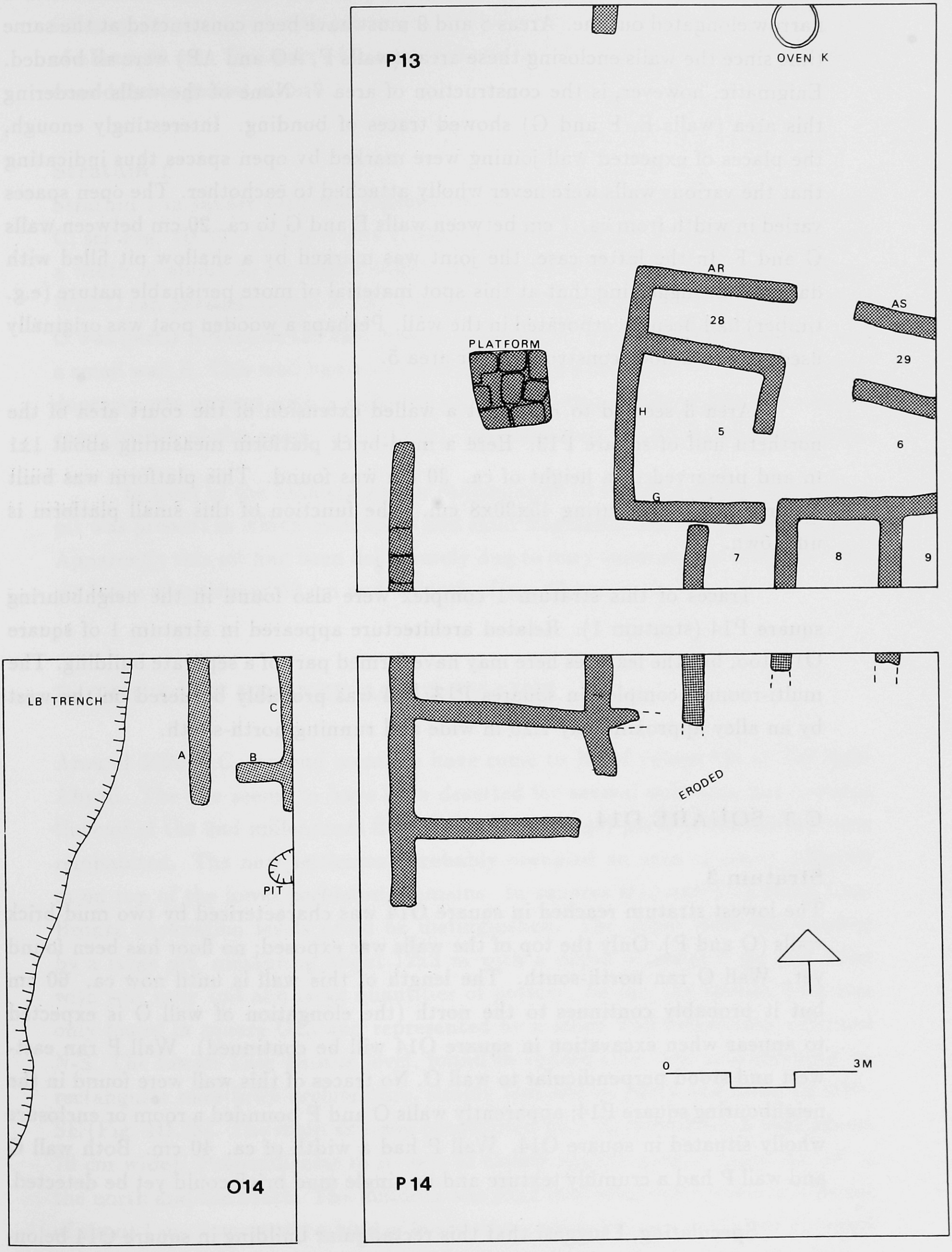


Fig. III.22. Topmost (stratum 1) architecture in squares P13, P14 and O14.

Little can be said about the southern areas 7, 8 and 9 which were all unearthed only on a limited scale. These southern areas seem to have had a narrow elongated outline. Areas 8 and 9 must have been constructed at the same time since the walls enclosing these areas (walls F, AO and AP) were all bonded. Enigmatic, however, is the construction of area 7. None of the walls bordering this area (walls E, F and G) showed traces of bonding. Interestingly enough, the places of expected wall joining were marked by open spaces thus indicating that the various walls were never wholly attached to eachother. The open spaces varied in width from ca. 7 cm between walls E and G to ca. 20 cm between walls G and F. In the latter case, the joint was marked by a shallow pit filled with dark ashes, suggesting that at this spot material of more perishable nature (e.g. timber) had been incorporated in the wall. Perhaps a wooden post was originally used here in a door construction for area 5.

Area 3 seemed to represent a walled extension of the court area of the northern half of square P13. Here a mud-brick platform measuring about 1x1 m and preserved to a height of ca. 30 cm was found. This platform was built of large bricks measuring 45x30x8 cm. The function of this small platform is unknown.

Traces of this stratum 1 complex were also found in the neighbouring square P14 (stratum 1). Related architecture appeared in stratum 1 of square O14, too, but the features here may have formed part of a separate building. The multi-roomed complex in squares P13/P14 was probably bordered on the west by an alley approximately 1.25 m wide and running north-south.

C.3. SQUARE O14

Stratum 3

The lowest stratum reached in square O14 was characterised by two mud-brick walls (O and P). Only the top of the walls was exposed; no floor has been found yet. Wall O ran north-south. The length of this wall is until now ca. 60 cm but it probably continues to the north (the elongation of wall O is expected to appear when excavation in square O14 will be continued). Wall P ran east-west and stood perpendicular to wall O. No traces of this wall were found in the neighbouring square P14; apparently walls O and P bounded a room or enclosure wholly situated in square O14. Wall P had a width of ca. 40 cm. Both wall O and wall P had a crumbly texture and no single mud brick could yet be detected.

Speculating, I suggest that this rectangular building in square O14 belonged to the same phase of occupation as the stratum 6A tholos K in the neighbouring square P14 (see Fig. III.11).

Stratum 2

Stratum 2 represented a succession of loam layers of various thickness and consistency, intermingled with ash lenses and ashy spots. Stratum 2 had a thickness of about 60 cm. This part of square O14 had at any rate not been built on for a considerable period of time.[1]

Stratum 1

Stratum 1 in square O14 was characterised by three mud-brick walls (A, B and C; see Fig. III.22). Walls A and C were both running north-south. Wall A had a width of about 35 cm and a length (at least in square O14) of about 2.20 m. Wall C ran parallel to wall A and was also identical in length to this wall A. Wall C was partly hidden in the east balk of square O14. Perpendicular to wall C was a small wall B. This wall had a width of 30 cm and a length of 70 cm. In wall B a doorway was present with a width of only 40 cm, thus giving access to a narrow room (width of this room: ca. 1.10 m). All walls were simply founded on earth.

In front of the building and in continuation of wall C a small and shallow pit was present in which both spine and skull fragments of a bovine were found. Apparently this pit had been deliberately dug to bury these animal remains. The pit had a diameter of 50 cm and a depth of ca. 40 cm.

D. THE LATE BRONZE AGE REMAINS

Around 5000 B.C., an end seems to have come to Halaf village life at Tell Sabi Abyad. The site seems to have been deserted for several millennia but towards the end of the 2nd millennium B.C. (Late Bronze Age) parts of the mound were reinhabited. The new settlement probably occupied an area of about 100x100 m on top of the lower prehistoric remains. In squares O13 and O14 three Late Bronze occupation levels could be distinguished. The upper level was marked by a large pit, measuring about 12x3 m with a depth of about 1 m, and filled with soft ashy soil and large quantities of pottery. So far, the second level was only found in square O13 and represented by a stone wall foundation, oriented N-S. The lowest Late Bronze level, found in square O14, was characterised by rectangular mud-brick architecture. simply founded on earth and oriented NW-SE (Fig. III.23). The main axis was constituted by a thick mud-brick wall (about 70 cm wide). Perpendicular to it, sets of closely spaced parallel walls ran off to the north and the south. The building was sunk into prehistoric levels to a depth of about 1 m. Apparently a kind of foundation trench was dug, probably to create a flat surface suited for building on the slope of the mound. The construction was heavily disturbed by erosion and a number of pits dug in from the surface.

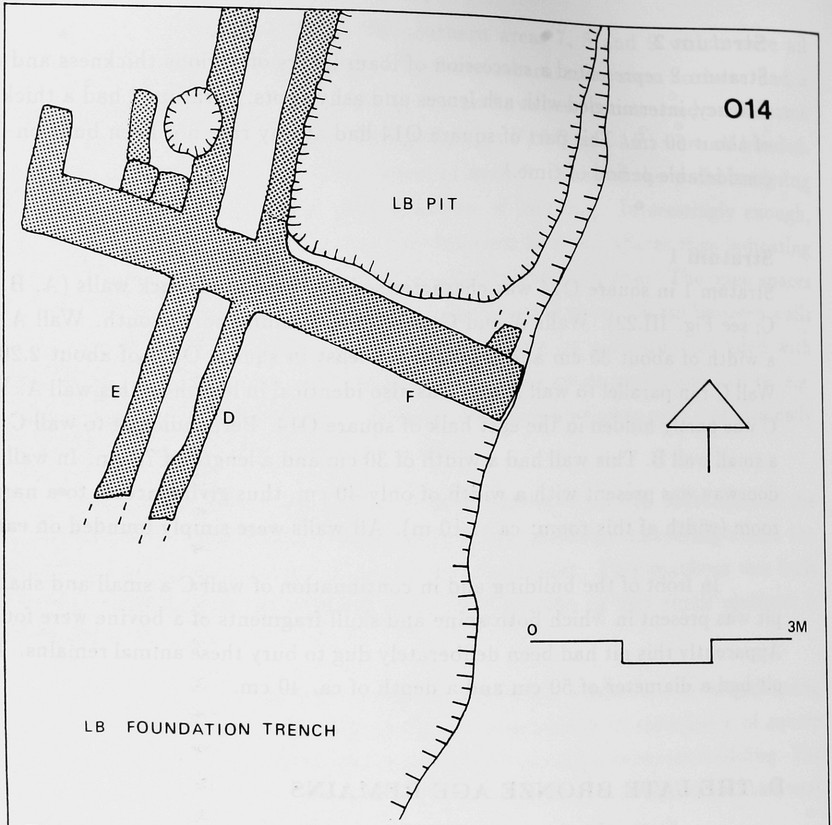


Fig. III.23. Late Bronze Age architecture in square O14.

E. ARCHITECTURE AT TELL SABI ABYAD: AN OVERVIEW

The 1986 excavations at Sabi Abyad yielded abundant traces of architectural remains. Rectangular and round buildings, kilns, ovens, fireplaces, plaster basins etc. appeared in the various strata. A survey of these features is given below. When possible, relationships with a selection of other sites are indicated.

E.1. Building Materials and General Characteristics

Mud bricks appear to be the principal material for wall building at Tell Sabi Abyad. These bricks may vary considerably in size, even within the same feature. Apparently the bricks were hand-molded. Most common were rectangular bricks measuring about 35x30x8 cm. Some of the tholoi gave evidence of bricks of smaller dimensions measuring only about 27/28x24/26x6/7 cm. The rectangular building partly uncovered in the topmost stratum on the southeastern mound of Sabi Abyad showed very large bricks measuring up to 50x40x10 cm.

In the Balikh valley, the use of mud bricks had a long tradition. Already at the 7th millennium sites of Tell Assouad and Tell Damishliyya the abundant use of mud bricks was attested in excavations (Cauvin 1972; Akkermans, in press). At Damishliyya bricks were sometimes very large (up to 60x40x10 cm) and repeatedly the reuse of bricks was observed. At Tell Sabi Abyad mud bricks appeared in the Late Neolithic strata and their use seems to be continued, without any major modification, into the subsequent Halaf strata. Until now, no true evidence of the use of pisé has been found at Sabi Abyad. At other Halafian sites pisé seems to be the main material for wall construction and mud bricks appears only occasionally. At the small site of Kudish Saghir two tholoi appeared, one in the lower trench 9A and one in the upper trench 2. The lower tholos had been built of pisé whereas the latter had been constructed of mud bricks. This led the Kudish excavator to the conclusion that at this site a transition took place between 'the old and the new building method' (Starr 1939:9). At Yarim Tepe II, however, both pisé and mud bricks were used side by side although there was a clear preference for pisé (Munchaev and Merpert 1973:11-12). In modern villages in Iraq and Iran but also at archaeological sites the combined use of pisé and mud brick for constructing a single wall has been observed (see Aurenche 1981:126-27). The use of either pisé or mud brick (or of a combination) seems to depend on traditions and preferences of the builders and should not be interpreted as an indication for 'progress' or 'backwardness' of the technology.

Stone-founded walls only one course thick appeared occasionally at Sabi Abyad but generally walls were simply founded on earth. No foundation trenches were dug. In square P14, the lowest Neolithic stratum reached (stratum 11) showed a very well constructed stone foundation but its position and function have remained enigmatic until now, due to the limited extent of the excavation. In square P13, the Halaf stratum 5 gave evidence of a large rectangular structure, the main building of which also had a stone foundation whereas the annexes were founded on earth.

In the Balikh valley, the technique of using foundation stones was applied as early as the 7th millennium B.C. at Tell Damishliyya (Akkermans, in press) but through time it never became a common feature in building practices. At the nearby site of Tell Hammam et-Turkman architectural remains of the 5th to 2nd millennium B.C. were recovered on an extended scale (van Loon 1982, 1983, 1985, 1987) but here, too, stone foundations rarely occurred. No doubt, this limited occurrence of stone foundations is due to the general absence of stones in the Balikh floodplain itself. All stones had to be brought to the site from the Pleistocene terrasses bordering the floodplain, at a distance of 3 to 5 km, involving considerable labour. Taking this into account, we may conclude that apparently special care was taken in the construction of the Halaf main building of stratum 5 in square P13. The construction of this building must have required the investment of a great amount of energy.

In most cases the mud-brick walls were covered by a mud plaster about 1-2 cm thick which protected the individual bricks from weathering. Usually this mud plaster seems to have been covered in its turn by a thin white (gypsum) coating about 2-3 mm thick. This white coating gave the buildings a bright, white appearance but probably also fulfilled a more practical role: it not only limited the heat-storing capacity of the clay walls by reflecting the sun-light but it also protected the mud plaster. Mud plaster rapidly decays from weathering in the course of time and needs yearly replastering. If this yearly repair is omitted, the mud bricks, and thus the building itself, will be irretrievable damaged. Thus in modern villages in the Near East, in the fall and before the start of the rainy season the walls and roofs of most buildings are carefully replastered. No doubt, at Tell Sabi Abyad such replastering had also taken place in early times but no traces of it have been found so far. The absence of traces of replastering may indicate that the buildings at Sabi Abyad were used during a short period only.

Not only the outer wall faces but also the interior of most building showed a mud plaster. Occasionally a white coating was present here as well. In some rooms of the stratum 1 building on the southeast mound of Sabi Abyad traces were found of a very thick white plaster (up to 1 cm thick). Perhaps these rooms served specific purposes. The most remarkable kind of plaster was found in the tholoi at Sabi Abyad: here a *hard-burnt* mud plaster appeared (see the section on tholoi below).

The floors in most buildings consisted of surfaces simply smoothed and tamped (except those of the tholoi, see below). The floors do not seem to have been specially prepared. No pavements or the like were found.

Most buildings gave evidence of doorways varying in width from 40 to 90 cm (those structures without an entrance were either incompletely excavated or partially disturbed). Sometimes a clay or mud-brick threshold was present but more often this entrance simply started at floor level without any elaboration. No pivot stones were found except one; this object, however, appeared in a disturbed context (Square P14, stratum 10). The entrances of two buildings[2], however, showed holes serving as doorsockets and sunk into the threshold. These pivot holes were tapering and their walls had been reinforced either by a white plaster or by a coating of small sherds. No such pivot holes were found in any of the other structures. Perhaps these buildings were closed simply by removable mats or timber plates. Again, the tholoi may have formed an exception (see below).

E.2. The Tholoi

During the 1986 excavations at Tell Sabi Abyad I, eleven tholoi were wholly or partially recovered. All tholoi had been constructed of mud bricks of varying sizes and virtually all had an interior diameter of about 3 meters. Only the stratum 6D tholos AC showed a considerably smaller diameter measuring only 1.5 m. None of the tholoi had an antechamber. All tholoi were simply founded on earth without any specific foundation. No foundation trenches had been dug.

The tholoi contained doorways varying in width from 60 to 90 cm. Nothing can be said about the height of these entrances. Sometimes a mud threshold was present. In one case (the P14 stratum 6D tholos O) a hole serving as a door socket was found. This tholos apparently had a true door construction. In this tholos, near the wall, also a rectangularly-shaped fireplace appeared. None of the other tholoi at Sabi Abyad showed this feature.

The wall exterior of all tholoi was mud-plastered. Usually this mud plaster was covered by a thin white coating (gypsum), thus giving these tholoi a bright white appearance. Most interesting is the tholos interior which is always marked by a very hard-burnt mud plaster up to two cm thick. This mud plaster was chaff-tempered. Most of the floors also indicated such a burnt plaster carried up onto the tholos wall but in several cases floors only consisted of highly irregular and wavy surfaces. These irregularly finished surfaces, however, were always burnt as well. The making of such a hard-burnt plaster involved considerable heating and is probably the result of the intentional filling of the tholos interior with fuel and subsequent firing of the building. There is no doubt that the interior burning of the tholoi at Tell Sabi Abyad was a planned activity and not an accidental feature. Cross-sections through the tholoi indicate that the heat penetrated the walls and floors up to 7-10 cm, thereby gradually colouring the burnt parts from orange-red into black. Apparently the firing took place in an oxidising atmosphere. Interestingly enough, the surface directly exposed to the fire always had a light-grey colour which may be the result of scumming: soluble salts present in the clay used for building are transported in solution to the surface during heating and drying and remain when the water evaporates (Rye 1981:35).

At present, little is known on the superstructure of the tholoi at Sabi Abyad. Virtually all buildings are preserved only to a limited height and do not allow any definite conclusions. Among archaeologists, a domed superstructure for tholoi-like constructions in general is commonly accepted (see Aurenche 1981:150-53 and 188-91 for a discussion), although occasionally also simple flattened roofs are suggested (Seeden 1982:74-75 and fig.79; Merpert et al. 1977:89; Munchaev et al. 1984:33). At Sabi Abyad, one tholos (tholos N found in square P13 stratum 5) showed a wall even slightly incurving at floor level, thus suggesting a domed roof. This building would only have stood to a man's height. It is, however, doubtful whether the generally thin mud-brick walls were strong enough to carry a dome wholly constructed of mud bricks.[3] Another tholos (tholos P found in square P14 stratum 6B) contained a stone platform for a wooden post in its centre. This post may originally have supported a flattened roof or perhaps a conical or pitched roof, thus giving the building a hut-like appearance. Within a truly dome-shaped roof construction of mud bricks a post would be of no use. It should, however, be stressed that the stone platform in tholos P is as yet a unique feature; in no other building at Sabi Abyad indications have been found for roof support by means of posts. It may very well be that the post in tholos P was not part of the original construction but was placed into the building at a later stage to support a weakened roof or to allow room partitioning (small additional post holes suggest that the tholos interior had originally been divided into compartments by means of wooden structures). On the floor of most tholoi at Sabi Abyad a thin layer of ash was found, in turn covered by mud brick and plaster fragments. Apparently, organic matter consumed by fire accumulated on the floor before the final collapse and levelling of the building. Perhaps this burnt organic material originally formed part of the roof construction of the tholoi. However, a botanical analysis of two samples from the contents of tholoi L and O indicated that these ash layers were largely made up of the residues of crop-processing and crop-cleaning waste (see van Zeist and Waterbolk-van Rooijen, this volume). Although speculative, the tholoi from Sabi Abyad are reconstructed here as buildings with walls incurving towards the top but finally covered by a more or less flattened roof perhaps consisting of twigs or reeds overlaid by a layer of mud.

The purpose of the tholoi found at most Halaf sites has led to considerable discussion and speculation. Woolley (1934) considered the circular structures he uncovered at Yunus to be kilns but Mallowan found clear evidence at Arpachiyah that these buildings were more than simple kilns and suggested a religious function for at least some of these buildings (Mallowan and Rose 1935:34). However, although some of the larger tholoi may have had a public function, the common appearance of tholoi at most Halaf sites and the distribution of artifacts in them no doubt points to an essentially utilitarian function for these buildings (Oates and Oates 1976:107). The large-scale excavations at Yarim Tepe II have yielded a huge number of tholoi of various dimensions and their excavators consider these buildings to be the basic living units, occasionally enlarged by rectangular auxiliary rooms (Munchaev and Merpert 1971:19). Some tholoi found at Yarim Tepe II are thought to have been used in other domestic activities apart from living; perhaps these tholoi served as granaries or storage rooms (Merpert et al. 1977:91; Munchaev and Merpert 1973:12). Nowadays most archaeologists are convinced that tholoi represent the primary Halaf dwelling architecture (see e.g. Seeden 1982).

The common beliefs and interpretations about the shape and function of the ancient tholoi are not only based on information received during excavations but for a large part also on observations in modern villages of e.g. northern Syria and southern Turkey[4]. In these 'beehive villages' (see e.g. Copeland 1955) two types of domed buildings seem to be present in general: a simple, round building already incurving from floor level upwards and a more elaborate structure of a basically rectangular outline with a dome on top. The rectangular lower part may vary in height from 0.3 to 2 m (Aurenche 1981:152). Large rectangular buildings may carry various domes which are sometimes flattened near the top. Both the simple and the elaborate type of dome-shaped structure may appear simultaneously and next to each other. Generally speaking, the large and basically rectangular dome-shaped buildings are used for living or as stables whereas the simple round and conical structures, usually appearing in clusters, are used for the storing of all kinds of goods or as kitchen-units, places of bread-baking, animal pens and chicken-coops (Copeland 1955).

The domes in these modern villages were constructed by laying bricks in a radial pattern, each row of bricks corbelling out over the lower one (Copeland 1955:23; Aurenche 1981:152). Sometimes the domes were reinforced by poles (ibid.). Domes have excellent thermal properties which are highly advantageous in hot climates (see below). Another major advantage of a domed superstructure is the limited amount of wood necessary in roof construction. Flat roofs require rather large numbers of wooden poles which are an expensive commodity in large regions of the modern Near East. When building a dome, the use of wood is reduced to a minimum. Nowadays the Balikh valley is virtually devoid of trees except for some isolated groves of poplar and willow along the river and in present-day villages in the region wood is sparsely used. However, in prehistoric

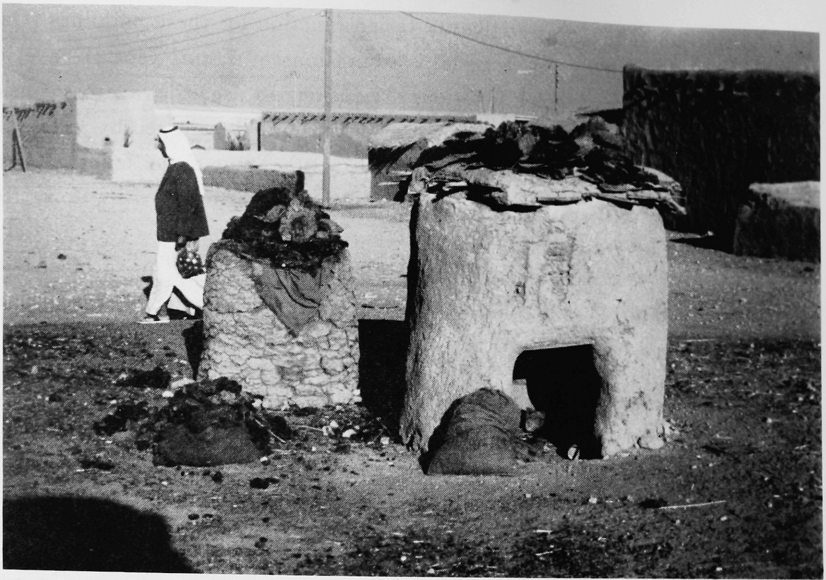


Fig. III.24. Round structures in the village of Hammam et-Turkman (Balikh valley).

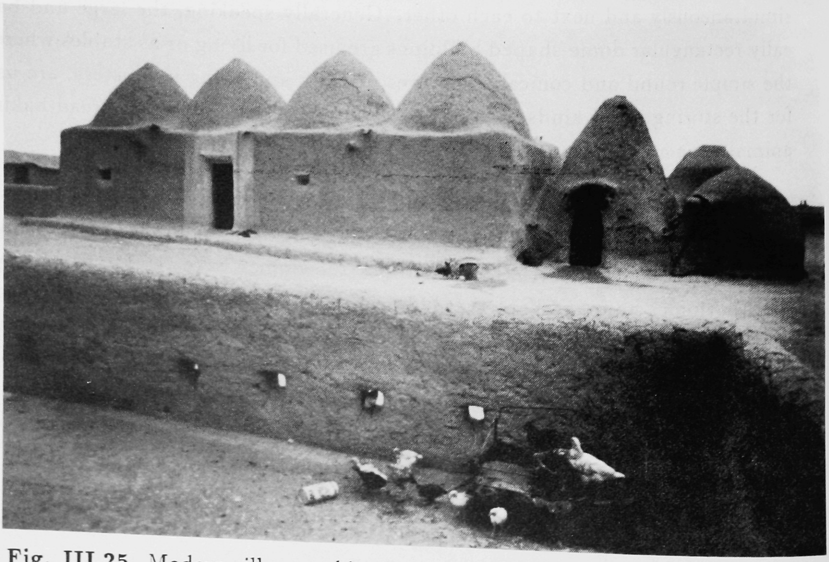


Fig. III.25. Modern village architecture displays close similarities to Halaf buildings. This picture shows a rectangular house flanked by three small 'tholoi'.

times trees must, no doubt, have been present in much more abundant numbers. The valley will never have been an area thickly covered with trees but particularly in the moister areas along the Balikh and the various wadis trees must have been commonly distributed. It is thus doubtful whether considerations concerning the saving of wood have ever played a role for Halaf people when deciding to build a dome or not.

The tholoi unearthed at Tell Sabi Abyad closely resemble the tholoi found at other Halaf sites but in one respect: the burnt interior wall and floor plaster. This most striking feature of all tholoi found at Sabi Abyad is at present without parallels; at no other site has such an interior finishing been observed until now. The question arises: what reasons underlie the interior firing of the tholoi at Sabi Abyad? No doubt, this firing is closely related to the intended function of the buildings. It seems to be most plausible that the tholoi were used as ovens but this possibility is rejected here for several reasons:

- the buildings are too large for ovens;
- no traces of secondary firing were found except in one case (where they had been caused by a small fireplace);
- the presence or indications in some tholoi of specific features like fireplaces, wooden posts, true doors, room partitioning;
- the absence of large quantities of ashes, slags and the like around the tholoi.

At Sabi Abyad, the first tholos appeared in stratum 6D. So far, the lower strata yielded rectangular structures only and also at other sites the levels preceding the introduction of Halaf are characterised by rectangular buildings although occasionally some round structures appeared as well (e.g. at Yarim Tepe I; Munchaev and Merpert 1971:25-27). At Arpachiyah, the Early Halaf phase A1 was marked by rectangular structures whereas the first tholoi appeared in phase A2 (Hijara 1980). Apparently at some point in history the need for round structures arose. Generally, Halaf tholoi have a diameter of 3-5 m although both smaller and much larger ones occur at some sites. At Sabi Abyad, the tholoi have an average interior diameter of 3 m, thus having an area of about 7 sq.m each. This seems to be too small for living units but Flannery (1972) has convincingly argued both on archaeological and on ethnographical evidence that circular structures of this kind would fit excellently within what he called the 'circular hut compound'. This type of permanent settlement is characterised by an often circular or oval arrangement of small huts, each housing only one or, at the most, two persons. Often this arrangement of huts surrounds a cleared area used for all kinds of activities and usually containing granaries and storage pits shared by all members of the community (ibid.:31). Broadly speaking, when comparing the 'circular hut compound' with villages set up with rectangular houses, the main differences may be found in the social organisation and the related mode of production: whereas the 'circular hut compound' may have been based upon extended family relations often of a polygynous nature, the rectangularly-shaped villages often consisted of nuclear families (ibid.:42). Although Flannery's model concerning the 'circular hut compound' seems to be highly appropriate at first sight when studying Halaf settlement organisation, a more detailed view questions its usefulness. At Tell Sabi Abyad we have found some evidence that at least at this site the tholoi were used for purposes other than living.

The most convincing indications come from strata 5 and 3 in squares P13-P14. Here some tholoi appeared which are related to a large rectangular building. This multi-roomed rectangular structure was carefully constructed and at least partially built on wide stone foundations. An oven or fireplace found in one room and the appearance of a number of vessels in another one suggest that this building was used in common domestic activities. This picture closely reminds us of present-day villages in the Syrian Jezirah where farmlets commonly consist of rectangular houses used for living, which are surrounded by smaller stables and storage rooms frequently of a circular lay-out.

Also the interior hard-burnt coating of the tholoi at Sabi Abyad points to another function of these structures than for living. Dwelling units do not require such a modification. Other features like the sometimes highly irregular and wavy floor and the probably limited height of the tholoi further combine to make the use of tholoi as dwelling units unlikely. This is also strongly suggested by the appearance of large quantities of burnt wheat around tholoi O and AC found in square P14 stratum 6D. This layer of burnt wheat, virtually free of field weeds and having an estimated volume of 2-3 m3, may perhaps be viewed as supplies originally stored in the tholoi (or at least in one of them) but displaced after an undoubtedly accidental destruction by fire. Small quantities of burnt cereal were also found around tholoi in other strata but the presence of wheat here may have had another reason (see below). A storage function is thus suggested for at least some of the tholoi at Sabi Abyad. A fireplace found in one tholos indicates that other activities may have been carried out also. It is obvious that not all tholoi were used for the same purposes, although their layout and construction suggest that they were originally designed for a specific kind of activity. It may well be that their actual use changed according to need. As in modern villages in northern Syria, the tholoi may have been used as stables or for the storage of all kinds of products, e.g. grain, fodder, litter, wood or dung for fire.

It is suggested here that the tholoi found at Sabi Abyad were originally designed as granaries. Such a round building with a wall incurving towards the top (leaving aside the point whether the building is fully domed or at some point simply flattened) is highly suited for grain storage in bulk. It is much stronger than a rectangular building and much better able to withstand the lateral thrust of its semi-fluid contents. This thrust can be expressed as 2/3 of the dead weight, i.e. three tonnes of grain stored in bulk represent two tonnes of lateral thrust on the wall (Reynolds 1974:125). If tholoi were used as granaries, these buildings had to meet various requirements. Stored cereals absorb oxygen on the one hand and produce heat, water and carbon dioxide on the other hand. If grain is stored whilst too hot or too wet, it will soon start to germinate and the dampness will encourage the growth of bacteria and fungi. If no measures are taken, these processes will cause rapid deterioration of the stored products, ending in rot. Thus the temperature and moisture content have to remain low in order to suppress these activities (Gentry 1976:2). Also insect infestation is minimised by keeping the temperature and moisture content low. In modern circumstances, these processes are controlled either by the cooling of dry grain by air conditioning, refrigeration of damp grain or through the exclusion of oxygen by storage in airtight silos (ibid.). In the case of our Halaf tholoi, the first and the last technique seem to have been possible.[5]

Mud brick or pisé used in wall construction has some excellent properties. Its thermal conductivity is very low since the porous consistency of dry mud retains the heat instead of quickly passing it through. As a thermal insulator mud is much better than, e.g., stone. Mud walls thus act as storage heaters. Consequently, the temperature inside the building is rather stable; during the hot day it is relatively cool inside, whereas at night it is relatively warm. Even during the cooler months of the year the temperature within a mud building is rather high (Beazly and Harverson 1982:14). Nevertheless, in the case of granaries this high capacity of mud for heat storage may be a disadvantage: the relatively high temperature, in combination with the natural dampness from the walls, may cause rotting of the stored cereals. This problem may be met by means of a dome-shaped superstructure. Domes loose more heat than flat roofs due to the larger area from which heat is radiated and to the property of convection when wind blows. By means of a white exterior coating these effects may be intensified. Excellent additional ventilation is provided by air draught through an opening in the dome's crown (Beazley and Harverson 1982:26; Bahadori 1978). Thus, the usefulness of a tholos for grain storage largely depends on its general thermal properties. Dry grain has to be stored at a temperature lower than 17°C to protect it from deterioration (Gentry 1976:2).

But grain storage in a tholos may also proceed along different lines. This second procedure depends on denying oxygen any further access to the storage area after filling. By sealing the entrances the grain is stored in an anaerobic or carbon-dioxide induced atmosphere. Any dampness in the tholos wall will cause the germination of the grain immediately adjacent to the wall. Carbon dioxide gas is thus produced which will thereafter inhibit further germination and, provided interference is minimal, a highly stable storage system is created (Reynolds 1974:119).

The hard-burnt interior wall and floor plaster of the tholoi at Sabi Abyad strongly support an interpretation of the tholoi as granaries. The plaster may have acted as a highly vermin-resistant coating. Granaries provide ideal food and shelter for rodents (mice or rats) but a strong plaster may prevent them from penetrating the building. At Roman sites in Britain, too, traces of firing were found in association with granaries but here the firing seems to have been of a different nature. The firing seems to have taken place outside the building but near the ventilation holes and may have been used to smoke out vermin (Gentry 1976:11). The interior firing of the tholoi may, however, also be explained in a completely different way: assuming that tholoi were originally designed to store cereals in bulk, it may have been desirable to burn out the interior after use in order to fumigate the building before refilling[6]. Dampness in the tholos wall will have caused the germination of grain immediately adjacent to the wall, thus resulting in a thin skin of waste consisting of germinated grains with sprouts and rootlets and bearing many fungi and bacteria. Before reuse of the tholos, the waste product had to be scraped from the wall. Burning out the interior would have intensified this process of cleaning and fumigating. Cracks and holes in the wall and floor of a tholos provide ideal shelter for insects. Even in highly unfavourable environmental conditions insect eggs can survive for long periods and can hatch when conditions change. By means of firing the danger of insect infestation may have been minimised. In modern experiments, designed to investigate the nature of British Iron Age pits, the waste products from the walls were stripped away and burnt in the pit itself. This yielded a residual quantity of carbonised seeds which reflected the original conditions in the pit. These seeds indicated germination, the further development of which had been terminated by the carbon dioxide atmosphere within the pit (Reynolds 1974). At Tell Sabi Abyad small quantities of carbonised seeds appeared around some of the tholoi; perhaps these seeds are the residual product of the burning of the waste skin from the tholos walls. It is, however, stressed that the botanical analysis of two samples from tholoi L and O do not support this hypothesis (see van Zeist and Waterbolk-van Rooijen, this volume).

E.3. Rectangular Architecture

So far, the Late Neolithic strata at Sabi Abyad yielded but few traces of architecture, probably of rectangular layout. More substantial remains stem from the Halaf strata at the site. The lower strata in square P14 are characterised by rectangular structures, on the corners of which sometimes buttresses are present. Due to the limited extent of our trenches, no single rectangular unit was unearthed in its entirety and thus little can be said about the general outline. Broadly speaking, the buildings seem to be north-south oriented. Most walls are only one mud brick wide (ca. 30-35 cm) but also traces were found of a wall at least two rows of bricks wide.

The most extensive traces of Halaf rectangular complexes were found in squares P13 and P14, strata 5 and 3 respectively, and in the topmost stratum (stratum 1) in squares P13, P14 and O14. The first mentioned complex yielded well-preserved traces of a central rectangular building extended by rectangular annexes and some tholoi. The main building probably comprised the actual living quarters whereas the annexes and the tholoi may have been used for storing and auxiliary purposes. The main building was constructed of thick mud-brick walls on a stone foundation. The northern and western faces of this building were white-plastered and also the interior wall faces showed traces of white plaster. Slightly south of the main building a number of tiny rooms appeared which were probably added to the main building at a later stage. The added complex partly cut a tholos, thus pointing to a distinction in the date of construction. This tholos must already have been out of use when the additional rooms were built but apparently it still stood to a considerable height and may have been used for specific purposes. West of this tholos stood another one which, however, had been heavily disturbed by later building activities. In contrast to the main building, the added complex and the tholoi were built of small mud-brick walls, simply founded on earth. Although incomplete, the present evidence suggests that the southeastern mound of Tell Sabi Abyad was largely covered by only one extended complex, housing only a limited number of people. Generally, the excavations gave the impression of a rather open scatter of buildings. The site does not seem to have been densely built on. Close similarities to this open village outline are found in modern villages in the Syrian Jezirah; here, too, isolated rectangular houses commonly appear, surrounded by smaller rectangular stables and small round and domed buildings which are used for all kinds of purposes, e.g. as storage areas or places for bread-baking.

Whereas at Tell Sabi Abyad the rectangular architecture probably represents the main living units, this seems not to be the case at other Halaf sites. There, too, rectangular structures appeared but these buildings are commonly considered to be of secondary importance. Tholoi are viewed as the primary structural features whereas rectangular buildings are viewed as being used for auxiliary aims (e.g. storage). Only few rectangular buildings are said to be houses for living, as the following short overview of some of the literature shows.

Interestingly enough, at Arpachiyah the earliest layers of Halaf occupation seem to be characterised by rectangular buildings solely. Tholoi are said to appear from level VIII (phase A2) onwards (Hijara 1980). What reasons underlie this remarkable change in architecture at Arpachiyah is unknown at present. In the various layers at Yarim Tepe II a large number of rectangular buildings was found. The excavators consider most structures to be annexes to tholoi or of some other subsidiary function. Nevertheless, some buildings seem to have been more than simple annexes. In level VI at Yarim Tepe II a large, multi-roomed rectangular complex appeared which seems to be constructed around a central tholos. This tholos had an interior diameter of only 2.60 m and was divided into small compartments (Munchaev and Merpert 1973:12 and Pl.IX:2). The excavators of this interesting complex do not consider it to have been designed for dwelling but instead suggest it might have been a community storage house (ibid.). However, in the light of the evidence from Sabi Abyad this complex may very well represent an extended living unit.[7]

Another building from level VI at Yarim Tepe II consisted of only one room measuring 4.40 x 2.15/2.20 m. The southern wall of this building was strengthened by buttresses. A doorway about 40 cm wide gave access to the building. Its interior was marked by a gypsum-plastered floor. A small oven was built against the east wall. Soon after the construction of this dwelling unit several other rectangular houses were built, one of which consisted of five narrow rooms (Merpert et al. 1976:51).

In the later part of the Halaf period rectangular buildings seem to have become more commonly used for living. At Arpachiyah, building levels TT5 and TT6 consisted completely of rectangular architecture. From level TT7 downwards also tholoi appeared (Mallowan and Rose 1935:13 ff). In level TT6 at Arpachiyah the famous 'burnt house' was found. This large building consisted of long-drawn narrow rooms of varying size and measured at least about 25x15 m. The edges of the building had been eroded and originally the complex may have been much larger. In view of its dimensions it is doubtful whether this building actually represents only one house; perhaps it should be viewed as a cluster of living units. The TT6 building was situated in the centre of the mound and at least at the top of the mound there seems to be little space left for other structures. Perhaps other occupation took place on the slopes or in the immediate surroundings of the mound but no evidence was found for either option (see Mallowan and Rose 1935:18-19). It seems more likely that the burnt house of level TT6 was actually the only building of this phase at the site. In this view, the TT6 burnt house closely resembles the general settlement outline of Tell Sabi Abyad; here, too, the southeastern mound seems to be largely occupied by only one house complex. Tell Sabi Abyad, built up of several small but merged tells and of much larger general dimensions than Arpachiyah, perhaps contained several such extended complexes.

At the site of Yarim Tepe III also late Halaf layers were unearthed which on the basis of the recovered ceramics can be related to Arpachiyah TT8-6 and Gawra XX-XVIII (Merpert and Munchaev 1984:65). These levels at Yarim Tepe III gave abundant evidence of complex rectangular architecture in combination with tholoi of varying sizes. Rectangular architecture became dominant in the final levels of Halaf occupation at the site (ibid.:57). On the whole, Halaf occupation at Yarim Tepe III gives the impression of a dispersed settlement marked by large open areas. The inhabited area is intersected with rather narrow alleys.

In the Balikh valley, a rectangular structure with narrow rooms and supposedly belonging to the Halaf period is reported from Tell Assouad (Mallowan 1946:124-126) but we may doubt whether this attribution is correct. Copeland (1979:269) has already pointed out that it seems more likely that Mallowan's building is in fact of Neolithic date, thus preceding a possible Halaf occupation at the site. In the building at Assouad, among scarce Halaf sherds, a collection of flint and obsidian implements was found, some of which show some close resemblances to the Levantine Byblos points. In the Halaf strata at Tell Sabi Abyad no such Byblos-type points appeared but both at Tell Assouad and at the nearby site of Tell Damishliyya such implements were found in clearly 7th millennium layers (Cauvin 1972; Akkermans, in press). Furthermore, the stepped trench laid out at Assouad by Cauvin in the early 1970's yielded exclusively Neolithic levels from top to base (Cauvin 1972).

E.5. Fireplaces, Ovens and Kilns

Fireplaces were found in several strata at Sabi Abyad and appear to have been of a varied nature. The most simple fireplaces appeared in open areas outside the buildings and were indicated by more or less rounded but unlined areas of ashes and charred wood. Apparently a heap of fuel was simply stacked upon the surface and set on fire. The present evidence suggets that this sort of fireplaces was used only once. Occasionally shallow rounded or rectangular pits were dug into which the firing took place.

A highly interesting kind of fireplace, also located in the open air, appeared in square P13, stratum 3. Here a shallow, slit-like trench was found, about 1.60 m long and varying in width from 40 to 70 cm. It had a depth of about 20 cm. This pit was filled with ashes in which charred twigs of ash (*Fraxinus*) were found. A striking parallel to this kind of fireplace was found in the modern village of Aşvan, eastern Turkey (Weinstein 1973). Here an almost identical slit trench appeared, fired with willow twigs and used exclusively for the preparation of bulgur, cooked in cauldrons over this trench. The pit was refilled immediately after use and, interestingly enough, the charcoal content of the previous firing was not cleared before refilling. I suggest a similar use of the slit trench found at Sabi Abyad. The undisturbed nature of this pit may be explained by the fact that the making of bulgur takes place only once a year, thus rendering subsequent clearance or modification superfluous. This kind of pit, or more properly: fireplace, was used during a short time only and then further left to its fate. The next season a new pit was dug.

In square P14 the lower stratum 8 yielded another type of fireplace. Here an oblong structure with rounded off edges appeared measuring about 75 x 42 cm (its actual length is larger but this feature was only partially excavated). The fireplace had burnt clay walls about 2 cm thick, raised to a height of about 30 cm. It was filled with ashes. This feature was placed immediately next to a house in an apparently unroofed area. This type of fireplace resembles some oval but long-drawn structures from Yarim Tepe II and Yarim Tepe III (see e.g. Munchaev et al. 1984:37).

Deliberately constructed fireplaces were found inside some of the buildings at Sabi Abyad. In a tholos a small rectangular fireplace appeared near the wall. It measured about 75 x 50 cm and had straight walls about 5 cm thick and preserved to a height of about 10 cm. The side directed towards the tholos centre may have been open. In one of the rooms of the rectangular building found in square P13 (stratum 5) a fireplace appeared as well but was constructed in a different manner. This slightly oval-shaped structure had a diameter of about 65 cm and was built in coils, preserved to a height of about 22 cm. It had been built against the southern wall, almost in the southwest corner of the room.

Most of the ovens found at Sabi Abyad are of the wellknown 'tannur'-type. This kind of oven has a long history in the Near East and is found in a largely identical shape at innumerable sites from all periods. These structures are commonly considered to be used for bread baking (see Aurenche 1981:251). At Sabi Abyad, five such 'tannurs' were found both in the Late Neolithic and in the Halaf strata. They were all round and varied in diameter from 0.65 to 1.35 m. All ovens were built in coils and became narrower in diameter when increasing in height. The interior showed a smooth, hard-burnt mud plaster. The exterior, too, had a clay coating (although unfired). All these ovens seem to have been placed in open, unroofed areas and thus must have been exposed to considerable weathering. No traces of replastering were found. Perhaps these ovens were rebuilt seasonally. Evidence for rebuilding was found in one case at Sabi Abyad: the Late Neolithic stratum 1 in square T5 yielded a large 'tannur' almost levelled at floor level but rebuilt at the same spot (although on a slightly smaller scale). Immediately east of this oven a wall fragment stood which may have served as a wind-screen.

The 'tannur'-type of oven is commonly reported from other sites. At Arpachiyah, large numbers of 'bread ovens' were found particularly in the outlying areas (Mallowan and Rose 1935:14 and Fig. 3). These structures vary in diameter from 1 to 2 m and have walls about 30 cm thick[8]. On modern analogies Mallowan suggests that these structures must have carried a clay dome. Similar dome-shaped 'tannurs' are reported from Yarim Tepe II (see e.g. Merpert et al. 1981:25). Here, too, the ovens seem to have been built in open, unroofed areas (Munchaev et al. 1984:37) but frequently this kind of oven is also said to have been present in tholoi and rooms of rectangular buildings (see e.g. Merpert et al. 1977:85, 89; 1978:41). It is, however, doubtful whether these structures are truly comparable to the ovens from Sabi Abyad; it seems more likely that the 'tannurs' found in buildings at Yarim Tepe II are in fact raised fireplaces (see e.g. Merpert et al. 1977, Fig. XVII:4).

Another type of oven at Sabi Abyad is represented by two interesting features found in square P13 strata 3 and 4. These ovens, or, more properly, kilns, are keyhole-shaped and are for the larger part sunk into earlier layers. The kilns consisted of a long-drawn but rather narrow rectangular area connected to a circular chamber. Traces of firing appeared solely in the rectangular part which was probably the combustion chamber whereas the circular part is considered to have been the heating chamber. In the case of the stratum 4 kiln this heating chamber was filled with blackened, heat-cracked stones but the wall of the chamber itself did not show traces of firing. The mud plaster in the combustion chamber indicated only superficial traces of firing, thus suggesting that the fire here had not reached very high temperatures. As shown by traces of mud bricks and incurving walls these kilns probably had a dome-shaped, mud-brick superstructure.

As to the function of these kilns we can only speculate for the moment. It is very unlikely that these kilns were used for pottery production in view of their construction, the probably limited temperatures reached in them and the absence of wasters in the immediate surroundings. The present evidence suggests that the fire in the combustion chamber mainly served to heat the stones in the next chamber which may thus have been used e.g. for the roasting or drying of meat or cereals (see e.g. van Loon 1968:269; Helbaek 1969:402; Hole 1977:89-90; Morris 1979:5 ff). Close parallels to these kilns from Sabi Abyad are found at Yarim Tepe II. Here these two-chambered and dome-shaped kilns appeared from the lowest level at the site onwards (Merpert et al. 1976:47, 1978:40; Munchaev and Merpert 1981:166 ff and Fig. 48). Keyhole-shaped kilns are a characteristic feature of the Halaf period (see Molist 1986:149-152 and Tab. 11).

E.6. Plaster Basins

Plaster basins occur commonly in the Halaf strata at Tell Sabi Abyad and are all associated with open, unroofed areas. Most basins were cylindrical in shape and had flat bases but there are some exceptions. Pit AF (found in square P14, stratum 6A) was bell-shaped whereas pit R (square P14, stratum 6C) represents a wide but shallow type of basin. The diameter of the cylindrical-shaped basins varies from 42 to 60 cm whereas their depth seems to range from 20 to 36 cm (one basin had a depth of only 15 cm but here the upper part had been eroded).

All basins were carefully constructed and had smoothed surfaces. In all cases, the walls and bases showed a white coating (lime or gypsum) about 2-4 mm thick. The openings were at the level of the surface into which they were sunk. These basins occur either isolated or in groups of two or three.

A close parallel to this kind of basin is found at the early 6th millennium site of Tell Sotto. Here a small gypsum-plastered basin was found which is said to have been used as a water-trough for animals (Merpert et al. 1977:97). Related basins are reported from Bouqras (de Contenson and van Liere 1966, Pl. 11:6) and particularly from Chagha Sefid in the Deh Luran (Hole 1977:88-89). At the latter site, these basins are commonly enforced and lined by stones. Often they were replastered each time when the surrounding floor level rose. At Tell Sabi Abyad no such replastering was noted. Hole (1977:88) is inclined to consider these basins as mortar-like utensils used for the grinding of grain and other vegetable foods, although he also suggests that they may have held liquids. At Sabi Abyad, we may doubt whether the rather thin white plaster present in all basins was strong enough to resist the continuous pressure of pounding. Since no repair (i.e. replastering) ever took place, we may conclude that either the plaster was strong enough or that these basins were used for other activities. Since the white plaster may have acted as a more or less impermeable coating, the basins perhaps served as water-troughs for animals. White plaster is also reported to appear in storage pits (Peters 1979) but the limited size of the basins at Sabi Abyad make a storage function highly unlikely. Besides, for storage more suitable places were available: the tholoi or, on a smaller scale, the large storage vessels.

E.7. Pits

Pits of all kinds commonly appear at archaeological sites and Sabi Abyad is no exception to this rule. A number of pits of various dimensions and nature were found. As to the function of the pits we have to speculate, although occasionally the construction or contents of these pits gave some clues as to their original use. Thus small rounded or rectangular pits filled with ashes and charcoal were probably used as fireplaces whereas the small but carefully constructed white-plastered pits may have served as basins for grinding or as liquid containers (see the previous sections). In trench T4 on the northeastern part of the site parts of a large pit were found wholly filled with ashes. It seems very unlikely that this pit was used as a fireplace or that it was deliberately dug for the purpose of ash dumping; more probably it was originally dug for some specific reasons (e.g. to obtain clay for mud brick production) and was used as an ash-dump at a later stage.

A specific type of pit is constituted by those with a beehive or bell-shaped cross-section. At Sabi Abyad, several such bell-shaped pits were found ranging in diameter from 1.20 to 1.50 m at the top to 1.50 to 2.00 m at the base. Their depth was about 1.00 m. In one case, the bottom of such a pit was covered with stones. Commonly this kind of feature is termed 'refuse pit' but it is highly unlikely that they were originally dug for refuse deposition. In modern villages in the Near East domestic garbage is dumped in specific areas of the courtyard or at nearby uninhabited parts of the settlement. Pits are rarely dug for the dumping of refuse but may be used for this when they have lost their original meaning (Peters 1979:136). A storage function for the bell-shaped pits seems to be more suitable (Peters 1979, but see particularly Reynolds 1974 for an extensive discussion on storage pits). It is of greatest importance to assure the dryness of the grain in storage. This can be achieved by carefully sealing the pit for which any malleable but impermeable material is suitable. An internal lining is not essential (Reynolds 1974:130). The bell-shaped pits found at Sabi Abyad gave several indications of storage but in all cases these clues remain speculative and may very well be open to other solutions:

Firstly, modern experiments have shown that beehiveshaped pits involve less wastage of stored grain than other types of pits due to the more favourable thermal and biochemical properties of these pits after sealing (Reynolds 1974:126 ff). A beehive shape may, however, also result from erosion or seasonal cleaning (ibid.).

Secondly, the content of the pits. In two pits at Sabi Abyad large quantities of charred grain were found and it is tempting to consider these cereals as an accidentally burnt stock pile still in situ. This is, however, doubtful in view of the rather loose concentration of seeds and their additional distribution in the immediate surroundings of the pits. More likely these burnt cereals were part of secondary pit fill. This is also indicated by the numerous pottery fragments found in these pits.

Thirdly, the sealing of the pits. In one case, the floor of a pit was covered with stones which, however, do not seem to have been part of the original pit construction. The position and elevation of the separate stones suggest that they were placed on the floor at a later stage. Perhaps these stones were originally used for the lining or reinforcement of the pit sealing. In another pit traces of white plaster were found (near the opening of the pit and sloping inwards). Perhaps here this plaster was used to create an impermeable cover.

Bell-shaped and other types of pits supposedly used for grain storage are reported from several Halaf sites. At Yarim Tepe II a considerable number of both bell-shaped and cylindrically-shaped pits appeared in the lower level VIII. Two of the bell-shaped examples had a diameter (at the opening) of about 1.00 m and a depth of about 1.50 m but two others, while having approximately the same diameter, were 2.95 m and 3.60 m deep respectively. It has been suggested that the deep pits served as wells or as water reservoirs whereas the smaller ones may have been used for the storage of food products (Merpert et al. 1978:37). The filling of the various pits contained the usual rubbish (sherds, bones, quern fragments etc.) and gave no definite indications of their original purpose. Occasionally cylindrically-shaped pits are found in tholoi thus forming cellar-like areas which may also have been used for storage (Munchaev and Merpert 1973:10-11). At Arpachiyah, a circular pit is said to have been used for grain storage, there on the basis of a pot containing grains of emmer wheat found in this pit (Mallowan and Rose 1935:15). It is, however, evident that the sole contents of this pot cannot define the use of the pit. The presence of barley remains in the so-called 'well' at Arpachiyah led Mallowan to the conclusion that this feature, too, may have served as a granary at a time when it was no longer in use as a water-supply (ibid.).

NOTES

1 Halaf levels in square O14 could only be traced within a very limited area due to heavy disturbance of the area in later times (i.e. late 2nd millennium). It may very well be that architectural features had been present in square O14 but that these were wholly destroyed by late 2nd millennium building activities.

2 These buildings are both found in square P14: the stratum 7B rectangular building and the stratum 6D tholos O.

3 Similar doubts were brought forward by Mellaart (1975:159) concerning the roofing of the tholoi from Yarim Tepe II. He thinks it is more likely that the roofs of the Yarim Tepe structures were thatched with reeds.

4 Aurenche 1981:153) pointed out that also in other regions of the modern Middle East domed buildings appear, viz. the Caucasus, east-Iran, Baluchistan and Turkmenistan.

5 In view of the general climatic conditions in Syria and our present knowledge on Halaf technology, the second technique, which requires the refrigeration of damp grain at 0-7.5 C (Gentry 1976:2) may be excluded.

6 This possibility was first suggested to me by Dr. Sytze Bottema, Biologisch-Archeologisch Instituut, Groningen. Highly valuable comments were also obtained from Dr. Peter J. Reynolds of the Butser Ancient Farm Project Trust, Hampshire.

7 Munchaev and Merpert (1973:12) deny a dwelling function for this building on the basis of the generally small size of the rooms and on the limited number of sherds and bones found in and around the building. Indeed, some of the rooms are too small for living but the dimensions of others seem to be wholly acceptable and are not in disagreement with room sizes at other sites. It is a fact that at most prehistoric sites room dimensions are generally small. On room size alone, the function of a building cannot be firmly established (see Aurenche 1981:218 ff for a discussion on this matter). The second point brought forward by Munchaev and Merpert (the absence of small finds) does in my opinion not argue against a dwelling role for the level VI building but, on the contrary, pleads for it! The fill in rooms can only in a few cases be used as evidence for the original use of these rooms but in most cases this fill has been dumped into them after the dismantling of the building. Usually the fill in rooms tells us more about the use of the areas after the building got out of use than when it was still in use. The absence of sherds and bones in and around the level VI building at Yarim Tepe II may indicate that the building and its surroundings were originally kept painstakingly clean and that after its decay the area as a whole was largely abandoned for some time.

8 The sometimes rather large diameter and thick walls of these buildings, together with the hard-burnt interior, suggest some close parallels to the smallest tholoi from Sabi Abyad! Similar large ovens are also reported from Yarim Tepe II (see e.g. Munchaev et al. 1984:37).

Chapter IV

THE PREHISTORIC POTTERY OF TELL SABI ABYAD

By Peter M.M.G. Akkermans

A. INTRODUCTION

A.1. General aspects

During the 1986 excavations at Tell Sabi Abyad, large quantities of pottery were recovered from the prehistoric strata at the site. Two main periods are indicated, viz. a Late Neolithic and an Early Halaf period. The former is mainly characterised by coarsely-made and undecorated ceramics whereas the latter is characterised by the mass appearance of well-made, painted pottery. The pottery discussed in this chapter stems from two separate areas of excavation, viz. the northeastern area (consisting of trenches T4, T5 and S5) and the southeastern area (consisting of trenches P13, P14, O13 and O14). The northeastern area rendered mainly Late Neolithic ceramics; here Early Halaf pottery has only been found in the upper three strata of trench T4. The reverse is true for the southeastern area: here almost exclusively Halaf pottery has been found whereas Late Neolithic ceramics appeared only in a small test trench in square P14. The pottery of the northeastern and southeastern areas will be discussed separately.

A.2. Pottery procedures

The present analysis of the prehistoric pottery of Tell Sabi Abyad is almost entirely based upon sherds. Complete vessels appeared in very limited numbers (only 6 complete vessels have been found). In total, 11,518 sherds have been recovered from the prehistoric strata. However, not all sherds found during excavation have been used in further analysis. The reasons for discarding large numbers of pottery were twofold. Firstly, since our analysis is primarily based on a clear stratigraphic assignment of pottery, all sherds which could not be properly ascribed to a particular stratigraphic unit were excluded. Secondly, in order to deal effectively with the vast amount of ceramics, it was decided to divide the pottery into two groups: diagnostic sherds (i.e. rims, bases, handles, spouts, decorated body sherds) and non-descript body sherds. The latter, which did not fit any of the diagnostic sherds, were counted according to ware and subsequently discarded. It was felt that the ratio of invested labour versus retrieved information would have been beyond the point of diminishing returns when processing both the diagnostic and the non-diagnostic ceramics. Indeed, this notion is merely based upon assumptions instead of proved facts; its correctness has not yet been checked. However, the incorporation of non-descript body sherds would have enlarged our sample of data only regarding a limited number of attributes like temper, firing, colour and surface treatment, i.e. those categories which are also covered by the diagnostic sherds. It thus seems reasonable to assume that inclusion of the non-diagnostic body sherds would for the larger part mean more of the same instead of adding new information.

All pottery recovered during the excavations at Sabi Abyad has been processed along lines developed in recent years during work at the nearby site of Tell Hammam et-Turkman (see Meijer et al. 1987). While digging, all recovered pottery was collected in 'pottery lots' which were each labelled and given a unique number according to provenience. The contents of each lot were washed, counted and sorted into diagnostic and non-descript body sherds. Subsequently, all diagnostic sherds were given a coded numerical description, covering both technological and typological aspects. Eight attributes were distinguished and given a code, whereas the various states, which each attribute possessed, received their own numerical designation. Following Clarke (1978:152 ff), an 'attribute' is defined as an independent variable acting within a specific frame of reference and having two or more states. The 'attribute state' describes the specific value of the attribute. An example: while 'temper' constitutes an attribute, sand, lime or plant inclusions each define an attribute state of temper. Unfortunately, the nominal nature of most attributes makes it difficult to circumscribe these attributes and their states in such a way that their extent and limits are definitely set; in other words, it is difficult to avoid any subjective interpretation in defining the attributes and their states. The more people are involved in coding, the more confusion may arise due to matters of experience, training or even intuition. In order to avoid this confusion, it was decided to have all diagnostic pottery fragments coded by only one person (the author of this chapter). A consistency in coding may therefore be assumed (although, of course, this consistency is of a subjective nature).

In the various sections below, the following attributes will be discussed: vessel shape, manufacture, temper, firing, surface treatment, colour, decoration, and rim type. It seems useful to describe these attributes and their states in short.

Vessel shape refers to the broad division of rim sherds into restricted and unrestricted categories, taking into account the complete shape of a vessel (Shepard 1963). Four broad categories were defined: bowls, trays (both categories are unrestricted forms with rather wide diameters and limited height), pots (a restricted form, usually without a neck), and jars (a restricted form with a neck).

Manufacture refers to the method of constructing a vessel. A distinction is made in hand-made and wheel-made pottery. At Sabi Abyad, all prehistoric pottery was hand-made. The various techniques of constructing a vessel will hardly be touched upon in the present chapter; for this the reader is referred to the chapter on the technological aspects of the Sabi Abyad ceramics (van As and Jacobs, this volume).

Temper is defined as the non-plastic inclusions in the clay of a vessel, added by the potter in order to minimise shrinkage and to facilitate uniform drying by an increase of the porosity of the paste (Shepard 1963:25). Various states of temper have been recognised (plant, lime, calcite, sand or a combination of these; a more detailed account of the kinds of inclusion is given by van As and Jacobs, this volume); the main division refers to the vegetable or mineral nature of the inclusions. The type of inclusion was coded on the basis of macroscopic observations. In various instances, it was suspected that some of the observed inclusions were natural inclusions in the clay used for pottery manufacture instead of deliberate additions by the potter, but any definite conclusions await laboratory analyses.

Firing refers to the heating of pottery to a temperature high enough to cause permanent change of the clay minerals. Alterations of the physical state of the clay minerals by sufficient heating renders pottery hard and durable (Rye 1981:96 ff; Shepard 1963:19 ff). The various states of firing are described in a very general manner: low, medium and high.

- The code of low firing was given whenever the section of the vessel wall showed a 'sandwich' pattern (e.g. orange-black-orange). A clearly visible, usually dark-coloured core is present.
- The code of medium firing was given whenever the section of the vessel wall showed a rather granular, light-coloured composition without a distinct core.
- The code of high firing was given whenever the section of the vessel wall showed a compact, usually greyish composition without traces of a core. This pottery often had a 'metallic' sound. Included in this group is also greenish and often crumbly pottery, which indicates overfiring.

In general, low-fired pottery was easily recognised by its dark core, but in the case of medium and high firing the limits were more gradual. It should be emphasised that the present division is of a descriptive nature; it does not indicate the actual temperatures of firing, but defines in a broad sense only the composition and colouring of the vessel wall. Differences in section composition and colouring indicate various stages in firing conditions and, consequently, allow inferences on pottery manufacture (cf. Shepard 1963; Franken 1974; Rye 1981). In this sense, 'low firing', for example, does not necessarily indicate firing at low temperatures; the vessel involved may very well have been fired at a high temperature but during a short time only, which will also produce a dark core (the firing time is not sufficient to allow complete oxidation).

Surface treatment refers to the final touches applied to the outside of a vessel by the potter before firing. Various states of surface treatment are distinguished (cf. Shepard 1963; Hole et al. 1969):

- slip: a coat of fine, well-cleaned clay applied to the surface of a vessel.
- wash: a very thin and watery slip, probably due to wet-smoothing. wet-smoothing: the wiping of the surface of a vessel
- with wet hands or a piece of fabric before firing.
- scraping: in order to make the vessel wall thinner and more even, the vessel wall is scraped by means of e.g. a piece of flint.
- burnish: the achievement of a lustrous vessel surface by rubbing the leather-hard vessel with an implement, thus closing the surface pores of the clay and creating a tight coating. Two techniques of burnishing were recognised at Sabi Abyad: a) overall burnishing (burnish on the complete outer and/or inner surface of a vessel) and b) pattern burnish.

Colour refers to the surface colour of a sherd. The range of colours is limited to nine categories: cream, buff, orange, red, brown, grey, black, green and white. For coding a standard collection of sherds was used which was assumed to comprise the main variation in colour. The range of colour of this standard collection was broadly defined by derivation from the Munsell Soil Color Charts. By comparing a sherd to this standard collection, the state of colour was established in a general manner and based on the most obvious trend in colour visible on the sherd surface. It must be stressed that colour, even on the same vessel, can vary considerably due to various circumstances of manufacture and subsequent post-depositional processes (Rye 1981:119). Thus, any interpretation of colour of a particular sherd should be used with caution. Colour has mainly a descriptive value.

Decoration refers to the use of paint, incision or application of clay (either separately or in combination) on the outer and/or inner surface of a vessel.

The various pottery attributes and their states will be investigated separately, but any relationships between attributes will be shown whenever possible. In most cases, alterations in one attribute are necessarily accompanied by changes in other attributes. For example, when a potter changes his temper materials, this will have its consequences concerning the firing techniques, surface treatment, colour, wall thickness and, ultimately, the shape of the vessel. All pottery attributes are interdependent and operating within a coherent framework of ceramic development. Thus ceramics, like all artifacts, are not a simple sum of ingredients inevitably leading to a particular product but, on the contrary, constitute a complex and interrelated system of materials, techniques, rules, behaviour and deliberate decision-making allowing a wide differentiation in final outcome (Franken 1974; see also Clarke 1968; Watson et al. 1971).

A.3. Ware and type

At present, three broad ware categories can be distinguished within both the Late Neolithic and the Early Halaf pottery assemblages, viz. Coarse Ware, Grey-Black Ware and Fine Ware. 'Ware' is defined as a category of ceramics grouped on the basis of clay composition, firing, surface treatment and range of shapes (cf. Hole et al. 1969:109; Rice 1987:5). As a whole, the various wares are easily distinguishable although the specific technological and typological traits of each category are not necessarily limited to one ware category only.

The general characteristics of the various wares are as follows:

- **Coarse Ware**: roughly and irregularly shaped, thickwalled ceramics, mainly tempered with chopped straw. Mineral tempering materials hardly occur and, when present, are usually found in combination with plant inclusions. The section of the vessel wall generally shows a distinct dark core ('sandwich' pattern), indicating incomplete oxidation. Most of the pottery is scraped, thus having a rough and scratched surface. Decoration hardly occurs, but burnishing is commonly found. The surface is usually brown or orange-brown coloured.

- **Fine Ware**: this pottery is made of finely textured clay and is mainly lime-tempered. The pottery is well-fired, showing evenly coloured vessel walls without cores. Surface colours are light (cream or buff). The vast majority of the Fine Ware ceramics was painted.

- **Grey-Black Ware**: this pottery is marked by a grey or black surface colour which is due to firing under reducing circumstances. In most cases, this pottery has been burnished. These ceramics are virtually always mineral-tempered (lime or fine sand). Commonly these ceramics have a brittle and granular texture. In most cases the section of the vessel wall shows a dark core, although in other instances the vessel was blackened throughout.

The characteristics of the various wares differ according to period and area and a more detailed picture is given in the various sections below.

In sorting the pottery of each ware, a typology was set up mainly on the basis of rim shape. The rim sherds found during excavation have been ordered according to similarity in profile. Generally, a particular rim shape is associated with a particular vessel shape (i.e. bowl, pot, jar, tray) and therefore vessel form is included in the typology. The combination of both rim shape and vessel shape defines a 'type'. At present, relatively few types are recognised within each ware category. Any true standardisation seems to be largely absent, as expected with hand-made pottery probably manufactured by non-specialists. Thus, some of our types show a considerable internal variation. In most cases, however, any subdivision of the present types has been omitted since the boundaries between these 'sub-types' are often ill-defined. It was felt that a subdivision in many cases would have been an academic exercise, leading to an endless list of 'types' without any meaning. It is suggested that pottery manufacture at Tell Sabi Abyad involved the use of a broad set of shapes, largely allowing each potter to produce a particular vessel to his/her own wishes and needs. A similar conclusion can be derived from an analysis of design motifs used on Sabi Abyad pottery. A vast number of design elements has been attested but most of these occur only once or twice, thus indicating a considerable idiosyncratic behaviour.

B. THE POTTERY OF THE NORTHEASTERN AREA

B.1. Introduction

The excavation on the northeastern mound of Tell Sabi Abyad (trenches T4, T5, S5) yielded two ceramic assemblages which can be clearly distinguished from eachother on technological as well as on typological grounds, viz. a) Late Neolithic ceramics and b) Early Halaf pottery. These assemblages seem to belong to two wholly different periods of occupation, separated from eachother at least in this part of Sabi Abyad by a hiatus of an as yet unknown duration. So far, no transition has been observed on the northeastern part of Sabi Abyad.

In trenches T5 and S5 Halaf pottery was found almost exclusively in the disturbed top soil layer; here Halaf, Late Neolithic and some Late Bronze Age sherds were found side by side. In the lower strata, clearly diverging from the loose top soil in soil consistency and texture, architectural features and artifactual remains, hardly any Halaf or Halaf-like sherds have been found. The question whether these few sherds should be considered as intrusive in the Late Neolithic levels or whether they perhaps represent forerunners of the later Halaf painted ware will be discussed in more detail below.

In trench T4, the lower stratum 4 yielded solely Late Neolithic ceramics whereas the upper strata 3 to 1, situated immediately above this stratum 4, contained virtually only Halaf pottery. The fully developed nature of these Halaf ceramics and the stratigraphic evidence from trench T4 suggest that, as in square T5, no transition exists between the Late Neolithic and Halaf periods. Apparently, the northeastern part of Sabi Abyad had been deserted for some time after the Late Neolithic period before it was reoccupied in the Halaf period. On stratigraphic arguments, the Late Neolithic stratum 4 in trench T4 is provisionally correlated to stratum 1 of the neighbouring square T5. In the following, the small ceramic sample (only 17 diagnostic sherds) from stratum 4 of trench T4 is included in the discussion of the stratum 1 ceramics of square T5.

In view of the obvious chronological and cultural differences, a discussion is presented of the Late Neolithic ceramics first and after that a discussion will be given of the Halaf pottery. The general procedure will be as follows: firstly, the characteristics of each assemblage as a whole will be presented, whereby any diachronic developments will be emphasised; secondly, the various wares and types within each assemblage will be discussed.

B.2. THE LATE NEOLITHIC POTTERY OF THE NORTH-EASTERN AREA

B.2.1. Introduction

During the 1986 soundings on the northeastern mound, a total number of 1625 sherds was recovered from the Late Neolithic strata. The sample used for the present analysis, however, is much smaller and consists of 215 rim fragments. No complete vessels have been found but several sherds have been preserved from rim to base, thus allowing the complete reconstruction of the vessel.

B.2.2. General trends

Vessel shape

Four broad categories of vessel shape were recognised: bowls, pots, jars and husking trays. The relative frequency of each shape category is tabulated in Tab. IV.1.

Bowls are most common, generally accounting for over half of the recognised shapes. Pots were only found in small numbers, comprising about 15% of the pottery. Husking trays are rare in the lower stratum, but sharply increase in

Table IV.1. Distribution of vessel shape per stratum
Count
Column %

	1	2	total
Bowl	18	77	95
	47.4	55.4	53.7
Pot	5	22	27
	13.2	15.8	15.3
Jar	10	39	49
	26.3	28.1	27.7
Husking tray	5	1	6
	13.2	0.7	3.4
Total	38	139	177
	21.5	78.5	100.0

importance in the topmost stratum. About 17.7% of the rim sherds from the Late Neolithic strata was of indeterminate character.

Manufacture

All Late Neolithic pottery was hand-made. No evidence has been found for the use of a fast turning device, although occasionally perhaps some kind of slow turntable may have been employed. More or less parallel finger striations on some sherds point towards the use of a turning board or mat. The Late Neolithic pottery was constructed either by pinching, drawing, coiling or by a combination of these (van As and Jacobs, this volume).

Table IV.2. Distribution of temper per stratum
Count
Column %

	1	2	total
plant	25	105	130
	65.8	59.3	60.5
lime/sand	–	2	2
	–	1.1	0.9
calcite	–	2	2
	–	1.1	0.9
lime	5	29	34
	13.2	16.4	15.8
sand	1	5	6
	2.6	2.8	2.8
plant/lime	6	30	36
	15.8	17.0	16.7
plant/sand	–	3	3
	–	1.7	1.4
not visible	1	1	2
	2.6	0.6	0.9
Total	38	177	215
	17.7	82.3	100.0

Temper

The majority of the pottery found in both strata of square T5 and the lowest stratum of trench T4 is plant-tempered. About 78% of the stratum 2 pottery and 81.6% of the stratum 1 pottery gives evidence of added vegetable inclusions. Vegetable tempering material appears both on its own and in combination with mineral elements (particularly carbonates). Pottery with plant inclusions only is most numerous in both strata, accounting for about 60-65% of the ceramics. About 17% of the pottery indicates the combined use of plant and lime inclusions. The combination of plant and fine sand particles appears in minute quantities (ca. 1.7%) in the lower stratum 2 only. In the Balikh region the combination of plant and mineral temper will in most cases probably mean plant temper only. The mineral component is usually found in such minute quantities that it seems more likely that these elements were already present in the clay used for pottery production. Apparently, various sources of clay were used.

Solely mineral-tempered pottery constitutes a minority within the Late Neolithic ceramic sample. Lime is the most commonly used kind of mineral temper; it accounts for about 16.4% of the stratum 2 ceramics and for 13.2% of the stratum 1 pottery. Fine sand was used in very small quantities, hardly accounting for more than 2%. The use of mineral tempering materials is almost exclusively restricted to the Grey-Black Ware and the Fine Ware ceramics. Coarse Ware pottery at Sabi Abyad shows almost always plant inclusions.

Firing

The vast majority of the Late Neolithic ceramics was fired in an oxidising atmosphere. Most sherds, however, show a dark grey or black core, indicating incomplete oxidation due to a relatively short firing time or firing at rather low temperatures (see Rye 1981:114 ff). This is particularly true in the case of plant-tempered ceramics but also most of the mineral-tempered pottery indicated incomplete oxidation. Along with these ceramics a minor component of grey-black pottery appeared which seems to have been intentionally blackened by carbon deposition in a reducing atmosphere. Carbon deposition is caused by preventing access of air either during the last stage of firing or at the beginning of the cooling process. By excluding air reoxidation of the carbon is prevented (Rye 1981:115). Grey-black ceramics fired under reducing conditions are rare in the Late Neolithic strata and comprise about 5.5% of the ceramic sample. The technique of producing grey-black ceramics in a reducing atmosphere is not limited to the Late Neolithic strata but is also found in the Halaf levels at Tell Sabi Abyad.

Following our earlier definitions of firing and its associated states, three broad categories of firing are distinguished: low firing, medium firing and high firing. High-fired ceramics, however, are completely absent within our sample. The majority of the sherds was low-fired, i.e. they gave evidence of a distinct dark core. This does not necessarily implicate firing at low temperatures; firing at high temperature but during a short time only may also produce a dark core. Medium-fired ceramics constitute a minority in the Late Neolithic strata at Sabi Abyad, accounting for about 30% of the recovered rim sherds. When compared with the low-fired ceramics, the medium-fired pottery suggests firing under well-controlled conditions. The various pottery wares and particularly the various means for tempering require different treatment during firing. In this respect, it is interesting to note that most medium-fired ceramics contain mineral kinds of temper and for the larger part comprise those vessels termed Grey-Black Ware and Fine Ware in this study. The production of medium-fired ceramics seems to have necessitated some kind of kiln whereas the coarse, low-fired pottery may have been fired in a pit or the like (see van As and Jacobs, this volume).

Table IV.3. Distribution of firing per stratum
Count
Column %

	1	2	total
Medium	9	57	66
	23.7	32.2	30.7
Low	29	120	149
	76.3	67.8	69.3
Total	38	177	215
	17.7	82.3	100.0

In the topmost stratum 1 low-fired ceramics seem to increase in importance at the expense of medium-fired pottery, but the small sample from stratum 1 prevents any definite conclusions.

Surface treatment

The majority of the Late Neolithic pottery at Sabi Abyad had been scraped, which is indicated by sharp striations on the vessel surfaces. Superfluous clay is removed by the potter by holding some kind of scraping implement perpendicular or almost at a right angle to the vessel's surface. Usually this is done when the clay is leather-hard (Rye 1981:86). By scraping, coarse inclusions in the clay (e.g.

plant fibres) are removed from their original position and produce deep lines or striations. In general, scraped pottery has a rough and irregular appearance.

Scraped pottery constitutes about 57% of the stratum 2 ceramic inventory whereas in the topmost stratum this number seems to increase rapidly to about 71%. Smoothed ceramics increase in importance as well, from 16.4% in stratum 2 to 21.1% in stratum 1. The increase of both scraped and smoothed pottery is at the expense of burnished vessels. Burnishing sharply decreased in the last Late Neolithic stratum of the northeastern area.

Smoothing refers to the modification of the clay texture by rubbing or wiping the leather-hard vessel surface with wet hands or a piece of fabric in order to create a regular and even surface (wet-smoothing). Obviously, the non-plastic inclusions in the clay will strongly affect the result. Whereas the removal by rubbing of large and coarse inclusions (e.g. chaff) will deeply scratch the vessel surface, finer particles (e.g. lime) will not cause these striations and allow an even, smoothed surface. Smoothing is largely restricted to those ceramics described here as Fine Ware, whereas only a minor part of the so-called Coarse Ware had a smoothed surface.

Table IV.4. Distribution of surface treatment per stratum
Count
Column %

	1	2	total
Smoothing	4	29	33
	21.1	16.4	15.4
Scraping	27	101	128
	71.1	57.1	59.3
Burnishing	3	47	50
	7.9	26.6	23.3
Total	38	177	215
	17.7	82.3	100.0

Burnishing constitutes a characteristic ceramic trait in the lower Late Neolithic stratum of the northeastern mound. About 26.5% of the stratum 2 ceramics has been burnished. In the next stratum burnishing sharply decreases to about 8% only. An overall burnish is most frequently found. Only one pattern-burnished sherd has been found.

Only very few of the Late Neolithic ceramics give evidence of a wash or slip. Both traits together comprise about 5.1% of the ceramic sample and are evenly distributed in both strata. A slip is most commonly associated with burnishing. This combination renders a smooth surface and reduces the permeability of a vessel (Shepard 1963:191).

Table IV.5. Distribution of colour per stratum
Count
Column %

	1	2	total
Cream	1	6	7
	2.6	3.4	3.3
Buff	7	29	36
	18.4	16.4	16.7
Orange	2	9	11
	5.3	5.1	5.1
Red	–	4	4
	–	2.3	1.9
Brown	25	120	145
	65.8	67.8	67.4
Grey	2	6	8
	5.3	3.40	3.7
Black	1	3	4
	2.6	1.7	1.9
Total	38	177	215
	17.7	82.3	100.0

Colour

At present, seven colour categories are distinguished within the Late Neolithic ceramic sample: cream, buff, orange, red, brown, grey and black. Most of the pottery has a brown-coloured surface (about 67.4%). The light buff and cream-coloured pottery together accounts for about 20% of the ceramic sample. The other states of colour are each attested in very small quantities. Grey-black ceramics seem to increase slightly in importance in the topmost stratum, accounting for about 8% of the recovered pottery. In the lower stratum 2 about 5% of the ceramics had a grey or black colour.

Decoration

The vast majority of the Late Neolithic pottery is undecorated (about 88%). Decoration is largely restricted to the Fine Ware pottery; only very few Coarse Ware or Grey-Black Ware sherds were decorated. One Grey-Black Ware sherd showed an incised pattern of cross-hatching (no. 37), whereas only three Coarse Ware vessels showed traces traces of painting (nos. 15, 72 and 75). A small number of body sherds (10 fragments), probably all parts of jars, gave evidence of either incision, impression or a combination of impression and painting (nos. 38-44). The latter sherds all showed a highly burnished, dark-red paint.

B.2.3. Wares and types

Coarse Ware

Coarse Ware pottery constitutes the vast majority of the Late Neolithic ceramics (about 83.3% of the rim sherd sample). Generally, Coarse Ware consists of coarsely hand-made and thick-walled ceramics, heavily tempered with chopped straw. Over 71% of the pottery showed plant inclusions exclusively whereas the remainder displayed for the larger part plant temper in combination with mineral inclusions (mainly lime; sand or calcite occur sporadically). Mineral temper only is rare, accounting for hardly 9% of the sample. Most of the sherds have a distinct dark core, indicating incomplete oxidation ('low-fired'). Occasionally, the firing time must have been very short or the reached temperatures low, since in some cases plant fibres are still present in the section of the vessel wall. In most instances, however, plant inclusions have been burnt out completely. Only some of the smaller types of ceramics gave evidence of an evenly fired vessel wall without a true core. The brittle texture of these sherds, however, suggests that this pottery, too, is more closely associated with the so-called low-fired ceramics than with truly medium-fired pottery (the latter is mainly represented by the Fine Ware pottery). Most sherds have a dark orange-brown or, less frequently, buff surface colour. The vast majority of the Coarse Ware pottery has been scraped and shows no further treatment. Most vessels have a rough appearance. Burnishing is a characteristic trait of these Late Neolithic ceramics. It is, however, largely restricted to the lower stratum 2 of the northeastern mound. In the topmost stratum, burnished Coarsed Ware pottery decreases dramatically and is largely replaced by simply smoothed ceramics.

The Coarse Ware ceramics exhibit only little variety in shape. At present, we can distinguish seven broad categories or 'types'. These types are found in both Late Neolithic strata of the northeastern mound of Sabi Abyad in more or less the same relative frequencies, except for the so-called 'husking trays' which are rare in the lower Late Neolithic stratum 2 but which constitute a characteristic feature of the topmost stratum (see Tab. IV.1).

Most common are simple, plain-rim bowls showing a rounded or occasionally straight vessel wall (type 137; nos. 3-10). About half of the recognisable rim sherds showed this kind of profile. The majority of these bowls probably had rounded or slightly flattened bases. Truly flat bases are found in very small numbers in the Late Neolithic strata; in only two cases a flat base could with certainty be ascribed to these plain-rim bowls (nos. 5, 6). In size, plain-rim bowls show a large internal variability. The diameter ranges from 60 to 300 mm (220 to 280 mm being the most common), whereas the thickness of the vessel wall varies from 6 to 20 mm (12 to 16 mm being the most common). Most of these bowls have been scraped, without any additional treatment. About 18.8% of these vessels gave evidence of a slight burnish. Plain-rim bowls were rarely decorated. In one case, a large bowl fragment was found, indicating a rough, scraped surface covered by a thin buff wash. The lip exterior showed a narrow horizontal band of matt black paint with more or less straight vertical lines (no. 15).

A specific group of bowls, found only in very small numbers (only once or twice in each stratum) are the vessels illustrated by nos. 75, 76 (type 145). These bowls have a solidly reddish-brown painted exterior whereas the interior shows a band of paint near the lip. Moreover, the exterior is marked by one or two broad incised ridges immediately underneath the rim.

Holemouth pots (type 239; nos. 16-21) constitute about 15% of the stratum 2 ceramics and 11.2% of the stratum 1 pottery. These closed vessels have rounded lips and the body and base, too, had probably been rounded. Occasionally, these vessels showed a lug handle (no. 20). Most of the holemouth pots had been plant-tempered and showed a distinct dark core. Mineral temper (lime or sand) occurs sporadically. Generally, these pots have a brown colour and a scraped surface but, when compared with the other types of vessels, a rather large number of these holemouth pots had been burnished: 36.8%. Burnishing creates a water-tight coating by closing the surface pores of the clay. Probably these holemouth pots represent cooking ware. This is also suggested by the traces of secondary firing shown on some pots. Holemouth pots have a diameter ranging from 110 to 280 mm, and a wall thickness varying between 10 and 19 mm (12 to 14 mm being the most common).

