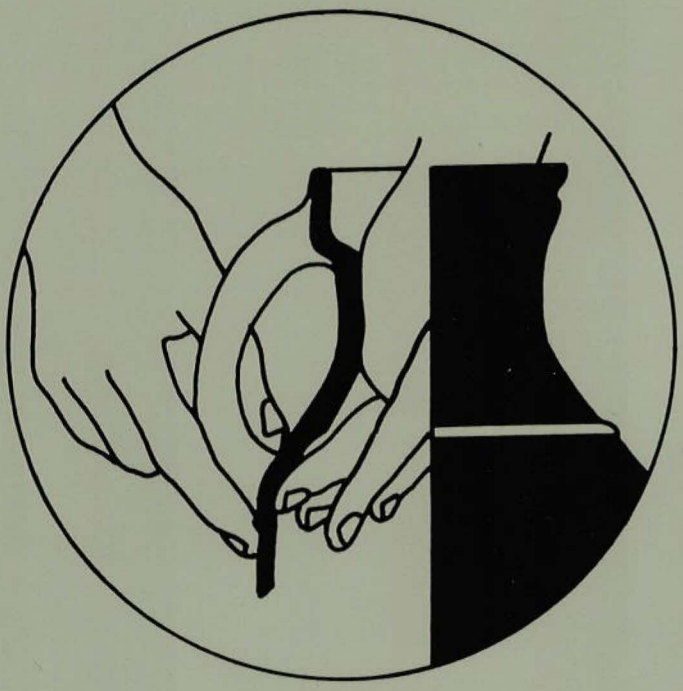
NEWSLETTER

Department of Pottery Technology

VOLUME 11/12 - 1993/1994



LEIDEN UNIVERSITY — THE NETHERLANDS

NEWSLETTER

DEPARTMENT OF POTTERY TECHNOLOGY

LEIDEN UNIVERSITY

VOLUME 11/12 - 1993/1994

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EDITORIAL

In 1983 the first *Newsletter of the Department of Pottery Technology (Leiden University)* appeared. More than ten years have passed since then. For this reason, it seems to be the right moment to look back and define the position of our *Newsletter* once again.

By means of the *Newsletter* (see vol. 1, p. 1) the Institute of Pottery Technology wished to address itself in the first place to people making use of the facilities of the Institute in order to keep them informed of recent developments. We hoped that through the *Newsletter* fresh contacts would be established with archaeologists and institutes interested in aspects of the ancient pottery craft as well as in the part which pottery plays in ethnoarchaeological research.

Looking back, we think that the idea has been successful. Over the past decade the Institute has become increasingly involved in quite a number of archaeological research projects partly as a result of the *Newsletter*. Apart from the Department of Archaeology projects, there have also been projects financed by the Netherlands Organization for Scientific Research (NWO) and projects executed and financed through international cooperation.

Over the last few years a number of visitors have been welcomed who have been introduced to the research methods of the Institute. The teaching activities of the Institute were not limited to Leiden. The bilateral agreement between the Yarmouk University (Irbid/Jordan) and Leiden University led to a teaching course in Archaeological Ceramology being given for the first time in 1993 at the Institute for Archaeology and Anthropology of the Yarmouk University.

In principle, our *Newsletter* only reports on the Institute's activities. On page 9 - 10 of this *Newsletter* you will find an updated statement about the activities of the Institute. In principle, the *Newsletter* should always appear at the end of the year under review or at the beginning of the following year. In actual practice, however, this was not always possible and a double issue is then the only solution.

Reviewing the contents of the *Newsletter* vol. 1-10, the contributions can be divided into several categories (see p. 13 - 18). They were either written by the staff members of the Institute itself or by research-workers outside the Institute, whose research the Institute was directly involved in. We have never accepted contributions on archaeo-ceramological research in which the Institute had not been involved. If we had included these kinds of contributions, our *Newsletter* would have become a *Journal* and this was not our intention.

We would like to continue our *Newsletter* along the same lines. As we have decided against setting up an Advisory Board, we will turn to colleagues for advice and critical comments.

From now on we will clearly indicate the following sections in the contents:

1. Information (annual report, announcements);
2. Preliminary/interim reports;
3. Articles on:
   a. Methodology;
   b. Ceramology;
   c. Archaeo-ceramology (technological studies of several archaeological pottery repertoires);
   d. Ceramic experimental archaeology;
   e. Ceramic ethnoarchaeology.

The final results of the Institute's research will also be published as is the case, in other periodicals and archaeological publications. Finally, we intend to publish the *Newsletter* annually, in accordance with the original idea.

A. van As

INFORMATION

ABOUT THE INSTITUTE

The Institute of Pottery Technology was founded in 1980 and forms a section of the Department of Archaeology of the Faculty of Arts at Leiden University. The Institute is housed within the Archaeological Centre, where apart from the Department of Archaeology, the Faculty of Pre- and Protohistory is also accomodated.

The Institute of Pottery Technology has a small staff, consisting of two archaeologists, Dr. A. van As, Director, and Mrs. Dr. M.B. Annis (part-time). Attached to the Institute are a professional ceramist and teacher of the craft, Mr. L. Jacobs, a laboratory assistant, Mr. E.P.G. Mulder (part-time), a draughtsman, Mr. A.E.A. van Driel (part-time), and a part-time secretary, Mr. J.J. Hoff.

The Institute has a laboratory and workshop equipped with apparatus designed for the research-work performed by the Institute, and a documented study collection of archaeological ceramics (see p. 11 - 12).

The Institute of Pottery Technology carries out archaeo-ceramological research and provides lectures on the subject.

The research-work is focused on the study of the potter's craft in its entire scope, including the production of and trading in the products. It also deals with such questions as how to recognize and define production centres or workshops, production organization, pottery traditions and the history of traditions. The research programme covers the following areas:

I. Research into excavated pottery(sherds).
   1. Investigation of the raw materials:
      a. Quantitative analysis of the non-plastics: quantity, size, and roundness of the mineral inclusions;
      b. Qualitative analysis of the non-plastics as far as can be investigated without using thin-section analysis. Thin-sections are made by the Institute. The interpretation is contracted out.
   2. Analysis of the shaping techniques:
      a. Reconstruction of the shaping techniques based on the interpretation of relevant characteristics;
      b. Verification experiments.
   3. Analysis of the firing techniques:
      a. Analysis of the firing atmosphere;
      b. Analysis of the firing temperature.

II. Investigation of clay samples from the surroundings of the archaeological sites for comparison with the results of the research into the excavated pottery(sherds) (see above).
   1. Workability tests: experiments to determine the behaviour of clays in relation to the potter's craft (plasticity, shrinkage, firing colour etc.) and the influence on the function of the pottery.

2. Investigation of the non-plastic inclusions (see I1), especially important for archaeological provenance studies.

III. Ceramic ethnoarchaeological research.
Investigations into the activities of traditional potters working at present and a study of the interaction of factors playing a part in the pottery production process so as to come to a correct interpretation of archaeological phenomena.

The teaching activities of the Institute concern instruction in Archaeological Ceramology, included in the curriculum of the Department of Archaeology: an introduction in the first year, followed by a seminar and practical work in later years. Besides this, the teaching activities involve a considerable amount of coaching to Ph.D. students from Leiden and other Dutch universities. Foreign students are also regularly welcomed to the Institute and participate in courses. In 1993 a teaching course in Archaeological Ceramology was given for the first time to archaeology students of the Yarmouk University in Irbid (Jordan). We intend to give such courses elsewhere too.

Archaeologists and students can apply for the Institute's assistance in appraisal. After a discussion on the archaeological question, the character, extent, and planning of the Institute's part in the archaeo-ceramological research are established. Until now no special charge is made for technological investigations. Only laboratory costs (thin-sections, refiring tests etc.) and travel and accommodation expenses, if any, are charged.

THE STUDY COLLECTION

The study collection (pottery archive) of the Institute of Pottery Technology is housed in the cellar of the Archaeological Centre and in the attic of the neighbouring Arsenal Building ("Arsenaal").

The study collection includes:
1. Documentation of various archaeological pottery repertoires investigated by the Institute (complete pots and sherds);
2. Randomly collected pottery (sherds).

As a rule a selection of the investigated material has been documented on boards arranged according to archaeological sites and periods. These overviews enable colleague-archaeologists to go through the material quickly. These boards are considered to be a concrete document together with the publication. Additional sherds matching the boards are also available in separate boxes.

There are also boards representing specific ceramological phenomena, such as surface treatment and construction of handles. For these boards pottery sherds from different archaeological sites and periods have been used together.

The following is a short inventory of the study collection, in alphabetical order arranged according to country of origin, archaeological site, and archaeological period.

CYPRUS		
Kouklia	-	Persian
IRAQ		
Tell ed-Dēr	-	2nd millennium B.C. (Old Babylonian/Kassite)
JORDAN		
Abu Gourdan	-	Islamic (8th-15th century A.D.)
Amman Citadel	-	Late Byzantine/Early Islamic (Umayyad)
Buseira	-	Iron Age II
Deir Alla	-	Late Bronze Age
	-	Iron Age
Emeiri	-	Early Bronze Age
	-	Iron Age
	-	Islamic
Petra	-	Roman/Nabataean
Tawilan	-	Iron Age II

MALI		
Djenné	-	Tellem
THE NETHERLANDS		
Haarlem	-	Medieval
Haren (Brabant)	-	Iron Age
PALESTINE/ISRAEL		
Jericho	-	Neolithic
	-	Early Bronze Age
	-	Middle Bronze Age
	-	Iron Age
Jerusalem	-	Early Bronze Age
	-	Middle Bronze Age
	-	Iron Age
	-	Persian
	-	Hellenistic
	-	Early Roman
	-	Byzantine
Qumran	-	Roman
SYRIA		
Hadidi	-	Bronze Age
	-	Early Islamic
Palmyra	-	Byzantine/Roman
Qalat Jabar	-	Islamic (Ayyubid/Mamluk)
Selenkahiye	-	Middle Bronze Age
Ta'as	-	Early Islamic

In the Institute an inventory list is available with full documentation of the collection (description of pottery, find context, and references). At the moment we are preparing a more user-friendly system of access to the collection. The study collection can be consulted by appointment.

CONTENTS OF THE *NEWSLETTER* VOL. 1-10 (1983-1992)

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Scope of the Institute's research work. A short introduction (Franken) (1-1983:1-4)

Four large projects of the Institute (Franken) (1-1983:4-5)

A summary of the research methods (Jacobs) (1-1983:34-35)

The Tabqa project (van As) (2-1984:5-9)

Announcement

Clay - a source of life (Franken) (2-1984:4)

Reviews

Two ceramological conferences (van As) (1-1984:31-33)

Pottery technology: the materials science/archaeology interface: a symposium held during the 83rd annual meeting of the American Anthropological Association (van As) (3-1985:6-9)

A remarkable sherd characterization study (Franken) (6-1988:97-99)

Ethnoarchaeology in the Netherlands - a review (van Dommelen) (7/8-1989/90:133-139)

Preliminary reports/interim reports

Greece

Technological research on Neolithic pottery from Sesklo (Greece) - a preliminary report (van As/Jacobs/Wijnen) (6-1988:23-34)

Iraq

Technological research of Palaeo- and Meso-Babylonian pottery from Tell ed-Dēr (Iraq) - a report (van As/Jacobs) (3-1985:15-26)

Technological research of Palaeo- and Meso-Babylonian pottery - a report on the 1986 season at Tell ed-Dēr (Iraq) and some preliminary results (van As/Jacobs) (4-1986:21-28)

Towards a corpus of Mesopotamian pottery (van As) (5-1987:29-38)

Report on the activities of the Working Group on Mesopotamian Pottery during the years 1987 and 1988 (van As/Jacobs) (6-1988:1-22)

Italy

Potters from Sardinia - An interim report, March 1982 (Annis) (1-1983:13-26)

Technological analysis of some Late Roman amphorae (Schuring) (2-1984:27-31)

Terra sigillata africana from the San Sisto Vecchio in Rome: aspects of fabric characterization: a preliminary assessment (Schuring) (5-1987:54-73)

Jerusalem

Iron Age pottery from Jerusalem - a preliminary classification of the pottery found in two caves during the 1961-1967 Kenyon excavations (LaGro/Noordhuizen) (5-1987:1-24)

Jordan

A technological study of the pottery from Deir 'Alla Phase M (Vilders) (6-1988:79-87)

Some technological features of the Late Bronze and Iron Age cooking pots from Tell es-Sa'idiyeh, Jordan (Vilders) (9/10-1991/92:69-81)

Announcing a study of Islamic pottery from Tell Abu Sarbut (Jordan) (LaGro/de Haas) (6-1988:89-96)

Sugar pots: a preliminary study of technological aspects of a class of medieval

industrial pottery from Tell Abu Sarbut, Jordan (LaGro/de Haas) (7/8-1989/90:7-20)

Syrup jars and sugar pots: a preliminary study of a class of medieval industrial pottery from Tell Abu Sarbut, Jordan, part II (LaGro/de Haas) (9/10-1991/92:55-68)

Turkey

An exploratory visit to Ilipinar (Turkey) (van As/Wijnen) (6-1988:41-46)

Neolithic and early Chalcolithic pottery from Ilipinar (phases X-VIII) in northwestern Anatolia (van As/Wijnen) (7/8-1989/90:21-68)

Chalcolithic pottery from Ilipinar (phases VIII-V) in northwestern Anatolia (van As/Wijnen) (9/10-1991/92:23-45)

Articles

General

Pottery technology and physicoscientific analyses of ceramics (van As) (2-1984:10-13)

Technological study of ancient pottery - a note on sense and nonsense (Stienstra) (3-1985:10-14)

Systematic macroscopic description of the texture and composition of ancient pottery - some basic methods (Stienstra) (4-1986:29-48)

Heavy minerals and feldspars in potsherds (van der Plas/van Doesburg) (5-1987:74-86)

A computer-based system for measurements of thermal properties of archaeological ceramics (Bronitsky) (5-1987:87-92)

Where to draw the line: illustrating ceramic technology (Glock) (5-1987:93-110)

Pottery technology: the bridge between archaeology and the laboratory (van As) (9/10-1991/92:1-6)

'Form is the essence of a ceramic vessel' (Franken) (7/8-1989/90:1-5)

Réflexions sur une archéologie (Gasche) (5-1987:25-28)

Firing of clay tablets in the field (Jacobs) (4-1986:4-11)

Experiments with stone "pottery wheel" bearings - notes on the use of rotation in the production of ancient pottery (Edwards/Jacobs) (4-1986:49-55)

Notes about the relation between filler and clay, and filler and shrinkage, respectively (Jacobs) (1-1983:6-12)

Australia

Early pyrotechnology - notes on investigating ancient Australian aboriginal fire places (Edwards) (5-1987:111-124)

Antilles

A technological study of some potsherds from Saba and St. Eustatius (De Josselin de Jong collection) (van As/Jacobs) (4-1986:12-20)

Cyprus

Regionalism in traditional Cypriote ceramics (London) (5-1987:125-136)

Greece

The potter of Dimini (Greece) - some observations (van As/Jacobs/Wijnen) (6-1988:35-40)

Italy

Pots in Oristano - a lesson for the archeologist (Annis) (2-1984:32-51)

Ethnoarchaeological research - water vessels in Sardinia (Annis) (3-1985:43-94)

Ethnoarcheological research - pottery production in Oristano (Sardinia). Relationships between raw materials, manufacturing techniques and artifacts (Annis/Jacobs) (4-1986:56-85)

Production and distribution of cooking ware in Sardinia (Annis/Geertman) (5-1987:154-196)

Modes of production and the use of space in potters' workshops in Sardinia: a changing picture (Annis/Jacobs) (6-1988:47-77)

Cooking ware from Pabillonis (Sardinia): relationships between raw materials, manufacturing techniques and the function of the vessels (Annis/Jacobs) (7/8-1989/90:75-130)

Iraq

Causes for the pale colour of iron-containing, second millennium B.C. pottery from three archaeological sites in Mesopotamia (Jacobs) (9/10-1991/92:7-21)

Second millennium B.C. goblet bases from Tell ed-Dēr - the relationship between form and technique (van As/Jacobs) (5-1987:39-53)

Jerusalem

A class of Iron Age bowls from Jerusalem (Franken) (3-1985:27-42)

Jordan

The relation between pottery body, firing method and colour of glazed cooking pots dug up at the Amman Citadel in Jordan (Jacobs) (2-1984:14-26)

Mali

Aspects of life-span of Dogon pottery (Bedeaux/van der Waals) (5-1987:137-153)

The Netherlands

Decorated pottery from the early La Tène period from Friesland, the Netherlands (Franken/Jacobs) (1-1983:27-30)

Iron Age pottery from Haren, Brabant, the Netherlands (Franken/Kalsbeek) (2-1984:17-26)

Syria

Medieval pottery from the Levant, entirely or partly made in moulds (Franken/Kalsbeek) (9/10-1991/92:47-53)

Turkey

The potter from Örnekköy (Turkey) - some observations (van As/Wijnen) (7/8-1989/90:69-74)

ANNUAL REPORT 1993/1994

Research projects in cooperation with:

Leiden University/Department of Archaeology:

Indian America:

- Pre-Columbian pottery from Saba (Dr. C.L. Hofman).

Palestinian Archaeology:

- Pottery dating from the Bronze Age and Iron Age from Tell Deir Alla (Dr. G. van der Kooij);
- Pottery dating from the Bronze Age and Iron Age from the British Museum excavations at Tell es-Sa'idiyeh (Jordan) (Mrs. M.M.E. Vilders);
- Regional survey in the Central Jordan Valley (Jordan). (Mrs. E.J. van der Steen).