The vessels termed holemouth jars (type 340; nos. 23–27) represent an intermediate type of ceramics in between the holemouth pots (nos. 16-20) and the angle-necked jars (nos. 28-32). Whereas the pots show no collar at all, the angle-necked jars give evidence of a true collar and are marked by a sharp junction between the vessel's neck and shoulder. The holemouth jars have a collar, too, but this one gradually evolves from the body without any distict junction. Holemouth jars were found in slightly varying numbers in the Late Neolithic strata of the northeast mound. Whereas in stratum 2 about 17% of the pottery indicated this kind of vessels, in stratum 1 this number was reduced to about 13%. Almost all of these holemouth jars had been plant-tempered and had a brown colour and a scraped surface. In only one case, such a vessel had been burnished. One other vessel showed two broad bands of dark red paint near the rim. The diameter of the holemouth jars varied from 90 to 230 mm, and the wall thickness ranged from 8 to 21 mm (most commonly being 10 to 15 mm).

Angle-necked jars (type 327; nos. 28-29) are marked by a distinct junction between neck and shoulder and were found in small quantities in the Late Neolithic strata at Sabi Abyad (12.5% of the rim sherd sample in stratum 2, 10.5% in stratum 1). As common in the Late Neolithic strata, most of these vessels had been scraped and had a brown colour. However, a considerable amount of these jars had been burnished: about 30%. In this respect, these vessels closely resemble the holemouth pots. Most of these jars have flaring and low collars with simple, pinched rims. In one instance, a sherd with an outrolled lip was found (no. 33). Tall-collared jars are rare, only two examples were found. One of these tall-collared vessels was solidly covered by dark reddish-brown paint and had been burnished (no. 77). The diameter of the angle-necked jars ranges from 110 to 290 mm. The wall thickness varies between 7 and 18 mm. Angle-necked jars were also found in the other kinds of wares recognised in the Late Neolithic strata of Sabi Abyad but within these other wares the diameter seems to be restricted to 100-130 mm, whereas the wall thickness varies between 4 and 10 mm. Apparently, the larger angle-necked jars are solely found within the Coarse Ware component.

'Husking trays'were found in small squantities in the Late Neolithic strata at Sabi Abyad (see Tab. IV.1). One fragment was found in stratum 2, whereas 5 fragments were retrieved from the topmost stratum. These trays had low and thick walls, about 100-120 mm high. The small size of the sherds did not allow any diameter measurement, but this must have been fairly wide (over 300 mm).

The interior base showed either shallow ridges (nos. 78-79) or finger-impressed pits about 10-20 mm deep (nos. 80-81). Occasionally the interior wall showed some narrow ridges as well.

Grey-Black Ware

Grey-Black Ware was found in very small quantities in the Late Neolithic strata at Sabi Abyad, accounting only for about 5.5% of the rim sherd sample. In an earlier report (Akkermans 1987a) it was said that no Grey-Black Ware had been found in the Late Neolithic strata but this turned out to be incorrect. Grey-Black pottery has a grey or black-coloured surface which is virtually always burnished. Moreover, this kind of ceramic is almost exclusively mineral-tempered (lime, sand or, in one case, calcite). Vegetable inclusions occur sporadically and, when present, are found in combination with lime. Most of the ceramics had a dark core but occasionally the vessel wall was blackened throughout. The latter ceramics invariably indicate a brittle and granular clay texture. The Grey-Black Ware ceramics seem to have been fired in a reducing atmosphere, thus creating carbon deposition. Grey-Black Ware is rarely decorated. Only one sherd showed traces of two horizontal bands of dark red paint. Another sherd, being part of a bowl, showed an incised pattern of cross-hatching (no. 37).

Grey-Black Ware shows only little variety in shapes. Unfortunately, the present small sample does not allow any quantification. Three types of Grey-Black Ware ceramics are distinguished: simple plain-rim bowls (nos. 1, 2, 12, 37), holemouth pots, some of which have a lug handle (nos. 20, 21) and small angle-necked jars (nos. 30, 31). Bases may have been flat (no. 36) or more or less rounded (no. 37). At least in shape, the Grey-Black Ware closely resembles the Coarse Ware pottery of Sabi Abyad. However, in view of the technical characteristics of the Grey-Black Ware (mineral temper, reduced firing, burnish), the potter apparently took special care in producing this kind of pottery. A clay analysis suggested that this pottery was not locally made, but imported from western Syria or Cilicia (see Le Mière, this volume). Grey-Black Ware is not limited to the Late Neolithic strata at Sabi Abyad but also appears in the Halaf levels at the site. In the latter period new shapes were introduced.

Fine Ware

Fine Ware pottery appeared in small quantities in the Late Neolithic strata at Sabi Abyad and constitutes about 11.2% of the ceramic sample. This kind of pottery has been made of finely textured clay and is almost exclusively lime-tempered (about 98%). Other kinds of temper, viz. sand or fine chaff, occur sporadically, each represented by only one or two examples. The vast majority of the Fine Ware ceramics is medium-fired, showing an evenly coloured wall section without a core. Only very few of the thicker Fine Ware sherds show a slight colouring due to uneven oxidation. Most of the ceramics have a cream-buff surface colour; only very few sherds gave evidence of a light orange-brown colour. Almost all the diagnostic Fine Ware sherds had been decorated, either painted or, less commonly, painted-and-incised. Fine Ware sherds without decoration were all parts of bases which themselves probably belonged to decorated vessels. At Sabi Abyad, both in the Late Neolithic and in the Early Halaf strata, decoration is mainly found on the upper parts of a vessel, viz. the rim, neck and upper body. The lower parts of the body and the base were usually left unpainted. Most undiagnostic Fine Ware sherds (which have been excluded from the present analysis) seem to belong to the lower parts of a vessel, thus confirming the above.

The Fine Ware from the Late Neolithic strata at Sabi Abyad is represented by two subgroups, viz. Halaf Fine Ware and Samarra Fine Ware.

a) **Halaf Fine Ware**

Whether this kind of ceramic truly forms part of the Late Neolithic assemblage from the northeastern part of Tell Sabi Abyad is doubtful for the moment. Only 21 Halaf sherds have been found and virtually all appeared either in the upper part of stratum 1 of square T5 (immediately below the top soil) or in trench T4 at the interface between the Late Neolithic stratum 4 and the next Halaf stratum 3. Probably these sherds are intrusive in the Late Neolithic strata. In square T5 the distinction between the top soil level and stratum 1 was ill-defined, being only marked by a gradual transition of loose, light-coloured top soil into darker and ashy stratum 1 soil. At present, all Halaf sherds from stratum 1 have been discarded (19 fragments). More enigmatic, however, are two Halaf sherds found in the lower parts of stratum 2. One sherd was part of a large angle-necked jar (no. 74) whereas the other indicated a flat base probably belonging to a large plain-rim bowl (no. 73). Both shape and decoration are very common in the later Halaf strata at Sabi Abyad. Both sherds were recovered from an area sealed by the stratum 1 architectural features and no pit or the like coming down from the surface of the mound has been observed. Both pottery fragments seem to be part of the original deposit.

b) **Samarra Fine Ware**

Samarra or Samarra-related ceramics constitute the bulk of the Fine Ware at Late Neolithic Sabi Abyad. In my earlier preliminary reports on the site (Akkermans 1987a, 1987b), the presence of 'grit-tempered and painted ceramics', occurring together with some Samarra-like pottery, was mentioned, but a more careful analysis suggests that all of this 'Late Neolithic Fine Ware' was of Samarra derivation.

Samarra Fine Ware consists of jars and bowls, the latter showing a variety of shapes. Jars all are of the angle-neck type, indicating a distinct junction between neck and shoulder. These vessels have a flaring plain rim and a rounded or carinated body. All jars had been decorated, either painted or painted-and-incised. In general, the decoration seems to have been carefully and skilfully executed, although some vessels clearly deviated from this rule (e.g. no. 46). The paint is of a reddish-brown or black colour, often faded or, due to circumstances of firing, gradually shaded-off from red-brown into black. Jars always show a narrow line of paint at the lip whereas the neck is busily painted. Here the design consists either of simple cross-hatching (nos. 54-56) or of a repetitive pattern of impaled zigzags (nos. 46, 48, 49). The interior of these vessels showed either no decoration at all (no. 54), or a simple band of paint (nos. 55, 56), a fringe of small oblique strokes (no. 46), one or more wavy horizontal lines (no. 49) or a continuous row of so-called 'dancing ladies' (no. 61). The body of the jar is either painted or, less commonly, incised at the shoulder and further painted (nos. 56, 57). Decoration seems to be limited to the shoulder and the upper parts of the body whereas the lower parts and the base are left blank. Most of the jars indicate a carinated body and usually a band of paint immediately below this carination limits the area of decoration. The emphasis of decoration is on horizontal banding which encloses design elements in narrow zones. Usually two different motifs are used, appearing in alternating bands. A characteristic design element at Sabi Abyad is represented by the 'pegs' which are found together with zones of cross-hatching (no. 60), oblique vertical lines (no. 58) or wavy horizontal lines (no. 59). Also cross-hatched ladders or triangles commonly appear (no. 57, 64, 66-68). Other motifs are found sporadically. Panelling does occur, too (nos. 62, 64), but in these cases decoration always seems to be broadly executed emphasising a more areal instead of lineal use of space.

Bowls are marked by slightly outrolled or outturned rims. At present, 4 shapes are indicated: low, hemispherical bowls (no. 45), rather large and flaring, straight-walled bowls (nos. 50, 53), narrow but deep S-curved bowls (no. 47) and flaring, carinated bowls (no. 52). Unfortunately, the small number of rim fragments does not allow any quantification of shapes. Decoration of bowls is simple and seems mainly to indicate the use of bands of impaled zigzags ('herringbone' pattern; no. 47) or of continuous chevrons (nos. 50-52). One sherd showed a pattern of pending, wavy lines joined to a narrow line at the lip (no. 45) whereas another sherd only indicated a band of paint at the rim (no. 53). The interior design of bowls consists either of a simple band of paint (no. 47), of some wavy lines (no. 53) or of a fringe of short oblique strokes (nos. 45, 50).

B.3. THE EARLY HALAF POTTERY FROM THE NORTH-EASTERN AREA

B.3.1. Introduction

In a stratigraphic context, Halaf pottery has been recovered from trench T4 of the northeastern area. In total, 1719 sherds have been found. However, the present emphasis on rim sherds limited the number of useful sherds to 149 fragments only. Most of these rim sherds have been found in the topmost stratum 1 (over 60%). The relatively small number of rim sherds per stratum (particularly in strata 2 and 3) allows hardly any quantification and therefore it was decided to analyse the pottery from the various Halaf strata of trench T4 as a whole. When necessary, the specific stratum will be referred to.

B.3.2. General trends

Vessel shape

Three broad categories are distinguished: bowls, pots and jars. The latter are most common, including over half of the rim sherds recovered. Jars seem to be much more abundant in trench T4 than in the Halaf strata from the southeastern part of Tell Sabi Abyad (squares P13-P14) where these vessels constitute almost 37% of the rim sherds. It should, however, be kept in mind that a rather large part (27.1%) of the rim sherds of the southeastern area is of an indeterminate character and may thus distort the present picture.

Table IV.6. Distribution of vessel shape in T4

	N	%
Bowl	38	29.2
Pot	10	7.7
Jar	82	63.1
Total	130	100.0

Bowls constitute about 25.5% of the sherds from trench T4, whereas pots are only found in small quantities, accounting for about 6.7% of the rim sherd sample. A relatively small amount of rim sherds from trench T4 was of indeterminate character (about 12.8%).

Temper

The pottery from the three Halaf strata in trench T4 is mainly lime-tempered (over 88%). Fine sand is the only other kind of temper attested, constituting about 6% of the rim sherds. A small amount of ceramics seems to contain no temper at all (ca. 5.4%). Apparently, the clay used in pottery manufacture did not always necessitate the addition of tempering material. Perhaps different sources of clay were in use. None of the rim sherds contained plant inclusions. However, a number of body sherds from trench T4 did show plant inclusions which suggests that the present rim sherd sample does not give a complete picture of temper variability for this part of Tell Sabi Abyad.

Table IV.7. Distribution of temper in T4

	N	%
Lime	132	88.6
Fine sand	9	6.0
Not visible	8	5.4
Total	149	100.0

Firing

The vast majority of the Halaf ceramics was fired under well-controlled conditions in an oxidising atmosphere. Medium-firing is most abundantly attested for over 93% of the rim sherds. Sections of vessel walls generally show uniform colouring without a distinct core. Occasionally, a slight colouring was noted which is probably due to the positioning of the vessel in the kiln or to local kiln conditions.

High-fired pottery, having a highly compact and 'clinky' texture, hardly appeared. A few greenish and brittle sherds indicate overfiring.

Low-fired ceramics, characterised by a 'sandwich'-patterned vessel wall, were found in small amounts (about 6%). These ceramics all belong to the Coarse Ware assemblage. Most low-fired ceramics seem to be present in stratum 3, the earliest Halaf stratum on the northeastern part of Sabi Abyad.

A small amount of grey-black pottery, fired under reducing circumstances, has been found in the various strata (about 6% of the rim sherd sample). Generally, the vessel wall was blackened throughout. Grey-black pottery was already present in the lower Late Neolithic stratum 4 in trench T4 and in the neighbouring trench T5.

Table IV.8. Distribution of firing in T4

	N	%
High	1	0.7
Medium	139	93.3
Low	9	6.0
Total	149	100.0

Surface treatment

Most pottery from the Halaf strata had been simply smoothed (over 92%). This pottery had an even and regular surface, either as the outcome of manufacture technique (see van As and Jacobs, this volume) or as the result of an additional modification, e.g. the rubbing or wiping of a scraped vessel. The latter was repeatedly observed in the case of jars: whereas the decorated upper parts had been carefully smoothed, the lower undecorated areas often showed scraping marks. Completely scraped vessels, without an additional smoothening, were rare, accounting for hardly 1.3% of the rim sherd sample.

Small numbers of overall burnished vessels have been found in the various strata (but mainly in the topmost levels). Burnishing constitutes about 6% of the present sample.

Table IV.9. Distribution of surface treatment in T4

	N	%
Smoothing	138	92.6
Scraping	2	1.3
Burnishing	9	6.0
Total	149	100.0

Colour

The range of colours is limited to 7 main categories. The majority of the pottery had a buff colour (almost 78%). The other colour groups each comprise only a limited number of rim sherds (see Tab. IV.10). Pottery showing a grey or black colour is mainly found in the topmost Halaf stratum 1. These ceramics are considered to form a specific ware category (Grey-Black Ware).

Decoration

The vast majority of the pottery from the Halaf strata was painted (about 83%). Decoration is restricted to the Fine Ware ceramics; none of the other wares gave evidence of decoration.

Table IV.10. Distribution of colour in T4

	N	%
Cream	10	6.7
Buff	116	77.9
Orange	6	4.0
Green	2	1.3
Brown	6	4.0
Grey	6	4.0
Black	3	2.0
Total	149	100.0

B.3.3. Wares and types

The various wares and the vessel types distinguished by ware will now be discussed briefly. All wares and types have also been found on the southeastern part of Sabi Abyad (squares P13-P14), although in generally much larger quantities. A more extensive discussion will be given while discussing the ceramics from the southeastern area.

Coarse Ware

Coarse Ware pottery was very rare in the Halaf strata of trench T4, accounting only for about 4% of the sample. So far, Coarse Ware rim sherds have only been found in the lower strata 2 and 3. The Coarse Ware sherds all had a dark core and a brown surface colour. Temper consisted either of lime or fine sand particles. Only three shapes have been recognised, each represented by a few fragments only.

In stratum 3, two plain-rim bowls appeared (type 137; nos. 86, 92). Both vessels had been lime-tempered and scraped. These vessels had rather large diameters, viz. 300 and 290 mm. Wall thickness was 16 and 15 mm. In both cases the rim was flattened. In none of the other excavated areas at Sabi Abyad such flattened rims have been found.

In strata 2 and 3, three fragments of holemouth pots appeared (type 238; nos. 130, 131). These vessels were sand-tempered and two of them had been burnished.

The last type is represented by the angle-necked jars, only one fragment of which was found in the topmost stratum (type 327; no. 111). This wide and low-collared vessel had been burnished.

Grey-Black Ware

Grey-Black Ware pottery constitutes about 6.7% of the rim sherd sample from T4. Virtually all sherds have been found in the topmost stratum 1; only one fragment appeared in stratum 2. This pottery is grey or black-coloured and commonly burnished. Either lime or fine sand was used for tempering. One sherd seems to contain no temper at all. Grey-Black Ware was probably fired under reducing circumstances. Generaly, the vessel sections are evenly dark-coloured. Three types can be recognised:

Flat-based, straight-sided bowls (type 116; no. 96). Only one, overall burnished fragment has been found. This type of vessel has close counterparts in the Fine Ware assemblage.

Flaring and carinated bowls (type 129; nos. 98, 99). These vessels were either lime or sand-tempered and all had been burnished. These bowls seem to constitute the most characteristic Grey-Black Ware type. On the southeastern mound of Sabi Abyad, these vessels appeared only in phases C and B.

Angle-necked jars (type 327; no. 110). These vessels were all lime-tempered. They seem to have rather small diameters, ranging from 80 to 150 mm. Necks were generally flaring although a tall-collared vessel found in stratum 1 had a straight neck (no. 104).

Fine Ware

Fine Ware pottery makes up the vast majority of the ceramics from trench T4, accounting for 89.1% of the sample. This pottery was all made carefully and well-fired. Vessel walls mainly show evenly coloured sections without a core. About 15% of the pottery showed a slight colouring (light-grey to orange-like), indicating incomplete oxidation. Virtually all sherds were lime-tempered. Fine sand had been sporadically used as a tempering material, whereas a few other sherds seem to contain no temper at all. In general, the pottery had a light buff colour. Most of the Fine Ware ceramics had been painted (about 92%).

Jars are most common, making up 59.5% of the Fine Ware sample. Bowls constitute about 36.9%, whereas pots are rare, accounting only for about 3.6% of the sample.

At present, 7 types of bowls can be distinguished:

- flat-based and straight-sided bowls (type 116; nos. 139-149) are the most common type. These vessels make up about 17% of the Fine Ware sample or about 46.3% of the bowl sample. Virtually all these bowls had been painted but in stratum 3 an undecorated example was found (no. 95).
- Flaring, S-shaped bowls (type 119; nos. 151, 152, 156, 159) have been found in very small numbers in the topmost stratum 1. These vessels constitute hardly 2% of the Fine Ware sample or about 5% of all bowl sherds.
- Simple, hemispherical bowls (type 117; nos. 160-163) were rare; only two examples have been found in trench T4.
- The low and flaring, carinated bowls (type 132; nos. 164-171) have been found only in the lower stratum 3. These bowls make up 2.7% of the Fine Ware pottery or 7.3% of all bowl fragments. Absent in trench T4 are the type 129 carinated vessels (cf. nos. 172-180) which on the southeastern mound of Sabi Abyad are closely associated with the type 132 bowls.
- The flaring 'cream bowls' (type 111; nos. 183-204) are commonly found in trench T4 and constitute about 11.7% of the Fine Ware pottery and 31.7% of the bowl sample. Two variants are distinguished, viz. the small, low-collared bowls (cf. nos. 183-192), which are found in all strata, and the large tall-collared vessels (cf. nos. 196-204) which have only been found in the topmost stratum.
- The large type 123 bowls (nos. 100-103) have only been found in stratum 1. These vessels make up 2.7% of the Fine Ware sample and 7.3% of the bowl sample.

- A very rare bowl form (type 124) is shown in no. 206, found in stratum 2. This vessel has a pinched rim and is solidly covered by a dark-red slip. So far, only one fragment has been found in the Halaf strata of Tell Sabi Abyad but a close parallel (no. 76) was found in the Late Neolithic stratum 4, underlying the Halaf strata in trench T4. It is doubtful whether the fragment from stratum 2 truly belongs to this level.

Pots are represented by two types, each occurring only once or twice. All pot fragments stem from stratum 1. The first type comprises the pots with S-shaped profile (type 210; nos. 133-134). The other type consists of holemouth pots (type 239). These vessels are rare within the Fine Ware assemblage. So far, only one fragment has been found in the Halaf strata excavated at Tell Sabi Abyad.

Jars comprise two types, viz. flaring angle-necked jars and straight angle-necked jars.

Flaring angle-necked jars (type 327; nos. 207-234, 245-252) are most numerous, accounting for 58.8% of the Fine Ware sample and 95.5% of all jar fragments. These vessels show flaring necks joined at a sharp angle to the body.

Straight angle-necked jars (type 328; nos. 242-244) are rare, making up only 2.7% of the Fine Ware pottery and 4.5% of the jar fragments. These vessels are characterised by a straight, inturning neck and rim. A few such vessel fragments were found in phase B of the southeastern mound of Sabi Abyad.

C. THE POTTERY OF THE SOUTHEASTERN AREA

C.1. Introduction

In the southeastern part of Tell Sabi Abyad, prehistoric ceramics have been recovered from squares P13, P14 and, on a limited scale, O14. The latter trench, however, had been heavily disturbed by late 2nd millennium (Late Bronze Age) activities and all pottery recovered from this square is excluded from the present analysis. In the neighbouring square O13, our excavations reached only a limited depth, thereby exposing only late 2nd millennium features. As in square O14, the Late Bronze Age construction works almost completely destroyed the upper prehistoric strata. As a consequence, the present analysis is based exclusively on ceramics recovered from squares P13-P14. These squares yielded a sequence of Early Halaf strata, immediately overlying Late Neolithic levels. Until now, these Late Neolithic strata have been uncovered only on a limited scale in the 2 m wide test trench near the east section of square P14. Virgin soil has not yet been reached. In contrast with the sequence from the northeastern mound of Sabi Abyad, where the Halaf strata are clearly divided from the lower Late Neolithic levels by a hiatus of as yet unknown duration, the southeastern area seems to give evidence of a more or less uninterrupted occupation from Late Neolithic times into the Halaf period. Both the stratigraphy and the artifactual evidence point towards such a continuous development, the Halaf traits at the site being an outgrowth of Late Neolithic features.

In order to pinpoint any diachronic developments in the pottery of the southeastern area, the most ideal procedure would be to analyse these ceramics per stratum (each stratum representing a temporal unit). Unfortunately, however, the emphasis on rim sherds throughout this study strongly affected the sample size and various strata are represented only by limited numbers of ceramics. Any calculation of relative frequencies per stratum thus becomes a hazardous enterprise lacking a firm basis. Therefore, it was decided to regroup the pottery from the various strata and squares into phases, termed A to G (G being at present the earliest phase). The division of the various strata from squares P13 and P14 into phases is schematically represented by Tab. IV.11.

The phases were established on the basis of their stratigraphic relationships. The nature of some strata suggested a close association; one stratum, for example, being an erosion level of another stratum (as the in case of strata 7A-7B) or one stratum being a rebuilding phase on more or less the same plan of an earlier stratum (as in cases of strata 6A-6D). In other instances, the lower remains were still standing to some height, although in a ramshackle state, while the areas

Table IV.11. Correlation of strata and phases

	P13 Strata	P14 Strata
A	1	1
B	2	2
	3	3
	4	
	5	
C	6	4
D		5
E		6A
		6B
		6C
		6D
F		7A
		7B
		8
		9
G		10
		11

were already used for other activities. Moreover, the stratigraphic scheme in all areas was not always the same: whereas some areas were intensively used and reorganised, other areas remained deserted on the whole. The artifactual evidence from the latter areas could not always be ascribed to a single stratum but may include various strata. Thus. whereas these phases were at first created perforce, in order to correct for small sample size, it has been tried to keep these chronological units as narrowly defined as possible and to connect them with related architectural and occupational developments as well.

Nevertheless, despite our efforts to increase sample size by creating phases. in two instances, viz. the lower phase G and the topmost phase A, the actual number of rim sherds remained extremely limited. However, in order to avoid a distorted picture, it was regarded as undesirable to include the strata constituting these phases within other phases. Phase G is clearly of Late Neolithic date and closely related to the Late Neolithic strata from the northeastern mound. The topmost phase A is of a completely different layout when compared with the strata immediately below, thus suggesting a wholly different use of space. Both phase A and phase G must be used with care, always keeping in mind the limited sample size. In the case of phase G, a link is made to the strata of the northeastern mound of Sabi Abyad to give this phase a firmer basis for comparison with the upper, Halaf-related strata. The phase G artifactual remains are virtually identical to those recovered from the Late Neolithic strata of the northeastern mound. In the following, phase G has been excluded from any cross-tabulations because of the limited sample size (number of rim sherds: 19).

When compared with the analysis of the pottery from the northeastern mound of Tell Sabi Abyad, the ceramics from the southeastern area will be treated in a slightly different manner. Whereas the ceramics from the northeastern mound have been discussed as two wholly different sets of pottery (Late Neolithic versus developed Halaf), divided from each other by means of a hiatus in time and thus bearing no direct relationship towards each other, the link between the lower Late Neolithic and the upper Halaf-related strata is actually recognised on the southeastern area. Consequently, the ceramics from the southeastern area will be treated as a whole, emphasising the long-term relationships between the pottery from the various phases.

C.2. General trends

Vessel shape

Vessel shape refers to the complete shape of a vessel. Four broad categories were defined, each showing considerable internal variability: bowls, pots, jars and husking trays. The relative frequency of each shape category is tabulated in Tab. IV.12.

Jars are most common in all phases, generally accounting for over half of the recognised shapes. Relatively large numbers of jars have been found in phases D-C. The increase of jars in these phases is accompanied by a reverse decrease of both bowls and pots. Bowls account in total for about 40% of the recognisable vessel shapes. Pots were found only in small quantities, comprising about 8.7% of the pottery. Most pots were found in the lower phases F-E, but phase B, too, contained a rather large number of pots.

Table IV.12. Distribution of vessel shape per phase
Count
Column %

	F	E	D	C	B	A	Total
Bowl	23	109	12	27	81	8	260
	39.0	44.1	32.4	35.5	38.4	47.1	40.2
Pot	6	22	1	4	23	–	56
	10.7	8.9	2.7	5.3	10.9	–	8.7
Jar	30	112	24	45	107	9	327
	50.9	45.3	64.9	59.2	50.7	52.9	50.5
Husking	–	4	–	–	–	–	4
tray	–	1.6	–	–	–	–	0.6
Total	59	247	37	76	211	17	647
	9.1	38.2	5.7	11.8	32.6	2.6	100.0

Temper

The vast majority of the pottery recovered from the southeastern area is lime-tempered. Over 86% of the ceramics showed lime inclusions exclusively whereas another 1.9% indicated the combined use of both plant and lime particles. Other kinds of tempering materials, with the exception of chaff, occurred sporadically. Sherds containing fine chaff made up almost 8% of the pottery.

When looking at the temporal distribution of both lime and chaff temper, an interesting pattern is perceptible. The ceramics from the lower phase G are closely related to those recovered from the Late Neolithic strata on the northeastern mound and when taking the latter strata as a frame of reference, we may expect phase G to contain about 15% of exclusively lime-tempered ceramics. Again on the basis of the evidence from the northeastern mound, we may expect the number of plant-tempered ceramics in phase G to vary around 60%. From phase F onwards, a rapid increase of solely lime-tempered ceramics is perceptible. In phase F almost 67% of the pottery was lime-tempered whereas in the upper phases this percentage increased from about 86% in phase E to over 90% in the topmost phases. If we accept the counts just given for phase G, a considerable increase of lime as a means of temper, apparently at the expense of chaff, is perceptible from phase F onwards. This phase F represents a period of important alterations in pottery production at Sabi Abyad. True Halaf ceramics now appear in bulk and here this phase F is considered to be the first true Halaf phase at the site. Phase F seems to represent a transitional stage between the Late Neolithic and Halaf periods at Sabi Abyad.

Phase A requires some caution in view of the limited sample size, but when compared with the phases immediately below, the present count for phase A is wholly acceptable. Phase D, however, obviously gives a distorted picture due to our emphasis upon rim sherds. At present, phase D seems to yield solely lime-tempered ceramics but in reality a small number of coarse, plant-tempered sherds were found (all body sherds). At Sabi Abyad, almost all of the so-called Fine Ware is lime-tempered. Coarse Ware shows mainly plant inclusions or, to a lesser extent, sand particles.

Table IV.13. Distribution of temper per phase
Count
Column %

	F	E	D	C	B	A	Total
Plant	22	31	–	9	8	–	70
	25.3	9.0	–	9.3	2.9	–	7.9
lime/	–	–	–	1	–	–	1
sand	–	–	–	1.0	–	–	0.1
calcite	–	1	–	1	1	–	3
	–	0.3	–	1.0	0.4	–	0.3
lime	58	299	52	81	253	25	768
	66.7	86.7	100.0	83.5	90.7	92.6	86.6
sand	1	8	–	2	8	1	20
	1.2	2.3	–	2.1	2.9	3.7	2.3
plant/	4	6	–	3	4	–	17
lime	4.6	1.7	–	3.1	1.4	–	1.9
plant/	–	–	–	–	2	–	2
sand	–	–	–	–	0.7	–	0.2
not	2	–	–	–	3	1	6
visible	2.3	–	–	–	1.1	3.7	0.7
Total	87	345	52	97	279	27	887
	9.8	38.9	5.9	10.9	31.5	3.0	100.0

The increase of lime-tempered pottery is accompanied by a reverse decrease of plant-tempered ceramics. Whereas in phase F about one quarter of the ceramics is still plant-tempered, in phases E-C this percentage is reduced to about 9% and in phase B even to 2.9%. The topmost phase A yielded no plant-tempered rim sherds but probably the limited sample size partially accounts for this deficiency.

Sand-tempered pottery occurs in very small numbers, hardly accounting for 2-3% per phase.

Firing

Virtually all the ceramics from the southeastern mound were fired in an oxidising atmosphere under well-controlled conditions. Cross-sections of vessel walls generally show uniform colouring without any distinct core ('medium-fired' pottery). Some sherds actually showed some colouring, thus suggesting that firing was not complete. Probably this slight colouring is due to accidental features like the positioning of the vessel in the kiln or to local kiln conditions. This is confirmed by the fact that some of the larger vessel fragments showed wall sections partly coloured uniformly, partly discoloured slightly.

Medium-fired pottery accounts for over 85% of the recovered pottery. The vast majority of the medium-fired pottery at Sabi Abyad is lime-tempered and belongs to the so-called Fine Ware. Lime-tempered pottery needs to be fired at a relatively high temperature but only during a short time (in order to avoid lime decomposition and, consequently, complete destruction of the vessel involved). Incidentally, some greenish and brittle sherds indicating overfiring have been found. The crumbly nature of these sherds suggests that the process of lime decomposition had already started. In combination with some irregularly-shaped pottery fragments, no doubt to be considered wasters, these greenish ceramics point towards local pottery manufacture at Tell Sabi Abyad.

Low-fired pottery, i.e. ceramics showing a distinct dark core, has been found in all phases although in varying quantities. Low firing is associated with Coarse Ware pottery at Sabi Abyad. The considerable differences in firing conditions, among other things, between Fine Ware and Coarse Ware ceramics suggest that both kinds of pottery were not produced simultaneously in the same kiln but on different occasions and perhaps even by different potters.

In all phases very small quantities of so-called Grey-Black and often burnished pottery appeared. Grey-Black Ware pottery seems to have been fired under reducing circumstances, thus causing carbon deposition. In most cases the vessel wall was blackened throughout. Grey-Black pottery had already been found in the Late Neolithic levels of the northeastern mound and provides an obvious link between the Late Neolithic and Halaf periods. However, a number of differences is perceptible in shape.

On the basis of comparison with the pottery from the northeastern mound of Sabi Abyad, the lower phase G is expected to yield about 70% of low-fired ceramics and about 30% of medium-fired pottery. In phase F, immediately following this Late Neolithic phase G, the situation seems to be reversed: now about 70% of the pottery is medium-fired and the remainder low-fired. This rise of medium-fired ceramics, at the expense of low-fired pottery, is continued in the upper phases: medium-fired pottery now includes about 80-90% of the rim sherds recovered.

Table IV.14. Distribution of firing per phase
Count
Column %

	F	E	D	C	B	A	Total
Medium	61	298	48	79	248	26	760
	70.1	86.4	92.3	81.4	88.9	96.3	85.7
Low	26	47	4	18	31	1	127
	29.9	13.6	7.7	18.6	11.1	3.7	14.3
Total	87	345	52	97	279	27	887
	9.8	38.9	5.9	10.9	31.5	3.0	100.0

Surface treatment

The vast majority (about 86%) of the pottery has simply been smoothed. By rubbing or wiping the leather-hard surface of a vessel, an even and regular surface was created excellently suited for decoration. Virtually all of the painted pottery of Sabi Abyad was smoothed. However, it was repeatedly noted that the lower, usually undecorated part of a vessel showed traces of scraping whereas the upper part had been carefully smoothed. Probably most ceramics were at first scraped and subsequently, according to the needs and wishes of the potter, smoothed to some extent.

It goes without saying that the nature of the inclusions in the clay (either naturally present or added by the potter) strongly affects the result of scraping and smoothing. Coarse inclusions (e.g. chaff) will inevitably lead to a deeply scratched surface whereas in the case of fine particles (e.g. lime) the effects of scraping can be completely removed by subsequent smoothing.

Completely scraped vessels account for about 7% of the sample. These vessels are commonly coarsely made and undecorated and have simple shapes (e.g. holemouth pots).

On the basis of the evidence from the northeastern mound, the Late Neolithic phase G is expected to contain about 60% of wholly scraped pottery and about 15-20% of smoothed pottery. In the next phase F, the first Halaf stratum at the site, the number of scraped ceramics has sharply decreased, now accounting for about 25%. In the subsequent phases this number is even much smaller (see Tab. IV.15). At the same time, smoothed ceramics increase in importance. Whereas in phase F about 70% of the ceramics had been well-smoothed, in the upper phases about 80-90% of the pottery indicated this kind of surface treatment.

Table IV.15. Distribution of surface treatment per phase
Count
Column %

	F	E	D	C	B	A	Total
Smoothing	61	307	48	81	241	24	762
	70.1	89.0	92.3	83.5	86.4	88.9	85.9
Scraping	22	19	1	9	12	–	63
	25.3	5.5	1.9	9.3	4.3	–	7.1
Burnish	4	19	3	7	26	3	62
	4.6	5.5	5.8	7.2	9.3	11.1	7.0
Total	87	345	52	97	279	27	887
	9.8	38.9	5.9	10.9	31.5	3.0	100.0

Vessels showing a burnished exterior have been found in small numbers in all phases. When taking all pottery into account, about 7% of these ceramics showed some kind of burnishing. Usually the exterior was overall burnished but in phase E a few pattern-burnished sherds appeared. The interior is rarely burnished. Interior burnishing is limited to some wide, grey-black bowls. Other kinds of vessels occasionally showed some burnishing near the vessel's lip. In the lower phases F to D about 5% of the pottery had been burnished but in the upper phases C to A burnishing increased in importance, accounting for about 7% in phase C to over 9-11% in the topmost phases B and A.

Colour

Nine categories of colour are distinguished: cream, buff, orange, red, brown, grey, black and white. The last colour refers to a slip applied to some sherds of phases F and E and does not represent the original surface colour of these sherds. A quick glance at Tab. IV.16 immediately shows that buff and cream are the most commonly appearing surface colours. Buff-coloured ceramics make up about 58.7% of the rim sherd bulk whereas cream-coloured pottery includes about 20% of the sample. Buff-coloured pottery increases in importance in the course of time (from about 40% in phase F to 70% in phase A) whereas the use of light cream-coloured ceramics, after a continuous rise in phases F to D, decreases in the upper phases C-A. The other kinds of colour, with the exception of brown, all appear in very small numbers, each accounting for a few percent only. Brown-coloured pottery, all belonging to the Coarse Ware assemblage, accounts for about 11% of the ceramic bulk. Brown-coloured pottery is mainly found in the lower phases G to E whereas in the upper phases this kind of colour is much less frequently distributed. An exception is phase C which contained about 17.5% of brown coarse ware.

Pottery showing a grey or black colour is found in low quantities in all phases but seems to be most common in the upper phases B-A.

Decoration

The vast majority of the pottery from the southeastern mound had been decorated. About three quarters of the rim sherds showed traces of painting. Incision or *appliqué* has not been attested in association with rim sherds. Actually, in phases C-B five incised body sherds (nos. 364-368) have been found but these fragments all seem to be of Late Neolithic date and are considered to be intrusive in the Halaf strata of Sabi Abyad. So far, decoration is limited to the Fine Ware pottery.

The painting of a vessel is carried out either before or after firing. This basic decision strongly affects the colour, consistency and permanency of the paint. At Sabi Abyad, the pottery has been invariably painted before firing. The paint may be applied either on the leather-hard or on the dry, unfired clay, the

Table IV.16. Distribution of colour per phase
Count
Column %

	F	E	D	C	B	A	Total
Cream	18	85	15	13	43	4	178
	20.7	24.6	28.9	13.4	15.4	14.8	20.1
Buff	35	186	31	62	188	19	521
	40.2	53.9	59.6	63.9	67.4	70.4	58.7
Orange	4	14	1	2	3	1	25
	4.6	4.1	1.9	2.1	0.4	3.7	2.8
Red	–	4	–	–	2	–	6
	–	1.2	–	–	0.7	–	0.7
Brown	24	39	3	17	20	–	103
	27.6	11.3	5.8	17.5	7.2	–	11.6
Green	4	8	–	–	4	–	16
	4.6	2.3	–	–	1.4	–	1.8
Grey	–	4	–	1	7	1	13
	–	1.2	–	1.0	2.5	3.7	1.5
Black	1	4	2	2	12	2	23
	1.2	1.2	3.9	2.1	4.3	7.4	2.6
White	1	1	–	–	–	–	2
	1.2	0.3	–	–	–	–	0.2
Total	87	345	52	97	279	27	887
	9.8	38.9	5.9	10.9	31.5	3.0	100.0

major difference being the surface porosity. Whereas a leather-hard surface acts as a non-porous painting ground, the dry but unfired clay has a large porosity. The degree of porosity strongly influences the adherence of the paint: the more the porosity is reduced, the worse the paint adheres (Colbeck 1983:188). Tempering materials and surface treatment, too, strongly affect the vessel porosity and, consequently, the quality of the paint adherence (Franken 1969:173). Last but not least, the type of pigment and the use of a medium to improve spreading and binding of the paint acts upon the quality of painting.

The decorated ceramics all gave evidence of a monochrome paint, ranging in colour from orange-red to black, the latter being the most common. About

63% of the decorated pottery had a black paint, about 33% had a brown paint whereas the remainder had either an orange-red or red paint. Polytone colouring, probably of an accidental nature, was repeatedly noted: here the same basic colour results in different shades due to variations in pigment thickness and firing conditions. The thickness of the paint differed considerably. In many instances, the colour had faded or failed to adhere firmly to the vessel wall. Flaking of paint commonly occurred. About half of the painted sherds gave evidence of a lustrous paint whereas only about 9% had a definitely non-lustrous paint. However, a large number of sherds did not allow any definite conclusions on this matter due to their state of preservation, flaking of the paint or salt deposits. The degree of lustre varied considerably.

When relating the application of paint to vessel shape (i.e. bowls, pots, jars, trays), it appears that the vast majority of those vessels recognised as jars had been painted (about 82%). Bowls, too, had been commonly painted (61%) but only small numbers of pots turned out to be decorated (16.5%). In the case of bowls, the actual number of painted vessels may be larger since probably a considerable amount of trays, always undecorated, has been included into this category (the small size of many sherds made it impossible to make a realistic division between bowls and trays; in many aspects, the sherds of coarse bowls hardly differed from those sherds suspected to represent trays).

The exterior is the main area for decoration. Painted decoration is always busily applied, the design covering the larger part of a vessel. In the case of bowls and pots, the exterior is usually completely painted (i.e. from rim to base). In the case of jars, however, decoration is largely restricted to the neck and the upper parts of the body whereas the lower parts (i.e. below the carination of the body) is most often left blank.

The design repertoire at Sabi Abyad is largely limited to geometric and non-representational designs embedded within horizontal bands. The most characteristic and most numerously occurring design at Sabi Abyad is the so-called 'horizontal cross-hatching', shown by e.g. nos. 163-173. Only few designs are representational such as birds, bukrania, trees and human images. At present, 89 different design entities have been distinguished, the majority of which occurred only once or twice. Idiosyncratic variability thus seems to be considerable. Not all design entities, however, appear to be wholly unique; in most cases, they represent variations on a specific theme and thus can be regrouped into a number of broader categories. The entire varietry of design elements used at Sabi Abyad is depicted in the illustrations (nos. 139-362). A more detailed analysis is in progress and will be published separately.

While studying the decorated pottery from the Late Neolithic northeastern mound, a distinction was made between Halaf painted ware and Samarra painted ware. Initially, it was tried to divide the pottery from the Halaf strata at the site into these categories, too, but it soon turned out that many sherds, at first sight hardly distinguishable from Halaf pottery, after a closer look displayed clear Samarra decorative traits in combination with Halaf features. Therefore, no reliable distinction can be made. A clay analysis showed that Halaf and Samarra-like pottery was highly identical in chemical composition and probably made of clay coming from the same source (see Le Mière, this volume). Probably both kinds of pottery were locally manufactured.

C.3. Wares and types

As with the ceramic assemblage from the northeastern area, in the southeastern area, too, three wares can be distinguished, viz. Coarse Ware, Grey-Black Ware and Fine Ware.

Coarse Ware

Apart from the lower phase G, Coarse Ware pottery constitutes a minority within the ceramic assemblage from the southeastern area. In total, Coarse Ware ceramics makes up 8.3% of the rim sherd sample but the distribution of Coarse Ware varied considerably per phase (see Tab. IV.17). As expected, the largest amount of Coarse Ware pottery has been found in the Late Neolithic phase G. In the next phase F the quantity of Coarse Ware ceramics has sharply decreased to about 43% and in the subsequent phases Coarse Ware ceramics continuously decrease in importance from about 16% in phase E to 10% in phase A.

Coarse Ware pottery includes coarsely finished and thick-walled vessels. In total, about 45% of the pottery is exclusively plant-tempered whereas another 13% shows both plant and lime inclusions. A large number of Coarse Ware pottery, viz. almost 41%, contained mineral inclusions only, showing either lime (28.6%), sand (11.2%) or calcite (1%). Mineral-tempered Coarse Ware pottery slightly increases in importance in the upper phases C to A.

Virtually all Coarse Ware sherds show a distinct dark core. indicating incomplete oxidation. Colour varies from buff to orange-brown, the latter being the most common. Coarse Ware pottery generally has a rough appearance due to intensive scraping (about 40.9%). Ceramics which have been smoothed (after an initial scraping) include 32.6% of the sample. About 26.5% of the pottery has been burnished.

Coarse Ware pottery includes 7 types:

Simple plain-rim bowls (type 137; nos. 82-91) are most common and make up about 38.2% of the Coarse Ware sample. These bowls are more or less evenly distributed throughout the various phases. The vast majority of these bowls showed plant inclusions and scraping marks. The diameter of the plain-rim bowls ranged from 160 to 280 mm and the wall thickness varied for the larger part between 10 and 23 mm. Most plain-rim bowls had a rounded or flaring straight wall (nos. 82-86). Occasionally, the vessel wall was turned inwards (no. 88) or shows a carination (no. 87). Most of the bowls probably had a rounded or slightly flattened base. True flat bases occurred sporadically and seem to be limited to wide but low vessels built up in coils (nos. 90-93). Perhaps some of these vessels (nos. 92-93) should be viewed as trays.

So far, only the so-called 'husking trays' have been classified as trays. The interior of these wide but low, coarsely-made vessels showed either shallow ridges or finger-impressed pits (nos. 78-81). Four husking tray fragments have been found, all in phase E and all in the debris layers of the open area west of the tholoi. Husking trays were already present in the Late Neolithic strata of the northeastern mound of Sabi Abyad. It is unknown whether the tray fragments from the Halaf phase E truly belong to this period or should be regarded as intrusive sherds originally belonging to an earlier occupation level at the site.

Holemouth pots (type 238; nos. 122-132) form a characteristic component of the Coarse Ware assemblage from phases F to A. These vessels make up 32.7% of the Coarse Ware rim sherd sample and are distributed in more or less the same numbers throughout the various phases. Only phase A did not yield any holemouth pots. Holemouth pots are rounded and closed vessels, mainly showing rounded lips. Occasionally, the rim is inward-bevelled (no. 122, 126). Some of these vessels show a lug handle (no. 122-124). The majority of the holemouth pots (about 70%) is mineral-tempered, showing either lime or, to a lesser extent, sand particles. Over half of the pots has been burnished. Burnishing is strongly associated with mineral tempering; hardly any plant-tempered pots are burnished. Almost all vessels show a dark core. Surface colour is mainly orange-brown. Only very few pots showed a lighter colour. Holemouth pots have a diameter ranging from 80 to 230 mm and a wall thickness varying between 9 and 19 mm (10 to 15 mm being the most common).

Plain-rim pots (type 239; nos. 120-121) are a variant of the holemouth pots. These vessels are slightly less closed. The distinction between both types, however, is minimal. One of these vessels showed a spout (no. 121). Spouts are extremely rare at Sabi Abyad.

Pots with S-profile (type 210; no. 132) were found in small quantities (4.9%). These vessels are well-made, showing either a smoothed or burnished surface. Temper is varied and includes plant, plant-and-lime, lime and sand. Colour is mainly brown. The vessel diameter ranges from 110 to 130 mm whereas the vessel wall ranges from 7 to 15 mm. Most of these pots were found in phase E; one other example appeared in phase B. Interestingly enough, these pots have also been found within the Fine Ware assemblage (cf. nos. 133-134). The latter vessels are painted.

Holemouth jars (type 340; nos. 116-117) account for about 9.8% of the Coarse Ware pottery. These vessels have low collars, which gradually evolve from the body without a distinct junction between neck and body. Holemouth jars were found almost exclusively in the lower phases G to E. Only two fragments appeared in the upper phases. All jars are plant-tempered and scraped. They invariably show a dark core. The surface colour is mainly brown. The rim diameter ranges from 100 to 240 mm. Wall thickness varies between 10 and 22 mm. These jars all seem to represent large vessels.

Table IV.17. Distribution of wares in the southeastern area (on the basis of the types recognised)

Count
Column %

	G	F	E	D	C	B	A	Total
Coarse	15	30	39	2	15	25	1	127
	(93.8)	41.7	13.6	5.0	17.2	10.1	(5.0)	16.5
Grey-	1	1	6	1	2	18	2	31
Black	(6.2)	1.4	2.1	2.5	2.3	7.3	(10.0)	4.0
Fine	–	41	242	37	70	2047	17	611
	–	56.9	84.3	92.5	80.5	82.6	(85.0)	79.5
Total	16	72	287	40	87	247	20	769
	2.1	9.4	37.3	5.2	11.3	32.1	2.6	100.0

Angle-necked jars (type 327) are marked by a distinct junction between neck and shoulder. These jars constitute about 6-7% of the Coarse Ware pottery. In general, angle-necked jars are large vessels, either plant or lime-tempered. Burnishing seems to be common. Most jars seem to have been carefully finished although some others were very coarse products (e.g. no. 105). Most jars have flaring, low collars with plain rims (no. 30), although incidentally the lip is slightly outrolled (no. 112). High-necked jars (nos. 108-109) have been found as well. The red-burnished, tall-collared jars found in the Late Neolithic strata (see no. 77) are absent in the various Halaf phases; grey-black burnished jars (no. 110) seem to have replaced these vessels.

Grey-Black Ware

Grey-Black Ware pottery was found in small quantities in the various phases of the southeastern mound, accounting in total for about 4% of the rim sherd sample. Grey-Black Ware is rare in the lower phases F to C but increases in importance in phase B (see Tab. IV.17). This pottery ranges in surface colour from light-grey to dark-black. Over 70% of the vessels was completely burnished. Virtually all sherds were lime-tempered. Most ceramics had been evenly fired although dark cores commonly appear as well. About 6% of the pottery showed traces of paint. Grey-Black Ware ceramics were all carefully made and in this respect closely resemble the Fine Ware pottery of Sabi Abyad. Vessel walls are thin and range in diameter from 5 to 11 mm. Only very few sherds were thicker. The diameter of Grey-Black vessels has a wide range, varying between 80 and 350 mm.

At present, 6 types have been recognised (unfortunately, the small sample size does hardly allow any quantification): Flaring and carinated bowls (type 129; nos. 98-99) are most common and account for about 26% of the sample. These vessels were exclusively found in the upper phases C-B. These bowls all seem to have large diameters (between 200 and 300 mm).

Holemouth pots (type 238; nos. 125, 128) are common as well (about 25%). In shape, these vessels are hardly distinguishable from their Coarse Ware counterparts.

Angle-necked jars (type 327) represent another characteristic Grey-Black Ware type (about 22%). Some of these jars have straight and tall collars (no. 104) but more commonly angle-necked jars are rather small vessels with flaring rims (no. 110). The Grey-Black angle-necked jars have little in common with their Coarse Ware counterparts and most closely resemble some of the Fine Ware jars.

The other types each occur in small numbers. Some plain-rim bowls have been found (no. 84). In phase B, a jar fragment with a low but straight neck was found (no. 88) which slightly resembles the Coarse Ware holemouth jars. In phase B, a fragment of a pot with an S-profile appeared, too. Similar vessels have been recognised in the Coarse Ware and Fine Ware assemblages (nos. 132-134).

Related to the Grey-Black burnished ceramics are two carefully made and finely textured, flaring bowls found in phase E (stratum 6C). Both vessels showed a pattern-burnish, consisting of a panelled band of cross-hatching in combination with chevrons (no. 138). One bowl had a slightly brown colour whereas the other was pinkish-red. The latter showed a repair-hole. Both bowls were sand-tempered. Pattern-burnish is very rare at Tell Sabi Abyad. Apart from these phase E ceramics, one other pattern-burnished sherd, having a black colour, was found in the Late Neolithic stratum 2 of the northeastern mound. The two phase E bowls differ from the other burnished vessels at Tell Sabi Abyad in shape, temper, colour and kind of burnish and may represent import products (see also Le Mière, this volume). An almost identical vessel was found at Tell Judaidah in the Amuq and is ascribed to the First Mixed Range, i.e. late Amuq B or early Amuq C (Braidwood and Braidwood 1969:100 ff and Fig. 81:1). In the Amuq, pattern-burnishing first appeared in phase B.

Fine Ware

Fine Ware pottery comprises the vast majority of the ceramics recovered from the southeastern area (almost 80% of the rim sherd sample). Fine Ware is present in varying quantities in all phases at Tell Sabi Abyad (see Tab. IV.17); so far, phase G yielded only some body fragments.

The Fine Ware ceramics have all been made of finely textured clay and were virtually all lime-tempered. Sporadically some sand-tempered sherds appeared. Fine Ware pottery is well-fired, in most cases showing an evenly coloured wall section without a core. Only about 9% of the ceramics gave evidence of some slight colouring (light-grey to orange), indicating that oxidation was not complete. Fine Ware pottery generally has a light surface colour (cream-buff). The vast majority of the pottery had been painted (about 90%). Incision was hardly used as a technique of decoration and appeared only in combination with painting. Undecorated Fine Ware pottery makes up only about 10% of the sample. Some of these undecorated vessels had been burnished. Undecorated Fine Ware pottery is more or less equally distributed throughout the various phases; only phase C showed a remarkably small amount of undecorated Fine Ware sherds (4.3%).

Within the Fine Ware assemblage, jars are most common (52.6%), closely followed by bowls (44.8%). Pots are rare, accounting for a few percent only (2.6%). At present 13 types are distinguished.

The most common type of bowl is the straight-sided bowl (type 116; nos. 139-150). These vessels account for 21.6% of the Fine Ware ceramics. Almost half of all bowl fragments belonged to this type (45.8%). Straight-sided bowls were found in rather small quantities in the lower phase F, accounting here for about 12.5% of the Fine Ware sample, but rapidly increase in importance in the upper phases from about 19% in phase E to about 24% in the topmost phases B-A. All bowls have plain rims and flat or, less commonly, slightly sagging bases. Generally, these straight-sided bowls are large vessels, having a diameter ranging from 170 to 240 mm and a height up to 150 mm. Wall thickness mainly varies between 7 and 10 mm. However, smaller vessels occurred as well, although in minute quantities (nos. 147, 149, 150) as do some larger vessels (up to 300 mm). Virtually all straight-sided bowls had been painted. Undecorated vessels hardly occurred (nos. 95, 150). The range of design entities used for the decoration of straight-sided bowls was highly limited and entirely covered by the vessels illustrated (nos. 139-149). Most common are cross-hatched diamonds arranged in one or more continuous bands or vertical panels. Interior decoration is limited to one or more horizontal bands near the lip. In only one case (no. 144), this straight rim line was accompanied by a wavy line joined to it. Apparently straight-sided bowls not only differ in shape but also in decoration from the other types of bowls at Sabi Abyad. Design elements used on straight-sided bowls are rarely found on other types of bowls and *vice versa.*

Related to the straight-sided bowls are the flaring, S-shaped type 119 bowls (nos. 151-159). These vessels only account for 2-3% of the Fine Ware pottery per phase. Some of these vessels are wide and deep (nos. 151-152) but smaller examples occur as well (no. 158). Generally, these type 119 bowls are carefully made, although a very crude vessel appeared in phase E (no. 155). The latter had a coarse, irregular shape and had been carelessly painted. Moreover, the vessel wall showed several large cracks and holes due to water expansion during firing. Hastily and carelessly produced vessels like no. 155 occurred only sporadically within the Fine Ware of Sabi Abyad. Type 119 bowls show a wide variety of design elements used for decoration, with no exterior motif found more than once. Most interesting are the Samarra traits shown by some vessels (nos. 152, 157-159) which resemble designs found at e.g. Tell es-Sawwan.

Simple hemispherical bowls with flat or rounded bases (type 117; nos. 160-163) appeared in very small quantities, hardly accounting for 1% of the Fine Ware sample. These vessels all seem to have wide but low shapes and are all decorated simply.

The low and flaring type 132 bowls (nos. 164-171) constitute about 3.1% of the Fine Ware sample and about 6.5% of all bowls. These vessels were found mainly in the lower phases F-E where they account for about 6% of the Fine Ware pottery. In the upper phases D to A, hardly 1.5% of the pottery indicated this shape. The exterior of these bowls is virtually always decorated by means of 'horizontal cross-hatching' (nos. 164-169). Only one bowl fragment (no. 170) indicated a more elaborate, Samarra-like pattern of simple vertical lines near the rim in combination with a band of running oblique triangles or wedges. The interior of these type 132 bowls shows either a simple band near the rim or, more commonly, a line in association with one or more wavy lines. Most type 132 bowls are low but wide vessels, but occasionally some larger specimens appeared (nos. 181-182). These showed a busy exterior decoration, indicating a chequerboard pattern of alternately cross-hatching and stippling. The interior was almost completely covered by broad bands of paint. Type 132 bowls have either a flaring, curving wall and a flat base (nos. 165, 181, 182) or, more commonly, a carinated vessel wall and a rounded base (e.g. nos. 167-171). Occasionally, the vessel wall above the carination is straight (nos. 169-171). The diameter of the type 132 bowls ranges from 120 to 210 mm (150 to 180 mm being the most common). The thickness of the vessel wall varies from 5 to 10 mm (5 to 7 mm being the most common).

The type 129 bowls represent restricted vessels with carinated walls and rounded bases (nos. 172-180). These bowls are closely related with the type 132 carinated vessels. Several sherds seem to represent an intermediate stage between the type 132 and type 129 bowls. Generally, type 129 bowls are small vessels, having a diameter ranging from 140 to 190 mm, although some larger vessels occurred as well. These vessels show a wider and more elaborate range of design elements than the type 132 bowls. Several of these bowls displayed clear Samarra traits (e.g. nos. 174-175). Type 129 bowls make up about 3.3% of the Fine Ware sample and 7% of the bowl sample, and are equally distributed through time. So far, these vessels are absent from phase F.

The flaring and carinated type 111 bowls (nos. 183-204) belong to the most characteristic shapes found in phases F to A of the southeastern area of Sabi Abayd. These vessels closely resemble the Arpachiyah 'cream bowls' (Mallowan and Rose 1935:131 and Figs. 62, 63). The lower body is carinated whereas a second angular break shows at the joint between neck and shoulder. In some cases, the carination of the lower body is angular (nos. 187, 191-193) but more often it has a rounded profile. Bases are either flat or rounded. The type 111 bowls account for about 14.3% of the Fine Ware sample and for about 30% of the bowl sample. At least three variants can be recognised:

a) small, low-collared bowls (nos. 183-192). These bowls are most numerous, constituting over 60% of the type 111 vessels. In phase F, about 6.3% of the Fine Ware sample consists of low-collared cream bowls but in phase E this number is almost doubled (12.5%). In the topmost phases, however, the number of low-collared bowls decreases again to about 6%. These bowls have diameters ranging from 110 to 210 mm (130 to 190 mm being the most common), whereas the wall thickness varies between 3 and 8 mm (4 to 6 mm being the most characteristic). Height ranges from 40 to 75 mm. The exterior of these low-collared bowls is invariably simply decorated by means of 'horizontal cross-hatching'. The interior shows a slightly wider variety of design elements, viz. a broad band of paint (no. 185), a band of paint with one or more wavy lines joined to it (nos. 186, 194) or, most commonly, a broad band with pendent vertical lines attached to it (nos. 183, 184, 187-189, 191). The latter seems always to be interrupted, either by a V-shaped motif (nos. 183, 189), a cross (nos. 188, 193) which was occasionally transferred by solid painting into two opposite triangles (no. 184), or by some wavy lines (no. 191). Those sherds without such an interruptive element (e.g. no. 187) are expected to yield such a motif whenever a larger part of the vessel has been found. Most low-collared bowls are carefully made vessels, although occasionally some coarse examples were found, hardly recognisable as cream bowls (no. 194).

b) Medium-sized bowls with a sharp carination almost level with the flat base (no. 195). So far, only one example has been found in phase D (stratum 5 of square P14). This vessel was extremely well-made with very thin walls, almost egg-shell in thickness, which had been delicately painted. The exterior showed a design commonly found at Tell Sabi Abyad whereas the interior had been decorated by means of a continuous row of socalled 'dancing ladies' (a characteristic Samarra design). This vessel resembles some of the finest cream bowls from Arpachiyah (see Mallowan and Rose 1935:132 and Fig. 63:1).

c) Large, tall-collared bowls (nos. 196-204). These vessels closely resemble the small, low-collared 'cream bowls' but are much larger, having a diameter varying between 190 and 300 mm and a wall thickness varying between 5 and 11 mm (7 to 9 mm being the most common). These bowls are up to 160 mm deep. Tall-collared bowls show a wider range of design elements than their low-collared counterparts (which can partly be explained by the height of the collars: the collar is the main area for decoration and in the case of the low-collared bowls this area is simply too small to allow any complex decoration). 'Horizontal cross-hatching' in combination with broad bands of paint occurs most commonly (nos. 196, 202-204). The simple bands of paint in combination with a solidly painted lower body are also characteristic (nos. 200-201). Other exterior designs are rare. Nos. 197-199 illustrate some elaborately decorated vessels. No. 197 combined 'horizontal cross-hatching' with a band of coarsely executed oblique triangles or wedges. The latter seems to represent a Samarra trait and is commonly found on angle-necked jars (cf. nos. 315-320). No. 198 showed an oblique chequerboard of alternately cross-hatching and simple crosses. Such chequerboards are found on jars, too (cf. no. 224). No. 199 showed a naturalistic design of rows of bukrania in combination with trees. The interior had been decorated by a continuous row of 'dancing ladies'. The latter design is commonly found on the tall-collared vessels of Sabi Abyad (see nos. 203, 204). Another characteristic interior design is the broad band to which pendent vertical lines have been joined (nos. 200-202). As with the low-collared bowls, an interruptive element always seems to be present here as well (cf. no. 202). The pendent vertical lines may represent an utmost stylised version of the 'dancing ladies'. So far, the large, tall-collared cream bowls have not been found in the lower phase F. These vessels appeared in low quantities in phase E, accounting for about 2.6% of the Fine Ware pottery, but rapidly increased in importance in the upper phases, accounting for up to 10% of the Fine Ware pottery per phase.

A characteristic Early Halaf form are the type 123 bowls (nos. 100-103). These deep and wide vessels have straight walls with flaring rims. The diameter ranges from 180 to 280 mm and the wall thickness varies from 10 to 13 mm. In fabric, these large bowls closely resemble the other Fine Ware ceramics, but they seem to be less carefully finished on the whole. The vessel wall is often of irregular shape and thickness. All type 123 bowls were lime-tempered and well-fired. They were never decorated. Type 123 bowls account for about 2.3% of the Fine Ware assemblage and for about 5% of the bowl sample. They seem to be more or less equally distributed through time. So far, no such vessels have been found in phase F, the earliest Halaf phase at Sabi Abyad.

A very rare shape is shown by no. 205. This wide and thick-walled vessel (type 150) has a flat rim, decorated by so-called 'rim thicks'. The exterior has been solidly painted whereas the interior shows dense stippling. This design is very rare at Sabi Abyad. Both in shape and in decoration this vessel differs considerably from the other Halaf ceramics at the site. Moreover, it was found in the top soil of square P13, among large quantities of Late Bronze Age pottery. Thus, this sherd is wholly out of its proper context and probably belongs to a later stage of Halaf occupation than presently attested in the excavated areas. At Tell Aqab in the upper Khabur drainage, rim thicks are a characteristic Middle Halaf feature (Davidson 1977:120). The shape resembles the Aqab form 16 bowl which is mainly a Late Halaf type although a few examples have already been found in the later part of the Middle Halaf phase (ibid.:127). Pots are rare within the Fine Ware assemblage. So far, only two types can be recognised, viz. the pots with S-shaped profile and the holemouth pots with bevelled rim.

Pots with S-shaped profile (type 210; nos. 133-134) appeared in low quantities, only one or two sherds found per phase. Similar pots have been recognised within the Coarse Ware pottery of Sabi Abyad (cf. no. 132).

Holemouth pots with bevelled rim (type 249; nos. 135-137) closely resemble the Coarse Ware holemouth pots but the Fine Ware specimens are all much smaller. These pots all show an inwards-bevelled rim. Decoration is rare and, when present, is very simple (nos. 135, 137). Only few examples of these pots have been found in phases E and B.

Jars basically comprise three shapes, viz. flaring angle-necked jars, straight angle-necked jars and flaring round-necked jars. Most of these vessels have been painted; only about 5% has not been decorated.

Flaring angle-necked jars (type 327; nos. 207-234, 245-252) are most common and make up about 49% of the Fine Ware sample and over 95% of the recovered jar shapes. These vessels are more or less equally distributed through time. The jars are marked by flaring necks and display a sharp junction between neck and shoulder. The globular body commonly shows a carination, thus giving these jars a squat appearance (nos. 207, 220). Angle-necked jars vary considerable in size, ranging in rim diameter from 60 to 360 mm (80 to 160 mm being the most common). Generally, the neck seems to be about one-third of the height of the vessel (cf. nos. 207-210). Low-collared vessels (nos. 211, 220) or tall-collared jars (no. 240) occurred sporadically. No. 220 represents a rare, squat bowl-like jar resembling the *Büchsen* of Tell Halaf (cf. von Oppenheim and Schmidt 1943, Pl. XII-XIII). Wide and highly flaring vessels as illustrated by nos. 232-234 are rare, too. The vessels illustrated by nos. 245-254 represent a group of very large jars, probably used for storage. These vessels were found in small quantities in the various phases and are all decorated simply, showing either a repetitive pattern of broad bands of paint (nos. 245-249) or 'horizontal cross-hatching' (nos. 250-252). The jars illustrated by nos. 253-254 most closely resemble the Coarse Ware holemouth jars; it is doubtful whether these vessels actually belong to the angle-necked category.

Miniature jars are rare. Two such vessels (nos. 255-256) were found on the floor of the side-room of the building uncovered in stratum 5 of square P13, whereas another vessel (no. 257) was found in stratum 1 of trench T4 on the northeastern mound of Sabi Abyad. The miniature jar shown by no. 255 was accompanied by a lid which may have served as a cup as well. So far, only one other miniature vessel, representing a bowl, has been found in stratum 6B of square P14 (phase E). This object (not illustrated) had a diameter of 44 mm and was only 26 mm high.

Straight angle-necked jars (type 328; nos. 242-244) are a very rare shape, few examples of which were found in phase B only. These jars have a straight but inturning rim, giving these vessels a closed appearance. They seem to represent the Fine Ware counterpart of the Coarse Ware holemouth jars.

Flaring round-necked jars (type 322; nos. 235-237) represent another rare jar shape, so far found only in phases E and B. These jars lack the sharp joint between neck and shoulder, so characteristic of most jars at Sabi Abayd, and have a smooth, rounded transition between both vessel areas instead. The vessel illustrated by no. 237 shows a Samarra-like decoration and resembles the deep, beaker-like bowls from Tell es-Sawwan (cf. Ippolitoni 1970-71, Fig. V).

When compared with the other types of decorated vessels found at Sabi Abyad, jars display the largest variety of design elements. The decoration of jars clearly reflects the hierarchically organised encoding sequence used by the Sabi Abyad potters (cf. Friedrich 1970; Hardin 1979). Decoration is carried out at two basic levels, viz. a) spatial division and b) design element application. In the case of jars, the spatial division requires at least three horizontal bands of paint: one at the rim, one at the junction of neck and body and one near the base. The vessel is thus divided into two main areas suitable for decoration, viz. the neck and the upper body. The body may be subdivided by one or more optional lines which, however, do not affect the basic layout. In most cases optional bands seem to be used to emphasise the design areas (the design elements are attached to these lines; virtually no 'free-floating' designs are found at Sabi Abyad). Optional lines fill part of the area available for decoration and are in fact part of the design. In most cases they seem to be related to particular designs. Whereas e.g. cross-hatched diamonds may be associated with optional lines, cross-hatching as such has virtually never optional bands. Optional bands of paint are limited to the vessel's body; the neck never shows optional lines. Generally, the neck shows but little variety in design; simple cross-hatching or its derivations are most often found. The neck seems to be a highly redundant area of decoration; the emphasis is upon the jar body. The latter shows a wide variety of design configurations. Particularly in the case of Samarra or Samarra-like designs a repetitive pattern of two alternating design elements in narrow zones commonly occurs.

D. THE PREHISTORIC POTTERY: SOME CHRONOLOGICAL REMARKS

D.1. Introduction

So far, two periods of occupation, termed Late Neolithic and Early Halaf and both covering the later stages of the Neolithic (ca. 5300 - 5000 B.C.), have been attested at Tell Sabi Abyad. The periods are mainly defined on the basis of stratigraphy and associated ceramic traits. Although the ceramic assemblages from both periods as a whole strongly diverge, it is suggested that a close relationship exists between these periods, the Early Halaf period being an outgrowth of Late Neolithic developments.

Stratigraphically, the Halaf strata at Tell Sabi Abyad give a *terminus ante quem* for the Late Neolithic remains at the site. In the excavated areas on the northeastern part of Sabi Abyad, the Halaf strata seem to have been divided from the earlier Neolithic levels by means of a hiatus of as yet unknown duration. Here Halaf occupation seems to have concentrated on the slope of the mound, marked in trench T4 by 3 strata with flimsy traces of architecture and situated upon a sloping Late Neolithic stratum without architectural features. Moreover, since no internal stratification within this Late Neolithic stratum in trench T4 was observed, this stratum is probably best defined as a homogeneous layer of erosion material related to the topmost Late Neolithic stratum in the neighbouring trench T5.

In the excavated areas of the southeastern area of Sabi Abyad no such hiatus between the Late Neolithic and Early Halaf periods seems to be present. Both on the basis of the stratigraphy and the artifacts recovered, the southeastern square P14 gives evidence of a continuous and uninterrupted development from the Late Neolithic into the Early Halaf period. Strata 11 and 10 in square P14, the earliest strata excavated so far on the southeastern mound, have yielded ceramics identical to those from the Late Neolithic strata of the northeastern mound. The next strata 9 to 7A in square P14 seem to represent a transitional stage, whereas from stratum 6D onwards the pottery is entirely of Halaf derivation.

A number of radiocarbon samples have been collected from the various strata at Tell Sabi Abyad but unfortunately no dates are available yet.

So far, only few parallels have been found for the pottery of Tell Sabi Abyad. In the Balikh valley, in around 6000/5900 B.C. a flourishing early Neolithic society (as represented by the sites of Assouad and Damishliyya; see Cauvin 1972; Akkermans, in press) seems to have come to an end and occupation in the region then seems to develop a more mobile, perhaps nomadic or semi-nomadic, character. At present, only two sites, viz. Tell Mounbatah in the middle Balikh region and Tell Sabi Abyad in the north, give evidence of a continuous occupation throughout the 6th millennium B.C. (see Copeland 1979; Akkermans 1988). Mounbatah has not yet been excavated and at Tell Sabi Abyad we have so far reached later 6th millennium layers only. It is, however, expected that future fieldwork at Sabi Abyad will yield a complete sequence of 6th millennium occupation levels, perhaps already starting in the later 7th millenniuym B.C.

D.2. The Late Neolithic Pottery

In the Syrian Jezirah, the closest parallels to the Late Neolithic ceramics of Sabi Abyad are probably found at the sites of Tell Halaf, Tell Habesh and Chagar Bazar. The information that has been published on these sites, however, is limited and the chronological positioning of the recovered ceramics is far from clear. At Tell Halaf on the Syro-Turkish border, the basal levels yielded exclusively so-called '*Altmonochrome*' pottery, followed at a later stage by a mixture of both *Altmonochrome* and painted Halaf pottery until in the upper levels the *Altmonochrome* finally disappeared (von Oppenheim and Schmidt 1943:25).

Altmonochrome pottery generally consists of coarsely-made and thick-walled vessels, often burnished and having a grey, yellowish-brown or red colour. The majority of the ceramics shows a distinct dark core and has apparently been fired at low temperatures or during a short time only. Interestingly enough, most of the *Altmonochrome* from Tell Halaf seems to have been mineral-tempered (lime or sand), although plant inclusions have been found as well. In this respect, the *Altmonochrome* clearly differs from the Late Neolithic pottery of Tell Sabi Abyad, where the reverse holds true: here the ceramics are mainly plant-tempered, the grit-tempered variety being restricted to the Grey-Black and Fine Wares. The *Altmonochrome* pottery is divided into two broad categories, differing from eachother in surface treatment and shape variety, viz., 'common ware' and so-called '*Wirtschaftskeramik*' (von Oppenheim and Schmidt 1943:25 ff). When looking at the shapes, the common ware shows some close parallels to the Late Neolithic ceramics from Sabi Abyad, although some shapes (e.g. the vessels with sharply inturning rims, or the platters and dishes) are wholly absent from our site. Interestingly enough, the ceramics defined as '*Wirtschaftskeramik*' at Tell Halaf are also entirely lacking at Sabi Abyad, except for some simple bowl and holemouth profiles. The reasons for this apparent lack are unknown at present but recently it has been suggested (Bartl, in press) that at least some of the pottery described as *Altmonochrome* at Tell Halaf is not of prehistoric date but belongs more probably in the Iron Age; these ceramics may have been either intrusive in the Neolithic levels at the site or, in view of the absence of any reliable stratigraphy, have simply been ascribed to these levels on stylistic arguments. The present evidence from Tell Sabi Abyad seems to support this view. Another possibility to explain the obvious ceramic differences between Tell Halaf and Tell Sabi Abyad is that pottery traditions strongly varied from region to region. Van As and Jacobs (this volume) have pointed out that the manufacture of the coarse ware ceramics of Tell Sabi Abyad requires but few technical abilities and may very well have been carried out within a domestic mode of production.

The closest parallels between Tell Halaf and Sabi Abyad are constituted by the commonly appearing holemouth pots and by the simple plain-rim bowls with rounded or occasionally carinated bodies. Conical lugs are a characteristic feature of the *Altmonochrome* vessels of Tell Halaf and are found both on bowls and pots. At Sabi Abyad, only pots indicate such handles. Another interesting parallel is constituted by the so-called 'husking trays', one fragment of which was found at Tell Halaf (von Oppenheim and Schmidt 1943, Textabb. 2). This example shows deeply incised ridges on the vessel wall and probably on the base, too, and closely compares to some husking tray fragments from Sabi Abyad. Some shapes found at Tell Halaf are absent at Sabi Abyad whereas, on the other hand, some profiles from our site are not found at Tell Halaf (e.g., the holemouth jars). Moreover, incised pottery seems to be absent from Tell Halaf. Some ceramics related to those termed Fine Ware at Sabi Abyad seem also to have been found in association with *Altmonochrome* pottery, but in the final Tell Halaf volume little is reported from which any definite conclusions in this respect can be drawn (cf. von Oppenheim and Schmidt 1943:67 ff).

Pottery closely related to the *Altmonochrome* from Tell Halaf is also reported from Tell Habesh, situated in the upper Wadi Dara area, about 50 km east of Tell Halaf (Davidson 1977:88). This site was truncated by modern construction works which thus allowed the examination of a complete vertical section through the mound. The lower levels seem to contain solely monochrome burnished pottery, immediately followed by levels showing both this monochrome burnished ware and Early Halaf ceramics. In this respect, Tell Habesh closely resembles Tell Halaf. At Sabi Abyad, the southeastern area seems to indicate a comparable transitional stage.

At Chagar Bazar, also located in the Wadi Dara region, the lowest level at the site (level 15) has yielded some pottery which seems to be related to that from the Late Neolithic strata of Sabi Abyad. Level 15 at Chagar Bazar gave no evidence of architectural vestiges but consisted of two pits with numerous Samarra-like ceramics together with monochrome burnished and occasionally incised grey-black ceramics (Mallowan 1936). This combination of both Samarra and monochrome burnished pottery closely resembles our findings at Tell Sabi Abyad. The next levels 14 and 13 at Chagar Bazar yielded mainly Samarra pottery but apparently without the monochrome burnished ware. Some Halaf sherds were found, too, but these are probably of an intrusive nature. Halaf pottery appeared in bulk in the strata 12-6, now completely replacing the Samarra ware, but on the basis of the excavations at Tell Aqab (Davidson 1977) this Halaf pottery can definitely be ascribed to the later stages of the Halaf period. A hiatus is indicated between levels 15-13 on the one hand and levels 12-6 on the other hand. This gap in occupation was already expected by Mallowan (1936:17) and has been confirmed by the Aqab sequence (Davidson 1977:105-106).

In western Syria, phase B of the Amuq must have been contemporary with the early strata reached at Sabi Abyad. However, Dark-Faced Burnished Ware, as described by Braidwood and Braidwood (1960), is virtually absent in the Balikh region and seems to be a characteristic Levantine feature. Amuq B is characterised by, among other traits, the appearance of pattern-burnished pottery in low quantities (Braidwood and Braidwood 1960:68 ff). At Sabi Abyad, a few pattern-burnished sherds were found both in the Late Neolithic and Early Halaf strata. The earliest examples had a grey-black and overall light-burnished surface, decorated by a more intensively burnished pattern of cross-hatching. In the Halaf strata at Sabi Abyad two pattern-burnished bowl fragments appeared in phase E. These bowls differ from the other burnished pottery in shape, temper, colour, kind of burnish and decorative pattern and probably represent import products from western Syria (see Le Mière, this volume). One of these bowls strongly resembles a vessel from Tell Judaidah in the Amuq, ascribed to the First Mixed Range, i.e. late Amuq B or early Amuq C.

The coarsely made, red-painted and incised pottery from Sabi Abyad, only found in very small quantities in the Late Neolithic strata at the site, shows some similarities to the Amuq A-B Washed Impressed Ware (ibid.:52-55, 78-79). In the Amuq, this pottery seems to consist of hemispherical bowls only, with a band of red wash along the lip and an impressed pattern underneath, whereas at Sabi Abyad mainly the body of jars or pots seems to have this kind of decoration.

Another parallel between Sabi Abyad and the Amuq B levels at Judaidah is constituted by the perforated sherd disks (see the chapter on the small finds).

On the Syrian Euphrates, early 6th millennium ceramics were found in small quantities at Bouqras but this pottery is related to that from Umm Dabaghiyah and Tell Sotto (Le Mière 1983, 1986) and no doubt precede the present Late Neolithic pottery from Tell Sabi Abyad. Both in shape and decoration, the ceramics from Sabi Abyad differ very much from those of Bouqras and contemporary sites.

The occurrence of Samarra-like pottery at Tell Sabi Abyad was a surprising feature although Lorraine Copeland, while discussing the results of her 1978 Balikh survey, had already mentioned the presence of possible Samarra cognates at Tell Mounbatah in the middle Balikh region (Copeland 1979:270). Until then, Baghouz on the Euphrates and Chagar Bazar in the upper Khabur region were the westernmost known Samarra or Samarra-related sites in Syria, but apparently Samarra influence reached much further westwards. At present, the Samarra-related pottery from the Late Neolithic strata at Tell Sabi Abyad shows but little variety in shape and decoration. The pottery can hardly be compared with that of sites in the Samarra heartland, like Tell es-Sawwan or Samarra itself, which is in general much more complex in terms of shape or design layout. Moreover, many of the shapes or designs found here, have not been attested at Sabi Abyad and *vice versa*. In this respect, it seems more correct to consider the pottery of Sabi Abyad of Samarra derivation than as true Samarra ware or even Samarra imports. This view is confirmed by a clay analysis of the Sabi Abyad ceramics (Le Mière, this volume) which indicated that Samarra-like pottery had been locally made. Ippolitoni (1970-71:139-140) suggested a regional variation in Samarra pottery, the ceramics from sites in the periphery, like Hassuna, Matarrah and Shimshara, generally of a poorer quality and lacking the more elaborate shapes or design elements like those found in the Samarra heartland. Earlier, Smith (1952:6) reached a similar conclusion, while discussing the Samarra pottery from Matarrah.

In northern Mesopotamia, Samarra pottery repeatedly occurred in late Hassuna contexts. At the site of Tell Hassuna, Samarra pottery appeared, in a fully developed state and perhaps as a result of import, in level III, amidst Standard Hassuna ceramics, and increased in importance in the upper strata IV and V (Lloyd and Safar 1945). At Matarrah, a similar development seems to have taken place, Samarra pottery appearing together with Hassuna pottery in the Upper Phase, and following a period marked by solely Hassuna pottery (the Lower Phase; Braidwood et al. 1952). Further east, Samarra ceramics were found at Tell Shimshara in the upper levels 13 to 9, related to Hassuna III-V and Matarrah Upper Phase (Mortensen 1970:129). Another parallel is shown by Nineveh on the Euphrates, where Samarra ceramics occurred in level 2(b), probably related to Hassuna III-V, whereas in the next level 2(c) Samarra pottery was found in association with Halaf ceramics (Mallowan 1933:132; Porada 1965:175; level 2(c) at Nineveh, however, seems to represent a mixed deposit: some probably early Halaf sherds were found together with trichrome painted pottery which no doubt belongs to a late Halaf phase). At this time, perhaps Samarra influence reached the Balikh valley, too. The Late Neolithic of Sabi Abyad and the *Altmonochrome* of Tell Halaf seem to have acted as the Syrian counterpart of the northern Iraq late Hassuna culture and partially coincide with the central Mesopotamian Samarra culture.

The expansion of Samarra influence into the outlying regions seems to have taken place during the later stages of Samarra society, viz. the Middle or Classic Samarra period (Tell es-Sawwan levels IIIA to V; see e.g. Mellaart 1975:154; Copeland and Hours 1987:407). Returning to Tell Sabi Abyad, it thus seems that the Late Neolithic pottery retrieved so far cannot be older than Sawwan level III. Actually, one of the most characteristic Samarra traits at Sabi Abyad, i.e. the painted-and-incised pottery, confirms this view: at Sawwan this pottery first appeared in level IIIA and was found in small quantities in the upper levels IIIB to V (Ippolitoni 1970-71:109). A number of radiocarbon dates from Sawwan and related sites suggest a date in the later 6th millennium, viz. about 5300-5000 B.C., for the Classical Samarra. For a detailed discussion of the, often ambiguous, radiocarbon dating of the 6th millennium cultural complexes of Mesopotamia, the reader is referred to Copeland and Hours (1987) and Watkins and Campbell (1987).

Watkins and Campbell (1987:433) have already pointed out that Hassuna is strictly limited in distribution to northern Iraq. Tell sabi Abyad seems to confirm this view: apart from the occurrence of husking trays and Samarra-like pottery, the Late Neolithic ceramic assemblage of Sabi Abyad shows no relationship with the Hassuna ceramic assemblage. Husking trays are a characteristic component of Hassuna pottery. At Tell Hassuna, these trays first appeared in level II, preceding the occurrence of Samarra pottery at the site, but were also found in association with both Samarra pottery and Hassuna Standard Ware in the upper strata at the site (Lloyd and Safar 1945). Husking trays were also found in true Samarra contexts, e.g. at Tell es-Sawwan levels III-IV (the first husking trays at the site had already appeared in level II, probably related to the Hassuna culture; Ippolitoni 1970-71:113, 139). It seems reasonable to assume that husking trays reached the Balikh region together with the Samarra traits, although it cannot be ruled out yet that these vessels were already known in earlier times.

Samarra-like pottery remained in use during the next, Early Halaf period at Sabi Abyad. At this time, characteristic Samarra designs (like the pegs or the 'dancing ladies') are found side by side with Halaf traits, occurring even on the same vessel. This pottery shows some close parallels to Baghouz (see below).

D.3. The Early Halaf Pottery

Thousands of sherds and several complete vessels were recovered from the Halafian strata at Tell Sabi Abyad. On the whole, the pottery constitutes a coherent assemblage and seems to belong to the earliest Halaf ceramics known at present.

As mentioned above, the Late Neolithic levels exposed at Tell Sabi Abyad immediately precede the Halaf strata at the site. At least in the southeastern area of Sabi Abyad no true break in occupation has been attested. In the northeastern area a hiatus between the Late Neolithic and Halaf periods seems to exist, although, on the basis of some ceramic parallels with the southeastern mound, this gap in occupation was probably of short duration. A close relationship between the Late Neolithic and Halaf periods at Sabi Abyad is suggested on the following grounds:

- The apparent lack of a break in the stratigraphy of square P14.
- The relatively large amount of coarse ware ceramics, hardly distinguishable from those of the Late Neolithic layers, in the earliest Halaf strata of square P14.
- The continuous presence of Samarra influence.
- The continuous presence of specific types (e.g. the holemouth pots).
- The continuous presence of grey-black and burnished ceramics (although new types are introduced in the Halaf period).
- The close similarities between the lithic implements from both periods (see Copeland, this volume).
- The continuous presence of perforated sherd disks.