Theoretical Archaeology:

- Pottery from the Riu Mannu survey project (Sardinia) (Dr. P. van de Velde).

University of Hamburg/Department of Classical Archaeology;
University of Amsterdam/Department of Mediterranean Archaeology:

- Phoenician amphorae (Prof. dr. H.G. Niemeyer; R. Docter).

The Netherlands Institute for the Near East, Leiden:

- Pottery dating from the Early Bronze Age from Hacilartepe (Northwestern Turkey) (dr. J.J. Roodenberg);
- Islamic pottery from Tell Abu Sarbut (Jordan). (H.E. LaGro).

Municipal Archaeological Service Alkmaar:

- Medieval pottery from Alkmaar (P. Bitter).

Royal Musea for Art and History, Bruxelles:

- Pottery from the excavations at Lehun (Jordan) (Dr. Dényse Homès-Frederiq).

Soprintendenza Archeologica di Ostia and Museo dell'Alto Medioevo:

- Late Antiquity and Early Medieval pottery from excavations in Rome (Dr. Lidia Paroli).

American-Dutch excavations in Berenike (Egypt):

- Pottery (3rd century B.C. - 6th century A.D.) from Berenike (Egypt) (Dr. S.E. Sidebotham and Mrs. W.Z. Wendrich).

Working Group on Mesopotamian Pottery:
- Pottery dating from the second millennium B.C. from Iraq.

Fieldwork:

28/09 - 03/11 1993	M.B. Annis: Riu Mannu Survey (Sardinia).
19/01 - 12/02 1994	A. van As, L. Jacobs: Berenike excavations (Egypt).
25/05 - 20/06 1994	A. van As, A.E.A. van Driel, L. Jacobs: Ilipinar/Hacilartepe excavations (Turkey).
02/10 - 30/10 1994	M.B. Annis: Riu Mannu Survey (Sardinia).

Publications, elsewhere (1992 -1994):

Annis, M.B. (1992a), Ceramica altomedievale a vetrina pesante e ceramica medievale a vetrina sparsa proveniente dallo scavo di San Sisto Vecchio in Roma; analisi tecnologica e proposta interpretativa. In: L. Paroli (ed.), *La ceramica invetriata tardoantica e altomedievale in Italia*, Siena: 394-417.

Annis, M.B. (1992b), Ricerche mineralogico-petrografiche e analisi fisico-chimica di campioni ceramici provenienti da diversi sontesti romani. In: L. Paroli (ed.), *La ceramica in vetriata tardaantica e altomedievale in Italia*, Siena: 603-620.

Annis, M.B. (1992c), Analisi tecnologica di ceramica a vetrina pesante e sparsa da San Sisto Vecchio in Roma. *Archeologia Medievale* 19: 123-178.

As, A. van and L. Jacobs (1992a), The work of the potter in ancient Mesopotamia in the second millennium B.C. In: P.B. Vandiver et al. (eds.), *Materials Issues in Art and Archaeology III* (Proceedings Symposium San Francisco 1992, material Research Society Series 267.

As, A. van and L. Jacobs (1992b), A technological study of Golden Rock pottery. In: A.H. Versteeg and K. Schinkel (eds.), *The archaeology of St. Eustatius, the Golden Rock site*, Amsterdam: 230-236.

Dommelen, P. van, P. van de Velde and M.B. Annis (1994), Plattelandsbewoning en sociaal-politieke organisatie: het Riu Mannu Survey project. *Profiel* 6,1: 6-12.

Franken, H.J. and A. van As (1994), Potters who used Euphrates clay. In: H. Gasche and M. Tanret (eds.), *Cinquante-deux réflexions sur le Proche-Orient*, Mesopotamian History and Environment Series, Occasional Publications vol. 2: 507-518.

Hofman, C.L., L. Jacobs, and P. van Olst (1993), Technological aspects of the Pre-Columbian pottery. In: C.L. Hofman, *In search of the native population of Pre-Columbian Saba (400 - 1450 A.D.), Part one. Pottery styles and their interpretations*, Leiden: 159-196.

Lectures:

15/03 1993	M.B. Annis: *Etnoarcheologie: aardewerk productie op Sardinië*; Studium Generale; Leiden University.
24/04 - 05/05 1993	M.B. Annis, A. van As, L. Jacobs: course in *Archaeological Ceramology*; the Yarmouk University; Irbid (Jordan).
23/10 1993	M.B. Annis, P. van Dommelen, P. van de Velde: *Il projetto archeologico Riu Mannu: metodologie e primi risultati*; Biblioteca Comunale; Guspini.
22/11 1993	A. van As: *Aardewerktechnologie*; Archeologische Werkgemeenschap Nederland; Haarlem.
15/12 1993	A. van As: *The efficiency of the archaeo-ceramological approach: time is money*; "Post excavation work and processing" Workshop; Leiden University.
31/03 1994	M.B. Annis: *Verandering in aardewerkproductie en consumptie in Sardinië (1920-1990)*; Cursus AIO/OIO Netwerk Archeologie: Materiële cultuur massaproductie en -consumptie; University of Amsterdam.
07/10 1994	M.B. Annis: *Il paese delle pentole*; Symposium "Terra cruda e terrra cotta"; Pabillonis.
28-30/10 1994	M.B. Annis: *Economia di una produzione ceramica: Oristano 1920-1990*; La ceramica racconta la storia; Oristano.

Meetings:

24/02 1993	Working Group on Mesopotamian Pottery, Ghent: preparation of a Corpus of Mesopotamian pottery (2nd millennium B.C.).
25/02 1993	Royal Musea for Art and History, Bruxelles: preparation of an exhibition.
07/04 1993	Working Group on Mesopotamian Pottery, Ghent: preparation of a Corpus of Mesopotamian Pottery (2nd millennium B.C.).
09-12/03 1994	Working Group on Mesopotamian Pottery, Maison de l'Orient Mediterranéen - Lyon: preparation of a Corpus of Mesopotamian pottery (2nd millennium B.C.).

Visitors:

03/06 1993	Dr. Ahmad Salem Saleh, vice-president of the Yarmouk University Irbid (Jordan).
09/09 1993	Ole Stilborg, Lab. for Ceramic Research, Dept. of Quarternary

	Geology, Lund University, Sweden.
22/08 1994	Ihor Poshyvajlo, Oles Poshyvajlo, and Tania Marchenko from the National Museum of Ukrainian Ceramics in Opishne.
17/11 1994	Murray Eiland, Research Laboratory for Archaeology and the History of Art, University of Oxford, Great Britain.

Visitor's grants for study at the Institute:

- Hamed Salem (Birzeit University): PEACE program;
- Nabil Qadi (Yarmouk University): bilateral agreement between the Yarmouk University and Leiden University.

ANNOUNCEMENT

The Institute of Pottery Technology has been able to help in preparing *The potters of Deir Mawas. A village in Middle Egypt*, two videofilms made by Paul T. Nicholson and Willemina Z. Wendrich (see p. 23-24).

Copies of the films are available direct from:

Paul T. Nicholson
University of Wales
PO Box 909
Cardiff CF1 3XU
Great Britain

Direct Dial tel. 0222-874582
Fax 0222-371921

The costs are £ 20.00 plus £ 2.50 postage and packing for Europe (£ 3.50 if paying by Eurocheque). Copies suitable for use in the U.S.A. can be supplied, but these are more expensive. Paul Nicholson suggests that prospective byers contact him directly to ask about price and supply.

THE POTTERS OF DEIR MAWAS. A VILLAGE IN MIDDLE EGYPT (FILMS BY PAUL T. NICHOLSON AND WILLEMINA Z. WENDRICH)*

During the Egypt Exploration Society's 1987 season of excavations at Tell el - Amarna, a small pottery workshop was discovered.

In order to better make comparisons between this industry and contemporary potting practices it was decided that a study should be made of a nearby potter's workshop which was of a similar scale to that excavated. It was also intended that the technology and methods of production of the workshop be recorded in their own right.

The workshop is situated in Deir Mawas, on the West Bank of the Nile, opposite the ancient city of Tell el-Amarna. The workshop is a family concern, operated by a master potter, his wife and their eldest son, assisted to varying degrees by children of school age.

A wide range of vessels are manufactured from a silt clay. This is typical of silt-ware industries in Egypt, whereas those using marl clay tend to be more specialized, and produce a very limited range of forms.

The clay is obtained from the dried dredgings of an irrigation canal a few miles from Deir Mawas, and transported by "pick up" to the workshop compound. Here it is soaked and trampled in preparation for wedging.

Perhaps the most interesting vessels made are the very porous water jars. These are made in two distinct stages. A cube of prepared clay varying in size from about 28-38 cm across is taken and placed in a shallow depression in the workshop floor. This depression is a carefully made hemisphere lined with clay. The clay in this hollow is dampened and then chaff is sprinkled into the hollow and onto the clay cube.

The clay is then hit with a fired clay anvil of mushroom shape and quickly opened out into a thick-walled bowl form. Chaff is regularly added to the clay and pounded in. The vessel is continually struck and turned in its hollow until the walls are judged to be sufficiently thin for the use of the paddle. The paddle is made from a piece of curved timber about 30 cm long, in fact part of a broken agricultural riddle or *corbal*. This is struck against the vessel which is continually rotated in the hollow. The paddle and anvil are used in this way until the vessel is almost a complete sphere and has walls of the desired thickness. The tools used are exactly like those recorded in the same area by W. Blackman (*The Fellahin of Upper Egypt*, London 1927). The opening is then pinched with the finger and thumb to strengthen it before it is placed in a less carefully prepared hollow in the courtyard to dry. This stage of the process is almost exclusively carried out by the potter's wife

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* From: P.T. Nicholson (1991), Ethnoarchaeology at Deir Mawas, Egypt. *The Ceramic Petrology Group. Newsletter* No. 6.

or one of her female relatives.

After a day's drying the vessel is placed on the potters wheel, standing in a prepared ring of dried clay so it can balance. The potter then adds the rim. This is done by taking a thick roll of clay and pressing it around the vessel opening, whilst slowly revolving the vessel. Once pressed onto the vessel in this way the wheel is revolved more quickly and the rim thinned and drawn up into a short flaring shape. It is also smoothed onto the body to disguise the join. The clay used does not have chaff added to it, so that although the body is very rich in organic matter the rim is not. Hence, it would be possible to describe the sherds from the two parts of the body as different fabrics, a factor which we should perhaps bear in mind when examining some ancient vessels. The rim is the work of the male potter.

The rim is allowed to dry for two or three hours before either two or three handles are added to the pot. This again is work for the women of the family. They also slip the vessel. This is usually done pre-firing, but a fugitive slip might be added at the post-firing stage. The women will also patch drying cracks with new clay before firing. The sexual division of labor therefore corresponds to the classic pattern of female labor on hand-made vessels, male on wheel-made.

Once dry, usually the following day, the vessel is fired in the small kiln. The fuel used is largely oily sawdust collected from a local garage along with domestic rubbish and items of old clothing. It is difficult to measure quantities of fuel used, since the fuel heap is generally not distinguishable from the courtyard floor.

The rate of temperature increase is high, and can be up to 400 degrees Celsius in ten minutes. The open nature of these clay bodies allows them to withstand this rate of increase. Peak temperature is between 700 and 900 degrees Celsius. During firing the chaff in the clay is burnt out or carbonized. As is characteristic of silt-ware potters, the attention given to firing is less than in the more specialized marl industries, and a great deal of temperature variation is acceptable.

Vessels which undergo some distortion in the kiln, or deform to the extent that they crack or split, are repaired. These repairs are made using bread dough. Once dry, a fugitive slip is added and the repair rendered invisible. It is possible that some archaeological accounts of "waster vessels", apparently used far from any kiln site, might stem from this kind of process. The organic material used in the repair would normally be lost to the archaeologist, so that what had been originally bought as a sound vessel appears to us as a waster.

A reconstruction of the excavated Amarna kiln was built and fired using information derived from the firings recorded at Deir Mawas. Unfired vessels from the potter were used in the kiln, along with experimentally produced pieces.

PRELIMINARY / INTERIM REPORTS

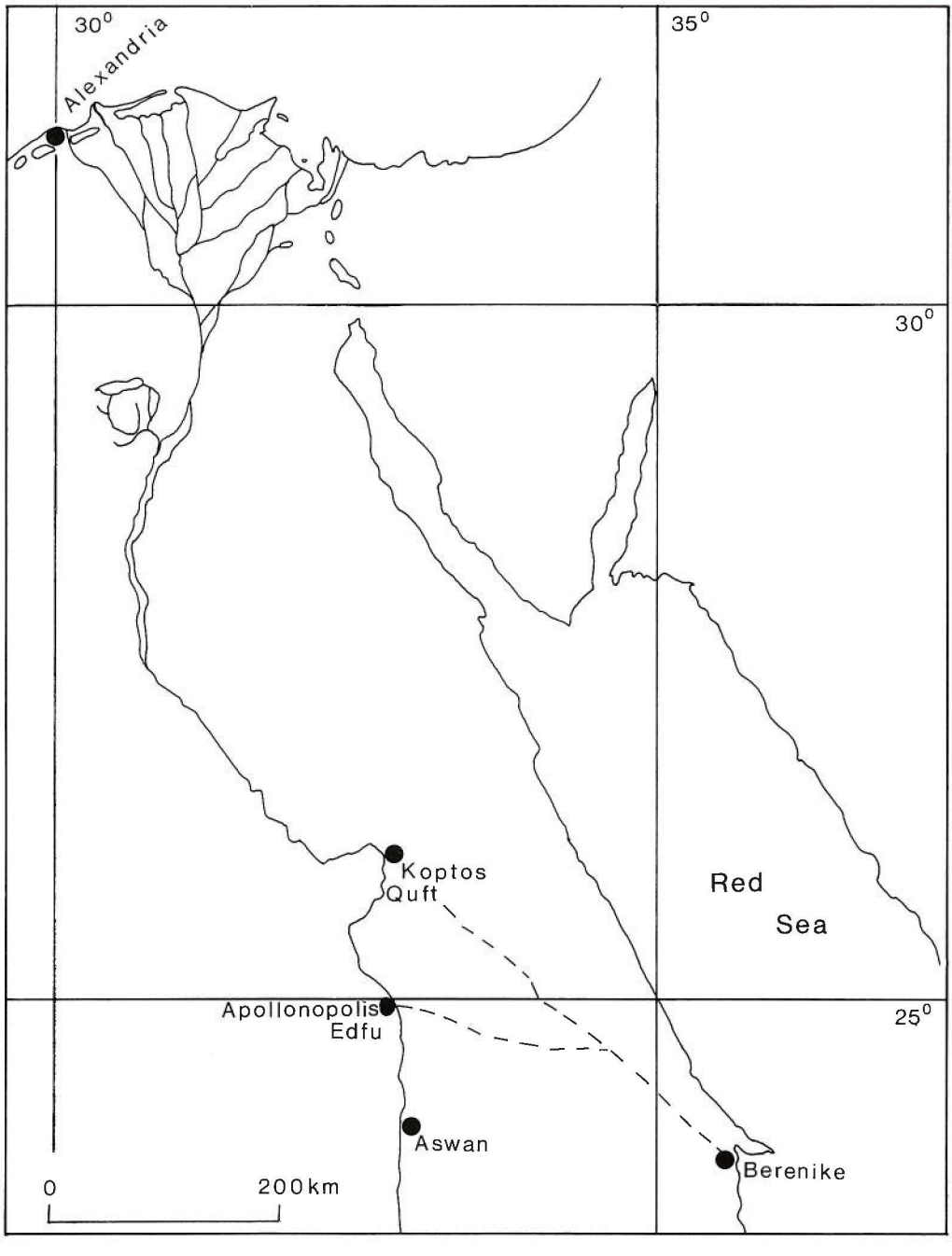

Fig. 1. Sites mentioned in the text.

A. van As
L. Jacobs

ARCHAEO-CERAMOLOGICAL RESEARCH IN BERENIKE, A SEAPORT ON THE EGYPTIAN RED SEA COAST (3RD CENTURY B.C. - 6TH CENTURY A.D.) - A REPORT OF THE 1994 EXPEDITION

In January and February 1994 the Institute of Pottery Technology carried out exploratory archaeo-ceramological research during the first excavation campaign of the American-Dutch archaeological expedition in Berenike, a Ptolemaic seaport on the Egyptian Red Sea coast (see also Sidebotham and Wendrich 1995).

Berenike[1]

The ruins of Berenike are situated in a desolate desert close to the Red Sea coast, roughly at the same latitude as the city of Aswan, 959 kilometres south of Caïro (Fig. 1; see opposite). At the moment the only form of habitation is a Bedouin settlement and a an Egyptian Army base situated near Ras Benas.

Berenike was once a seaport, founded in 275 B.C. by Ptolemy II, Philadelphus and named after his mother. Berenike developed itself into a small town with a fortress and a temple dedicated to the god Serapis. From textual evidence we know that Berenike was the most important port of transhipment on the Egyptian Red Sea coast. Goods shipped from sub-Saharian Africa and from India were loaded on camels to be transported overland to the Nile Valley. The route led through the Wadi al Qash and the Wadi Abbad respectively to Koptos (Quft) and Apollonopolis Magna (Edfu). Particularly, the trade in spices, incense, and silk went by way of Berenike.

Life must have been hard in Berenike. An absence of other building materials meant that the buildings had to be made of coral. The water-supply must have been problematic. Possibly the town was not inhabitated throughout the entire year, since most shipping traffic was dependent on the monsoon. Thus, on the one hand Berenike was an important trading port and a crossroad of cultures: on the other hand, Berenike was a very isolated settlement, where providing the bare essentials presented the inhabitants with a huge problem. Berenike functioned as a seaport until the 6th century A.D.