At present, only few parallels have been found for the Halaf pottery of Sabi Abyad. In the Balikh valley, Halaf pottery was found on the surface of 28 sites, but most of these ceramics seem to belong to the later stages of the Halaf period (Akkermans 1988). The Halaf pottery uncovered during the 1984 excavation at Tell Damishliyya, situated at a distance of only 5 km west of Sabi Abyad, is definitely of a later date than that of Sabi Abyad and resembles the Middle Halaf ceramics of Tell Aqab in the upper Khabur region (Akkermans, in press). However, some sherds found on the surface of Tell Mounbatah, in the middle Balikh region, closely resemble the Sabi Abyad pottery (cf. Copeland 1979). Moreover, at Mounbatah both pre-Halaf and later Halaf pottery has been abundantly attested, suggesting a complete sequence of the Halaf period for this site. At Sabi Abyad, only the Early Halaf period has been attested in a stratigraphic context, although some sherds found in disturbed contexts suggest that perhaps later Halaf levels can be found somewhere at the site as well.

Outside the Balikh valley, early Halaf pottery has only been reported from Tell Aqab (Davidson 1977; Davidson and Watkins 1981) and Arpachiyah

(Hijara 1980, Hijara et al. 1980). Both sites, however, were newly founded in the Halaf period and lack any immediate predecessors. Halaf ceramics appeared in a developed state at Aqab and Arpachiyah and apparently this tradition of pottery manufacture was brought to these sites from somewhere else. Early Halaf pottery can also be found at Tell Halaf. Some vessels illustrated in the final Tell Halaf publication (von Oppenheim and Schmidt 1943) closely resemble some of the ceramics from Tell Sabi Abyad. Moreover, a small quantity of Samarra-like pottery was found at Tell Halaf, thus pointing towards an early date in the Halaf sequence as well. Tell Halaf probably shows a similar transition from the Late Neolithic into the Halaf period as seen at Sabi Abyad.

At Tell Aqab, early Halaf levels were reached only in a small sounding measuring 4x1.5 m at the southern end of trench S3. Three building levels can be recognised (Davidson and Watkins 1981:5). A sample of 482 sherds is ascribed to the early Halaf period (Davidson 1977:109). About 37% of these sherds belong to an undecorated, straw-tempered and burnished ware, said to be similar to that of Arpachiyah (ibid.:156). This pottery is probably related to the commonly occurring Coarse Ware ceramics of Sabi Abyad. Since Davidson's figure has been based upon total sherd counts (including rims, bases and body sherds) and the counts which have been given in the present study are based upon rim frequencies only, it is evident that both counts cannot be compared just like that. However, when taking *all* sherds of Sabi Abyad into account, coarse ware ceramics make up almost 49% of the lower phase F pottery and about 17% of the next phase E pottery. In this respect, the early Halaf pottery of Tell Aqab easily fits within phase F at Sabi Abyad. However, when looking at the distribution of Sabi Abyad coarse ware per stratum, it appears that these ceramics vary from about 49% in stratum 9 to about 38% in stratum 7A, and decrease even more in the subsequent strata from ca. 26% in stratum 6A to 15% in the topmost stratum 1. In this sense, Tell Aqab most closely compares with stratum 7A at Sabi Abyad, i.e. the latest stage of phase F at the site. It should, however, be kept in mind that it is not necessary to expect a specific type or ware to appear at all sites in more or less the same numbers; numerous variables (e.g. size of excavation, nature of deposits or functional circumstances) may define the frequency of appearance of a particular kind of pottery. The colour of the straw-tempered and burnished pottery of Tell Aqab ranges from grey through grey-brown to buff and usually these ceramics show a dark wall section, indicating incomplete oxidation. Shapes are simple and mainly seem to consist of holemouth vessels and crudely shaped bowls with flat bases. One pattern-burnished sherd was found which is regarded as an import (Davidson and Watkins 1981:7). At Sabi Abyad, a few pattern-burnished sherds were found both in the Late Neolithic and Early Halaf strata; here, too, these sherds seem to represent imports (see Le Mière, this volume).

The painted Halaf ware from the early phase at Aqab yielded only four shapes, viz. straight-sided bowls (comparable to our type 116 bowls), 'cream bowls' (our type 111 bowls), simple hemispherical bowls (our type 117) and squat jars with flaring rims (resembling our angle-necked jars, type 327). The simple, straight-sided bowls with flat bases are most common and constitute about 70% of the reconstructable early Halaf vessels at Aqab (Davidson 1977:111). The cream bowls have only been found at Aqab in the early levels but at Arpachiyah these vessels also occur in later, Middle Halaf levels. In the Balikh valley, cream bowls have also been found in a probably Middle Halaf context at Damishliyya, although of a slightly different shape when compared with the early vessels from Sabi Abyad (Akkermans, in press). The cream bowls of Aqab seem to be virtual identical, both in shape and decoration, to those from Sabi Abyad (ibid.:112-113 and Fig. 20). The other types of vessels recognised at Aqab easily fit within the early pottery of Sabi Abyad as well. Simple, hemispherical bowls are rather rare at Aqab, which is also the case at Sabi Abyad. However, the small amount of jar fragments is remarkable, since at Sabi Abyad these vessels have been found in vast numbers. The most common design element at Sabi Abyad, viz. the so-called 'horizontal cross-hatching', is said to be fairly common in the early phase at Aqab (ibid.:114).

When comparing the Early Halaf pottery of Tell Aqab as a whole with that of Sabi Abyad, it is evident that the present sample of the former site is deficient in various respects. Not only does the range of shapes at Aqab seem to be incomplete, but some of the present types are either over- or underrepresented as well. Thus, the number of jars seems to be much too limited, whereas, on the other hand, the straight-sided bowls are present in unlikely large numbers. As mentioned above, at Aqab straight-sided bowls account for 70% of the reconstructable shapes whereas at Sabi Abyad these vessels make up about 21% of the Halaf painted ware (or 45% of the bowl sample). Another remarkable feature is the lack of Samarra traits within the early pottery of Tell Aqab but some sherds showing Samarra affinities did appear in a Middle Halaf context at the site (ibid.:110). Perhaps the small sample size or the nature of the early deposits at Aqab account, at least partially, for these differences.

For a long time now, the site of Arpachiyah in the Mosul region of northern Iraq has been of basic importance for the internal chronology of the Halaf period. In the early 1930s the site was excavated, during an eight-week-campaign, and on the basis of both the stratigraphy and stylistic developments within the pottery, Mallowan suggested a threefold division of the Halaf period at the site, viz. levels pre-TT10, levels TT10-8 and levels TT7-6 (Mallowan and Rose 1935). Perkins (1949:42) first suggested to term these periods Early, Middle and Late Halaf, respectively, and Davidson, in his extensive study of Halaf pottery, adopted this scheme, pointing out that it holds true for Halaf sites in other regions as well (Davidson 1977:25 ff, 340). Actually, the Early Halaf levels at Arpachiyah were not reached at the mound proper but were uncovered in less well stratified circumstances in the immediate surroundings of the site and therefore any direct correlations with the sequence at the tell itself cannot be shown. In this respect, the recent re-excavation of Arpachiyah by Ismail Hijara is of utmost importance, since Hijara's soundings have extended the stratigraphic sequence at the tell down to virgin soil (Hijara 1980; Hijara et al. 1980). Hijara's work has recently been discussed in detail by Gustavson-Gaube (1981) and Watson and LeBlanc (in press); here only a few points will be made.

When comparing the pottery of the early levels at Tell Arpachiyah and those of Sabi Abyad, one is struck by the paucity of similarities between both sites, particularly in design elements. In the following, firstly, the pottery found by Mallowan will be compared with that of Sabi Abyad, and, secondly, Hijara's results will be discussed briefly.

Mallowan found Early Halaf (i.e. pre-TT10) pottery only in the outlying areas. Like at Tell Aqab, only few shapes are indicated, viz. simple straight-sided bowls with flat bases, cream bowls, hemispherical bowls with flat or rounded bases and flaring angle-necked jars. Most vessels were decorated and showed considerable similarities both in design elements and design layout.

Straight-sided bowls seem to be most numerous and are said to be a characteristic early shape, although some examples were also found in the later levels at the mound (Mallowan and Rose 1935:151). Occasionally, these bowls have a flat or slightly bevelled rim (ibid., Fig. 70, nos. 2-3). Flat or bevelled rims do not occur at Sabi Abyad. Most frequently, decoration consists of a continuous row of cross-hatched lozenges, sometimes supplemented by solidly painted triangles (ibid.:153 and Fig. 72). In case of the straight-sided bowls, these design elements seem to represent a characteristic early feature at Arpachiyah, found only in the pre-TT10 levels. Numerous other decorative elements, however, are present (cf. Davidson 1977, Table 2), all of which are lacking at Sabi Abyad. Apart from a straight band most commonly in combination with a wavy line, the interior of these bowls is hardly decorated. Occasionally, bowl bases are painted with bukrania. At Tell Sabi Abyad, interior decoration is virtually restricted to one or more horizontal bands near the lip.

Cream bowls have been found in all levels except TT6 at Arpachiyah (Mallowan and Rose 1935:135). All vessels were intricately decorated, stippling or 'egg and dot' patterns being the most common. At Sabi Abyad, stippling is virtually absent, occasionally occurring in combination with naturalistic motifs.

At nearby Tell Damishliyya, however, stippling frequently occurs on pottery of probably Middle Halaf date. Davidson (1977:33) points out that the decoration of the Arpachiyah cream bowls closely conforms to that of the simple, straight-sided bowls, thus constituting a marked difference with Sabi Abyad where both kinds of vessels strongly differ in decoration. Again, many of the design elements present at Arpachiyah have not been found at Sabi Abyad and *vice versa*.

Hemispherical bowls, decorated in a simple manner (e.g. cross-hatched lozenges) are rare in the early levels at Arpachiyah. At Tell Sabi Abyad these vessels appear only in minute quantities as well.

Regarding the angle-necked jars with flaring rims, Davidson (1977:35) states that decoration is largely similar to that of the straight-sided bowls, the main difference being the use of multiple zone decoration on the jars. Design motifs are largely identical to those used on the bowls, stippling being the most common. The necks of the Early Halaf jars at Arpachiyah are often solidly painted, a feature which hardly occurs at Sabi Abyad but which has been commonly attested within the later Ḥalaf pottery of Damishliyya (Akkermans, in press).

Samarra influences seem to be absent within the Early Halaf assemblage of Arpachiyah. Actually, some Samarra-like pottery did appear at Arpachiyah but in a later, Middle Halaf context (Mallowan and Rose 1935:22).

From the above it will be clear, that Mallowan's pre-TT10 pottery differs considerably from that of Sabi Abyad. Indeed, the shapes found at Arpachiyah have also been attested at our site, but, on the other hand, numerous characteristic types of Sabi Abyad do not appear at Arpachiyah. Moreover, the kinds of decorative elements and their distribution among the various Arpachiyah forms differ strongly from Sabi Abyad. Although regional variation may partly account for the observed differences, it seems, in view of some obvious comparisons with Damishliyya and related sites, that chronological variables are at work as well. Mallowan's Early Halaf pottery from the outlying regions seems to be closely related to that of the lowest levels of the tell proper and, as already noted by Hijara (1980) and by Watson and LeBlanc (in press), does not represent the earliest known Halaf pottery. Within Hijara's terminology, these ceramics probably fit best into his early period IVA (Hijara 1980, Table 10; see also Watson and LeBlanc, in press, Table IV.5).

Hijara laid out three trenches on top of the mound, two of which ran north-south (measuring 9 x 3 m and 8 x 2 m, respectively) whereas one was oriented east-west (measuring 40.5x2.5 m). On the basis of the pottery, four phases have been distinguished, termed periods I to IV, only the last one of which (period IV) corresponds partially with Mallowan's levels TT10 to TT6 on the mound

(Hijara 1980b:76). It thus seems that Davidson's Early, Middle and Late Halaf phases can all be equated with Hijara's period IV, whereas Hijara's periods I to III precede Davidson's Early Halaf.

Hijara has divided his pottery chronologically on the basis of the appearance of specific shapes and design elements. Watson and LeBlanc (in press), however, have correctly critised Hijara's approach of ordering the various ceramic features by stating that it is much too differentiated (hundreds of motifs and 48 shapes are distinguished, most of them showing strong similarities) and tends to show differences which are not necessarily significant. It remains doubtful whether Hijara's chronological scheme is truly reliable.

In association with the pottery periods I-III, two main phases of occupation have been recognised, termed phase 1 and 2 (phase 1 being the earliest; Hijara 1980). Since the architectural phase 2 also covers part of Hijara's pottery period IVA, it seems that Mallowan's earliest levels of the outlying areas (Early Halaf) can be equated with the upper part of Hijara's building phase 2. Each of Hijara's phases consists of at least 3 building levels, thus suggesting a considerable span of time. However, when looking at the pottery from periods I to III, one is struck by the strong parallels, both in shape and decoration, with Mallowan's earliest pottery. Virtually all shapes and decorative elements found by Mallowan already existed in Hijara's periods I-III. Straight-sided bowls, occasionally showing a flat or bevelled rim with so-called rim thicks (Hijara 1980, Pl. XI, nos. 69-71, Pl. XII, nos. 78-79; Pl. XIII, no. 80; Pl. XIV, nos. 86-91) appeared throughout periods I to III and closely compare with vessels found in an Early Halaf context in the outlying areas or even Middle Halaf context on the mound proper (Mallowan 1935, Figs. 69-72). Periods I-III cream bowls, too, closely compare with vessels from Mallowan's soundings as do simple, hemispherical bowls and most jars. On the whole, a close relationship seems to exist between Hijara's periods I-III and the Early Halaf ceramics uncovered by Mallowan. In this respect, it is not surprising to find only few parallels when comparing Hijara's periods I-III pottery with that of Sabi Abyad (see above).

As at Tell Aqab, pre-Halaf levels are not present at Arpachiyah. Halaf pottery appeared here in a developed state and must, no doubt, have been brought to the site. So far, the earliest Halaf seems to be lacking in northern Iraq although this may easily be due to the present state of research (only few Halaf sites have been excavated so far).

Returning now to western Syria and southeastern Turkey, it is worth devoting some attention to the Halaf pottery found in the Euphrates valley, the Amuq, the Qoueiq region and at Sakçe Gözü , in the hilly country north of the Qoueiq.

For the Amuq, our sole information on Halaf pottery found in a stratified context stems from Tell Kurdu, phases C and D (Braidwood and Braidwood 1960). Unfortunately, at Kurdu no Amuq B levels were found and phases B and C seem to be divided from each other by means of a hiatus of as yet unknown duration (ibid.:137). Davidson (1977:265 ff) has already pointed out that the Amuq C-D pottery easily fits within his Middle and Late Halaf periods and that the earliest Halaf is apparently missing in the Amuq (at least in a stratified context). Braidwood and Braidwood (1960:18) point out that, since virgin soil was not yet reached at Kurdu, perhaps an earlier phase is present at the site, yielding the transition between phases B and C.

At Sakçe Gözü, excavations carried out in 1908 and 1911 yielded Halaf and Samarra-related pottery in the lower periods I to III (Garstang 1908; Garstang et al. 1937). Period I pottery mainly consisted of plain, grey-black burnished and incised vessels; only very few painted sherds were found but some of these display clear Halaf influence (cf. Garstang 1908, Pl. XLVIII). Painted pottery increases in importance in the next period II. These ceramics show some close parallels with those of Tell Sabi Abyad. Pottery of clear Samarra derivation has now been found (Garstang et al. 1937:130 and Pl. XXV, no. 6), whereas some true Halaf sherds show the most commonly occurring design element of Sabi Abyad, viz. the so-called 'horizontal cross-hatching' (ibid., Pl. XXV, no. 4). Moreover, a sherd showing a human image (ibid., Pl. XXV, no. 15) closely resembles a bowl fragment from Sabi Abyad (no. 350). The period III painted pottery of Sakçe Gözü seems to belong to a later stage of the Halaf period and closely resembles some of the ceramics found at Damishliyya on the Balikh, situated at a slight distance of Sabi Abyad.

The renewed excavations at Sakçe Gözü in 1949 largely confirmed Garstang's earlier findings (du Plat Taylor et al. 1950). As for the periods of our concern, du Plat Taylor et al. (1950:56, 83) point out that, whereas their periods II and III equate Garstang's periods II and III, their period I is of later date than Garstang's period I (but antedating period II). The excavators (ibid.:83) suggest that their period I is possibly of pre-Halaf date but a quick glance at the illustrated pottery (ibid., Fig. 12) immediately shows a strong resemblance with some of the Halaf ceramics of Sabi Abyad. Plain wares predominate in period I, but, no doubt, already an Early Halaf component is present. In period II, plain wares still dominate but, as already noted by Garstang, painted pottery markedly increases in numbers. A few sherds showing clear Samarra traits were found. In this respect, it is interesting to learn that the excavators of Sakçe Gözü (ibid.:86) are inclined to consider Samarra-related pottery as pre-dating the main stage of Halaf (= period III) at the site, an observation which wholly confirms our findings at Sabi Abyad and Damishliyya. As already suggested by Garstang, period III at Sakçe Gözü clearly represents the later part of the Halaf period. Some bichrome sherds were found as well as a ring base (du Plat Taylor et al. 1950:93). Davidson (1977:263-264) remarks that no Early Halaf pottery has been found at Sakçe Gözü (despite the opinions of the excavators), a view which is not held here.

During a survey in the Qoueiq region north of Aleppo, Halaf ceramics were abundantly attested: at least 25 sites yielded this kind of pottery (Mellaart 1981:143). Referring to Hijara's sequence at Arpachiyah, Mellaart (ibid.) suggests that his Qoueiq C material is all of Early Halaf date, i.e. Hijara's periods I and II. I have already pointed out the difficulties in relating the Arpachiyah ceramics to those of the Balikh region, and when looking at Mellaart's illustrations (ibid., Figs. 96-107) it seems that most of the Qoueiq C pottery can be related to the pottery found at Damishliyya, covering part of the later Halaf period (Davidson's Middle Halaf). Actually, this attribution conforms to Hijara's suggestion (1980:254) that Halaf spread into the Levant and Syro-Cilicia during his period IV. Davidson (1977:256 ff) holds this view, too. However, in the light of our work in the Balikh valley, there is no reason to assume that earlier Halaf can not be found in western Syria. Some of the sherds illustrated by Mellaart (Mellaart 1981, Figs. 97:259, 260; 98:266; 101:288; 102:297-304; 106:397; 107:401, 405) would not be out of place at Sabi Abyad. Moreover, at Sakçe Gözü the presence of some painted pottery closely related to that of Sabi Abyad clearly indicates that Halaf influence reached into western Syria and southeastern Turkey at a much earlier date than had been supposed so far. Although in the Amuq the earliest stratified Halaf pottery known so far stems from phase C at Tell Kurdu, ascribed by Davidson (1977) to his Middle Halaf period, it must be stressed that a hiatus seems to exist between Amuq B and C. It is most likely that the Amuq sequence is incomplete and that the first appearance of Halaf in the region perhaps has to be looked for in the as yet unexcavated lower levels of Tell Kurdu.

Surveys along the middle and lower Syrian Euphrates (van Loon 1967; Kohlmeyer 1984; Geyer et Monchambert 1987) yielded only few Halaf sites, all of which seem to belong to the later stages of the Halaf period (Davidson 1977:223 ff). At Tell Zaidan, near the confluence of Balikh and Euphrates, some polychrome Halaf pottery was found (Kohlmeyer 1984:107 and Abb. 5), whereas the sherds collected from the surface of Tell Zreyjiye (Lüth and Nowatzyk, forthcoming), too, represented later Halaf pottery; some of the Zreyjiye ceramics closely resemble the pottery found at Damishliyya, whereas some other sherds are definitely of Ubaid-derivation and related to the period IV pottery of Hammam et-Turkman on the Balikh (cf. Akkermans, in press). Along the middle Euphrates, Halaf pottery appeared in a stratified context only at Shams ed-in Tannira and there seems to be little doubt that these ceramics are late, i.e. Middle or Late Halaf (Gustavson-Gaube 1981:90). Davidson (1977:227) suggests that Halaf was introduced in the Euphrates region in an already developed form from the east. However, I have some reasons for doubting Davidson's conclusions. Above I have already pointed out that the earliest Halaf known so far can be found in the regions immediately surrounding the Euphrates valley. The sites of Turlu, Yunus/Carchemish and Til Barsib, which have so far yielded only Middle or Late Halaf pottery, are all situated in an area which must have felt Halaf influence already at an early time. Davidson (ibid.) remarks that the Euphrates Halaf pottery shows some similarities to that of the Khabur region but is by no means identical to the Khabur ceramics and probably constitutes a local tradition in its own rights. The occurrence of some close parallels between the pottery from Sabi Abyad and Baghouz on the lower Euphrates suggests that Halaf settlements may have existed in the Euphrates valley earlier than known so far.

Excavations at Baghouz in 1935-36 yielded a pottery assemblage closely related to that of the Samarran sites in Mesopotamia (du Mesnil du Buisson 1948; Braidwood et al. 1944). Baghouz was probably founded during the Middle to Late Samarra period, i.e. Sawwan III-V (Mellaart 1975:154). At Sabi Abyad, some of the pottery found in the Halaf strata (e.g. nos. 152, 157-159, 170, 174-175, 216, 230-231, 237, 302-324) is definitly of Samarra derivation, resembling the ceramics of e.g. Baghouz or Tell es-Sawwan. Similarities are mainly found in the designs used, but also some of the shapes present at Sabi Abyad resemble Samarra forms. Thus, for example, our type 129 bowls (nos. 175-180) compare with the painted cups or deep S-curved bowls found at Sawwan (Ippolitoni 1970-71. Figs. S, T, V) and Baghouz (du Mesnil du Buisson 1948, Pl. XXI:H; Braidwood et al. 1944, Pl. II:1). Also the few painted-and-incised jars found at Sabi Abyad constitute a close parallel with the Samarran sites. Characteristically, jar necks at Sabi Abyad have been decorated by means of so-called 'horizontal cross-hatching' and this design is found, in an identical manner, on a low-necked jar of Baghouz (du Mesnil du Buisson, Pl. XXI:R).

So far, Baghouz represents the sole true Samarra settlement in Syria. A survey in the region around Baghouz (Geyer et Monchambert 1987) has yielded no other Samarra sites. No Halaf settlements were found either. It thus seems that during the later 6th millennium B.C. the lower Euphrates valley was largely devoid of permanent occupation, a situation resembling the earlier Neolithic period in this region. Only few late 7th and early 6th millennium sites are known at present (Bouqras, Tell es-Sin and one site newly found by Geyer and Monchambert; cf. Akkermans et al. 1981; Roodenberg 1979-80; Geyer et Monchambert 1987), all of which are situated on terrace remnants overlooking the valley. Baghouz, too, is located on these terraces. Akkermans et al. (1981:495) have already suggested that contemporary settlements may have existed in the Euphrates floodplain but may have been completely washed away by the meandering river. This is even more plausible in the light of the similarities between Baghouz and Sabi Abyad. Although I do not suggest that Baghouz and Sabi Abyad maintained direct contacts, it seems reasonable to assume that Samarra influence reached inland Syria, including the Balikh region, through the Euphrates depression. In this case, more Samarra or Samarra-influenced sites are expected to have existed in the Euphrates valley.

D.4. Conclusions

Tell Sabi Abyad has given some extremely valuable information on the origins and nature of Halaf in Syria. It should be kept in mind that the earliest Halaf strata at the site have been unearthed on a limited scale so far and there is still a lot to be learnt about the local transition from the Late Neolithic into the Halaf period. It is expected that the next season of excavation at Sabi Abyad will clarify at least some of the problems concerning the introduction of Halaf in the Balikh region. On the basis of the present evidence, I suggest that Halaf was a local development, emerging out of earlier Late Neolithic cultural traditions. The appearance of Halaf-style painted pottery was preceded by Samarra-influenced ceramics and, although highly speculative, it seems that Halaf was a local answer to continuous Samarra impulses. At present, it is not clear how to interpret this apparent interaction between the generally strongly diverging Samarra and Halaf cultural complexes.

On a wider scale, it seems that Halaf was introduced in northwestern Syria at a much earlier date than had been supposed so far. The view commonly put forward that Halaf originated in the upper Khabur and the Sinjar/Mosul regions (see e.g. Davidson 1977:341; Hijara 1980:264) needs some modification: at least the Balikh valley but, most likely, also the regions further west form part of the Halaf homelands as well. The considerable differences, both in shape and design elements, between the earliest Halaf pottery found at Sabi Abyad and at Arpachiyah suggests that Halaf developed along different lines from region to region. Perhaps the basic division between 'Western' and 'Eastern' Halaf pottery postulated by Perkins (1949:186-187) holds some validity, despite Davidson's denial (Davidson 1977:343; it should, however, be noted that Davidson's critique refers to Perkins's mistaken association of, as we know now, chronologically differentiated pottery with contemporary regional stylistic variations).

CATALOGUE OF POTTERY

Fig. IV.1.

1. SAB-no. 18-19. T5, stratum 2. Lime temper. Low fired. Burnished surface. D. 140 mm. Black colour. Grey-Black Ware. Type 137.

2. SAB-no. 17-3. T5, stratum 2. Lime temper. Medium fired. Burnished surface. Grey colour. D. 150 mm. Grey-Black Ware. Type 137.

3. SAB-no. 21-39. T5, stratum 2. Plant temper. Low fired. Scraped surface. Brown colour. D. 170 mm. Coarse Ware. Type 137.

4. SAB-no. 13-4. T5, stratum 2. Plant temper. Low fired. Scraped surface. Brown colour. D. 260 mm. Coarse Ware. Type 137.

5. SAB-no. 2-10. T5, stratum 1. Plant temper. Medium fired. Scraped surface. Brown colour. D. 120 mm. Coarse Ware. Type 137.

6. SAB-no. 12-1. T5, stratum 2. Plant temper. Low fired. Scraped surface. Brown colour. D. 60 mm. Coarse Ware. Type 137.

7. SAB-no. 16-1. T5, stratum 2. Plant temper. Low fired. Scraped surface. Brown colour. D. 240 mm. Coarse Ware. Type 137.

8. SAB-no. 21-1. T5, stratum 2. Plant-and-lime temper. Low fired. Scraped surface. Buff colour. D. 270 mm. Coarse Ware. Type 137.

Fig. IV.2.

9. SAB-no. 5-6. T5, stratum 1. Plant-and-lime temper. Low fired. Scraped surface. Brown colour. D. 210 mm. Coarse Ware. Type 137.

10. SAB-no. 15-2. T5, stratum 2. Plant-and-lime temper. Low fired. Scraped surface. Brown colour. D. 300 mm. Coarse Ware. Type 137.

11. SAB-no. 21-28. T5, stratum 2. Plant-and-lime temper. Low fired. Burnished surface. Brown colour. D. 230 mm. Coarse Ware. Type 137.

12. SAB-no. 21-29. T5, stratum 2. Plant-and-lime temper. Medium fired. Burnished surface. Grey colour. D. 250 mm. Grey-Black Ware. Type 137.

13. SAB-no. 10-5. T5, stratum 1. Plant-and-lime temper. Medium fired. Scraped surface. Buff colour. D. 240 mm. Coarse Ware. Type 137.

14. SAB-no. 17-4. T5, stratum 2. Plant-and-lime temper. Low fired. Burnished surface. Brown colour. D. 230 mm. Coarse Ware. Type 137.

Fig. IV.3.

15. SAB-no. 21-45. T5, stratum 2. Plant temper. Low fired. Scraped surface. Brown colour. Matt black paint. D. 270 mm. Coarse Ware. Type 137.

16. SAB-no. 11-8. T5, stratum 1. Plant-and-lime temper. Scraped surface. Brown colour. D. 120 mm. Coarse Ware.rType 238.

17. SAB-no. 18-13. T5, stratum 2. Lime temper. Low fired. Burnished surface. Brown colour. D. 160 mm. Coarse Ware. Type 238.

18. SAB-no. 15-3. T5, stratum 2. Plant temper. Low fired. Scraped surface. Brown colour. D. 240 mm. Type 238.

19. SAB-no. 18-6. T5, stratum 2. Plant temper. Low fired. Scraped surface. Brown colour. D. 250 mm. Coarse Ware. Type 238.

20. SAB-no. 4-6. T5, stratum 2. Calcite temper. Medium fired. Burnished surface. Brown colour. D. 220 mm. Coarse Ware. Type 238.

Fig. IV.4.

21. SAB-no. 21-25. T5, stratum 2. Sand temper. Medium fired. Burnished surface. Black colour. D. 140 mm. Grey-Black Ware. Type 238.

22. SAB-no. 21-26. T5, stratum 2. Plant-and-lime temper. Low fired. Scraped surface. Buff colour. D. 290 mm. Coarse Ware. Type 238.

23. SAB-no. 18-5. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 240 mm. Coarse Ware. Type 340.

24. SAB-no. 21-18. T5, stratum 2. Plant temper. Medium fired. Scraped surface. Brown colour. D. 140 mm. Coarse Ware. Type 340.

25. SAB-no. 8-7. T5, stratum 1. Plant temper. Low fired. Smoothed surface. Buff colour. D. 150 mm. Coarse Ware. Type 340.

26. SAB-no. 5-3. T5, stratum 1. Plant temper. Low fired. Scraped surface. Brown colour. D. 130 mm. Coarse Ware. Type 340.

Fig. IV.5.

27. SAB-no. 15-1. T5, stratum 2. Plant temper. Low fired. Scraped surface. Reddish-brown colour. D. 230 mm. Coarse Ware. Type 340.

28. SAB-no. 17-8. T5, stratum 2. Plant temper. Low fired. Scraped surface. Cream colour. D. 160 mm. Coarse Ware. Type 327.

29. SAB-no. 4-15. T5, stratum 2. Plant temper. Low fired. Scraped surface. Brown colour. D. 220 mm. Coarse Ware. Type 327.

30. SAB-no. 25-10. T4, stratum 4. Plant-and-lime temper. Low fired. Scraped surface. Greyish-brown colour. D. 110 mm. Coarse Ware. Type 327.

31. SAB-no. 25-9. T4, stratum 4. Plant-and-lime temper. Low fired. Burnished surface. Grey colour. D. 130 mm. Grey-Black Ware. Type 327.

32. SAB-no. 21-21. T5, stratum 2. Plant temper. Low fired. Scraped surface. Brown colour. D. 110 mm. Coarse Ware. Type 327.

33. SAB-no. 21-41. T5, stratum 2. Plant temper. Low fired. Scraped surface. Buff colour. D. 110 mm. Coarse Ware. Type 327.

Fig. IV.6.

34. SAB-no. 21-38. T5, stratum 2. Plant-and-sand temper. Low fired. Scraped surface. Brown colour. Coarse Ware.

35. SAB-no. 21-37. T5, stratum 2. Plant temper. Low fired. Scraped surface. Brown colour. Coarse Ware.

36. SAB-no. 21-27. T5, stratum 2. Sand temper. Medium fired. Burnished surface. Black colour. Grey-Black Ware.

37. SAB-no. 30-1. T4, stratum 4. Sand temper. Low fired. Burnished surface. Black colour. D. 120 mm. Grey-Black Ware. Type 132.

38. SAB-no. 10-5. T5, stratum 1. Plant-and-lime temper. Medium fired. Smoothed surface. Buff colour. Incision. Coarse Ware.

39. SAB-no. 14-15. T5, stratum 2. Plant-and-lime temper. Low fired. Smoothed surface. Buff colour. Incision. Coarse Ware.

40. SAB-no. 22-10. T5, stratum 2. Plant temper. Low fired. Scraped surface. Brown colour. Incision. Coarse Ware.

41. SAB-no. 11-4. T5, stratum 1. Plant-and-lime temper. Low fired. Smoothed surface. Brown colour. Impression. Coarse Ware.

42. SAB-no. 12-7. T5, stratum 2. Plant temper. Low fired. Smoothed surface. Brown colour. Impression. Coarse Ware.

43. SAB-no. 14-3. T5, stratum 2. Lime temper. Low fired. Burnished surface. Brown colour. Impression and dark-red lustrous paint. Coarse Ware.

44. SAB-no. 14-4. T5, stratum 2. Plant temper. Low fired. Burnished surface. Brown colour. Impression and dark-red lustrous paint. Coarse Ware.

Fig. IV.7.

45. SAB-no. 17-1. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 140 mm. Matt reddish-brown paint. Fine Ware.

46. SAB-no. 18-1. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Cream colour. D. 120 mm. Matt reddish-brown paint. Fine Ware.

47. SAB-no. 11-2. T5, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 110 mm. Matt reddish-brown paint. Fine Ware.

48. SAB-no. 5-3. T5, stratum 1. Lime temper. Low fired. Smoothed surface. Buff colour. D. 130 mm. Matt reddish-brown paint. Fine Ware.

49. SAB-no. 2-13. T5, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 160 mm. Matt reddish-brown paint. Fine Ware.

50. SAB-no. 4-1. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Brown colour. D. 180 mm. Matt reddish-brown paint. Fine Ware.

51. SAB-no. 7-1. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt reddish-brown paint. Fine Ware.

52. SAB-no. 14-2. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Burnished surface. Orange colour. Lustrous brown paint. Fine Ware.

53. SAB-no. 18-34. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 210 mm. Lustrous brown paint. Fine Ware.

54. SAB-no. 4-4. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 100 mm. Matt brown paint. Fine Ware. Type 327.

55. SAB-no. 14-1. T5, stratum 2. Lime and sand temper. Medium fired. Smoothed surface. Buff colour. D. 100 mm. Lustrous brown paint. Fine Ware. Type 327.

56. SAB-no. 13-1. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 100 mm. Lustrous brown paint and impression. Fine Ware. Type 327.

57. SAB-no. 21-52. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Orange colour. Lustrous brown paint and impression. Fine Ware.

Fig. IV.8.

58. SAB-no. 19-8. T4, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt brown paint. Fine Ware.

59. SAB-no. 19-7. T4, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

60. SAB-no. 18-35. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous brown paint. Fine Ware.

61. SAB-no. 16-3. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

62. SAB-no. 10-1. T5, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

63. SAB-no. 21-50. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

64. SAB-no. 21-51. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous brown paint. Fine Ware.

65. SAB-no. 11-1. T5, stratum 1. Lime temper. Medium fired. Burnished surface. Orange colour. Lustrous reddish-brown paint. Fine Ware.

66. SAB-no. 8-22. T5, stratum 1. Sand temper. Medium fired. Burnished surface. Brown colour. Black paint. Fine Ware.

67. SAB-no. 5-1. T5, stratum 1. Lime temper. Medium fired. Smoothed surface. Black paint. Fine Ware.

68. SAB-no. 13-2. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

Fig. IV.9.

69. SAB-no. 11-3. T5, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

70. SAB-no. 18-4. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous brown paint. Fine Ware.

71. SAB-no. 18-3. T5, stratum 2. Lime temper. Medium fired. Burnished surface. Brown colour. Lustrous brown paint and incision. Fine Ware.

72. SAB-no. 21-54. T5, stratum 2. Plant temper. Low fired. Burnished surface. Orange colour. Lustrous red paint. Coarse Ware.

73. SAB-no. 21-49. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Cream colour. Lustrous brown paint. Fine Ware.

74. SAB-no. 21-53. T5, stratum 2. Lime temper. Medium fired. Smoothed surface. Cream colour. D. 180 mm. Lustrous black paint. Fine Ware.

75. SAB-no. 19-1. T5, stratum 2. Plant temper. Low fired. Smoothed surface. Brown colour. D. 220 mm. Red slip/paint and incision. Coarse Ware. Type 145.

76. SAB-no. 25-8. T4, stratum 4. Lime temper. Medium fired. Smoothed surface. Brown colour. Red slip/paint. Coarse Ware. Type 145.

77. SAB-no. 13-5. T5, stratum 2. Plant-and-lime temper. Burnished surface. Red slip/paint. D. 170 mm. Coarse Ware. Type 327.

Fig. IV.10.

78. SAB-no. 52-35. T5, stratum 1. Plant temper. Low fired. Scraped surface. Orange-brown colour. Husking tray (wall fragment).

79. SAB-no. 2-16. T5, stratum 1. Plant temper. Low fired. Scraped surface. Brown colour. Husking tray (base fragment).

80. SAB-no. 2-15. T5, stratum 1. Plant temper. Low fired. Scraped surface. Brown colour. Husking tray (base fragment).

81. SAB-no. 12-8. T5, stratum 2. Plant temper. Low fired. Scraped surface. Brown colour. Husking tray (base fragment).

Fig. IV.11.

82. SAB-no. 37-23. P13, stratum 6. Plant temper. Low fired. Scraped surface. Brown colour. D. 160 mm. Coarse Ware. Type 137.

83. SAB-no. 37-19. P13, stratum 6. Lime temper. Medium fired. Smoothed surface. Brown colour. D. 250 mm. Coarse Ware. Type 137.

84. SAB-no. 9-15. P13, stratum 3. Lime temper. Low fired. Smoothed surface. Black colour. D. 160 mm. Grey-Black Ware. Type 137.

85. SAB-no. 36-18. P13. stratum 5. Lime temper. Medium fired. Burnished surface. Reddish-brown slip. D. 180 mm. Fine Ware. Type 137.

86. SAB-no. 22-33. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 210 mm. Fine Ware. Type 116.

87. SAB-no. 64-9. P14, stratum 11. Plant temper. Low fired. Scraped surface. Brown colour. D. 180 mm. Coarse Ware. Type 137.

88. SAB-no. 40-1. P14, stratum 7B. Plant-and-lime temper. Low fired. Scraped surface. Buff colour. D. 180 mm. Coarse Ware. Type 137.

89. SAB-no. 37-21. P13, stratum 6. Plant temper. Low fired. Burnished surface. Brown colour. D. 200 mm. Coarse Ware. Type 137.

90. SAB-no. 34-39. P13, stratum 6. Plant-and-lime temper. Low fired. Scraped surface. Brown colour. D. 280 mm. Coarse Ware. Tray?

Fig. IV.12.

91. SAB-no. 16-4. P13, stratum 4. Plant temper. Medium fired. Scraped surface. Buff colour. D. 270 mm. Coarse Ware. Tray?

92. SAB-no. 22-2. T4, stratum 3. Lime temper. Low fired. Scraped surface. Brown colour. D. 290 mm. Coarse Ware. Tray?

93. SAB-no. 17-16. P14, stratum 5. Lime temper. Low fired. Scraped surface. Brown colour. D. 270 mm. Coarse Ware. Tray?

94. SAB-no. 30-9. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 170 mm. Fine Ware. Type 116.

95. SAB-no. 22-34. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 180 mm. Fine Ware. Type 116.

96. SAB-no. 20-24. T4, stratum 1. Lime temper. Low fired. Burnished surface. Grey colour. D. 210 mm. Grey-Black Ware. Type 137.

97. SAB-no. 7-3. P13, stratum 3. Lime temper. Medium fired. Scraped surface. Orange colour. D. 240 mm. Coarse Ware. Type 137.

Fig. IV.13.

98. SAB-no. 11-3. P13, stratum 4. Lime temper. Medium fired. Burnished surface. Black colour. D. 280 mm. Grey-Black Ware. Type 129.

99. SAB-no. 14-117. P14, stratum 6A. Sand temper. Medium fired. Burnished surface. Grey colour. D. 350 mm. Grey-Black Ware. Type 129.

100. SAB-no. 6-57. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 240 mm. Fine Ware. Type 223.

101. SAB-no. 55-22. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 180 mm. Fine Ware. Type 223.

102. SAB-no. 13-1. T4, stratum 1. Lime temper. Low fired. Scraped surface. Buff colour. D. 270 mm. Fine Ware. Type 223.

Fig. IV.14.

103. SAB-no. 16-3. P13, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 250 mm. Fine Ware. Type 223.

104. SAB-no. 13-26. T4, stratum 1. Lime temper. Low fired. Burnished surface. Grey colour. D. 150 mm. Grey-Black Ware.

105. SAB-no. 28-23. P14, stratum 6C. Plant temper. Low fired. Scraped surface. Brown colour. D. 220 mm. Coarse Ware.

106. SAB-no. 22-1. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 220 mm. Fine Ware.

107. SAB-no. 5-41. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 260 mm. Fine Ware. Type 327.

108. SAB-no. 28-17. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Brown colour. D. 240 mm. Coarse Ware. Type 327.

Fig. IV.15.

109. SAB-no. 28-16. P14, stratum 6C. Lime temper. Medium fired. Scraped surface. Buff colour. D. 130 mm. Fine Ware. Type 327.

110. SAB-no. 11-5. T4, stratum 1. Sand temper. Medium fired. Burnished surface. Grey colour. D. 100 mm. Grey-Black Ware. Type 327.

111. SAB-no. 5-43. T4, stratum 1. Sand temper. Low fired. Burnished surface. Brown colour. D. 280 mm. Coarse Ware. Type 327.

112. SAB-no. 16-5. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 290 mm. Fine Ware. Type 327.

113. SAB-no. 18-1. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 90 mm. Fine Ware.

114. SAB-no. J5. P14, stratum 10. PLant temper. Low fired. Smoothed surface. Orange-brown colour. D. 120 mm. Coarse Ware.

Fig. IV.16.

115. SAB-no. 16-1. P14, stratum 4. Sand temper. Low fired. Burnished surface. Brown colour. D. 270 mm. Coarse Ware. Type 327.

116. SAB-no. 35-26. P13, stratum 3. Plant temper. Medium fired. Smoothed surface. Brown colour. D. 230 mm. Coarse Ware. Type 327.

117. SAB-no. 38-12. P14, stratum 7A. Plant temper. Low fired. Scraped surface. Brown colour. D. 180 mm. Coarse Ware. Type 341.

118. SAB-no. 34-37. P13, stratum 6. Plant temper. Low fired. Smoothed surface. Brown colour. D. 120 mm. Coarse Ware. Type 341.

119. SAB-no. 7-2. P13, stratum 3. Lime temper. Medium fired. Burnished surface. Grey colour. Grey-Black Ware. Type 341.

120. SAB-no. 64-3. P14, stratum 11. Plant temper. Low fired. Smoothed surface. Brown colour. D. 280 mm. Coarse Ware. Type 239.

Fig. IV.17.

121. SAB-no. 18-21. P13, stratum 4. Calcite temper. Low fired. Burnished surface. reddish-brown colour. D. 220 mm. Coarse Ware. Type 239.

122. SAB-no. 39-28. P13, stratum 5. Plant-and-sand temper. medium fired. Burnished surface. Brown colour. D. 150 mm. Coarse Ware. Type 238.

123. SAB-no. 28-24. P14, stratum 6C. Plant temper. Low fired. Burnished surface. Brown colour. D. 150 mm. Coarse Ware. Type 238.

124. SAB-no. 14-125. P14, stratum 6A. Plant-and-lime temper. Low fired. Smoothed surface. Brown colour. D. 80 mm. Coarse Ware. Type 238.

Fig. IV.18.

125. SAB-no. 53-94. P14, stratum 6C. Lime temper. Low fired. Burnished surface. Brown colour. D. 210 mm. Coarse Ware. Type 238.

126. SAB-no. 37-20. P13, stratum 6. Lime-sand temper. Low fired. Burnished surface. Brown colour. D. 220 mm. Coarse Ware. Type 238.

127. SAB-no. 10-45. P14, stratum 4. Lime temper. Low fired. Burnished surface. Grey colour. D. 180 mm. Grey-Black Ware. Type 238.

128. SAB-no. 23-16. P13, stratum 4. Lime temper. Low fired. Smoothed surface. Black colour. D. 230 mm. Grey-Black Ware. Type 238.

129. SAB-no. 35-22. P13, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 200 mm. Coarse Ware. Type 238.

130. SAB-no. 15-16. T4, stratum 2/3. Sand temper. Medium fired. Burnished surface. Brown colour. D. 200 mm. Coarse Ware. Type 238.

Fig. IV.19.

131. SAB-no. 6-56. T4, stratum 1. Lime temper. Low fired. Smoothed surface. Brown colour. D. 170 mm. Coarse Ware. Type 238.

132. SAB-no. 35-25. P13, stratum 3. Plant temper. Medium fired. Smoothed surface. Brown colour. D. 120 mm. Coarse Ware. Type 238.

133. SAB-no. 31-4. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 120 mm. Fine Ware. Type 210.

134. SAB-no. 40-4. P14, stratum 7B. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 90 mm. Fine Ware. Type 210.

135. SAB-no. 26-6. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 120 mm. Lustrous black paint. Fine Ware. Type 249.

136. SAB-no. 17-15. T4, stratum 2. Sand temper. Medium fired. Burnished surface. Brown colour. D. 140 mm. Fine Ware. Type 249.

137. SAB-no. 53-85. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Orange colour. D. 180 mm. Matt reddish paint. Fine Ware. Type 249.

138. SAB-no. 28-1. P14, stratum 6C. Sand temper. Low fired. Pattern-burnished surface. Reddish-brown colour. D. 250 mm.

Fig. IV.20.

139. SAB-no. 12-1. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 190 mm. Lustrous brown paint. Fine Ware. Type 116.

140. SAB-no. 20-1. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 230 mm. Lustrous brown paint. Fine Ware. Type 116.

141. SAB-no. 2-1. T5, top soil. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 210 mm. Lustrous black paint. Fine Ware. Type 116.

141. SAB-no. 6-1. T5, top soil. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 240 mm. Lustrous brown paint. Fine Ware. Type 116.

Fig. IV.21.

143. SAB-no. 9-19. P14, stratum 2/3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 290 mm. Lustrous brown paint. Fine Ware. Type 116.

144. SAB-no. 36-20. P13, stratum 5. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 220 mm. Lustrous brown paint. Fine Ware. Type 116.

145. SAB-no. 33-1. P14, stratum 6D. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 160 mm. Lustrous brown paint. Fine Ware. Type 116.

146. SAB-no. 39-1. P13, stratum 5. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 180 mm. Lustrous brown paint. Fine Ware. Type 116.

147. SAB-no. 4-1. P13, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 120 mm. Matt brown paint. Fine Ware. Type 116.

148. SAB-no. 33-12. P14, stratum 6D. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 150 mm. Matt brown paint. Fine Ware. Type 116.

149. SAB-no. 33-1. P13, stratum 5. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 90 mm. Lustrous black paint. Fine Ware. Type 116.

150. SAB-no. 8-29. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 60 mm. Fine Ware. Type 116.

Fig. IV.22.

151. SAB-no. 3-2. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 220 mm. Lustrous brown paint. Fine Ware. Type 119.

152. SAB-no. 26-5. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 170 mm. Matt brown paint. Fine Ware. Type 119.

153. SAB-no. 42-2. P13, stratum 3. Lime temper. Medium fired. Smoothed surface. Cream colour. D. 170 mm. Lustrous brown paint. Fine Ware. Type 119.

154. SAB-no. 50-66. P14, stratum 6A. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 140 mm. Lustrous black paint. Fine Ware. Type 119.

155. SAB-no. 49-12. P14, stratum 6C. Lime temper. Low/medium fired. Smoothed but irregular surface. Buff colour. D. 150 mm. Fine Ware. Type 119?

156. SAB-no. 13-8. T4, stratum 1. Sand temper. Medium fired. Smoothed surface. Buff colour. Red-brown paint. Fine Ware. Type 119.

157. SAB-no. 45-29. P14, stratum 8. Lime temper. Medium/high fired. Smoothed surface. Greenish colour. Lustrous black paint. Fine Ware. Type 119.

158. SAB-no. 45-28. P14. stratum 8. Lime temper. Medium/high fired. Smoothed surface. Greenish colour. Lustrous black paint. Fine Ware. Type 119.

159. SAB-no. 3-6. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous brown paint. Fine Ware. Type 119.

160. SAB-no. 27-7. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 210 mm. Lustrous black paint. Fine Ware. Type 117.

Fig. IV.23.

161. SAB-no. 35-24. P13, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 180 mm. Lustrous brown paint. Fine Ware. Type 117.

162. SAB-no. 9-7. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 140 mm. Black paint. Fine Ware. Type 117.

163. SAB-no. 4-2. P13, stratum 1. Lime temper. Medium fired. Smoothed surface. Orange colour. D. 130 mm. Fine Ware. Type 117.

164. SAB-no. 49-5. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware. Type 132.

165. SAB-no. 31-27. P13, stratum 5. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 180 mm. Brown paint. Fine Ware. Type 132.

166. SAB-no. 28-28. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 180 mm. Matt brown paint. Fine Ware. Type 132.

167. SAB-no. 25-2. P14, stratum 6B. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 180 mm. Matt brown paint. Fine Ware. Type 132.

168. SAB-no. 28-30. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 170 mm. Matt brown paint. Fine Ware. Type 132.

169. SAB-no. 58-1. P14, stratum 9. Lime temper. Medium fired. Smoothed surface. Cream colour. D. 180 mm. Lustrous black paint. Fine Ware. Type 132.

170. SAB-no. 45-27. P14, stratum 8. Lime temper. Medium/high fired. Smoothed surface. Greenish colour. Matt black paint. Fine Ware. Type 132.

171. SAB-no. 55-5. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Cream colour. D. 180 mm. Matt black paint. Fine Ware. Type 132.

172. SAB-no. 1-1. T5, top soil. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 170 mm. Matt black paint. Fine Ware. Type 129.

173. SAB-no. 11-4. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Cream colour. D. 240 mm. Matt black paint. Fine Ware. Type 129.

Fig. IV.24.

174. SAB-no. 0-1. Surface northeastern mound. Sand temper. Medium/high fired. Smoothed surface. Greenish colour. D. 230 mm. Matt black paint. Fine Ware. Type 129.

175. SAB-no. 13-1. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 180 mm. Matt brown paint. Fine Ware. Type 129.

176. SAB-no. 2-3. O14, stratum 1. Lime temper. Medium fired. Smoothed surface. Cream colour. D. 120 mm. Lustrous black paint. Fine Ware. Type 129.

177. SAB-no. 53-84. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 140 mm. Matt orange-red paint. Fine Ware. Type 129.

178. SAB-no. 50-10. P14, stratum 6A. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 160 mm. Matt brown paint. Fine Ware. Type 129.

179. SAB-no. 31-1. P13, stratum 5. Lime temper. Medium fired. Smoothed surface. Cream colour. D. 190 mm. Matt brown paint. Fine Ware. Type 129.

180. SAB-no. 31-2. P13, stratum 5. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 100 mm. Matt brown paint. Fine Ware. Type 129.

181. SAB-no. 20-13. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. bf. D. 260 mm. Lustrous black paint. Fine Ware. Type 132.

Fig. IV.25.

182. SAB-no. 8-1. P14, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 360 mm. Lustrous black paint. Fine Ware. Type 132.

183. SAB-no. 28-29. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 130 mm. Lustrous black paint. Fine Ware. Type 111.

184. SAB-no. 16-2. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 140 mm. Lustrous black paint. Fine Ware. Type 111.

185. SAB-no. 59-1. P14, stratum 6D. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 140 mm. Lustrous black paint. Fine Ware. Type 111.

186. SAB-no. 25-1. P14, stratum 6B. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 180 mm. Lustrous black paint. Fine Ware. Type 111.

187. SAB-no. 4-6. P13, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 170 mm. Matt black paint. Fine Ware. Type 111.

188. SAB-no. 8-3. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 170 mm. Matt black paint. Fine Ware. Type 111.

189. SAB-no. 38-1. P13, stratum 5. Lime temper. Medium fired. Smoothed surface. Greenish colour. D. 140 mm. Lustrous black paint. Fine Ware. Type 111.

190. SAB-no. 26-1. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 210 mm. Lustrous black paint. Fine Ware. Type 111.

191. SAB-no. 3-1. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 170 mm. Lustrous black paint. Fine Ware. Type 111.

192. SAB-no. 5-4. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 200 mm. Lustrous black paint. Fine Ware. Type 111.

193. SAB-no. 31-34. P13, stratum 5. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 200 mm. Lustrous brown paint. Fine Ware. Type 111.

194. SAB-no. 20-31. P14, stratum 6A. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 150 mm. Lustrous black paint. Fine Ware. Type 111.

Fig. IV.26.

195. SAB-no. 21-1. P14, stratum 5. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 230 mm. Lustrous black paint. Fine Ware. Type 111.

196. SAB-no. 44-7. P13, stratum 6. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 230 mm. Matt brown paint. Fine Ware. Type 111.

197. SAB-no. 2-16. P14, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware. Type 111.

198. SAB-no. 53-83. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware. Type 111.

199. SAB-no. 11-1. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware. Type 111.

Fig. IV.27.

200. SAB-no. 3-3. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 270 mm. Lustrous black paint. Fine Ware. Type 111.

201. SAB-no. 7-1. P13, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 260 mm. Lustrous black paint. Fine Ware. Type 111.

200. SAB-no. 42-1. P13, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 310 mm. Lustrous black paint. Fine Ware. Type 111.

203. SAB-no. 9-1. T4, stratum 1/2. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 300 mm. Matt black paint. Fine Ware. Type 111.

Fig. IV.28.

204. SAB-no. 20-25. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 320 mm. Lustrous brown paint. Fine Ware. Type 111.

205. SAB-no. 7-1. O13, in Late Bronze Age stratum 1 (out of context). Lime temper. Medium fired. Smoothed surface. Buff colour. D. 300 mm. Matt black paint. Fine Ware. Type 150.

206. SAB-no. 7-21. T4, stratum 2. Lime temper. Medium fired. Smoothed surface. Orange colour. D. 150 mm. Lustrous reddish-brown paint. Fine Ware. Type 145.

Fig. IV.29.

207. SAB-no.-49-49. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Cream colour. D. 90 mm. Lustrous black paint. Fine Ware. Type 327.

208. SAB-no. 86-J1. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 90 mm. Lustrous black paint. Fine Ware. Type 327.

209. SAB-no. 32-1. P13, stratum 5. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 90 mm. Lustrous black paint. Fine Ware. Type 327.

210. SAB-no. 86-J2. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 85 mm. Lustrous black paint. Fine Ware. Type 327.

211. SAB-no. 9-6. T4, stratum 1/2. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 110 mm. Lustrous black paint. Fine Ware. Type 327.

Fig. IV.30.

212. SAB-no. 13-5. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 110 mm. Lustrous brown paint. Fine Ware. Type 327.

213. SAB-no. 13-5. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 80 mm. Matt black paint. Fine Ware. Type 327.

214. SAB-no. 10-4. T4, stratum 2/3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 110 mm. Lustrous black paint. Fine Ware. Type 327.

215. SAB-no. 41-1. P14, stratum 7B. Lime temper. Medium fired. Smoothed surface. Cream colour. D. 100 mm. Lustrous brown paint. Fine Ware. Type 327.

216. SAB-no. 11-1. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 130 mm. Lustrous black paint. Fine Ware. Type 327.

217. SAB-no. 38-1. P14, stratum 7A. Lime temper. Medium fired. Smoothed surface. Cream colour. D. 120 mm. Matt brown paint. Fine Ware. Type 327.

218. SAB-no. 27-14. P14, stratum 6B. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 120 mm. Matt brown paint. Fine Ware. Type 327.

219. SAB-no. 51-65. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 100 mm. Lustrous black paint. Fine Ware. Type 327.

220. SAB-no. 28-1. P14, stratum 6C. Sand temper. Low fired. Burnished surface. Red colour. D. 150 mm. Lustrous black paint. Fine Ware. Type 327.

221. SAB-no. 51-63. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 120 mm. Matt brown paint. Fine Ware. Type 327.

222 SAB-no. 3-5. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 150 mm. Lustrous black paint. Fine Ware. Type 327.

223. SAB-no. 13-7. T4, stratum 1. Lime temper. Medium fired. Smoothed surface.Buff colour. D. 170 mm. Lustrous brown paint. Fine Ware. Type 327.

Fig. IV.31.

224. SAB-no. 35-1. P14, stratum 7A. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 200 mm. Matt black paint. Fine Ware. Type 327.

225. SAB-no. 50-5. P14, stratum 6A. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 230 mm. Lustrous reddish-brown paint. Fine Ware. Type 327.

226. SAB-no. 13-6. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 230 mm. Lustrous black paint. Fine Ware. Type 327.

227. SAB-no. 6-4. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 210 mm. Lustrous black paint. Fine Ware. Type 327.

228. SAB-no. 5-3. T4, stratum 1. No visible temper. Medium fired. Smoothed surface. Buff colour. D. 300 mm. Lustrous brown paint. Fine Ware. Type 327.

229. SAB-no. 49-43. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 210 mm. Matt black paint. Fine Ware. Type 327.

Fig. IV.32.

230. SAB-no. 14-64. P14, stratum 6A. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 200 mm. Lustrous black paint. Fine Ware. Type 327.

231. SAB-no. 37-1. P13, stratum 6. Lime temper. Medium fired. Smoothed surface. Brown colour. D. 130 mm. Matt brown paint. Fine Ware. Type 327.

232. SAB-no. 9-2. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 150 mm. Lustrous black colour. Fine Ware. Type 327.

233. SAB-no. 18-10. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 170 mm. Lustrous black paint. Fine Ware. Type 327.

234. SAB-no. 16-1. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 220 mm. Lustrous black paint. Fine Ware. Type 327.

235. SAB-no. 31-3. P13, stratum 5. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 160 mm. Lustrous black paint. Fine Ware. Type 322.

236. SAB-no. 6-4. P14, stratum 2/3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 110 mm. Lustrous black paint. Fine Ware. Type 322.

237. SAB-no. 34-46. P13, stratum 6. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 110 mm. Matt brown paint. Fine Ware. Type 322.

238. SAB-no. 16-25. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 130. Lustrous black paint. Fine Ware. Type 327.

239. SAB-no. 7-1. P14, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 120 mm. Lustrous black paint. Fine Ware. Type 327.

240. SAB-no. 4-7. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 70 mm. Lustrous black paint. Fine Ware. Type 327.

241. SAB-no. 50-65. P14, stratum 6A. Lime temper. Medium fired. Smoothed surface. Orange colour. D. 70 mm. Lustrous black paint. Fine Ware. Type 327.

Fig. IV.33.

242. SAB-no. 9-3. T4, stratum 1/2. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 110 mm. Matt black paint. Fine Ware. Type 328.

243. SAB-no. 15-5. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 160 mm. Lustrous black paint. Fine Ware. Type 328.

244. SAB-no. 10-3. T4, stratum 2. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 100 mm. Matt black paint. Fine Ware. Type 328.

245. SAB-no. 13-2. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 180 mm. Lustrous black paint. Fine Ware. Type 327.

246. SAB-no. 16-3. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 230 mm. Lustrous black paint. Fine Ware. Type 327.

247. SAB-no. 5-1. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Orange colour. D. 280 mm. Lustrous brown paint. Fine Ware. Type 327.

248. SAB-no. 28-1. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 280 mm. Matt brown paint. Fine Ware. Type 327.

Fig. IV.34.

249. SAB-no. 13-4. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 230 mm. Matt brown paint. Fine Ware. Type 327.

250. SAB-no. 35-3. P14, stratum 7A. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 320 mm. Lustrous black paint. Fine Ware. Type 327.

251. SAB-no. 2-56. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 320 mm. Lustrous brown paint. Fine Ware. Type 327.

252. SAB-no. 6-5. P14, stratum 2/3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 230 mm. Lustrous black paint. Fine Ware. Type 327.

253. SAB-no. 28-1. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 280 mm. Matt brown paint. Fine Ware.

Fig. IV.35.

254. SAB-no. 49-1. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 290 mm. Lustrous brown paint. Fine Ware.

255. SAB-no. 86-J4. P13, stratum 5. Lime temper. Medium/high fired. Smoothed surface. Greenish colour. Brittle texture. D. 52 mm. Lustrous black paint. Fine Ware. Miniature vessel. Found together with lid.

256. SAB-no. 86-J3. P13, stratum 5. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 50 mm. Lustrous black paint. Fine Ware. Miniature vessel.

257. SAB-no. 6-2. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. D. 60 mm. Lustrous black paint. Fine Ware. Miniature vessel.

258. SAB-no. 15-1. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

259. SAB-no. 25-2. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

260. SAB-no. 12-1. T4, stratum 2/3. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

261. SAB-no. 33-44. P14. stratum 6D. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

262. SAB-no. 49-29. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

Fig. IV.36.

263. SAB-no. 51-26. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt brown paint. Fine Ware.

264. SAB-no. 18-1. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint.

265. SAB-no. 40-1. P13, stratum 6. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

266. SAB-no. 53-1. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Cream colour. Lustrous black paint. Fine Ware.

267. SAB-no. 51-67. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

268. SAB-no. 40-3. P14, stratum 7B. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

269. SAB-no. 35-25. P14, stratum 7A. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous brown paint. Fine Ware.

270. SAB-no. 49-45. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt brown paint. Fine Ware.

271. SAB-no. 49-27. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

272. SAB-no. 31-19. P13, stratum 5. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

273. SAB-no. 22-12. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

Fig. IV.37.

274. SAB-no. 52-28. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt brown paint. Fine Ware.

275. SAB-no. 55-11. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

276. SAB-no. 14-37. P14, stratum 6A. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

277. SAB-no. 7-4. P13, stratum 3. Lime temper. Medium fired. Smoothed surface. Cream colour. Lustrous black paint. Fine Ware.

278. SAB-no. 35-2. P14, stratum 7A. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous reddish-brown paint. Fine Ware.

279. SAB-no. 53-1. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt brown paint. Fine Ware.

280. SAB-no. 50-50. P14, stratum 6A. Lime temper. Medium fired. Smoothed surface. Orange colour. Matt reddish-brown paint. Fine Ware.

281. SAB-no. 9-5. T4, stratum 1/2. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

282. SAB-no. 15-2. T4, stratum 2/3. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

283. SAB-no. 9-5. P14, stratum 2/3. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt brown paint. Fine Ware.

284. SAB-no. 26-7. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt brown paint. Fine Ware.

285. SAB-no. 18-3. T4, stratum 2/3. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

286. SAB-no. 12-1. P14, stratum 5. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

Fig. IV.38.

287. SAB-no. 12-2. T4, stratum 2/3. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

288. SAB-no. 25-4. P14, stratum 6B. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

289. SAB-no. 3-7. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous brown paint.

290. SAB-no. 49-34. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt brown paint. Fine Ware.

291. SAB-no. 7-10. P13, stratum 3. Lime temper. Medium fired. Smoothed surface. Cream colour. Matt black paint. Fine Ware.

292. SAB-no. 59-3. P14, stratum 6D. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous brown paint. Fine Ware.

293. SAB-no. 16-9. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

294. SAB-no. 1-10. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

295. SAB-no. 22-1. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

Fig. IV.39.

296. SAB-no. 16-4. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

297. SAB-no. 14-53. P14, stratum 6A. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

298. SAB-no. 34-45. P13, stratum 6. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt brown paint. Fine Ware.

299. SAB-no. 24-1. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt brown paint. Fine Ware.

300. SAB-no. 37-17. P13, stratum 6. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous brown paint. Fine Ware.

301. SAB-no. 59-2. P14, stratum 6D. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous brown paint. Fine Ware.

302. SAB-no. 26-1. P13, stratum 4. Lime temper. Medium fired. Smoothed surface. White slip. Matt black paint. Fine Ware.

303. SAB-no. 22-3. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

304. SAB-no. 33-47. P14, stratum 5. Lime temper. Medium fired. Smoothed surface. Greenish colour. Matt black paint. Fine Ware.

305. SAB-no. 22-6. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

306. SAB-no. 26-2. P13, stratum 3. Lime temper. Medium fired. Smoothed surface. Cream colour. Matt black paint. Fine Ware.

307. SAB-no. 10-41. P14, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

308. SAB-no. 45-25. P14, stratum 8. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

Fig. IV.40.

309. SAB-no. 27-1. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous brown paint. Fine Ware.

310. SAB-no. 13-25. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

311. SAB-no. 18-1. T4, stratum 2/3. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous reddish-brown paint. Fine Ware.

312. SAB-no. 34-49. P13, stratum 6. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

313. SAB-no. 0-2. Surface southeastern mound. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

314. SAB-no. 20-29. P14, stratum 6A. Lime temper. Medium fired. Smoothed surface. Cream colour. Lustrous brown paint. Fine Ware.

316. SAB-no. 6-6. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous brown paint. Fine Ware.

316. SAB-no. 45-26. P14, stratum 8. Lime temper. Medium fired. Smoothed surface. Cream colour. Matt brown paint. Fine Ware.

317. SAB-no. 35-21. P13, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

318. SAB-no. 3-2. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

319. SAB-no. 3-8. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

320. SAB-no. 59-4. P14, stratum 6D. Lime temper. Medium fired. Smoothed surface. Greenish colour. Matt brown paint. Fine Ware.

Fig. IV.41.

321. SAB-no. 56-13. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

322. SAB-no. 9-17. P14, stratum 2/3. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

323. SAB-no. 23-5. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

324. SAB-no. 33-7. P14, stratum 6D. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt brown paint. Fine Ware.

325. SAB-no. 33-2. P14, stratum 6D. Lime temper. Medium fired. Smoothed surface. Cream colour. Lustrous black paint. Fine Ware.

326. SAB-no. 4-3. P13, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

327. SAB-no. 6-53. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Cream colour. Lustrous black paint. Fine Ware.

328. SAB-no. 11-3. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

329. SAB-no. 49-44. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

330. SAB-no. 1-18. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

Fig. IV.42.

331. SAB-no. 2-50. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

332. SAB-no. 28-2. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Cream colour. Matt black paint. Fine Ware.

333. SAB-no. 36-1. P13, stratum 5. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

334. SAB-no. 7-2. P14, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

335. SAB-no. 55-18. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

336. SAB-no. 10-16. P14, stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

377. SAB-no. 1-23. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Cream colour. Matt black paint. Fine Ware.

338. SAB-no. 20-25. P14, stratum 6A. Lime temper. Medium fired. Smoothed surface. Cream colour. Lustrous brown paint. Fine Ware.

339. SAB-no. 22-3. P14, stratum 5. Lime temper. Medium fired. Smoothed surface. Buff colour. Reddish-brown paint. Fine Ware.

340. SAB-no. 64-10. P14, stratum 11. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt brown paint. Fine Ware.

341. SAB-no. 49-73. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt black paint. Fine Ware.

342. SAB-no. 36-16. P14, stratum 7A. Lime temper. Medium fired. Smoothed surface. Cream colour. Matt black paint. Fine Ware.

343. SAB-no. 53-44. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous brown paint. Fine Ware.

344. SAB-no. 57-2. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Cream colour. Lustrous black paint. Fine Ware.

Fig. IV.43.

345. SAB-no. 50-63. P14, stratum 6A. Lime temper. Medium fired. Smoothed surface. Cream colour. Matt black paint. Fine Ware.

346. SAB-no. 22-1. P14, stratum 5. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

347. SAB-no. 10-42. P14. stratum 4. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

348. SAB-no. 14-102. P14, stratum 6A. Lime temper. Medium fired. Smoothed surface. Cream colour. Matt brown paint. Fine Ware.

349. SAB-no. 6-8. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

350. SAB-no. 42-3. P13, stratum 3. Lime temper. Medium fired. Smoothed surface. Cream colour. Lustrous black paint. Fine Ware.

351. SAB-no. 53-81. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Matt brown paint. Fine Ware.

352. SAB-no. 10-12. P13, stratum 3. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

Fig. IV.44.

353. SAB-no. 28-4. P14, stratum 6C. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

354. SAB-no. 1-1. P13, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous brown paint. Fine Ware.

355. SAB-no. 24-1. P14, stratum 6A. Lime temper. Medium fired. Smoothed surface. Cream colour. Lustrous brown paint. Fine Ware.

356. SAB-no. 8-17. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

357. SAB-no. 27-9. T4, stratum 3. Lime temper. Medium fired. Smoothed surface. Greyish-brown colour. Matt black paint. Fine Ware.

358. SAB-no. 9-4. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

359. SAB-no. 49-19. P14, stratum 6C.

360. SAB-no. 4-1. T4, stratum 1. Lime temper. Medium fired. Smoothed surface. Buff colour. Lustrous black paint. Fine Ware.

361. SAB-no. 17-14. T4, stratum 2. Lime temper. Medium fired. Smoothed surface. bs. Lustrous black paint. Fine Ware.

362. SAB-no. 38-2. P13, stratum 5. Lime temper. Medium fired. Smoothed surface. Cream colour. Matt black paint. Fine Ware.

363. SAB-no. 15-4. P13, stratum 4. Lime temper. Low fired. Burnished surface. Grey colour. Grey-Black Ware.

Fig. IV.45.

364. SAB-no. 29-11. P13, stratum 5. Plant-and-lime temper. Low fired. Smoothed surface. Brown colour. Impression. Coarse Ware.

365. SAB-no. 42-1. P14, stratum 10. Plant-and-lime temper. Low fired. Burnished surface. Whitish slip. Impression. Coarse Ware.

366. SAB-no. 34-44. P13, stratum 6. Plant-and-lime temper. Low fired. Smoothed surface. Brown colour. Impression. Coarse Ware.

367. SAB-no. 33-46. P14, stratum 6D. Calcite temper. Low fired. Smoothed surface. Brown colour. Lustrous dark-red paint and impression. Coarse Ware.

368. SAB-no. 11-15. P13, stratum 4. Calcite temper. Medium fired. Smoothed surface. Buff colour. Impression. Fine Ware.

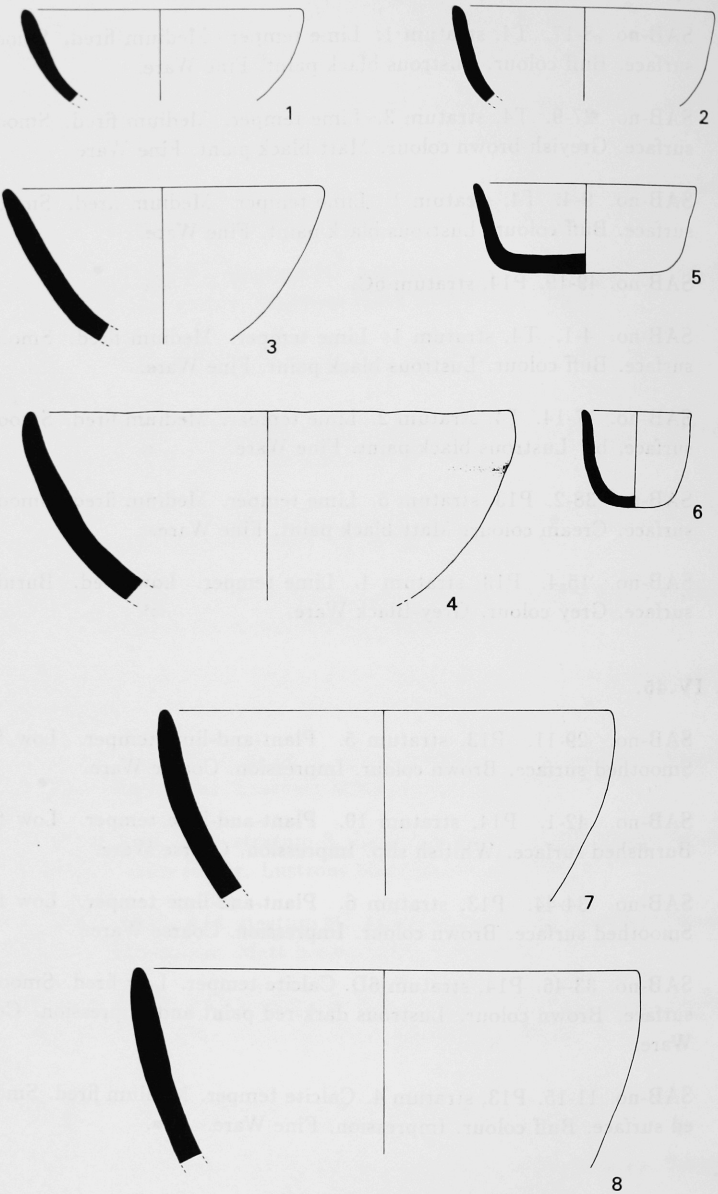


Fig. IV.1. Late Neolithic pottery from the northeastern area (scale 1:3).

Fig. IV.2. Late Neolithic pottery from the northeastern area (scale 1:3).

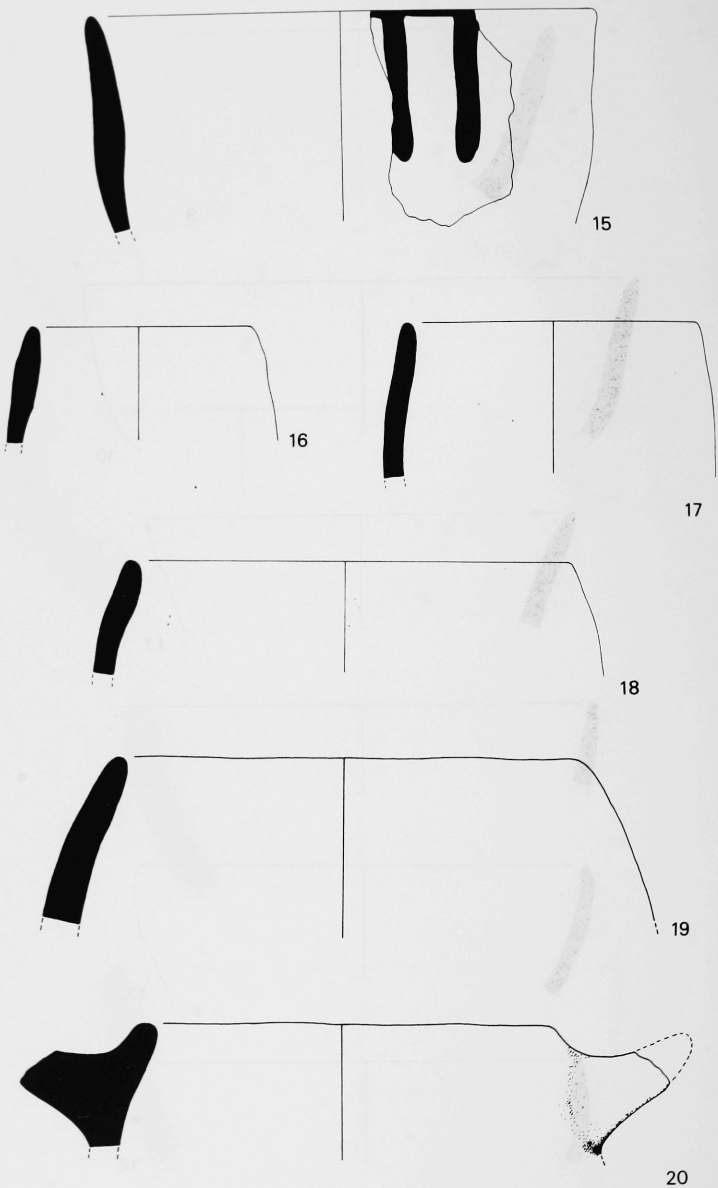


Fig. IV.3. Late Neolithic pottery from the northeastern area (scale 1:3).

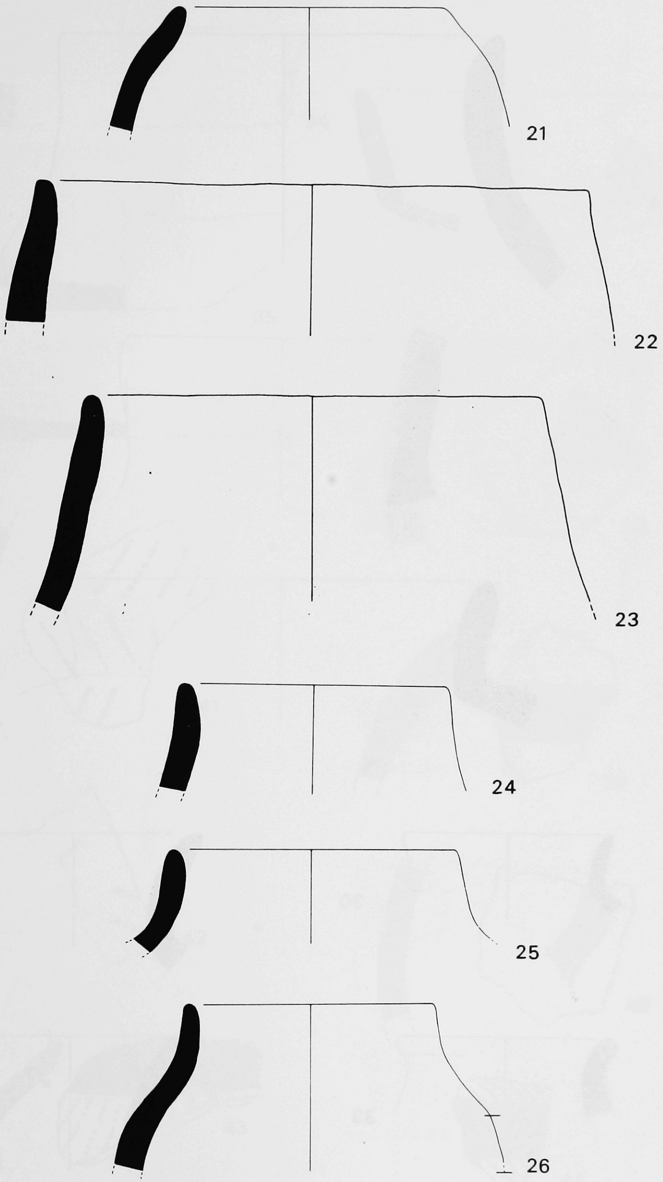


Fig. IV.4. Late Neolithic pottery from the northeastern area (scale 1:3).

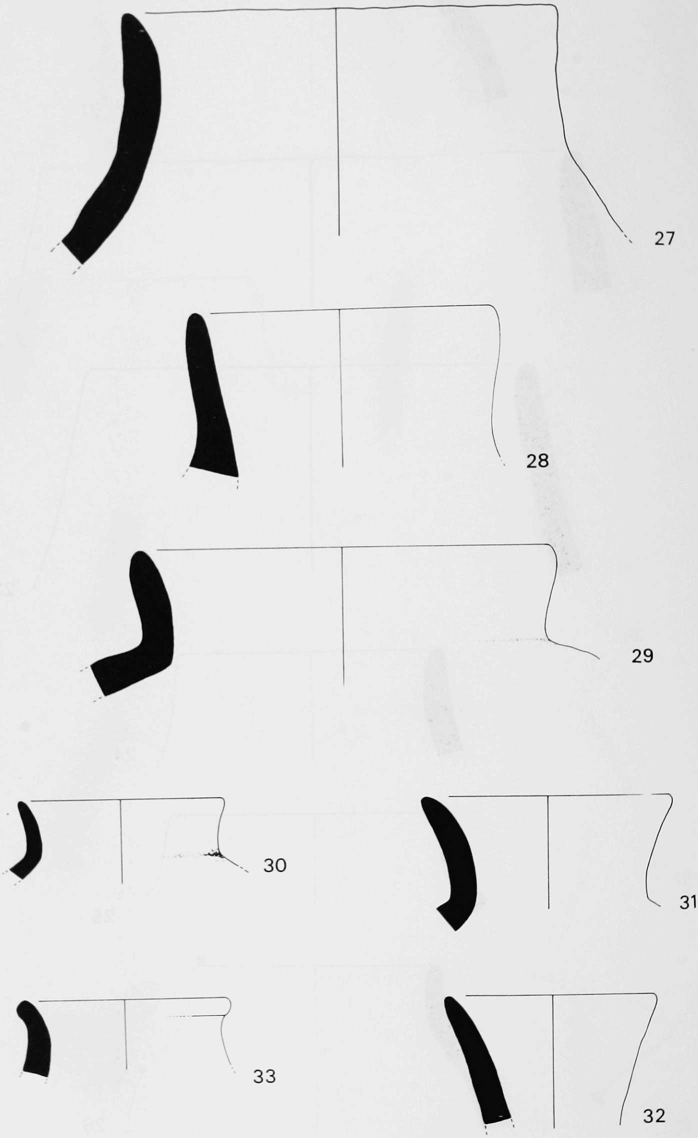


Fig. IV.5. Late Neolithic pottery from the northeastern area (scale 1:3).

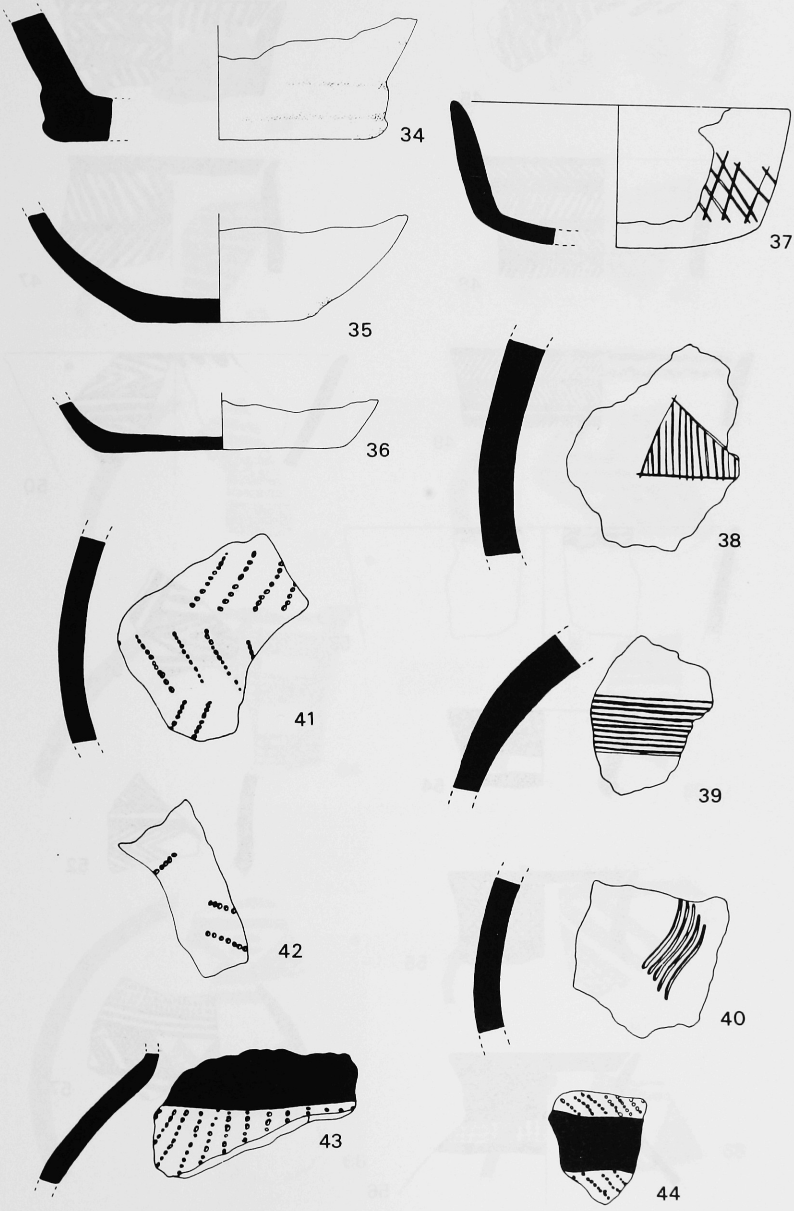


Fig. IV.6. Late Neolithic pottery from the northeastern area (nos. 34-37: scale 1:3; nos. 38-44: scale 1:2).

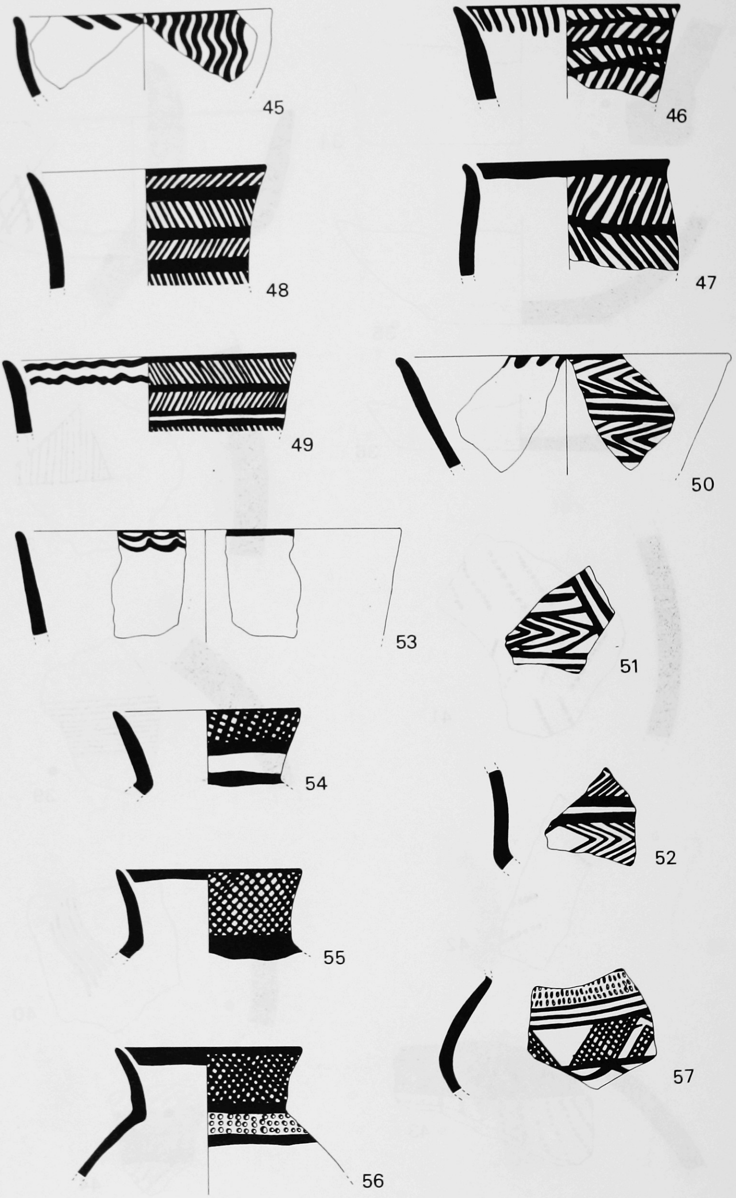


Fig. IV.7. Late Neolithic pottery from the northeastern area (scale 1:3).

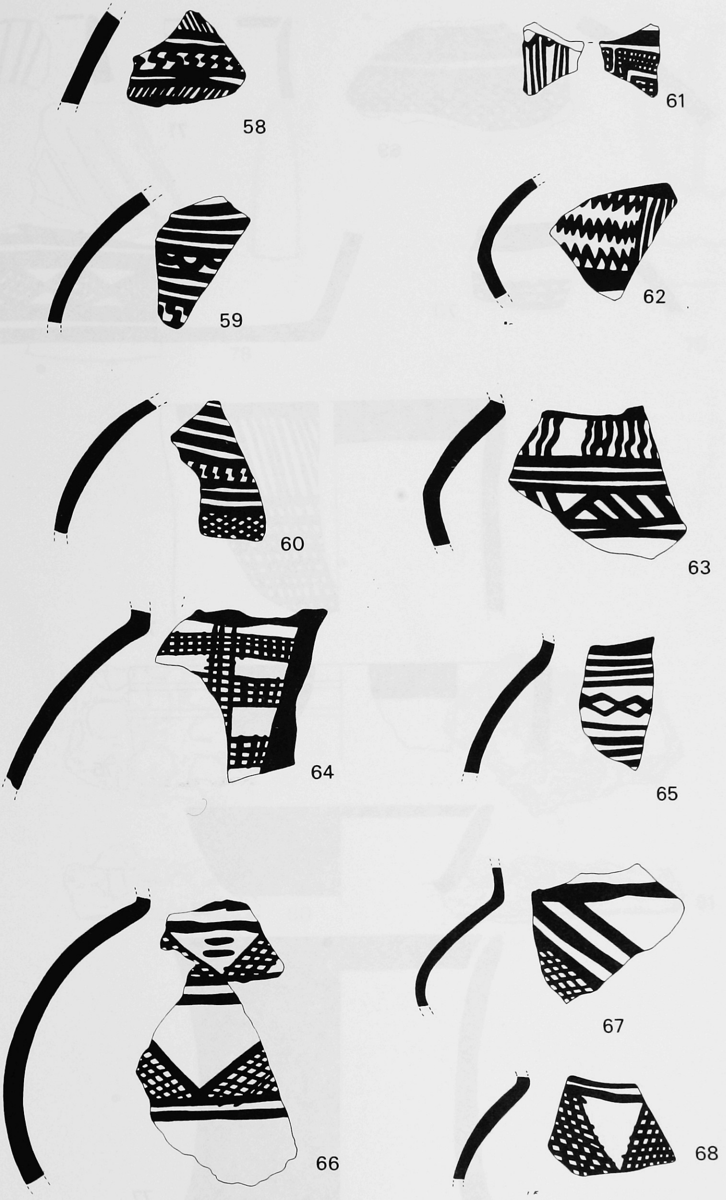


Fig. IV.8. Late Neolithic pottery from the northeastern area (scale 1:3).

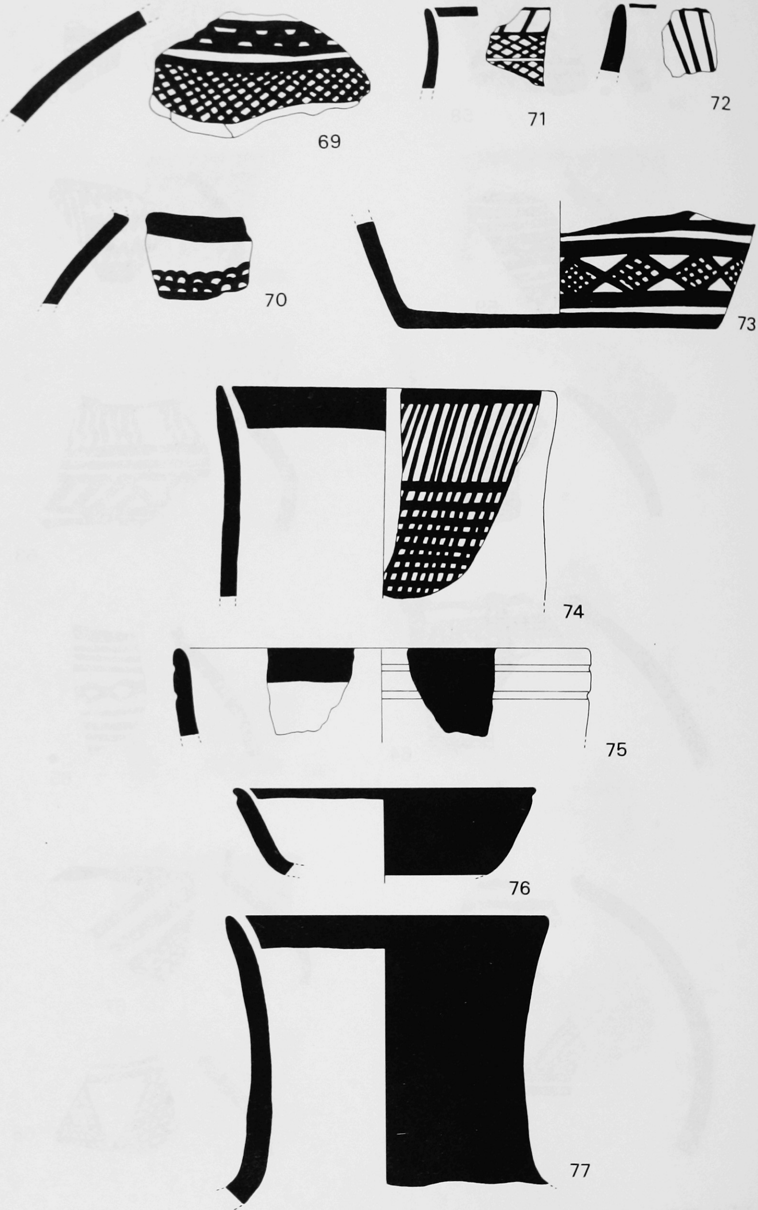
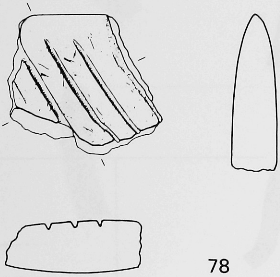
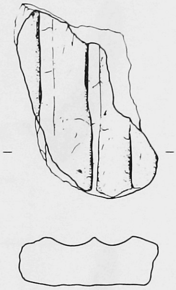


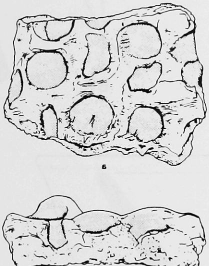
Fig. IV.9. Late Neolithic pottery from the northeastern area (scale 1:3).



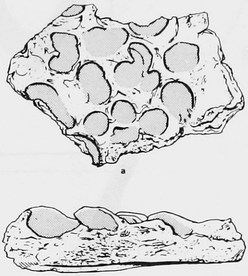
78



79



80



81

Fig. IV.10. Late Neolithic 'husking trays' from the northeastern area (scale 1:3).

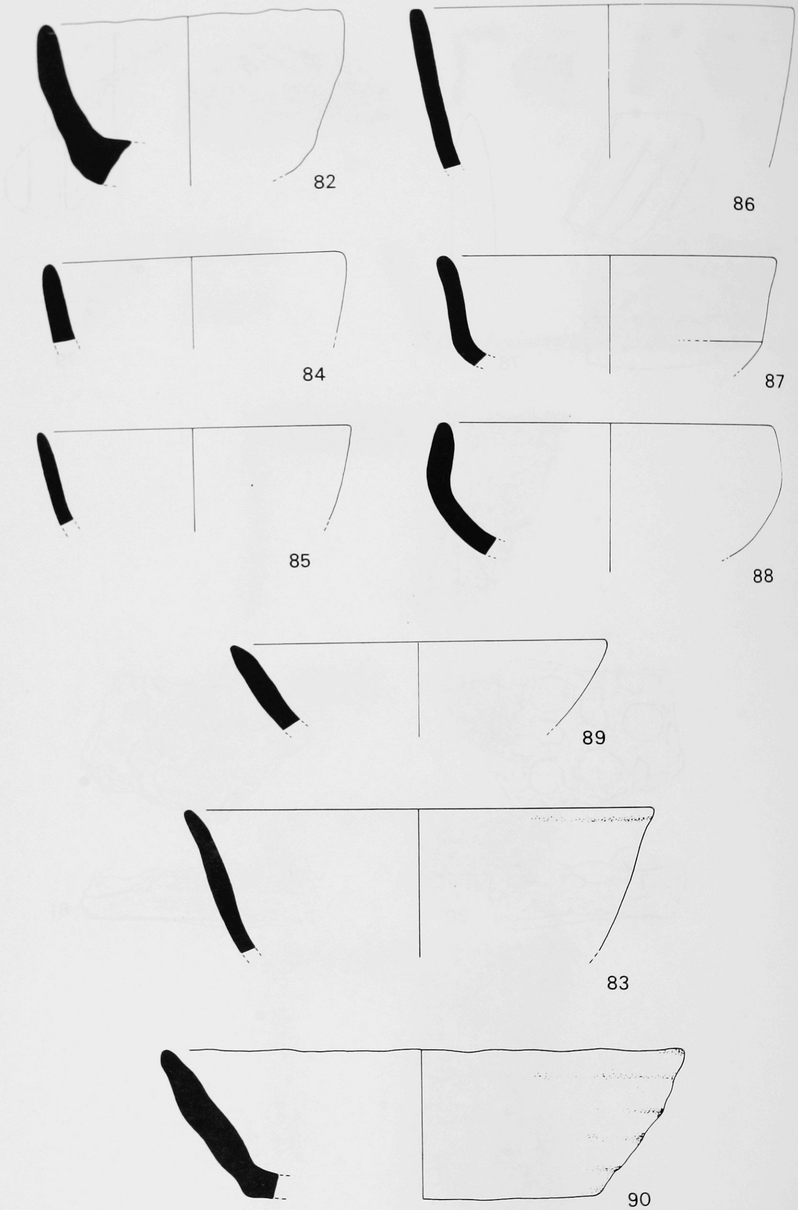


Fig. IV.11. Pottery from the Early Halaf strata. No. 87: Late Neolithic (scale 1:3).

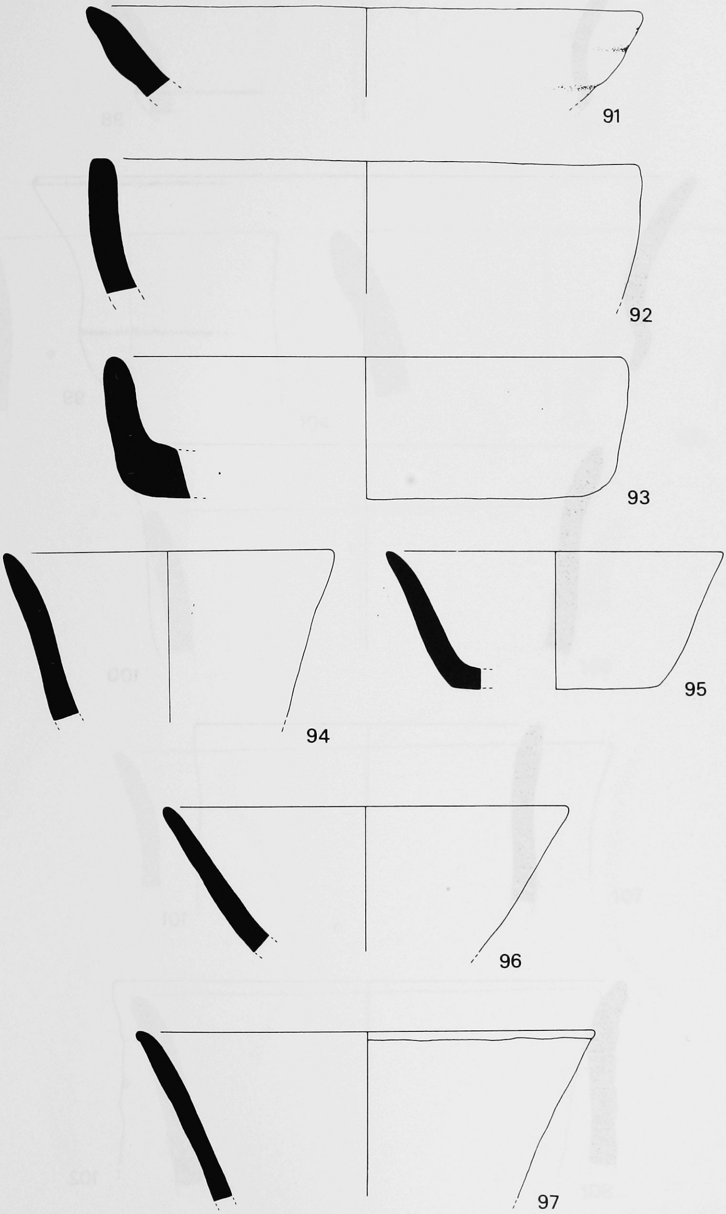


Fig. IV.12. Pottery from the Early Halaf strata (scale 1:3).

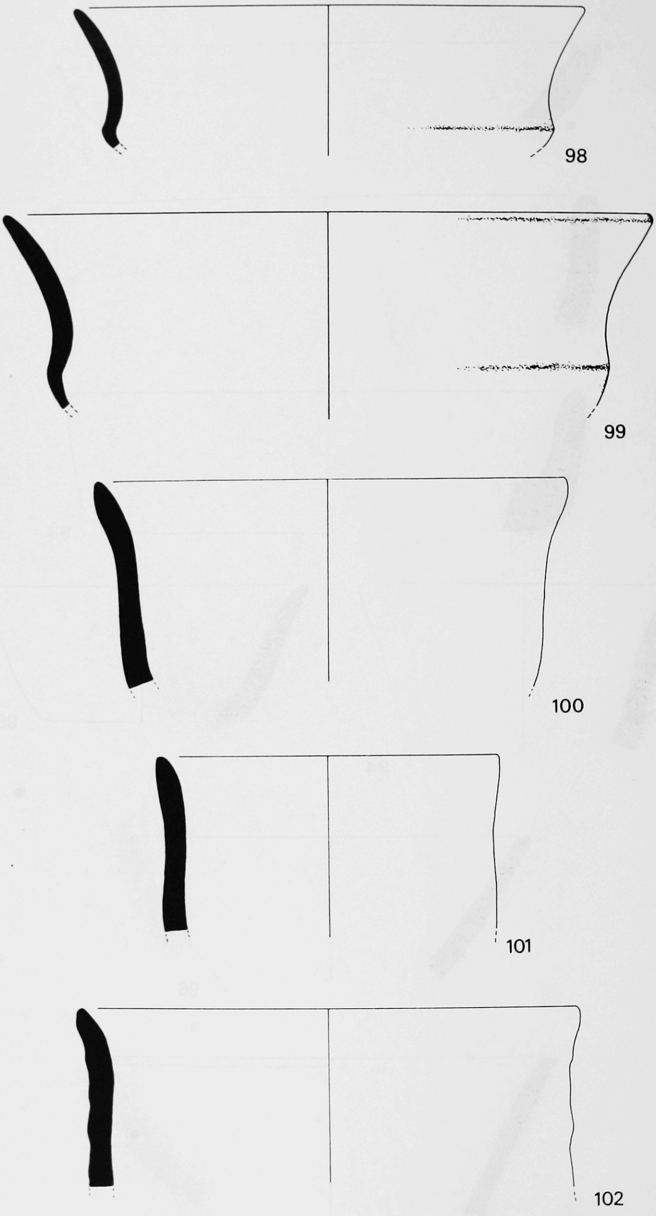


Fig. IV.13. Pottery from the Early Halaf strata (scale 1:3).

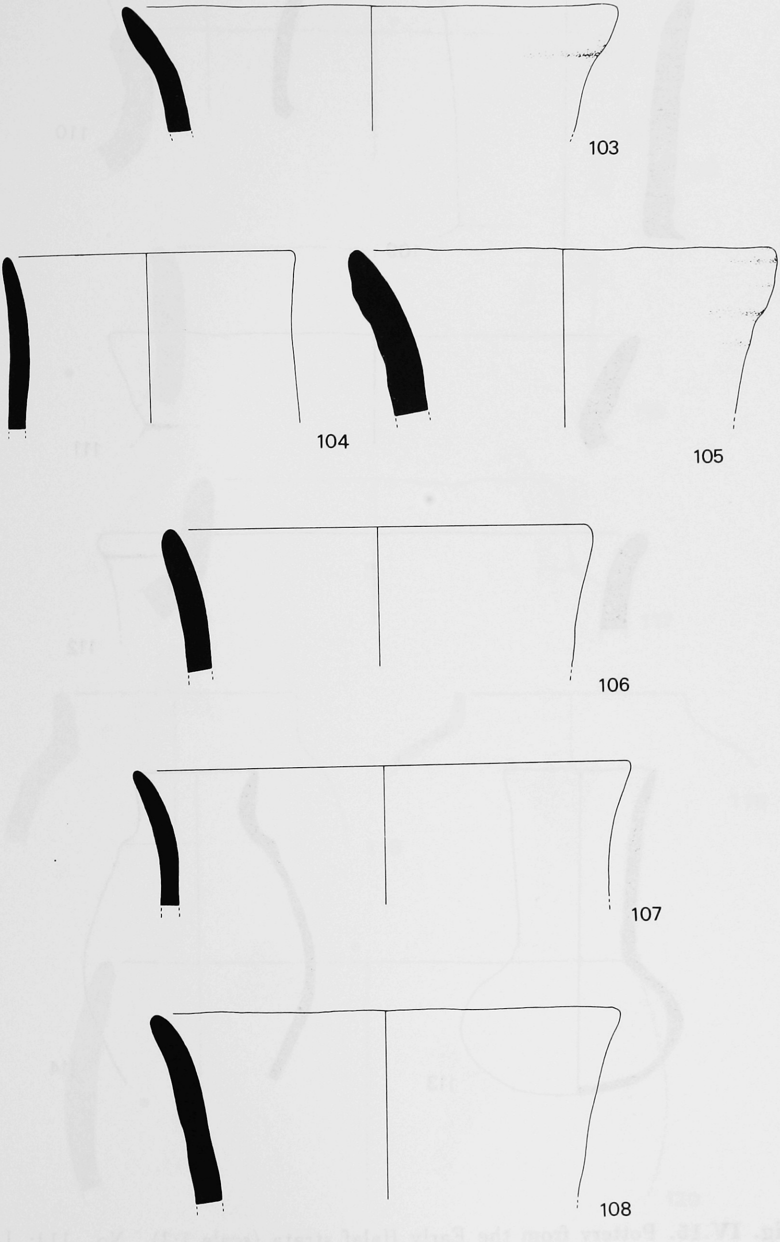


Fig. IV.14. Pottery from the Early Halaf strata (scale 1:3).

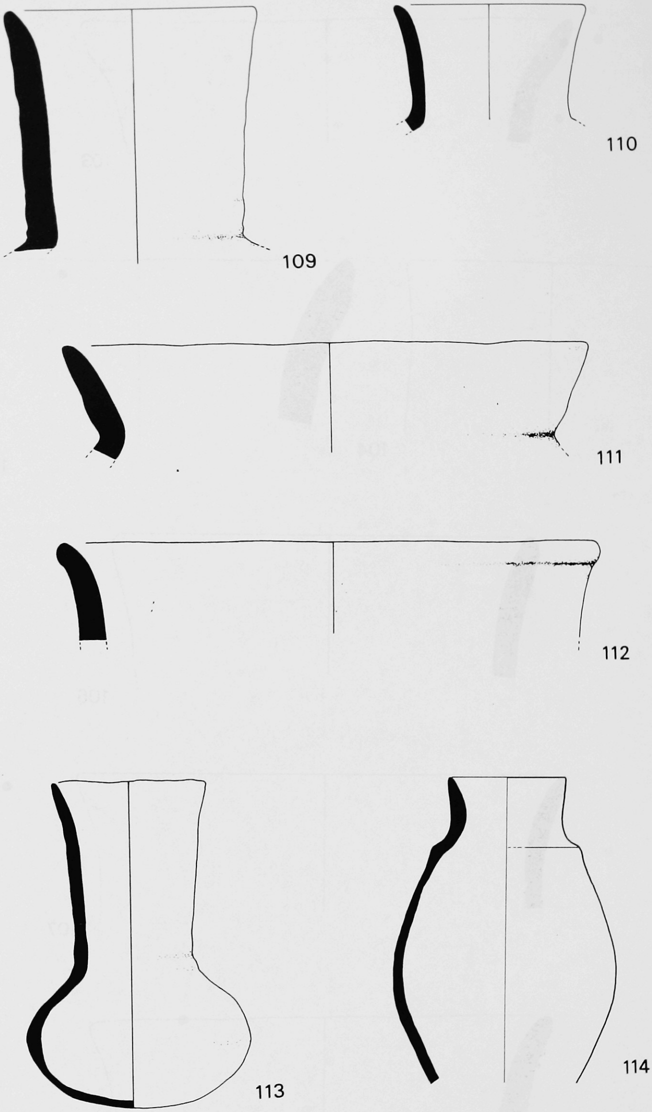


Fig. IV.15. Pottery from the Early Halaf strata (scale 1:3). No. 114: Late Neolithic (scale 1:6).

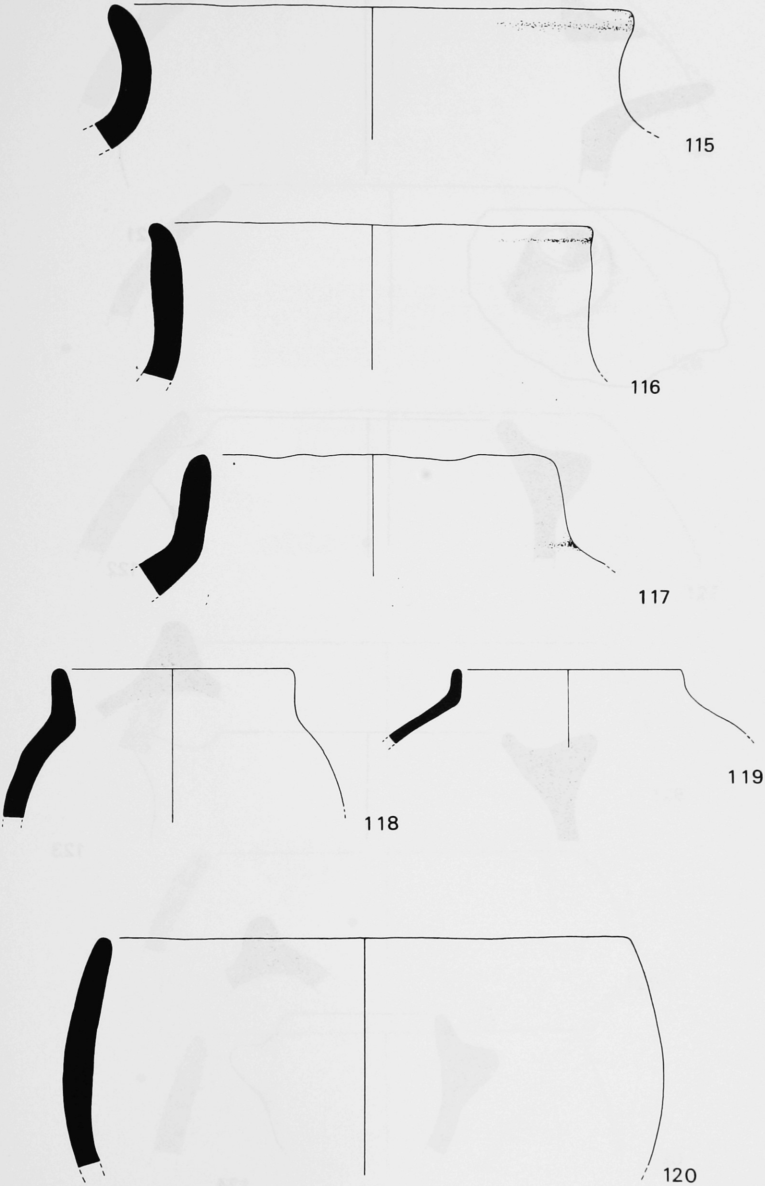


Fig. IV.16. Pottery from the Early Halaf strata. No. 120: Late Neolithic (scale 1:3).

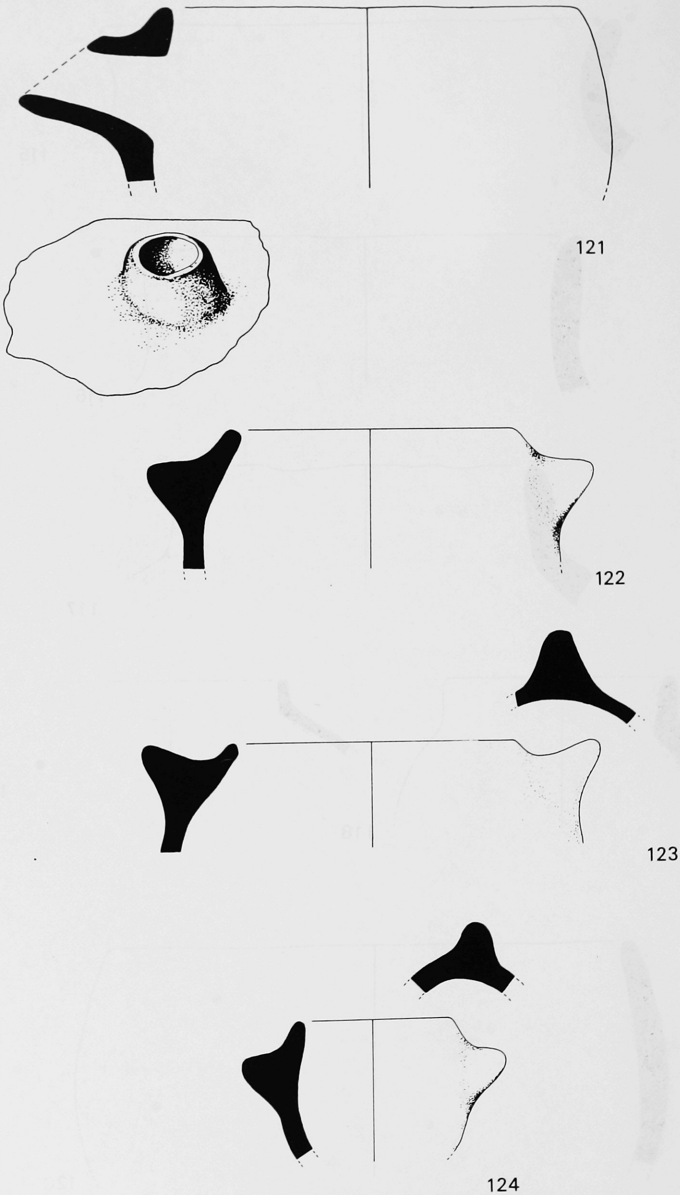


Fig. IV.17. Pottery from the Early Halaf strata (scale 1:3).

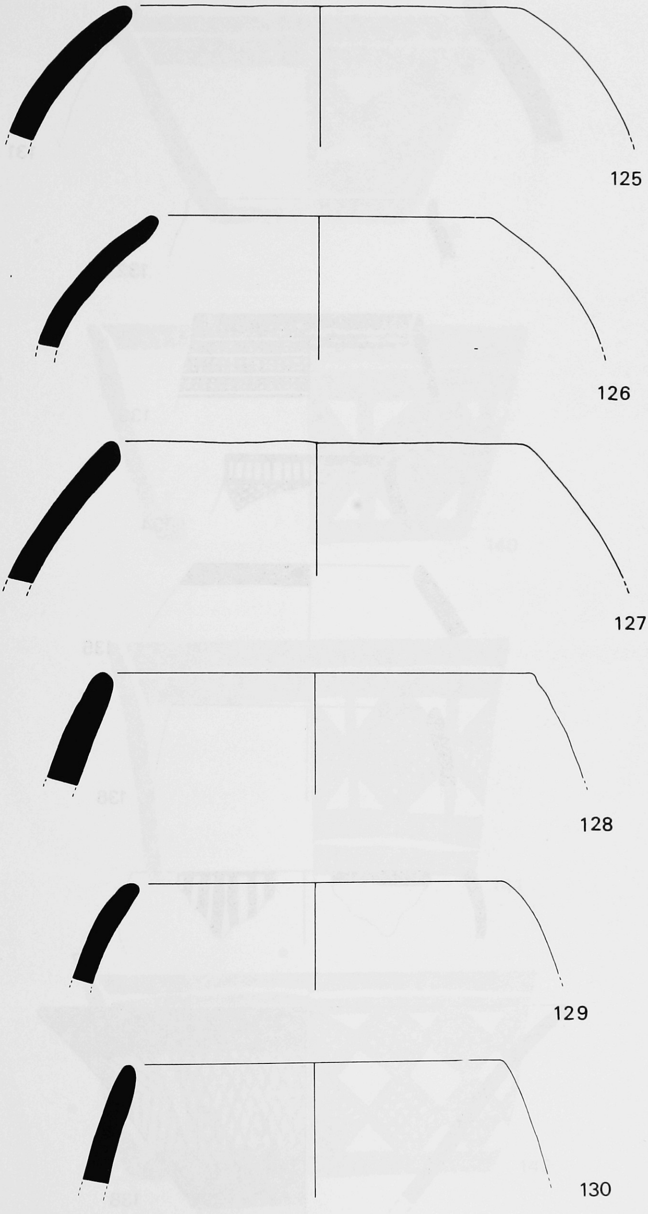


Fig. IV.18. Pottery from the Early Halaf strata (scale 1:3).

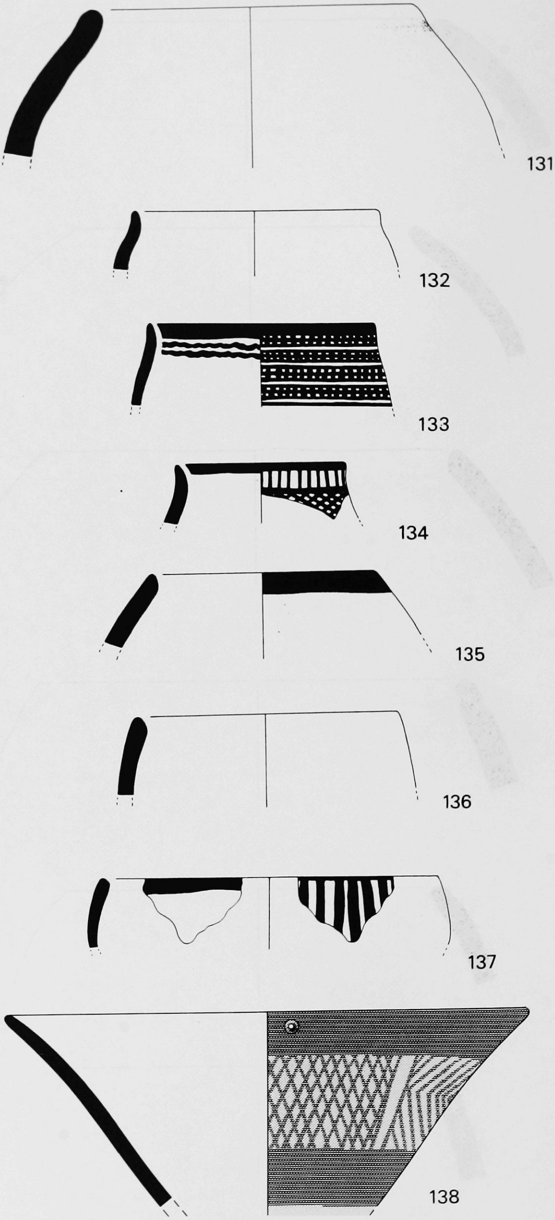


Fig. IV.19. Pottery from the Early Halaf strata (scale 1:3). No. 138: pattern-burnished.

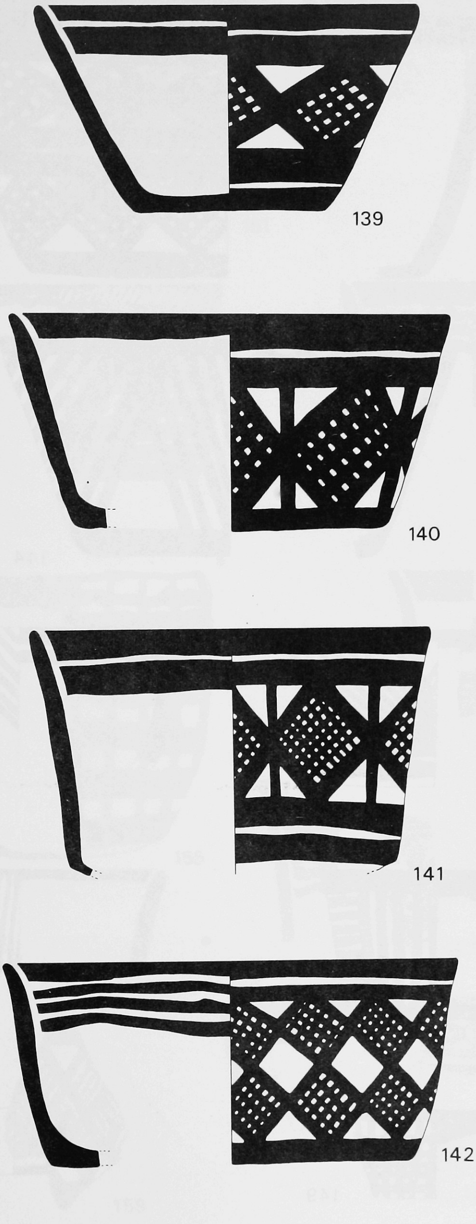


Fig. IV.20. Pottery from the Early Halaf strata (scale 1:3).

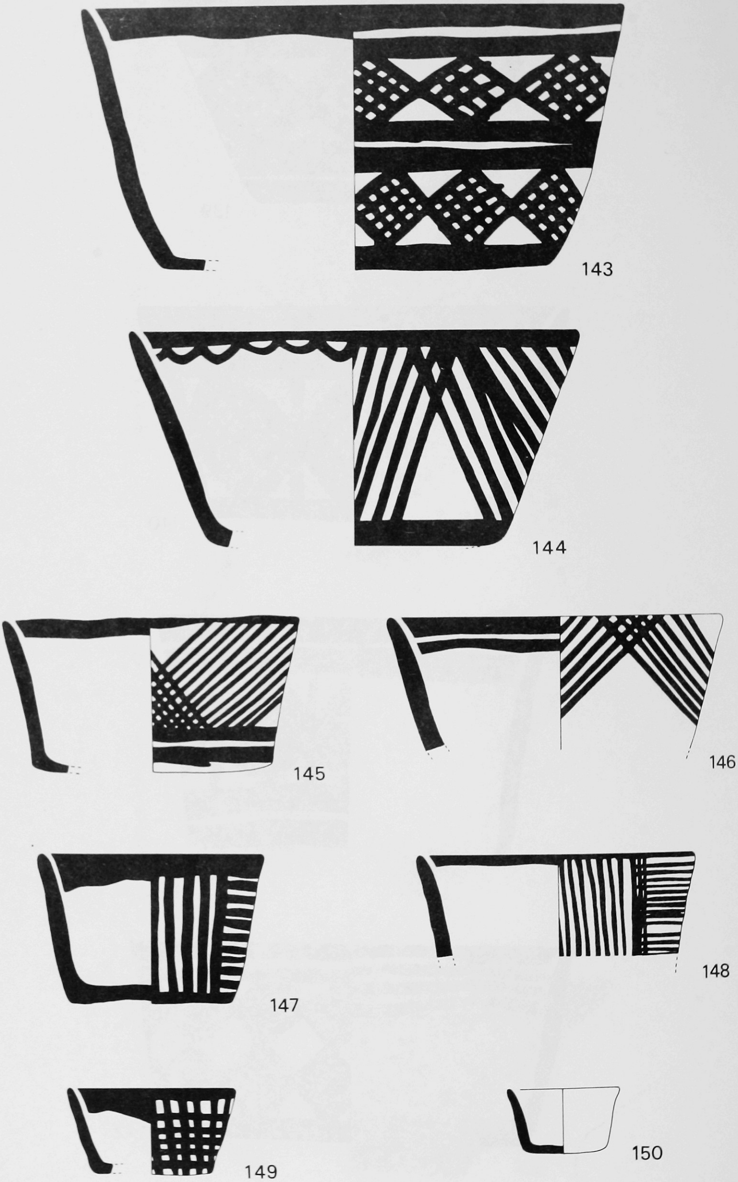


Fig. IV.21. Pottery from the Early Halaf strata (scale 1:3).

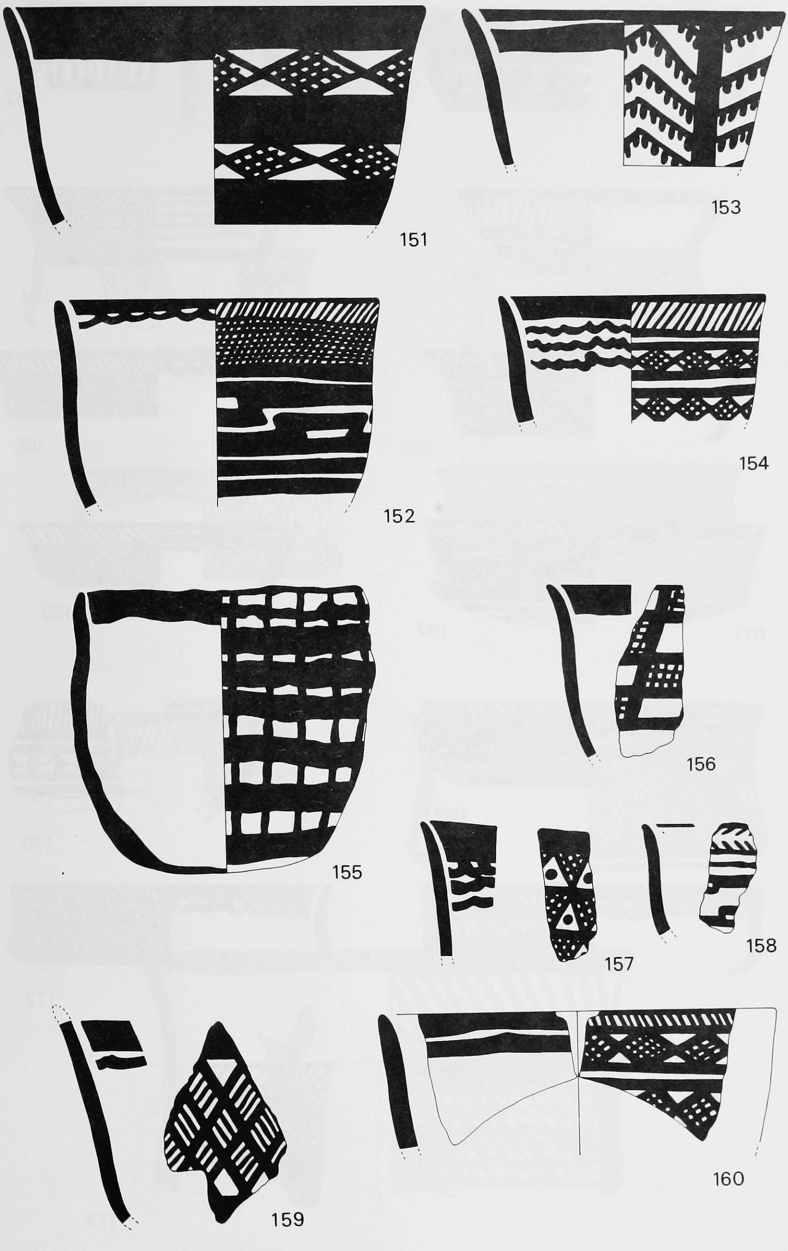


Fig. IV.22. Pottery from the Early Halaf strata (scale 1:3).

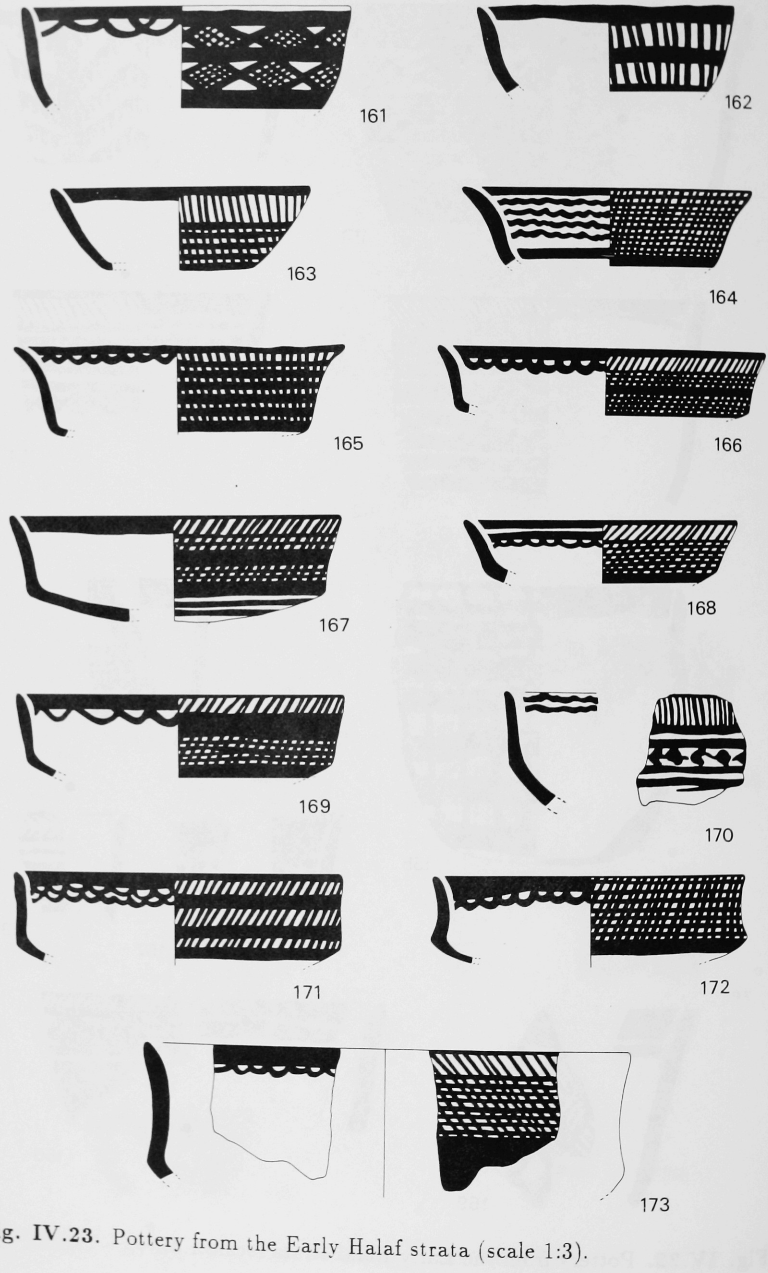


Fig. IV.23. Pottery from the Early Halaf strata (scale 1:3).

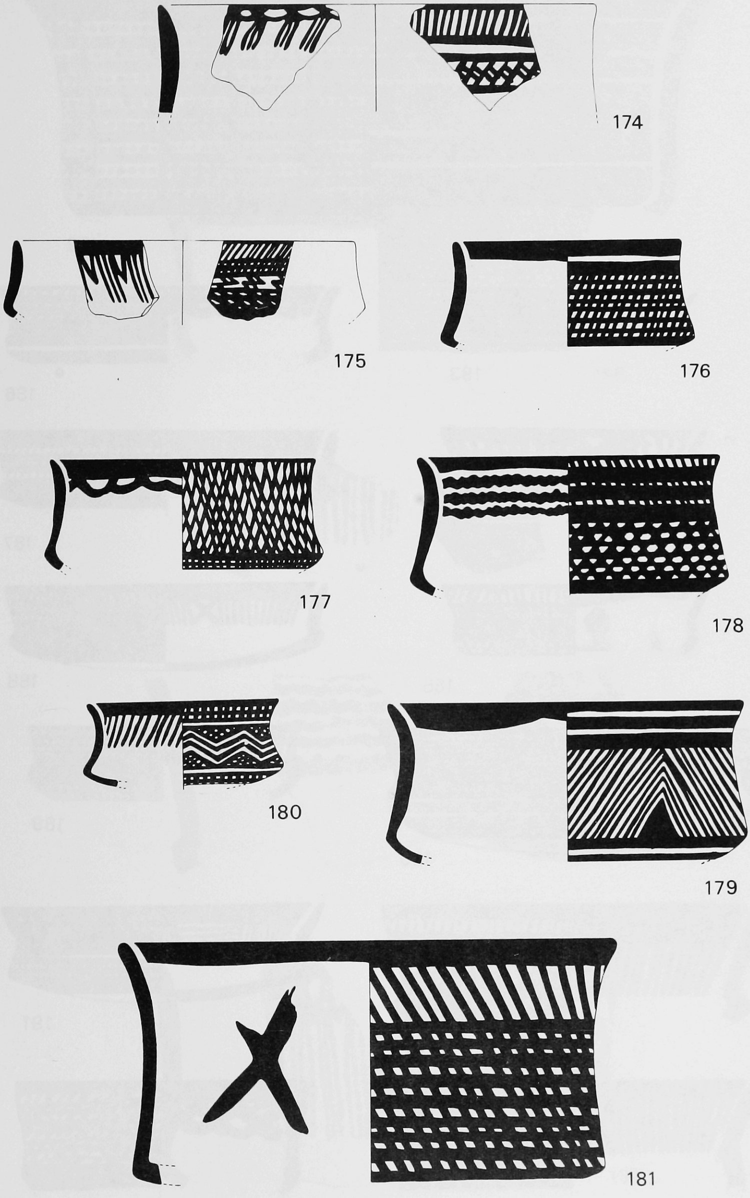


Fig. IV.24. Pottery from the Early Halaf strata (scale 1:3).

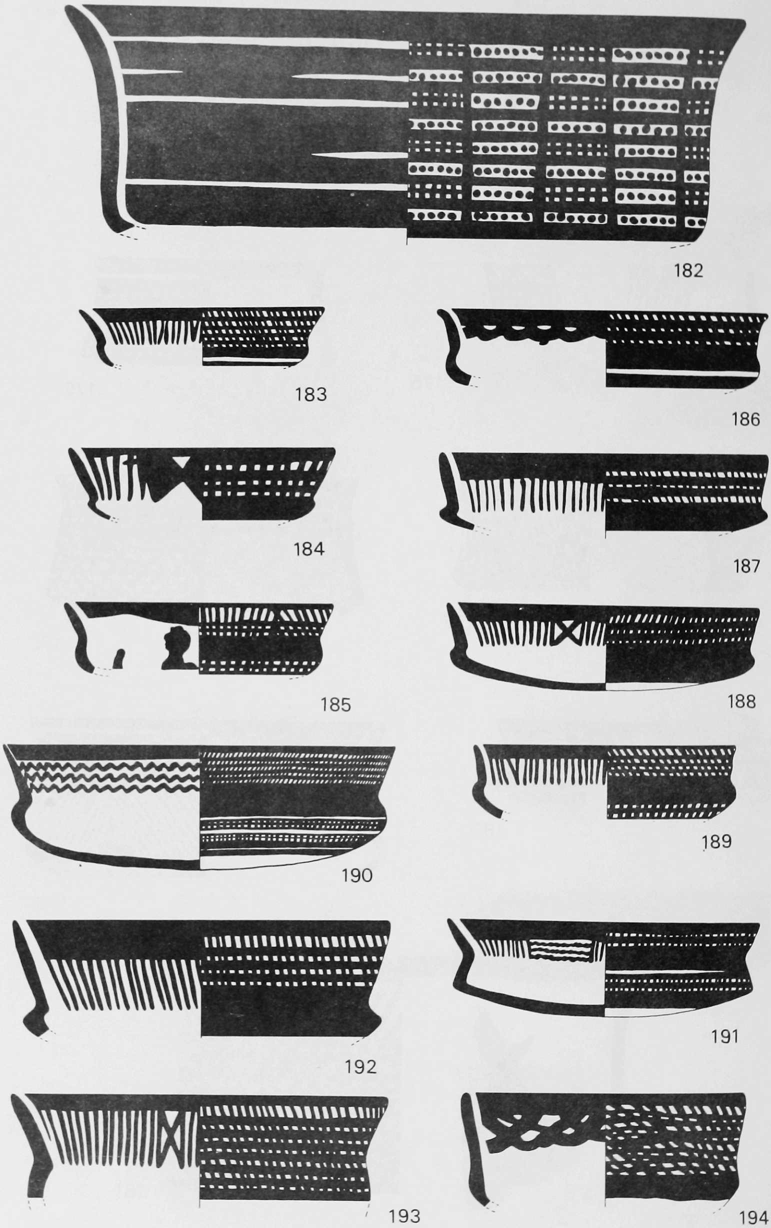


Fig. IV.25. Pottery from the Early Halaf strata (scale 1:3).

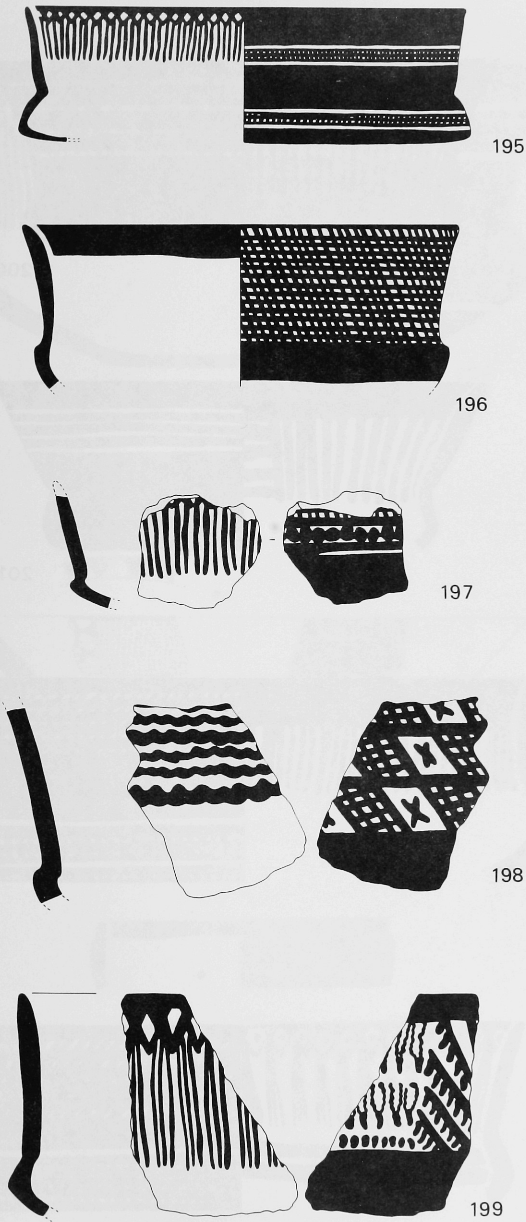
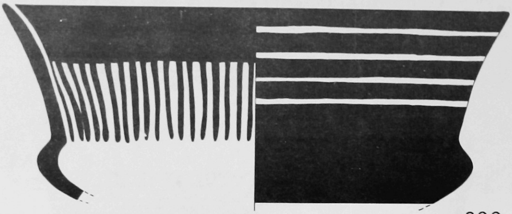
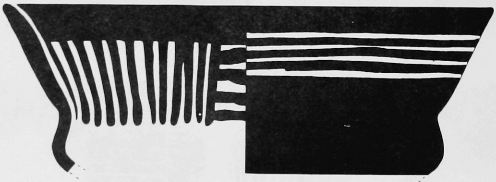


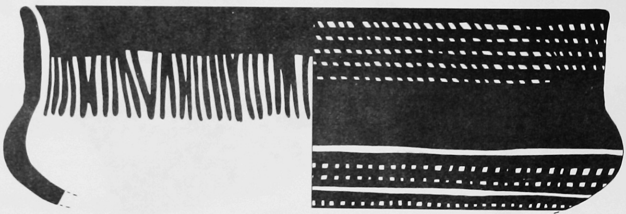
Fig. IV.26. Pottery from the Early Halaf strata (scale 1:3).



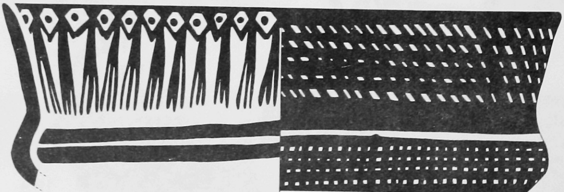
200



201

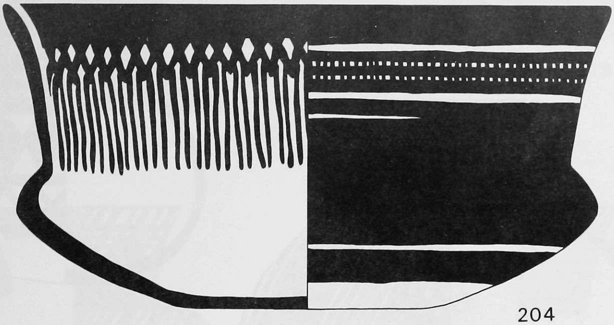


202

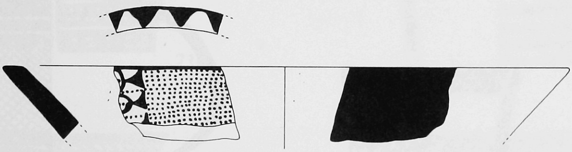


203

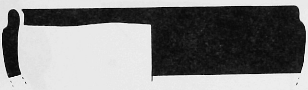
Fig. IV.27. Pottery from the Early Halaf strata (scale 1:3).



204



205



206

Fig. IV.28. Pottery from the Early Halaf strata (scale 1:3). No. 205: probably Middle or Late Halaf.

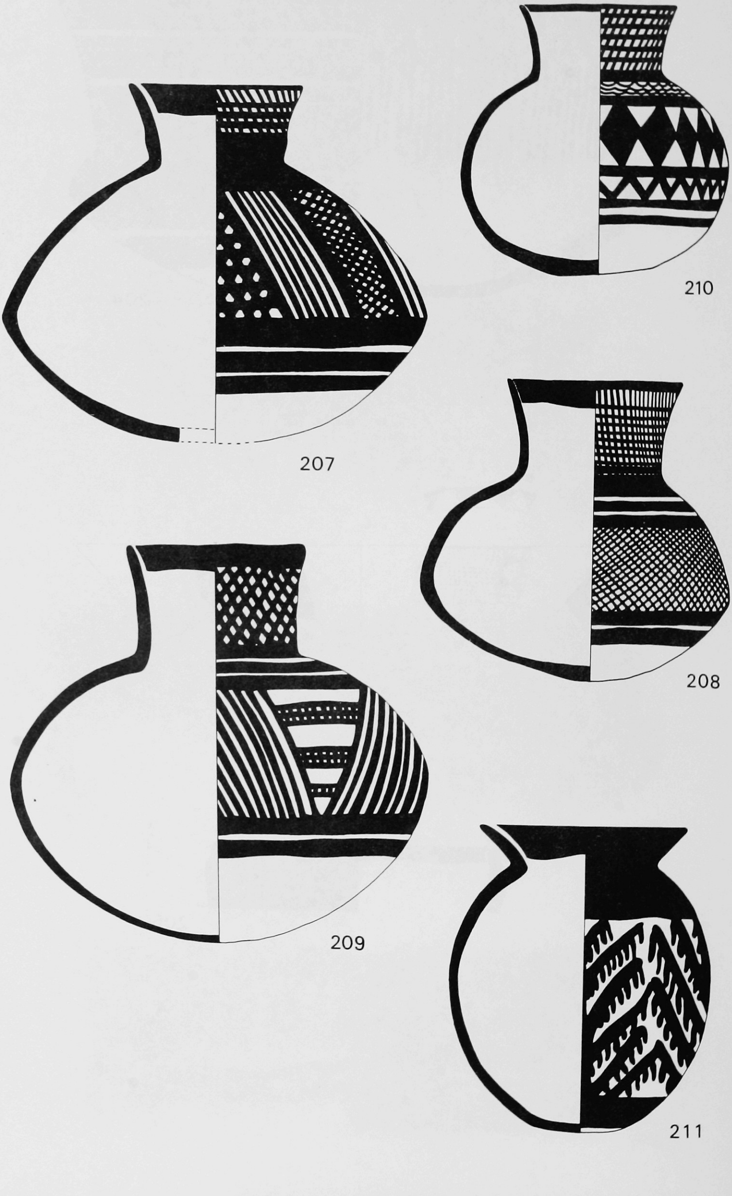


Fig. IV.29. Pottery from the Early Halaf strata (scale 1:3).

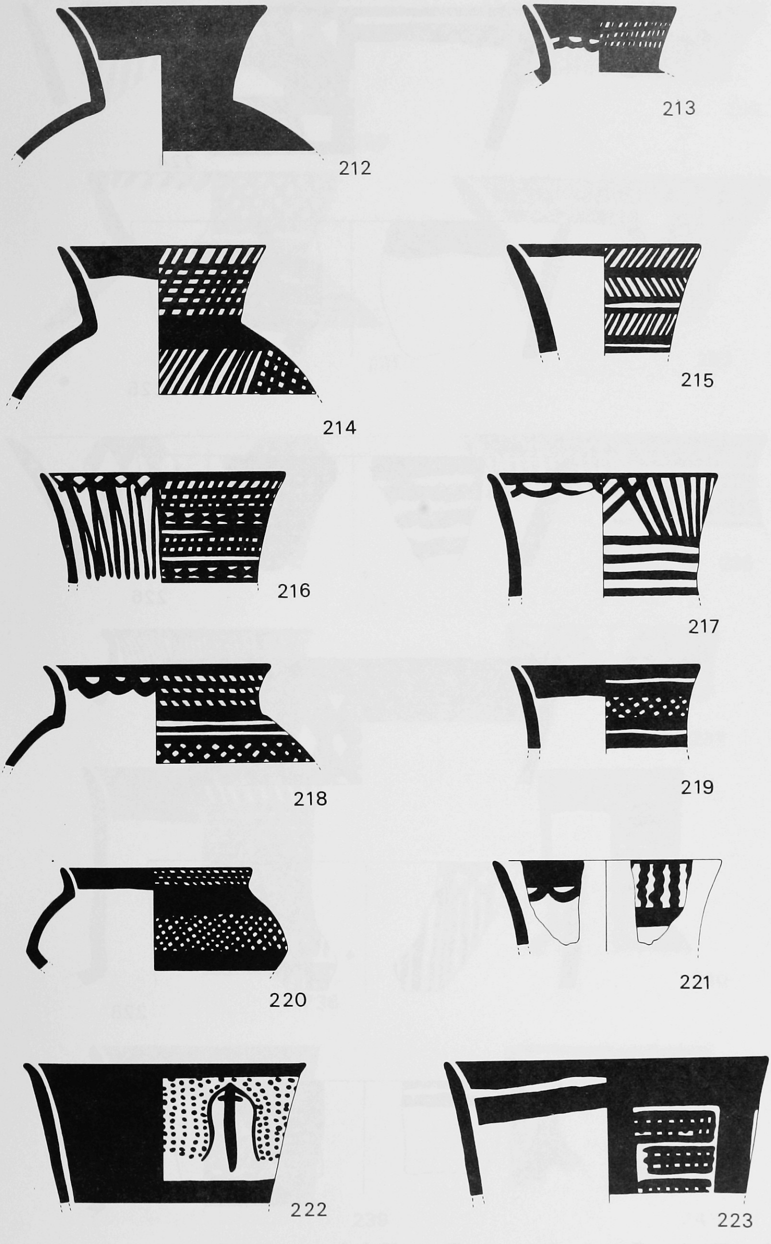
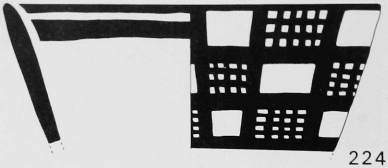
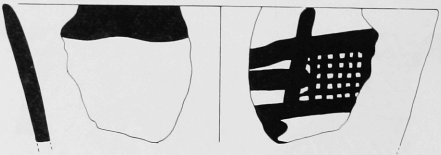
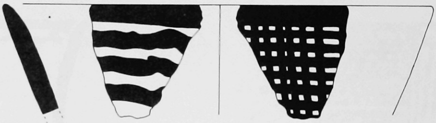
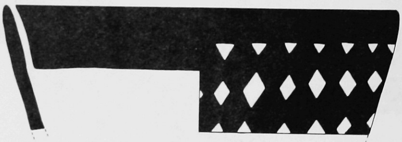


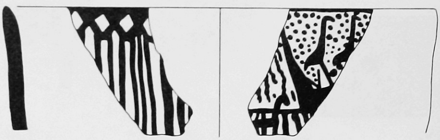
Fig. IV.30. Pottery from the Early Halaf strata (scale 1:3).


224


225


226


227


228

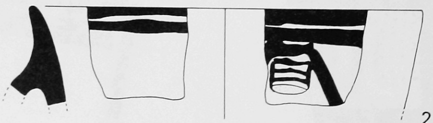

229

Fig. IV.31. Pottery from the Early Halaf strata (scale 1:3).

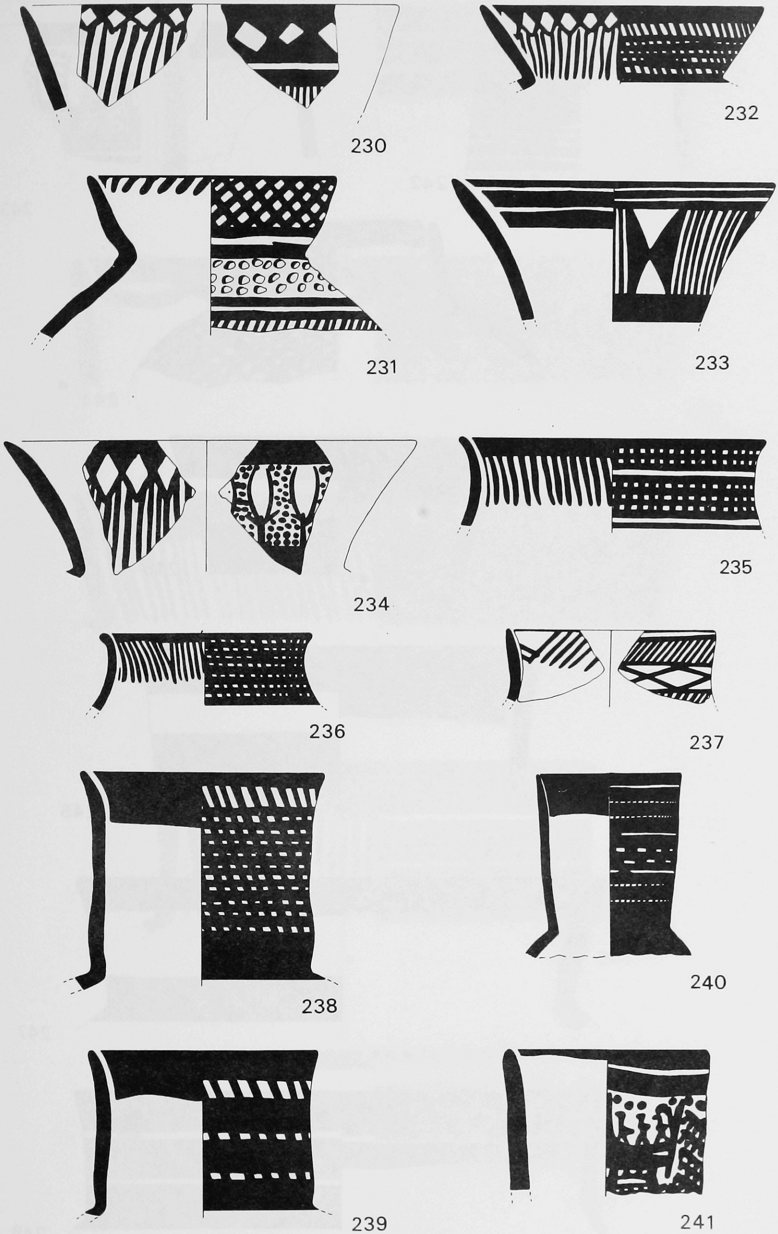
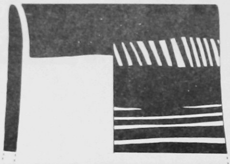
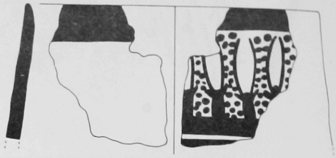


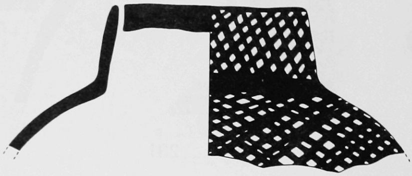
Fig. IV.32. Pottery from the Early Halaf strata (scale 1:3; no. 241: scale 1:2).



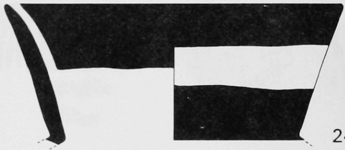
242



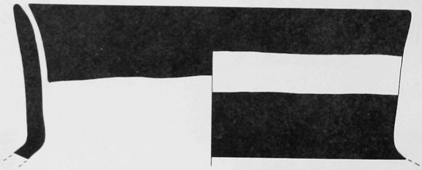
243



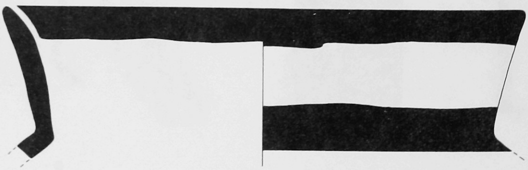
244



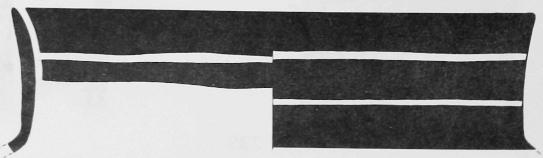
245



246



247



248

Fig. IV.33. Pottery from the Early Halaf strata (scale 1:3).

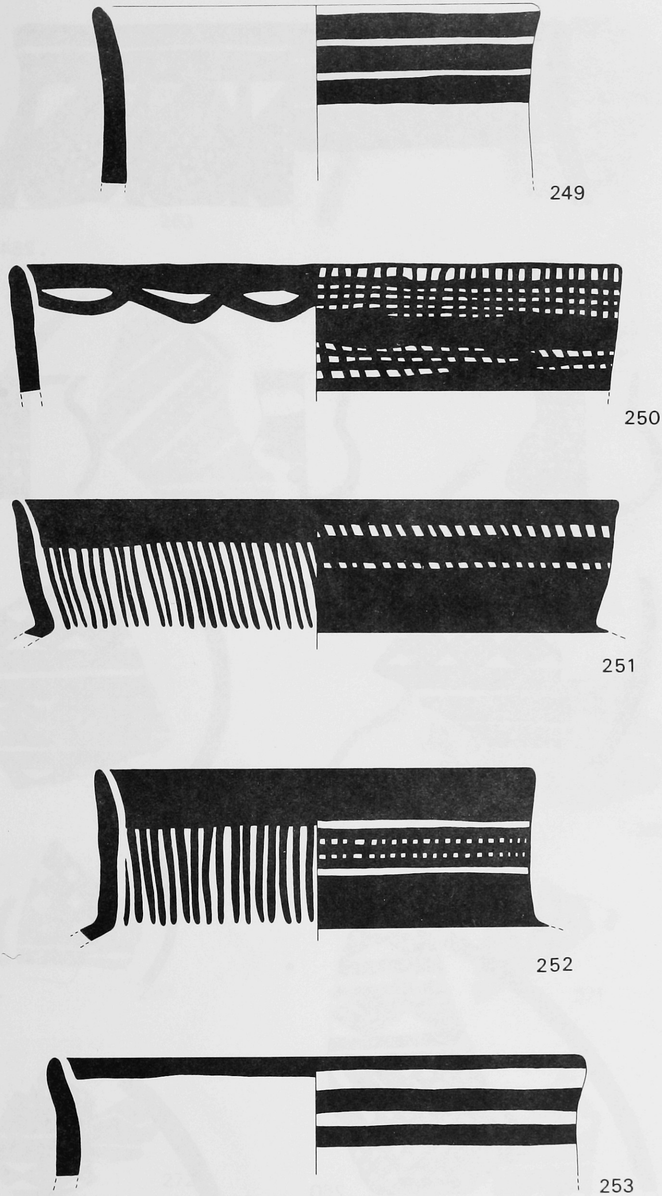


Fig. IV.34. Pottery from the Early Halaf strata (scale 1:3).

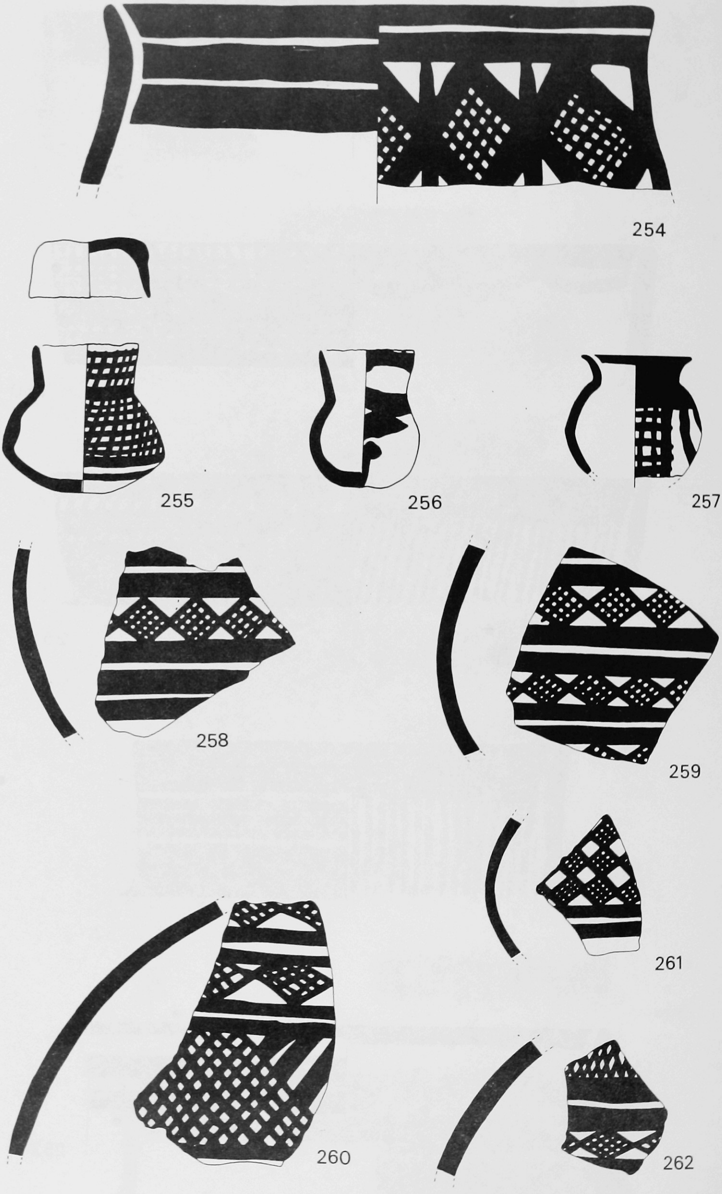


Fig. IV.35. Pottery from the Early Halaf strata (scale 1:3).

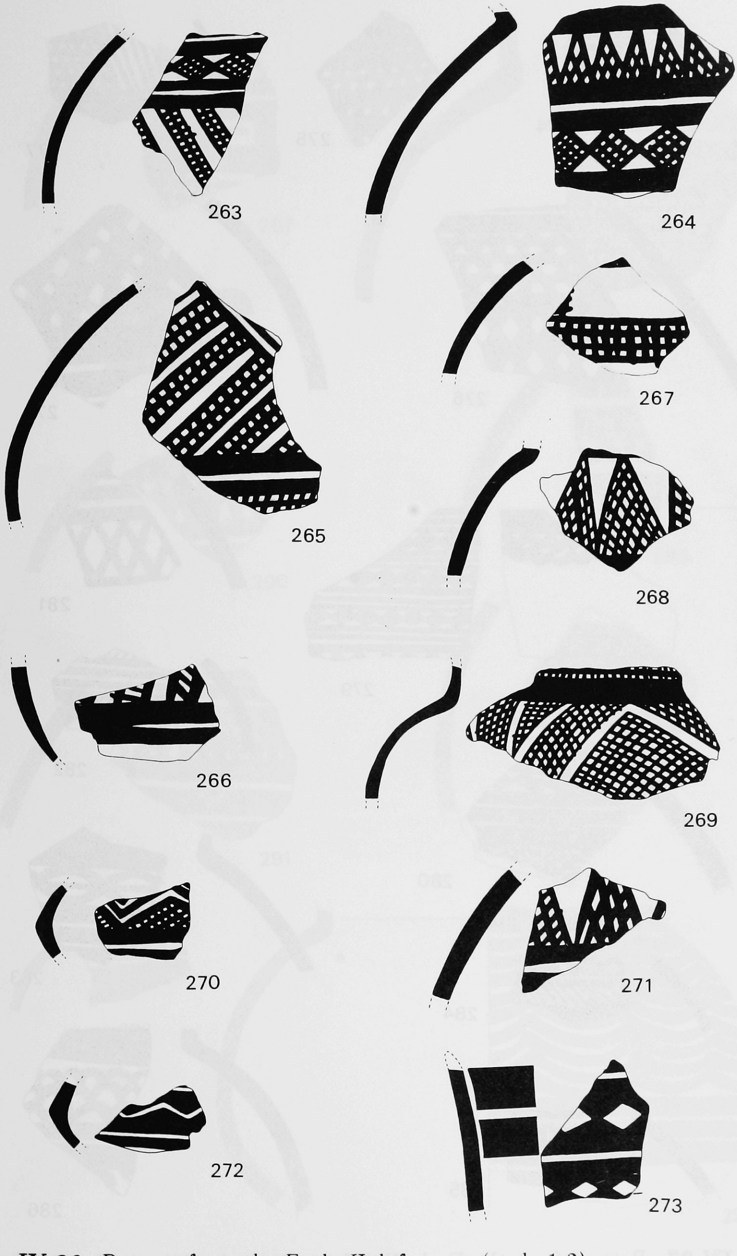


Fig. IV.36. Pottery from the Early Halaf strata (scale 1:3).

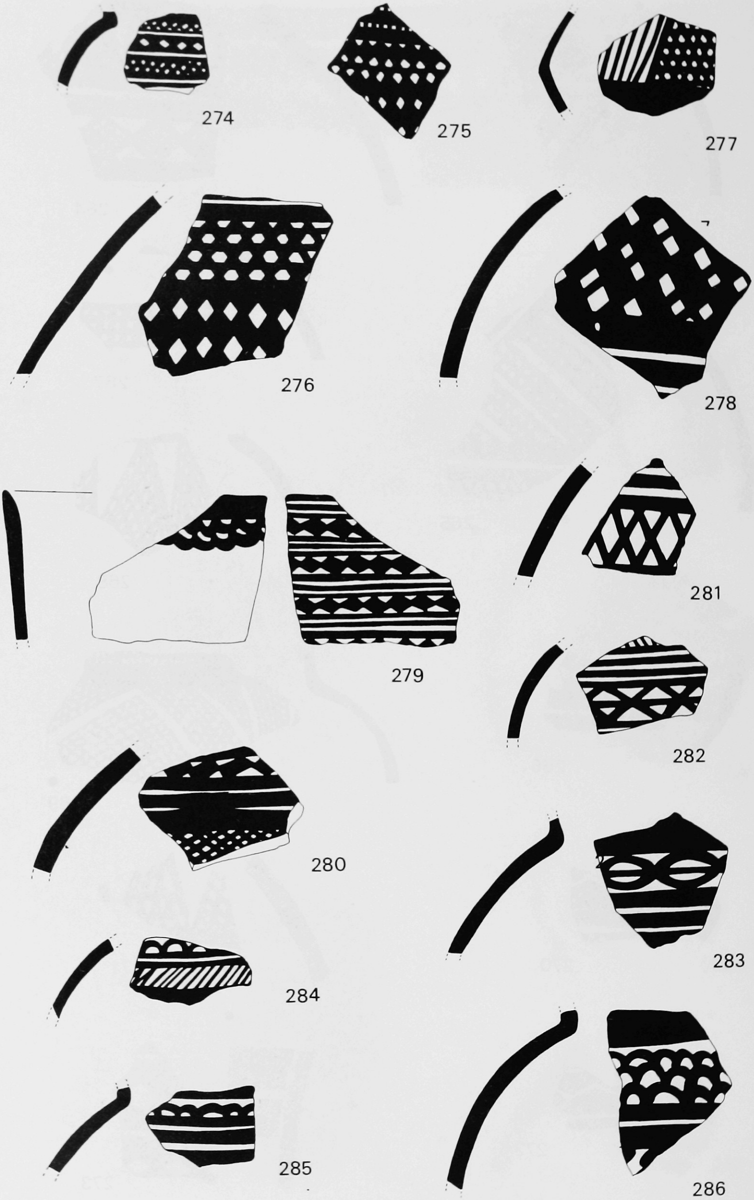


Fig. IV.37. Pottery from the Early Halaf strata (scale 1:3).

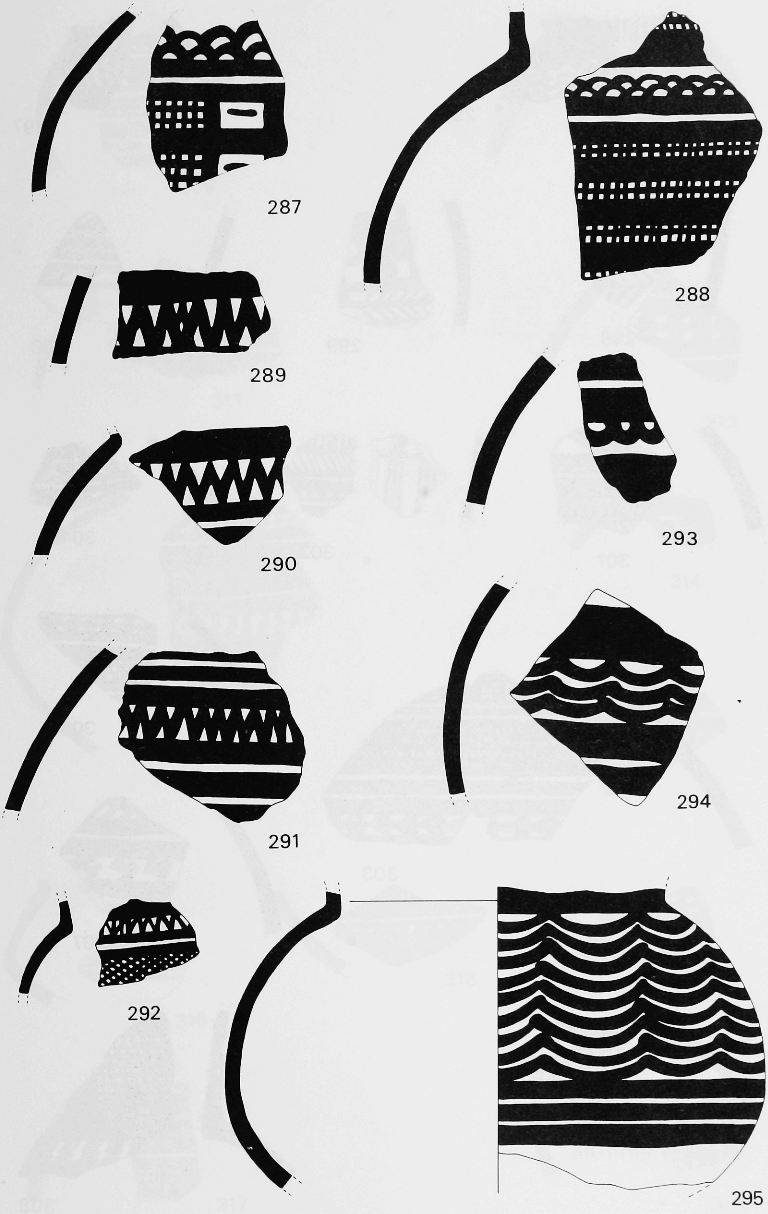


Fig. IV.38. Pottery from the Early Halaf strata (scale 1:3).