Newsletter of the Department of Pottery Technology (Leiden University) 11/12, 1993/94, 26-30.

Archaeological research

Systematic excavations have never been carried out in Berenike. The few early travellers visiting the region could not stay for longer than a few days, mainly because of a shortage of water. After thorough preparations geared to solving the logistic and organizational problems involved in a longer stay in the desert, a first exploratory American-Dutch archaeological expedition was set out, mainly financed by the *National Geographic Society* (Washington D.C.).

The archaeological research will focus on two important areas. The first area concerns the structure and function of the settlement in relationship to the harbour and the hinterland. In this part of the research, the road system between Berenike and the Nile Valley controlled by Roman way-stations will be mapped out. The second area concerns the long distance trade with India and sub-Saharian Africa. In this part of the research the imported articles will be closely studied.

During the first campaign two trial trenches (5 x 5 m) were opened. In one of them only architectural remains have been found, and hardly any pottery. In the upper layers of the other trench pottery was excavated dating from the 5th and 6th century A.D.

Apart from the ceramic experts no other specialists were involved during the first excavation campaign. On the basis of the results of this limited excavation, a decision will be taken on which specific knowledge will be necessary in the field during the following expeditions. Since Egyptian law does not allow finds being taken out of the country, all specialists will have to carry out their research-work at the site.

Archaeo-ceramological research

The Institute of Pottery Technology will carry out the technological investigations of the pottery. The typological studies are being executed by John Hayes.

The main aim of our visit was to get a preliminary impression of the pottery repertoire of Berenike in order to be able to make a concrete plan for future archaeo-ceramological research in Berenike. The very specific character of the site (a seaport), means it is likely that most of the pottery repertoire did come from elsewhere. This became immediately clear from the different places of origin of the various types of amphorae as indicated by John Hayes: Late Roman amphorae from Lower and Middle Egypt, Northern Egyptian amphorae, North African amphorae (Tripolitana), Gaza amphorae, Late Roman Agaean amphorae type 2, Rhodean amphorae (1st, 2nd century A.D.), Late Roman type 1 amphorae from southern Turkey and Cyprus, and Italian amphorae. Apart from the amphorae in the excavation trenches and on the surface, the following types of pottery were found: Aswan cream slip ware and Aswan red slip ware, Egyptian cooking ware, Italian terra sigillata, Roman glazed ware (1st - 2nd century A.D.), and Nabataean pottery. A remarkable category consisted of pottery which was indicated as Wadi Qitna H

(WQH)-ware (see Strouhal 1984)(Fig. 2). It is distinctive hand-made burnished and decorated pottery. Finally, we have found a group of potsherds which could not be identified. We made a description of the characteristics indicating the shaping techniques of the bigger pottery fragments. Furthermore, we have taken samples and prepared them for future investigation of the non-plastic mineral inclusions. Clay samples have been taken in order to get an idea as to whether, in principle pottery could have been produced in Berenike. The results of the workability tests carried out with the aeolian clays from just north of the site have demonstrated that these clays were perfectly suitable for pottery production.

Fig. 2. Wadi Qitna H-ware from Berenike.

The planning of future research

During the coming years the Berenike project will be continued on a larger scale. This will be funded by the Netherlands Organization for Scientific Research (NWO) from 1995-1998.

As to the technological investigations, it seems possible, in spite of some practical difficulties such as making thin-sections at the site, to establish an efficient research programme for the future. In the first place, we will focus on the WQH-ware. Secondly, we will test whether local pottery production actually occurred. Finally, technological investigations of the amphorae might be relevant for the amphorae research of the Institute of Pottery Technology. The archaeo-ceramological research in Berenike will be continued in the 1996 excavation season.

Note

1. We would like to thank Mrs. W.Z. Wendrich, the Dutch director of the Berenike excavations, for the data used in this section.

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M.B. Annis
P. van Dommelen
P. van de Velde

THE *RIU MANNU* SURVEY PROJECT IN WEST CENTRAL SARDINIA: A FIRST INTERIM REPORT

In Italian archaeology, regional research has been common practice for years. In Sardinia, however, little if any attention has been paid to regional research, because archaeologists have generally concentrated on indigenous monumental sites (in particular, the so-called *nuraghi* - typically Sardinian huge dry stone-walled towers-temples and megalithic tombs), and on large colonial settlements and their necropoleis (e.g. Tharros in west central Sardinia). Systematic research of the countryside beyond the immediate surroundings of a site is almost completely absent. In 1991, the *Riu Mannu* survey in west central Sardinia was set up as a project of the Theory and Methodology Section of the Department of Archaeology (Leiden University). Its permanent staff members are Pieter van de Velde, M. Beatrice Annis and Peter van Dommelen. Given the crucial role of pottery as a source of information in this type of research, the Institute of Pottery Technology has been involved in this project from the very beginning[1].

Research objectives

The *Riu Mannu* survey project aims at an explicitly archaeological description and study of various phenomena and developments in the socio-political organization of west central Sardinia (Fig. 1). The basic assumption is that the characteristics of the settlement pattern are related to and give insight into the social organization of a region. Attention is primarily focused on the distribution of sites in the entire area. These distribution patterns are then studied in detail, revealing smaller concentrations of objects (*scatters*) both within and outside the sites. The distribution of object-classes appears to contribute to a better understanding of the regional structure and organization, as shown by the *Ager Tarraconensis* survey in Spain (Keay and Millett 1991; cf. Schofield 1991).

The research project consists of two major complementary aspects: a methodological one investigating how the archaeological record can be 'translated' in socio-political terms, and a substantive one studying the diachronic development of the rural settlement pattern in relation to the proto-urban and urban nuclei in the area. The latter component focuses on different themes in different periods. These are the differentiation of settlements dating from the Neolithic and Bronze Age periods; the

Newsletter of the Department of Pottery Technology (Leiden University) 11/12, 1993/94, 31-44.

Fig. 1. Sardinia and the study area of the *Riu Mannu* Survey in west central Sardinia (grey tones indicate land above 100, 400 and 1000 m above sea level respectively).

interaction between both Punic and Roman colonization and indigenous settlement and land-use; and the integration of Late-Roman/Early-Medieval Sardinia in the political economy of the Mediterranean.

Sardinia offers a good opportunity for such a research project, because it is a relatively large island, rich in agrarian resources and mineral ores. This has not only allowed independent internal development since the Early Neolithic but has also always attracted people from elsewhere in the Mediterranean. From a practical point of view, Sardinia offers favourable conditions for an archaeological survey, as the vast lowlands are extensively worked and the influence of erosion and recent alluvial deposits is rather limited. As a consequence, the archaeological visibility generally is quite good and the surface finds are abundant and varied.

The region: west central Sardinia

West central Sardinia is characterized by three different landscapes (Fig. 2). The principal feature is the vast plain of the *Campidano*, which is roughly orientated in NW-SE direction. Clasped between the Gulf of Oristano and the Campidano plain lies the low and originally marshy *Arborèa*, which today has largely been reclaimed. The rough Iglesiente mountains, rich in copper- and iron ores, shield off the Campidano to the south-west from the Mediterranean. To the north-east of the Campidano are the marl hills of the *Marmilla*, which are separated from the Arborèa and the Gulf of Oristano by the mountain massif of the Monte Arci volcano, and are only easily accessible from the Campidano through two gorges. The only rivers of importance in this region are the Riu Mannu and the Riu Mògoro. The Riu Mannu, after which the survey project has been named, flows through the Campidano into the lagoon of San Giovanni and the Gulf of Oristano. The Riu Mògoro, whose drainage basin comprises the entire Marmilla, originally ran into the (now reclaimed) Sassu lagoon. This region was and is predominantly agricultural in character. Cities are absent and the population is concentrated in a few larger and many small villages.

One consideration in choosing west central Sardinia as a study area has been that this region in particular has known intensive settlement during all periods, as testified by numerous *nuraghi* as well as by many Punic and Roman remains. Moreover, the Arborèa and Campidano on the one hand and the Marmilla on the other hand represent two clearly distinguished *Siedlungskammer*, connected to each other by two narrow valleys. Since each of these areas has undoubtedly had its own settlement dynamics, the region offers an ideal opportunity to compare the developments of settlement patterns and socio-political organization in both areas.

Strategy

As a regional research project, the *Riu Mannu* survey combines a general and

Fig. 2. The principal landscapes of west central Sardinia (reconstructed situation in the later 1st millennium B.C.; grey tones indicate land above 100, 300, 400, 700 and 1000 m above sea level respectively).

several specific objectives. Given the sheer size of the study area, which prevents its complete coverage, a probabilistic sampling strategy had to be defined. A general sample is obviously the best method for the general level and it constitutes a background for the specific questions as well. With regard to the latter, one or more 'core areas' had to be established for more intensive fieldwork. In these areas, a larger sample should be taken so that more detailed patterns become recognizable.

Starting from the specific questions and from the articulation of the research area into three essentially different landscapes, two core areas have been defined (Fig. 3). These are strategically situated in the transitional areas between the three landscapes. In the first area, the Arborèa lowlands and the Campidano plain meet along the lower course of the Riu Mannu at the foot of the Iglesiente mountains and the Monte Arci. The other area is situated in the border zone between the Campidano plain and the Marmilla hills. It includes the transitional zone between the two *Siedlungskammer* of west central Sardinia.

From a statistical point of view, the definition of the core areas is biased, as it is based on specific questions, available archaeological and historical data, and the geomorphology of the region. For this reason, a second (stratified probabilistic) sample has been drawn from a grid of so-called 'standard transects' which had been laid out over the *entire* region (Fig. 3)[2]. The eventual sample which is investigated intensively, consists of the intersection of both samples: twenty-three transects or parts of transects within the two core areas and eleven (parts of) transects in the remainder of the three landscapes (Fig. 3).

The field walking techniques have been designed after earlier experiences in Indonesia (van de Velde 1984) and Italy (van Dommelen 1992). The major problem of the traditional technique of field walking is the often highly variable visibility of surface finds (see Shennan 1985: 1-45). As a consequence, quantitative registration of off-site material is rather problematic. As an alternative to linear observation by field walking, a point-by-point sampling technique has been adopted, which is more or less comparable to 'test pitting' (cf. Nance and Ball 1986). In practice, this means that only discrete points (usually 2 m^2) are examined, where all finds are collected, regardless of their quality. This strictly quantitative collection is matched by a so-called qualitative collection, which basically consists of all diagnostic materials encountered outside the collection points. In this way, the problems of archaeological visibility and quantification are largely overcome.

Archaeological survey and the processing of ceramic finds

The fieldwork campaigns of the *Riu Mannu* survey have annually taken place in autumn since 1992. Until now six transects within the first core area in the Riu Mannu estuary have been completely investigated. Two more transects have been surveyed in the Marmilla, just outside the other core area.

In total, 20 concentrations ('sites') have been encountered in the six transects investigated within the core area, which have provisionally been dated from the

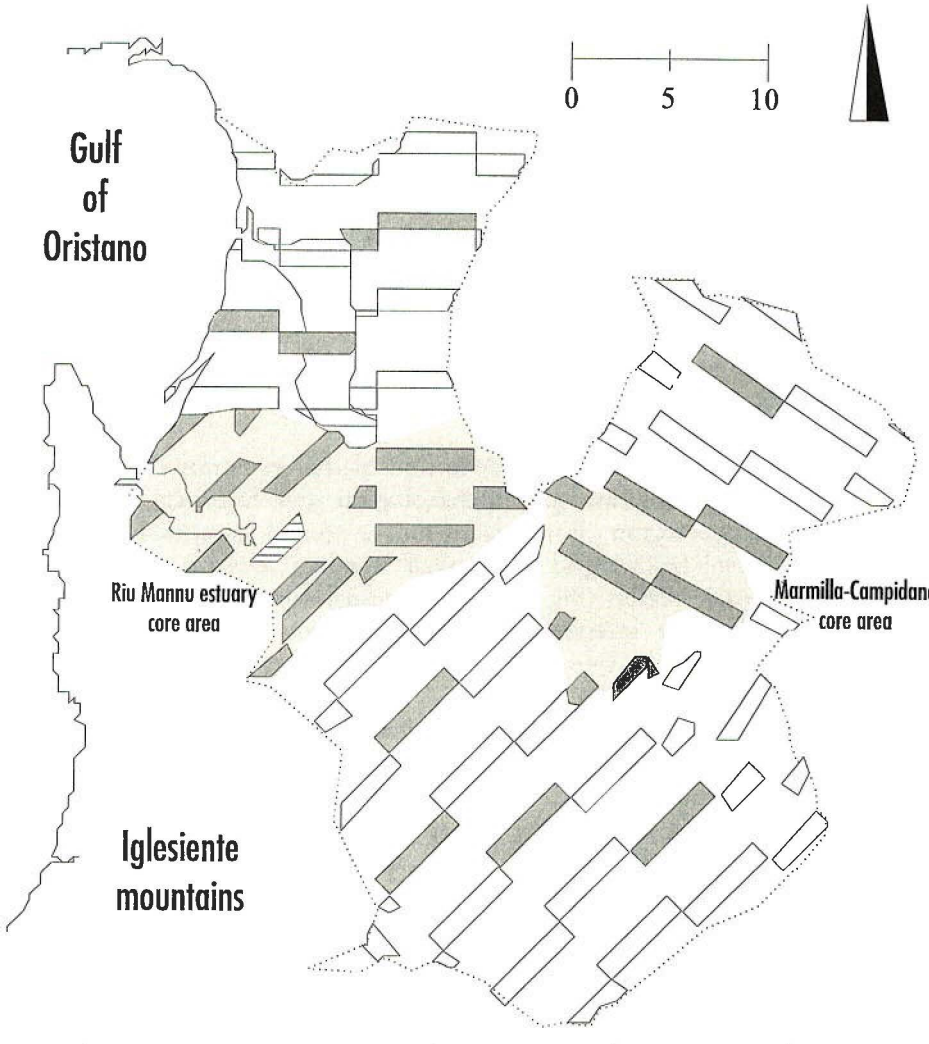

Fig. 3. The *Riu Mannu* survey sampling strategy: the sample under investigation (dark shading) consists of the intersection of two core areas (light shading) and a probabilistic sample taken from the entire region. The hatched transect is Transect 02 'Santa Chiara'.

(Late?) Neolithic until the Late Roman Period. The Punic period and Roman Imperial period appear to be remarkably well represented, respectively 50% and 30% of all concentrations. At the moment, the so-called 'site-density' in the Riu Mannu estuary core area has been estimated at ca. 7.2 concentrations per km^2. In the Marmilla hills, on the contrary, settlement appears to have been much less dense: only two minor concentrations have been found, both dating to the Roman period. An almost continuously present, if sometimes very thin, off-site distribution

nevertheless suggests human activities in other periods as well.

Like in most archaeological surveys, in the *Riu Mannu* project the ceramic material constitutes the bulk of the finds. Ceramics, both potsherds and building material, make up 77.3% of the collection. The average density is 2.40 sherds per m^2. Obsidian is also rather common with 0.35 fragments per m^2. It accounts for 19.4% of all fragments found. The remaining 3.2% of all finds consists of roughly equal quantities of flint and other sorts of stone, among which also marble, and other miscellaneous objects, such as glass and remarkably little metal. The density of each category is approximately 0.05 fragments per m^2.

Since Neolithic times, pottery has been very common in Sardinia. This constant presence, the variety of forms and functions, and the diversity of the modes of production and distribution in the various periods, make pottery the principal source of information for the *Riu Mannu* survey.

Apart from chronology, through ceramic analysis we expect to recover information about density, scale, diversity and hierarchy of settlements in the various periods. In this way, we hope to improve our understanding of the changing territorial organization in the wider socio-political and economic context.

Thus, an important role is given to pottery. Too important, one might say, since pottery is only one of the categories of artefacts representing the material culture of a society, and its preponderance in the archaeological record is above all based on its constant and abundant presence. This source should nevertheless be consulted as accurately as possible. In the analysis and processing of the recovered material, however, efficiency is indispensable, as restrictions on time and budget impose limits on the research plan[3].

The research plan

As explained above (p. 35), the artefacts are collected according to two different criteria. At the collection points all artefacts found within 2 m^2 are bagged. These make up the quantitative collection, which is the only one reckoned with in the statistical processing of the data. This first collection is complemented by a qualitative collection consisting of finds with a diagnostic value, picked up along the lines joining the collection points. This selective collection is obviously not taken into consideration for purposes of statistical processing. It serves exclusively as a support for the identification of quantitatively collected artefacts which are often extremely eroded[4].

Gathering all finds at the collection points has entailed the decision to regard these as if they had been excavated. This means that the ceramic material that was picked up is subjected to the same methods of recording and analysis as applied to pottery excavated in a stratigraphical context.

To determine the subsequent approach to data processing, a 'pilot study' was set up as a first step. The main goal was to get a clear picture of the problems posed by the ceramics, in particular with a view to building a suitable data-base. For this

purpose, we have chosen Transect 02 'Santa Chiara', which is situated at the heart of the Riu Mannu estuary core area (Fig. 3). This transect is relatively rich in concentrations ('sites') and the collected material is sufficiently varied, but not too heterogeneous[5].

Pilot study

Prior to the quantitative analysis of the pottery from the collection-points, both on-site and off-site, the qualitative collections of the three concentrations ('sites') A, B and D in the Santa Chiara transect have been examined (Figg. 3 and 4)[6].