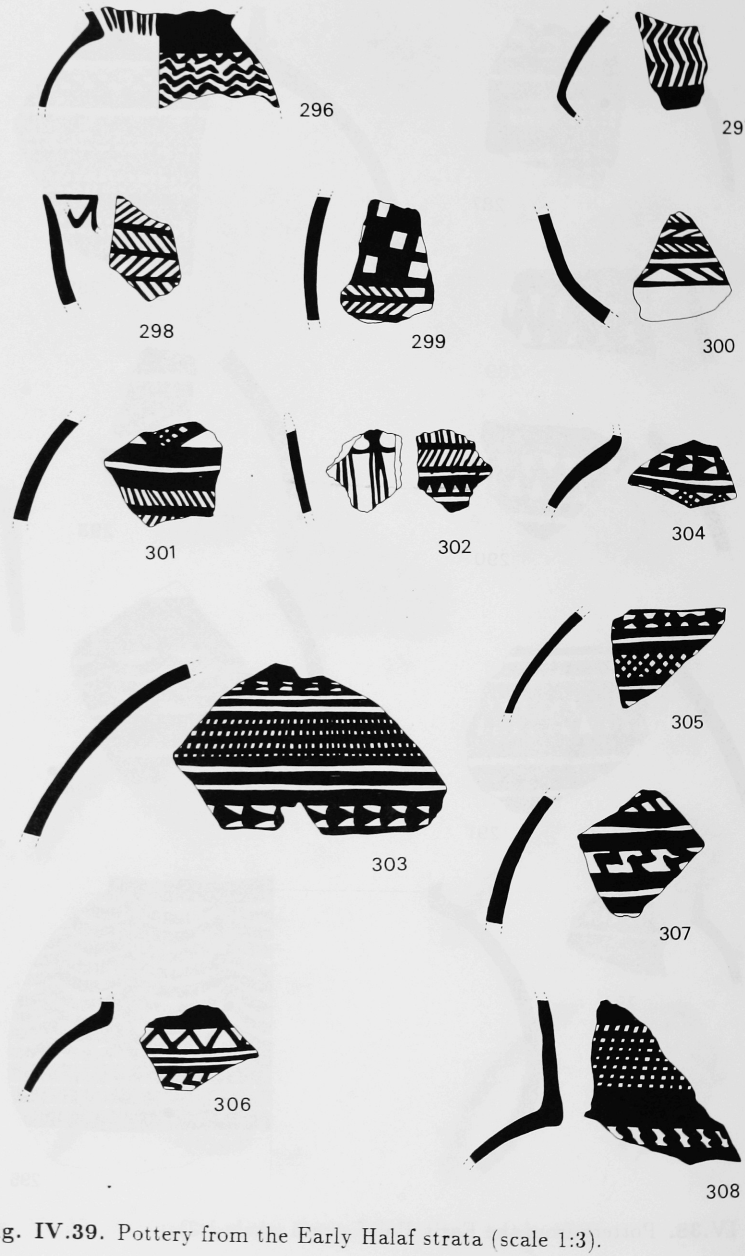


Fig. IV.39. Pottery from the Early Halaf strata (scale 1:3).

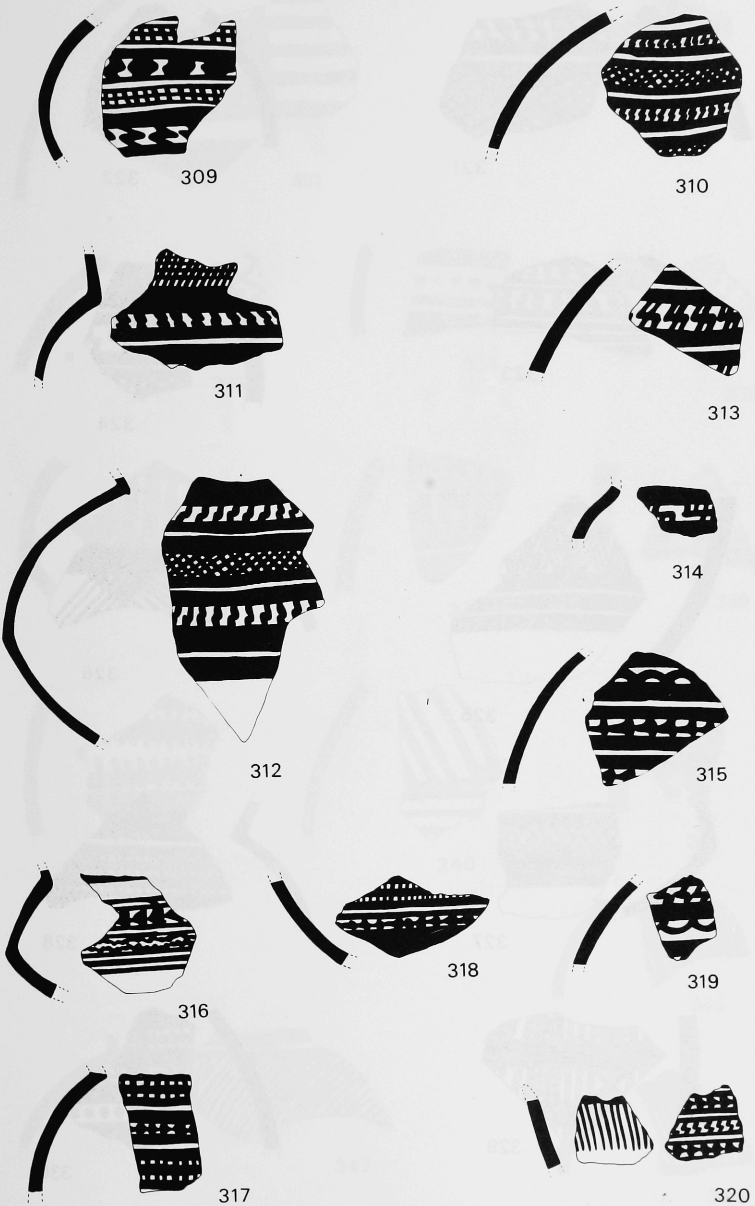


Fig. IV.40. Pottery from the Early Halaf strata (scale 1:3).

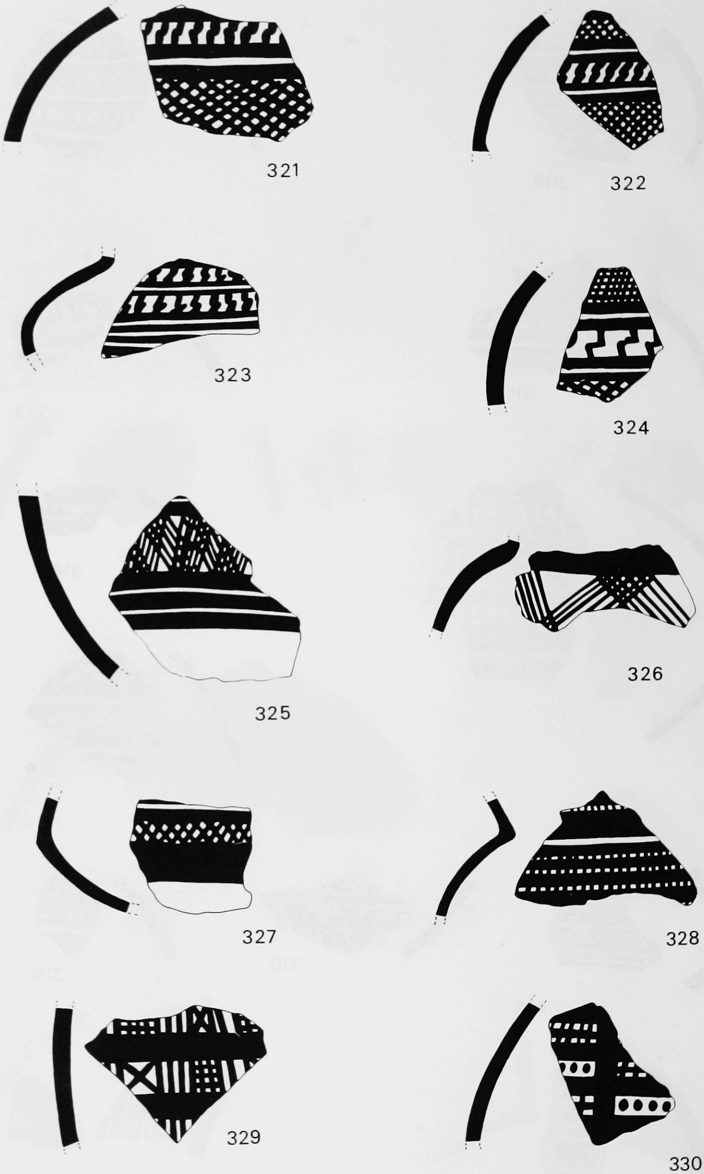


Fig. IV.41. Pottery from the Early Halaf strata (scale 1:3).

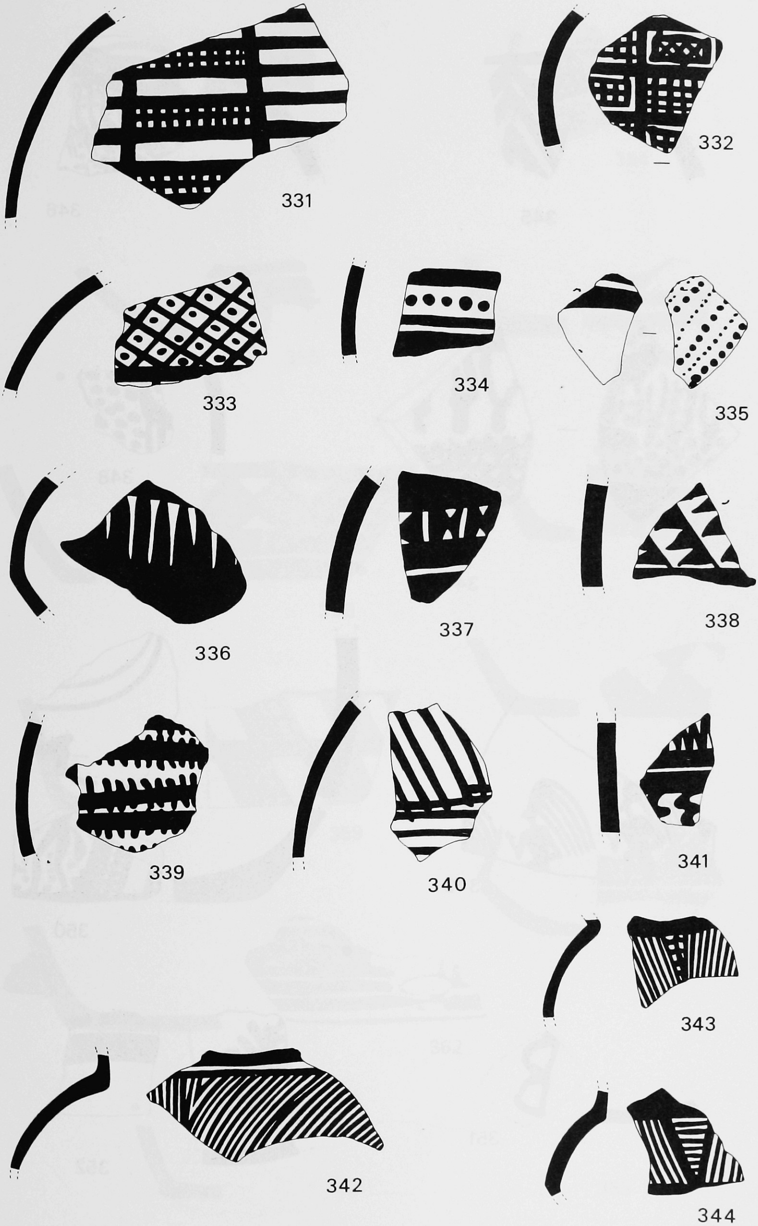


Fig. IV.42. Pottery from the Early Halaf strata (scale 1:3).

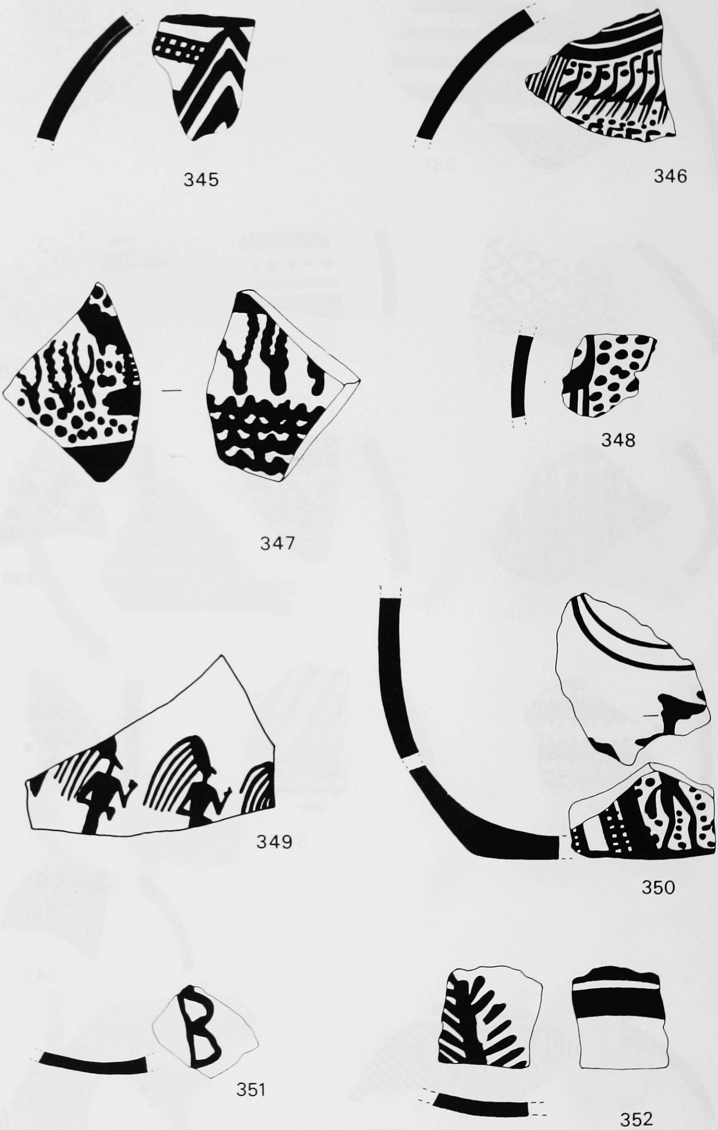


Fig. IV.43. Pottery from the Early Halaf strata (nos. 345, 351-352: scale 1:3; nos. 346-350: scale 1:2).

Fig. IV.44. Pottery from the Early Halaf strata (scale 1:3).

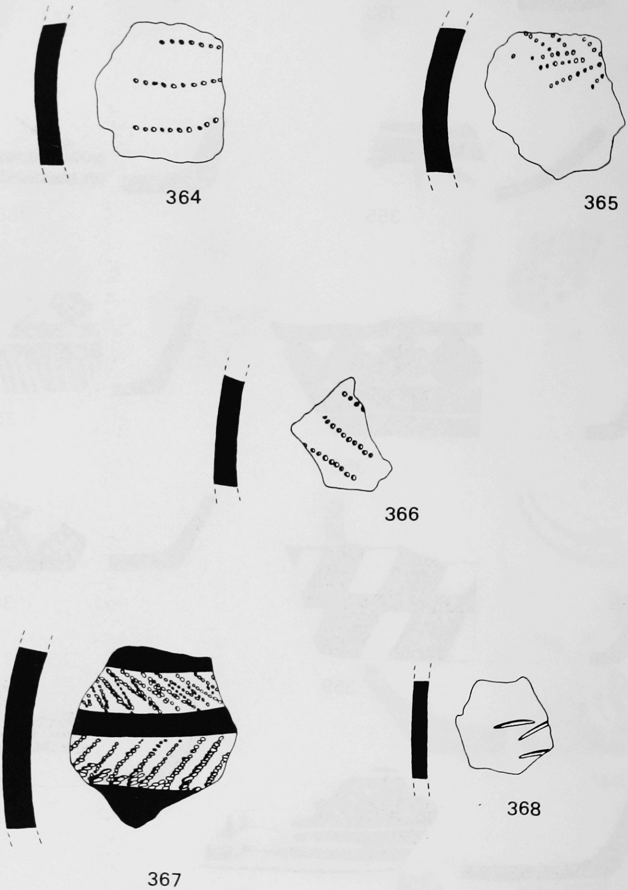


Fig. IV.45. Pottery from the Early Halaf strata (scale 1:2).

Fig. IV.46. Pottery from the Early Halaf strata. See drawing nos. 208 (c), 255 (a) and 256 (b).

Chapter V

TECHNOLOGICAL ASPECTS OF THE PREHISTORIC POTTERY

By Abraham van As and Loe Jacobs

A. INTRODUCTION

The present chapter will present the results of the research carried out by the Department of Pottery Technology (University of Leiden), into the technological aspects of the Late Neolithic and Early Halaf ceramics from Tell Sabi Abyad. The main objectives of this study included both an attempt to reconstruct the shaping and firing techniques of the pottery, and to define the applied raw materials.

The number of pottery sherds actually studied was limited. At the Albert Egges van Giffen Instituut voor Prae- en Protohistorie, Amsterdam, some 400 sherds were selected for technological study at Leiden, from among the ceramic material which had been transported from Syria to the Netherlands. These 400 sherds included 40 pieces which, with some certainty, could be used to reconstruct the method by which the pots, to which the sherds had belonged, were shaped. The characterisation of the applied raw materials involved in the main a macroscopic analysis of the non-plastics. For this purpose 63 sherds were selected. Particular attention was paid in the selection to the inclusion, within the sample, of both sherds which showed traces of the shaping techniques and sherds which came from all the archaeological categories of the ceramic repertoire. The same pottery sample was furthermore used for defining the firing techniques which were originally used (firing atmosphere and firing temperature).

B. METHODOLOGY

The technological study of the pottery from Tell Sabi Abyad involved: a) shape analysis and b) raw material analysis. The working methods applied conform to those generally followed at the Department of Pottery Technology (see van As 1984; Franken 1983; Jacobs 1983; Stienstra 1986).

B.1. Shape Analysis

The method of shaping was reconstructed on the basis of certain traces of the applied techniques still remaining on the pottery. This was followed by tests with appropriate clays. It was possible only with a very few sherds to reconstruct the original shaping process. Because of their size, most of the sherds only contained traces of a single aspect of the shaping technique. All too often traces of the shaping technique were erased by traces of the finishing, such as scraping, smoothing or painting.

B.2. Material Analysis

The material analysis included: a) a description of the texture of the pottery, and b) the determination of the original firing atmosphere and firing temperature.

In order to describe the texture, the non-plastics were macroscopically studied with a 10x and 40x lens, both from two of the test sherds which had been refired for 30 minutes in an oxidising atmosphere with a temperature of 750 °C and 850 °C respectively, and from the remaining test sherds which were not refired. All the grains which were larger than 100 micrometer, the so-called macrograins, were described. All the smaller grains (the micrograins) were considered to be part of the matrix (Stienstra 1986:39). The dominant size and shape of the various macrograins were determined. The type of non-plastic was determined, as far as possible[1]. The total amount of non-plastics was determined in percentages of dry weight, by comparison with a reference collection (Jacobs 1983a:6)[2]. Special attention was also paid to the spatial arrangement of, and the relationship between the components (the fabric).

The original firing atmosphere was determined on the basis of a comparison of the colour of the test sherds and those which had been refired in standard circumstances (in an electric oven for 30 minutes, with a temperature of 750 °C and 850 °C respectively). It should be noted that the colour of the sherds (exterior and the core) depends on the composition of the applied raw materials and the firing circumstances. The colour after refiring in standard circumstances indicates the firing colour of the used clay body. The colour of the sherds as found on the site indicates the variable original firing circumstances: oxidising (with a high percentage of oxygen), reducing (without oxygen), or neutral (with little oxygen). The colour of the sherds can also give an idea of the firing duration (see Rye 1981:114-118). On the basis of the rupture strength and the changes observed during the refiring process in the structure of the calcite grains in the sherds, an estimate could be made of the original firing temperature[3].

C. THE METHOD OF SHAPING

Within the pottery repertoire the following shaping techniques could be distinguished: moulding, coiling and pinching.

C.1. Moulded pottery

The use of a mould for the manufacture of pottery is possible because soft clay does not stick to a porous material. The advantages of the use of a mould are the following:

- Both a fairly dry and a fairly soft clay can be used.

- Both very plastic and very lean clay can be used. The latter is particularly advantageous for the manufacture of cooking pots, in which coarse calcite is preferably used because of heat conductivity and thermal shock resistance (see Rye 1976). The bases of cooking pots are therefore often made in a mould.

- The thickness of the pot can be well checked everywhere. Even the manufacture of a very thin wall can be done without too many problems.

- The technique does not demand a high level of craftmanship.

When the potter wants to make a base which is not strongly curved, he flattens a piece of clay between his hands (Fig. V.1), or on a surface. This piece of flattened clay is subsequently placed inside the mould and well pressed into it. The inside may be scraped somewhat (Fig. V.2). When a base with a strong curve is wanted, the potter flattens a smaller piece of clay directly inside the centre of the mould. Thereupon the potter adds pieces of clay and presses them into the mould. Traces of this pressing are often still visible on the inside of the pot. If possible, the joints were made in an overlapping manner. Sometimes, however, there are irregular seams which, if they are not removed later on, remain visible. It should be noted that these seams are not as long as those which are caused by building up the pot with coils. When a relatively dry clay is used, the shape can be removed from the mould after a short time. Subsequently the mould can be used again. When such a clay is used, the sherd will have a somewhat rough surface, which can be smoothed. If the clay which is used is fairly soft, this problem will not general occur, unless a very poor clay is applied. When a soft clay is used, the shape has to remain in the mould for a longer period, before it can be removed.

It is common practice to use a mould only for plates and the bases of pots. The wall of pots are built up by adding coils, one above the other (Figs. V.3, V.4).

Examples:

Fig. V.5 (Halaf Painted Fine Ware). A piece of clay is flattened and pressed upon a flat and plate-formed base of a porous material. It is possible that such

Fig. V.1.

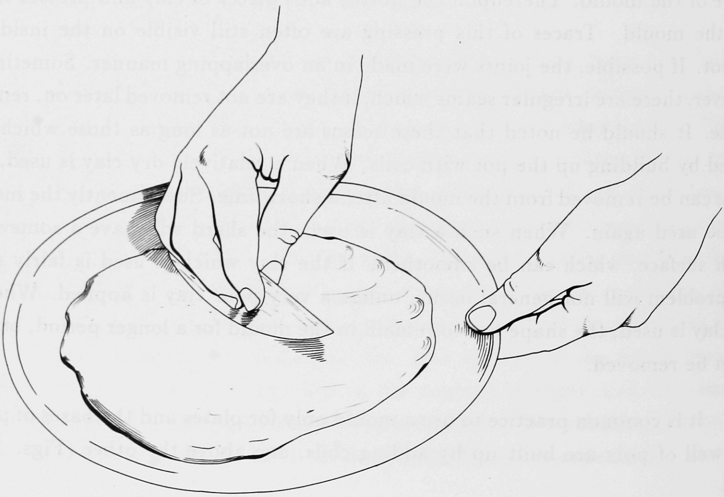


Fig. V.2.

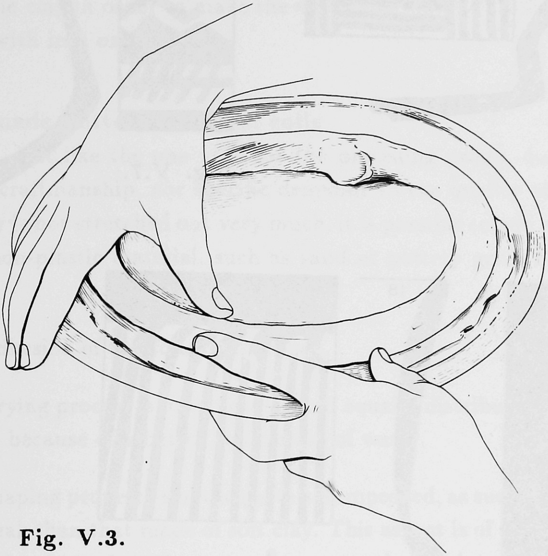


Fig. V.3.

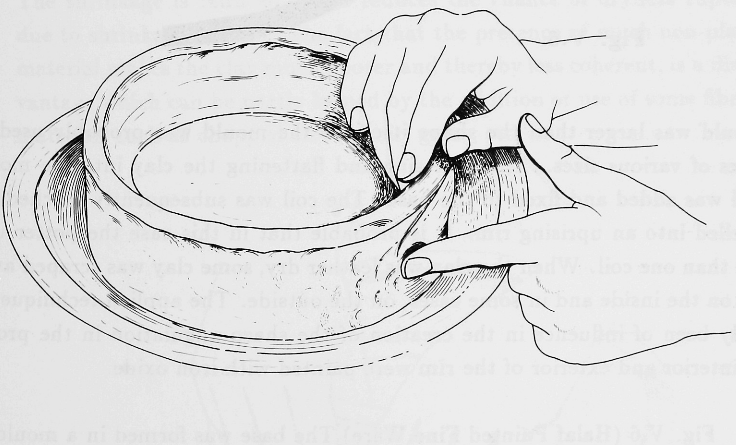


Fig. V.4.

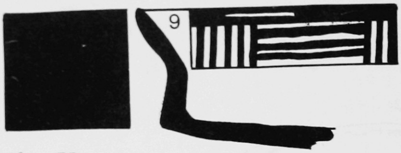


Fig. V.5.

Fig. V.7.

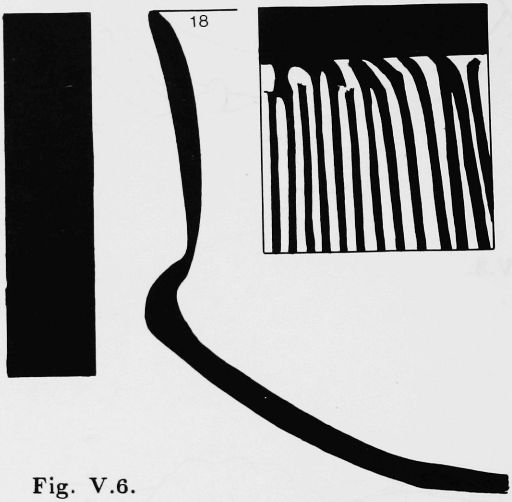


Fig. V.6.

a mould was larger than the shape itself, so the mould was probably used for shapes of various sizes. After pressing and flattening the clay into the mould, a coil was added and fixed to the base. The coil was subsequently pinched and modelled into an uprising rim. It is probable that in this case the potter used more than one coil. When the clay was leather dry, some clay was scraped away, both on the inside and in some cases, on the outside. The applied technique has clearly been of influence in the creation of the sharp angulation in the profile. The interior and exterior of the rim were painted with iron oxide.

Fig. V.6 (Halaf Painted Fine Ware) The base was formed in a mould. A piece of clay was flattened and pressed into the mould. The part of the shape which rose above the mould was built up with coils. This is indicated by the horizontal seams, which are sometimes fairly long. The interior and exterior of the shapes were painted with iron oxide.

Fig. V.7 (Halaf Painted Fine Ware) The base was formed in a mould. The upper part was made with coils. The inner side of the wall shows traces of the pinching of the clay in order to make the wall thinner. The outside of the shape was painted with iron oxide.

C.2. Handmade pottery, made of coils

This method, just like the one used for the preceding group, does not require considerable craftmanship, nor specific demands to the quality of the clay. Because the clay is not stretched out very much, it is possible to add relatively large amounts of non-plastic material, such as sand or pottery grit. The advantages are manifold:

- The adhesion of the coils is improved.
- The drying process is more regular and equally distributed over the whole shape, because of a better conduction of water.
- The shaping properties of the paste are improved, as such a clay mixture is less weak than that made of soft clay. This aspect is of special significance when the potter is trying to make a somewhat higher, or curved wall out of coils. In this manner the non-plastic material functions as some sort of skeleton, as the wall remains upright better and the work can be carried out somewhat quicker.
- The shrinkage is reduced. This reduces the chance of dryness ruptures due to shrinkage tension. The fact that the presence of much non-plastic material makes the clay much poorer and thereby less coherent, is a disadvantage which can be partly helped by the addition or use of some fibrous material, such as chopped straw, hair, grass, etc.

Fig. V.8.

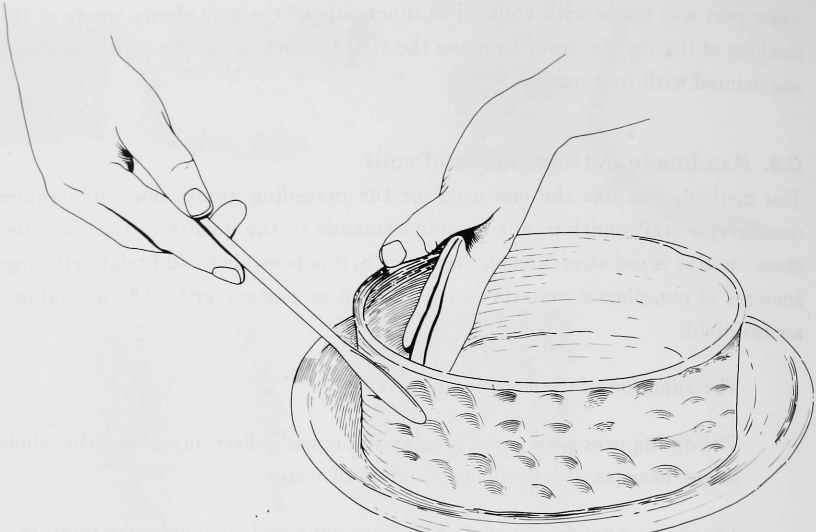


Fig. V.9.

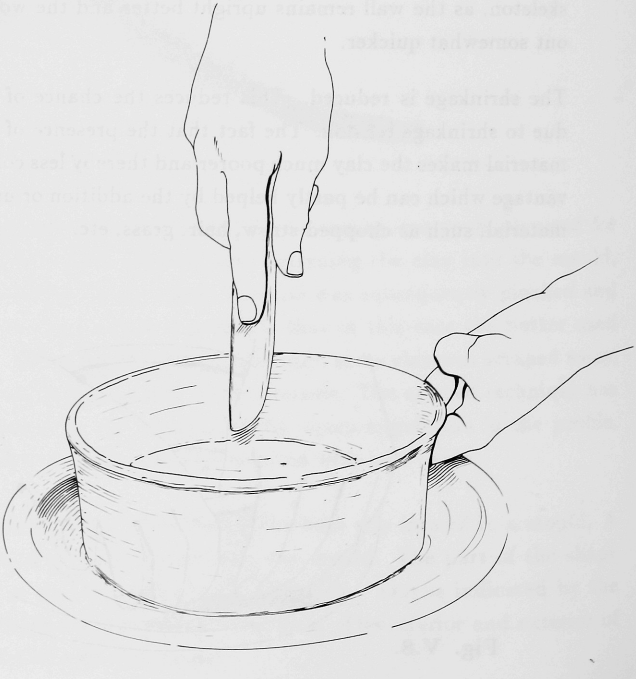


Fig. V.10.

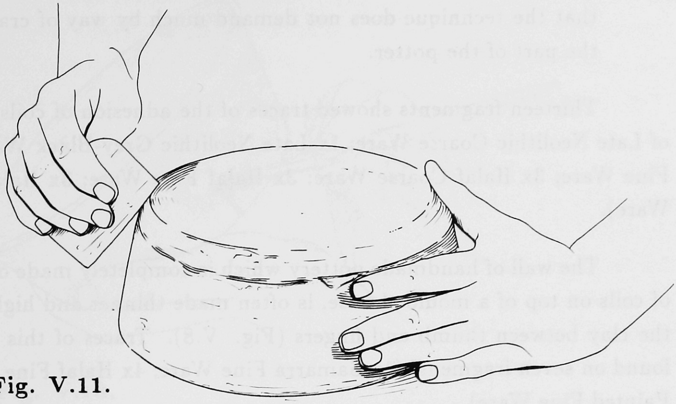


Fig. V.11.

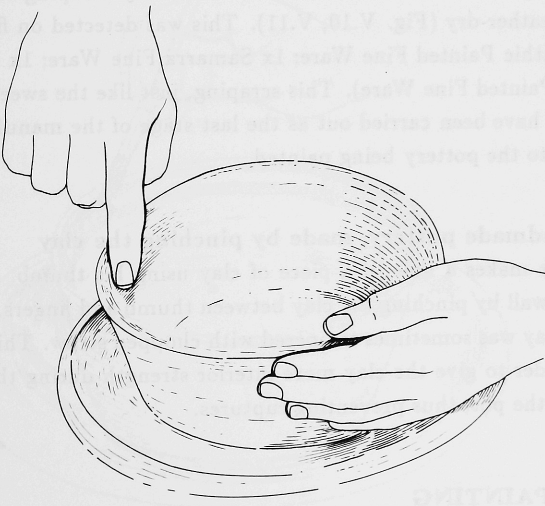


Fig. V.12.

- Provisional drying phases can be inserted when needed. This is especially useful when larger shapes are formed. It is partly because of this point that the technique does not demand much by way of craftmanship from the part of the potter.

Thirteen fragments showed traces of the adhesion of coils (2x in the case of Late Neolithic Coarse Ware; 1x Late Neolithic Grey-Black Ware; 1x Samarra Fine Ware; 3x Halaf Coarse Ware; 3x Halaf Fine Ware; 3x Halaf Painted Fine Ware).

The wall of handmade pottery which is completely made of coils, or made of coils on top of a moulded base, is often made thinner and higher by pinching the clay between thumb and fingers (Fig. V.8). Traces of this technique were found on seven fragments (1x Samarra Fine Ware; 4x Halaf Fine Ware; 2x Halaf Painted Fine Ware).

Another manner to make the wall thinner and higher is by patting the exterior of the pot, while the inside is supported by a hand or a rounded object (Fig. V.9).

Patting often occurs together with pinching. This method gives a pot a somewhat taut appearance. The wall of the pots which are made out of coils and afterwards pinched is sometimes made thinner by scraping the wall when the pots are leather-dry (Fig. V.10, V.11). This was detected on five fragments (1x Late Neolithic Painted Fine Ware; 1x Samarra Fine Ware; 1x Halaf Fine Ware; 2x Halaf Painted Fine Ware). This scraping, just like the sweeping (Fig. V.12), could also have been carried out as the last stage of the manufacturing process, and prior to the pottery being painted.

C.3. Handmade pottery, made by pinching the clay

The potter makes a hole in a piece of clay using his thumb. Subsequently he forms the wall by pinching the clay between thumb and fingers. It is remarkable that the clay was sometimes tempered with chopped straw. This was apparently done in order to give the clay more interior strength during the manufacturing process of the pot, thus preventing ruptures.

D. THE PAINTING

Within the ceramic repertoire a large number of the sherds were painted. The painting was done prior to the firing; the paint consists of a slip with fine iron oxide particles. These particles have a lower sintering temperature than the

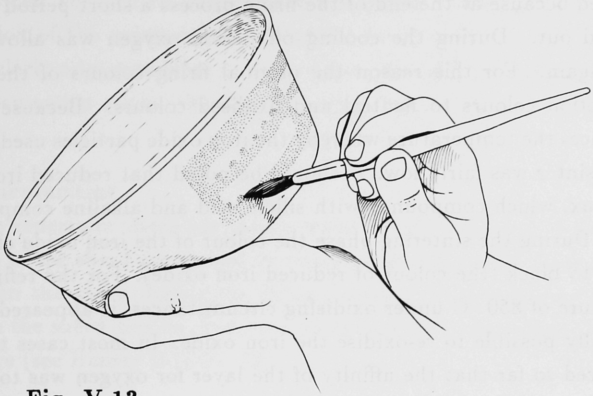


Fig. V.13.

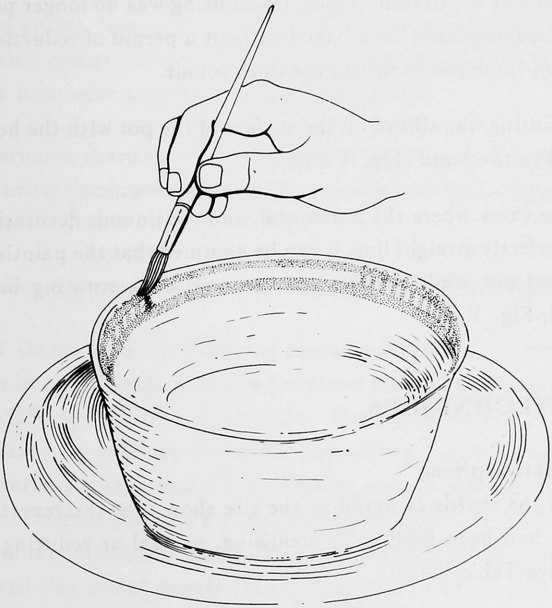


Fig. V.14.

normally occurring, coarser iron oxide particles. The sintering temperature was also lowered because at the end of the firing process a short period of reduction was carried out. During the cooling off period oxygen was allowed to enter the oven again. For this reason the original firing colours of the sherd vary from reduction colours to neutral and oxidised colours. Because of the said circumstances the temperature whereby the iron oxide particles used for painting started to sinter was fairly low. It should be noted that reduced iron oxide is a powerful flux, which compounds with silicic acid and alkaline components from the sherd. During the sintering phase the colour of the iron oxide changed from red brown to black (the colour of reduced iron oxide). For the refiring tests at a temperature of 850 °C under oxidising circumstances, it appeared that it was only partially possible to re-oxidise the iron oxide. In most cases the sintering had advanced so far that the affinity of the layer for oxygen was too low. This point did not apply to the sherd itself, the background to which the painting adhered. The cause for the black colours in the painting therefore lies in the low sintering temperature of this layer, combined with reducing circumstances at the end of the firing process. In two cases (Halaf Painted Fine Ware), the painting had not sintered that far, and re-oxidising to a red colour was still possible at a temperature of 850 °C. In other cases, re-oxidising was no longer possible. Some of the sherds had originally been baked without a period of reduction at the end: the painting on these pieces misses the dark colour.

The painting was affixed on the surface of the pot with the help of a brush: the pot rested in the hand (Fig. V.13).

In those cases where the horizontal, and continuous decoration lines were applied in a perfectly straight line, it can be assumed that the painting was affixed on the unbaked pot while being turned around on a rotating base (auxiliary potter's wheel; Fig. V.14).

E. FIRING TECHNIQUES

E.1. Firing atmosphere

The colours of the sherds as found at the site show that the repertoire included pottery which had been fired in an oxidising, neutral or reducing atmosphere. For a survey, see Table V.1.

E.2. Firing temperature

The minimal firing temperature which could be defined was ca. 700 °C. The maximum temperature that was found was ca. 950 °C. For a survey of the original firing temperatures, see Table V.1.

E.3. Manner of firing

The above can be used to deduct that the pottery under consideration, with the exception of the painted Halaf ceramics, could very well have been fired in not particularly advanced kilns or open fires. The painted Halaf pottery, to the contrary, demanded a kiln whereby the oven temperature could be adjusted.

E.4. Particularities

Within the repertoire there are sherds which show blistering. The bubbles on the surface of the sherd are caused by firing gasses which did not escape quickly enough from the sherd during the firing process. This indicates that the pot from which the sherd derives, had been subjected for a short time to a very high temperature (see Hamer 1975:27, 28).

F. THE RAW MATERIALS

Within the studied sample collection, the following materials were identified by macroscopic means: carbonate grains, calcite grains, quartz grains, conglomerate of quartz grains, iron oxide concretions, felspar grains, micas, pottery grit, undissolved clay grains, cavities of fibrous organic material, cavities of organic material with iron oxide accretion, unidentified grains.

Furthermore, changes in the structure of calcite at a temperatue of about 750 ^{0}C at reducing circumstances, and the reaction with hydrochloric acid (HCL) were also noted.

The following categories were distinguished (see also Table V.1):

Group 1. 21 sherds with the following characteristics: the presence of fine carbonate grains in rather large amounts (minimal size of the grains 0.1 - 0.2 mm. Amount: 10-15% and 15-20% dry weight. Homogeneous distribution. Shape: diverse angular). In addition there are sporadically other grains: iron oxide concretions (various shapes and sizes). Pottery grit (angular to badly rounded: various sizes). Unidentified black grains (mostly angular; various sizes). Undissolved clay grains (rounded). The clay is lightly to medium iron oxide containing. The undissolved clay grains mostly contain somewhat higher levels of iron oxide. The undissolved pieces of clay which were found at certain places in the sherd indicate that in these cases the clay had been mixed with water shortly before being processed by the potter. It is remarkable that in this category there are none or hardly any quartz grains. Only occasionally are there fine grains of quartz or a conglomerate of fine pieces of quartz.

In most cases the sherds from this group had originally been fired in an oxidising or neutral atmosphere. The firing temperature for at least half of the sherds did not originally reach a higher temperature than 750 °C, and for the remaining sherds the temperature did not go much beyond that.

Group 2. Two sherds showed the following characteristics: a dominant presence of quartz grains (angular to badly rounded $\leq$ 0.5 mm; also in conglomerate). Sporadic presence of felspar grains (angular) and micas (flat); unidentified black grains ($\leq$ 0.5 mm; variously angular) and longitudinal cavities of fibrous material. The sherds also contain carbonate grains (various forms and sizes, $\leq$ 1 mm) which at some places were partly burnt. Total amount of nonplastics: 15-20%.

Group 3. Twelve sherds showed the following characteristics: many cavities of burnt fibrous material (length of the fibres up to ca. 2 cm). At certain places the presence was noted of: carbonate grains (various forms and sizes; $\leq$ 2 mm; sometimes in the shape of conglomerates); micas and quartz grains $\leq$ 0.5 mm; angular to badly rounded); pottery grit ($\leq$ 0.5 mm); unidentified black grains (variously angular). Homogeneous sintering and amount of non-plastic material reaching from 5 to 10% and 10 to 15%.

Group 4. Four sherds showed the following characteristics: coarse calcite grains (angular; not homogeneous; sizes vary from 1-2 mm, 0.1-0.2 mm, and at some places grains of 6 mm, and 0.1-0.5 mm and 0.5-1 mm). In addition to calcite, there are also sporadic iron concretions (with various shapes), and pottery grit.

Group 5. Four sherds had the following characteristics: presence of clear amounts of dark brown to black grains with a somewhat fibrous lamellar structure ($\leq$ 4 mm; variously angular). In some places there are quartz/felspar grains ($\leq$ 1 mm; sometimes conglomerates $\leq$ 2 mm); white grains ($\leq$ 0.6 mm; possibly soap-stone) and iron concretions (various forms and sizes). Occasionally there is a rounded grain of milk quartz ($\leq$ 2 mm). The fabric was not homogeneous. The amount of non-plastics varies from 10-25%.

Group 6. Three sherds showed the following characteristics: few macro grains in the matrix (ca. 5%, consisting of carbonate grains, $\leq$ 0.1 mm, sometimes larger, up till 1 mm and with various shapes). In addition there is a sporadic presence of: pottery grit grains ($\leq$ 2 mm); badly rounded quartz grains ($\leq$ 1 mm); conglomerates of quartz grains, iron oxide concretions (with various shapes, $\leq$ 0.5 mm) and micas ($\leq$ 0.1 mm, flat). The fabric is not very homogeneous.

Group 7. Five sherds had the following characteristics: few non-plastics (ca. 5%). The difference with the composition of group 6 is not very clear from the non-plastics in the fabric, but is evident from the whole appearance and structure of the sherd. The sherd contains small carbonate grains ($\leq$ 0.5 mm; with various shapes). There are sporadic pottery grit grains and/or iron concretions. The fabric is homogeneous.

Group 8. This group (13 sherds) is, on the basis of the composition of the fabric, very difficult to describe as one section. Most of the separate sherds could be added to one of the above groups (1-7), but it is difficult to define which group is most suitable.

G. CONCLUSIONS

Although the sample was somewhat limited, some general and preliminary conclusions can be drawn as regards certain aspects of craftmanship from the Late Neolithic and Early Halaf pottery from Tell Sabi Abyad.

The form techniques which could be reconstructed (handmade pottery manufactured by pinching a piece of clay; handmade pottery made with coils; pottery made in a mould), did not demand much craftmanship from the potter. The ceramics, with the exception of the (painted) Halaf ware, were probably fired in primitive kilns or open fires. The painted wares were fired in a kiln in which the atmosphere was adjustable. The pottery under discussion thus contains two groups: 1. coarse ware; 2. (painted) fine ware. The first group indicates domestic production, while the second group shows characteristics of organised production.

For a survey of the similarities of the division of the pottery on the basis of the non-plastics, and the division on the basis of archaeological data, reference is made to Table V.1. Within the archaeological group of fine ware we can distinguish the material groups of 1, 6, 7 and 8. Within the archaeological group of coarse ware, we can distinguish the material groups of 3, 4, 5 and 6.

NOTES

1. With the applied macroscopic method of analysis the possibilities of identifying non-plastics are limited (see Stienstra 1986:46-48).

2. This reference collection consists of baked clay slices which consist of a mixture of clay and non-plastic additions. These have been mixed in known quantities, whereby the dry weight is taken as the standard.

3. The structure of calcite grains changes when being refired at a temperature of 750 ^{0}C or higher, under oxidising circumstances.

Table V.1. Technological and archaeological groups

Non-plastics Group	Shaping techn.	Firing atmosph.	Firing temp.	Find number	Arch. cat.
1		1,4	700°C	P13 15-20	A
	1,2	1,4	750°C	T4 16-93	A
	2,3	1,4	750°C	T5 1-7	A
		1,4	750°C	T4 3-7	A
	1,2,3	1,3,4	750°-800°C	T4 3-1	A
	2,3	1	750°-800°C	P13 13-5	A
	2,3	1	750°-800°C	P13 12-1	A
	3	1,3,4	750°-800°C	T4 8-29	A
	2,3	3	750°-800°C	T5 6-1	A
		1,4	750°-800°C	P14 58-23	A
		2,3,4	800°C	P13 18-1	A
		1	800°C	T5 11-3	B
	1,2,3	3,4	800°-850°C	T4 20-25	C
	2,3	3,4	800°-850°C	P14 8-1	C
		1,4	850°C	P14 33-44	C
		3,4	850°C	P14 33-2	C
	1,2,3	2	850°-900°C	T4 10-7	C
		3,4	850°-900°C	T4 1-25	C
		1,3,4	850°-900°C	P14 51-6	C
		3,4	900°C	P13 25-2	C
		1,3,4	950°C	T5 2-12	D
2		1	750°C	?	
	2	3,7	800°C	P14 44-18	?
3		5	700°C	T5 12-1	E
		5	700°C	P14 33-46	F
	2	5,7	700°-750°C	P14 28-23	F
	2	1	700°-750°C	T5 21-39	E
	2	5,7	750°C	P13 34-39	F
	2	1,7	750°C	T5 12-14	E
	2	1,7	750°C	P14 64-3	E
	2	5,7	750°C	P14 40-1	F
		1,7	750°C	T5 21-37	E
	2	1,7	750°C	T5 15-1	E
	2	1,7	750°C	T5 16-1	E
	2	3,7	750°C	T5 15-2	E
4		6	700°C	T5 18-22	E
		5	700°C	P14 52-32	F
		1,3	700°C	T5 14-14	E
	2	2	700°C	T5 4-6	G
5	2	2	700°C	T5 18-13	E
		2,3	700°C	T5 21-27	G
	2	5	700°-800°C	T5 13-5	E
	2,3	5	800°C	P14 28-1	H
6	2	1	700°-750°C	P14 28-16	C
	2	1	750°-800°C	P14 30-9	C

Non-plastics Group	Shaping techn.	Firing atmosph.	Firing temp.	Find number	Arch. cat.
	2	1	800°-850°C	T5 15-1	E
7	2,3	6	750°-800°C	T4 22-1	C
	2	1	750°-800°C	T5 18-5	I
		5	800°-850°C	T4 16-4	C
		3	850°C	P13 9-9	J
		5	900°C	P14 25-4	J
8		3	900°C	P14 49-30	J
		5	900°C	T4 12-1	J
		1	900°C	T4 3-11	J
		5	900°C	T4 1-8	J
		5	900°C	T4 11-3	J
	2,3	5	900°C	T4 6-2	J
	1,2,3	5	900°C	T4 17-14	J
		5	900°C	P13 15-2	J
	2,3	3	900°C	T5 13-1	K
		1	900°C	P14	?
	2,3	6	900°C	P14 38-1	J
		5	900°C	P14 28-1	J
	2	3,7	900°C	T5 13-1	K

Shaping technique

Traces of: 1= moulding, 2 = coiling, 3 = pinching.

Firing atmosphere

During the firing process conditions can change frequently. As a result the data presented in the list only present an approximate idea of the firing atmosphere.

1 = oxidation
2 = reduction
3 = neutral atmosphere
4 = short reduction at the end of the firing process, followed by oxidation during cooling
5 = reduction followed by oxidation during cooling
6 = neutral atmosphere followed by oxidation during cooling
7 = black core. Some sherds have a greyish to black core, while other parts have a normal range of oxidation colours. This black core is caused by carbonacious matter present in the clay or which developed during the burning of organic matter present in the clay. Because the firing time was short or the maximum temperature was rather low, this carbonacious material was not burned in the inner section of the sherds, where oxigen couldn't easily penetrate. The result is sometimes difficult to distinguish from sherds which have been treated as indicated by 5 and 6.

Firing temperature

The temperatures given are approximate values.

Archaeological categories

A = Halaf (painted) fine ware
B = Late Neolithic (painted) fine ware
C = Halaf (painted) fine ware
D = Samarra (painted) fine ware
E = Late Neolithic coarse ware
F = Halaf coarse ware
G = Late Neolithic grey ware
H = Halaf grey ware
I = Late Neolithic fine ware
J = Halaf fine ware
K = Samarra fine ware

Chapter VI

CLAY ANALYSES OF THE PREHISTORIC POTTERY: FIRST RESULTS

By Marie Le Mière

A. INTRODUCTION

At the 'Laboratoire de Céramologie' in Lyon, a preliminary analysis was carried out of the clay composition of 51 sherds coming from the prehistoric strata at Tell Sabi Abyad. The main aim of this analysis was to obtain some information on the local or non-local character of the pottery found at Tell Sabi Abyad.

The following sherds were used for analysis (the 'wares' are the same as those distinguished by Akkermans, see chapter IV):

- From the Late Neolithic strata: 7 Coarse Ware sherds, 11 Fine Ware sherds (10 painted, 1 unpainted), 3 Grey-Black Ware sherds (burnished).
- From the Halaf strata: 4 Coarse Ware sherds, 23 Fine Ware sherds (10 Halaf-type, 9 Samarra-type, 4 unpainted), 3 Grey-Black Ware sherds (burnished).

The method used for the chemical analysis was X-ray fluorescence. Ten main elements and ten traces [1] were measured. The data were statistically treated by cluster analysis (see Picon and Le Mière 1987).

B. THE RESULTS

The dendrogram (Fig. VI.1) shows that samples from the Late Neolithic strata (white signs) are rather well separated from those coming from the Halaf strata (black signs). Group B, which includes most of the Halaf Fine Ware samples and only one Late Neolithic Fine Ware sample, is highly homogeneous. No clear distinction in clay composition was observed between the Halaf and the Samarra-related sherds: both kinds of pottery seem to have been made of clay from the same source. The three Halaf Fine Ware samples (black triangles) shown on the right side of the dendrogram also belong to group B: their composition is highly similar to the composition of group B in general, except for a very low percentage of potassium, which is probably due to overfiring (as shown by the greenish colour of these sherds). The three grey-black and burnished sherds from the Halaf strata (black squares) all have the same composition and were made of a different clay than the Fine Ware sherds. The Coarse Ware sherds (black circles) seem also to have been made of a different clay than the other wares found in the Halaf strata, but the present sample is too small to allow further inferences.

Concerning the sherds from the Late Neolithic strata, group A comprises all but one of the Coarse Ware samples, and only one Fine Ware sample. The classification of the Fine Ware is not yet clear, as there seem to be two groups (C and D), but both of them are quite different from the Coarse Ware group (A). It will be necessary to enlarge the sample to find out the significance of these groups C and D.

The absence of local references, that is to say, clays from Tell Sabi Abyad and from various places in the Balikh valley, makes it impossible to determine whether the groups distinguished here are of a local or non-local nature. At present, we assume that the bulk of the Sabi Abyad Fine Ware ceramics from the Halaf strata was locally made. An exception, however, are the grey-black and burnished sherds found in the Late Neolithic strata at Sabi Abyad (white squares; last samples on the right side of the dendrogram). The composition of these Grey-Black Ware sherds differs strongly from that of the other groups and, no doubt, these sherds come from outside the Balikh valley. At present, we have but few chemical analyses of clays from the Syrian regions, which makes it impossible to define the exact area of origin of the Grey-Black Ware sherds. However, in the case of the Sabi Abyad sherds, the clay composition shows some peculiarities (high percentages of chromium and nickel) characteristic of the ophiolithic zones which can be found along the southern part of the Taurus region. Moreover, the strong similarities in appearance of the grey-black and burnished pottery of Sabi Abyad to the Dark Faced Burnished Ware of northwest-Syria and Cilicia, suggest that we have to look in these regions for the origins of our Grey-Black Ware. The sherds from Sabi Abyad can be classified within the same group as samples of Dark Faced Burnished Ware from Mersin, Ras Shamra and Sakçe Gözü (see Le Mière and Picon 1988).

To summarise the results of this preliminary analysis of Sabi Abyad ceramics, we can say that each ware of the Late Neolithic and Halaf periods seems to be different from each of the other ones. Apparently, different sources of clay for pottery production were in use. Probably the bulk of the pottery was locally made. In this respect, it is recalled that no distinction was noted between the painted Halaf and Samarra-like pottery; both seem to have been locally manufactured at Sabi Abyad. Interestingly enough, Dark-Faced Burnished Ware is present at Sabi Abyad, which was definitely not locally made and which

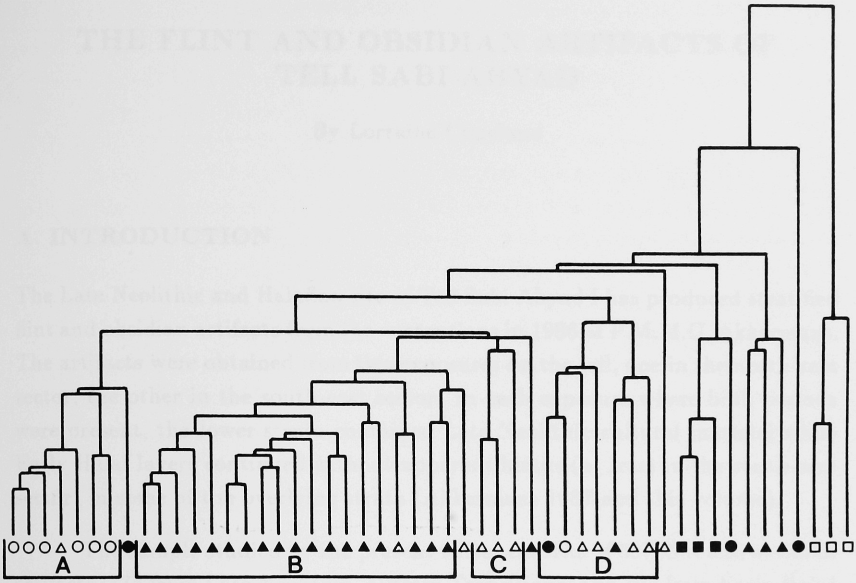


Fig. VI.1. Cluster analysis dendrogram of samples from Tell Sabi Abyad. White signs: samples from Late Neolithic strata. Black signs: samples from Halaf strata. Circles: Coarse Ware. Triangles: Fine Ware. Squares: Grey-Black Ware (drawing made by N. Vichy).

probably came from northwest-Syria or Cilicia. Further analyses are planned to clarify the exact nature of the groups distinguished here.

NOTE

1. The main elements were: Na_2O, K_2O, MgO, CaO, MnO, Al_2O_3 , Fe_2O_3, SiO_2, TiO_2, and P_2O_5.

The analysed traces were: Rb, Sr, Ba, Zn, Cr, Ni, V, Zr, La, and Ce.

Fig. VIII. Cluster analysis dendrogram of samples from Tell Sabi Abyad. White signs: samples from Late Neolithic strata. Black signs: samples from Halaf strata. Circles: Orange Ware. Triangles: Fine Ware. Squares: Grey Black Ware (drawing made by N. Vicky).

probably came from northwest-Syria or Cilicia. Further analyses are planned to clarify the exact nature of the groups distinguished here.

NOTE

1. The main elements were: Na_2O, K_2O, MgO, CaO, MnO, Al_2O_3, Fe_2O_3, SiO_2, TiO_2, and P_2O_5.

The analysed traces were: Rb, Sr, Ba, Zn, Cr, Ni, V, Zr, La, and Ce.

Chapter VII

THE FLINT AND OBSIDIAN ARTIFACTS OF TELL SABI ABYAD

By Lorraine Copeland

A. INTRODUCTION

The Late Neolithic and Halafian site of Tell Sabi Abyad I has produced stratified flint and obsidian artifacts from the excavations in 1986 of P.M.M.G. Akkermans. The artifacts were obtained from two exposures on the tell, one in the north-east sector, the other in the south-east sector. In each exposure where both periods were present, the lower strata contained Late Neolithic cultural material while Early Halaf layers continued without apparent hiatus (at least in the south-east sector) in some of the overlying strata (Akkermans 1987 and this volume).

The sample studied by the present writer consists of 507 flint and obsidian artifacts, 174 from Late Neolithic, 31 from Transitional and 302 from Early Halaf strata. A small number of intrusive Late Bronze artifacts will also be described.

B. THE LATE NEOLITHIC PERIOD

B.1. Introduction

The term Late Neolithic is used to refer to finds in strata preceding those of the Early Halaf. The material derives from squares T4, T5 and S5 in the north-east sector, which are regarded as representing an outdoor activity area, and from P14 in the larger, southern exposure, a domestic area with buildings. Virgin soil was not reached in 1986.

The artifacts from the various strata in these exposures are classified in Table VII.1. However, since there are only 52 retouched tools in all, and only 122 pieces of debitage, most coming from square T5, no patterns or developments upward through time are discernable, and it seems best to discuss the sample of 174 pieces as a whole, while bearing in mind that they are not all absolutely contemporary.

B.2. Raw material and condition

The materials used by the Neolithic Sabi Abyad knappers consists of flint and chert (85%) and obsidian (15%). The most often used stone material was a fine-grain, often glossy, light brown nodular or (more rarely) tabular flint. A few

Table VII.1. Analysis of Late Neolithic artifacts.

Trench	T4	T5	T5	P14	P14	P14	S5	
Stratum	4	1	2	9	10	11	1	Total
TYPE								
FLINT TOOLS:								
Lustred sickle element	1		1					2
Non-lustred sickle element	1	3	3		1			8
Truncated piece			1					1
Pressure-flaked piece		1	1					2
Racloir							1	1
Tabular knife		1	1					2
End- or flake-scraper		1						1
Burin	1		2					3
Borer and drill		1		1	1		1	4
Notch			1	2				3
Denticulate		4		1				5
Divers retouched piece		3	4		1			8
TOTAL	3	14	14	4	3		2	40
FLINT DEBITAGE:								
Core for bladelets		2						2
Other core		2	1					3
Core fragment or chunk		3	2	1				6
Flake	3	10	4	7		1	2	27
Part-cortex flake	1	7	8	2				18
Cortex flake			4		1			5
Trimming-flake	1	5	14	2	3	2		27
Blade			4					4
Fragment		6	4					10
Debris		1	2	2	1			6
TOTAL	5	36	43	14	5	3	2	108
TOTAL FLINT	8	50	57	18	8	3	4	148
OBSIDIAN TOOLS:								
Retouched bladelet	1	2		1				4
Retouched blade		2	2					4
Retouched flake or fragment			2					2
Geometric		1	1					2
TOTAL	1	5	5	1				12
OBSIDIAN DEBITAGE:								
Core or core fragment	1	1						2
Bladelet	2	1		1				4
Blade		2	1					3
Flake or fragment	1		2	2				5
TOTAL	4	4	3	3				14
TOTAL OBSIDIAN	5	9	8	4				26
ARTIFACT TOTAL	13	59	65	22	8	3	4	174
Non-flint: pebble			1					1

pieces of black flint also occur. The artifacts are fresh, with largely undamaged edges in the case of unretouched pieces. They are unpatinated and, where cortex is present (25.3%), it can be seen that some artifacts were made from rounded pebbles, the latter presumably obtained from the Pleistocene fluviatile gravel terraces occurring nearby at the edge of the Balikh flood plain (Besançon et al. 1980; Besançon and Sanlaville 1981).

In the Late Neolithic strata, 16 of the flint pieces were obviously burned, with pot-lid fractures or calcined areas. No clearly heat-treated pieces (i.e. with retouched facets showing more glossy than the matt surface of unretouched areas) were noticed.

As to the obsidian artifacts, they are also in fresh condition and are without cortex or patination. Thick pieces appear as brilliant, mirror-like dense black, but in transmitted light the thin areas at the edges show that the true colours are rather similar: a clear or slightly smokey material with greyish-yellow, brown or greenish tinges. Only two pieces are mottled or striped by impurities. Colours of this sort are thought to be characteristic in the Bingöl/lake Van area, as will be discussed further below. The chemical composition of six specimens was analysed by J.A.K. Boerma (Institute of Earth Sciences, University of Utrecht): see Appendix B.

B.3. Method of classification

The typelist used here divides the artifacts into retouched pieces (i.e. tools) and unretouched pieces and cores (i.e. debitage); it is much the same list as that used by the present writer for the Middle Neolithic/Halafian artifacts from Tell Arjoune, a 5th millennium site near Homs (Marfoe et al. 1981; Copeland, in preparation). However, some sub-types have been amalgamated since often only one or a few examples of a type are present.

As Table VII.1 shows, the obsidian artifacts are listed separately from those of flint, because they are so distinctly different in debitage methods and in tool-types as to denote separate set of functions. The artifacts will be described in the following order: flint tools, flint debitage, obsidian tools, obsidian debitage. A 'comment' will be made when appropriate on each tool-group.

B.4. Late Neolithic flint tools

Lustred sickle element (2) Fig. VII.2:1

The drawn specimen is well-made with abrupt lateral backing, one end being truncated, the other snapped off leaving a clean break. The lustre continues the length of the cutting edge for a quarter of a centimetre in from the edge. The second specimen is a small flake with abrupt retouch opposed to the lustred edge. No bitumen traces appear on our pieces, although this fixing method is attested not only at neighbouring 7th millennium Tell Assouad but at the other 7th millennium site of Damishliyya (M.C. Cauvin 1973; Akkermans, in press), as well as later in the Balikh succession (Tell Hammam et-Turkman in early Ubaid-related levels; van Loon 1985).

Comment: None of these correspond to the much longer *lames faucilles* of the earlier Neolithic phases in the Near East, which were struck from naviform cores, nor are they like the similarly long and often unretouched elements reported from the Hassuna zone (Yarim Tepe I and II; Merpert et al. 1977). Sickle elements are presumed to have formed parts of composite tools, and to have been inserted into hafts, their function being to cut the stalks of organic materials. An example of such a tool was reconstructed by M.C. Cauvin at Assouad, using the bitumen traces found adhering to sickle elements. Actual remains of curved or straight sickle hafts of bone or wood, with the elements attached, have been found at several sites of the period (e.g. Tell Hassuna and Tell es-Sawwan, as discussed by M.C. Cauvin (1983)).

The lustre derives from silica contained in the stalks of the plants, during the cutting and dragging motions of the reaper. From experimental knapping and harvesting studies carried out, it appears that the lustre can quickly form (especially when the plants are moist) on fine-grain flint elements, but takes longer to form (if it appears at all) when these are made of coarser grain stone such as chert (Unger-Hamilton 1983 and in preparation). Our two pieces are in fine-grain flint.

Non-lustred 'sickle element' (8) Fig. VII.2: 2-6
Our specimens are made in two cases on part-cortex blades, two have irregular teeth and clear traces of heavy use. No. 2 on Fig. VII.2 shows the largest element, which is the tip of a Canaanean blade. The smallest (no. 4) is unusual in being made on a flake, and it is one of the two geometrically-shaped specimens: an irregular bi-truncated trapeze. The other (no. 3) is more triangular. None of these pieces have regular teeth, but inverse notches occur on no. 6 and two others show traces of 'chewing' due to heavy use (no. 5).

Most of the pieces here judged to be sickle elements consist of small or medium-sized segments of blades which have been deliberately shortened to between 2-3 cm in length. Usually both ends have been broken either by dorsal ridge percussion or by other techniques, which will be discussed below. In sum, they closely resemble the lustred sickle elements known from earlier Assouad and

Damishliyya. Morphologically, they resemble the often smaller trapezes of Jarmo (Hole 1983, Fig. 112:1-15).

Comment: Although neither lustre or polish is visible to the naked eye on these pieces, ESM experiments on material from other sites show that pieces shaped like the lustred specimens have also been used for cutting and slicing tasks (Unger-Hamilton 1983, 'shape-defined sickle elements'). Unger-Hamilton (ibid.) has been able to distinguish two kinds of lustre: one produced by barley and the other by reeds or wheat. It is possible that our fine-grained pieces without lustre were used on plant material softer than cereals. The longer pieces could also have been used as knives to cut meat or for wittling wood or bone.

Truncated piece (1)
This is a broad part cortex flake with a concave distal truncation. Although of glossy flint but without lustre, it may nevertheless have been used as a sickle element, since we know that truncations were typically used to fashion sickle elements during earlier Neolithic phases on the Balikh, e.g. at Breilat, Damishliyya and Assouad (Copeland 1979, 1982; Akkermans, in press; M.C. Cauvin 1973).

Pressure-flaked piece (2) Fig. VII.1: 4-5
'Pressure-flaking' (*retouche couvrante* or *envahissante*) is a term used to denote the elongated, small, flat facets seen on certain Neolithic/Chalcolithic artifacts, assumed (although without proof) to have been produced by pressure rather than by percussion. There are only four examples of this technique in the present sample, two of which are described below as 'Tabular knives'. No. 4 on Fig. VII.1 shows a piece reminiscent of an 'Aurignacian blade', struck off a blade core using a soft hammer (bone or wood); it shows reworking in scalar retouch over a previously pressure-flaked area. The other piece (no. 5) is a blade segment of glossy flint with abrupt oblique pressure-flaking on one edge and use traces ('utilisation retouche') on the other edge; one end has been truncated by the 'chanfrein technique' (a transverse blow from the lateral edge on the thickness) as described by this writer (Copeland 1979, 1982).

Comment: Since pressure-flaking is much more characteristic of the Middle Neolithic artifacts (including sickles) in the Levant (for example, Byblos; Cauvin 1968, Fig. 36), these artifacts may represent reuse of earlier Neolithic tools, but rare later examples do occur.

Racloir (1)
This is a well-made blade with alternating obverse and inverse scalar retouch, as well as obverse scalar retouch on the other edge; it could have scraped bone or hide material.

Tabular knives or 'Tile knives' (2) Fig. VII.1: 1-2

Our tabular knives are fragments of tools made on completely flat and thin (about 6-7 mm thick) pieces of tabular flint, with a bifacial working-edge formed by fine pressure-flaking. The very thin cortex on both surfaces has slight marks of use or smoothing. The pressure-flaking facets are minute. if 'ragged', done directly onto the cortex, extending about 1.5 cm in from the edge. The edge is straight on one specimen, convex on the other.

Comment: This tool-type is called 'tabular knive' following L. Braidwood (1944), who thus described the virtually identical pieces found at the Samarran village of Baghouz, on the Euphrates near Abu Kemal. The same type was dubbed 'tile knife' by H. Kapel (1967) for the Arabian Neolithic/Chalcolithic specimens. The thinness of the bifacial working edge seems to suggest a cutting/slicing, rather than scraping function. It is not clear whether these pieces were deliberately broken, so that the break could be used as a back or finger-hold while cutting or sawing, or whether they are parts of larger pieces. All the 13 Baghouz specimens illustrated by L. Braidwood are similarly incomplete, and their working-edges are also either straight (8) or convex (5).

The 'tabular knives' from Sabi Abyad would seem to form a link with the Samarra culture, as is also confirmed by the occurrence of Samarra-like sherds, but rare examples do also occur at Levant sites (one was reported from Byblos *Néolithique Récent* (i.e. Amuq D), described as a "*racloir (...) biface (...) sur plaquette cassée (...) avec cortex sur les deux faces*" (Cauvin 1968:168).

End-scraper (1) Fig. VII.2:7

This is a flake with irregular concave distal scraper retouch.

Comment: The absence of more typical end-scrapers is somewhat surprising, but a parallel lack occurs in some contemporary sites, as we shall discuss below. End-scrapers make good skinning-tools, since they separate skin from flesh without cutting the hide (Hole 1983:258).

Burin (3) Fig. VII.2:8

These are atypical and carelessly-made dihedral burins, one a *bec-de-flute*, the other a rightangle burin. The third (no. 8 on Fig. VII.2) is formed by a single blow from a distal concave notch on the thickest part of a broken flake.

Borer and drill (4) Fig. VII.1:3, 6, 8-9

Although superficially resembling a Byblos Point, no. 3 seems to represent a drill-bit (*mèche-de-foret*). Its point is trihedral and thick; it was evidently not rotated on materials hard enough to form a polish on the three edges. The tang-like base seems to have been formed at a later stage, perhaps for insertion into the drill haft.

The other three borers are of the small offset piercer type (*perçoir déjeté*; Cauvin 1968, Fig. 86:3), consisting of sharp points on the distal 'corners' of the natural debitage, assisted by notches on each side in two cases (one on the ventral surface), and by a truncation in one case (no. 9); no. 8 has two such points.

Comment: A piece very similar to nos. 8-9 is illustrated from Umm Dabaghiyah, described as a lancet-shaped tanged point (Mortensen 1983:210 and Fig. 4:a-b). Almost identical simple borers on only slightly modified flakes occurred in the Pottery Neolithic of Umm Dabaghiyah (ibid.). The scarcity of piercing tools at our site may be contrasted to the Levant where, at Byblos, they formed the most important group in the contemporary *Néolithique Récent* (Cauvin 1968:153).

Notch (3)
There are two kinds of notches: wide, single-blow ('Clactonian') in the case of one piece on the inverse of a square segment, and wider, retouched notches. The latter notch type resembles a concave truncation in two cases. Two have additional nibbling or 'utilisation retouch'.

Comment: Notches are regarded as being tools for scraping rods of bone or wood.

Denticulate (5) Fig. VII.2:9-10
All but one come from square T5, stratum 1. The size of the denticulations varies from 'Clactonian' to very fine; sometimes both kinds occur on the same piece (e.g. no. 10). The supports are also varied (flakes, a core-edge flake (no. 9), fragments, blade butts etc.). One specimen has a trace of sheen and may be a reused piece.

Divers fine and abrupt retouch (8)
One small part-cortex flake has abrupt (lateral) retouch and is possibly a refreshment-flake. The others have fine or nibbled retouch, usually on part of the lateral edges of blade-butts, tips or segments. The fine retouch is inverse in one case.

B.5. Late Neolithic flint debitage
The unretouched or waste flakes, cores and fragments of flint form 72.9% of the Late Neolithic sample.

Core (5) and core fragment (6) Fig. VII.1:7
Of the few cores present, the best-made are the two for the production of bladelets. They are small and were probably pyramidal or conical with plain striking-platform, before being worked down (no flint bladelets seem to be present, however). The other cores consist of globular or change-of-orientation types, with flake-removal scars going in several directions. There are also six fragments or amorphous chunks. The drawn piece seems to have been used as a hammerstone, having battered ridges on its crest; small flakes were struck from a platform around its circumference.

Unretouched flake and blade (108)
Both hard stone hammer and soft (wood or bone) hammer techniques of debitage were used to produce blanks. Evidence of primary flint working is rare, only 5 cortex flakes and 18 part-cortex flakes being present (21.2% of the 108 debitage pieces); these are often incomplete. Non-cortex flakes are more numerous and there are equal numbers of medium-sized and very small trimming flakes (*'éclats de taille'*), 54 in all or 25% each. Unretouched blades (4) are rare and with the ten broken pieces form another 12.9%. Most of the flakes are fairly flat, and have plain or cortex butts, while the trimming-flakes have shattered or linear butts. Some of the blades resemble types known from Pre-Pottery Neolithic contexts having the characteristic narrow, linear or punctiform butts and proximal core-refreshment facets. Others are thicker and wider, some having been deliberately broken (shortened), as shown by percussion marks on the dorsal ridge and incipient hinge fracture on the break.

Comment: The presence of the trimming flakes indicates that at least some knapping was done at the site; perhaps already pre-formed blanks were finally shaped there into tools or re-sharpened when necessary. On the other hand, crested flakes, spalls and refreshment tablets are very rare (two of each).

B.6. Late Neolithic obsidian tools
In contrast to the flint industry, where flakes and thick blades predominate, the obsidian industry is oriented towards production and use of blades, especially small blades. No piece is complete as to length. One of the methods used to shorten the blanks is by percussion; a blow (using a punch or hammer) on the dorsal ridge with the piece laid on an anvil breaks the blank, leaving a negative bulb of percussion on one of the break surfaces and a positive bulb on the other. Traces of the point of impact are often clearly visible. This is the 'voluntary fracture' described at the Halafian site of Shams ed-Din by C. Bergman (Azoury and Bergman 1980).

More rare is a variant of the microburin technique, where a small notch is made on the lateral edge and the remaining width snapped. The *'chanfrein* technique' was not observed on obsidian pieces.

Another fracture - referred to here as a 'snap' - leaves a break which is fairly clean except for an incipient hinge fracture on the break surface. Occasionally (where the force was directed onto the ventral surface) a slight overhang of the dorsal surface will result; this type is more likely to have resulted accidentally during debitage (something which frequently happens to obsidian blanks; Pelegrin 1984:114).

Bladelet with fine or other retouch (4) Fig. VII.3:7-8
No. 7 is a butt with triangular section and utilisation traces on both lateral edges, while no. 8 is a segment, deliberately snapped, having an inverse notch on each edge.

Blade with fine or other retouch (4) Fig. VII.3:1-3
The longest is 6.5 cm long with tip snapped off and nibbling on the inverse (no. 1); another blade butt has a notch on the distal break with use traces on the edges (no. 2). A third is a segment with a proximal truncation and a shoulder at the narrow end (part of the shortening process?).

Retouched flake and fragment (2) Fig. VII.3:4, 10
No. 4 is a fragment with pronounced inverse teeth and opposed use traces. No. 10 is a thin fragment either of a flake or a wide blade, but is without either extremity. Both edges are finely retouched.

Geometric (2) Fig. VII.3:5, 9
No. 9 shows a tiny segment, with one edge truncated and snaps at each end. It is either a carelessly-made transverse arrowhead or a by-product of the shortening of other blade tools (cf. Tixier et al. 1980, Fig. 6:10). The other is, in contrast, either a core fragment or a large and thick blade segment with a central ridge; it has been abruptly truncated on each end and on one edge, leaving a sharp edge with a point on one corner.

Comment: Similar obsidian geometrics from Jarmo are discussed by Hole (1983), who suggests that they formed parts of composite hafted tools. At the Samarran site of Tell es-Sawwan a sickle composed of three flint and one obsidian elements was found (el-Wailly and Abu es-Soof 1965), showing that obsidian was sometimes used in sickles.

B.7. Late Neolithic obsidian debitage

Core (1) Fig. VII.3:6 **and core fragment** (1)
The only specimen is a very well made conical bladelet core about the size of a small wallnut, with flat, all-round striking-platform on which scratches can be seen. The sharp overhangs have been rubbed off on half the circumference. The fragment may be, rather, a tablet.

Unretouched flake, blade and bladelet (12)
Apart from five flakes (a butt and small trimming-flakes), the main products of core-reduction are mainly thin, delicate blades or bladelets with punctiform or linear butts, straight dorsal ridges and parallel sides. There are four unretouched bladelets or bladelet fragments and three blade fragments (butts and segments).

Comment: The bladelets are probably produced by use of pressure. According to experiments carried out by C. Bergman at the Halafian site of Shams ed-Din on the Euphrates, pressure using a special tool (blunt point) rather than percussion is the easiest way to produce parallel-sided bladelets of obsidian. In contrast, soft-hammer percussion on a hand-held core is a less laborious method of producing obsidian blades, because it is not necessary to immobilise the core (Azoury and Bergman 1980).

Cassure volontaire, shown by stigmata on the break, has also been reported at earlier sites in the region (e.g. Assouad; M.C. Cauvin 1973:103, 1983). Unfortunately it is difficult to determine whether wear polishes are present on obsidian, and many more pieces than are counted as tools here may have been used. On the other hand, the slight 'nibbling' so often present may just be a measure of the fragility of the edges, so much more subject to accidental damage, whether from movement in a haft or from utilisation.

B.8. Late Neolithic non-flint artifacts (1) Fig. VII.3:11

A small, flat river-pebble of glossy, fine-grain grey stone; it has a dull patch in the centre of one surface, but is otherwise without visible signs of wear.

B.9. Late Neolithic: summary and interim discussion

The 52 Late Neolithic flint and obsidian tools at Sabi Abyad form about a third of the excavated sample of 174 artifacts. The proportion of the two raw materials concerned, flint and obsidian, are: 85.5% flint and 14.5% obsidian. Of these frequencies, 27.6% of the flint pieces are tools as against 46.2% of the obsidian pieces. Both industries consist of a limited number of types. Pieces such as shortened blades which could be regarded as sickle elements are the most numerous, only two of which have sickle sheen. While flakes and parts of thick blades support the flint tools, the obsidian tools are made on delicate blades and bladelets, usually also shortened into segments. The most well-made flint tools, which stand out from the rest in being bifacially pressure-flaked, are the tabular knives. The burins are somewhat atypical and there are no typical end-scrapers. Absent also are arrowheads, axes, and other heavy-duty tools such as choppers or hammerstones. The absence of axes is unexpected given their presence, if rarely, in the form of hard stone (e.g. chlorite) specimens in the earlier sites, Damishliyya and Assouad.

Although obsidian is present in fairly moderate percentage (about 15%), this is similar to the 16% obsidian seen at 7th millennium Damishliyya (stratum 7; an advantage over the 6% in stratum 2), and is less than the 19% seen in the overlying Early Halaf layers at Sabi Abyad. It is greater than the amounts seen in sites which are further from the Anatolian sources. For example, the site of Arjoune near Homs has less than 1% obsidian (Copeland, in preparation). However, one would not expect a percentage as high as the 80% cited from Tell Aqab (Davidson and Watkins 1981) and from other sites somewhat nearer to the sources.

If tool-types are not too varied, the reverse is true of the debitage techniques. Apparently several different methods of core reduction, followed by product modification, were known of and used for specific purposes according to the properties of the raw materials. Many of the very straight-sided and neat blades and bladelets may have been detached from the core by pressure techniques.

Since it is generally assumed that arrowheads are connected with hunting practices, and axes with tree-felling and firewood cutting, the absence of these types may indicate that neither hunting (at least with bow-and-arrow) nor woodworking took place. On the other hand it may mean only that the sample is biassed, for example from having been excavated in areas of the village where flint was not used or worked. This is the more likely explanation, given that not only were wild animals eaten, but evidence for wood (for doors, posts, lintels etc.) was present in the excavation, as were ovens, kilns, ashes and fireplaces.

The presence of the various sickle elements confirms the 'agricultural village' status of Sabi Abyad. From this sample it is not clear whether straight or curved sickle hafts were used, nor do we know what fixing material was used; no trace of bitumen can be seen, at least by the naked eye. If bitumen was used, it would represent a trading link with sites further to the east, located near oil seeps, links already confirmed by the presence of Samarran (or Samarran-influenced) pottery, and by some Samarran lithic types (tabular knives). The imported obsidian shows that trade with north-eastern sites also took place.

In sum, the typology of the Late Neolithic lithic sample studied here suggests that the occupation occurred at the very end of the Neolithic period in northern Syria, at a time when earlier types such as tanged Byblos Point arrowheads were no longer made, and (in the west) pressure-flaking on a varied range of artifacts was no longer carried out. On analogies with long sequence sites such as Byblos, Ras Shamra, Mersin and the Amuq sites, this should have been the Amuq B phase of Braidwood and Braidwood (1960), and in fact the excavator has suggested just such a date, i.e. the later half of the 6th millennium (Akkermans 1987 and this volume).

As we shall see, the Late Neolithic stone tools are not markedly different from those of the Halaf phase. This suggests that the Late Neolithic occupation took place only a short time before that of the Halaf, just as is indicated by the stratigraphy.

Unfortunately, no parallels for this phase (Period 6 of Aurenche et al. 1981 and Hours et al., forthcoming) can be cited in the immediate vicinity, or indeed in the southern Jezirah. Sabi Abyad is the only site now known of in this area where a late pottery Neolithic occurs preceding the Early Halaf. Something equivalent, however, is known in the northern Jezirah, for example at the base of Tell Halaf (dated to 5,600 B.C.) and perhaps the 'pre-level 15 pits' at Chagar Bazar as well as the (unexcavated but truncated) base of Tell Habesh (Davidson 1977 and references).

In looking for comparable sites to the east, it would appear that Sabi Abyad Late Neolithic folk were contemporaries of the late Hassuna and Samarra people who occupied the steppes between the Euphrates, the Jebel Sinjar and the Tigris. These cultures also had a 'banal' flint and obsidian industry, not too different (except in the presence of celts and axes) from that of Sabi Abyad; nevertheless their tool-kits included certain types (such as hoes, side-blow flakes, etc.) not seen at this time (except very rarely) in the west (Hours and Copeland 1983).

C. THE TRANSITIONAL PERIOD

All the artifacts (26 of flint, 6 of obsidian) assigned by the excavator to this phase come from one exposure: P14, strata 9 to 7A.

C.1. Raw material and condition

The same raw materials of flint, chert and obsidian were used as in the Late Neolithic levels. A few black flint pieces occur and three pieces are burned. The six obsidian pieces form 18.7% of this small sample and the colours noted are honey-brown, greenish-grey and grey.

C.2. Method

As before, the totals from the four strata have been combined for study, since the numbers of artifacts are too small for typological developments upward to be observed.