The finds have first of all been divided into four classes according to their overall texture: very coarse, coarse, medium and fine. This classification also applies to eroded sherds, which at first sight appear to be without any diagnostic value. Next,

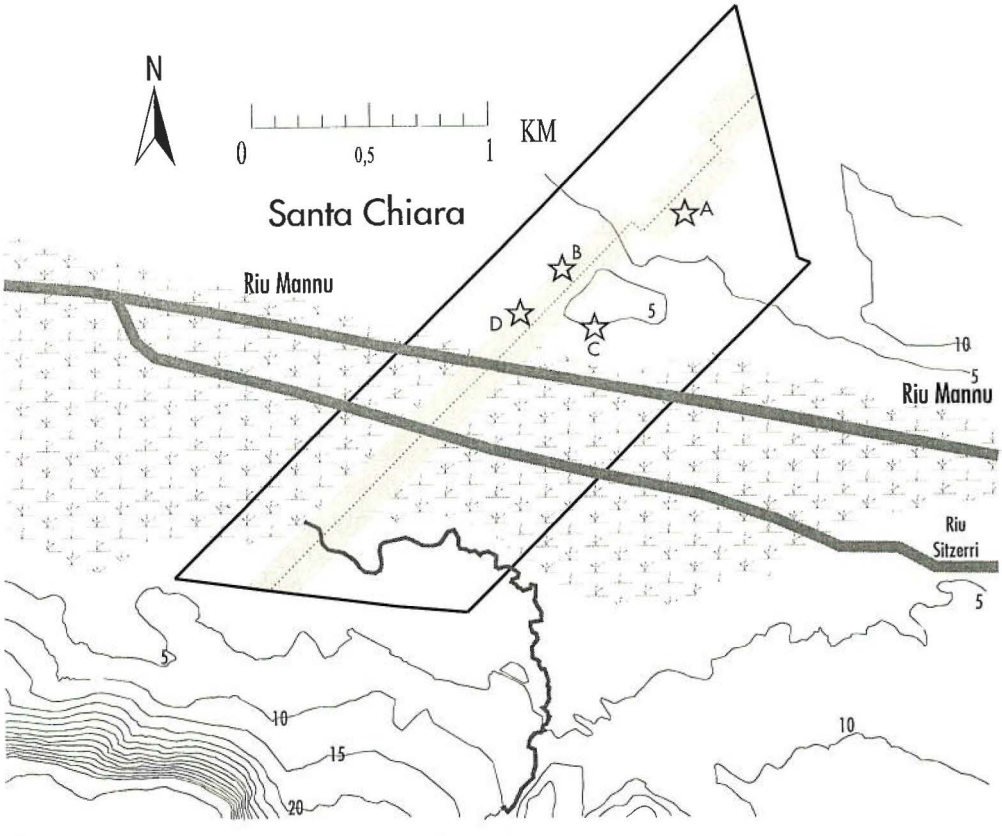

Fig. 4. The Santa Chiara transect (02), showing the sample grid examined and the sites attested in it as well as the canalized courses of the Riu Mannu river and its tributary the Riu Sitzerri and the reconstructed extent of the Riu Mannu estuary swamps (altitude in m above sea-level).

within the four classes just mentioned, the fragments have been assigned to broadly defined functional categories[7]. The registered weight and numbers per category have only an indicative value, as is the case with excavated material out of context.

Eventually, each fragment is, as far as possible, described in detail: functional category, shape and possible finishing (treatment of the surface and decoration), manufacturing technique, provenance, typo-chronological data, bibliography and, if applicable, graphic and photographic documentation. Similarly, the same basic classification according to texture is then used in the processing and recording of the quantitatively collected sherds. Weight and numbers of the fragments assigned to each of the four basic categories are important. Even more important, however, is in this case the quantitative registration of the different fabric types that have been distinguished within the basic categories just mentioned[8]. The other features that are registered, whenever possible, are shown in Table 1.

Coordinates	Texture	Very Coarse	Coarse	Medium	Fine	Total
Transect:	Weight	gr.	gr.	gr.	gr.	gr.
	Number of fragments	fr.	fr.	fr.	fr.	f.r
Coordinates:	Fabric types					
	Weight	gr.	gr.	gr.	gr.	gr.
Concentration (if applicable)	Number of fragments	fr.	fr.	fr.	fr.	fr.
	Other details					

Registration no.	Texture	Fabric	Function	Shape	Finishing	Manufacture	Provenance	Other details	Documentation (Drawings-photos-bibliography)

Table 1. Form used for registering all relevant details of the qualitative collections.

Fabric analysis

From the above it is clear that major importance is attached to the characterization of the different fabrics. This is based on both a number of general considerations and the particular situation of the *Riu Mannu* project.

Identification and dating of the finds are the basis and *conditio sine qua non* for answers to further-reaching questions about the characteristics of the different 'contexts', the functional associations, the relative density of the different categories in the various periods, and the calibration of the data (Millet 1987; 1991a; 1991b). The more diagnostic materials are available, the clearer the picture emerging from the regional analysis will be. A major handicap for the identification of surface finds is, as is well known, the loss of the formal and decorative characteristics. Even for local specialists, identifying such materials is not easy. All categories are affected by fragmentation and erosion. The more fragile artefacts from the pre- and proto-historical periods obviously suffer most, but the stronger products from the Punic and Roman periods can be equally affected by erosion and fragmentation. The fabric is often the only available datum. It makes sense, therefore, to characterize the most common fabrics from the different periods, which thus can be more reliably quantified in each transect[9].

Some preliminary results

The analysis of the qualitative collection of Transect 02 'Santa Chiara', which is still in a purely visual phase, has produced, among other things, the identification of two fabrics. These are assumed to be local since they are both very well represented in various periods and used for huge jars (*dolia*) and building material. The first fabric is widely distributed and has a strongly iron-bearing, red-brown and very porous matrix including a huge amount (30-40%) of sand with a great deal of quartz and other grains of variable fractions and sorts. Probably, the clay was quarried near the Riu Mannu river. The second fabric is much less common. It has a clear calcareous, yellow-white and rather compact matrix[10], including a smaller amount (20-30%) of inclusions among which dark grains (obsidian?) and grog. This fabric has mainly been found in the area south of the Riu Mannu river and only sporadically on the northern bank. The clay might come from the small peninsula of Capo Frasca, where Miocene marls surface in various places. The former fabric is not only used for tiles and bricks, but also for large *dolia* with finger imprints on the rim and foot (Fig. 5) as well for large so-called *salvacenere* ('ash-shields'). Both of these have been ascribed to the Punic period (Taramelli 1918: 140; Zucca 1987: 183; 186). Numerous amphorae dating from roughly the same period are characterized by the same fabric.

A third fabric has been identified as having been imported from coastal Tunesia. This was made possible by the presence at the Institute of Pottery Technology of a collection of Phoenician amphorae from an excavation in Carthage, which has

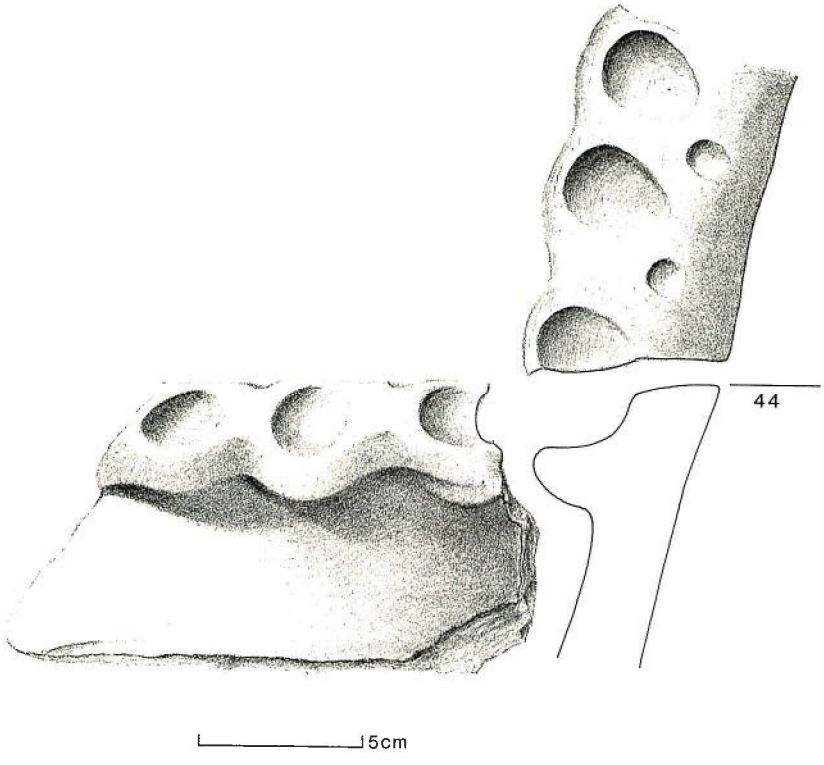

Fig. 5. A rim of a large *dolium* decorated with finger imprints (from site 02-A; reg. no. 02 50 250 33x).

enabled a direct comparison - this time also microscopically, using thin-sections - between amphorae produced in Carthage and some amphora fragments picked up in Transect 02[11]. Petrological analysis has proved the fabrics to be almost identical[12]. This shows once again the importance of comparing survey finds with excavated and well-dated material (cf. int. al. Yntema 1994: 9-10; Attema 1993: 208; 261-263). Unfortunately, only emergency excavations have taken place in the study area, which represents a serious obstacle for this type of research[13].

Finally, as to the character of the settlements in the Santa Chiara transect, it can be said in anticipation of a final report, that the bulk of the ceramic material of the three sites A, B and D can be dated to the Early Punic period: 5-4th century B.C., in some cases probably late 6th century. The sites A and B are characterized by the presence of roof tiles, large storage jars, Punic transport amphorae, cooking pots and fine table ware (Attic black glaze). This leads to the assumption that these represent permanently inhabited farms that were not only involved in agriculture, but also had access to colonial trading networks. Their location and the distribution of the off-site finds confirm this idea. Site D is different: the ceramic material consists almost exclusively of roof tiles and a remarkably high number of Punic

transport amphorae. Cooking pots and table ware are almost entirely missing. Its position on the northern bank of the river, close to the city of Neapolis, suggests a commercial function.

Notes

1. At Leiden University, the Classical Archaeology Section of the Department of Archaeology (Peter van Dommelen) and the Laboratory for Palaeoethnobotany (Corrie Bakels) also contribute to the *Riu Mannu* survey project. In Sardinia, it is supported by the Archaeological Service of southern Sardinia (*Soprintendenza Archeologica per le province di Cagliari e Oristano*), which has kindly granted permission to carry out fieldwork. We are also indebted to several other professional and amateur archaeologists active in the region, in particular Ubaldo Badas, who directs the municipal museum in Villanovaforru. At Cagliari University, Rita Melis of the Department of Geology actively participates in the *Riu Mannu* project. The local council of Gùspini (CA) provides lodging and several other facilities. The *Riu Mannu* survey project is primarily financed by the Department of Archaeology of Leiden University as well as by the Foundation for History, Archaeology and Art History (SHW) which is part of the Netherlands Organization for Scientific Research (NWO).

2. On the basis of exclusively geomorphological criteria, a number of internally more or less homogeneous strata have been defined in which 'standard transects' of 1 x 5 km have been plotted with an orientation at right angles of the over-all direction of each stratum.

3. Henk Franken has often pointed out this aspect (e.g. Franken 1983). The same warning can be found in Fulford and Peacock (1984: 2-4). More recently, the same problem has been addressed by van As (1991/1992: 1-6) and Orton *et al.* (1993: 39-43).

4. The registration number indicates the type of collection.

5. The permit, conceded by the *Soprintendenza Archeologica per le Province di Cagliari e Oristano*, to export the material temporarily to the Netherlands is essential for laboratory analysis at the Department of Pottery Technology in Leiden. During the field campaign there is hardly any time for anything else than registering the finds.

6. Concentration C has not been taken into consideration, as it is located outside the sample grid of the transect.

7. It is a very general classification suitable to all periods under consideration: building materials, *dolia* and other large storage jars, transport amphorae, so-called utilitarian wares, cooking pots, table wares, and miscellaneous objects (oil lamps, terracotta figurines etc.).

8. Fabric is the spatial arrangement and the relationship between the three components of the texture: matrix, grains and voids (Stienstra 1986).

9. At this moment some fabrics have been distinguished only visually. Macroscopical and thin section analysis will follow in time (cf. Annis 1992a and 1992b).

10. With regard to the causes of the pale colouring of pottery, see Jacobs 1991/1992: 7-21.

11. The excavation is a project of the University of Hamburg, directed by Hans Georg Niemeyer with the assistance of Roald Docter of the University of Amsterdam (Niemeyer, Docter *et al.* 1993; see also Docter 1994). Different types of Phoenician amphorae from the excavation have been analyzed in the Institute of Pottery Technology. The type discussed here is an amphora which was produced in Carthage from the late 8th century until the 5th century B.C.

12. This is significant in view of the colonization of Sardinia (van Dommelen, in press).

13. The recently started systematic excavations in Pinn'e Maiolu directed by Ubaldo Badas (Villanovaforru, Marmilla) represent a welcome exception.

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ARTICLES

H.J. Franken

NOTES ON THE TYPOLOGY OF POT HANDLES AND GRIPS

The technology of handles is a somewhat neglected subject in pottery studies. Handles are usually considered as aids to pick up a pot and are described by their shape and section as well as being illustrated by a drawing. However, the construction and especially the sticking of handles to pots always required some skill from the potter and all handles had to meet one and the same requirement: they should not come off when handled. Apart from this technical aspect, handles vary according to the way they were meant to be used. A combination of these aspects tells us a great deal about the technical level of the potters and usage of pots. The following is a short introduction to the study of handles. The examples are taken from different periods of pottery in the Near East but apply to pots from other cultures too.

Loop handles

The shape, cross-section and attachment

Loop handles are usually thicker than the pot wall to which they are attached for reasons of strength and require more drying time, both during the drying and the firing stage. Thus the stretch of the pot wall between the two points of a loop-handles's attachment will stop contracting or shrinking when bone dry while the loop handle continues to shrink. One end is bound to become detached (Fig. 1:1) unless the potter anticipates this and takes special measures. It is these 'special measures' that interest us here.

Logically one would think that the solution is to construct a handle in such a way that no matter how much the handle shrinks the distance between the two points of attachment to the pot is not affected. The simplest but very weak construction would be a handle in the shape of a ring, attached to the vessel at only one point, as can be seen in some Hellenistic lamps. The ring can shrink and may even develop a little crack at the place of attachment without causing anay damage. A better construction is to open the ring somewhat and fix the two ends to the wall close together. Through shrinkage the ring will become smaller but not develop stress at both ends.

A handle which is not thicker than the pot wall will take the same drying time as the pot and settle without problems. Such handles are usually flat in cross section and may be several times broader than thick, since they need more strength than

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the pot wall. This technique can be seen on Roman cooking pots and jars from Petra (Fig. 1:2).

If a handle is of an even thickness and its shape is roughly semi-circular lengthwise, be it round or flat in shape looked at in cross section, it may keep a firm grip on the pot at both ends while drying, but the semi-circular shape will become more oval in the process. While settling it becomes shorter and the opening between pot wall and handle becomes smaller.

In the case of jugs, ideally the handle runs from the rim to the shoulder. Pot wall and handle roughly form a quadrangle or oval, equal in length on both sides, and the handle can settle by becoming less angular (Fig. 1:3). In the Early Bronze Age one finds juglets with handles that stick out above the rim (Fig. 1:4), which is a practical solution.

Handles on storage jars have to be strong. They often have an inverted L-shape, a short horizontal stretch at the top and a long vertical stretch. The shape is inspired by the function of the handles but the problem of shrinkage is most obvious here: the lower end tends to come off. In the Middle Bronze Age one finds two solutions. (1) The potter made the area of contact between the end of the handle and the pot wall larger by inserting a clay prop in the sharp angle between pot and handle. (2) The potter made a handle of clay heavily tempered with dung to reduce shrinkage in combination with a clay prop made of the same material (Fig. 1:5). Such a prop with a handle is to be found as early as the Pottery Neolithic period at Jericho (Fig. 1:6). Usually the potter could fix the upper end of the handle by pressing hard and give counter pressure on the inside of the pot wall. The mouth of the pot must be wide enough to insert a hand. If the potter could not reach the place of attachment of the lower end of the handle inside the pot by hand he tried to enlarge the area of contact, making the end of the handle thinner by spreading the clay (Fig. 1:7). Later, in Roman times, the lower part was often pinched between the fingers for better grip on the handle when pressing it against the wall (Fig. 1:8).

If the disadvantages of the inverted L-shaped handle are taken into consideration it is not surprising that the semi-circular or bow-shaped handle is far more common than the other type. The former does not usually allow the insertion of four fingers of the hand as the latter does and the occurrence of the inverted L-shaped handle may be connected with the need to use the whole hand for lifting the pot. The semi-circular handle occurs in many periods on bowls and jars of small or medium sizes as these can be held by two fingers of the hand (Fig. 1:9).

The manufacture

Modern potters think of loop handles as 'pulled handles', for which plastic clays are needed. One recognizes such handles from the shape which tapers towards the lower end of the handle. Such handles shrink heavily, often more than 10%, and the potter makes the loop wider than the intended final shape, (Fig. 1:1). But 'pulled' handles are rare in the Near East and in Palestine they first occur in the Middle

Bronze Age near Jerusalem where a fairly plastic clay was found. Pulled handles are found in Petra where good thrower's clay could be obtained and in Byzantine and Islamic times. Lean clays cannot be used in such a technique because when pulled the clay will tear. Most pottery made from calcareous clays shows loop handles made from clay rolls. But there are many grades of plasticity and so one may find rilled and slightly pulled handles. Normally the upper end is attached head on to the pot and the lower end sideways.