C.3. Transitional flint tools

Non-lustred sickle element (1) Fig. VII.4:6
A small blade segment with older patina and traces of abrasion has been snapped and reused, probably in a composite tool.

Racloir (1) Fig. VII.4:2
A single convex scraper on a part-cortex flake.

Tabular knive (1) Fig. VII.4:1
This is thinner and less well-made than the Late Neolithic specimens; it is broken in two places, the working edge is very worked down and shows little evidence of pressure-flaking. However, there are traces of white plaster adhering to the cortex. This plaster shows scratches running transverse to the working edge (a similar feature occurred on Halafian tabular knives, as described below).

Borer or drill (2) Fig. VII.4:5
The drawn piece is made on a burin spall with inverse retouch, the other, possibly a drill, has much battering at the corner of a used flake.

Notch and denticulate (2) Fig. VII.4:3
The notch is made on a part-cortex blade, the drawn piece is a denticulate on a thick, more or less circular, part-cortex flake.

Table VII.2. Analysis of lithic artifacts from Transitional levels.

Trench Strata	P14 7A	7B	8	8/9	total
FLINT TOOLS:					
Non-lustred sickle element		1			1
Racloir			1		1
Tabular knife		1			1
Borer and drill		1	1		2
Notch				1	1
Denticulate		1			1
Backed piece				1	1
Divers retouch		1			1
Composite tool				1	1
TOTAL		5	2	3	10
FLINT DEBITAGE:					
Core tablet or spall	1	1			2
Part-cortex flake				2	2
Cortex flake	1				1
Trimming flake		3		2	5
Fragment	2	1	1	1	5
TOTAL	4	5	1	5	15
TOTAL FLINT	4	10	3	8	
OBSIDIAN TOOLS:					
Borer	1				1
Bladelets with fine or other retouch				1	1
Blade with fine or other retouch		2			2
Composite tool				1	1
TOTAL	1	2		2	5
OBSIDIAN DEBITAGE:					
Bladelet		1			1
TOTAL OBSIDIAN	1	3		2	6
ARTIFACT TOTAL	5	13	3	10	31

Backed piece (1)
This is a naturally-backed part-cortex flake which has utilisation traces.

Divers retouch (2)
One has abrupt, nibbled retouch, the other has fine notches.

Composite tool (1) Fig. VII.4:4
The drawn piece is a thick flake with its tip broken off; a notch as well as scraper retouch remain on the proximal part.

C.4. Transitional flint debitage

This consists of 15 artifacts: three cortex and part-cortex flakes, five trimming flakes and four fragments, as well as three refreshment flakes (e.g. a core-tablet and a scraper spall).

C.5. Transitional obsidian tools

Borer (1) Fig. VII.4:8
A small borer on the lower half of a broad flake with cortex butt, degaged by a notch and an area of parallel retouch.

Bladelet with fine or other retouch (1)
This piece is notched and is segmented by a truncation and a snap.

Blade with fine or other retouch (2) Fig. VII.4:7
The drawn piece is a well-used segment with small notches, a truncation and a snap. The other segment also has bilateral nibbling.

Composite (1) Fig. VII.4:9
This is a shouldered scraper or notch with a badly made burin, on a thinned flake fragment; there is an incipient bulb of percussion on the distal break surface.

C.6. Transitional obsidian debitage

The only piece is the butt of a grey bladelet.

C.7. The Transitional lithic material: summary

The only new types are the borer on an obsidian flake and the composite burin/scraper, but the sample is too small to regard this as meaningful. The plaster adhering to the tabular knives may indicate links between this phase and that of the Early Halaf.

D. THE EARLY HALAF PERIOD

D.1. Introduction

There seems to be no visible hiatus at the top of the Late Neolithic layers in the south-east section of Tell Sabi Abyad and the next levels are ascribed to the Early Halaf phase by the excavator.

The sample of chipped stone tools from Halaf levels is larger than that for the Late Neolithic and Transitional strata, and it is clear from the stratigraphy that the Halaf occupation took place through a considerable time, during which the use of space in the village shifted from place to place, and from one activity to another, several times. Nevertheless the number of retouched tools is modest (69) and their distribution among the different exposures, strata and features (buildings, pits, ovens, etc.) does not suggest any particular patterning, either functional or typological, except that, as would be expected, areas which were occupied by domestic installations (for example P13, stratum 5) have larger numbers of lithic artifacts than those representing erosional phases, such as P14, stratum 5.

As an interim measure, therefore, all the Halaf chipped stone assemblages will be considered together, bearing in mind that the lower strata (e.g. P14, strata 6D-6A) represent a village earlier than that found eroding out of the top of the tell (e.g. P13-P14-O14, stratum 1).

D.2. Halafian flint tools

Heavy-duty tool (1) Fig. VII.6:14
This is a fragment of the thick, narrow implement of dense chert or limestone, roughly triangular in section, which has been flaked and then partially polished. Its general shape suggests that it was a chisel, adze or pick. One end is broken off, the remaining end being a battered and blunted point. The flat base shows striations running from edge to edge. The piece may have been either rotated, as in a drill, or used as a plane or scraper after it was broken.

Comment: as Hole (1983:258) has pointed out, agriculturalists *can* farm without recourse to stone tools, but a few items would surely be needed (hoes or digging-stick weights to prepare the ground, axes or choppers to cut and prepare withies for winnowing-trays, baskets, stockades, etc.). Ground stone axes and celts are known at other Jezirah sites, but not in large numbers.

Lustred sickle element (5) Fig. VII.6:4-7
No. 6 is crescent-shaped (*à dos convexe*) and is interesting in having a rounded,

Table VII.3. Analysis of Early Halaf flint artifacts

Trench	P14						T4				P13					
Strata	2,	3,	5	6A,	6B,	6C,	1	1/2,	2/3	3	1,	3	4	5	6	
TYPE	2/3	3/4		6A/6C	6C	6C/6D		2			2					total
FLINT TOOLS:																
Heavy-duty tool												1				
Lustred sickle element					1									2	2	5
Non-lustred sickle element			1												4	5
Truncated piece		1			1									2		4
Pressure-flaked piece													1			1
Racloir									1							1
Tabular knife				1	1											2
End-of-blade scraper									1				1	1		3
Flake-scraper	1								2			1				4
Dihedral burin	1		1										1			3
Truncation burin				1												1
Borer or drill										1			1		1	3
Notch						1	1	1		1		1			2	7
Denticulate								1		4						5
Backed knife						1									1	2
Divers fine retouch											1		1	2	4	8
Divers other retouch				2	1		1		2	1		1	2	3	1	14
TOTAL	2	1	2	4	4	2	2	2	6	7	1	4	7	10	15	69
FLINT DEBITAGE:																
Core		2			2		1			2						7
Core fragment or chunk					1				1		1	1	1			5
Flake		2			2	2	3			1		1	3	5		19
Part-cortex flake		1	1		2	3	3	2	2	4	3	1	2	5	1	30
Cortex flake		1			2	1					1	1	1	2	1	11
Trimming flake				1	4	1	6		4	2	5	1	6	7	4	41
Blade				1	3		1		3		2		1			11
Refreshment element	2	1				2					3	1	1		1	11
Fragment	2			2	1				1	1		1	3	3	2	16
Debris	1				4	3	6	1	1	2	1		1	2	1	23
TOTAL	5	7	1	4	21	12	21	3	12	12	16	7	19	24	10	171
ARTIFACT TOTAL	7	8	3	8	25	14	23	5	18	19	17	11	26	34	25	243

blunt edge (presumably from heavy use) next to the area which is lustred. The steep back has a bipolar retouch. No. 5, a pointed type (probably inserted at the tip or base of the sickle), also has an abruptly retouched back. This is absent on no. 4 which is slightly 'beaked', resembling a type known from earlier Iraqi and Anatolian sites, e.g. Umm Dabaghiyah (Mortensen 1983).

Non-lustred sickle element (5) Fig. VII.6:8-11
All are short pieces, three being roughly square in shape, one, no. 10, being crescentic-shaped. All are made on blade segments, no. 9 having distinct teeth and an abruptly retouched back.

Comment: Experiments have shown that large-toothed elements are efficient at cutting reeds, but not effective on cereals (Cauvin 1968:73). At riverside sites such as Sabi Abyad, reeds must have been abundant, and were surely exploited, as they are today.

Truncated piece (4) Fig. VII.5:8 and Fig. VII.6:1-3
Three of these are bitruncated blades, forming shapes such as a square (no. 1 on Fig. VII.6) or an oblique trapeze (no. 2). The truncation can be concave as in no. 1 or straight as in no. 8 on Fig. VII.5. It is likely that three of these formed part of composite tools but no. 8 could have been differently used (for scraping?).

Pressure-flaked piece (1) Fig. VII.5:4
This is a thick tip fragment, pressure-flaked on the ventral surface and blunted by use, perhaps as a borer. It may be a reused Neolithic piece.

Comment: The presence of such pressure-flaking on the inverse of tips is characteristic of the tanged PPNB and early pottery Neolithic arrowheads, both in the Balikh sites and those in the west, as well as (although much more rarely) in the east (e.g. Yarim Tepe I, level 12; Merpert et al. 1977).

Racloir (1)
A side-scraper on a flake with opposed proximal notches, suggesting that the butt was hafted.

Tabular knife (2) Fig. VII.5:5, 7
These pieces are 'degenerate' in comparison with the specimens in the Late Neolithic levels. No. 5 is only 3-4 mm thick and the clearly re-sharpened working-edge shows traces of fine pressure-flaking. No. 7 has an abruptly retouched working-edge like a *raclette* on an even thinner (about 2 mm) tabular fragment. As before, the fracture planes are unretouched except for slight thinning on one. However, they have interesting functional overtones: both have white plaster

adhering to the cortex on both faces. Scratches in the plaster run transversally to the edge or at random.

Comment: It will be recalled that a closely similar artifact occurred in the Transitional levels at Sabi Abyad. Since plaster was so often used at Sabi Abyad for wall and floor coverings and for lining pits, these artifacts may have been used to apply or to smooth the plaster. Alternatively, they may have been used to pulverise the plaster nodules formed during its making (for the method used by modern Syrian villagers, see Aurenche and Marechal 1982). Although L. Braidwood does not mention plaster on the Baghouz knives, her photograph (1944, Pl. VIII) seems to show some scratches on numbers 2, 3 and 4.

End-of-blade scraper (3) Fig. VII.5:9, 11
No. 8 is a special ('peripheral') type, with the frontal retouch continuing down each lateral edge to aproximal point which is almost a tang. Similar pieces are reported from Fakheriyah, Mollah Assad and Cayönü in pre-pottery contexts (L. Braidwood 1952; Sanlaville, ed., 1985; Braidwood and Braidwood 1982). Since our specimen is patinated, it may represent another reused earlier tool. The other end-scrapers are more typical, no. 11 being undercut ('drooping front', a type thought to have been used for hide-scraping).

Flake scraper (4) Fig. VII.5:6, 10
No. 6 is a large tip fragment with neat circular front, and some semi-abrupt lateral retouch through an older patina. No. 10 has well-made, semi-abrupt front and some lateral retouch.

Dihedral burin (3) Fig. VII.6:12-13
No. 12 is a well-made angle burin on a narrow blade, contrasting with no. 13, an atypical double burin on a pebble.

Truncation burin (1)
This is a small piece with the burin facet struck from a distal notch.

Borer (2) Fig. VII.7:1
Both are small piercers, the point on one degaged by two notches at the corner of a shortened flake. On the drawn piece the point is degaged by retouch and a notch.

Drill (or pressure-tool?) (1) Fig. VII.7:2
This piece has a point which is blunted and shattered, as though damaged by percussion or by extreme pressure. It could represent reuse of a broken drill, which was then used to fracture blades.

Comment: Similar blunting was noted on some scrapers at 7th millennium Cafer Höyük on the upper Euphrates, attributed to percussion (Cauvin and Balkan 1983:58).

Notch (7) Fig. VII.7:7

Two are retouched notches, lateral in the case of the drawn piece, on a naturally-backed part-cortex blade, the other on the distal end of a flake. Another piece is incomplete, a concave notch on a triangle-shaped fragment. The others are medium-sized single-blow notches, one on the inverse surface.

Denticulate (5) Fig. VII.7:4-5

The drawn piece (no. 5) is a flake with three indented areas, two on the inverse (lateral and distal) and one on the lateral edge; the teeth are sharp and abrupt. Three others have fine denticulations and one (no. 4), with freshly-sharpened edge, has what appears to be polish on the inverse surface.

Backed knife (2) Fig. VII.7:6

The drawn piece has a small abruptly retouched area on one lateral edge and wear traces on the cutting edge. The other is small, with an abrupt back but no good cutting edge; it may be rather a refreshment-flake.

Divers fine retouch (8) Fig. VII.5:2-3 and Fig. VII.7:3

These are pieces, mainly incomplete, showing areas of discontinuous fine retouch. Fig. VII.5:2 is a 'Pre-pottery' type of blade (i.e. made by soft hammer or by use of a pressure), similar to that on Fig. VII.5:1, with fine inverse nibbling. No. 3 is the tip end of a delicate blade with alternating ventral and dorsal fine retouch. A thin flake fragment has concave parallel retouch of *raclette* type. Three other pieces may be either parts of composite tools or just pieces which were accidentally damaged.

Divers abrupt and other retouch (14) Fig. VII.5:1 and Fig. VII.7:8

These are pieces showing various forms of slight utilisation, not classifiable as any of the above types, Fig. VII.7:8 being a good example. One piece may be the extreme tip of an end-scraper. Fig. VII.5:1 is another 'Pre-pottery' type of blade slightly utilised at the tip and on one edge.

D.3. Halafian flint debitage

The flint debitage (cores and flakes, 174 pieces in all), form 71.6% of the flint sample.

Core (7), **core fragment** (4) and **chunk** (1) Fig. VII.7:11

The cores, either intact or fragmentary, are very scarce, especially in the P13 strata. Three are in fresh, sharp condition, but the others seem to have been battered. They have also been worked down to a point where they are more or less unclassifiable as to sub-type. No. 12 has been worked from both faces and is now very thin. One seems to have been a change-of-orientation core for small flakes. Two are made on flakes. The fragments seem to have last produced small flakes: two are very fresh and sharp, the others battered. The chunk has a *geode*.

Comment: The conical type for the production of bladelets, with round striking-platform, is absent, although it is often seen in Halafian and contemporary industries (e.g. Arjoune, Ayngerm or Khazzameh; Copeland, in press; Braidwood and Braidwood 1982; de Contenson 1968).

Unretouched flake blade and bladelet (162) Fig. VII.7:10, 12

As shown in Table 3 these are divided between the following classes: cortex flakes (6.7%), part-cortex flakes (18.5%), ordinary flakes (11.7%), trimming flakes (25.3%), refreshment flakes and tablets etc. (6.7%), flake fragments (9.8%) and debris (14.1%). There are no large pieces, most flakes being small or medium-sized. No. 12 is an example of a trimming flake. Neat, plain butts predominate on these flakes although rare facetted butts do occur. Just as in the Late Neolithic, the flakes are usually quite flat; they were probably made by stone hammer technique. Part of the core's edge has come off on the flake in 6 cases, and indicated that the cores were originally somewhat larger. Cortex-backed (naturally-backed) types are few. Bipolar dorsal surface preparation is rarely seen.

At least 33 (20.3%) of the unretouched pieces are broken, being either butts or tips. These pieces may be by-products, reflecting the prevalence of shortening seen in the industry. By-products of core-preparation are rare, no. 9 being a tablet and no. 10 a burned crested flake (perhaps once a burin).

A few blades were made in a different technique, using soft hammer or pressure techniques (as in Fig. VII.5:1-2).

Comment: As to the question of flint-working at the site, the same remarks as were made concerning the Late Neolithic apply here. It would appear that some knapping (perhaps only repair work) was done when necessary, but most of the primary jobs of cortex peeling, blank production etc. seems to have been carried out at another place.

D.4. Halafian obsidian tools

Most of the obsidian pieces are green, but brown or grey colouration is also present, some pieces being mottled or striped. A different obsidian type may have come into use during the Halaf phase at Sabi Abyad: a coarse-grain material which seems to contain more impurities.

As to condition, for the first time we see abraded pieces. Some artifacts are worn on the facet margins (Fig. VII.8:6) and, in addition, seem to be patinated, i.e. the break surfaces are bright while the other surfaces are grey and dull. Use-wear specialists have advanced two possible explanations for this kind of effect: it may indicate wear from the artifact having been used on its dorsal surface as a scraper or plane, or the abrasion may be due to movement of the artifact within a sleeve or haft (Anderson-Gerfaud 1982). Several pieces have minute scratches, indicating utilisation (Fig. VII.8:4, 6, 17). This effect is distinct from natural streaks in the raw material and also from the '*moustaches*' which radiate from the point of impact (Tixier et al. 1980). Fig. VII.8:3 is the smallest tool, a denticulated segment.

The matt, striated areas reported from Cafer Höyük 'sickles' seem to be different, since this effect occurs linearly on the inverse edge of abruptly retouched ('strangled') pieces there (Cauvin and Balkan 1983), whereas on our pieces the scratches occur at random over the ventral surface.

A few obsidian blades seem to have been detached from the core by direct percussion, as shown by pronounced bulb and distinct shock waves on the ventral surface, but others, with flat bulbs, could have been detached by pressure.

There is relatively less obsidian in the debris area of T4 than in P13/P14, which may mean that (as would be expected) obsidian was curated more than flint.

Notch (1) Fig. VII.8:16
A bladelet segment with a retouched lateral notch and two small proximal notches.

Bladelet with fine retouch (7) Fig. VII.8:1-2
The drawn pieces are two of the four butt ends present, no. 2 having inverse, no. 1 having obverse fine retouch. There are also two segments and a tip, the latter having a small notch.

Bladelet with other retouch (3) Fig. VII.8:3-4, 8, 17
Fig. VII.8:8 shows a bladelet with distal and proximal 'shoulders', either a broken double borer or a by-product. No. 4 is a narrow segment, apparently scratched on the ventral surface in random directions. No. 3 has small denticulations on both edges.

Table VII.4. Analysis of Early Halaf obsidian artifacts

Trench	P14						T4				P13					
Strata / TYPE	2. 2/3	3, 3/4	5	6A. 6A/6C	6B, 6C	6C, 6C/6D	1	1/2, 2	2/3	3	1, 2	3	4	5	6	total
OBSIDIAN TOOLS:																
Notch										1						1
Bladelet with fine retouch		1			1	1					1	2		1		7
Bladelet with other retouch				1	1				1							3
Bladelet with fine or other retouch	1	2			1	2	2			1				1	2	12
Flake with various retouch					1				1							2
Geometric			1											2	1	4
'Core for side-blow flake'														1		1
TOTAL	1	3	1	1	4	3	2		2	2	1	2		5	3	30
OBSIDIAN DEBITAGE:																
Unretouched bladelet	2	1		1	1	2	3	1					2	6	2	21
Unretouched blade	1							1		1						3
Unretouched flake													2	1	2	5
TOTAL	3	1		1	1	2	3	2		1			4	7	4	29
ARTIFACT TOTAL	4	4	1	2	5	5	5	2	2	3	1	2	4	12	7	59

Blade with fine retouch (8) Fig. VII.8:5-7, 9, 13

No. 9, a greenish butt, is the longest small blade present (5.5 cm) with tip broken by notching. Nos. 5 and 7 are butts with inverse nibbling. There are two segments of geometric aspect, no. 13 with voluntary fractures and bilateral fine retouch. No. 7 is slightly scratched, abraded and patinated.

Blade with abrupt and other retouch (4) Fig. VII.8:6

No. 6 is a smokey-brown segment with snapped ends, unusual in having an abraded dorsal surface with traces of random scratching, and dull grey patination, from T4, stratum 1.

Flake with various retouch (2) Fig. VII.8:18

No. 18 is the tip, perhaps of a refreshment-flake, with a concave truncation struck from the dorsal surface; a small bulb appears on the break surface. A butt and a trimming-flake show fine retouch.

Geometrics (4) Fig. VII.8:10-12, 14

No. 14 is a 'square' segment, unusual in being a part-cortex blade with two voluntary fractures. No. 11 is roughly trapeze-shaped and is abraded. Two others are rectangles, each one with a snap and a voluntary fracture showing the negative scar. No. 12 is a thin segment of a broad blade and no. 10 is a shorter rectangle.

Core for side-blow blade-flake (1) Fig. VII.8:15

This is a brownish-green segment with two negative scars, one on each of the breaks. The question is posed: how did the flint-knapper obtain a negative concave scar on *both* break surfaces?

Comment: The name of this tool-type was used at Telul et-Thalathat II, where many of the presumed products (the 'side-blow blade-flakes') were also found (Fukai and Matsutani 1977, Fig. 3: 3). The term side-blow blade-flake was first used at Jarmo by L. Braidwood (1961) and denotes a very thin segment of an obsidian blade, deliberately detached in series; in contrast to the 'cores' each has a negative scar on one break and a positive scar on the other. In republishing the material, F. Hole now (1983) uses the term 'thin-section' for these artifacts. They seem to be always made of obsidian and occur mainly in Neolithic and some early Chalcolithic sites in northern Iraq (Jarmo, Hajji Firuz, Umm Dabaghiyah, Thalathat II etc.). However, rare examples of the 'cores' are known from Syrian sites (e.g. Bahouerta near Aleppo; Copeland 1981). Their function is unknown and the method of their production is the subject of controversy (see discussion and references in Copeland 1983).

D.5. Halafian obsidian debitage

There are 29 pieces with various colours which seem to be unretouched, although some show slight nicking which may or may not be accidental.

Unretouched bladelet (21) Fig. VII.8:17
Two are tips, seven are butts and 12 are segments, often very small indeed (e.g. 6 mm wide). Five seem to be patinated to a dull grey and one is abraded on the dorsal surface. No. 17 has scratches at random on the ventral surface.

Unretouched flake (5)
Four are trimming flakes, the fifth is a butt end.

D.6. The Early Halaf lithic material: summary

The sample

Although the Halafian sample of 302 stone artifacts is larger than that available for the Late Neolithic, the number of retouched tools (99) pieces is only slightly less modest: 32.7% of the total. As with the Late Neolithic, often only one specimen of a particular tool-type is present per stratum. It is therefore necessary to ignore the stratigraphic succession and to amalgamate the stratum totals before a picture can be gained of the Halafian phase industry (Tables VII.3 and VII.4). We will therefore deal, as before, with the Early Halaf sample as a whole.

The condition of the industry is good, but 16 pieces (6.8%) show burning. This may be compared to the Late Neolithic, where 10.8% of the artifacts were burned.

When divided according to raw material, we see that 243 artifacts are of flint (80.4%) and 59 are of obsidian (19.5%). These groups differ in the proportion of tools (retouched pieces) versus debitage (unretouched pieces and cores): 28.3% of the dominant flint material consists of tools while tools form 50.8% of the scarcer obsidian. These figures differ very little from those seen in the Late Neolithic, where obsidian occurred in similar, if smaller, proportions (15%) and where there were nearly the same proportions of tools versus debitage: 27% flint tools and 46.1% obsidian tools. This remarkable consistency in use of raw material tends to further support the idea that the Late Neolithic and Early Halaf cultural phases occurred fairly closely in time. Nevertheless it is worth noting the appearance in the Halaf strata of a new obsidian type (coarse-grain), as well as what seems to be a new kind of physical condition: abrasion and patination on some pieces. It may be by chance that the abraded/patinated pieces are usually of the coarser obsidian.

The debitage

The Early Halafian industry gives an overall impression of smallness; although both blades and flakes of various kinds were used for tool-making, both were usually deliberately shortened, just as in the Late Neolithic, at the tip, the butt, or both. Technically, the industry is flake-dominated, flakes of various kinds forming 62.5% of the 179 unretouched flint artifacts. Of these, small trimming-flakes are the most numerous (22.3%), followed by non-cortex flakes (19%). The latter class includes some rare crested and secondary core-refreshment flakes. These, together with the trimming flakes and the many cortex and part-cortex flakes (21.2%), could indicate that flint nodules were worked at the site, but the scarcity of cores (13 pieces including fragments, or 7.2% of the debitage) does not confirm this. Most of the few cores present, among which we do not include the one for side-blow blade-flakes, are unstandardised cores for medium or small flakes; exceptions consist of the bladelet cores, of which there are only two, rather atypical, specimens. The cores have plain or cortex striking-platforms.

Although dominated by flake shapes, unretouched blades are present in small quantity (11 pieces or 6.1%). They are either of delicate 'Pre-Pottery' type with punctiform butt, or else thick, robust pieces with plain butts. However, since none are complete, it is difficult to give dimensions. Hard stone hammers, soft (wood or bone) hammers and pressure techniques were apparently used for core-reduction, depending on raw material.

The tools

These were fashioned by a variety of retouch types; pressure-flaking is present, as is bipolar ('*sur enclume*') abrupt retouch, flat scalariform retouch, semi-abrupt fine nibbling, denticulations. As in the Late Neolithic, many artifacts seem to show traces of utilisation retouch or discontinuous nicking.

While relatively sophisticated technically, the industry is typologically limited to just a few classes of tools. In this it much resembles the Late Neolithic.

The sickle and probable sickle element groups (lustred, unlustred and truncated) make up 20.2% of the 63 flint tools, followed by the notch and denticulate groups (12 pieces or 17.3%) and the divers retouch group (15.9%). In contrast to the Late Neolithic, there are eight wellmade scraper types (11.5%). There is an unexpected scarcity of borers and drills. There are no truncation burins and dihedral burins are rare and atypical (5.7%). Absent also except for one enigmatic fragment are heavy-duty tools such as axes, choppers and hammerstones. The piece on Fig. VII.6:14, which may have once been a chisel or adze, seems to have been later employed as a drill, or in the polishing of less hard material (such as alabaster, a plate fragment of which was found in the same stratum: P13, stratum 3).

The main tool group, the sickle elements, show a wide variety of shapes and treatments. One lustred piece is crescentic-shaped with bipolar abrupt retouch, another is bitruncated, a third is 'beaked' and yet another is apparently a refreshment-flake from a larger specimen. Several elements are toothed, the teeth being quite large. The unlustred pieces seem to be characterised by square or oblong shapes, perhaps indicating a special use.

Certain types are rare but have special significance: one of these is the tabular knife. Both the Halaf specimens show striations in the cortex, indicating heavy use, and it has already been suggested that these tools were used as plaster applicators or processors, but whether this only happened once the piece was broken and blunted, or whether it was first fashioned for this use, cannot be determined. Flint occurring in thin sheets derives from Cenozoic rocks in many areas of central and southern Syria (including, significantly, Jebel Sinjar, the Hassuna and Samarra zone) but is probably not present in Balikh valley bedrock; if this is so, the two tools might be imports.

Another special type is the obsidian 'core for side-blow blade-flakes', here regarded as a tool, but perhaps representing rather a by-product of certain debitage methods. It is interesting because of its links with the obsidian trade in the northern and eastern parts of the Fertile Crescent generally.

E. INTERIM DISCUSSION: EARLY HALAF

The buildings and features so far found in the excavated areas are thought to have been spread out, and separated by open spaces, as in Syrian villages today. Their lay-out suggests various domestic uses (grain storage, grain treatment, habitations, stabling etc.) which do not involve much flint working, and this may explain the relatively low number of stone artifacts.

The Early Halafians evidently maintained trade links to the north (obsidian, *Altmonochrome* pottery) and to the east (Samarran pottery), as in the Late Neolithic. They were also in contact with the west: pattern-burnished pottery is known from Amuq B sites in the Aleppo province, e.g. at Bahouerta and Ain et-Tell (Mellaart 1981) and it is worth recalling that Bahouerta produced two 'cores for side-blow blade-flakes' (Copeland 1981).

Radiocarbon dates are awaited, but the presence of *Altmonochrome* and pattern-burnished sherds in the Early Halaf argues strongly for an Amuq B date. At Tell Halaf the *Altmonochrome* is radiocarbon-dated to about 5,600 B.C., while pattern-burnishing on pottery is regarded as an Amuq B typefossil (Braidwood and Braidwood 1960).

Unfortunately, very few excavators of Halafian sites have produced detailed analyses of the lithic finds (an exception being Shams ed-Din). Furthermore, very few sites now known refer specifically to the Early Halaf part of the Halaf sequence. Among those which could be regarded as contemporary are the Late Samarran sites, but these, apart from Baghouz, are at a considerable distance from the Balikh (e.g. Tell es-Sawwan on the Tigris). The site by far the most relevant to Sabi Abyad is Tell Aqab in the Khabur headwaters region, where a long sequence of Halaf phases was excavated beginning with an Early Halaf (Davidson and Watkins 1981). So far, only the pottery of Tell Aqab has been described in any detail. As to the Balikh valley sites, the material so far reached at Tell Hammam et-Turkman is early in the Ubaid sequence (van Loon 1985), and Mounbateh (from which came sherds recognised by Davidson as equivalent to Aqab's Early Halaf) has not yet been excavated. Close comparisons are therefore not easy to establish.

F. GENERAL DISCUSSION

Earlier research in the western Jezirah

Until recently very little was known about the Neolithic and Chalcolithic prehistory of the western Jezirah, i.e. the area (which includes the Balikh valley) between the river Khabur and the southward-flowing stretch of the Middle Euphrates near Aleppo. The Halaf culture had evidently once occupied the zone to the east and in northern Iraq, as was shown from the excavations at e.g. Tell Halaf, Tell Chagar Bazar and Arpachiyah. It was also reported from the Balikh valley at Tell Aswad (Mallowan 1946). The Halafians were always recognised by their distinctive pottery and (when present) their *tholoi* and ornaments. As already noted, almost nothing was said in reports about their stone tool industries.

The antecedents of the Halaf people were unknown, although (again based on pottery) a pre-Halaf culture, represented by the *Altmonochrome* was present at the base of Tell Halaf, dated to 5,600 B.C. However, its exact stratigraphic connection with the Halaf was not too clear.

As to the Neolithic, no 6th millennium, 7th millennium or earlier site was known in the whole of the Jezirah, with one exception, this time based on flint typology: the flint assemblage found at Fakheriyah near Tell Halaf, which included tanged arrowheads, although, again, not in clear stratigraphy (L. Braidwood 1958). One other indication was the presence, at Mallowan's excavation at Ibn es-Shehab on the upper Balikh, of tanged arrowheads on the surface (Mallowan 1946); these are now known as Byblos Points, 'typefossils' of the PPNB and early Pottery Neolithic of the Levant.

Light began to be thrown on the later prehistory of the western Jezirah with the first excavation of Bouqras near Deir ez-Zor in 1965 (de Contenson 1983), where Levantine arrowhead types were found in a clearly early Neolithic context, dated to the second part of the 7th millennium. A Neolithic presence in the Balikh valley was confirmed when J. Cauvin re-excavated Tell Aswad (which he named Assouad, to distinguish it from the Tell Aswad in the Damascus basin), in 1970-71. The flint industry was found to have some clear links in its arrowheads with the PPNB and Amuq A phases of the Levant, but with other distinct differences (M.C. Cauvin 1972, 1973).

Various short surveys were carried out in the Balikh region, e.g. in 1969 by J. Cauvin (1970) and L. Copeland in 1978 (1979), when new Neolithic and Halaf sites were reported, e.g. Khirbet al-Bassal, Tulul Breilat and Tell Mounbateh. A more extensive survey by the University of Amsterdam carried out in 1983 discovered 22 7th and 6th millennium sites and 28 Halaf sites in the valley (Akkermans, in preparation).

Chronology

It was not until the radiocarbon dates for Bouqras, Assouad and the Tabqa Dam sites (van Loon 1967) became available (e.g. an average of 6,585 B.C. for Assouad, 6,400-5,900 B.C. for Bouqras and 6,240 B.C. for Abu Hureyra in the late Aceramic levels), that it became apparent to the present writer (Copeland 1979) that the western Jezirah had been the home of cultures which had a somewhat PPNB-like flint industry and who had gradually begun to make simple pottery during the late PPNB, i.e. at a time anterior to that of Amuq A. The latter had up until then been regarded as the first pottery Neolithic phase of the Levant (dated to ca. 6,000 B.C., e.g. at basal Mersin): the Period 5 of Hours et al. (in press).

Following further and more detailed work in the region (particularly the excavation by Akkermans of Tell Damishliyya), most colleagues hold the same view (e.g. Le Mière 1979, 1986; Akkermans 1987 and in press), which is that the period roughly 6,500-5,900 B.C. saw an Early Neolithic with some (non-Amuq A) ceramics but resembling in certain respects the PPNB of the Levant.

However, the next phase for which evidence was then available in the Balikh was that of the Halaf, conventionally assigned to the Amuq C phase (5,000-4,500 B.C.), leaving us with a gap in our knowledge for the Amuq A and B phases.

The Halaf culture has come to be regarded as having passed through an Early, a Middle, a Late and a Transitional phase (Davidson 1977). It was thought that the later Halafian phases were the ones represented at middle Euphrates and Levant sites (Davidson 1977; Mellaart 1975).

As mentioned above, on the advice of T. Davidson (p.c., 1979) some of the Mounbateh surface finds were assigned by the present writer to an Early Halaf phase such as was known from basal Tell Aqab. This extended the known distribution of Early Halaf sites westward of the 'heartland' zone. Since the time of the Early Halaf was put by Davidson as starting at about 5,500 B.C., this succeeded in filling up this part of the gap in our knowledge referred to above. However, at that juncture the Balikh valley had still not provided evidence of human occupation during the one thousand or so years between the Pre-Pottery/Early Pottery Neolithic and the Early Halaf.

Sabi Abyad has now provided evidence to fill more of the gap, having produced a Late Neolithic phase immediately anterior to the Early Halaf, probably to be dated to an earlier stage of Amuq B. It has also put on a secure stratigraphic basis the Early Halaf sequence in the Balikh valley previously hinted at by surface finds.

The Amuq A remains unaccounted for in the Balikh, if all the Assouad and Damishliyya-like material is earlier. The present writer surmised in 1979 that this absence might refer to the rather general collapse of PPNB cultures all over the Near East around 6,000 B.C. (Bouqras, Mureybit, Abu Hureyra, Ramad, Jericho).

Alternatively, as Akkermans (1987a) has suggested, the Balikh area was not entirely deserted, but occupation contracted instead, and strategies changed to cope with aridity in the Euphrates valley and inland Levant. Since virgin soil has not been reached yet at Sabi Abyad there is a good chance that the missing phase will be present there. According to Le Mière (1986) and Akkermans (p.c., 1987) an early pottery type, not present elsewhere, was noticed on the surface of Tell Mounbateh, which may refer to the early 6th millennium. It would be good to know if the uppermost levels at Damishliyya would link up with basal Sabi Abyad, making the sequence complete. It has also to be hoped that Mounbateh will be excavated since it promises a long sequence.

The Amuq B phase in relation to Sabi Abyad

Returning to the subject of this report, Akkermans' suggestion, quite apart from the other cultural evidence at Sabi Abyad, seems to be clearly supported by the kind of flint industry used by the Late Neolithic inhabitants; it (and also, presumably, the lifeways as well) have indeed changed considerably from those of the Pre-Pottery/Early Neolithic, as known in Damishliyya, Assouad and Breilat. This different mode of existence no longer necessitated the use of tanged Byblos Point arrowheads, or, apparently axes and adzes such as were used earlier at Damishliyya and Assouad.

This development surely refers to the similar marked change which occurred in the Levantine flint industries around 5,500-5,000 B.C., when the arrowheads and debitage methods inherited from the PPNB and used throughout Amuq A, ceased to be made or were used only very rarely (Copeland and Hours 1987; Hours and Copeland 1983). It is true, however, that what the Braidwoods have called the 'Syro-Cilician' flint industry of Amuq A continued a little longer at coastal sites, probably throughout most of Amuq B (e.g. at Mersin, Ras Shamra VA, Sukas 11-4, Byblos *Néolithique Moyen*). This seems to suggest that, if the changes inland reflected a need to adapt to environmental changes, these were not immediately felt along the Mediterranean shore. Alternatively, the change inland may have been a response, irrespective of climate, to new situations following full agricultural uses of plants and animals, as well as technical advances, e.g. in pottery manufacture, increasing knowledge of metallurgy, or the like. The arrival of new populations is another possible cause, and in this light the coast might be seen as continuing to harbour the older indigenous 'pre-pottery' people who were later to be influenced by the new cultures.

Once (for whatever reason) this change in the lithics took place, the complexion of the industries did not substantially alter throughout the next Chalcolithic phases in spite of major changes occurring in the pottery (and, presumably, cultures: Amuq C, D, E, F). Furthermore, at Sabi Abyad, the industry did not change in spite of shifts in site-use, unless the sample is too small for such changes to be detected.

Derogatory adjectives have often been applied to the lithics of these Near Eastern Chalcolithic phases ('banal', 'monotonous', 'impoverished'). It has always been inferred that the limited typology was due to the availability of alternative raw materials and ways of working them up to fit the needs of altered lifestyles. For example, the fact that (as faunal remains at Sabi Abyad indicate) wild animals were still hunted, even though tanged arrowheads had disappeared, indicates that new ways of taking game had been adopted. We know that sling-bolts were present at some sites (e.g. Tell Aqab; Davidson and Watkins 1981) but, as Hole (1983:237) has suggested, obsidian geometrics could well have been used serially in arrowhead shafts; he regards it a 'near certainty' that obsidian microliths were used in hunting at Jarmo (ibid.:258), and perhaps this practise was carried on to the west in the Late Neolithic. An alternative suggestion is that of Bergman who cites instances of use of wood arrows (Azoury and Bergman 1980).

The obsidian industry

However that may be, not everything changed. The Early Halafians continued the Late Neolithic habit of importing obsidian and, at Sabi Abyad, even increased slightly the amount brought in, as well as, perhaps, using a new source. The debitage methods were the same as before (cores designed to produce long straight blanks) and so were the products (small blades, bladelets); these were either deliberately fractured for reasons unknown to us, or had broken during detachment from the core. Virtually no artifact was left intact at Sabi Abyad. One may wonder if the cases of deliberate breakage of obsidian represent a way of overcoming its fragility. Small segments (e.g. in composite hafted tools) may have been easier to employ.

It seems obvious that, because of their different properties, obsidian and flint were dealt with differently by prehistoric peoples, both technically and functionally. Many studies of obsidian-working have been published, describing the replication of artifacts, and then the replication of activity-produced wear patterns (see e.g. the contributions in Tixier 1980), but, for all practical purposes we are only beginning to understand how and for what intended use, a foreign raw material was introduced into late prehistoric sites in Syria. Certainly its special properties had been understood thousands of years earlier; the rich industry of 7th millennium Cafer Höyük, with 90% obsidian, is a good example of this, since cores, products and tools are plentiful in every stage of manufacture (Calley 1983; Cauvin and Balkan 1983). Some obsidian artifacts are classed as sickle elements on the basis of ESM studies (Anderson-Gerfaud 1982). It is interesting to note that the PPNB features (Amuq and Byblos Points transferred at Cafer to obsidian) do not occur in the region after Amuq A/early Amuq B, either in obsidian (as at basal Mersin) or in flint.

Much has been written about other aspects of the Near East obsidian trade, such as the form in which the material arrived at archaeological sites, the trade mechanisms, and the identification of the various source areas in the volcanic regions of Anatolia. It has been accepted that the attributes (colour, mineral content) of obsidians could be used to determine the location of the source. Spectographic and other methods of assessing the trace elements were carried out to this end (Fornaseri et al. 1975-77, and their references).

However, it appears that the situation can be more complex in that obsidian of two or more different trace element compositions can emanate from the same source. This is so in cases where the molten obsidian was ejected in the form of 'bombs' rather than as flows over land. Falling on slopes, these would harden, then roll into valleys where, perhaps, blocks from previous eruptions (with different chemical compositions) had already come to rest, so that a single 'source' could obtain many types of material, the different compositions being due to their different ages. Evidence of such a situation was gained recently from the Bingöl region, where an extensive survey and careful analysis of materials was carried out (M.C. Cauvin et al. 1986). Nevertheless, it would seem that Fornaseri et al. (1975-77) can at least distinguish between central and eastern Anatolian sources and, in the eastern group, between the sources to the west and those to the north of Lake Van. At a guess, judging from the description in their report, our coarse-grain obsidian could have come from the Suphan source, the green specimens from one of the Bingöl sites of Nemrut Dag. According to Boerma, at least two groups of obsidians are represented at Sabi Abyad. Each group is present in both Halaf and Late Neolithic levels. The sources are presumably both in the eastern region, with one almost certain to be Bingöl (see also Boerma, in press b).

Microwear traces

Both wear traces (polish, scratches) and traces of usage (plaster) are present on Sabi Abyad tools. It is a pity that controversy now surrounds the subject of the identification of microwear traces, some of the earlier results having been questioned and found wanting (e.g. by Newcomer et al. 1986). In the case of the sickle sheen, some of the major difficulties concerning the identification of the materials causing the sheen have been demonstrated by Unger-Hamilton (1983, 1985). In spite of these problems, it is to be hoped that ESM techniques can be used to throw light on the various traces of use at Sabi Abyad. This should give us a better idea as to the functions of at least some of the lithic artifacts, and as to the technology used to fabricate them.

Conclusions

The evidence now available on Sabi Abyad's stone tools suggests that we are dealing in the Late Neolithic and Early Halaf phases with two very similar industrial facies. Both could be assigned on purely typological grounds, based on the chronological succession in the Levant, to Amuq B or Period 6 of Hours et al. (in press). Certain aspects of the industries - notably the sickle element morphology - seem to follow on from earlier Neolithic phases, and a case for a continuum (in place or somewhere in the area) from the 7th into the 5th millennium could be made out.

On the other hand, part of the apparent similarity stems from the post-Amuq A 'sameness' which characterises 5th millennium and later lithic industries, from the Zagros to the Mediterranean, mentioned above. This uniformity makes it difficult to distinguish western from eastern traits, to be precise about the chronology, or to propose (from the lithic perspective) possible candidates for the antecedents of the Balikh 6th and 5th millennium populations.

These industries might, as their geographic situation would indicate, be seen as representing a mixture of traditions in a zone of transition, half way between the Levant and northern Iraq. There are, however, certain features (one being the lack of axes and heavy-duty tools) which seem distinct from both sets of traditions, giving the Balikh industries (or at least the two phases under discussion) a certain originality. The rarity of excavated sites of these phases in the region hinder meaningful comparisons and (to complicate matters further) it is not ruled out that, as Akkermans (1987a) has mentioned, contemporary sites can be functionally differentiated in the Balikh valley itself. For comparisons we have to go further afield, to the Khabur headwaters area, where Late Neolithic and Early Halaf sites can be found, or else to the west. However, in the former the stratigraphy is unclear while in the latter area cultures with entirely different

('Syro-Cilician') traditions persisted during the whole of the later part of the 6th millennium.

In any case, it would seem that the Jezirah was not only one of the first areas in which pottery-making was invented, but was also in the vanguard in the development of the 'painted pottery Chalcolithic'. In the opinion of Davidson (1977), Halaf styles and influences did not arrive in the Levant until the Amuq C phase, about 5,000 B.C. (however, see chapter IV for a chronological discussion). If so, one of the areas from which this influence was transmitted was surely the Balikh valley.

As to the origins of the Early Halaf, the lithic industries are unlikely to provide any clear evidence, for reasons mentioned above. Although it is possible that it evolved out of the local Late Neolithic, and nothing to contradict this is evident in the lithics, it is also possible that Early Halafian groups entered the balikh from the north-east and integrated with the local population, who already had a somewhat similar stone tool-kit.

The work in the Balikh valley of the University of Amsterdam team already carried out has contributed much new and valuable information and promises to provide much more in the future.

APPENDIX A: Late Bronze Age Artifacts

Nineteen artifacts, 13 of flint and 6 of obsidian, were found associated with intrusive Late Bronze levels. The flint pieces consist of six flakes and fragments, two core fragments, two burin spalls and three chunks. The six obsidian pieces include one tool - an atypical end-scraper made on the butt end of a part-cortex blade, perhaps reused on the lateral edge as a sickle element. There are also four bladelet fragments and a flake fragment.

Three obsidian pieces are grey-patinated. Mottled, greenish and grey colouration was noted, while several pieces are scatched on the ventral surface like those seen in the Halaf strata.

This material seems in general little different from that found in the prehistoric levels, and may, in fact, belong with these.

APPENDIX B: Obsidian Analysis

J.A.K. Boerma (Institute of Earth Sciences, State University of Utrecht) has analysed the elemental composition of six obsidian samples from Tell Sabi Abyad, nos. 1-3 from Halaf levels, nos. 4-6 from Late Neolithic levels. The following is his report, accompanied by his two tables, incorporated as our Tables VII.5 and VII.6.

The analysis was carried out by means of 'Rapid Rock Analysis' (A) and I.C.P. (Inductive Compled Plasmajet; B and C). Both the Rapid Rock Analysis and the I.C.P. are well comparable; the former is said to be slightly more precise. I.C.P. is not suited for Si.

Results

A. Macro elements results (Table VII.5)

- On basis of Si values: nos. 1, 5, 6 belong together and nos. 2, 3, 4 belong together.
- The other elements (particularly Al_2O_3, Fe_2O_3, CaO, MgO), however, suggest the closest relationship between nos. 1 and 6 on the one hand and nos. 2, 3, 4 and 5 on the other hand.

B/C. Macro elements and element traces results (Table VII.6)

- On basis of Sr, Ce, Be, V, Zn, Zr, Y, a strong relationship is indicated between nos. 1-6 on the one hand and nos. 2, 3, 4 and 5 on the other hand.

- On basis of Co (which is considered to be remarkably high), nos. 1, 2, 3, 4 can be grouped and nos. 5 and 6.

- On basis of S: no. 5 deviates from the other samples.

- On the basis of Cr: two groups again, viz. nos. 1, 2, 3 and nos. 4, 5, 6.

- On basis of Cn and Li: no clear grouping.

Final conclusions:

Nos. 1 and 6 form one group.

Nos. 2, 3, 4 and 5 form one group.

Table VII.5. Macro elements according to Rapid Rock Analysis.

A.	Halaf			Late Neolithic		
	1	2	3	4	5	6
SiO_2	71.59	74.42	73.29	74.02	71.19	70.95
P_2O_5	0.03	0.01	0.01	0.01	0.01	0.03
Al_2O_3	14.38	11.33	10.93	10.59	10.68	14.04
IlO_2	0.19	0.16	0.21	0.18	0.19	0.20
FeO	1.07	1.52	2.31	2.00	–	1.34
Fe_2O_3	0.75	1.33	1.76	1.49	–	0.49
Na_2O	4.62	4.37	5.28	5.18	5.12	4.50
K_2O	5.02	5.21	4.30	4.19	4.20	4.94
CaO	0.68	0.08	–	0.06	0.08	0.58
MgO	0.12	0.01	0.02	0.01	0.02	0.17
MnO	0.06	0.07	0.10	0.06	0.07	0.03
Total	98.56	98.51	98.67	97.86	–	97.27
Fe_2O_3I	1.94	3.02	4.32	3.71	4.14	1.90

Table VII.6. Macro elements (B) and traces (C) according to I.C.P.

B.

	Halaf			Late Neolithic		
	1	2	3	4	5	6
P_2O_5	0.03	0.01	0.01	0.01	0.01	0.03
Al_2O_3	14.64	11.45	10.92	10.64	10.52	14.36
IlO_2	0.20	0.16	0.21	0.17	0.19	0.18
Na_2O	4.61	4.41	5.24	5.07	5.19	4.57
K_2O	5.28	5.72	4.64	4.59	4.61	5.48
CaO	0.80	0.22	0.25	0.20	0.24	0.77
MgO	0.17	0.01	0.02	0.01	0.02	0.17
MnO	0.04	0.06	0.08	0.06	0.08	0.04
Fe_2O_3I	2.00	3.13	4.49	3.92	4.27	2.04

C.

	1	2	3	4	5	6
Sr	43	1	1	1	2	43
Ce	73	199	201	225	186	70
Co	315	192	504	632	2010	1026
Be	5	9	11	14	11	5
Ba	363	5	4	3	6	353
S	0	12	27	28	72	24
V	3	1	1	1	1	3
Zn	46	187	201	230	190	50
Ch	6	4	7	7	10	7
Li	59	55	92	97	89	57
Zr	327	1091	1016	1173	1010	352
Ni	8	9	17	21	54	27
Y	33	145	146	171	144	34
Cr	2	1	7	10	29	12

DESCRIPTION OF FIGURES

Findspot is given in parentheses, e.g.: (T 5/1) = square T5 stratum 1.

Fig. VII.1 Late Neolithic flint artifacts

1. Tabular knife (T 5/1)
2. Tabular knife (T 5/2)
3. Drill (S 5)
4. Pressure-flaked piece (T 5/2)
5. Pressure-flaked fragment (T 5/1)
6. Borer (P 14/10)
7. Core (T 5/1)
8. Borer (P 14/*)
9. Borer (T 5/1)

Fig. VII.2 Late Neolithic flint artifacts

1. Lustred sickle element (T 5/2)
2. Non-lustred sickle element (T 5/2)
3. Non-lustred sickle element (T 4/4)
4. Non-lustred sickle element (T 5/1)
5. Non-lustred sickle element (T 5/1)
6. Non-lustred sickle element (T 5/2)
7. Flake-scraper (T 5/1)
8. Burin (T 5/2)
9. Denticulate (T 5/1)
10. Denticulate (T 5/1)

Fig. VII.3 Late Neolithic obsidian artifacts (nos. 1-10). No. 11: stone artifact

1. Blade with fine retouch (T 5/2)
2. Blade with concave retouch (T 5/2)
3. Blade butt with notch (T 5/1)
4. Flake fragment with denticulations (T 5/2)
5. Geometric: trapeze (T 4/4)
6. Core (T 5/1)
7. Bladelet with fine retouch (T 5/1)
8. Bladelet with notches (T 5/1)
9. Geometric: trapeze? (T 5/1)
10. Flake fragment with fine retouch (T 5/2)
11. Grey stone river-pebble (T 5/2)

Fig. VII.4 Artifacts from Transitional strata. Nos. 1-6: flint. Nos. 7-9: obsidian.

1. Tabular knife (P 14/7B)
2. Racloir (P 14/8)
3. Denticulate (P 14/7B)
4. Composite: borer/scraper (P 14/8-9)

5. Borer (P 14/7B)
6. Non-lustred sickle element, abraded (P 14/7B)
7. Obsidian blade with fine retouch (P 14/7B)
8. Borer on obsidian flake fragment (P 14/7A)
9. Composite: notch/scraper/burin (P 14/8-9)

Fig. VII.5 Early Halaf flint artifacts

1. Blade with proximal retouch (P 14/6A)
2. Blade with inverse retouch (P 13/1)
3. Blade with fine bilateral retouch (P 13/6)
4. Pressure-flaked piece (P 13/4)
5. Tabular knife (P 14/6C)
6. Flake-scraper (P 13/3)
7. Tabular knife (P 14/6A-C)
8. Truncated piece (P 14/6C)
9. End-scraper (P 13/4)
10. Flake-scraper (T 4/2-3)
11. End-scraper (T 4/2-3)

Fig. VII.6 Early Halaf flint artifacts

1. Truncated piece (P 13/5)
2. Truncated piece (P 13/5)
3. Truncated piece (P 14/6C)
4. Lustred sickle element (P 14/6C)
5. Lustred sickle element (P 13/5)
6. Lustred sickle element, crescentic (P 13/6)
7. Flake from lustred sickle element? (P 13/6)
8. Non-lustred sickle element (P 14/5)
9. Non-lustred sickle element (P 13/6)
10. Non-lustred sickle element (P 13/6)
11. Non-lustred sickle element (P 13/6)
12. Dihedral burin (P 14/2)
13. Dihedral burin (P 13/4)
14. Fragment of heavy-duty tool: adze or pick? (P 13/3)

Fig. VII.7 Early Halaf flint artifacts

1. Borer (P 13/4)
2. Drill? (T 4/3)
3. Divers fine retouch (P 13/3)
4. Denticulate (T 4/3)
5. Denticulate (T 4/3)
6. Backed knife (P 14/6C-D)
7. Notch (T 4/3)
8. Divers other retouch (T 4/1)
9. Tablet (P 13/6)
10. Crested blade (and burin?) (P 14/3-4)
11. Core (T 4/3)
12. Trimming-flake (T 4/1)

Fig. VII.8 Early Halaf obsidian artifacts

1. Bladelet with fine obverse retouch (P 14/3)
2. Bladelet with fine inverse retouch (P 14/6C-D)
3. Bladelet with bilateral 'teeth' (P 14/6C)
4. Bladelet with random scratches on the ventral surface (T 4/2-3)
5. Blade with fine inverse retouch (P 14/3-4)
6. Blade with various retouch and dorsal surface abrasion (T 4/1)
7. Blade with fine retouch (P 14/6C)
8. Broken double borer or by-product
9. Blade with voluntary fracture; x marks point of impact (P 14/6C-D)
10. Geometric: rectangle with voluntary fracture (T 4/1)
11. Geometric: trapeze? (P 14/5)
12. Geometric: oblong thin section of wide blade (P 14/6C)
13. Segment with bilateral retouch and notches (P 13/6)
14. Geometric: atypical 'square' with cortex (P 13/6)
15. 'Core for side-blow blade-flake' (P 13/5)
16. Blade segment with notches (T 4/3)
17. Unretouched bladelet with scratches (T 4/1-2)
18. Flake (refreshment?) with concave inverse truncation (P 14/6D)

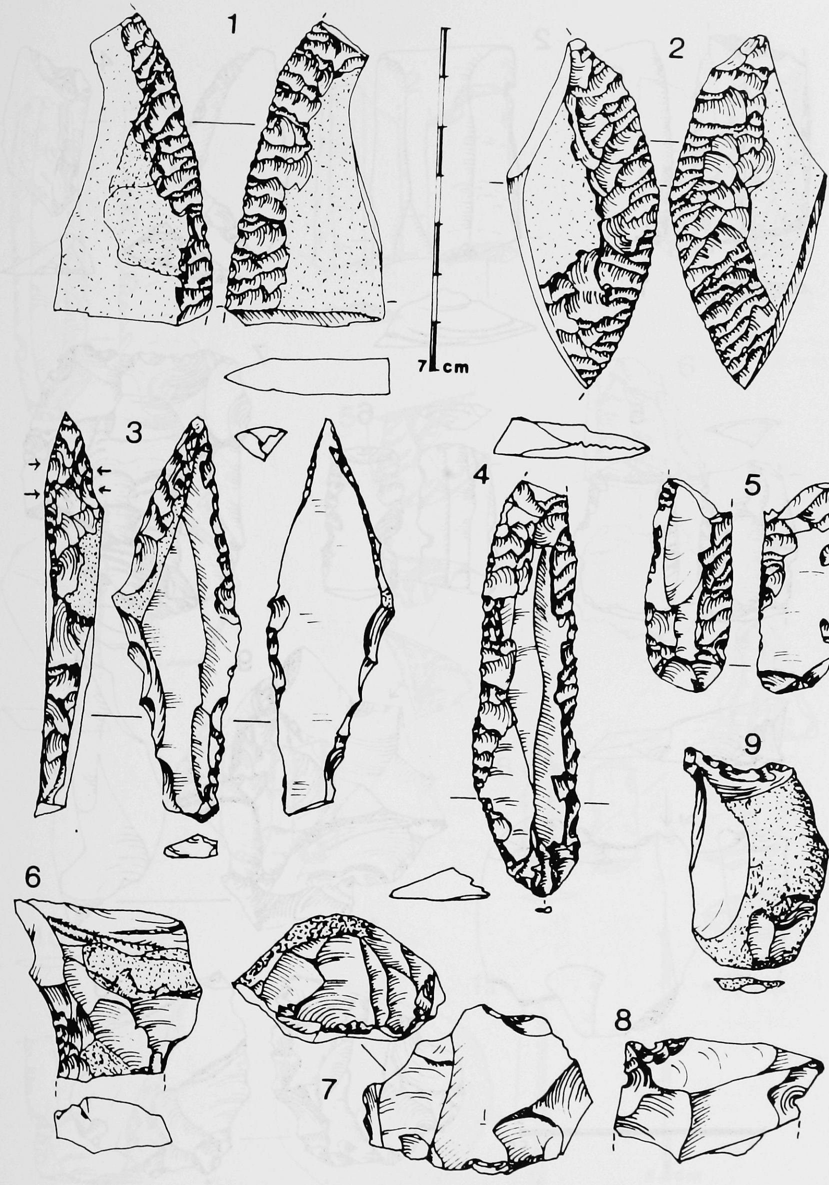


Fig. VII.1. Late Neolithic flint artifacts.

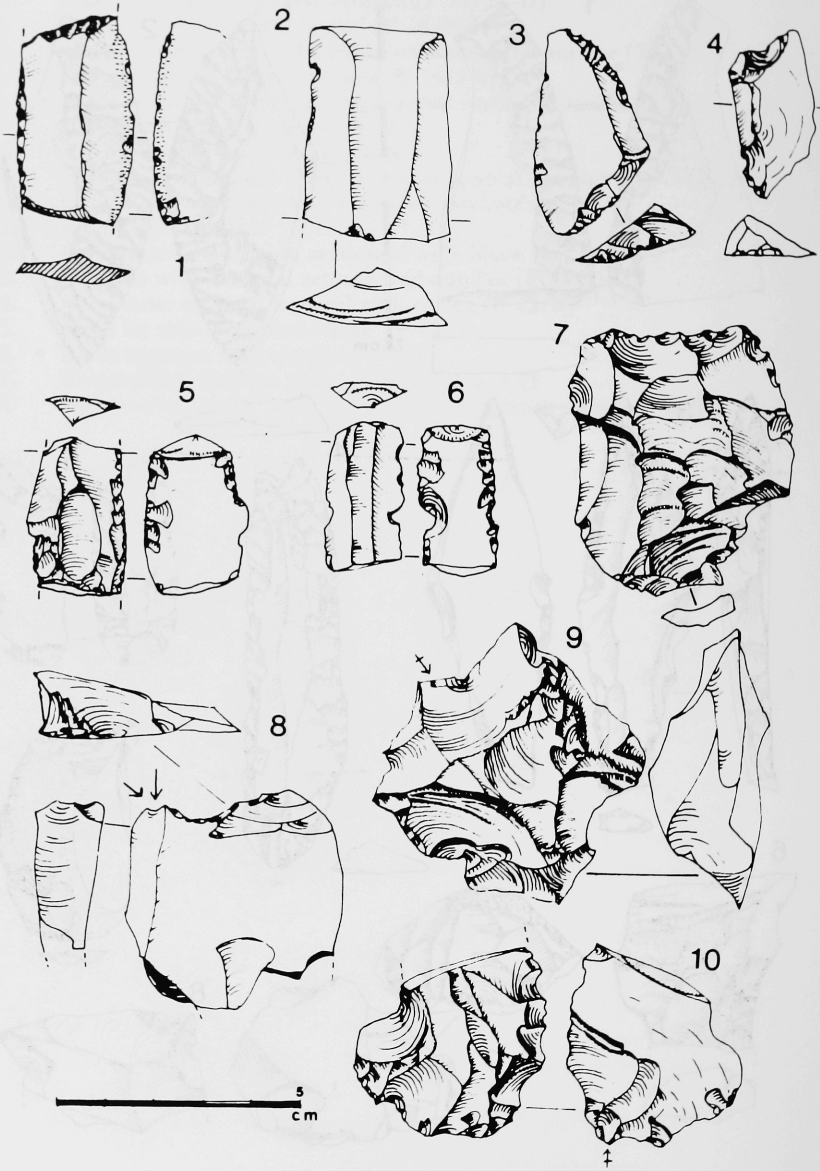


Fig. VII.2. Late Neolithic flint artifacts.

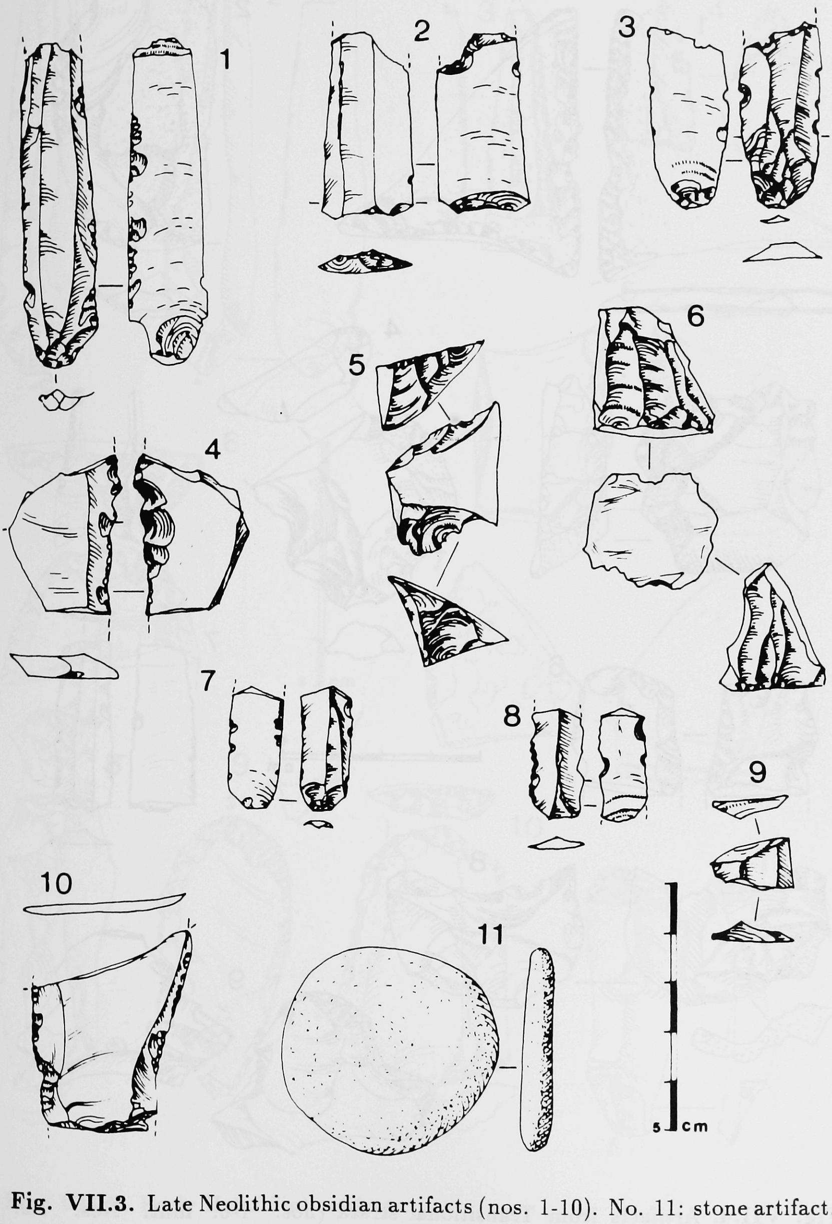


Fig. VII.3. Late Neolithic obsidian artifacts (nos. 1-10). No. 11: stone artifact.

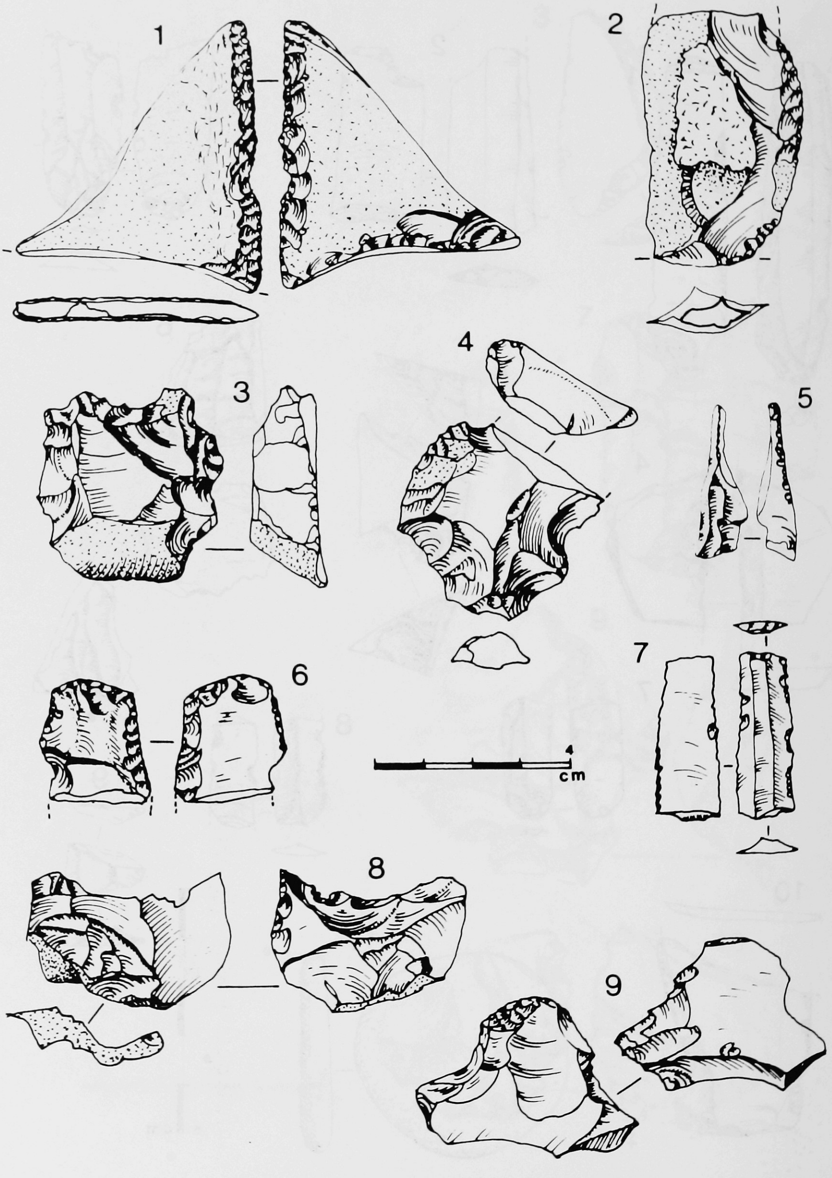


Fig. VII.4. Artifacts from Transitional strata (nos. 1-6: flint. Nos. 7-9: obsidian).

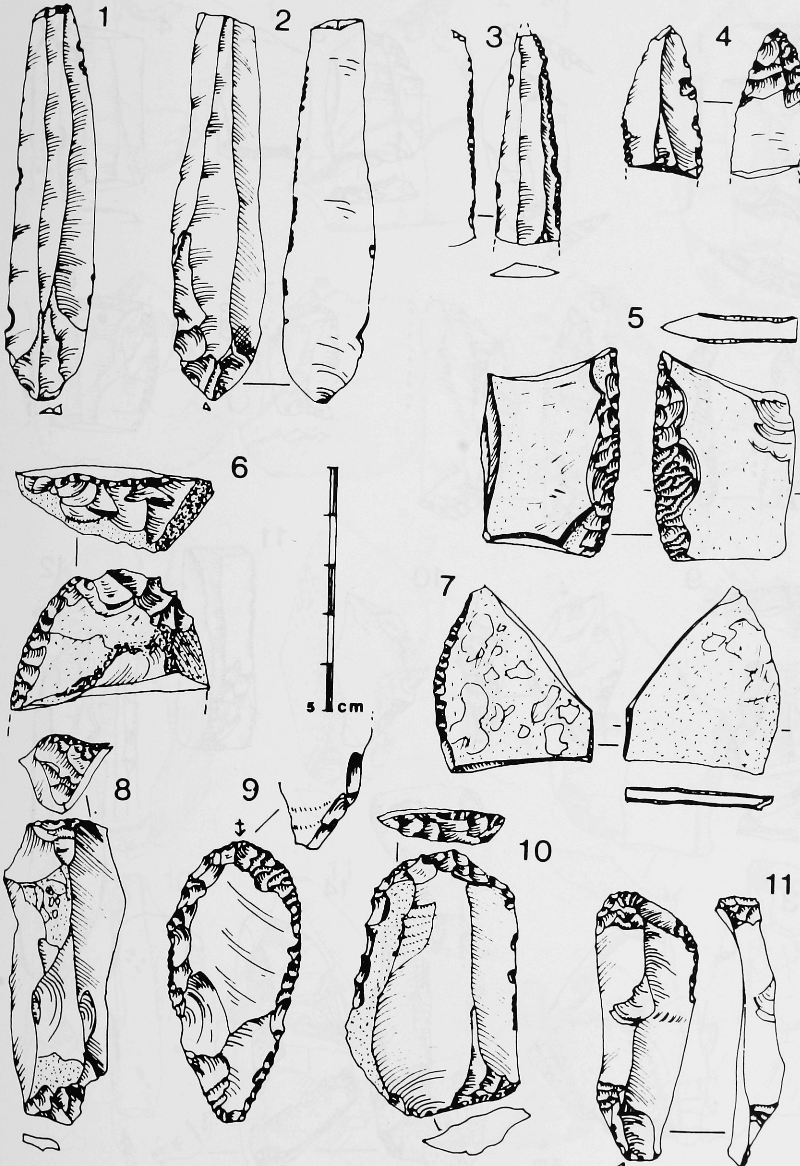


Fig. VII.5. Early Halaf flint artifacts.

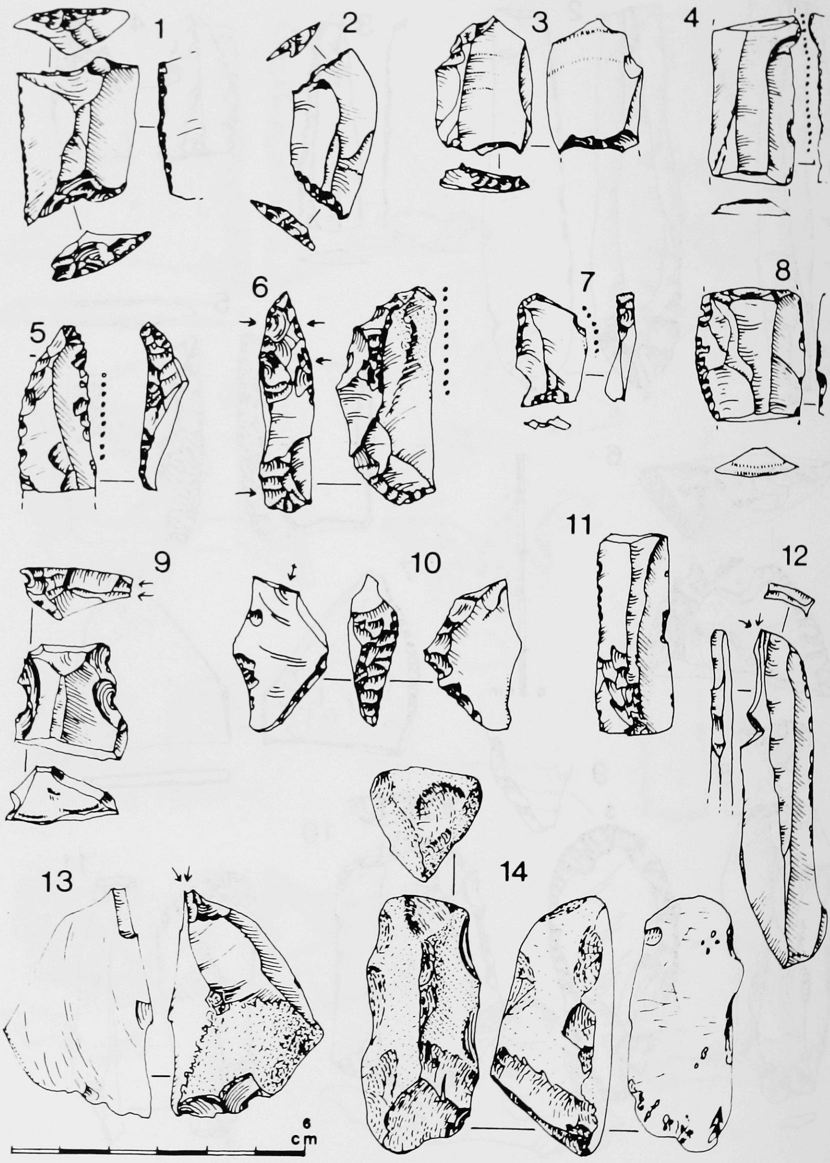


Fig. VII.6. Early Halaf flint artifacts.

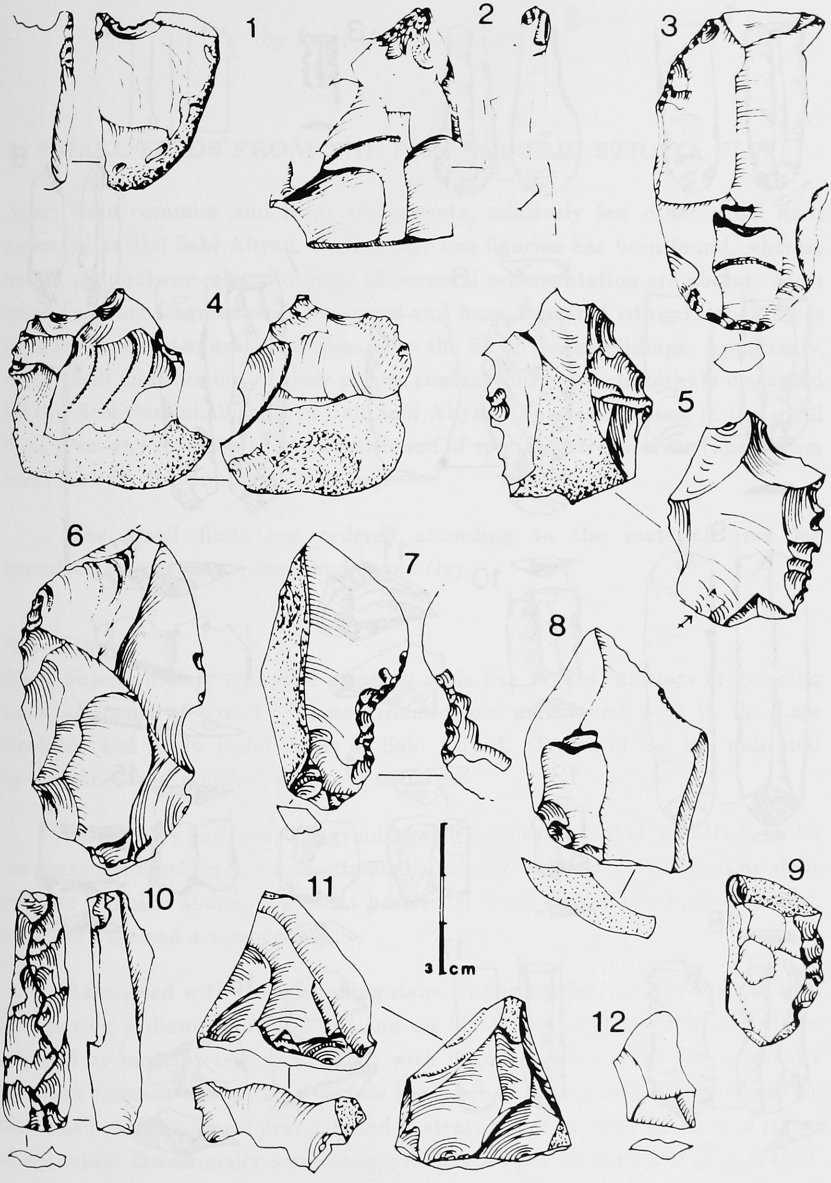


Fig. VII.7. Early Halaf flint artifacts.

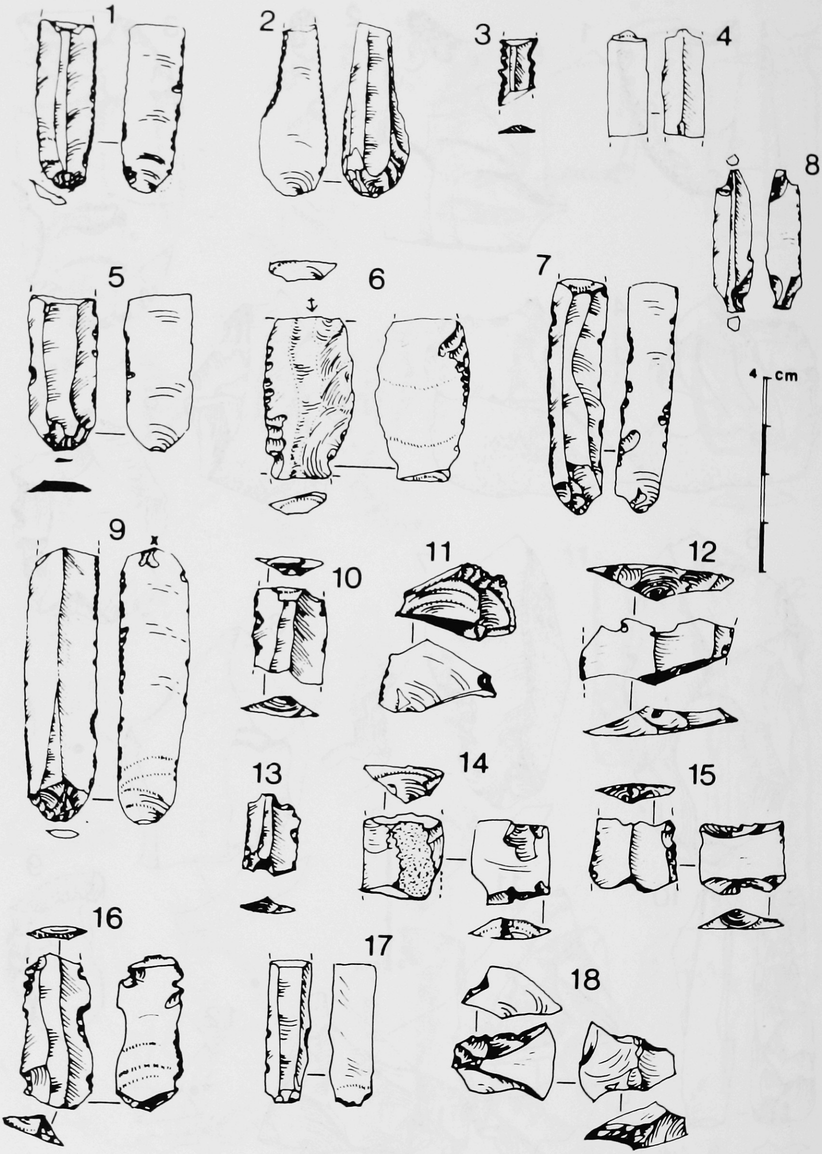


Fig. VII.8. Early Halaf obsidian artifacts.

Chapter VIII

THE OTHER SMALL FINDS OF TELL SABI ABYAD

by Peter M.M.G. Akkermans

A. SMALL FINDS FROM THE PREHISTORIC STRATA

Apart from ceramics and lithic implements, relatively few other small finds appeared at Tell Sabi Abyad. So far, only one figurine has been found, whereas beads, pendants or related objects of personal ornamentation are absent. Most small finds are fragmentarily preserved and have appeared either in open areas outside the architectural structures or in the fill of these buildings. Apparently, these small finds are out of their proper context and represent objects discarded by the Neolithic inhabitants of Tell Sabi Abyad. At present, none of the small finds gives any clues for the reconstruction of specific activity areas (apart from areas used for the dumping of refuse).

The small finds are ordered according to the material used for manufacture, viz. stone, bone and baked clay.

A.1. Stone

Stone objects mainly comprise grinding tools like pestles, mortars or grinding slabs, all made of basalt. These ground tools were found both in the Late Neolithic and Early Halaf levels at Sabi Abyad. Traces of use are indicated by smoothed and polished worn-out surfaces.

So far, only one complete grinding slab has been found (Fig. VIII.1, no.1); the presence of others has been attested solely by fragments. All grinding slabs indicate a similar shape, viz. a flat basalt slab with an oval or rounded outline, a convex base and a concave top.

Associated with these grinding slabs are the pestles, usually of small size, i.e. having a diameter of 4-5 cm and an identical height. Pestles are either rounded or more or less rectangular with rounded edges. The top is usually flattened whereas the working surface has a broad convex and smoothed shape. One small conical-shaped pestle, found in stratum 4 of square P13, showed traces of red ochre. Occasionally, some long, oval-shaped pestles appeared (Fig. VIII.2, nos. 2-4). A very large pestle was found (length: 280 mm; diameter: 80 mm) in square P13, stratum 5. This heavy object, having a cylindrical but flattened shape, showed traces of polishing on one of its flattened sides.

Basalt must have been brought to Sabi Abyad from a considerable distance. The nearest sources of basalt are found in the Turkish Karaca Dag region east of Urfa, or, to the south, in the volcanic area east of Raqqa on the Euphrates. In both cases, the distance from the source to Sabi Abyad is the same, viz. about 100 km. Leenders (in press), among others, has pointed out that basalt ground tools are among the most common objects found at archaeological sites in Syria. However, when compared to the abundant appearance of these objects in Chalcolithic, Bronze Age and Roman strata at Tell Hammam et-Turkman on the Balikh (ibid.), a remarkably small number of these tools was present both at the 7th millennium site of Damishliyya (Akkermans, in press) and at 6th millennium Sabi Abyad. Whereas in the case of Tell Hammam et-Turkman, no doubt, basalt was brought to the site with the help of back-animals, such animals were probably not available in Neolithic times (cf. Zeuner 1963; Clutton-Brock and Burleigh 1978; von den Driesch and Amberger 1981). This apparent lack of back-animals severely hampered the transport of heavy materials like basalt and may thus account for its relative scarcity at Neolithic sites in the Balikh valley.

Stone bowls are rare at Tell Sabi Abyad. So far, only 5 fragments have been found both in the Late Neolithic (3 fragments) and Early Halaf strata (2 fragments). These bowls were made either of basalt or of a black, unidentified kind of stone. The latter are more elaborately finished than their basalt counterparts. The walls of the black stone vessels are rather thin (7-8 mm) and these bowls have a worked rim (Fig. VIII.2, no. 5). The basalt bowls are simple vessels with thick and straight, flaring sides (Fig. VIII.2, no. 6). Perhaps basalt bowls were used as mortars. Stone vessels seem to constitute a mainly 7th millennium feature in the Balikh valley. At nearby tells Assouad and Damishliyya numerous fragments of such vessels were found (Cauvin 1972; Akkermans, in press). Pottery, however, is relatively rare at these sites. The present evidence from Sabi Abyad shows that pottery had apparently taken over the role of stone vessels in the daily life of the 6th millennium B.C.

In room 21 of the main building uncovered in square P13, stratum 5, a flat and polished, pierced stone has been found, which probably served as a spindle-whorl (Fig. VIII.4, no. 19). Its diameter was 39 mm, and its thickness was 6 mm. A similar object was found in the topmost Halaf stratum of trench T4 (Fig. VIII.4, no. 17). It had a diameter of 47 mm and a thickness of 9 mm.

A.2. Bone

So far, only 12 objects of bone have been found at Tell Sabi Abyad. All objects stem from Halaf strata. The few bone objects are divided into three categories, viz. awls (6 pieces), spatulas (3 pieces) and miscellanea (3 pieces).

Awls were all made of metapodia of sheep or goats. As a result of cutting and polishing these implements were pointed at one end, but otherwise they were left unworked (Fig. VIII.2, nos. 7-12).

Spatulas were made of ribs of sheep or goats. The edges of these implements were rounded by polishing.

A few other worked bone objects have been found, the function of which is unknown. One fragmentarily preserved metapodial showed a truncated and polished edge (Fig. VIII.2, no. 13). Two other pieces, each made of the ribs of cattle (*Bos taurus*), showed cut marks of varying length at small intervals (Fig. VIII.2, no. 14).

A.3. Baked clay

The small objects of baked clay from the various strata at Tell Sabi Abyad include a figurine, a small number of spindle-whorls and some perforated sherd disks.

In trench T4 a painted female figurine has been found in a Halaf pit, filled with ashes (Fig. VIII.3). This figurine was about 6 cm tall. The body was broken and the lower half was found in the pit at a depth of about 30 cm below the upper half. The head of this figurine is missing. A hole in the neck suggests that the head had been fitted onto the body by means of a dowel. Apparently, the head was removable or revolving. The lower part of the body is cube-shaped whereas the upper part is more flattened. Limbs are only superficially indicated and the main emphasis is on breasts and abdomen. Around the slim waist four ring-like belts are indicated. The figurine has been decorated with black paint. The breasts are encircled with dots of paint whereas the pubic triangle has been painted solidly. Traces of black paint appear on the legs as well. Some black lines around the neck may indicate a necklace. The back and the lower parts of the figurine sides show a vertical herringbone or tree design. Moreover, these lower parts are slightly polished which suggests that these parts had been frequently touched by hands. So far, no parallel has been found for this figurine.

Only 6 spindle-whorls have been found at Sabi Abyad, all of them in the Halaf strata. Spindle-whorls are made of slightly baked clay and have a rounded or occasionally flattened, biconical shape (Fig. VIII.4, no. 18).

An interesting category of clay objects are the small, perforated disks, made of sherds, 9 specimens of which were found in the Late Neolithic and Early Halaf strata at Sabi Abyad (Fig. VIII.4, nos. 16-17). These disks were made by chipping painted or unpainted sherds. However, only sherds belonging to the so-called Fine Ware were used. The perforated disks range in diameter from 25 to 45 mm. What these objects may have been is unclear; perhaps they were used as spindle-whorls. Chipped and perforated sherd-disks appear at numerous Neolithic sites in the Near East. In the Amuq, they were first found in a phase B context (Braidwood and Braidwood 1960:83).

B. SMALL FINDS FROM THE LATE BRONZE AGE STRATA

Only four objects stem from late 2nd millennium levels but these finds are all out of their proper context. They were found either in erosion layers in trench P10 or in the occupation fill of squares O13-O14. One object (a cylinder seal or amulet) was found in a Halaf context in square P13 but on stylistic grounds this find can definitely be ascribed to the Late Bronze Age.

A small, trapezium-shaped bronze axe (Fig. VIII.4, no. 20) has been found in an erosion layer in trench P10. This axe is 10.8 cm long, 4.1 cm wide and 0.9 cm thick. Its weight is 138 grams. Its appearance in trench P10 suggests that this object originally stems from a Late Bronze Age occupation level on the 'acropolis' of Tell Sabi Abyad.

In square O14, in the fill of the Late Bronze Age building unearthed, a partly hollowed-out basalt stone was found which may have been used either as a mortar or, in view of its irregular shape, as a door-socket. In the same fill a perforated sherd-disk has been found, very similar to those found in the prehistoric strata at the site. No doubt, this sherd-disk belongs to one of these Neolithic strata and is completely out of its proper context.

An extraordinary small find appeared in stratum 4 of square P13. Here a lightly baked clay cylinder seal or amulet (Fig. VIII.4, no. 21) was found above the floor, south of a bread-oven. On this floor, three complete Halaf vessels have been found as well. Whereas this find was found in a seemingly undisturbed Halaf stratum, an actual Halaf date for this seal or amulet is most unlikely. On stylistic arguments, our seal can be related to western Syrian and Levantine seals from the late 2nd millennium B.C. (cf. Homès-Fredericq et al. 1982; Collon 1982; Teissier 1984). Our seal seems to represent a provincial Syrian Late Bronze II style of seal design. The presence of this late 2nd millennium seal or amulet in a Halaf stratum is probably due to animal burrowing. The seal or amulet is 4.2 cm long and has a diameter of 2 cm. It is cylindrically shaped and longitudinally pierced. It shows a highly stylised design, indicating a scorpion, a person standing upside down, with pierced eyes and a bow in his left hand, a quadruped standing up straight, a tree or other plant, and a possibly horned person with perhaps a sickle in his hand.

CATALOGUE OF SELECTED SMALL FINDS

Fig. VIII.1.

1. SAB-no. 86-SS2. T4, stratum 3. Basalt grinding slab. L. 320 mm. W. 153 mm. H. 51 mm. Halaf.

2. SAB-no. 86-S1. T4, stratum 3. Basalt pestle. L. 44 mm. W. 44 mm. H. 43 mm. Halaf.

3. SAB-no. 86-S3. P13, stratum 4. Basalt pestle. Traces of ochre on lustrous and smoothed working surface. H. 47 mm. D. 47 mm. Halaf.

4. SAB-no. 86-S2. S5, stratum 1. Basalt pestle. L. 101 mm. D. 42 mm. Late Neolithic.

Fig. VIII.2.

5. SAB-no. 32-15. P14, stratum 6C. Black stone bowl. D. 110 mm. Halaf.

6. SAB-no. 16-6. P14, stratum 4. Basalt bowl. D. 150 mm. Halaf.

7. SAB-no. 86-I7. P14, stratum 6C. Bone awl. L. 105 mm. Halaf.

8. SAB-no. 24-9. P14, stratum 6B. Bone awl. L. 64 mm. Halaf.

9. SAB-no. 24-10. P14, stratum 6B. Bone awl. L. 75 mm. Halaf.

10. SAB-no. 27-12. P14, stratum 6B. Bone awl. L. 56 mm. Halaf.

11. SAB-no. 51-30. P14, stratum 6C. Bone awl. L. 68 mm. Halaf.

12. SAB-no. 52-12. P14, stratum 6C. Bone awl. L. 87 mm. Halaf.

13. Sab-no. 24-11. P14, stratum 6B. Worked bone. L. 59 mm. Halaf.

14. SAB-no. 86-I3. T4, stratum 2. Bone object with cut marks of varying length at small intervals. L. 65 mm. Halaf.

Fig. VIII.3.

15. SAB-no. 86-H1. T4, stratum 1. Clay female figurine. Buff colour. Traces of matt black and red-brown paint. L. 63 mm. Halaf.

Fig. VIII.4.

16. SAB-no. 5-2. T5, stratum 1. Perforated sherd disk. Spindle-whorl? Traces of lustrous dark-red paint on both sides. D. 35 mm. Late Neolithic.

17. SAB-no. 86-W1. T4, stratum 1. Perforated stone disk. Spindle-whorl? D. 47 mm. Halaf.

18. SAB-no. 86-W5. P13, stratum 5 (above floor of room 22 of Halaf main building). Clay biconical spindle-whorl. H. 22 mm. D. 28 mm. Halaf.

19. SAB-no. 86-W6. P13, stratum 5 (on floor of room 21 of Halaf main building). Perforated stone disk. Spindle-whorl? D. 39 mm. Halaf.

20. SAB-no. 86-M1. P10, erosion level 1. Bronze axe. L. 108 mm. W. 41 mm. H. 9 mm. Late Bronze Age.

21. SAB-no. 86-Z1. P13, stratum 4 (intrusive). Lightly baked clay amulet or cylinder seal. L. 42 mm. D. 20 mm. Late Bronze Age.

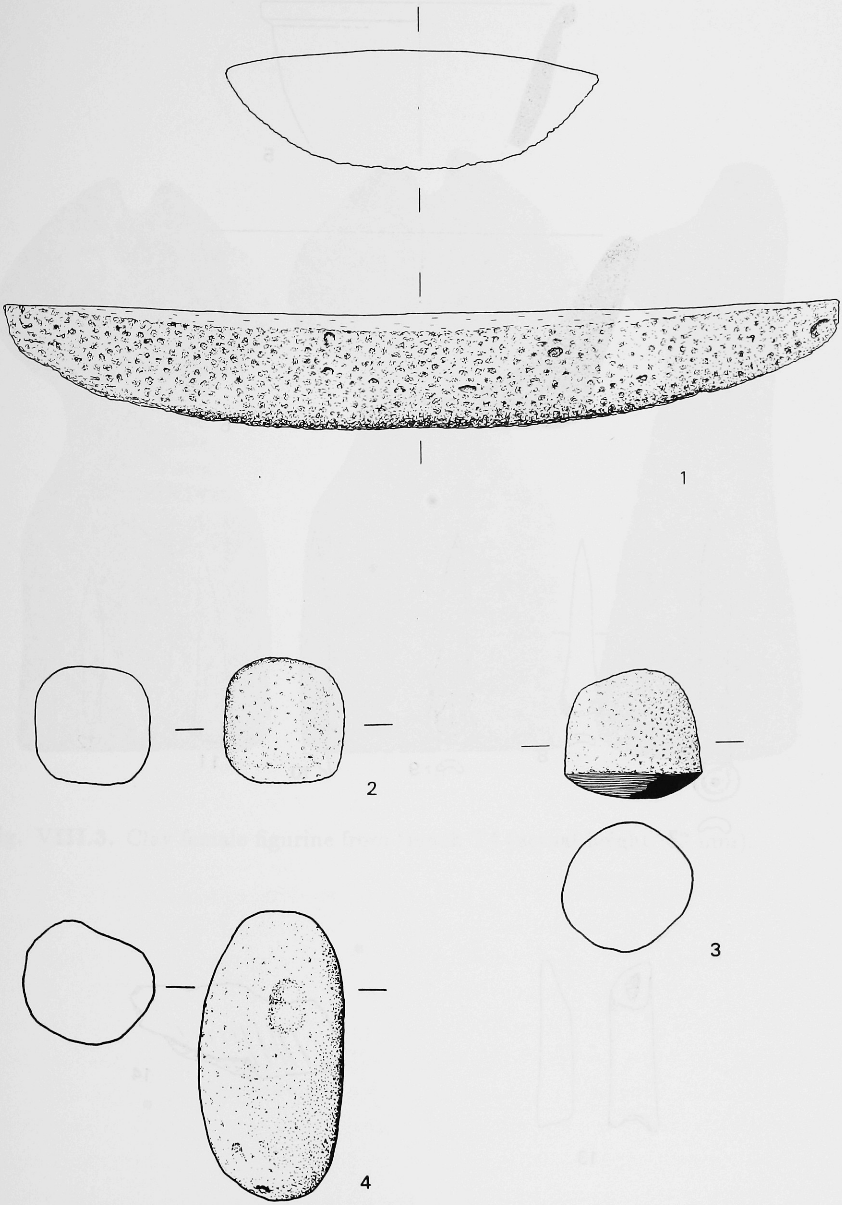


Fig. VIII.1. Basalt grinding slab and pestles. Scale 1:2.

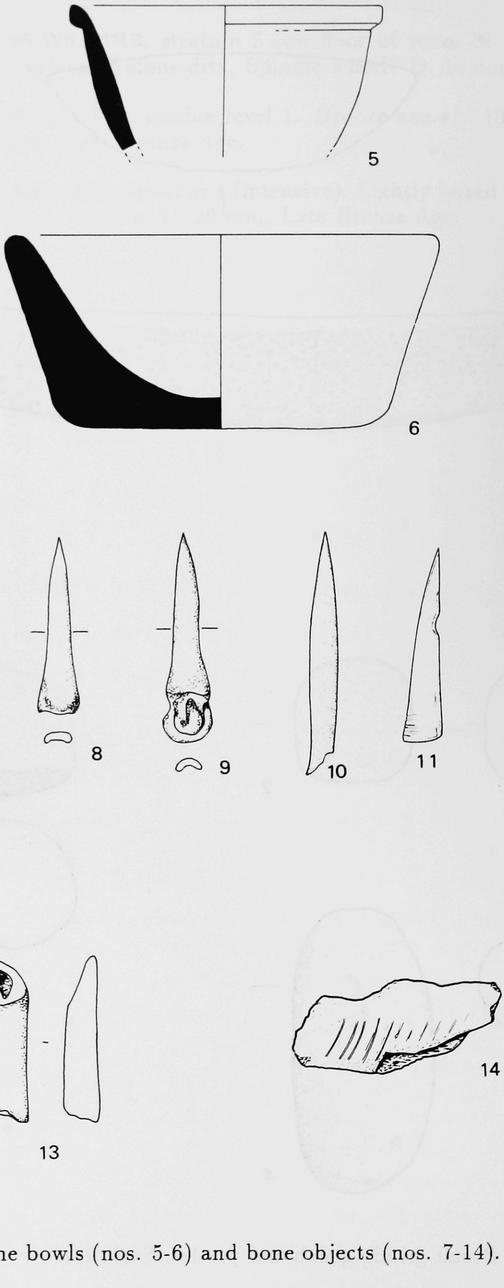


Fig. VIII.2. Stone bowls (nos. 5-6) and bone objects (nos. 7-14). Scale 1:2.

15

Fig. VIII.3. Clay female figurine from trench T4 (actual height: 63 mm).

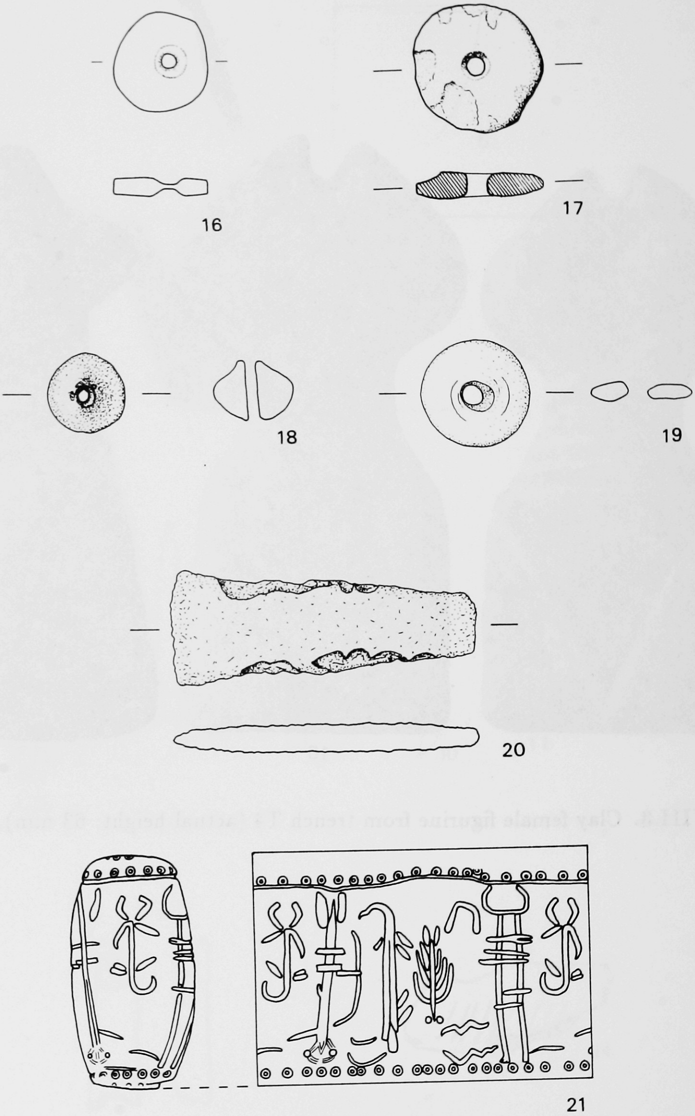


Fig. VIII.4. Spindle-whorls (?) from the prehistoric strata (nos. 16-19), bronze axe (no. 20) and clay amulet (no. 21) from the Late Bronze period. Nos. 16-20: scale 1:2. Actual height of no. 21: 42 mm.

Chapter IX

THE HUMAN SKELETAL REMAINS OF TELL SABI ABYAD

By Johanna Geerlink

A. CIRCUMSTANCES OF DISCOVERY

During the 1986 excavations at Tell Sabi Abyad two burials (B1 and B2) were found on the northeastern area of the site.

Burial B1 was discovered on the north slope of the tell, in trench T4, and consisted of a simple unlined pit, measuring approximately 100 cm in length, 50 cm in width and 40 cm in depth. The orientation of the pit was east-west. The individual buried in this pit had been laid on its left side, facing south. The body was oriented east-west (from atlas to sacrum). Arms and legs were tightly flexed. No burial gifts were found.

Burial B2 was found at the top of the northeastern mound of Tell Sabi Abyad, immediately underneath the topsoil in trench T5. As burial B1 in the neighbouring trench T4, this burial B2 consisted of a simple unlined pit. This pit was irregularly and more or less ovally shaped and measured approximately 80 cm in length, 60 cm in width and 20 cm in depth. The orientation of the pit was northwest-southeast. The dead person had been buried in a tightly flexed position on its left side, facing south-west. The body was oriented northwest-southeast. No burial gifts were present.

The dating of the two burials from Tell Sabi Abyad remains vague. The absence of any burial gifts, the almost identical positioning of the dead and the similar construction of the graves suggest a close relationship. Moreover, both burials were found immediately below the surface, at a close distance (about 15 metres) from eachother. Both burials were intrusive in the prehistoric strata of the northeastern area, being sunk either in the Halaf strata of trench T4 (B1) or in the topmost Late Neolithic stratum of square T5 (B2). The burials thus seem to be of a later date than the periods presently attested on the northeastern mound. Most likely the burials date from the Late Bronze Age, towards the end of the 2nd millennium B.C. Late Bronze occupation levels are present on the western half of Tell Sabi Abyad but have not been found on the northeastern part. Apparently the latter was a marginal area of the Late Bronze settlement at the site, thus suitable as a burial ground.

B. TAPHONOMY

The bones of the two skeletons were badly preserved and very fragile, which is probably due to the positioning of the dead immediately below the surface.

Skeleton B1

The considerable fragmentation of the skeleton hampered the determination of the exact position of every bone particle. Fig. IX.1 shows the determined fragments. Fragments of vertebrae, ribs and the skull besides phalanges of hands and feet, metatarsals and metacarpals and fragments of the long bones were present but their position could not be determined.

The age of individual B1 was established mainly on the basis of the suture closure. As the right ulna showed epiphyseal union, individual B1 had to be older than 16-20 years. The sutures supported this view: one suture, most likely being the middle part of the sutura sagittalis, was closed, whereas the most frontal part of the sutura sagittalis, at the joint with the sutura coronalis, was still open. This indicated that individual B1 was older than 20-30 years but younger than 40-50 years. The surface of the teeth showed attrition, typical of a 25-35 years old person (using the age-attrition table of Brothwell 1981:72). This was in accordance with the results of the suture closure and consequently the age of individual B1 was determined at 25-35 years.

Establishing the sex of this individual turned out to be more difficult as there were no traceable pelvic remains and the skull was far from complete. However, the processus zygomaticus proved to be rather robust, as were the long bones. Individual B1 showed rather large muscular ridges. Moreover, the inside surface of the angulus mandibulae was rather rough. Concluding, individual B1 seems to be male.

The height of individual B1 was ca. 150-155 cm. The humeri measured approximately 26-28 cm; the calculated height is inferred from data presented by Trotter and Gleser (1952, 1958) for American whites.

The severe fragmentation of the bones of skeleton B1 did not allow the detection of any pathologies except one: caries. The upper left second and third molar both showed interproximal neck caries.

Skeleton B2

The remains of this skeleton were as fragmentary as those of individual B1. Fig. IX.2 shows the determined fragments of individual B2. More fragments of the skull, long bones and several phalanges of hands and feet as well as metatarsals and metacarpals were present, besides fragments of the vertebrae and ribs.

In view of the lack of an epiphyseal union of the distal end of the left humerus, individual B2 must have been younger than 14-18 years. The wisdom-teeth (third molars) had not yet fully developed, thus restricting the age to 12-15 years old. This estimation was supported by the non-closure of the available sutures.

Only few remains of the pelvis have been recognised and these were insufficient to determine the individual's sex. However, the rather rough surface of the linea nuchae suprema suggests that this individual B2 was male. The lack of other traits supporting this view can be explained by the age of individual B2 (the skeleton of an adolescent usually shows very few sexual traits). In comparison to individual B1, individual B2's muscular ridges were much smoother and the long bones more fragile. The latter is not surprising in view of the age of individual B2.

The height of individual B2 must have been about 140-145 cm. The left femur measured approximately 34 cm; the calculated height is inferred from data given by Trotter and Gleser (1952, 1958) for American whites.

Individual B2 showed signs of hypoplasia on the upper incisors, probably as a result of undernourishment in an earlier stage of its life. No other pathologies could be detected.

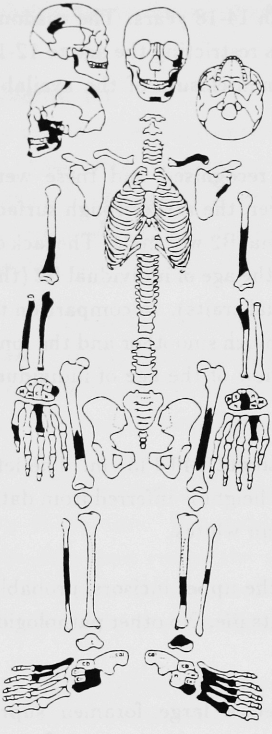
The distal end of the left humerus showed a large foramen supra condyloideus (Bass 1984:115).

C. CONCLUSIONS

Individual B1 was probably male, about 25- 35 years old, and 150-155 cm in height. Detectable pathology: caries.

Individual B2 was possibly male, too. This person must have been 13-15 years old and about 140-145 cm in height. Individual B2 showed hypoplasia on the upper incisors and a foramen supra condyloideus (septal aperture) in the left humerus. In view of the hypoplasia it may be possible to detect Harris-lines (lines of arrested growth) in the long bones if these are X-rayed.

If more skeletons appear, the occurrence of septal apertures might be used as a non-metrical trait in establishing the genetic distance of the people buried at Tell Sabi Abyad from other populations.



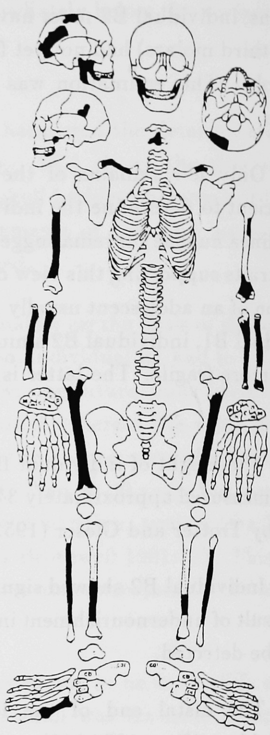


Fig. IX.1. Skeleton B1. **Fig. IX.2.** Skeleton B2.
The determined bone fragments are shown in black.

Individual B1: dental formula

*	*	*	*	*	C	I2	*	/	*	*	*	*	*	*	*	*
*	*	*	PM2	PM1	*	*	*	/	*	*	*	*	PM2	M1	M2	M3

Individual B2: dental formula

M3	*	M1	PM2	*	*	I2	I1	/	*	I2	*	*	PM2	*	M2	*
*	M2	M1	*	PM1	*	*	*	/	*	*	*	*	*	M1	M2	*

right left

* : tooth/(pre)molar missing.
A second M3 of individual B2 is not fully developed.

Fig. IX.3. Dental formula of individuals B1 and B2.

Chapter X

THE ANIMAL REMAINS FROM TELL SABI ABYAD - SQUARE P14

By Louise H. van Wijngaarden-Bakker

A. INTRODUCTION

The excavation of Tell Sabi Abyad in the Balikh valley in northern Syria produced evidence of a Late Neolithic and Early Halaf settlement dated between ca. 5300 and 5000 B.C. (Akkermans 1987 and this volume). This paper presents a preliminary report on the faunal evidence yielded by the excavation that was carried out by the University of Amsterdam under the direction of Peter Akkermans in 1986. Sofar only the animal remains from square P14 have been studied in detail. Stratigraphically 11 strata were distinguished, but these were regrouped into seven phases in order to correct for small sample size (see chapter IV). The phases date from the Late Neolithic (phase G) and, through a Transitional layer (phase F), from the Early Halaf period (phases E to A). However, no true break seems to be present in the occupation of the site. Each of the phases produced a number of animal remains. The bone assemblages are of unequal size, with specifically phases A, D and G being poor in bone material (see Table X.1). At least for phase G, the Late Neolithic layer, this is due to the fact that the excavated area of the square decreased from top to bottom. Future excavation will focus among other things on enlarging the area of Late Neolithic settlement.

The animal bones were identified and analysed at the Zooarchaeology department of the Albert Egges van Giffen Institute for Pre- and Protohistory of the University of Amsterdam. Management of the zooarchaeological data was carried out with the aid of dBase III and Lotus computer programs. Measurements were taken with the electronic measuring equipment that is available at the department.

Square P14 produced a total of 2344 animal remains of which only ca. 36% could be identified as to generic level. The remaining 64% have been subdivided into four categories: large, medium and small mammal and unidentified (Table X.2). Taken together the fragments in these categories consist for over 80% of small splinters of long bones, while 12% are rib fragments.

Table X.1. Sabi Abyad square P14 - animal remains

PHASE	A	B	C	D	E	F	G	TOTAL	%
BOS	5	20	17	8	73	26	8	157	
OVIS	1	2	4	3	35	12	3	60	
CAPRA	1	4	10	2	23	4	4	48	
OVIS/CAPRA	12	26	61	23	237	55	12	426	
SUS	6	7	29	6	57	8	1	114	
CANIS					2			2	
TOTAL DOM.	25	59	121	42	427	105	28	807	34.4
GAZELLA	2	1	1	2	2	4		12	
EQUUS					2			2	
MELES					1			1	
VULPES					1			1	
RODENTIA					1			1	
AVES	1						1	2	
UNIO		1			20	2		23	
MOLLUSC							1	1	
TOTAL WILD	3	2	1	2	27	6	2	43	1.8
LARGE MAMMAL	8	20	19	11	128	74	4	264	
MEDIUM MAMMAL	71	106	129	45	448	283	57	1139	
SMALL MAMMAL				1				1	
INDET.		1			77	12		90	
TOTAL INDET.	79	127	148	57	653	369	61	1494	63.7
TOTAL	107	188	270	101	1107	480	91	2344	100.0

Generally speaking the bones were in a bad state of preservation. Due to conservative action at the excavation postdepositional loss was kept to a minimum. A fairly large number of bone fragments exhibits fresh fractures. In many cases fragments could be glued together,but also quite often the counterparts of fresh fractures could not be traced. To establish whether these recent fractures affect the bones of either large or medium mammals differently, the ratio between these categories has been estimated. Within the identified material the ratio between large (*Bos* and *Equus*) and medium mammals (*Ovis, Capra, Sus, Gazella*) is almost equal to the one within the unidentified material (Table X.3). This would indicate that the taphonomic loss is roughly the same for the large and for the medium mammals.

The surface of most of the bones has been found to be fairly brittle. but in a number of cases traces of carnivore gnawing could be observed. Carnivore tooth marks and extensive pitting of bones as a result of gnawing have been observed on 3.2% of the bones of Caprini, on 5% of the bovid bones and on 7%

Table X.2. Specification of the unidentified animal bones

	LM	MM	SM	INDET	TOTAL	PERCT
CRANIUM	2	23		1	26	1,7
MANDIBULA				1	1	0,1
VERT.CERVICALES		5			5	0,3
VERT.THORACALES	5	25			30	2,0
VERT.LUMBALES	1	7			8	0,5
VERTEBRAE	7	20			27	1,8
COSTA	24	161			185	12,4
SCAPULA		1			1	0.1
HUMERUS		1	1		2	0.1
CARPALIA		2			2	0,1
PELVIS		1		1	2	0.1
TIBIA		1		1	2	0,1
INDET.	225	892		86	1203	80.5
TOTAL	264	1139	1	90	1494	
PERCENTAGE	17,7	76,2	0,1	6.0		

of the suid bones. In several other contexts the higher susceptibility of pig bones to carnivore gnawing was also observed (King 1978; Stallibrass 1985; van Wijngaarden-Bakker 1984). The overall percentage of carnivore gnawed bone from Sabi Abyad is not high, so that here again the taphonomic loss may be estimated to be fairly small.

Cutmarks have also been found on a small number of bone fragments. Cutmarks related to dismemberment, notably on the medial part of the distal humerus were encountered among the bones from *Ovis*, *Capra* (Fig. X.1) and *Gazella*. One goat horncore bears traces of skinning at its base. It should be noted that none of the pig bones bear cutmarks.

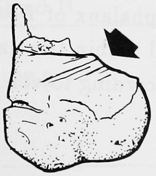


Fig. X.1. Cutmarks on the medial side of a distal humerus of *Capra* - goat.

Table X.3. Proportion between large and medium mammals

		n	%
Identified	large mammal	159	19.4
	medium mammal	660	80.6
Unidentified	large mammal	264	18.8
	medium mammal	1139	81.2

As has been stated above the bone material from Sabi Abyad was found to be heavily fragmented. To study the degree of fragmentation the proportion present of each bone was scored. The following groups were distinguished: <25%, 25%, 50%, 75% and 100% (Table X.4). In phase E, where a detailed study of the fragmentation was carried out, it was found that for *Bos* and *Sus* circa half of the fragments consist of less than 25% of the original bone, for the *Caprini* this was approximately one third. This apparently heavy fragmentation is also reflected in the high amount of unidentifiable bone splinters within the categories of large and medium mammals (see again Table X.2). At the other extreme complete bones are mainly represented by teeth, phalanges and carpals and tarsals. Not a single complete long bone has been found at the site sofar. The heavy fragmentation induces a loss of information in several fields such as estimation of shoulderheight, age and sex.

B. DOMESTIC ANIMALS

For each of the genera *Bos*, *Ovis*, *Capra*, *Sus* and *Canis* one has to reckon with the possible presence of wild specimens. As a result of the fragmented nature of the bone assemblage the observation of morphological criteria that distinguish wild from domestic specimens could not be used for this purpose. But for each of the species a metrical analysis could be carried out. Where distinction was possible on this basis the osteometric data were found to point to domestic status. The only exception might be a first phalanx of *Bos*. The osteometric data of *Ovis*, *Capra* and *Sus* were found to fall within the size range of domestic populations. All measurements were taken according to von den Driesch (1976).

B.1. *Bos taurus* - cattle

The bovid sample contains 157 fragments (Table X.1). Identification as domestic cattle is mainly based on the metrical data. With one exception all measurements

Table X.4. Degree of fragmentation, phase E.

	BOS		CAPRINI		SUS	
	n	%	n	%	n	%
<25%	35	48,6	103	34,9	29	50,9
25%	12	16,7	64	21,7	8	14,0
50%	4	5,6	32	10,8	3	5,3
75%	7	9,7	30	10,2	11	19,3
100%	13	18,1	66	22,4	6	10,5
TOTAL	72		295		57	

seem to fall within the range known for (large) domestic cattle. A single phalanx 1 with a peripheral length of 73.8 mm falls outside this range. Its proximal width of 38.2 mm approaches the width of a proximal phalanx 1 from Shams ed-Din which measured 38.5 mm and is considered to come from wild cattle (*B. primigenius*) by Uerpmann (1982). The phalanx from Sabi Abyad is somewhat smaller than two specimens from the Neolithic levels of nearby Tell Assouad, dated to the mid-seventh millennium. These phalanges have been ascribed by Helmer (1985) to *B. Primigenius*. A slight problem arises, however, in that Helmer's measurements do not follow von den Driesch so that his data may not be strictly comparable. A definite allocation of the phalanx 1 from Sabi Abyad can not be made as long as the lower size limit of early Holocene wild cattle from northern Syria and the upper size limit of domestic cattle from the same area remain unknown. Comparative measurements have been assembled in Table X.5.

Table X.5. *Bos cf. primigenius*: greatest length (GL), proximal width (BP), smallest width of the diaphysis (DS) and distal width (BD) of phalanx 1 from Sabi Abyad, Shams ed-Din and Tell Assouad. Data from Uerpmann (1982) and Helmer (1985).

	Sabi A.	Sh.ed-D	Ass.	Asss.
GL	73.8	-	80.8	79.2
BP	38.2	38.5	45.2	34.6
SD	31.7	-	36.4	27.8
BD	32.5	-	-	33.8

Table X.6. *Bos taurus*, phalanx 1 and 2. Comparison of measurement ranges. For abbreviations see Table X.5.

	Sabi Abyad		Shams ed-Din		Girikihaciyan		Total	
	n	range	n	range	n	range	n	range
Phalanx 1								
GL	3	61.1 - 64.7	6	56.5 - 61.0			9	56.5 - 64.7
BP	4	28.1 - 32.6	5	30.0 - 33.0	4	27.5 - 30.3	13	27.5 - 33.0
SD	8	22.0 - 29.1	6	24.5 - 28.5			14	22.0 - 28.5
BD	8	25.8 - 30.1	5	25.8 - 32.0			13	25.8 - 32.0
Phalanx 2								
GL	3	39.5 - 43.6	5	39.0 - 45.5			8	39.5 - 45.5
BP	5	28.3 - 33.5	2	27.0 - 33.5	4	27.3 - 36.6	11	27.0 - 36.6
SD	4	21.8 - 26.3	5	22.0 - 28.5			9	21.8 - 28.5
BD	3	23.2 - 28.1	4	23.0 - 31.0			7	23.0 - 31.0

The complete set of metrical data for cattle have been assembled in appendix A. They are mostly individual data, but for the first and second phalanges a range of data could be established (Table X.6). The ranges correspond well to those from the Halafian site of Shams ed-Din (see Uerpmann 1982).

All skeletal elements are present, but there is a marked overrepresentation of cranial elements, mostly loose teeth (Table X.7).

In Table X.7 all phases have been taken together. Due to the fragmentated state of most of the bones only a limited number of age observations could be made. Of five third molars of cattle two exhibit a slight wear, two moderate wear and only one heavy wear. Epiphyseal fusion of cattle bones could be observed in only 34 cases. Of the bones that fuse late, i.e. between three and four years (proximal and distal femur, distal radius, distal tibia and calcaneum) 35% are fused. The main mortality probably lies in the third and fourth year. The sex ratio could not be established.

B.2. *Caprini* - sheep and goat

Distinction between *Ovis* and *Capra* has been attempted with the aid of morphological criteria (Boessneck et al. 1964; Spahn 1978; Prummel and Frisch 1986). Distinction was hampered by the fragmented state of many bones, by the absence of diagnostic criteria for some bone types, by the presence of young, unfused bones and by the lack of comparative material from the Near East. In the overall assemblage bones of Caprini are present in a proportion of 55 sheep :

Table X.7. Specification of skeletal elements of domestic animals.

	BOS	OVIS	CAPRA	O/C	SUS	CANIS
PROC.CORNEUS	2	5	7	3		
CRANIUM	3	3		15	29	
MAXILLA	1			14	5	
MANDIBULA	23			55	9	1
DENTES	30			143	13	
ATLAS			2	3	4	
AXIS		1	2	7		
VERT.CERVICALES	2			2		
VERT.THORACALES	1			5		
VERT.LUMBALES	2			7		
VERT.CAUDALES	1					
VERTEBRAE						
COSTA	4					
SACRUM	1			1		
SCAPULA	2	5	3	28	6	
HUMERUS		11	8	23	3	
RADIUS	3	3	4	24	8	
ULNA		3	4	2	4	
CARPALIA	7	4	6		1	
METACARPALIA	4	1	4	20	1	
PELVIS	7	14	2	5	9	
FEMUR	12	4	2	6	6	
PATELLA	2	1				
TIBIA	10			33	4	
FIBULA	2					1
ASTRAGALUS	3			6	5	
CALCANEUM	4	2		2	4	
TARSALIA	1			1		
METATARSALIA	4	2		13	2	
METAPODIA	2					
PHALANX1	11	1	3	6		
PHALANX2	7			1	1	
PHALANX3	6		1	1		
TOTAL	157	60	48	426	114	2

45 goat. In phase E the proportion amounts to 60 sheep : 40 goat. This proportion is biased by the presence of associated bones and by possible different mortality patterns. To bypass these constraints the distal humerus (the earliest fusing epiphysis of the caprine skeleton) has been used. In the overall assemblage there are 11 distal humeri of *Ovis* and 8 of *Capra*, leading to a proportion of 58 sheep : 42 goat.

Fig. X.2. Horncore of *Capra* - goat with light chopmark at the basis.

The measurements of the Sabi Abyad sheep and goats (appendices B and C) agree well with those from Shams ed-Din and as for that site it may be concluded that the Sabi Abyad sheep and goats were domesticated. All skeletal elements are present in the sheep/goat category (Table X.7). There is, however, an underrepresentation of the elements of the axial skeleton because these have mostly landed in the group of 'medium mammals'. Certain elements, such as the tibia, have all been allocated to 'sheep/goat' in the absence of diagnostic features. Horncores, important elements for the eventual distinction between wild and domestic specimens, are present for both species. The sheep horncores are too fragmented to allow any further comment. Among the goat horncores there is an almost complete one, that is 'sabre-shaped' with a well developed anterior keel. There are transverse cutmarks at its basis (Fig. X.2). A goat metacarpal from phase C gives an estimate shoulder height of 59.5 cm.

The mortality pattern of the Caprini has been studied with the aid of the dentition and of the epiphyseal fusion of the long bones. For both methods sheep and goat have been considered together. Because of the limited size of the samples of the separate phases, the mortality data have been taken from the database as a whole. The dental evidence of the mandibulae has been grouped into four age classes:

class: <1 yr (M1 unerupted; M1 erupted, M2 unerupted)
class: 1 - 2 yrs (dP4 moderate wear)
class: 2 - 4 yrs (P4 in eruption; M3 in eruption; M3 light wear)
class: >4 yrs (M3 heavy wear; P4 heavy wear).

The epiphyseal data have also been grouped into four classes:

class: <1 yr (unfused acetabulum, distal humerus, proximal radius)
class: 1 - 2 yrs (unfused phalanx 1 and 2, distal metacarpal, distal tibia, distal metatarsal)
class: 2 - 3 yrs (unfused proximal ulna, proximal femur, calcaneum, distal radius)
class: 3 - 4 yrs (unfused proximal humerus, distal femur, proximal tibia)

Table X.8. Mortality of Caprini.

	dentition	epiphyses
< 1 yr	17%	9%
1 - 2 yrs	22%	32%
2 - 4 yrs	33%	34%
> 4 yrs	28%	25%
n	18	122

It should be noted that the formation of these age classes is rather arbitrary, that the dental evidence is based on less than 20 mandibles and that one has to reckon with a taphonomic loss in particular of the younger fusing epiphyses. Bearing these constraints in mind, the two sets of ageing data have been compared and they have been found to agree fairly well (Table X.8).

B.3. *Sus domesticus* - pig

The measurements of individual bones (Appendix D) point to domestic animals, that are smaller in size than the assumedly large wild boar that was present in the Near East during the early Holocene (Ducos 1978). Theoretically some measurements could fall within the extreme lower range of wild boar, but the same measures fall well into the known range for domestic pig. Although most of the long bones come from immature animals, comparison with similar young elements from European pigs again suggests a full domestic status for the pigs from Sabi Abyad.

Epiphyseal fusion could be observed on a total of 34 fragments. The data have been grouped into three classes:

class: 0 - 1 yr (unfused acetabulum, distal humerus, proximal radius)
class: 1 - 2,5 yrs (unfused distal metatarsal, distal metacarpal, distal tibia, calcaneum)
class: 2,5 - 3,5 yrs (unfused distal radius, proximal ulna, proximal and distal femur, proximal tibia)

Within the first class 64% is fused, whereas in both the second and third class only 10% of the fragments are fused. This means that 90% of the animals were killed before they reached the age of two and a half years, while only 10% survived into their fourth year. The dental evidence points in the same direction: one jaw comes from an individual of 8 - 9 months old, and three sets of dentition come from animals between 16 and 23 months old. There is one canine from a female individual.

B.4. *Canis familiaris* - dog

Skeletal evidence for the dog is confined to a small fragment of a mandibula and to a distal fragment of a fibula. Both finds come from phase E. However, bones of domestic animals with traces of carnivore gnawing are present throughout the seven phases. It seems reasonable to assume that these traces are the result of the action of dogs and not of some wild carnivore.

C. NON-DOMESTIC ANIMALS

The Sabi Abyad assemblage contains only 43 remains of non-domestic animals. Of these, 17 come from mammals (Table X.9).

Gazella is present with one or two fragments in each of the phases with the exception of the Late Neolithic phase G. The bones have been identified to genus level only. Three species of gazelle may be expected to have occurred around the site: *G.gazella*, *G. subgutturosa* and *G. dorcas*. Species identification is possible on the (male) cranial skeleton (Uerpmann 1982) and recently Hakker (1986) has shown that the determination of species on the postcranial skeleton of gazelle can be done by a stepwise discriminant analysis. In the absence of skulls and of a sufficient number of measurable bones, species identification has not been attempted for the gazelles from Sabi Abyad. Individual measurements (Appendix E) compare well with those from the later Halaf site of Shams ed-Din (Uerpmann 1982) and the seventh millennium site of Tell Assouad (Helmer 1985). One distal humerus displays transverse chop marks on the posterior side just above the trochlea.

The two equid bones, a scapula and a third phalanx, have been identified as *Equus hemionus* - onager. Their size (Appendix F) agrees well with that of onager bones from Shams ed-Din. Both bones come from phase E and were found together.

Phase E yielded an almost complete ulna of a badger, *Meles meles*, and a complete metacarpal of a fox, *Vulpes vulpes*. In phase A a distal fragment of an ulna of an as yet unidentified large bird was found, while phase G produced a complete coracoid of a duck, *Anas* spec. Shells of the bivalve *Unio tigridis* were

Table X.9. Specification of wild mammal remains.

	GAZELLA	EQUUS	MELES	VULPES
MAXILLA	1			
MANDIBULA	2			
SCAPULA	1	1		
HUMERUS	1			
ULNA			1	
METACARPALE	1			1
METATARSALE	2			
METAPODIA	1			
PHALANX 1	3			
PHALANX 3		1		
TOTAL	12	2	1	1

Table X.10. Frequency of domestic animals.

PHASE	A		B		C		D		E		F		G	
BOS	5	20.0%	20	33.9%	17	14.0%	8	19.0%	73	17.1%	26	24.8%	8	28.6%
OVIS	1	4.0%	2	3.4%	4	3.3%	3	7.1%	35	8.2%	12	11.4%	3	10.7%
CAPRA	1	4.0%	4	6.8%	10	8.3%	2	4.8%	23	5.4%	4	3.8%	4	14.3%
OVIS/CAPRA	12	48.0%	26	44.1%	61	50.4%	23	54.8%	237	55.5%	55	52.4%	12	42.9%
SUS	6	24.0%	7	11.9%	29	24.0%	6	14.3%	57	13.3%	8	7.6%	1	3.6%
CANIS									2	0.5%				0.0%
TOTAL DOM.	25		59		121		42		427		105		28	

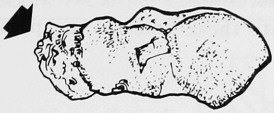


Fig. X.3. Proximal radius of *Ovis* - sheep with pathological condition, possibly an effect of old age.

present in phase A (1 shell), phase E (20 shells) and phase F (2 shells). The assemblage further contains a thoracic vertebra of an unidentified rodent and the shell of a (still) unidentified mollusc.

D. DISCUSSION

The sixth millenium settlement traces on Tell Sabi Abyad have been interpreted by Akkermans (1987 and this volume) as the remains of a permanent settlement. The round structures or 'tholoi' that appear at the site in the Early Halaf period suggest that storage was an important aspect of the local economy. The present zooarchaeological study together with the palaeobotanical research (van Zeist and Waterbolk-van Rooyen, this volume) present clear evidence that we are here dealing with a fully agrarian community. Hunting and gathering of molluscs and wild fruits played a minor role in the subsistence economy of the site. Gazelle and onager were occasionally hunted as an additional food resource. The single bones of badger and fox may well represent animals hunted for their fur rather than for their meat. Of the aquatic resources from the nearby Balikh river, there is only evidence for the exploitation of *Unio*. Sofar no fish remains have been recovered from the site. The lithic assemblage gives no indication of hunting equipment either (Copeland, this volume).

The zooarchaeological data give evidence of animal husbandry with an emphasis on sheep and goats. Together these species account for ca. 60 to 70% of the domestic animal remains (Table X.10). The ageing data present a rather generalised mortality pattern and it seems that no specific strategy was followed for slaughter at a certain age. About a quarter of the animals survived beyond their fourth year. It could not be assessed if a different mortality pattern exists for *Ovis* and *Capra*. One proximal radius and ulna of sheep exhibit a severe pathological condition with exostoses at the joint (Fig. X.3). A similar condition was found to be related to old age (van Wijngaarden-Bakker and Maliepaard, unpubl. manuscr.). Among the finds from the Halaf layers were some spindle-whorls. It is tempting to relate these finds to the presence of old individuals among the Caprini.

The cattle bones from Sabi Abyad are large in size, but with the possible exception of one exceptionally large phalanx 1, all fragments have been identified as domestic cattle. The pig remains are of medium size with no indication of the presence of wild boar. The suid mortality pattern is striking for its high percentage of young individuals, according to many authors one of the 'classic' characteristics of a domestic population.

The relative frequency of the domestic species exhibits an important change through time. The pattern becomes especially clear when only those phases with over a hundred bones of domestic animals are examined, e.g. phases F, E and C. The observed pattern shows a marked increase in pig linked to a decrease in cattle (Fig. X.4). At this moment one can only speculate about the reason for these changes. Changes in environment, such as decrease in good grazing areas might account for the observed pattern. Van Zeist and Waterbolk-van Rooyen (this volume) have found that when the emmer wheat crop was harvested, the straw was left on the field. This harvesting method would result in good grazing possibilities especially for cattle. Sofar there has been no evidence to show that this harvesting method changed nor is there evidence for change in the local climate in the second half of the sixth millennium.

One of the aspects of the increase in pig husbandry might be that the Late Neolithic level of Sabi Abyad gives very early evidence for the herding of domestic pigs in the Near East. Flannery (1983) assumes three centres of pig domestication: south-east Europe, the Zagros mountains and the southern Taurus. Domestic pigs make their appearance in these centres around 6500 to 6000 B.C. The increase in the relative importance of pigs at Sabi Abyad might be the result of a slow incorporation of pig husbandry into the adaptive strategy of the inhabitants of the tell. Flannery (1983) has drawn attention to the fact that transhumant herders and fully sedentary agriculturalists might live side by side. It is only the fully sedentary agriculturalists that can profitably accomodate pig herding into their economy, pigs being incompatible with a nomadic or

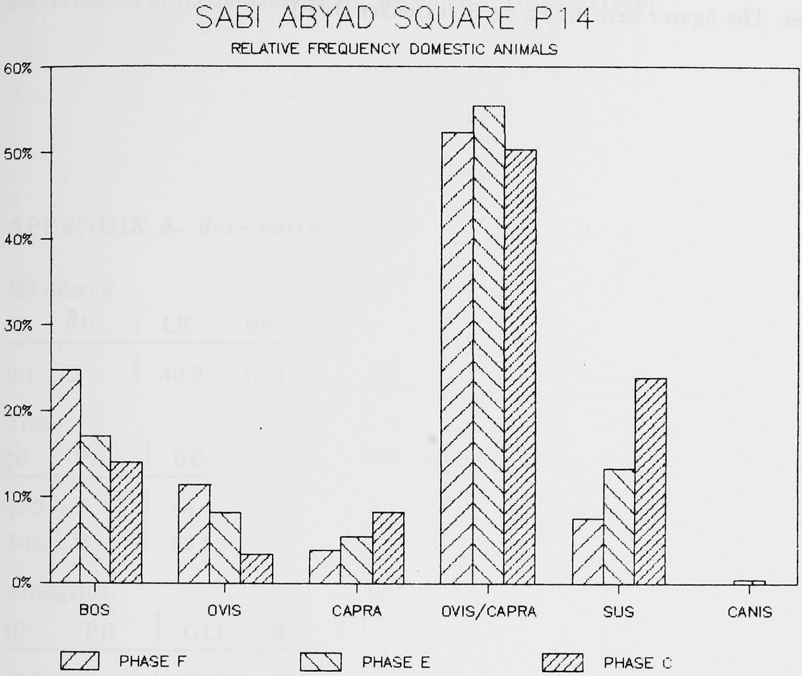


Fig. X.4. Relative frequency of domestic animals in phases F, E and C. Source: Table X.10.

transhumant way of life. The many architectural remains at Sabi Abyad from the Late Neolithic onwards show that this tell has always been a site of sedentary settlement. Incorporation of pig herding would then be a viable and profitable option. At the same time the relative frequency of sheep decreases while that of goats increases. With our present knowledge it is difficult to decide whether ecological factors such as changes in the local vegetation or economic factors underly these changes.

The upper Balikh valley seems to be one of the few areas in the Near East where such changes can be observed on a regional scale. Future excavations are planned with a focus on such regional aspects and we hope that an extension of the zooarchaeological database will provide further evidence of the changes in the agricultural strategy of the prehistoric inhabitants of the region.

Acknowledgements

This study would not have been possible without the invaluable assistance of Rik Maliepaard. Willem Schnitger helped with the sorting of the sheep and goat bones. The figures were drawn by Bob Donker (IPP).

APPENDICES: measurements

All measurements are in millimeters. ID = Identification, PH = Phase. For abbreviations of the measurements, see von den Driesch (1976).

APPENDIX A. *Bos* - cattle

M3 inferior

ID	PH	LE	BR
9-4	D	40.9	15.9

Tibia

ID	PH	BD
42-2	F	64.4
3-15	B	62.5

Astragalus

ID	PH	GLL	BD
49-33	E	73.8	48.8
31-1	E	75.7	49.5

Calcaneum

ID	PH	GL	GB
2-1	B	141.8	43.4

Metatarsale

ID	PH	BD
27-16	E	56.8

Phalanx 1

ID	PH	GL	BP	SD	BD	
15-1	E	73.8	38.2	31.7	32.5	WILD
38-1	F	64.7	32.6	27.3	30.1	
53-19	E	61.1	28.1	23.2	26.7	
12-1	C	61.8	30.7		29.1	
20-1	E		32.6	28.6	31.3	
3-1	B			28.2	31.1	
41-1	E			25.5	29.9	
37-3	F			22.0	25.8	
7-24	C			23.8	27.0	

Phalanx 2

ID	PH	GL	BP	SD	BD
42-1	F	42.0	28.6	21.8	23.2
25-4	E	39.5	28.3	21.7	23.7
37-4	F		33.5	26.3	
47-16	E	43.6	31.5		28.1
61-23	G		30.6	25.8	

Phalanx 3

ID	PH	DLS
28-14	E	63.5

APPENDIX B. *Ovis* - sheep

Scapula

ID	PH	SLC	GLP	LG	BG
61-2	G	19.7			
17-21	E	20.6	32.5	22.8	20.1
11-6	E	16.5	27.4		
27-2	E	16.6	29.9	22.4	18.5
33-14	F	18.0	32.3		

Humerus

ID	PH	BD	BT
51-3	E	31.7	29.2
50-10	E	31.8	30.1
37-1	F	29.9	27.3
33-4	F	31.7	29.1
47-1	E	29.9	27.9
53-14	E	29.6	28.1
17-1	E	28.3	26.6
61-9	G	29.0	27.8
60-33	E	30.8	28.6
17-3	E	29.5	27.7
61-8	G	31.9	29.5

Radius

ID	PH	BD
36-5	F	25-9
31-5	E	25.4

Ulna

ID	PH	LO	SDO	BPC
27-3	E	41.1	20.8	17.6

Calcaneum

ID	PH	GL	GB
1-4	A	54.1	12.8
57.7	E	51.1	

Metatarsale

ID	PH	BD
36-6	F	22.4

Phalanx 1

ID	PH	GL	BP	SD	BD
14-2	D	42.7	14.1	9.7	13.0

APPENDIX C. *Capra* - goat

Scapula

ID	PH	SLC	GLP	LG	BG
20-3	D	18.3	27.2	21.4	21.1

Humerus

ID	PH	BD	BT
53-16	E	28.8	27.1
30-2	E	29.2	27.5
17-2	E	26.0	25.3
36-4	F	29.6	26.4
57-3	E	28.9	26.7
31-6	E	29.9	27.6
20-4	D	28.9	25.6

Radius

ID	PH	BP	SD
28-17	E	32.8	19.0
61-3	G	30.3	
24-2	E	29.7	
26-7	E	31.3	

Ulna

ID	PH	DPA	SDO	BPC
61-5	G	25.6	22.2	17.1
61-4	G		17.0	
26-8	E	25.2	21.2	18.7

Metacarpale

ID	PH	GL	BP	SD
7-2	C	103.5	24.4	15.6

Pelvis

ID	PH	LA
60-47	E	27.2

Femur

ID	PH	BD
53-41	E	32.4

Phalanx 1

ID	PH	GL	BP	SD	BD
7-12	C	33.9	11.4	9.6	11.0
7-14	C	34.1	11.4	9.6	11.4
7-13	C	35.3		9.7	11.3

Phalanx 3

ID	PH	DLS
56-1	F	35.7

APPENDIX D. *Sus* - pig

Maxilla

ID	PH	LPR	LM3
11-27	E	47.9	33.3

Mandibula

ID	PH	LPR
31-9	E	47.4

Scapula

ID	PH	SLC
2-4	B	22.3
4-11	B	20.3
33-18	F	22.1

Radius

ID	PH	BP
61-6	G	28.5

Ulna

ID	PH	DPA	BPC
11-3	E	29.3	19.1
31-16	E	28.3	19.5

Metacarpale II

ID	PH	GL
57-4	E	58.2

Pelvis

ID	PH	LA
11-7	E	31.8
38-5	F	33.9

Astragalus

ID	PH	GL	GLL
39-8	F	28.8	26.7
51-25	E	36.4	40.3
1-1	A	42.2	
7-3	C	37.7	42.0
28-20	E		45.2

APPENDIX E. *Gazella* - gazelle

Scapula

ID	PH	SLC	GLP	LG	BG
4-9	B	17.9	30.7	24.4	23.4

Humerus

ID	PH	BD	BT
39-8	F	28.8	26.7

Metacarpale

ID	PH	BD
31-8	E	19.8

Phalanx 1

ID	PH	GL	BP	SD	BD
20-5	D	41.8	10.3	7.3	9.2
18-2	D	34.8	9.7	6.8	8.0

APPENDIX F. *Equus hemionus* **- onager**

Scapula

ID	PH	SLC	GLP	LG
25-2	E	50.2	74.8	48.2

Phalanx 3

ID	PH	GL	GB	BF	LD
25-3	E	51.2	57.0	39.8	44.7

Chapter XI

PLANT REMAINS FROM TELL SABI ABYAD

by W. van Zeist and W. Waterbolk-van Rooijen

A. INTRODUCTION

During the 1986 excavations at Tell Sabi Abyad, 15 samples were retrieved for the study of vegetable remains. The samples from the occupational fill were taken and processed (manual water flotation) by G.J. de Roller, who also carried out a preliminary examination in the field. Two of the samples are from a Late Neolithic context, while 13 botanical samples stem from Halaf strata at the site. The definitive analyses of the flotation residues were carried out in the laboratory (Palaeobotany department of the Biologisch-Archaeologisch Instituut, Groningen). Two of the Halaf samples have not been included in the examination because they turned out to be very poor in identifiable plant remains. Table XI.1 lists the samples that have been examined. Some of the samples were examined wholly, whereas other samples (large ones) have been sorted out only in part. The results of the analyses are presented in Table XI.2. Four grass-fruit fragments have arbitrarily been counted as one specimen. With regard to the cereal grain fragments, it should be mentioned that the mean 100-grain weight of *Triticum dicoccum* is 1.04 gram (average of 3 samples).

As most of the samples are from Halaf strata, emphasis will be laid on the plant husbandry of that period. Information on the palaeobotany of Halaf sites is not particularly abundant. Flax-seed imprints are mentioned by Helbaek (1959) for Brak and Arpachiyah, while the latter site evidently also yielded emmer wheat and barley (Perkins 1949:37). A more substantial body of archaeobotanical data could be obtained from the Halaf site of Gerikihaciyan in south-east Turkey (van Zeist 1979-1980). Halaf levels at Ras Shamra, situated on the Mediterranean coast of northwestern Syria, yielded quite appreciable quantities of floral remains (van Zeist and Bakker-Heeres 1984/1986). The location of the sites mentioned in this chapter in shown on Fig. XI.1.

First, attention will be paid to the crop plants attested at Sabi Abyad, and in the second part of this report some other aspects of the charred seed record will be discussed.

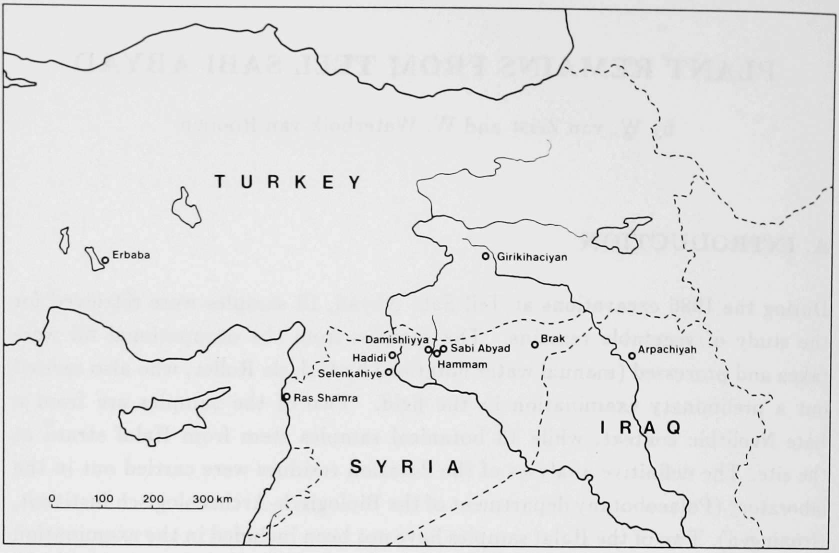


Fig. XI.1. Location map of sites mentioned in the text.

	sample number	square	stratum	area	level	volume of soil in litres	provenance
Neolithic	26	T5	2	8	3	25	surroundings of oven
	37	T5	2	7	3	60	contents of oven B
Halaf	5	T4	1	8	7	60	pit
	47	P14	3	15	4	70	on surface in open area
	54	P13	2	9	4	100	contents of tholos L
	56	P13	4	1	4	70	burned area, in pit
	57	P13	4	2	4	30	burned area around oven P
	58	P13	4	13	5	30	contents of white-plastered pit O
	65	P13	4	17	4	50	oven V
	67	P13	3	14	5	30	ashy area, pit
	70	P13	4	17	4	40	ashy layer on floor of oven V
	74	P14	6A	22	7	30	area around tholoi O and AC
	77	P14	6B	23	8	80	on floor of tholos O

Table XI.1. Sabi Abyad samples included in the examination of seeds and fruits.

B. THE ARCHAEOBOTANICAL EVIDENCE

B.1. Wheat

For Sabi Abyad the glume wheats *Triticum dicoccum* (emmer wheat) and *Triticum monococcum* (einkorn wheat) have been ascertained. In addition to the grains of these species, other remains in the form of spikelet forks and glume bases were found, sometimes in considerable quantities. The distinction between the grains of both glume wheats was sometimes rather arbitrary. In this connection it should be remembered that grains from one-seeded emmer wheat spikelets (particularly found at the top of the ear) are difficult to separate from those of einkorn wheat. In spite of some uncertainties it may safely be assumed that in addition to emmer wheat, einkorn wheat was also grown, be it on a modest scale. It cannot be established whether einkorn wheat was cultivated as a crop in its own right or whether it occurred only as an admixture to emmer wheat.

The quantity as well as the quantity (preservation) of the emmer wheat in samples 57, 67 and 74 allowed the measuring of satisfactorily great numbers of grains. The results of the measurements are presented in Table XI.3 and Fig. XI.2. As appears from Table XI.3, mean dimensions and index values (size and shape) of the grains in samples 67 and 74 do not differ much from the other, but the wheat from the latter sample has a higher 100-grain weight and, moreover, the frequency distributions of the lengths show differences (Fig. XI.2). The wheat grains of sample 57 are, on average, more slender (higher L/B index values) than those from the other two provenances (compare also the frequency distributions of the L/B index values in Fig. XI.2).

For a comparison of the Sabi Abyad emmer wheat grains with those from other sites, the dimensions and index values of kernels from Halaf levels at Ras Shamra, from the Halaf site of Gerikihaciyan and also from Neolithic Erbaba (about 5800-5400 B.C.) are listed in Table XI.3. The grains from Gerikihaciyan, which probably represent one harvest, are on average significantly larger than those from Sabi Abyad. The 100-grain weight is also distinctly higher. As for the shape, which finds expression particularly in the L/B index values, there are no great differences. The majority of the emmer wheat kernels of both sites are of a rather slender type. One is inclined to ascribe the larger size of the Gerikihaciyan grains to better growing conditions (e.g. higher precipitation), but caution is required in drawing this kind of conclusions. The Ras Shamra grains are, on average, somewhat plumper (lower L/B index values) than those from Sabi Abyad and Gerikihaciyan. The volume of the Ras Shamra grains is, on average, larger than that of the Sabi Abyad specimens: the former are slightly longer and significantly broader and thicker than the Sabi Abayd grains. Average annual precipitation in the Ras Shamra area is about 790 mm. It is, again,

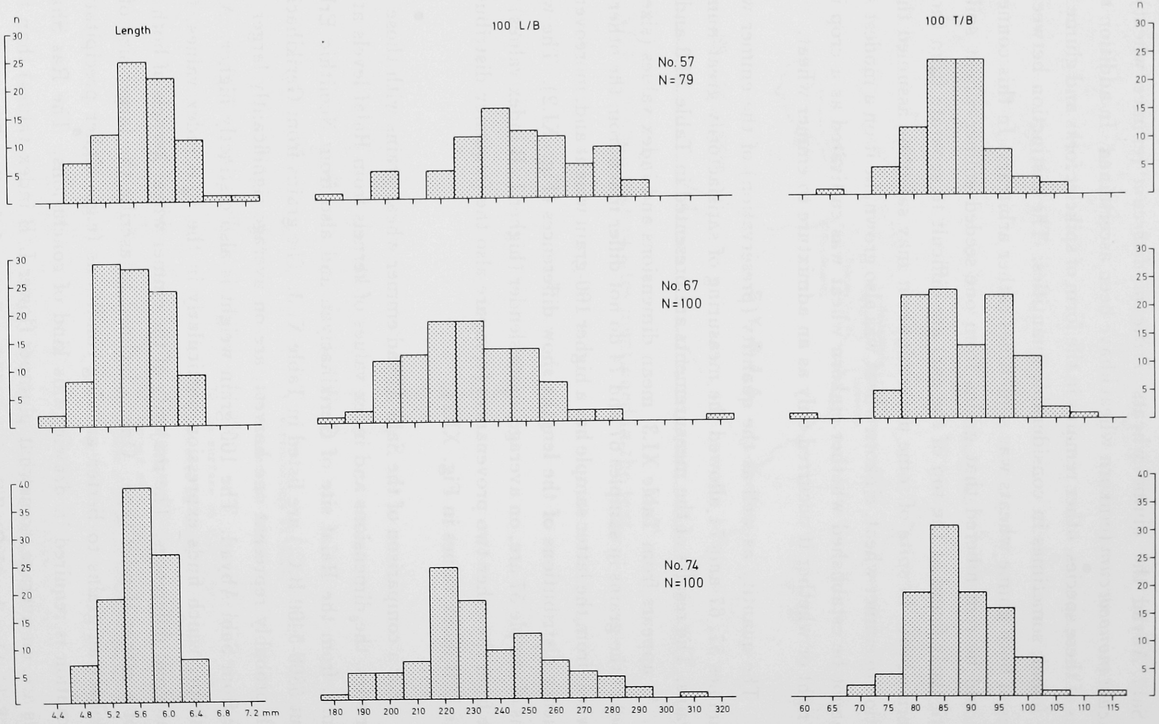


Fig. XI.2. Frequency distribution histograms for *Triticum dicoccum* grains from Sabi Abyad.

tempting to relate the good quality emmer wheat crop at Ras Shamra to favourable climatic conditions. Compared to those of other prehistoric sites, the Sabi Abyad grains are not particularly small-sized. This appears, for instance, from a comparison with the dimensions and 100-grain weights of emmer wheat kernels from late Neolithic Erbaba. Speculations on the quality of an ancient crop, as expressed by the dimensions of the diaspores, must remain somewhat inconclusive as no long as no further data are available.

B.2. Barley

The Sabi Abyad barley is of the hulled type. The majority of the barley grains are rather poorly preserved which hampers a species determination. Fairly well preserved specimens point to the two-rowed form: *Hordeum distichum* (*H. vulgare* ssp. *distichum*). Consequently all barley of Sabi Abyad is, with some reservations, attributed to this type. The rachis internode fragments do not provide any information in this respect. Usually only small fragments have been preserved, mainly of the lower part of the internode. Because of the small width of some of the internode fragments, it cannot be excluded that these are of a wild barley species. With one exception (sample 5), emmer wheat is much more numerous than barley in the Halaf samples, suggesting that the former was quantitatively the more important crop.

B.3. Linseed

Only a few *Linum* seeds have been retrieved. As usual these seeds have been more or less seriously affected by the carbonisation. The length of three of the seeds could be determined: 3.0 - 3.2 mm. In flax seeds, carbonisation causes a decrease in length of 12 to 15%. The original length of the three measured Sabi Abyad seeds (after correction for 13% shrinkage) would have amounted to 3.4 - 3.7 mm, which size points to domesticated flax, *Linum usitatissimum* (cf. van Zeist and Bakker-Heeres 1975).

B.4. Pulses

Leguminous crop plants are scarcely represented. Lentil (*Lens culinaris*) was certainly cultivated by the Sabi Abyad farmers. Only one seed could safely be attributed to field peas (*Pisum sativum*). The single specimen of bitter vetch (*Vicia ervilia*) is no firm evidence of the cultivation of this species because it occurs also as a field weed. On the other hand, at the Halaf site of Gerikihaciyan bitter vetch certainly formed part of the crop-plant assortment (van Zeist 1979-1980).

B.5. Wild fruits

Evidence of the gathering of wild fruits is amazingly meagre. Only two samples yielded a few *Pistacia* (pistachio) nutshell remains, while of *Amygdalus* (almond)

Sample number	57	67	74	70	65	58	56	54	47	77	5	26	33
Part of sample examined	1/3	1/5	1/18	1/5	1/1	1/1	1/1	1/1	1/1	3/7	1/1	1/1	3/7
Triticum dicoccum	260	880	580	91	84	45	7	27	97	22	4	4	9
Triticum monococcum	11	15	7	2	–	1	1	8	4	6	1	1	1
Triticum, spikelet forks	28	138	140	10	19	17	5	11	25	17	56	110	103
Triticum, glume bases	205	299	425	7	80	104	2	100	85	119	330	498	410
Hordeum (distichum)	2	3	3	1	1	–	1	13	10	4	16	29	21
Hordeum, internode fragments	–	3	–	–	2	–	–	–	2	12	2	8	10
Cereal grain fragments*	5.48	5.60	13.60	0.30	1.10	0.85	0.56	1.50	3.06	1.38	0.76	1.60	1.08
Linum usitatissimum	1	–	–	–	–	1	5	–	–	–	2	–	–
Lens culinaris	–	–	–	–	1	–	–	10	–	–	1	–	–
Pisum sativum	–	–	–	–	–	–	–	1	–	+	cf1	–	–
Vicia ervilia	–	–	–	–	–	–	–	–	1	–	–	–	–
Ficus	–	–	–	–	1	–	–	9	2	2	–	–	–
Pistacia	–	+	–	+	–	–	–	–	–	–	–	–	–
Amygdalus	–	–	–	–	–	–	–	+	–	–	–	–	–
Aegilops, grains	–	2	–	–	–	–	–	1	1	1	1	–	1
Aegilops, spikelet bases	–	1	–	–	–	–	–	–	1	1	–	2	–
Lolium(-type)	–	9	6	2	4	10	1	25	26	17	23	4	16
Hordeum (wild)	–	–	1	–	3	–	–	17	–	2	1	1	3
Phalaris	–	–	–	–	–	1	–	14	16	–	1	2	–
Cynodon (dactylon)	–	–	–	–	–	–	1	9	–	–	–	–	–
Bromus	–	1	–	–	–	–	–	3	–	+	–	–	+
Eremopyrum	1	–	–	–	–	–	–	1	–	–	–	–	1
Agrostis/Poa	–	–	–	–	–	–	–	–	2	–	1	–	–
Setaria-type	–	–	–	–	–	–	–	–	–	–	1	–	–
Digitaria-type	–	–	–	–	–	–	–	–	–	2	–	–	–
cf. Echinochloa	–	–	–	–	–	–	–	1	–	–	–	–	–
Unident. Gramineae	1	2	–	–	4	6	3	40	23	11	7	12	14
Astragalus	–	1	–	–	–	1	1	4	1	1	4	15	4
Vicia spec.	–	–	–	–	1	1	–	11	1	–	–	–	1
Medicago	–	–	–	–	–	–	–	3	–	–	–	–	–
Trigonella astroites	–	–	–	–	–	–	–	1	–	–	–	3	–
Prosopis	–	–	–	–	cf+	–	–	–	–	+	–	2	2
Unident. Leguminosae	–	1	–	–	1	–	1	44	5	1	2	5	8
Scirpus maritimus	–	–	–	–	–	–	–	1	1	–	–	2	1
Carex	–	–	–	–	1	–	–	1	4	–	–	1	4
Eleocharis-type	–	–	–	–	–	–	–	1	–	–	–	1	–
Cephalaria syriaca	1	–	–	–	–	–	–	2	–	–	–	–	–
Silene	1	–	–	–	2	–	1	5	1	4	5	–	–
Galium	–	1	2	–	–	1	–	12	–	–	–	2	5
Rumex (pulcher)	–	–	2	1	1	3	–	15	26	1	1	5	4
Polygonum (venantianum-type)	–	–	–	–	–	–	–	–	1	–	–	–	1
Heliotropium	–	–	–	–	–	–	–	1	–	–	–	–	–
Arnebia decumbens	–	–	–	–	–	1	–	–	–	4	–	–	–
Lithospermum tenuiflorum	–	–	–	–	–	–	–	–	–	–	–	1	–
Malva	–	–	–	–	–	–	–	–	–	–	–	1	1
Solanum (nigrum-type)	–	–	–	–	–	–	–	1	1	–	–	–	–
Adonis	–	–	–	–	1	–	–	–	2	–	–	3	–
Verbena	–	–	–	–	–	–	–	1	–	–	–	–	–
Bellevalia	–	1	–	–	–	–	–	–	–	–	–	–	–

* in grams

Table XI.2. Seeds, fruits and other plant remains in Sabi Abyad samples. Nos. 26 and 33 are from Late Neolithic strata; the other samples are from a Halaf context.

only one wall fragment could be established (sample 54). From the same sample a small number of *Prunus* (prune)-type nutshell remains were recovered (not listed in Table XI.2). The scarce representation of pistachio and almond could indicate that these wild fruit trees were not found in the vicinity of Sabi Abyad. More to the north, in the foothills of the Taurus mountains, these species may have formed part of the forest-steppe.

Wild fig (*Ficus*) must likewise have been of minor importance, as otherwise more pips would have been recovered. In this connection it may be remembered that one single fig fruit contains several hundreds of pips.

	N	Length	Breadth	Thickness	100 L/B	100 T/B	100-grain weight in grams
Sabi Abyad 57	79	5.66(4.5-7.3)	2.33(1.8-3.0)	2.02(1.6-3.0)	247(184-292)	87(63-107)	1.00
Sabi Abyad 67	100	5.51(4.4-6.6)	2.44(1.9-3.0)	2.14(1.5-2.6)	228(178-317)	87(61-108)	0.98
Sabi Abyad 74	100	5.58(4.6-6.6)	2.47(1.8-3.2)	2.14(1.7-2.6)	233(175-313)	87(69-116)	1.14
Girikihaciyan[1]	100	5.93(5.0-7.2)	2.54(1.9-3.2)	2.09(1.6-2.6)	235(176-317)	83(64-104)	1.31
Erbaba 931[2]	96	5.57(4.2-6.7)	2.40(1.5-3.0)	1.99(1.2-2.6)	233(188-300)	83(61-110)	0.89
Erbaba 426J(2)	99	5.62(4.7-6.4)	2.54(2.0-3.1)	2.04(1.5-2.6)	223(175-280)	81(61-100)	1.07
Erbaba 426 J(3)	100	5.63(4.0-6.3)	2.51(1.9-3.1)	2.05(1.6-2.6)	225(186-268)	82(61-103)	1.04
Erbaba 427B	44	5.58(4.4-6.7)	2.40(1.5-3.1)	2.03(1.4-2.9)	239(180-353)	85(66-108)	
Erbaba 1359	93	5.54(4.0-6.6)	2.45(1.9-3.0)	2.04(1.4-3.0)	228(164-285)	84(56-111)	0.98
Ras Shamra, Halaf samples[3]	24	5.72(5.1-6.4)	2.70(2.2-3.3)	2.50(1.7-3.0)	213(180-245)	92(78-109)	
	18	5.79(4.8-7.0)	2.76(2.2-3.2)	2.56(2.2-3.2)	211(182-278)	94(74-110)	
	11	5.64(5.0-6.1)	2.65(2.2-3.0)	2.43(2.1-3.0)	213(192-246)	92(79-100)	
	15	5.72(4.5-6.5)	2.78(2.3-3.0)	2.47(2.1-2.9)	206(178-231)	89(78-103)	

[1] van Zeist (1979-1980)
[2] van Zeist & Buitenhuis (1983)
[3] van Zeist & Bakker-Heeres (1984(1986)), table 5

Table XI.3. Dimensions in mm and index values of *Triticum dicoccum* grains. N is number of measured grains.

B.6. Other species

In addition to the diaspores of wild and cultivated food plants discussed above, a fairly great variety of other seeds was found. Most common among this group of plants are wild grasses, followed by wild leguminous species and dock (*Rumex*). No descriptions of these types are presented here, but it should be mentioned that many of the seed and fruit types are depicted in van Zeist and Bakker-Heeres (1982/1985). Almost all non-food plants attested at Sabi Abyad could have occurred as weeds in and near fields.

B.7. Charred wood

Two charcoal samples from a Halaf context were submitted for species identification. One of them consisted of poplar (*Populus*) wood, the other of that of ash (*Fraxinus*). *Populus (euphratica)* and *Fraxinus (syriaca)* must have occurred naturally in the Balikh valley.

C. DISCUSSION

C.1. The nature of the samples

The vegetable material in samples from cultural deposits is often of mixed origin, representing the outcome of various human activities. Among the Sabi Abyad

Halaf samples two main types can be established, viz. samples made up of the remains of a rather pure crop and those consisting largely of waste fractions of crop processing.

Samples 57, 67 and 74 represent the charred remains of emmer wheat crops that had been threshed and cleaned, but that had not yet been de-husked. Small numbers of einkorn wheat and barley could have occurred as admixtures in the emmer wheat fields concerned. In glume wheats (and hulled barley) threshing breaks up the ears into the individual spikelets. De-husking or hulling is the process of liberating the kernels from the spikelets in glume wheats. The great numbers of spikelet forks and glume bases suggest that we are dealing here with the remains of supplies consisting of whole spikelets. The absence of culm remains could indicate that in harvesting only the ears had been cut or plucked, leaving the straw on the field to be grazed by cattle and other domestic animals. This way of harvesting results in a crop almost free of weed seeds. However, the fairly large numbers of field-weed diaspores in other Sabi Abyad samples (see below) suggest that, with the crop, field weeds had been brought to the site and that subsequently the crop was cleaned of weed seeds and other contaminants. This would imply that the grain had been reaped low on the straw. The authors of this report are inclined to assume that the weed seeds present in samples 57, 67 and 74 would have escaped crop cleaning. In this respect it should be mentioned that after de-husking and before food preparation the crop was cleaned again by means of sieving and winnowing (cf. Hillman 1984).

Although the samples discussed above represent the remnants of emmer wheat supplies, it is not likely that the crop had been stored on the spot where the charred grains were found. After the fire that destroyed the grain storage, the carbonised remains had been taken out and deposited elsewhere. Sample 74 is a fairly large one, containing an estimated number of 33.000 grains (the greater part of which in fragments).

Sample 5 consists largely of the waste fraction of the de-husking of hulled wheat. This is suggested by the great quantities of spikelet forks and glume bases relative to the number of wheat grains. Some of the field-weed seeds in this sample may have been removed from the crop together with the spikelet remains, but other weed seeds may have become mixed with the de-husking residue before or after the carbonisation. Crop-plant diaspores other than those of wheat (barley, linseed, pulses) were probably also of different origin. The pit from which sample 5 originates was probably used as a refuse dump.

The contents of samples 47, 54 and 77 are clearly of mixed origin: waste fractions of crop-cleaning and crop-processing operations, accidental carbonisation during food preparation etc. It is, of course, not possible to account for every detail of the botanical contents of the samples. Samples consisting of vegetable remains from various origins are most common for archaeological deposits, particularly if the samples are not from a definite feature. Therefore, it is even surprising that 3 of the 11 Halaf samples are largely or wholly made up of the remains of one crop in a specific stage of processing.

Sample 70 consists largely of burnt twigs, probably a dwarf-shrub collected in the steppe, with small numbers of cereal grains.

C.2. The role of pulses

With regard to the ratio between pulses and cereals in the diet of the Halaf inhabitants of Sabi Abyad, the following may be remarked. It is often claimed that in the archaeological charred seed record pulses are seriously under-represented with respect to cereals. The chances for pulse-crop seeds to become carbonised would have been much smaller than for cereal grains. This is probably correct; at least, one can put forward arguments in favour of this hypothesis. On the other hand, one cannot escape the impression that where pulse crops played a major role in the economy of the site, they are well represented among the charred plant remains. Thus, at the Halaf site of Gerikihaciyan in south-eastern Turkey, pulse-crop seeds (lentil, bitter vetch, chick-pea) are usually more numerous than cereal grains (mainly emmer wheat) in occupational fill samples (van Zeist 1979-1980). Another example of this kind concerns the Bronze Age sites of Selenkahiye and Hadidi on the Syrian Euphrates. Conditions for plant cultivation near these sites must have been largely similar. Nevertheless, at Selenkahiye pulses are rather scarcely represented, whereas Hadidi yielded a considerable amount of pulse-crop seeds, in particular grass pea (*Lathyrus sativus*) and lentil (van Zeist and Bakker-Heeres 1985/1988). It seems reasonable to assume that at Sabi Abyad pulse crops were of minor importance; at least the vegetable remains recovered so far point in that direction.

C.3. The tholos sample (sample 54)

The question has been raised whether the round, perhaps beehive-shaped structures (commonly called tholoi) could have served as grain storage places. The excavator of Sabi Abyad (P.M.M.G. Akkermans) wonders whether the light-grey inner wall faces of the tholoi at the site could point to the annual cleaning of these structures before the storage of a new harvest. Sample 54, collected from the contents of tholos L, by no means gives the impression of being the remains of a grain store. In contrast to samples 57, 64 and 74, which are interpreted as the charred remains of almost pure emmer wheat supplies, sample 54 seems to be of a mixed origin: the greater part of the sample is made up of the residues of crop-processing and crop-cleaning waste. Sample 54 shows the greatest variety of weed seeds of all Sabi Abyad samples examined. It will be clear that this cannot have been the composition of grain stored in a tholos or other container. Sample 77, from the floor of tholos O, is also of mixed origin. It is possible that tholoi were, indeed, used for storing food supplies but tholoi samples 54 and 77 do not support such a hypothesis. One wonders whether perhaps the emmer wheat of sample 74 had been stored in tholos AC around which the grain was found (Table XI.1).

C.4. Agricultural practices

In the preliminary report on the plant remains from Tell Hammam et-Turkman (van Zeist et al., in press) attention is paid to possible indications of irrigation agriculture in the past. At present, crops are grown under irrigation in the Balikh valley, whereas on the uplands dry farming is practised (particularly barley is grown on rain-fed fields). The present-day mean annual precipitation of 250 mm is rather marginal for dry farming. For Tell Hammam et-Turkman it was concluded that the archaeobotanical indications of irrigation agriculture were too meagre to be adduced as firm evidence of the utilisation of Balikh water for plant cultivation. The situation at Sabi Abyad is not very different. Some of the weeds established for this site could be indicative of periodically irrigated fields: *Cynodon (dactylon)*, *Polygonum (venantianum*-type), *Digitaria*(-type), *Setaria*(-type). In view of the scarce representation of these species the question whether or not irrigation was practised by the Halaf farmers must remain unanswered here.

C.5. The Late Neolithic samples

Two samples were collected from a Late Neolithic context at Sabi Abyad, both of which clearly consist of the waste of crop processing and crop cleaning. The plant material concerned may have been used as fuel or for kindling the fire. Only three crop-plant species are represented in these samples, viz. emmer and einkorn wheat and hulled, two-rowed barley. It goes without saying that one may not expect the whole array of crop plants cultivated at the time in only two samples. On the other hand, two samples from Neolithic Tell Damishliyya, only a few kilometres west of Sabi Abyad, yielded three pulse-crop species in addition to emmer wheat, free-threshing wheat and barley. Damishliyya is dated around 6000 B.C., whereas according to Akkermans (1987) the Late Neolithic levels of Sabi Abyad date in the later part of the 6th millennium B.C. Thus, there is a time difference of more than 500 years between the two sites, which may explain at least part of the differences in the crop plants recovered.

It will be superfluous to remark that from the numerical ratios between the grains of wheat and barley in the two samples of Sabi Abyad no inferences may be drawn on the relative importance of the two cereals in the economy of the Late Neolithic inhabitants. Thus, it cannot be assumed that barley was the major crop. If the non-seed spikelet remains are included in the calculation, wheat is the predominant crop in both samples.

the Late Neolithic inhabitants. Thus it cannot be assumed that barley was the major crop. If the non-seed spikelet remains are included in the calculation, wheat is the predominant crop in both samples.

[illegible] es had these samples 34 and 17 [illegible] other perhaps [illegible] with the [illegible] (Table [illegible]).