With the introduction of a 'fast' wheel and the use of clays with a higher degree of plasticity in the Near East sometime during the 7th century B.C., one would have expected the 'pulled' handle to be used, but other techniques for making handles were introduced. When potters started to use plastic clays and heavy wheels they automatically speeded up the production and made more pots. (This is a complicated process and it needs a socio-economic situation demanding large quantities of pottery). The production of handles had to be increased at the same rate and in the Near East this was done as follows: prepared clay was pressed into large thin sheets on a flat wooden surface. These sheets were cut into strips twice the width of the handle, and the strips were cut to the required lengths needed for jugs or jars. These cut strips were then folded lengthwise and the folds pressed together. In that way many handles could be made in a short time (Fig. 1:10).

The Petra potters developed another technique. A large thin tube of clay was thrown on the wheel. Using a needle the potter cut rings from this cylinder. These rings were as wide as the finished handle had to be. Then each ring was cut in half and so the potter had a whole set of handles ready for use. The width of the rings varies from less than one cm. to several cms. (Fig. 1:11). Since this clay was very plastic, twisted and fancy handles could be made for small objects (Fig. 1:12). Quite often one finds tiny loop handles on bowls from Petra which can clearly only be used as knob handles between thumb and forefinger. They are too small for even one finger to be inserted into them (Fig. 1:13).

It is quite well possible that the folded handles were stronger than the handles made from a clay roll from the same amount of clay, and this may also be true in the case where rolled or pulled handles show a somewhat pronounced relief in cross section (Fig. 1:14).

If handles were meant to be used for picking up the pot they had to be large enough to allow one or more fingers to be inserted, depending on the weight of the bowls or jar when filled with a commodity. Many storage jars may only have been taken up by the handles when empty. In the case of jars made for transport of wine, one finds really very sturdy, large handles. These are oval or circular in cross section and one can sometimes see that they were made from flat clay sheets which were first folded and then rolled. Pulled handles would certainly not have been strong enough. A similar case may be the double handles. Occasionally one finds them in early times and these clearly belong to the group of fancy handles. But when found on large Hellenistic storage jars they may have added strength.

Another case of a fancy handle that could be made very quickly can be found in Byzantine/Early Islamic times in white firing pottery. They have a profile in cross

section that could hardly have been made by the fingers. The potter may have used a wire template to cut such handles from a clay sheet (Fig. 1:15).

Cooking pot handles in Hellenistic and Roman times are often too small for one finger to be inserted. Maybe they became too hot to be handled anyway. These pots could only be lifted by taking the two handles between thumb and forefinger. In Byzantine times one finds broad cooking pot handles, horizontal in the middle which might have been cooler (Fig. 1:16). This design was continued with the manufacture of medieval hand-made cooking pots.

Bar (knob or lug) handles, ledge handles and grips

Loop handles are found right through the history of ceramics in the Near East. But they are by no means a common feature in every period. Before the Early Bronze Age they are comparatively rare. In the earlier cultures the loop handle was modelled by hand from a clay roll but it was found to be a bad construction and the potters prefered to fix such clay rolls full length to the pot and when vertically or horizontally attached they often pierced a hole through them. Often such grips were not meant to be used to pick up a pot, being too small for that purpose, but to hold a string in place which could be used to carry the pot. Such handles are sometimes found on the lower half of jars. This kind of bar, knob or lug handle was developed into a wider grip, the so-called ledge handles, applied to jars. They were often made from a clay ball, kneaded into a flat circular clay sheet which was folded double, cut in at the fold and then attached to the pot wall or made into two halves, each being used as a handle (Fig. 2:1). This assured a wide area of contact between pot and handle. To accomodate the handle to the curve of the pot wall the handle tended to curve up somewhat.

The bar handle is made from a clay roll split in half lengthwise and attached along the rim or just below the rim of bowls. The ends are pressed in, forming knobs. They are found on small and large bowls (Fig. 2:2).

The use of ledge, knob or bar handles is not restricted to the early cultures. For instance knob handles occur on many moulded lamps from Hellenistic times and ledge handles are found on some early lead-glazed cooking pots.

A good example of an efficient and time saving technique for producing a grip is the knob on the lids of Byzantine cooking pots (Fig. 3:1-3). The potter first made the lower half of the pot on the wheel as a dome shape (Fig. 3:1), then turned this bowl right side up (Fig. 3: 2) and pulled up the clay into another dome shape (Fig. 3:3). Before closing this part he pulled up the remaining clay and formed a knob. Then he took a needle and cut the lid from the pot. Both the inside base of the pot and the centre of the knob inside show the characteristic traces of this technique (Fig. 3: 4-5).

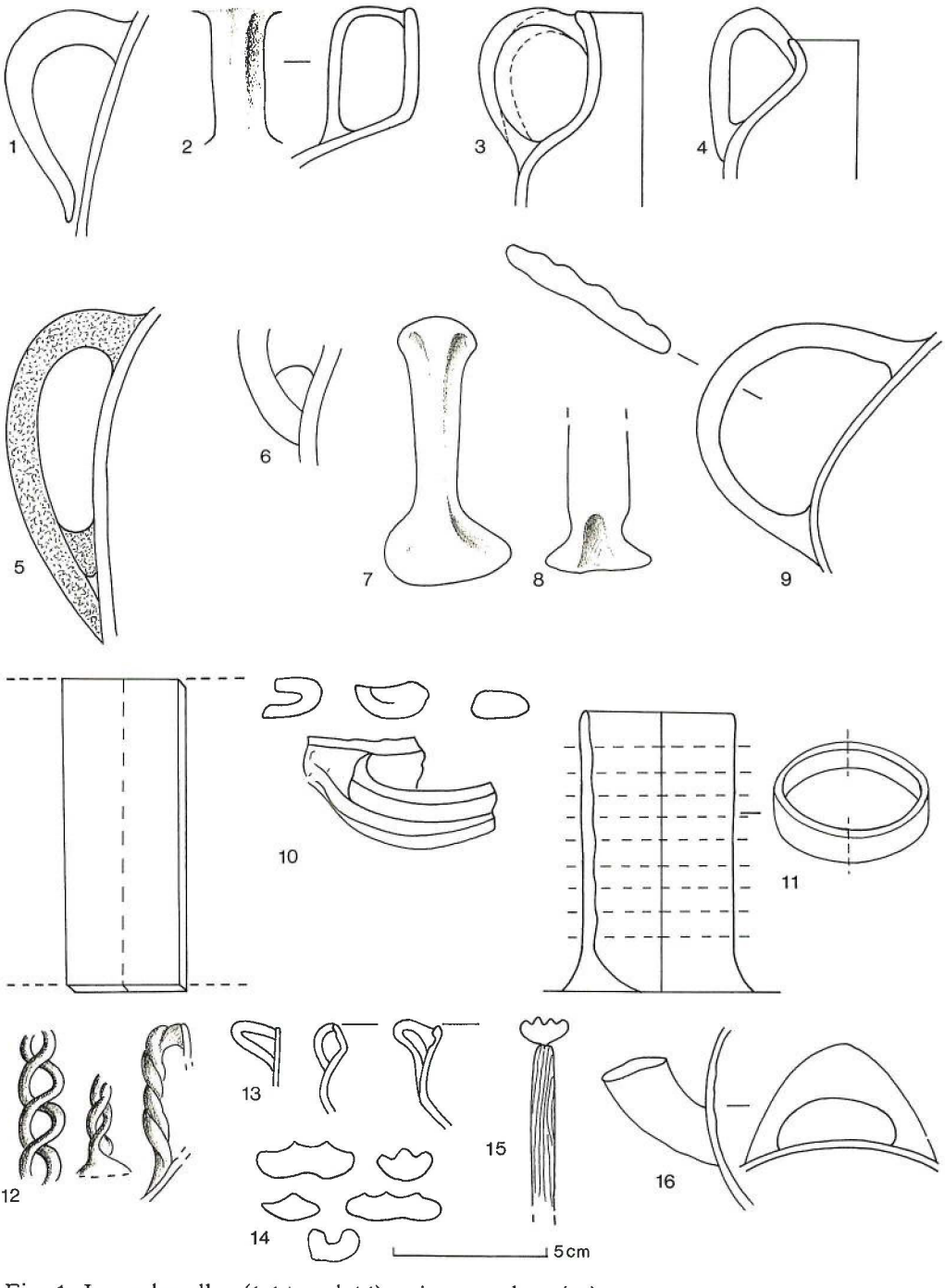

Fig. 1. Loop handles (1-14 and 16); wire template (15).

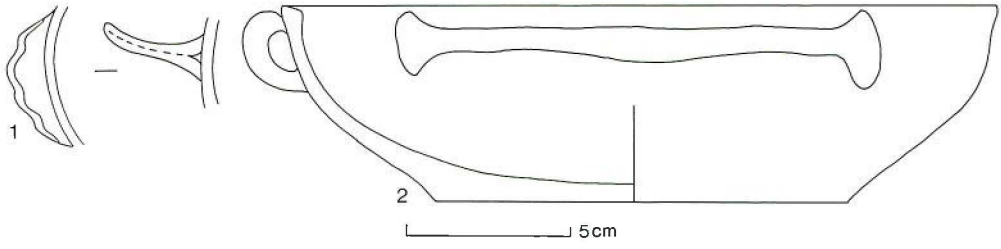

Fig. 2. Bar handles and ledge handles.

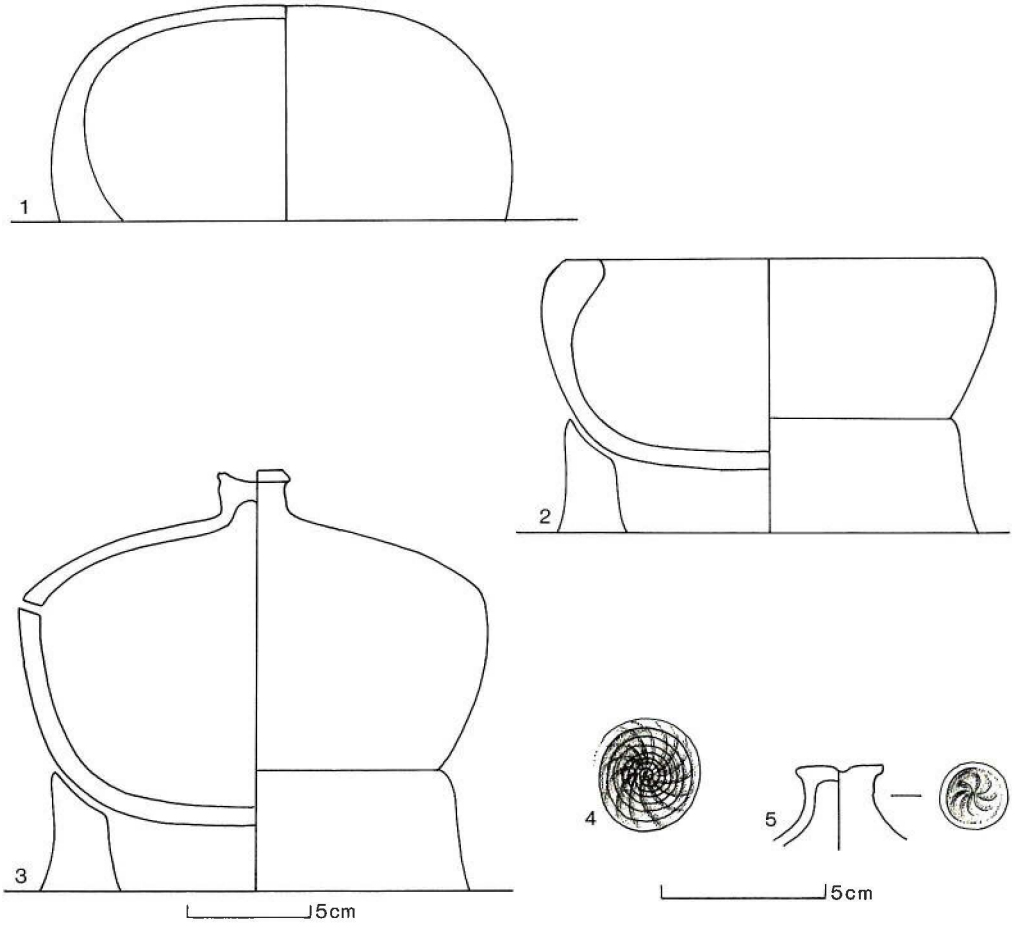

Fig. 3. Grips of Byzantine cooking pots (construction and characteristic traces).

Conclusion

This short survey of handles and grips shows that much useful information is stored in them. It points to the technical skill of the potters and demonstrates the need to classify handles in the context of the technological level of the periods from which they originate.

Knowing how the pot was handled gives a greater understanding of the usage of pots. Take for instance the Cypriot "milk bowls" with the wishbone handles. Could one pick up these bowls by the handle when they were filled without breaking it off? Or was the handle only meant for hanging the empty bowl on a peg? Modern jars for drinking water in countries with a hot climate may have one or two handles but those without have a long neck by which people lift them to drink. Once aware of such possible usages of handles and grips one will find in the study of handles, which includes also the absence of handles on pots, a rich source of additional information about pot construction and pot usage.

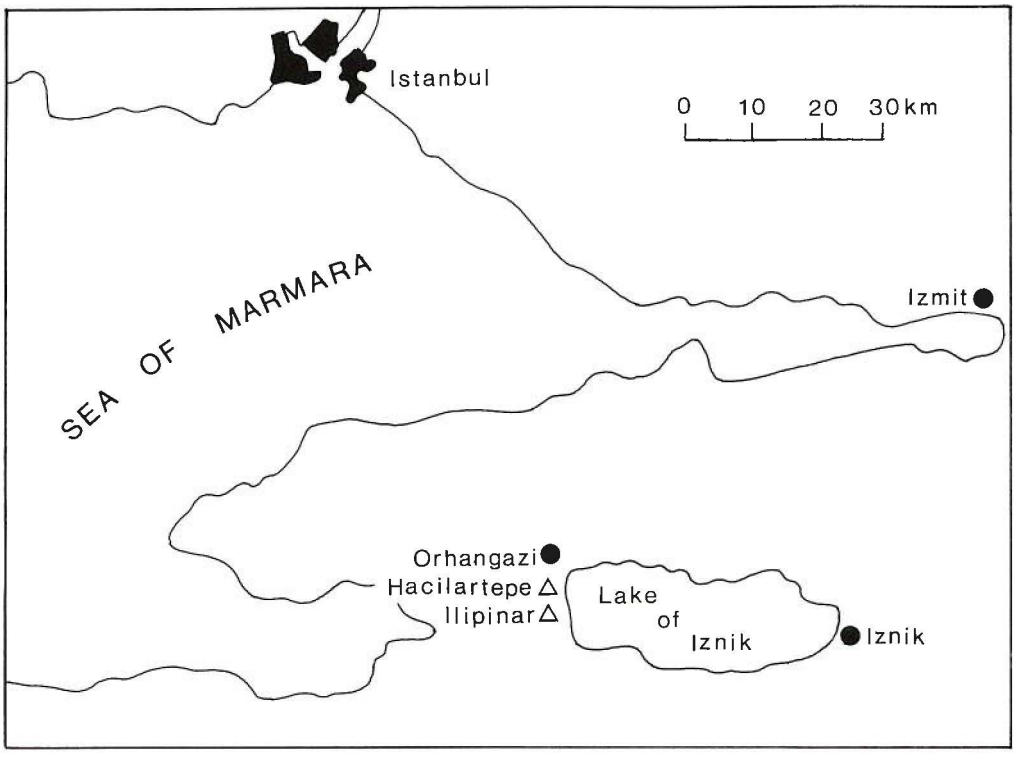

Fig. 1. Hacilartepe in northwestern Anatolia.

A. van As
L. Jacobs
M.-H. Wijnen

THE PRODUCTION SEQUENCE OF POTTERY DATING FROM THE EARLY BRONZE AGE EXCAVATED AT HACILARTEPE IN NORTH-WESTERN ANATOLIA

Introduction

Within the scope of the archaeological project "The pre-Trojan habitation phases of Ilipinar", which has been running since 1992 under the direction of dr. J.J. Roodenberg (The Netherlands Institute for the Near East, Leiden), the Institute of Pottery Technology has carried out technological research on Early Bronze Age pottery from Hacilartepe, situated close to Ilipinar hüyük (Fig. 1; see opposite)[1]. The pottery has been excavated from habitation layers in the middle of the mound (an area 10 x 10 m square). A representative sample of 1100 sherds was taken from a total of 5800 diagnostic sherds (rim-, base fragments and decorated sherds). This sample has been tested for the composition of the clay body and the shaping- and firing technique. The pottery repertoire consisted mainly of fragments of bowls, jugs, and pots. It also included fragments of large storage vessels and platters. The fine ware consisting of very small bowls formed a special category.

Clay body

The potters in the Early Bronze Age collected their clays from local deposits as they had done in the Neolithic and Chalcolithic periods. This can be concluded by comparing the analyses of the matrix and the non-plastics of the sherds and the clay samples from the surroundings of Ilipinar hüyük (see also Overweel in van As and Wijnen at press; Overweel in Pavlovics 1993)[2].

The natural clay contained mixed sand. After the very coarse sand grains had been removed, the clay was generally used by the potters immediately. No extra temper was added nor was the clay levigated. The presence of sand in the clay made it strong enough to build up a pot in parts. It prevented the collapse and deformation of the newly-formed clay-wall. Moreover, the adhesive strength of the rather plastic clay was raised. Only for the manufacture of the fine ware was the clay selected or prepared for its specific purpose. These conclusions can be drawn from the macro- and microscopical analysis of the non-plastic inclusions of a representative sample of sherds, before and after refiring (850° C, oxidizing atmosphere), seen

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on the fresh breaks and the cut breaks.