7.4. Agricultural practices

In the preliminary report on the plant remains [illegible] Hamrum and Ducamp (van Zeist et al., in press) attention is paid to the possible indications of irrigation agriculture in the past. [illegible] for irrigation in the Balikh valley, whereas in the [illegible] particularly barley is grown on rain-fed fields. The [illegible] precipitation of 250 mm is rather marginal for dry farming. For Tell Hammam et-Turkman it was concluded that the [illegible] indications of irrigation agriculture were [illegible] as [illegible] of the utilization of Balikh water for [illegible]. The situation at Sabi Abyad is not very different. Some of the [illegible] for this site could be indicative of [illegible] irrigated fields: *Cyperus* (*Scirpus*), *Polygonum* (*amphibium*-type), [illegible] type), *Setaria* type). In view of the scarce representation of these species the question whether or not irrigation was practised by the Halaf farmers must remain unanswered here.

7.5. The Late Neolithic samples

Two samples were collected from a Late Neolithic context at Sabi Abyad, both of which clearly consist of the waste of crop processing and [illegible] cleaning. The plant material concerned may have been used as fuel or [illegible] the [illegible]. Only three important species are represented in these samples: [illegible] emmer and naked wheat and hulled two-rowed barley. It goes without saying that one [illegible] about the [illegible] of crop plants cultivated [illegible] in only two samples. On the other hand, two samples from Neolithic Tell [illegible], only [illegible] of Sabi Abyad, yielded three [illegible] species in addition [illegible] free-threshing wheat and barley. [illegible] is dated around [illegible] according to Akkermans (1987) the Late Neolithic levels of [illegible] the later part of the 6th millennium B.C. Thus, there is a [illegible] less than 500 years between the two sites, which may explain [illegible] differences in the crop [illegible] recovered.

It will be superfluous to [illegible] that from the numerical ratio between the grains of wheat and barley in the two samples of Sabi Abyad no inferences may be drawn on the relative importance of the two cereals in the economy of

Chapter XII

LATE BRONZE AGE POTTERY OF TELL SABI ABYAD

By Inge Rossmeisl

A. INTRODUCTION

During the excavations carried out at Tell Sabi Abyad in 1986 large numbers of sherds of the Late Bronze period were found. These sherds were collected from erosion levels and from a large pit in square O13, and indicate occupation in Late Bronze times. Although some architecture was found (see chapter III), it proved to be too scarce and too damaged for further interpretation.

A stepped trench is planned to establish a proper stratigraphy of the Late Bronze period at the site.

This report will give a short presentation of the Late Bronze Age pottery. Although out of its proper context, some preliminary remarks and conclusions on this Late Bronze pottery are given below. For this preliminary analysis only diagnostic sherds were selected (for a discussion of the pottery procedures and terminology followed, see Meijer et al., in press). These 186 sherds consist of 122 rim sherds, 56 base sherds, 7 decorated body sherds and 1 handle.

B. DESCRIPTION

B.1. Shape

The majority of the rim sherds belong to bowls and jars; pots and potstands are rare. A representative selection is shown in Figs. XII.1 - 11.

The rims of the bowls (nos. 1-26, nos. 83-86 and nos. 92-96) show a variety from plain to thickened inward/outward. Nos. 23-26 are sharply carinated bowls. Most other bowls have a slight carination.

Two goblet rim sherds were found (nos. 27-28). Nr. 28 is a characteristic example of the Late Bronze (often cream and burnished) goblets on a nipple base.

Jars show but little variety in rim shape. So-called 'ribbon' rims (nos. 42-61) commonly occur.

Nos. 39-41, 80-82 and 87-89 (93?) probably represent potstands.

Pots (nos. 94-101) have rather pronounced and complicated rims; the basic shape, however, is a hammer profile in several variations. One handmade pot was found (no. 98).

Nos. 102-127 are a selection of the 56 base sherds. Disk (concave) and ring bases are common. Flat bases are rare. Four nipple bases (nos. 124-127) belong to goblets. There is a tendency to leave a lot of clay at the bottom of the vessels to create massive bases.

B.2. Temper

The vast majority of the pottery has a plant-and-fine sand temper (70%). The other tempers in use are plant-and-lime (15%), lime-and-(gold) glitters (8%), lime-and-fine sand (5%) and lime only (2%). All combinations can have a third element (fine sand, lime or glitters), but only in a limited amount. The complete absence of a calcite temper is remarkable.

B.3. Manufacture

The majority of the pottery is wheelmade. Only a few vessels are handmade.

B.4. Firing

The majority of the pottery is medium fired. A 'sandwich colour' is visible in one third of the vessels, especially in bowls. The usual 'sandwich colour' is orange in different tones or a combination of orange and grey. The nipple-based goblets are high fired.

B.5. Surface Treatment

Only the goblets have a slip and some of them are overall burnished. The usual surface treatment, however, is smoothing.

B.6. Decoration

Decoration is virtually absent. Of the diagnostic body sherds, one shows incisions with an unclear pattern, another one has an incised wavy line and a handmade vessel has an applicated rope-patterned ridge.

C. CONCLUSIONS

The Late Bronze pottery of Sabi Abyad can be related to period VIIIB at nearby Tell Hammam et-Turkman (Smit, in press). So far, pottery related to the earlier period VIIIA at the latter site has not been attested at Sabi Abyad. The four sharply carinated bowls (nos. 23-26) of Sabi Abyad are not uncommon in the Late Bronze period in Syria; although the bulk and the finest examples appear at Tell Hammam et-Turkman in the Middle Bronze Age (see Curvers, in press), the sharply carinated bowls continue into the Late Bronze Age (see e.g. Hama G and Alalakh II; Fugmann 1958; Woolley 1955). Still, most of the bowls show the tendency from more or less carinated to nearly straight bodies. At Sabi Abyad the rim sherds show but little variety in shape, a situation similar to Hammam VIIIB but different from Hammam VIIIA. Especially the jars have much more variation in rims in Hammam VIIIA, but real 'ribbon' rims are absent. Four examples of 'ribbon' rims have been found in Hammam VIIIB beside more complicated rims. At Sabi Abyad the common shape is the 'ribbon' rim; a few, rather plain, thickened outward rims complete the jar repertoire. A few nipple-based goblets are also noticed in Hammam VIIIB.

At Sabi Abyad, the bulk of the pottery shows a plant-and-fine sand temper. At nearby Tell Hammam et-Turkman, in period VIIIA the usual temper is plant-and-lime, whereas in the next period VIIIB there is a tendency to use a combination of plant, lime and fine sand. All this could suggest a preference for a plant-and-fine sand temper in the final Late Bronze II period. It could mean that Sabi Abyad has had a contemporary occupation with Hammam VIIIB and a later occupation in continuation.

CATALOGUE OF LATE BRONZE AGE POTTERY

Fig. XII.1.

1. Plant-and-fine sand temper. Cream colour. Orange 'sandwich' core. D. 270 mm.

2. Plant-and-fine sand temper. Green colour. D. 270 mm.

3. Plant-and-fine sand temper. Orange colour. D. 220 mm.

4. Plant-and-fine sand temper. Buff colour. D. 220 mm.

5. Plant-and-lime-and-fine sand temper. Cream colour. Orange 'sandwich' core.

6. Plant-and-fine sand-and-lime temper. Cream colour. D. 170 mm.

7. Plant-and-fine sand temper. Sharp striations on the surface. Cream colour. D. 270 mm.

8. Plant-and-lime temper. Green colour. D. 240 mm.

9. Plant-and-fine sand-and-lime temper. Handmade (?). Green colour. D. 230 mm.

10. Plant-and-lime temper. Cream colour. D. 210 mm.

11. Plant-and-fine sand temper. Orange colour. Orange/grey 'sandwich' core. D. 190 mm.

12. Plant-and-fine sand temper. Orange colour. Orange/grey 'sandwich' core. D. 170 mm.

Fig. XII.2.

13. Plant-and-fine sand temper. Cream colour. D. 200 mm.

14. Plant-and-fine sand temper. Orange colour. D. 340 mm.

15. Plant-and-fine sand temper. Cream colour. Cream/orange 'sandwich' core. D. 320 mm.

16. Plant-and-fine sand temper. Orange colour. D. 320 mm.

17. Plant-and-fine sand-and-lime temper. Orange colour. D. 240 mm.

18. Plant-and-fine sand temper. Cream colour.D. 355 mm.

19. Plant-and-fine sand temper. Slip. Orange colour.

20. Plant-and-fine sand-and-lime temper. Orange colour.

21. Plant-and-fine sand temper. Orange colour. Orange/grey 'sandwich' core. D. 320 mm.

Fig. XII.3.

22. Plant-and-fine sand temper. Orange colour. Orange/grey 'sandwich' core. D. 310 mm.

23. Plant-and-lime temper. Green colour. D. 160 mm.

24. Plant-and-fine sand temper. Green colour. Green/orange 'sandwich' core. D. 100 mm.

25. Plant-and-lime temper. Cream colour. Cream/orange 'sandwich' core. D. 250 mm.

26. Plant-and-fine sand temper. Green colour. D. 270 mm.

27. Plant-and-fine sand temper. Slip. Orange colour.

28. Temper not visible. Slip. Burnished. Cream colour. D. 70 mm.

29. Plant-and-fine sand-and-glitter temper. Orange colour. orange/grey 'sandwich' core. D. 285 mm.

30. Plant-and-fine sand-and-lime temper. Orange colour. D. 300 mm.

31. Plant-and-fine sand temper. Green colour. D. 120 mm.

32. Plant-and-lime temper. Green colour. D. 110 mm.

33. Plant-and-lime-and-fine sand temper. Cream colour. D. 260 mm.

34. Plant-and-fine sand temper. Cream colour.

35. Plant-and-fine sand temper. Cream colour. D. 180 mm.

Fig. XII.4.

36. Plant-and-fine sand temper. Cream colour. Cream/orange 'sandwich' core. D. 140 mm.

37. Plant-and-fine sand temper. Cream colour. D.210 mm.

38. Plant-and-lime temper. Cream colour. D. 310 mm.

39. Plant-and-fine sand temper. Cream colour. D. 185 mm.

40. Plant-and-fine sand-and-lime temper. Cream colour. D. 200 mm.

41. Plant-and-lime temper. Cream colour. D. 170 mm.

42. Plant-and-fine sand-and-lime temper. Orange colour. Orange/ grey 'sandwich' core. D. 130 mm.

43. Plant-and-fine sand-and-lime temper. Orange colour. D. 180 mm.

44. Plant-and-lime temper. Cream colour. D.170 mm.

45. Plant-and-fine sand-and-lime temper. Orange colour. D. 180 mm.

46. Plant-and-fine sand-and-lime temper. Orange colour. D. 140 mm.

47. Plant-and-lime-and-glitter temper. Cream colour. D.170 mm.

48. Plant-and-fine sand temper. Orange colour. D. 160 mm.

Fig. XII.5.

49. Plant-and-fine sand temper. Cream colour. D. 130 mm.

50. Plant-and-fine sand-and-lime temper. Cream colour. D. 150 mm.

51. Plant-and-fine sand temper. Cream colour. D. 150 mm.

52. Plant-and-lime temper. Orange colour. Orange 'sandwich' core. D. 125 mm.

53. Plant-and-fine sand temper. Orange colour. Orange/grey 'sandwich' core. D. 160 mm.

54. Plant-and-fine sand temper. Cream colour. D. 180 mm.

55. Plant-and-lime temper. Green colour. D. 200 mm.

56. Plant-and-fine sand temper. Orange colour. D. 200 mm.

57. Plant-and-fine sand-and-lime temper. Green colour. D. 200 mm.

58. Plant-and-lime temper. Green colour (warped). D. 270 mm.

59. Plant-and-fine sand temper. Cream colour. D. 130 mm.

60. Plant-and-lime temper. Orange colour. D. 140 mm.

61. Plant-and-glitter temper. Orange colour. Orange/grey' sandwich' core. D. 140 mm.

Fig. XII.6.

62. Plant-and-fine sand temper. Orange colour. D. 210 mm.

63. Plant-and-fine sand temper. Cream colour. D. 120 mm.

64. Plant-and-glitter-and-lime temper. Orange colour. D. 135 mm.

65. Plant-and-glitter temper. Orange colour. Orange/grey 'sandwich' core. D. 130 mm.

66. Plant-and-fine sand-and-lime temper. Green colour. Green/orange 'sandwich' core. D. 200 mm.

67. Plant-and-fine sand-and-lime temper. Green colour. D. 210 mm.

68. Plant-and-fine sand temper. Cream colour. Cream/orange 'sandwich' core. D. 230 mm.

69. Plant-and-fine sand temper. Orange colour. Orange/grey 'sandwich' core. D. 110 mm.

70. Plant-and-fine sand temper. Cream colour. D. 200 mm.

71. Plant-and-fine sand-and-lime temper. Orange colour. D. 400 mm.

72. Plant-and-fine sand-and-glitter temper. Orange colour. D. 290 mm.

73. Plant-and-fine sand-and-lime temper. Orange colour. D. 340 mm.

74. Plant-and-fine sand temper. Cream colour. Cream/orange 'sandwich' core. D. 170 mm.

Fig. XII.7.

75. Plant-and-fine sand temper. Orange colour. D. 230 mm.

76. Plant-and-fine sand temper. Orange colour. Orange/grey 'sandwich' core. D. 170 mm.

77. Plant-and-lime temper. Green colour (warped). D. 270 mm.

78. Plant-and-lime-and-glitter temper. Orange colour. Orange/grey 'sandwich' core. D. 285 mm.

79. Plant-and-fine sand temper. Handmade. Orange colour. D. 370 mm.

80. Plant-and-lime temper. Cream colour. D. 210 mm.

81. Plant-and-lime temper. Cream colour. Cream/brown 'sandwich' core. D. 290 mm.

82. Plant-and-lime-and-fine sand temper. Cream colour. Orange/green 'sandwich' core. D. 350 mm.

Fig. XII.8.

83. Plant-and-lime temper. Orange colour. Orange/grey 'sandwich' core. D. 250 mm.

84. Plant-and-lime temper. Orange colour. Orange/grey 'sandwich' core. D. 130 mm.

85. Plant-and-fine sand temper. Cream colour. D. 220 mm.

86. Plant-and-fine sand temper. Orange colour. Orange/grey 'sandwich' core. D. 360 mm.

87. Plant-and-fine sand-and-glitter temper. Cream colour. orange/grey 'sandwich' core. D. 275 mm.

88. Plant-and-fine sand-and-lime temper. Cream colour. Cream/orange 'sandwich' core. D. 220 mm.

89. Plant-and-fine sand-and-lime temper. Cream colour. Orange/cream/green 'sandwich' core. D. 200 mm.

90. Fine sand-and-glitter temper. High fired. Slip. Burnished. Cream colour. D. 270 mm.

91. Plant-and-fine sand temper. Orange colour. Orange/grey 'sandwich' core. D. 230 mm.

Fig. XII.9.

92. Plant-and-fine sand-and-lime temper. Buff colour. Grey/brown 'sandwich' core. D. 120 mm.

93. Plant-and-fine sand temper. Cream colour. D. 220 mm.

94. Plant-and-fine sand temper. Orange colour. Orange/grey 'sandwich' core. D. 400 mm.

95. Plant-and-fine sand temper. Orange colour. D. 360 mm.

96. Plant-and-lime-and-fine sand temper. Orange colour. D. 280 mm.

97. Plant-and-fine sand temper. Cream colour. Cream/orange 'sandwich' core. D. 250 mm.

98. Plant-and-glitter-and-fine sand temper. Orange colour.

99. Plant-and-fine sand temper. Cream colour. D. 225 mm.

Fig. XII.10.

100. Plant-and-lime-and-glitter temper. Orange colour. D. 220 mm.

101. Plant-and-fine sand-and-lime temper. Green colour. Green/buff/brown 'sandwich' core. D. 190 mm.

102. Plant-and-fine sand temper. Orange colour. Orange/grey 'sandwich' core. D. 40 mm.

103. Lime-and-glitter temper. Handmade (?). Buff colour. D. 70 mm.

104. Plant-and-lime-and-fine sand-and-glitter temper. Orange colour. D. 80 mm.

105. Plant-and-fine sand temper. Orange colour. D. 70 mm.

106. Plant-and-lime temper. Cream colour. D. 85 mm.

107. Plant-and-fine sand temper. High fired. Orange colour. Cut with pin. D. 40 mm.

108. Plant-and-fine sand temper. Buff colour. Buff/orange 'sandwich' core. D. 110 mm.

109. Plant-and-lime-and-fine sand-and-glitter temper. Orange colour. D. 80 mm.

110. Plant-and-fine sand temper. Cream colour. Cut with pin. D. 40 mm.

111. Plant-and-fine sand-and-lime temper. Orange colour. D. 40 mm.

Fig. XII.11.

112. Plant-and-fine sand temper. Orange colour. Orange/grey 'sandwich' core. Cut with pin. D. 100 mm.

113. Plant-and-fine sand-and-lime temper. Orange colour. Orange/grey 'sandwich' core. D.70 mm.

114. Plant-and-fine sand temper. Orange colour. D. 110 mm.

115. Plant-and-fine sand-and-lime temper. Orange colour. D. 50 mm.

116. Plant-and-fine sand-and-lime temper. Buff colour. Cut with pin. D. 100 mm.

117. Plant-and-fine sand temper. Cream colour. Cream/orange 'sandwich'core. D. 45 mm.

118. Plant-and-fine sand temper. Orange colour. Orange/grey 'sandwich' core. D. 90 mm.

119. Plant-and-fine sand-and-lime temper. Buff colour. Buff/black 'sandwich' core. D. 53 mm.

120. Plant-and-fine sand temper. Sharp striations on surface. Cream colour. D. 85 mm.

121. Plant-and-fine sand temper. Buff colour. Orange/grey 'sandwich' core. D. 75 mm.

122. Plant-and-fine sand temper. Grey colour. D. 80 mm.

123. Plant-and-fine sand temper. Sharp striations on surface. Cream colour. Cream/orange 'sandwich' core. D. 45 mm.

124. Fine sand-and-lime temper. High fired. Slip. Cream colour. cream/orange 'sandwich' core. D. 13 mm.

125. Plant-and-fine sand temper. High fired. Slip. Overall burnished. Buff colour.

126. Plant-and-lime temper. High fired. Green colour.

127. Lime-and-fine sand temper. High fired. Sharp striations on surface. Cream colour.

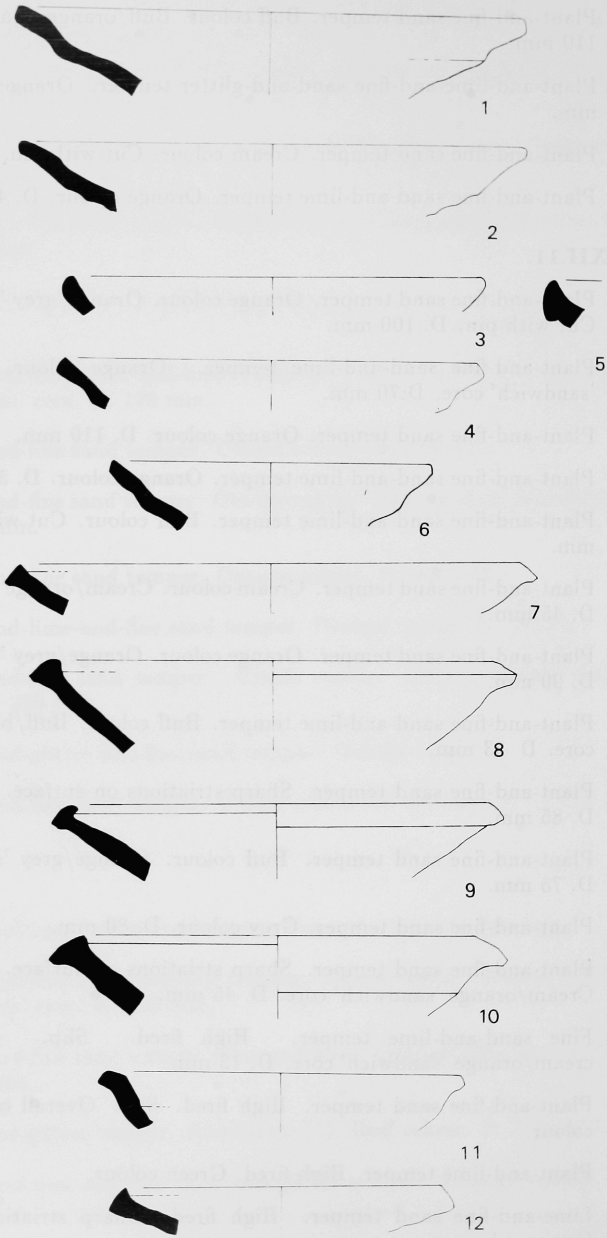


Fig. XII.1. Late Bronze Age pottery. Bowls (scale 1:3).

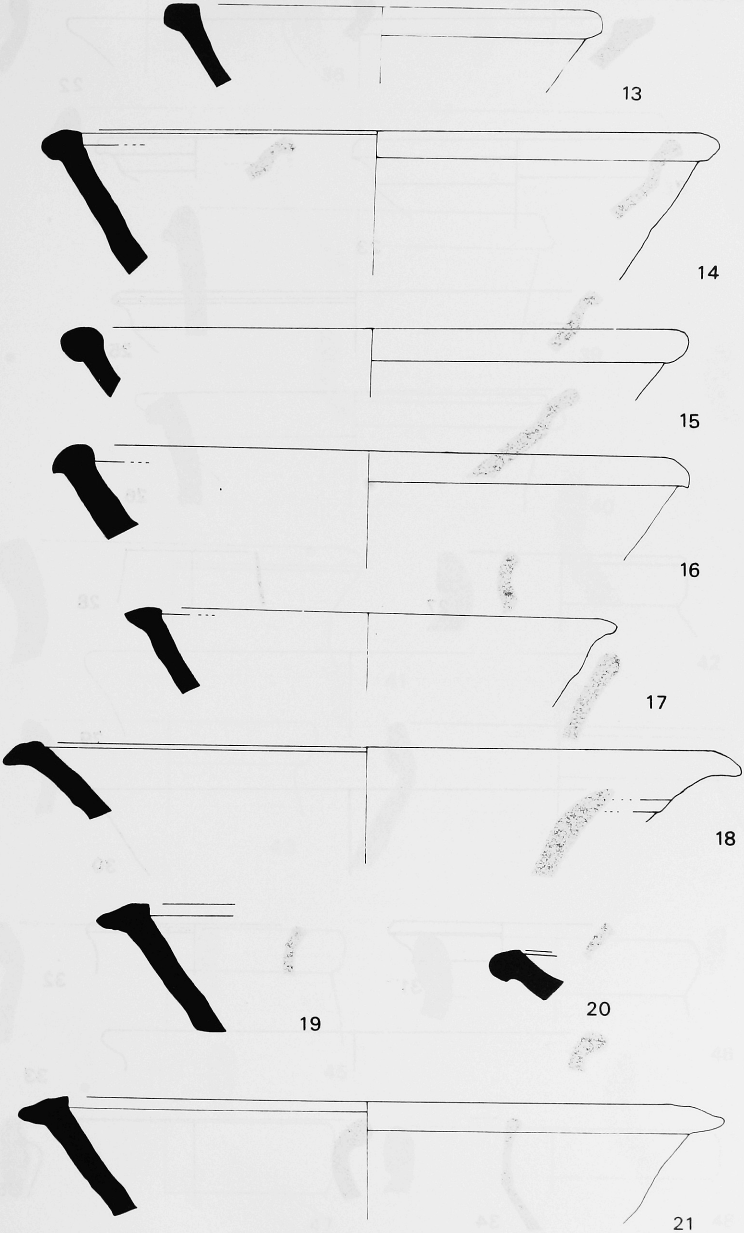


Fig. XII.2. Late Bronze Age pottery. Bowls (scale 1:3).

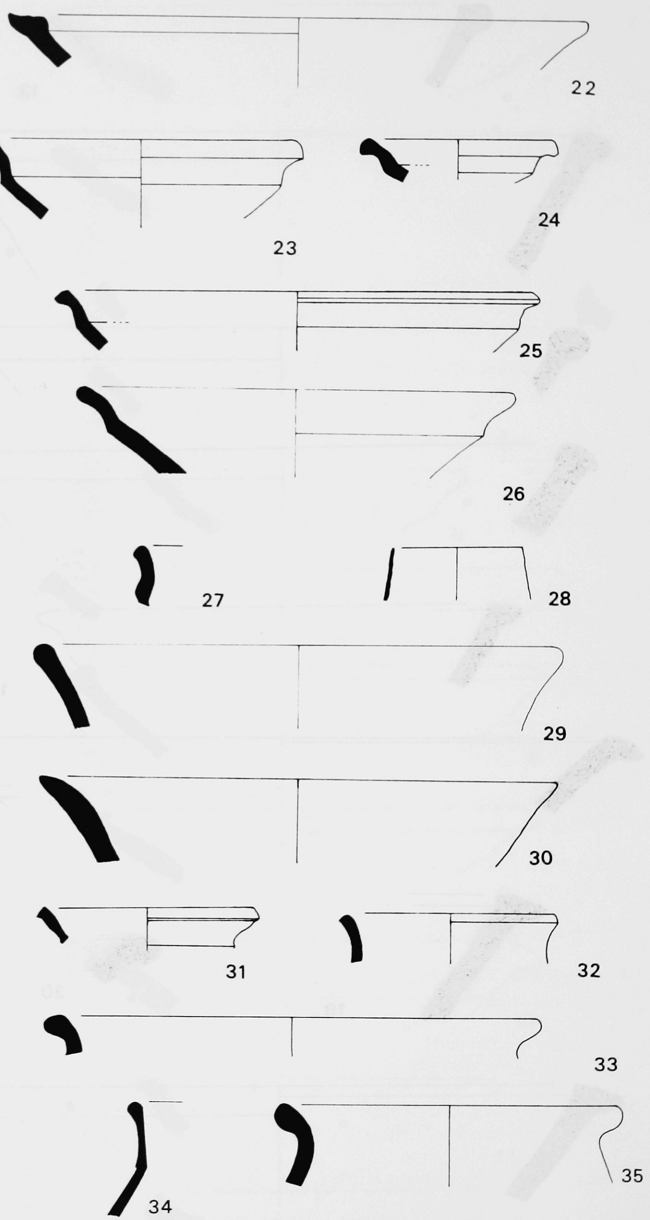


Fig. XII.3. Late Bronze Age pottery. Bowls: nos. 22-26. Goblets: nos. 27-28. Jars: nos. 29-35 (scale 1:3).

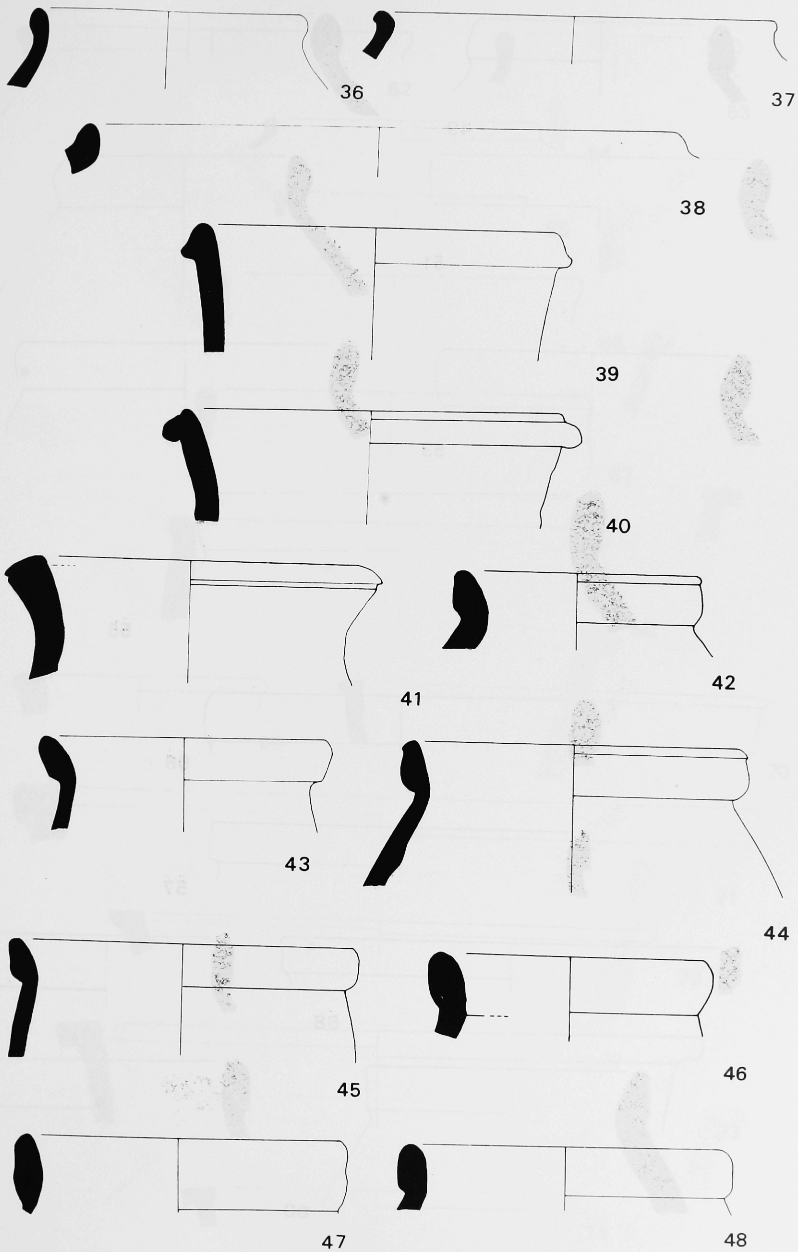


Fig. XII.4. Late Bronze Age pottery. Jars: nos. 36-38, 4148. Potstands (?): nos. 39-40 (scale 1:3).

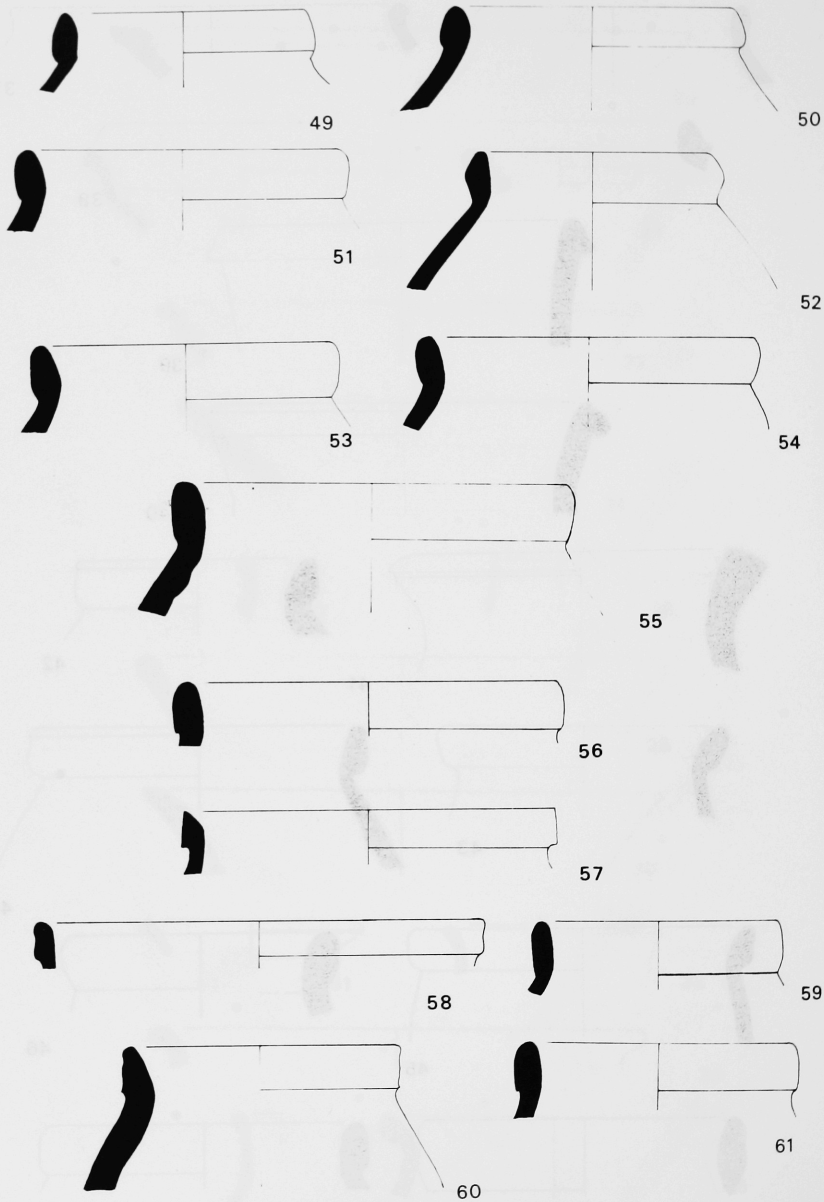


Fig. XII.5. Late Bronze Age pottery. Jars (scale 1:3).

Fig. XII.6. Late Bronze Age pottery. Jars and pots (scale 1:3).

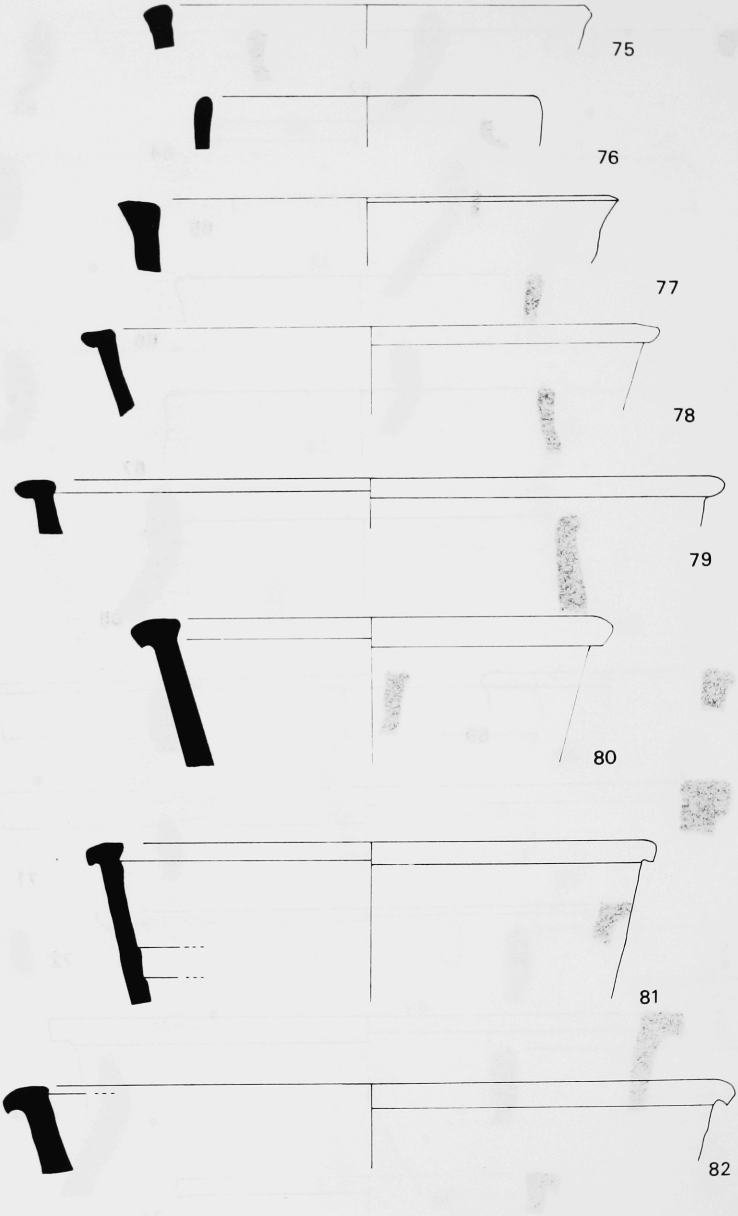


Fig. XII.7. Late Bronze Age pottery. Pots (scale 1:3).

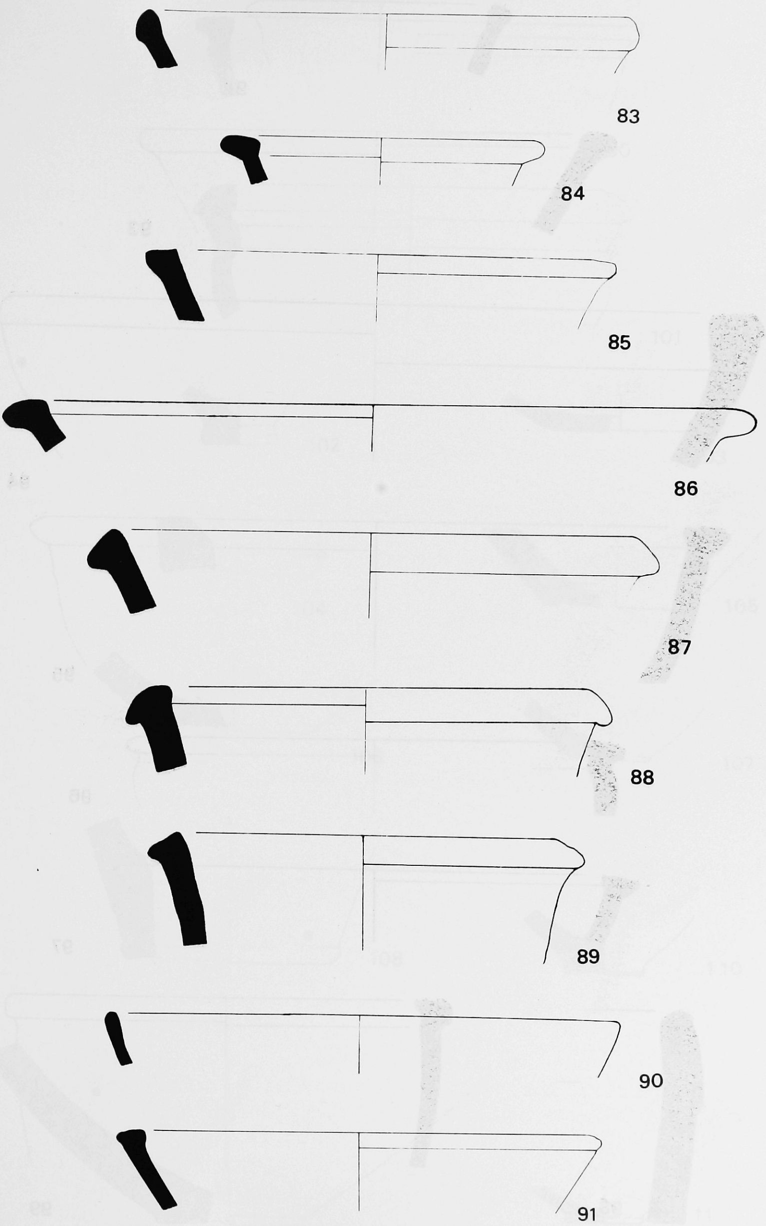


Fig. XII.8. Late Bronze Age pottery. Bowls: nos. 83-86, 90-91. Potstands: nos. 87-89.

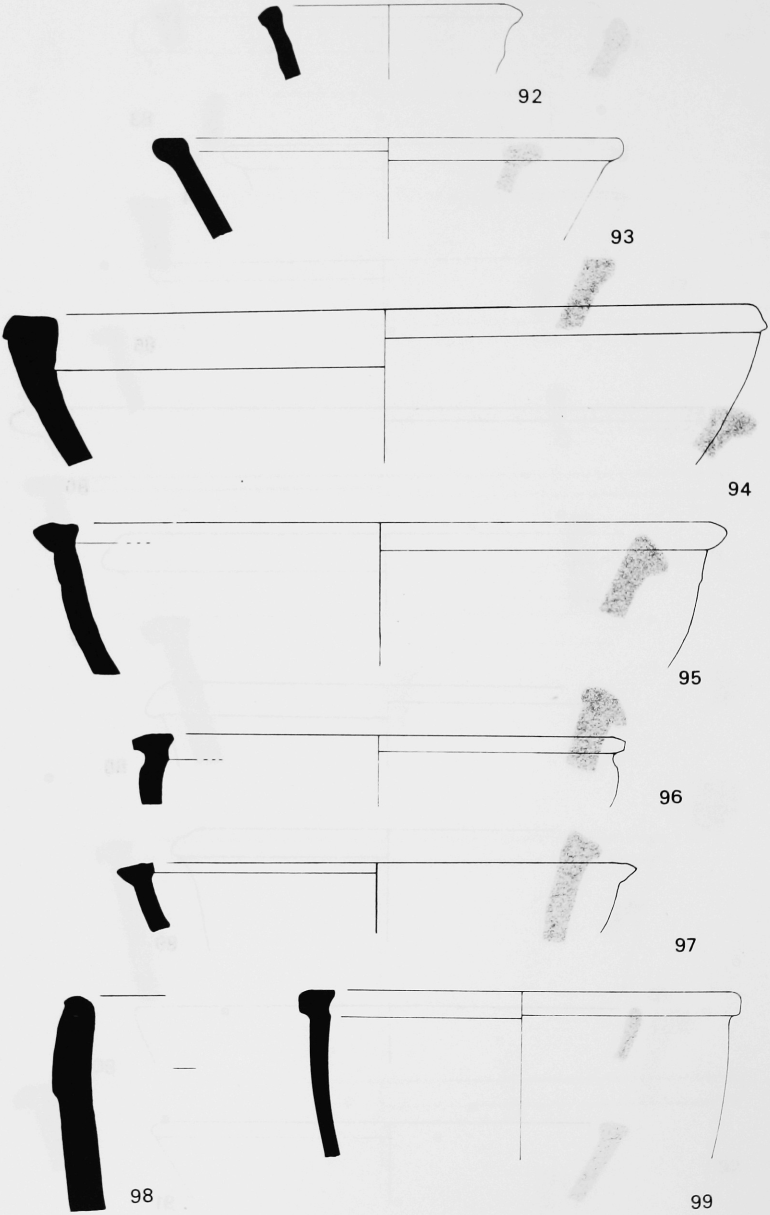


Fig. XII.9. Late Bronze Age pottery. Bowls: nos. 92-96. Pots: nos. 97-99 (scale 1:3).

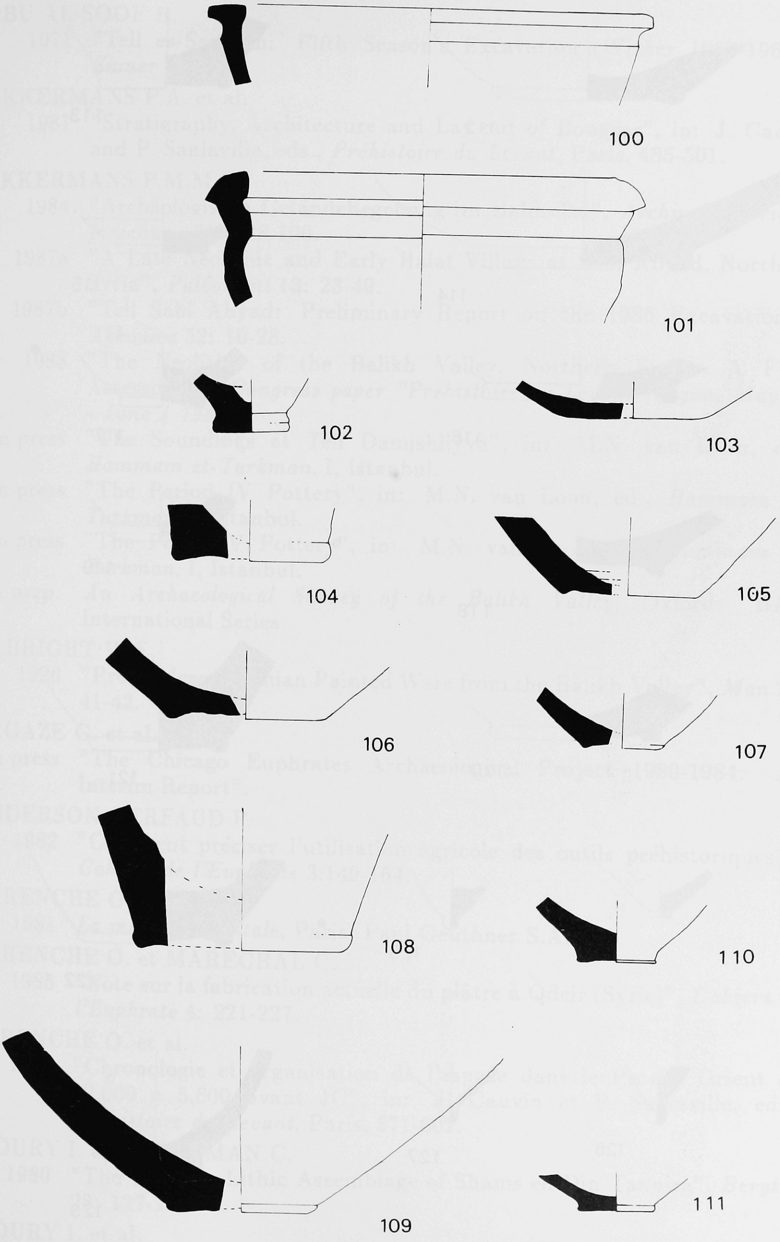


Fig. XII.10. Late Bronze Age pottery. Pots: nos. 100-101. Bases: nos. 102-111 (scale 1:3).

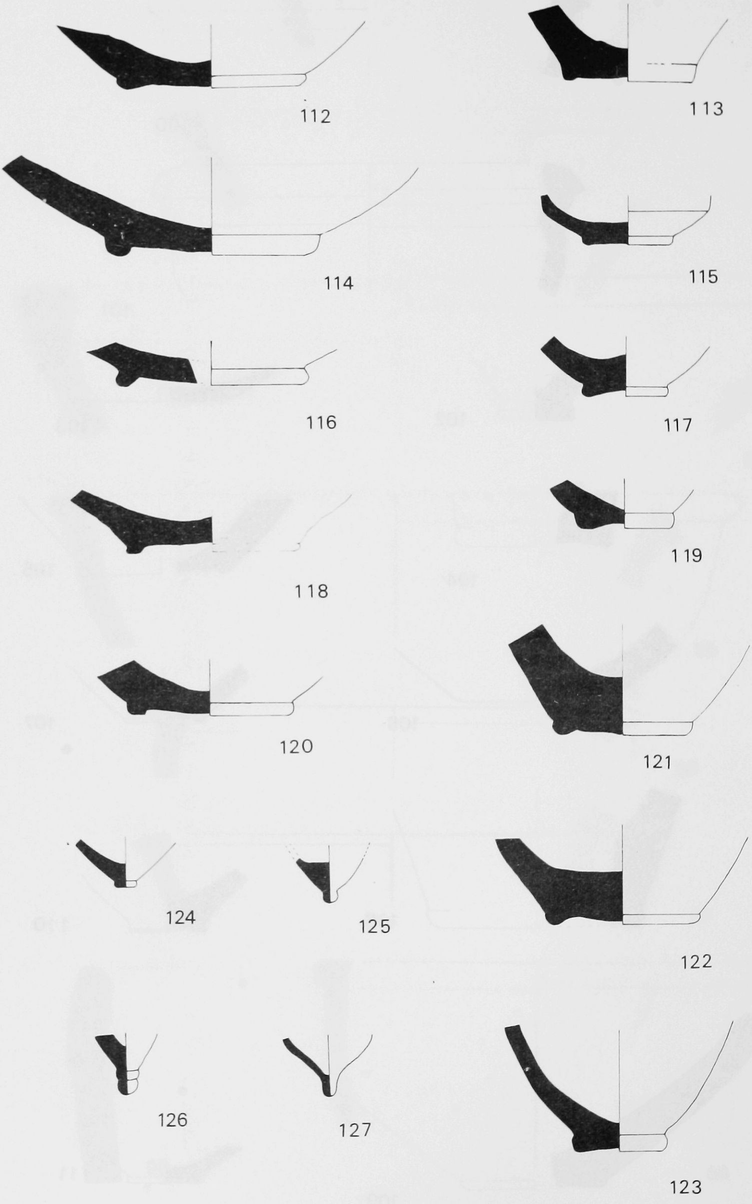


Fig. XII.11. Late Bronze Age pottery. Bases (scale 1:3).

BIBLIOGRAPHY

ABU AL-SOOF B.
1971 "Tell es-Sawwan: Fifth Season's Excavation (Winter 1967-1968)", *Sumer* 27: 3-7.

AKKERMANS P.A. et al.
1981 "Stratigraphy, Architecture and Lay-out of Bouqras", in: J. Cauvin and P. Sanlaville, eds., *Préhistoire du Levant*, Paris, 485-501.

AKKERMANS P.M.M.G.
1984 "Archäologische Geländebegehung im Balih-Tal", *Archiv für Orientforschung* 31: 188-190.
1987a "A Late Neolithic and Early Halaf Village at Sabi Abyad, Northern Syria", *Paléorient* 13: 23-40.
1987b "Tell Sabi Abyad: Preliminary Report on the 1986 Excavations", *Akkadica* 52: 10-28.
1988 "The Neolithic of the Balikh Valley, Northern Syria: A First Assessment", *Congress paper "Préhistoire du Levant", Lyon, May 31 - June 4 1988.*
in press "The Soundings at Tell Damishliyya", in: M.N. van Loon, ed., *Hammam et-Turkman*, I, Istanbul.
in press "The Period IV Pottery", in: M.N. van Loon, ed., *Hammam et-Turkman*, I, Istanbul.
in press "The Period V Pottery", in: M.N. van Loon, ed., *Hammam et-Turkman*, I, Istanbul.
in prep. *An Archaeological Survey of the Balikh Valley*, Oxford: BAR International Series.

ALBRIGHT W.F.
1926 "Proto-Mesopotamian Painted Ware from the Balikh Valley", *Man* 26: 41-42.

ALGAZE G. et al.
in press "The Chicago Euphrates Archaeological Project 1980-1984: An Interim Report".

ANDERSON-GERFAUD P.
1982 "Comment préciser l'utilisation agricole des outils préhistoriques?", *Cahiers de l'Euphrate* 3:149-164.

AURENCHE O.
1981 *La maison orientale*, Paris: Paul Geuthner S.A.

AURENCHE O. et MARECHAL C.
1985 "Note sur la fabrication actuelle du plâtre à Qdeir (Syrie)", *Cahiers de l'Euphrate* 4: 221-227.

AURENCHE O. et al.
1981 "Chronologie et organisation de l'espace dans le Proche Orient de 12,000 a 5,600 avant JC", in: J. Cauvin et P. Sanlaville, eds., *Préhistoire du Levant*, Paris, 571-602.

AZOURY I. and BERGMAN C.
1980 "The Halafian Lithic Assemblage of Shams ed-Din Tannira", *Berytus* 28: 127-143.

AZOURY I. et al.
1980 "A Stone Age Village on the Euphrates, I-V, Reports from the Halafian Settlement at Shams ed-Din Tannira: AUB Rescue Excavations 1974", *Berytus* 28: 87-143.

BADER N.O. et al.
1981 "Soviet Expedition's Surveys in the Sinjar Valley", *Sumer* 37: 55-95.

BAHADORI M.N.
1978 "Passive Cooling Systems in Iranian Architecture", *Scientific American* 238: 144-154.

BARTL K.
in press "Zur Datierung der 'altmonochromen' Ware von Tell Halaf", in: Peter M.M.G. Akkermans and Hans H. Curvers, eds., *To the Euphrates and Beyond* - Archaeological Studies in Honour of Maurits N. van Loon, Rotterdam: A.A. Balkema.

BASS W.M.
1984 *Human Osteology: A Laboratory and Field Manual of the Human Skeleton*, Missouri Archaeology Society Special Publication no. 2.

BEAZLEY E. and HARVERSON M.
1982 *Living with the Desert.* Working Buildings of the Iranian Plateau. Warminster: Aris and Philips Ltd.

BESANÇON J. et SANLAVILLE P.
1981 "Aperçu géomorphologique sur la vallée de l'Euphrate Syrien", *Paléorient* 7/2: 5-18.

BESANÇON J. et al.
1980 "Géomorphologie et préhistoire de la vallée moyenne de l'Euphrate. Essai de chronologie du Pleistocne et du Paléolithique de Syrie", *Comptes Rendues de l'Academie des Sciences*, T.290, 21st Jan., D 167-170.

BINTLIFF J.L.
1982 "Palaeoclimatic Modelling of Environmental Changes in the East Mediterranean Region since the Last Glaciation", in: John L. Bintliff and Willem van Zeist, eds., *Palaeoclimates, Palaeoenvironments and Human Communities in the Eastern Mediterranean Region in Later Prehistory*, BAR International Series 133, 485-527.

BOERMA J.A.K.
in press "Soils and Environment of Tell Hammam et-Turkman", in: M.N. van Loon, ed., *Hammam et-Turkman*, I, Istanbul.
in press "Obsidian Analyses", in: M.N. van Loon, ed., *Hammam et-Turkman* I, Istanbul (Appendix 3).

BOESSNECK J.H. et al.
1964 "Osteologische Unterscheidungsmerkmale zwischen Schaf (*Ovis aries linné*) und Ziege (*Capra hircus* linné)", *Kühn Archiv* 78: 1-129.

BOTTEMA S.
1983 "The Composition of Modern Charred Seed Assemblages", in: W. van Zeist, ed., *Plants and Ancient Man*, Rotterdam, 207-212.

BOTTEMA S. and VAN ZEIST W.
1981 "Palynological Evidence for the Climatic History of the Near East, 50.000-6.000 BP", in: J. Cauvin and P. Sanlaville, eds., *Préhistoire du Levant*, Paris, 111-132.

BRAIDWOOD L.
1958 "The Stone Artifacts", in: C. McEwan et al., *Soundings at Tell Fakhariyah*, OIP LXXIX, Chicago, 53-55.
1961 "The General Appearance of Obsidian in Southwestern Asia and the Microlithic Side-blow Blade-flake in Obsidian", *V. Intnl. Kongress für Vor- und Frühgeschichte*, Hamburg, 142-147.

BRAIDWOOD L. and BRAIDWOOD R., eds.
1982 *Prehistoric Village Archaeology in South-Eastern Turkey*, Oxford: BAR International Series 138.

BRAIDWOOD L. et al.
1983 *Prehistoric Archeology along the Zagros Flanks*, Chicago: The University of Chicago, OIP 105.

BRAIDWOOD R.J. and BRAIDWOOD L.S.
1960 *Excavations in the Plain of Antioch* I, OIP LXI, Chicago: University of Chicago Press.

BRAIDWOOD R.J. and HOWE B.
1960 *Prehistoric Investigations in Iraqi Kurdistan*, SAOC 31, Chicago: The University of Chicago Press.

BRAIDWOOD R.J. et al.
1944 "New Chalcolithic Material of Samarran Type and Its Implications", *Journal of Near Eastern Studies* 3: 47-72.
1952 "Mattarah, a Southern Variant of the Hassunan Assemblage, Excavated in 1948", *Journal of Near Eastern Studies* 11: 2-75.

BROTHWELL D.R.
1981 *Digging Up Bones*, Oxford: Oxford University Press.

CALLEY S.
1983 "Les nucléus en obsidienne du Néolithique de Cafer Höyük (Turquie): étude preliminaire sur les techniques de taille", *Cahiers de l'Euphrate* 4: 87-108.

CAUVIN J.
1968 "Les outillages néolithiques de Byblos et du littoral Libanais", *Fouilles de Byblos* IV, Paris.
1970 "Mission 1969 en Djezireh (Syrie)", *Bulletin de la Société Préhistorique Française* 67: 286-287.
1972 "Sondage à Tell Assouad (Djézireh, Syrie)", *Annales Archéologiques Arabes Syriennes* 22: 85-88.
1974 "Les debuts de la céramique sur le Moyen-Euphrate: nouveaux documents", *Paléorient* 2: 199-205.
1978 *Les premiers villages de Syrie-Palestine du IXème au VIIème millénaire avant J.C.*, Lyon: Maison de l'Orient.
1985 "Le Néolithique de Cafer Höyük (Turquie). Bilan provisoire après quatre campagnes (1979-1983)", *Cahiers de l'Euphrate* 4: 123-133.

CAUVIN M.C.
1972 "Note préliminaire sur l'outillage lithique de Tell Assouad (Djézireh)", *Annales Archéologiques Arabes Syriennes* 22: 90-94, 102-103.
1973 "Problèmes d'emmanchement des faucilles du Proche Orient: les documents de Tell Assouad (Djézireh, Syrie)", *Paléorient* 1: 103-108.
1983 "Les faucilles préhistoriques du Proche Orient, données morphologiques et fonctionelles", *Paléorient* 9/1: 63-80.

CAUVIN M.C. et BALKAN N.
1983 "Cafer Höyük: analyse de l'outillage lithique (campagnes 1982-83): problèmes typologiques et chronologiques", *Cahiers de l'Euphrate* 4: 53-86.

CAUVIN M.C. et al.
1986 "Origine de l'obsidienne de Cafer Höyük (Turquie): premiers resultats", *Paléorient* 12/2: 89-97.

CLARKE D.L.
1978 *Analytical Archaeology*, London.

CLUTTON-BROCK J. and BURLEIGH R.
1978 "The Animal Remains from Abu Salabikh: Preliminary Report", *Iraq* 40: 89-100.

COLBECK J.
1983 *Pottery: Techniques of Decoration*. London: B.T. Batsford Ltd.

COLLON D.
1982 *The Alalakh Cylinder Seals*. Oxford: BAR International Series 132.

COPELAND L.
1979 "Observations on the Prehistory of the Balikh Valley, Syria, during the 7th to 4th Millennia B.C.", *Paléorient* 5: 251-275.
1981 "The Flint Industries of the Nahr Qoueiq Valley", in: J. Matthers, ed., *The River Qoueiq, Northern Syria, and its Catchment*, Oxford: BAR International Series 98. 81-129.
1982 "Prehistoric Tells in the Lower Balikh Valley, Syria: Report on the Survey of 1978", *Annales Archéologiques Arabes Syriennes* 32: 251-271.
in prep. "The Lithic Material of Tell Arjoune (Syria): 1978-1982 Seasons", in: P. Parr et al.. *Excavations at Tell Nebi Mend.*

COPELAND L. and HOURS F.
1987 "The Halafians, Their Predecessors and Their Contemporaries in Northern Syria and the Levant: Relative and Absolute Chronologies", in: Olivier Aurenche et al., eds., *Chronologies in the Near East*, Oxford: BAR International Series 379, 401-425.

COPELAND P.W.
1955 "Beehive Villages of North Syria", *Antiquity* 29: 21-24.

CURVERS H.H.
in press "The Period VII Pottery", in: M.N. van Loon, ed., *Hammam et-Turkman* I, Istanbul.

DAVIDSON T.E.
1977 *Regional Variation within the Halaf Ceramic Tradition*, Edinburgh: University of Edinburgh.

DAVIDSON T.E. and WATKINS T.
1981 "Two Seasons of Excavation at Tell Aqab in the Jezirah, n.e. Syria", *Iraq* 43: 1-18.

DE CONTENSON H.
1968 "Rapport préliminaire sur les fouilles à Tell Khazzami en 1967", *Annales Archéologiques Arabes Syriennes* 18: 55-62.
1983 "Le campagne de 1965 à Bouqras", *Cahiers de l'Euphrate* 4: 335-372.

DE CONTENSON H. and VAN LIERE W.J.
1966 "Premier sondage à Bouqras en 1965, rapport préliminaire", *Annales Archéologiques Arabes Syriennes* 16: 181-192.

DUCOS P.
1978 *Tell Mureybet, étude archéozoologique et problèmes d'écologie humaine*, Paris: Editions du CNRS.

DU MESNIL DU BUISSON, Le Comte
1948 *Baghouz, l'ancienne Corsote*, Leiden: E.J. Brill.

DU PLAT TAYLOR J. et al.
1950 "The Excavations at Sakçe Gözü", *Iraq* 12: 53-138.

EL-WAILLY F. and ABU ES-SOOF B.
1965 "The Excavation at Tell es-Sawwan: First Preliminary Report", *Sumer* 21: 17-32.

FLANNERY K.V.
1972 "The Origins of the Village as a Settlement Type in Mesoamerica and the Near East: A Comparative Study", in: Peter J. Ucko et al., eds., *Man, Settlement and Urbanism*, London: Duckworth, 23-53.
1983 "Early Pig Domestication in the Fertile Crescent: A Retrospective Look", in: T. Cuyler Young Jr. et al., eds., *The Hilly Flanks and Beyond*, Chicago: SAOC 36, 163-188.

FORNASERI M. et al.
1975-77 "Analysis of Obsidians from the Late Chalcolithic Levels of Arslantepe (Malatya)", *Paléorient* 3: 231-246.

FRANKEN H.J.
1974 *In Search of the Jericho Potters*. Amsterdam: North-Holland Publishing Company.
1983 "Scope of the Institute's Research Work. A short Introduction". *Newsletter of the Department of Pottery Technology Leiden* 1: 1-4.

FUGMANN E.
1958 *Hama* II, Copenhagen.

FUKAI S. and MATSUTANI T.
1977 "Excavations at Telul eth-Thalathat, 1976", *Sumer* 33: 48-53.

GARSTANG J.
1908 "Excavations at Sakje-Geuzi in North Syria: Preliminary Report for 1908", *Annals of Archaeology and Anthropology* 1: 97-117.

GARSTANG J. et al.
1937 "Third Report on the Excavations at Sakje-Geuzi, 1908-1911", *Annals of Archaeology and Anthropology* 24: 119-140.

GENTRY A.P.
1976 *Roman Military Stone-Built Granaries in Britain*, Oxford: BAR British Series 32.

GEYER B. et MONCHAMBERT J.-Y.
1987 "Prospection de la Moyenne Vallée de l'Euphrate: Rapport Préliminaire (1982-1985)", *Mari* 5: 293-344.

GUEST E.
1966 *Flora of Iraq*, Baghdad: Ministry of Agriculture.

GUSTAVSON-GAUBE C.
1981 "Shams ed-Din Tannira: the Halafian Pottery of Area A", *Berytus* 29: 9-182.

HAKKER D.
1986 "The Determination of Sex and Species in Gazelles with the Use of Stepwise Discriminant Analysis", in: L.H. van Wijngaarden-Bakker, ed., Database Management and Zooarchaeology, *PACT* 14: 173-184.

HAMER F.
1975 *The Potter's Dictionary of Materials and Techniques*, London, New York.

HELBAEK H.
1959 "Notes on the Evolution and History of Linum", *KUML* 1959: 103-129.
1969 "Plant Collecting, Dry-Farming, and Irrigation Agriculture in Prehistoric Deh Luran", in: Frank Hole et al., *Prehistory and Human Ecology of the Deh Luran Plain*, Ann Arbor: The University of Michigan, Museum of Anthropology Memoirs no. 1, 383-426.

HELMER D.
1985 "Étude de la faune de Tell Assouad (Djézireh, Syrie), sondage Cauvin", *Cahiers de l'Euphrate* 4: 275-286.

HIJARA I.H.
1980 *The Halaf Period in Northern Mesopotamia*, Ph.D. dissertation, University of London.

HIJARA I.H. et al.
1980 "Arpachiyah 1976", *Iraq* 42: 131-154.

HILLMAN G.C.
1984 "Traditional Husbandry and Processing of Archaic Cereals in Recent Times: The Operations, Products and Equipment which might feature in Sumerian Texts. Part I: The Glume Wheats", *Bulletin on Sumerian Agriculture* 1: 114-152.

HOLE F.
1977 *Studies in the Archeological History of the Deh Luran Plain*, Ann Arbor: University of Michigan, Museum of Anthropology Memoirs no. 9.
1983 "The Jarmo Chipped Stone", in: L. Braidwood et al., eds., *Prehistoric Archaeology along the Zagros Flanks*. OIP 105, Chicago, 233-284.

HOLE F. et al.
1969 *Prehistory and Human Ecology of the Deh Luran Plain*, Ann Arbor.

HOMÈS-FREDERICQ D. et al.
1982 *Les sceaux-cylindres de Syrie*, Bruxelles: Musées royaux d'art et d'histoire.

HOURS F.
1979 "La fin de l'Acheuléen en Syrie du Nord, note préliminaire", *Paléorient* 5: 9-16.

HOURS F. et COPELAND L.
1983 "Les rapports entre l'Anatolie et la Syrie du Nord à l'époque des premières communautés villageoises de bergers et de paysans (7,600-5,000 B.C.)", in: T.C. Young et al., eds., *The Hilly Flanks and Beyond*, SAOC 36, Chicago, 75-90.

HOURS F. et al.
in press *Le Proche Orient Ancien de 10,000 a 3,700 avant JC*, Lyon: Maison de l'Orient. Editions du CNRS.

INIZAN M.L. et al.
1975-76 "Avantage d'un traitment thermique pour la taille des roches silicieuses", *Quaternaria* 20: 1-18.

IPPOLITONI F.
1970-71 "The Pottery from Tell es-Sawwan, First Season", *Mesopotamia* 5-6: 105-179.

JACOBS L.
1983a "A Summary of the Research Methods", *Newsletter of the Department of pottery Technology Leiden* 1: 34-35.
1983b "Notes about the Relation between Filler and Clay, and Filler and Shrinkage, respectively", *Newsletter of the Department of Pottery Technology Leiden* 1: 6-12.

KAPEL H.
1967 *Atlas of Stone Age Cultures of Qatar*, Copenhagen.

KING A.
1978 "A Comparative Survey of Bone Assemblages from Roman Sites in Britain", *Bulletin of the Institute of Archaeology* 15: 207-232.

KOHLMEYER K.
1984 "Euphrat-Survey - Die mit Mitteln der Gerda Henkel Stiftung durchgeführte archäologische Geländebegehung im syrischen Euphrattal", *Mitteilungen der Deutschen Orient-Gesellschaft* 116: 95-118.

LEBLANC S.A. and WATSON P.J.
1973 "A Comparative Statistical Analysis of Painted Pottery from Seven Halafian Sites", *Paléorient* 1: 117-133.

LEENDERS R.
in press "Stone Objects", in: Maurits N. van Loon, ed., *Hammam et-Turkman*, I, Istanbul.

LE MIÈRE M.
1979 "La céramique préhistorique de Tell Assouad, Djézireh, Syrie", *Cahiers de l'Euphrate* 2: 4-76.
1983 "Pottery and White Ware", in: P.A. Akkermans et al., Bouqras Revisited: Preliminary Report on a Project in Eastern Syria, *Proceedings of the Prehistoric Society* 49: 351-354.
1986 *Les premières céramiques du Moyen-Euphrate*, Lyon: Université Lumière-Lyon 2.

LE MIÈRE M. and PICON M.
1987 "Productions locales et circulation des céramiques au VIème millénaire, au Proche-Orient", *Paléorient* 13/2: 137-151.

LLOYD S. and SAFAR F.
1945 "Tell Hassuna: Excavations by the Iraq Government Directorate General of Antiquities in 1943 and 1944", *Journal of Near Eastern Studies* 4: 255-289.

LÜTH F. und NOWATZYK G.
in prep. "Zreyjiye, ein halafzeitlicher Fundplatz am Assad-Stausee / Nordsyrien".

MALENFANT M.
1976 "L'industrie Acheuléenne de Chniné (Djézireh, République Arabe Syrienne)", *Annales Archéologiques Arabes Syriennes* 26: 145-159.

MALLOWAN M.E.L.
1933 "The Prehistoric Sondage of Nineveh, 1931-1932", *Annals of Archaeology and Anthropology* 20: 127-186.
1936 "The Excavations at Tell Chagar Bazar and an Archaeological Survey of the Habur Region 1934-5", *Iraq* 3: 1-87.
1946 "Excavations in the Balih Valley (1938)", *Iraq* 8: 111-156.

MALLOWAN M.E.L. and ROSE J.C.
1935 "Excavations at Tell Arpachiyah, 1933", *Iraq* 2: 1-178.

MARFOE L. et al.
1981 "Arjoune 1978: Preliminary Investigations of a Prehistoric Site in the Homs Basin", *Levant* 13: 1-27.

MEIJER D.J.W. et al.
in press "Excavation and Pottery Procedures", in: M.N. van Loon, ed., *Hammam et-Turkman*, I, Istanbul.

MELLAART J.
1970 "The Earliest Settlements in Western Asia from the Ninth to the End of the Fifth Millennium B.C.", *Cambridge Ancient History* I, 248-303.
1975 *The Neolithic of the Near East*, London: Thames and Hudson.

1981 "The Prehistoric Pottery from the Neolithic to the Beginning of E.B. IV", in: John Matthers, ed., *The River Qoueiq, Northern Syria, and its Catchment*, Oxford: BAR International Series 98, 131-319.

MERPERT N. and MUNCHAEV R.

1969 "The Investigation of the Soviet Archaeological Expedition in Iraq in the Spring 1969", *Sumer* 25: 125-131.

1971 "Excavations at Yarim Tepe 1970, Second Preliminary Report", *Sumer* 27: 9-22.

1971 "Sites des agriculteurs anciens dans la Mésopotamie septentrionale", *Sovetskaa Arkheologia* 3: 141-169 (in Russian, with summary in French).

1973 "Early Agricultural Settlements in the Sinjar Plain, Northern Iraq", *Iraq* 35: 93-113.

1984 "Soviet Expedition's Research at Yarim Tepe III Settlement in Northwestern Iraq, 1978-1979", *Sumer* 43: 54-68.

MERPERT N. et al.

1976 "The Investigations of Soviet Expedition in Iraq, 1973", *Sumer* 32: 25-61.

1977 "The Investigations of Soviet Expedition in Iraq, 1974", *Sumer* 33: 65-104.

MOLIST M.

1986 *Les structures de combustion au Proche-Orient néolithique (10.000-3700 B.C.)*, Thèse de doctorat, Lyon: Université Lyon 2.

MOORE A.M.T.

1983 "The First Farmers in the Levant", in: T. Cuyler Young Jr. et al., eds., *The Hilly Flanks and Beyond*, Chicago, SAOC 36, 91-111.

MORRIS P.

1979 *Agricultural Buildings in Roman Britain*, Oxford: BAR British Series 70.

MORTENSEN P.

1970 *Tell Shimshara, the Hassuna Period*, Copenhagen.

1983 "Patterns of Interaction between Seasonal Settlements and Early Villages", in: T.C. Young et al., eds., *The Hilly Flanks and Beyond*, SAOC 36, Chicago, 207-229.

MULDERS M.

1969 *The Arid Soils of the Balikh Basin*, Utrecht: University of Utrecht.

MUNCHAEV R. and MERPERT N.

1971 "The Archaeological Research in the Sinjar Valley (1971)", *Sumer* 27: 23-32.

1973 "Excavations at Yarim Tepe 1972: Fourth Preliminary Report", *Sumer* 29: 3-16.

MUNCHAEV R. et al.

1984 "Archeological Studies in the Sinjar Valley, 1980", *Sumer* 43: 32-53.

NEWCOMER M. et al.

1986 "Investigating Microwear Polishes with Blind Tests", *Journal of Archaeological Science* 13: 203-217.

OATES D. and OATES J.

1976 *The Rise of Civilization*, Oxford: Elsevier-Phaidon.

PELEGRIN J.
1984 "Systèmes expérimentaux d'immobilisation du nucléus pour le débitage par pression", in: J. Tixier, ed., *Préhistoire de la Pierre Taillée, 2: économie du débitage laminaire: technologie et experimentation*, Valbonne, 105-116.

PERKINS A.L.
1949 *The Comparative Archaeology of Early Mesopotamia*, SOAC 25, Chicago.

PETERS E.
1972 "Lehmziegelhäuser in der Altinova", *Keban Project 1970 Activities*, Ankara, 173-182.
1979 "Vorratshaltung in der anonymen Architektur der Altinova", *Keban Project 1973 Activities*, Ankara, 135-142.

PFÄLZNER P.
1984 "Eine archäologische Geländebegehung im Gebiet des Wadi 'Agig/Ostsyrien", *Archiv für Orientforschung* 31: 178-185.

PICON M. and LE MIÈRE M.
1987 "Géochimie des céramiques", in: J.-C. Miskovsky, ed., *Géologie de la préhistoire*, Paris: Géopré, 883-901.

PORADA E.
1965 "The Relative Chronology of Mesopotamia. Part I: Seals and Trade (6000-1600 B.C.)", in: Robert W. Ehrich, ed., *Chronologies in Old World Archaeology*, Chicago and London: The University of Chicago Press, 133-200.

PRUMMEL W. and FRISCH H.-J.
1986 "A Guide to the Distinction of Species, Sex and Body Side in Bones of Sheep and Goat", *Journal of Archaeological Science* 13: 567-577.

REDMAN C.L.
1978 *The Rise of Civilization*, San Francisco: W.H. Freeman and Company.

REYNOLDS P.J.
1974 "Experimental Iron Age Storage Pits: An Interim Report", *Proceedings of the Prehistoric Society* 40: 118-131.

RICE P.M.
1987 *Pottery Analysis: A Source Book*, Chicago and London: The University of Chicago Press.

RIHAOUI A.-K.
1969 "Aperçu sur la civilisation de Al-Jezira et de la vallée de l'Euphrate à l'époque Arabe-Musulmane", *Annales Archéologiques Arabes Syriennes* 19: 77-100.

ROODENBERG J.
1979-80 "Sondage des niveaux néolithiques de Tell es Sinn, Syrie", *Anatolica* 7: 21-33.

ROSEN A.M.
1986 *Cities of clay*. The Geoarcheology of Tells. Chicago and London: The University of Chicago Press.

RYE O.S.
1976 "Keeping your Temper under Control: Materials and the Manufacture of Papuan Pottery", *Archaeology and Physical Anthropology in Oceania* 11: 106-137.
1981 *Pottery Technology*. Manuals on Archeology 4. Washington.

SACHAU E.
1883 *Reise in Syrien und Mesopotamien*, Leipzig.

SANLAVILLE P., ed.
1985 *Holocene Settlement in North Syria*. Résultats de deux prospections archéologiques effectuées dans la région du Nahr Sajour et sur le haut Euphrate syrien. Oxford: BAR International Series 238.

SEEDEN H.
1982 "Ethnoarchaeological Reconstruction of Halafian Occupational Units at Shams ed-Din Tannira", *Berytus* 30: 55-95.

SHEPARD A.O.
1963 *Ceramics for the Archaeologist*, Washington.

SMIT F.
in press "The Period VIII Pottery", in: M.N. van Loon, ed., *Hammam et-Turkman* I, Istanbul.

SMITH J.G.
1952 "The Matarrah Assemblage", in: R.J. Braidwood et al., Matarrah, A Southern Variant of the Hassunan Assemblage, Excavated in 1948", *Journal of Near Eastern Studies* 11: 2-75.

SPAHN N.
1978 "Untersuchungen an grossen Röhrenknochen von Schafen und Ziegen aus der frühmittelalterlichen Siedlung Haithabu", *Schrifte aus der Archäologisch-Zoologischen Arbeitsgruppe Schleswig-Kiel* 3.

STALLIBRAS S.
1985 "Some Effects of Preservational Biases on Interpretations of Animal Bones", in: N.R. Fieller et al., eds., *Palaeobiological Investigations*. Oxford: BAR International Series 266, 65-72.

STARR R.F.S.
1939 *Nuzi*. 1. Report on the Excavations at Yorgan Tepe: 1927-1931. Cambridge, Mass.: Harvard University Press.

STIENSTRA P.
1986 "Systematic Macroscopic Description of the Texture and Composition of Ancient Pottery - Some Basic Methods", *Newsletter of the Department of Pottery Technology Leiden* 4: 29-48.

TEISSIER B.
1984 *Ancient Near Eastern Seals from the Marcopoli Collection*, Berkeley: University of California Press.

TIXIER J. et al.
1980 *Préhistoire de la Pierre Taillée, 1; Terminologie et technologie*, Valbonne. Editions du CNRS.

TROTTER M. and GLESER G.C.
1952 "Estimation of Stature from Long-Bones of American Whites and Negroes", *American Journal of Physical Anthropology* 10: 463-514.
1958 "A Re-Evaluation of Estimation of Stature Based on Measurements of Stature during Life and Long-Bones after Death", *American Journal of Physical Anthropology* 16: 117-144.

UERPMANN H.-P.
1982 "Faunal Remains from Shams ed-Din Tannira, a Halafian Site in Northern Syria", *Berytus* 30: 352.

UNGER-HAMILTON R.
1983 "An Investigation into the Variables affecting the Development and the Appearance of Plant Polish on Flint Blades", in: M.C. Cauvin, ed., *Traces d'utilisation sur les outils néolithiques du Proche Orient*, Lyon: Editions du CNRS, TMO 5, 243-250.
1985 "Microscopic Striations on Flint Sickle-Blades as an Indication of Plant Cultivation: Preliminary Results", *World Archaeology* 17/1: 121-126.

VAN AS A.
1984 "Reconstructing the Potter's Craft", in: S.E. van der Leeuw and A.C Pritchard, eds., *The Many Dimensions of Pottery*. Ceramics in Archaeology and Anthropology, Amsterdam, 131-164.

VAN LOON M.N.
1967 *The Tabqa Reservoir Survey 1964*. Damas: Direction Générale des Antiquités et des Musées.
1968 "The Oriental Institute Excavations at Mureybit, Syria: Preliminary Report on the 1965 Campaign", *Journal of Near Eastern Studies* 27: 265-282.
1982 "Hammam et-Turkman on the Balikh: Background and First Results of the University of Amsterdam's 1981 Excavations", *Akkadica* 27: 30-45.
1983 "Hammam et-Turkman on the Balikh: First Results of the University of Amsterdam's 1982 Excavation", *Akkadica* 35: 1-23.
1985 "Hammam et-Turkman on the Balikh: First Results of the University of Amsterdam's 1984 Excavation", *Akkadica* 44: 21-40.

VAN LOON M.N., ed.
in press *Hammam et-Turkman* I, Istanbul: Nederlands Historisch-Archeologisch Instituut.

VAN LOON M.N. and MEIJER D.J.W.
1983 "Hammam et-Turkman on the Balikh: First Results". *Annales Archéologiques Arabes Syriennes* 33: 131-152.

VAN WIJNGAARDEN-BAKKER L.H.
1984 "De dierenresten van Smeerenburg: een poging tot reconstructie van de dierlijke component in de voeding van de 17e eeuwse walvisvaarders", in: L. Hacquebord, *Smeerenburg. Het verblijf van Nederlandse walvisvaarders op de westkust van Spitsbergen in de 17e eeuw*, University of Amsterdam Dissertation, 279-300.

VAN ZEIST W.
1967 "Late Quaternary Vegetation History of Western Iran", *Review of Palaeobotany and Palynology* 2: 301-311.
1979-80 "Plant Remains from Girikihaciyan, Turkey", *Anatolica* 7: 75-89.

VAN ZEIST W. and BAKKER-HEERES J.A.H.
1975 "Evidence for Linseed Cultivation before 6000 B.C.", *Journal of Archaeological Science* 2: 215219.
1982/1985 "Archaeobotanical Studies in the Levant. 1. Neolithic Sites in the Damascus Basin: Aswad, Ghoraife, Ramad", *Palaeohistoria* 24: 165-256.
1984/1986 "Archaeobotanical Studies in the Levant. 2. Neolithic and Halaf Levels at Ras Shamra", *Palaeohistoria* 26: 171-199.
1985/1988 "Archaeobotanical Studies in the Levant. 4. Bronze Age Sites on the North Syrian Euphrates", *Palaeohistoria* 27: 247-316.

VAN ZEIST W. and BUITENHUIS H.
1983 "A palaeobotanical Study of Neolithic Erbaba, Turkey", *Anatolica* 10: 47-89.

VAN ZEIST W. and WOLDRING H.
1978 "A Postglacial Pollen Diagram from Lake Van in East Anatolia", *Review of Palaeobotany and Palynology* 26: 249-276.
1980 "Holocene Vegetation and Climate of Northwestern Syria", *Palaeohistoria* 22: 111-125.

VAN ZEIST W. et al.
1968/ 1970 "Studies of Modern and Holocene Pollen Precipitation in Southeastern Turkey", *Palaeohistoria* 14: 19-39.
1975 "Late Quaternary Vegetation and Climate of Southwestern Turkey", *Palaeohistoria* 17: 53-143.
in press "Some notes on the Plant Husbandry of Tell Hammam et-Turkman", in: M.N. van Loon, ed., *Hammam et-Turkman*, I, Istanbul.

VOGEL J.C. and WATERBOLK H.T.
1964 "Groningen Radiocarbon Dates V", *Radiocarbon* 6: 349-369.

VON DEN DRIESCH A.
1976 "A Guide to the Measurement of Animal Bones from Archaeological Sites", *Peabody Museum Bulletin* 1.

VON DEN DRIESCH A. and AMBERGER G.
1981 "Ein altbabylonisches Eselskelett vom Tell Ababra, Iraq", *Bonner Zoologische Beiträge* 32, heft 1-2.

VON OPPENHEIM M. und SCHMIDT H.
1943 *Tell Halaf I: die prähistorischen Funde*, Berlin: Walter de Gruyter and Co.

VON WICKEDE A.
1984 "Çavi Tarlasi 1983", *VI. Kazi Sonuçlari Toplantisi*: 191-196.
1986 "Die Ornamentik der Tell Halaf-Keramik. Ein Beitrag zu ihrer Typologie", *Acta Praehistorica et Archaeologica* 18: 7-32.

VON WICKEDE A. and MISIR A.
1985 "Çavi Tarlasi 1984 kazi kampanyasi", *VII. Kazi Sonuçlari Toplantisi*: 103-109.

WATKINS T. and CAMPBELL S.
1987 "The Chronology of the Halaf Culture", in: Olivier Aurenche et al., eds., *Chronologies in the Near East*, Oxford: BAR International Series 379, 427-464.

WATSON P.J.
1983 "The Soundings at Banahilk", in: Linda S. Braidwood et al., *Prehistoric Archeology along the Zagros flanks*, Chicago, OIP 105, 545-613.

WATSON.P.J. and LeBLANC S.A.
1973 "Excavation and Analysis of Halafian Materials from Southeastern Turkey; the Halafian Period Reexamined", *Paper presented at the 72nd annual meeting of the American Anthropological Association, New Orleans, Nov.28 - Dec.2, 1973.*
in press *Gerikihaciyan, a Halafian Site in Southeastern Turkey*, Los Angeles: UCLA Institute of Archaeology.

WATSON P.J. et al.
1971 *Explanation in Archaeology*, New York: Columbia University Press.

WEINSTEIN M.
1973 "Household Structures and Activities", *Anatolian Studies* 23: 271-276.

WIRTH E.
1971 *Syrien, eine geographische Landeskunde*, Darmstadt.

WOOLLEY C.L.
1934 "The Prehistoric Pottery of Carchemish", *Iraq* 1: 146-162.
1955 *Alalakh, An Account of the Excavations at Tell 'Atchana in the Hatay, 1937-1949*, Oxford.

WULFF H.E.

1966 *The Traditional Crafts of Persia*, Cambridge, Mass., and London: MIT Press.

ZEUNER F.E.

1963 *A History of Domesticated animals*, New York.