As far as one can determine, without using thin-section analysis, the mixed sand in the clay includes various minerals and rocks, like quartz, schist, gneiss, feldspar, jaspis, and hematite. These appear in both angular and rounded shapes. This indicates that the clay was not crushed before use. The non-plastics are badly sorted, the fabric shows little homogeneity and the inclusions are of various grain sizes. Except for the fine ware, this is true for all categories. The fabrics can be classified into many fuzzy-edged categories, ranging from a compact fabric containing a low to normal amount of medium to large grains right up to a crumbly fabric with a rather high amount of fine to coarse grains. No correlation between these categories and the different pottery categories (bowls, jugs etc.) could be established. Only the fine ware showed evidence of a mainly fine grain size.

The shaping techniques

Bowls

The category "bowls", with a rim diameter ranging from 16 to 24 cm, a wall thickness ranging from 6 to 10 mm, and a wobbly base, can be divided into deep bowls (Fig. 2) and shallow bowls (Fig. 3). The bowls possess a rounded, flattened or inverted rim. The deep and shallow bowls sometimes have handles (Fig. 12). The category termed "bowls" includes also small bowls and bowls with a rising rim and handle.

Deep and shallow bowls

The deep and shallow bowls were made by putting a flattened piece of soft non-sticky clay in a mould. The mould could have been an ordinary bowl. Next, the clay was firmly pressed and spread till a clay-wall of the desired thickness was

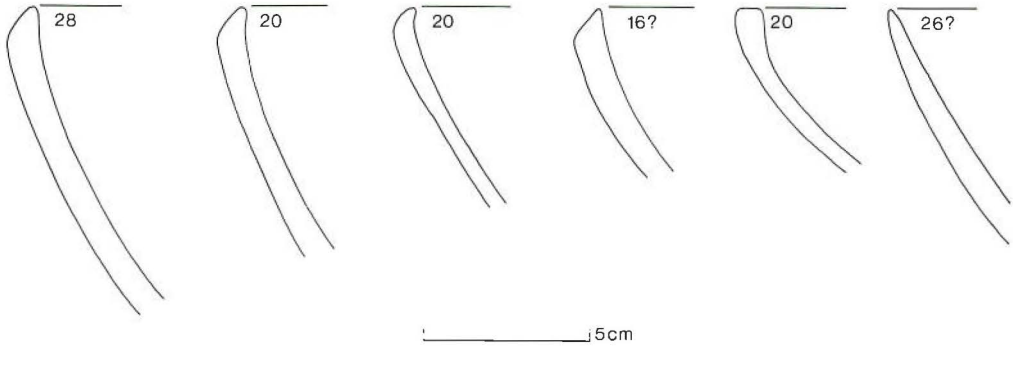

Fig. 2. Fragments of deep bowls.

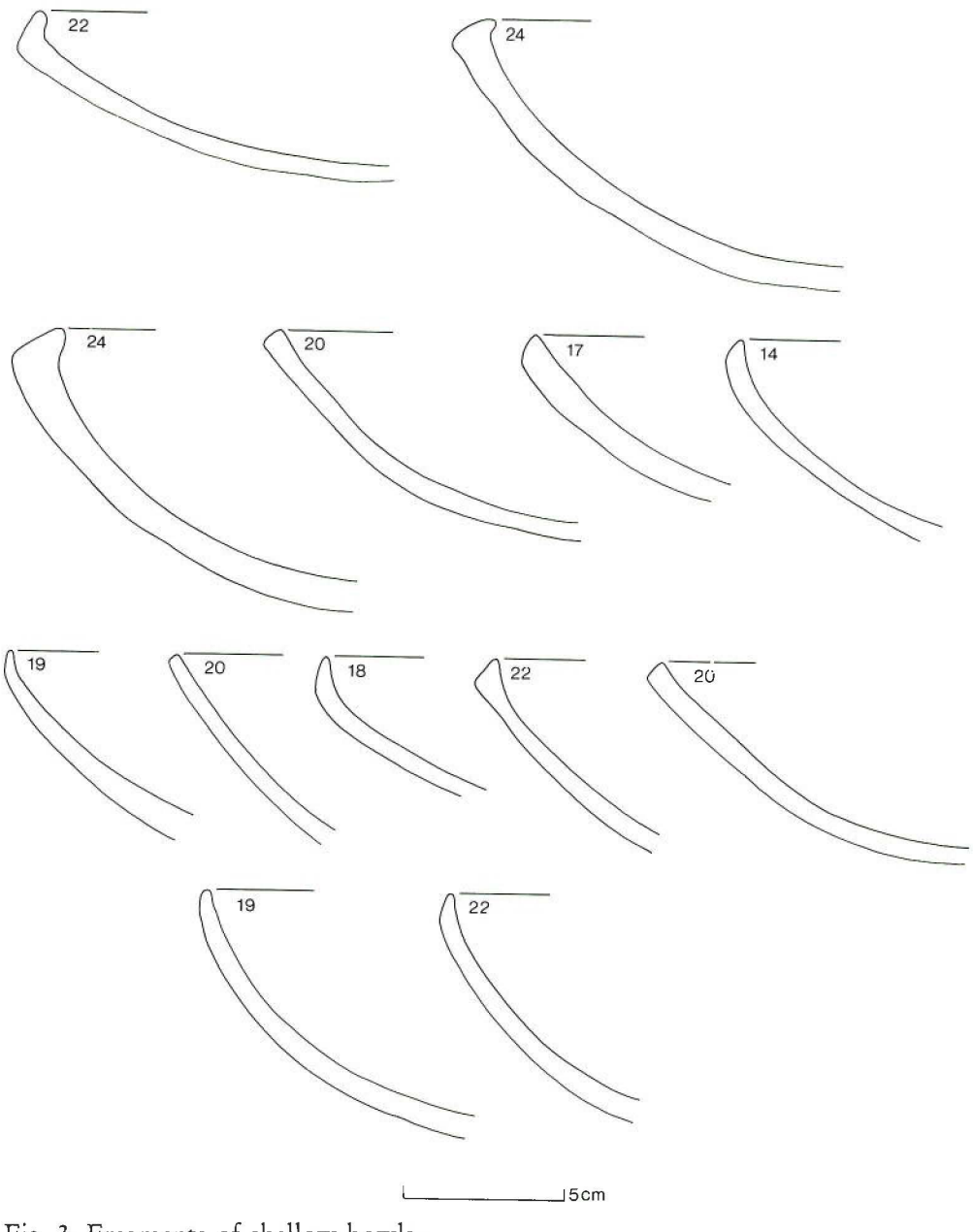

Fig. 3. Fragments of shallow bowls.

obtained. New clay was added repeatedly by pressing it obliquely across the clay-wall made a moment earlier. Irregularities in the surface on the inside were smoothed with the fingers or by using a curved rib following the profile of the bowls on

the inside. They ensured that the wall was of an even consistency.

The technique described above could be applied as long as the shape of the vessels was such that they could easily be detached, as in the case of the open bowls. However, if the wall of a vessel inverted at the top, it could not be made in a mould in one go. In cases like this - after some drying - one or more coils of clay were attached or pieces of clay were kneaded onto the top of the part made in a mould. The easiest way of making a inverted rim was by attaching a coil of clay which was subsequently smoothed out.

Since the coarse non-plastic inclusions did not shrink, they caused a slight thickening in the clay wall when it shrunk. Moreover, the soft to leather-hard clay around the places where the hard inclusions had been made was slightly indented during burnishing. The result was a more or less bumpy surface - whether polished to a gloss or not. The development of the gloss was dependent on various factors, such as the phase of polishing, the firing conditions, the fineness of the clay, and the absence of salts soluble in water. A high gloss was promoted by polishing the clay in a relatively dry stage, a black colour was caused by the atmosphere, being reduced during firing. A tight smooth surface could be obtained by adding a slib layer of fine clay before polishing. However, the slib layer was not actually necessary to produce a high gloss and was therefore often omitted.

The reconstruction of the shaping technique as described above can be concluded from the following observations and considerations:

- Apart from the joint of the rim, no traces of joints of coils have been found;
- The fractures of the bowls do not indicate coil-building;
- Unless a mould is used, as seen in the Early Bronze Age Hacilartepe repertoire, it is virtually impossible to coil bowls without constantly deforming the soft product;
- The bowls display a rather even wall thickness;
- If the bowls are flattened without using a mould it is difficult to control the shape. At the same time the wall thickness becomes less even. In this case the rather thick wall has to be scraped down afterwards;
- No traces of scraping have been found. Although the surfaces are usually burnished or polished some traces of shaping should have been left if scraping was a normal part of the scraping process. This is even more true, because the clay often contains many rather coarse grains.

Small bowls

The small bowls have a more or less spherical shape. Sometimes they have been adorned with small handles and/or decorations (Fig. 4). In general the small handles have been fastened by means of a dowelled-joint. Only in exceptional cases have the small handles been stuck to the bowls. The small bowls and the oval bowl have been made by pinching. In this technique the plastic clay is subjected to equal pressure in all directions. The small bowls were made by pressing a hole into a

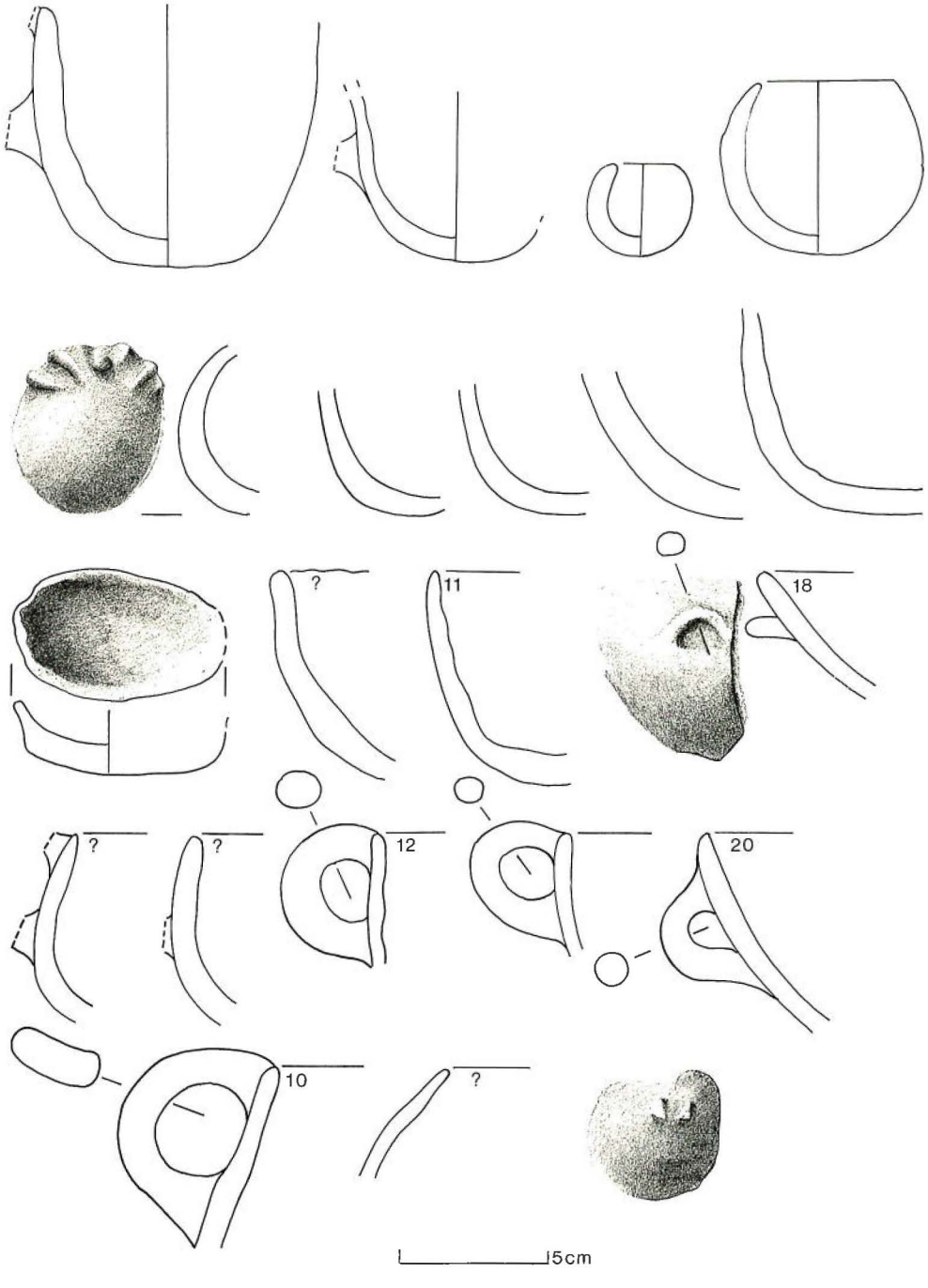

Fig. 4. Fragments of small bowls.

more or less spherical ball of soft clay using one or both thumbs. Next, the form was slowly rotated and the walls made thinner by kneading and spreading the clay between the thumb and fingers. By pinching the wall, the size of the bowl increased. Widening could be prevented by restricting expansion at the top of the bowl with the fingers. In general pinched bowls were rather roughly made. However, finer examples, often with a black polished finish, have been found too. The surface on the inside, if not burnished or polished, shows traces of the clay being spread and finger impressions. In general the surfaces of bowls with a slib layer were burnished. Mostly, however, no slib layer was applied. In general a type of clay including rather coarse sand was used for making the pinched bowls. Since this type of clay did not allow the potter to pinch thin walls, the walls became rather thick. When a rather fine clay was used, the walls of the bowls are often less thick.

The reconstruction described above can be concluded from the following observations:

- The shape and the limited size;
- The thickness of the walls;
- The irregular pattern of pinching and spreading the clay, visible on the outer surface.

Small bowls with a pouring lip

In this category of bowls the wall opposite to the handle is slightly raised thus making the lip suitable for pouring liquids (Fig. 5). The bowls were made by pinching as described earlier. The handle was made of a bent coil of clay which was attached by piercing a hole in the wall of the bowl and inserting a pointed roll of clay. The joint was closed by adding some extra clay. This so-called dowelled-joint was necessary since the fastening of the handle at the bottom had to be at right angles to the wall. By doing this the handle did not easily break loose due to shrinkage in the drying process. This hazard is connected with the direction of the shrinkage tension affecting the handle. However, the fastening at right angles was problematic. Fastening handles by merely sticking them on and spreading the clay was not good enough. For this reason, the remarkable dowelled-joint was applied, an efficient solution more common for metal objects than for earthenware. As to shrinkage, the fastening of the handle at the top was less problematic. In the first place, because it was easier to fasten the clay at the top. In the second place, because the wall at the top had a certain amount of give by which the shrinkage tension could be sufficiently absorbed. The handle was fastened to the rim by kneading and spreading the clay with the help of a rib. The bowls with a pouring rim were polished on the inside and on the outside as well. Some bowls in this category have little spouts as well. These bowls were made using the same technique.

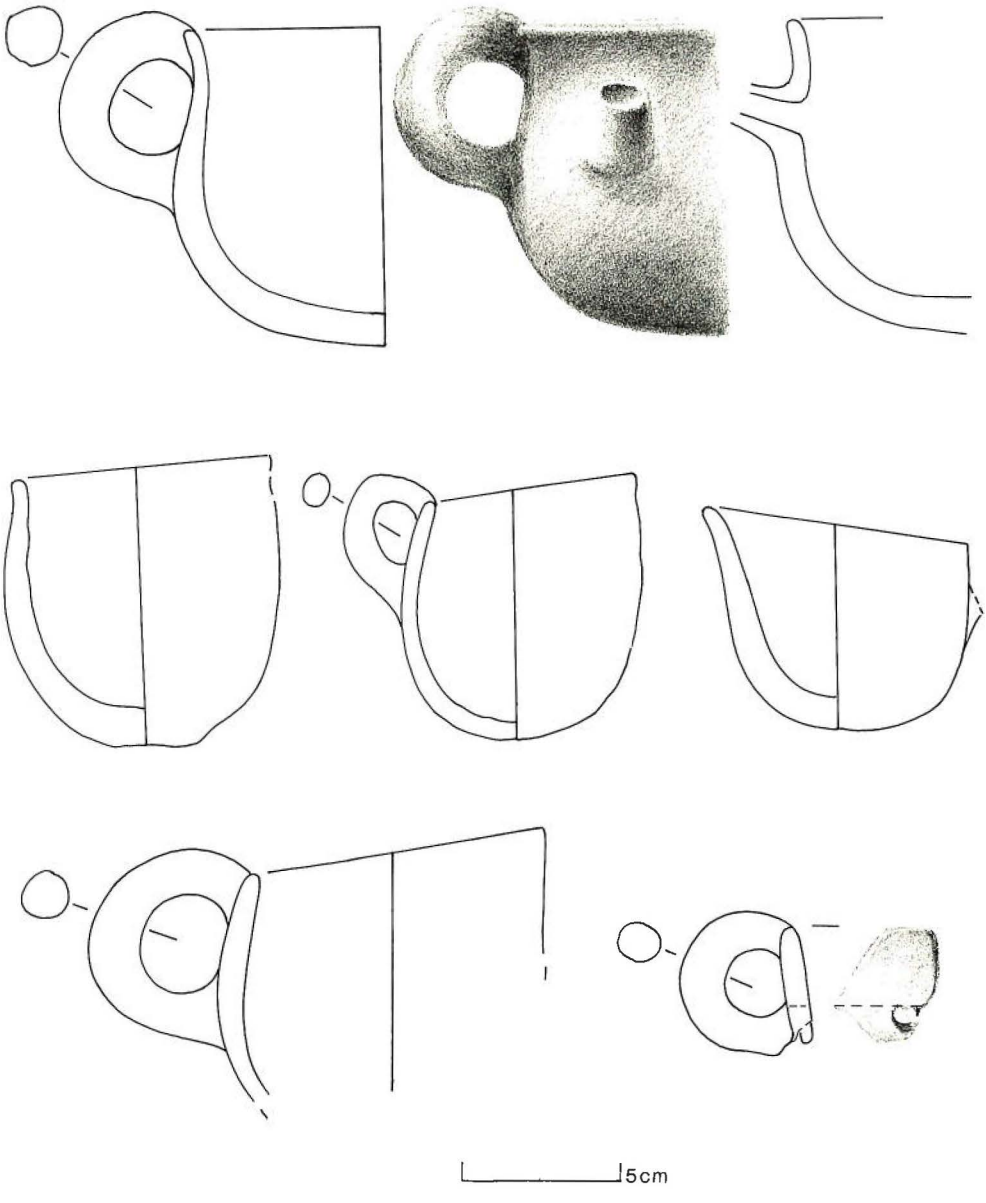

Fig. 5. Small bowls with pouring lip.

Jugs

The jugs come in various sizes, ranging from ca 10 to 90 cm in height (Fig. 6). They have an almost wobbly convex base, a little flattened in the middle. The jugs have a neck with a pouring rim and a handle running from the rim to the shoulder.

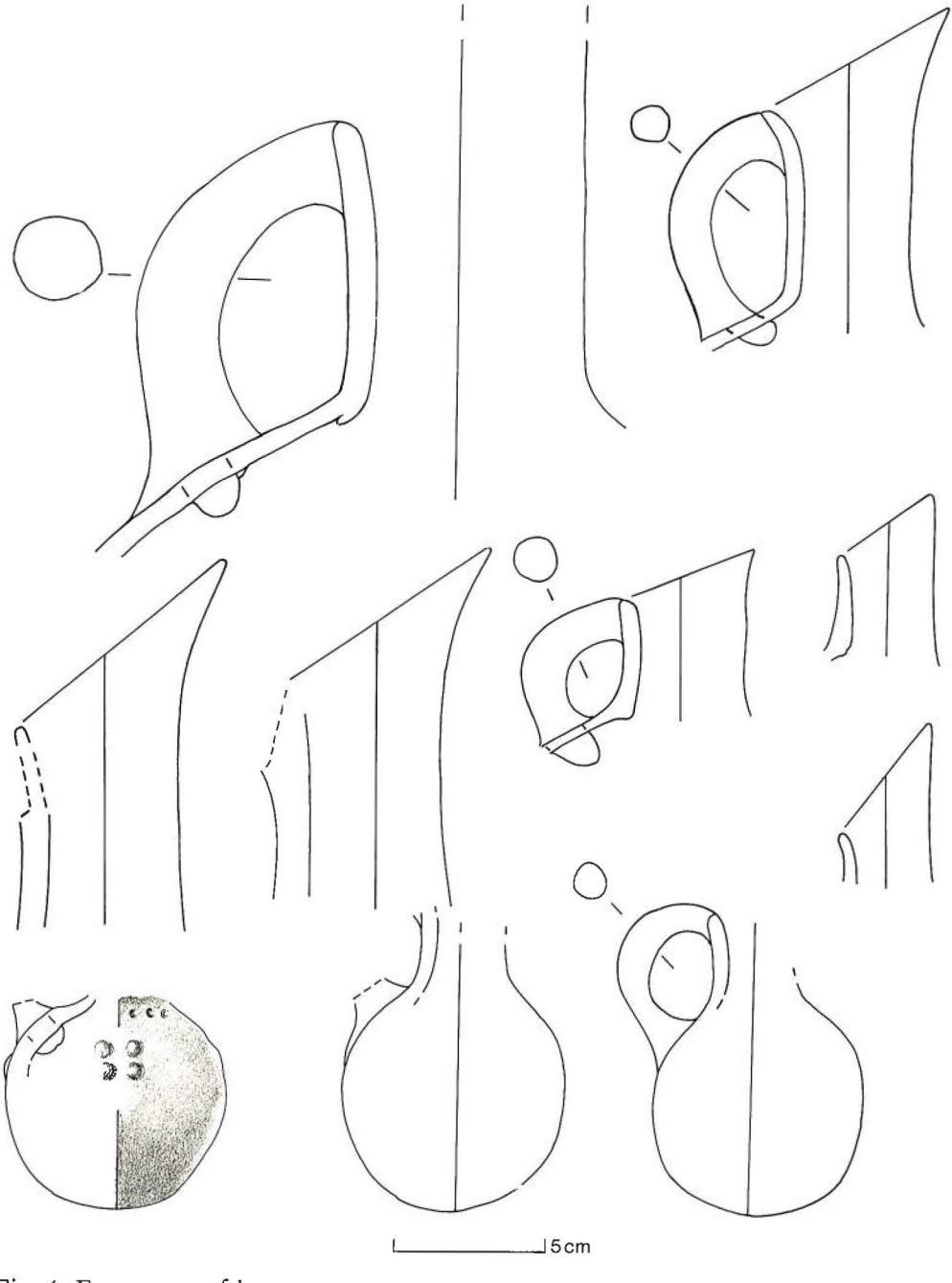

Fig. 6. Fragments of jugs.

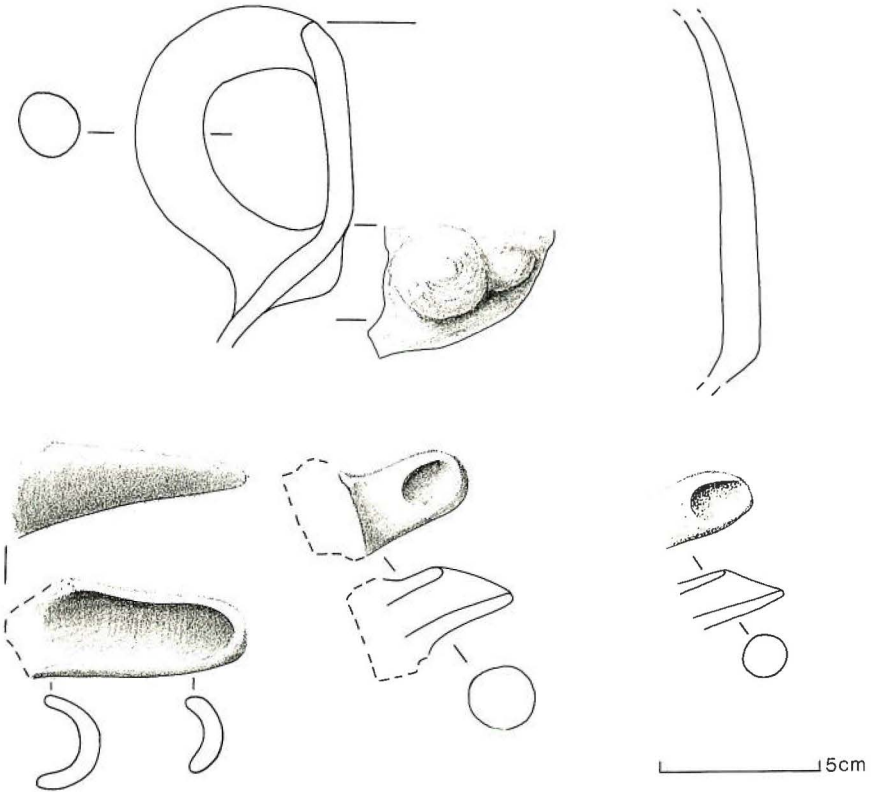

Fig. 6 (cont.). Fragments of jugs.

The bases could be made easily and quickly in a mould. After some stiffening the base part was taken from the mould. Next, the wall was built up by adding flattened pieces of clay. Initially, the surface on the inside could be worked with help of a rib, while supporting the outside. This way, the wall became smoother and reached the desired thickness. In addition, the fastening of the modelled pieces of clay was strengthened. Apart from using a rib the surface on the inside, it was also smoothed with the fingers. The joints between the various modelled pieces of clay were not always smoothed on the inside and some parts were more even than others. This was only done on the outside. The surface on the inside of the shoulder could not be scraped because of its position and because the opening became smaller. By letting the clay stiffen a little more each time, it was possible to make rather large jugs without the likelihood of their collapsing under their own weight. In this respect large amounts of non-plastic inclusions in the clay were an extra beneficial factor. Meanwhile another jug could be made. In this way it was possible to make two or more jugs at the same time. One was also able to work on the neck which - like the handle - was made separately. After a little drying, the

cylindrical neck made seperately was set on top of the opening in the body and fastened through the neck opening at the inside. Unlike the outside, the joint between body and neck on the inside was not smoothed over with some extra clay. No hand would be able to pass through the small diameter of the neck of the small jugs. These necks are often too long for the fingers to pass through. In cases like this, the lower part, made separately, was fastened to the body in the fashion described earlier. Next, the neck was finished by modelling. The surface on the inside of the narrow necks was smooothed with a little water or slib, indicating that the clay was used when it was rather soft. This was only possible when drying phases were inserted to enable the clay to stiffen. By using a rather soft clay the potter was able to make stronger joints.

The handle was made by putting a rolled piece of clay through an opening in the shoulder. The other end was fastened to the rim of the neck. The joint was smoothed over with a little extra clay. The same was done where the handle goes through the body. In this way the handle was strengthened. Some handles taper a little at the top. If this type of handle was too thin, it was thickened by spreading some extra clay on to it. Smoothing of the pointed handle on the inside of the shoulder was only possible if the neck was wide enough.

Finally the jugs were polished. Also, if possible, on the inside of the neck. A slib layer was not usually necessary.

The reconstruction of the shaping technique was based on the following observations:

- Traces of pressing, spreading and scraping of the clay on the inside of the base;
- Traces of the modelling technique, such as finger impressions, traces of tearing and joints overlapping obliquely at the inside of the body and shoulder;
- Traces of setting in the neck;
- Traces of the dowelled-joint of the handle;
- Traces of using soft wet clay on the inside of the neck.

Pots

The pots of various sizes show a slightly bent rim profile (Fig. 7). The diameter of the rim ranges from 16 to 24 cm. The thickness of the wall ranges from 7 to 11 mm. Sometimes, they have been provided with a horizontally or vertically fastened handle. Based on the rim fragments alone - it is uncertain which base fragments within the repertoire might belong to the category of pots - the general impression is that the pots were made by modelling. At the top a coil was sometimes added in order to make a horizontal lip. The handles at right angles to the wall were fastened using the dowelled-joint method. They were usually stuck to the rim. The surface of the pots - mostly the outer surface stretching over the rim - is often roughly smoothed by polishing.

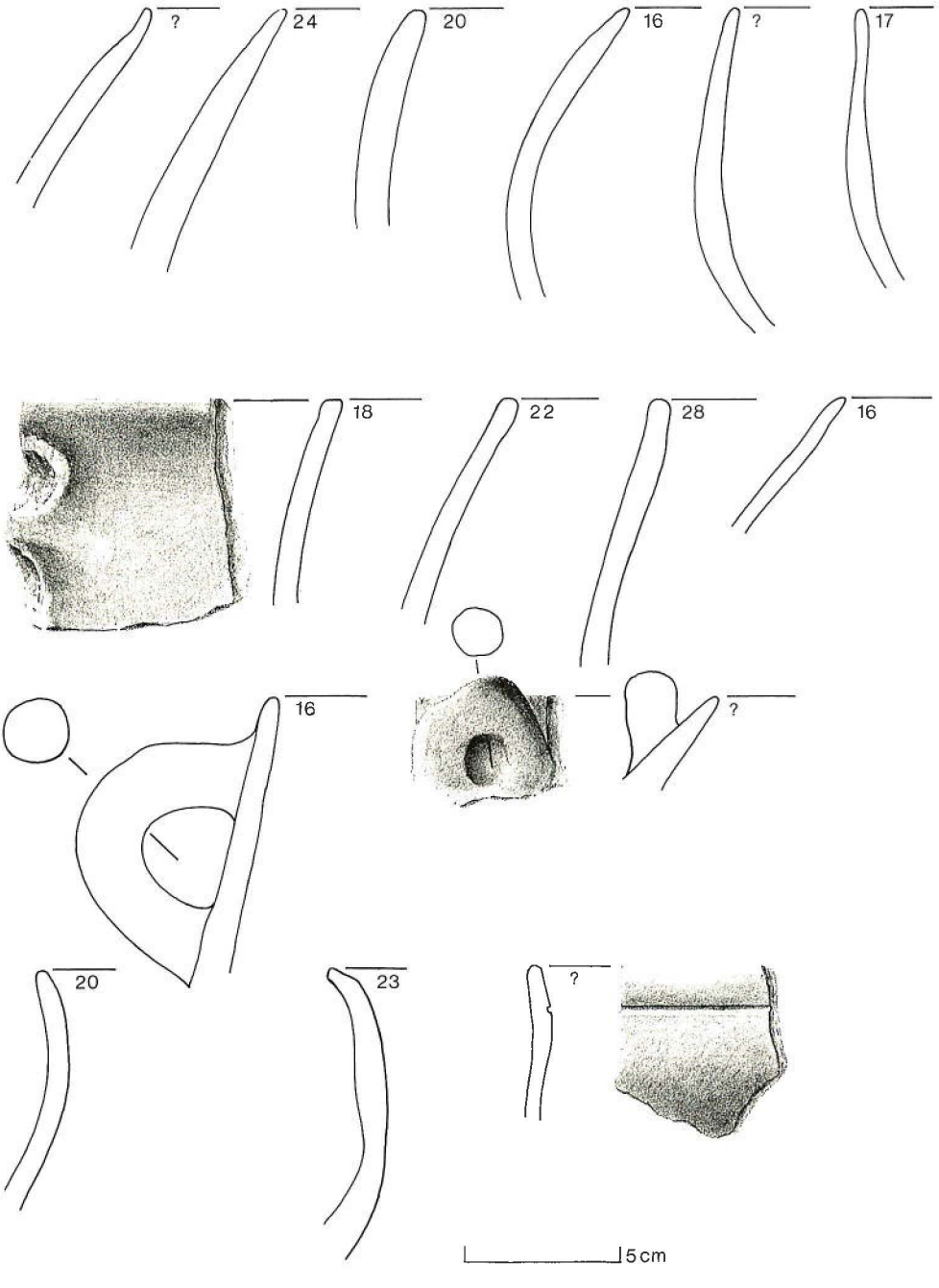

Fig. 7. Fragments of pots.

Large storage vessels

The large storage vessels possess a wall thickness ranging from 14 to 3 mm (Fig. 8). The diameter of the fragments could not be measured. One handle was found. The total shaping technique could hardly be reconstructed because the remains were very fragmentary. The rim fragments point to additive modelling. The surface was smoothed with the fingers. The handles were fastened using the dowelled-joint method.

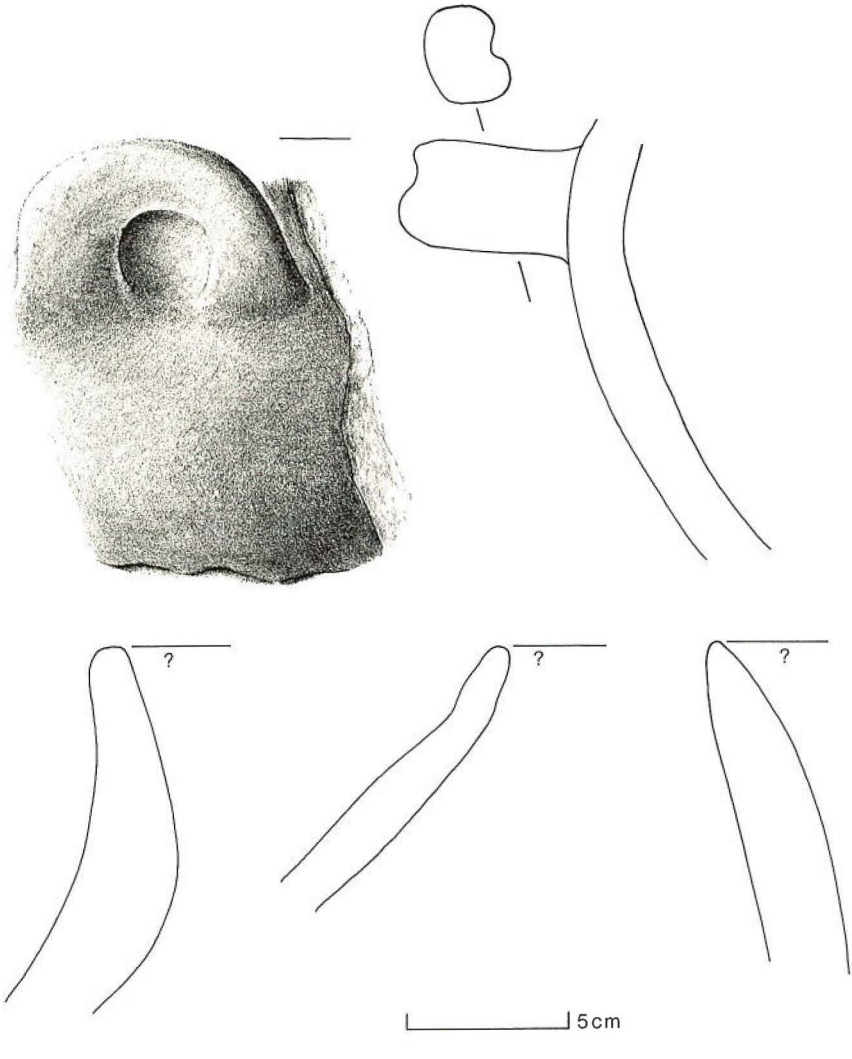

Fig. 8. Fragments of large storage vessels.

Platters

The platters have thick walls (up to 2.5 cm wall thickness) (Fig. 9). They were made by flattening an amount of clay on a flat dry surface, a flat stone for instance. The rim was mostly heightened by fastening a coil of clay. The upper surface and the rim were often smoothed with the help of a rib or by burnishing/polishing. Since this was done almost immediately, little or no gloss was to be seen.

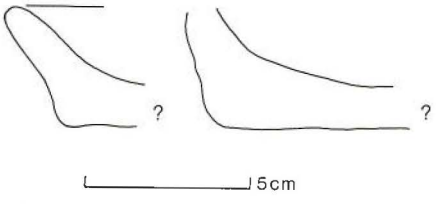

Fig. 9. Fragments of platters.

Fine ware

The fine ware has very thin walls (wall thickness ranging from 2.5 to 4 mm) and includes mainly small bowls (diameter of the rim 8-16 cm)(Fig. 10). For the manufacture of the fine thin-walled pottery many coarse non-plastic inclusions in the clay were undesirable. For this reason, a specially selected clay or prepared clay body was used. The traces of the shaping technique were erased by the way the surface had been finished. Therefore, the reconstruction of the shaping technique is based on characteristics like shape, appearance, thickness and size. The fine ware seems to have been made using the same techniques used for other categories of the Hacilartepe Early Bronze Age repertoire. The bowls were made in a mould. The more vertical parts of the wall were made by modelling. The small partly spherical or strongly curved small vessels were made by pinching. Two phases of polishing can be distinguished. The first polishing was done with a hard object (a rib or polishing stone) when the vessel was not yet leather-hard but strong enough to be

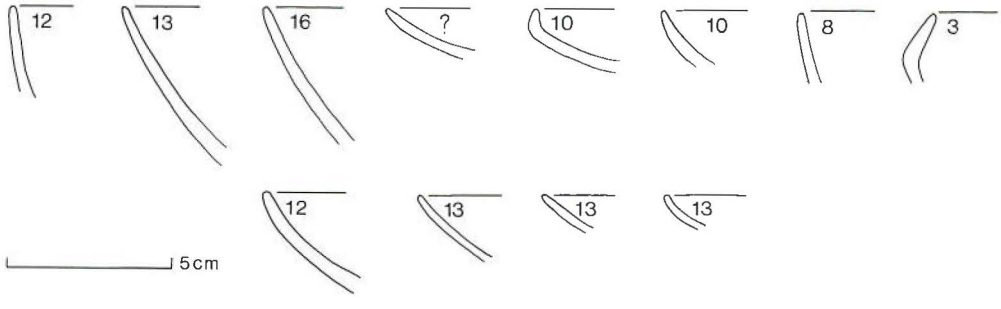

Fig. 10. Fragments of fine ware.

handled, resulting in a slightly faceted surface. The idea was to push the protruding grains into the soft clay in order to prepare the surface for real polishing (see Seeherr 1987: 2-7). After further drying, but before the vessel was completely dry, the finishing polish was carried out with the help of a polishing tool. If a very smooth result was to be obtained, this had to be done very precisely. An even better result could be obtained by adding a slib layer of a fine levigated clay. This could be the same clay as used for the manufacture of the vessels. However, this slib was specially prepared by removing the finest sand particles. The black colour seems to be aimed at during firing. The firing process would seem to have been aimed at producing a black coloured vessel.

Miscellanea

Lids

The lids (Fig. 11) were made by flattening and modelling a piece of clay. A hole was made in the middle through the thickened part with help of a little stick. Next, the surface was smoothed with the fingers. Instead of piercing the thickest part, the middle was sometimes heightened by adding some extra clay. A little stick was modelled into it which was later removed. This way, a transverse piercing was made through which a string or a little strap could be attached. Some of the thinner lids were provided with a modelled knob handle. Finally they were smoothed or polished.

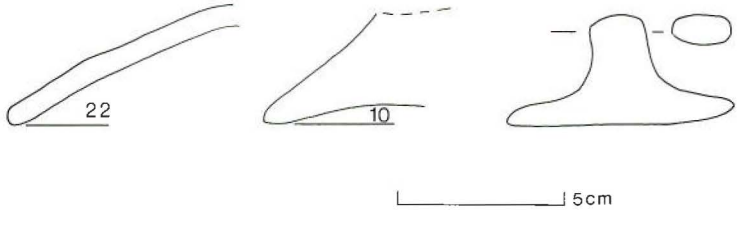

Fig. 11. Fragments of lids.

Handles

There are various types of handles (Fig. 12):

1. Rolled handles (horizontally or vertically fastened or stuck to the wall) with a round profile;
2. Square handles;
3. Ridge handles, made of a coil of clay. The ridge handle was fastened to the vessel through a dowelled-joint. Next, the ridges were made by adding some extra clay (possibly small rolls) and by pressing grooves into it with the aid of a rib;

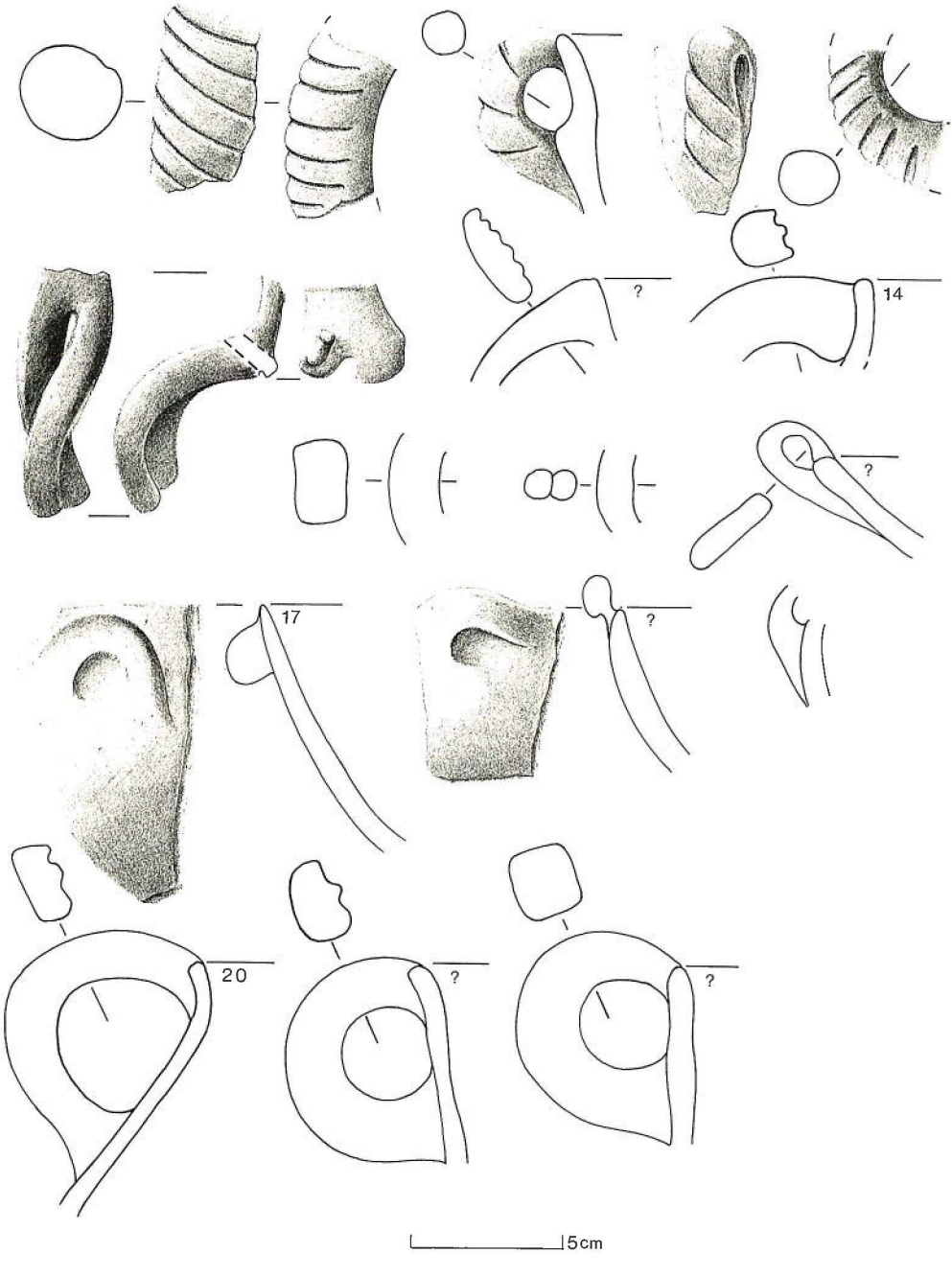

Fig. 12. Fragments of handles.

4. Handles decorated with transverse ridges. These are common handles made of a coil of clay and fastened through a dowelled-joint. The transverse ridges are made with the help of a rib;
5. Handles consisting of small, pierced, modelled plugs of clay. Sometimes this was done by including a tiny stick which was taken out after the modelling;
6. Handles made by twisting two small coils of clay in each other;
7. Handles made by pressing two small coils of clay to each other. The joint was pressed tight with the help of a rib.

Decoration

The following decoration techniques could be distinguished (Fig. 13):

1. Attached decoration:
   a. Small balls of clay were pressed against the surface with some water or clay slib. They were smoothed to make a gradual transition with the wall. In general they form a pattern. Finally, the wall was polished;
   b. Small rolls of clay were stuck to the wall, pressed, and smoothed. The thickenings form an abstract pattern. The surface was generally polished. Sometimes a transverse impression was made (giving a string effect).
2. Embossed decoration.
   The wall was indented at certain places. This resulted in a fold on one side and an impression on the other side. The thickness of the wall is the same everywhere. The applied embossed decoration was polished on both sides.
3. Scratched decoration.
   Before the finishing polish, lines were scratched into the surface. This was done when the vessel was dry enough to be handled, up to the leather-hard stage. The appearance of any burr depends on the position of the tool. A groove of a tight or crumbling character is caused by the exact stage of scratching and the sort and size of the non-plastics. The lines form abstract patterns. In some cases the grooves were filled with light coloured loam. Firing in a reducing atmosphere resulted in a black/white contrast. Therefore the filling took place after firing.
4. Piercings.

Firing technique

Small bowls, pots and large storage vessels are in mottled colours (MSCC: reddish yellow, light reddish brown, yellowish red, reddish brown, very dark grey, black, very pale brown, light yellowish brown, brown and light red). These colours indicate the use of open bonfires. Such firing techniques produced an alternating

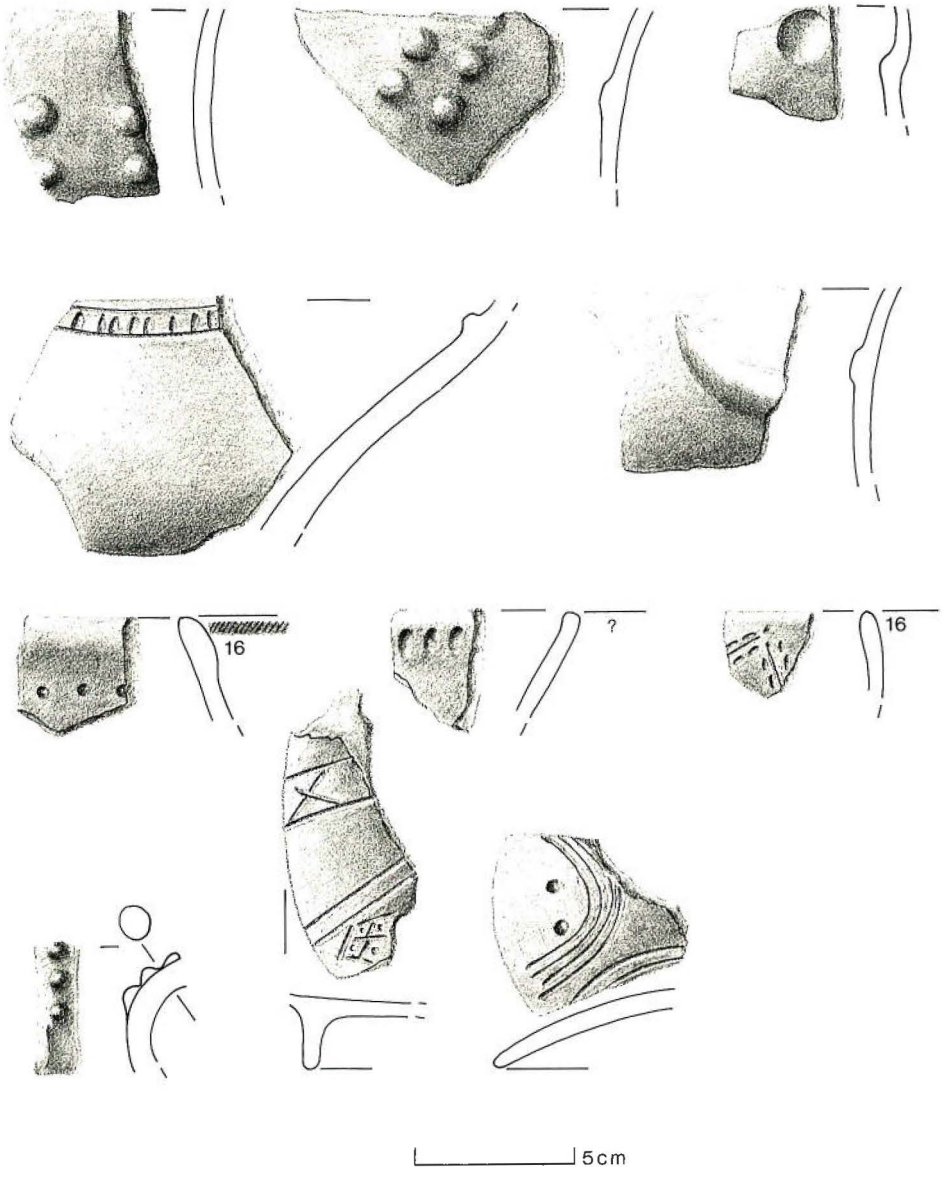

Fig. 13. Decoration.

oxidizing, neutral or reducing atmosphere if no further action was undertaken. In addition, sometimes the differences within the bonfire were that great that a diversity of colours became visible in one and the same vessel.

The deep and shallow bowls, the jugs and the fine ware are mainly black. This pottery is generally polished. The fine ware even has a glossy polish. By this the

black colour is shown to advantage. The gloss is more intense. For this reason we may assume that this was done on purpose. There are also jugs with a uniform glossy red colour. It took some extra effort to make the pottery a uniform black. We may assume that the bonfires were built and protected in a special way. In order to obtain a complete reducing atmosphere at the end, they had to ensure that the fire was smothered at the right moment when the pottery was very hot. This could be done by adding extra fuel. The best materials for this purpose are seeds, fat oily fuel, or chopped vegetable material. Since the temperature was not allowed to drop too low, in this phase, the fuel could be humid but not too wet. They had to ensure that no oxygen could enter until the pottery had been cooled down to under 400° C. A complete exclusion of oxygen could be reached by covering the bonfire with potsherds and earth. Nevertheless, in some cases a complete reduction could fail. This resulted in a partly not totally black or grey or brown/grey pot.

Conclusions

Like the Ilipinar Neolithic/Chalcolithic pottery repertoire the Early Bronze Age Hacilar repertoire was made of locally or regionally collected raw materials (see van As and Wijnen at press). Only the calcite-tempered group does not occur in the Early Bronze Age repertoire. This might indicate that in quarrying the clay the potters did operate more selectively. The repertoire of shapes has been changed and extended. However, the shaping technique of the Early Bronze Age Hacilar repertoire is essentially different. The fastening of the handle by means of the dowelled-joint is remarkable. Instead of coiling, the mould and modelling technique appears. According to Blegen *et al.* (1950: 52) and Seeherr (1957: 143) the identical Early Bronze I pottery from Troy and Demircihüyük respectively was coiled. If this is true the different local productions show evidence of being made using different technological traditions.

Notes

1. The investigations were carried out between 28 May and 15 June 1994 at the excavation house of the Ilipinar expedition at Gölyaka, and they were financed by the Foundation for History, Archaeology and Art History (SHW) which is part of the Netherlands Organization for Scientific Research (NWO). Members working on the project were: A. van As, A.E.A. van Driel, L. Jacobs, and M.-H. Wijnen.

2. The sample of sherds taken for thin section analysis has not yet arrived in the Netherlands. The results of these analyses will be published in a following volume of the *Newsletter*.

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OBSERVATIONS ON A VILLAGE POTTER FROM THE EUPHRATES VALLEY[1]

Introduction

The Department of Classical and Near Eastern Studies at the University of Melbourne has been undertaking salvage excavations at the northern Syrian site of Tell Ahmar (ancient Til Barsip) for the past six years under the direction of Dr. Guy Bunnens (Bunnens 1989; 1990; 1991a; 1991b; 1992)[2]. The site is located on the east bank of the Euphrates river, approximately 20 kilometres from the Turkish border and will soon be flooded as a result of the construction of the Tishreen Dam which is being built by the Syrian authorities[3]. Settlement at Tell Ahmar dates back to the early fourth millennium B.C. Present evidence suggests that the site was occupied continuously up until Late Antiquity. Its greatest period in history is however, the 9th century B.C., when it was the capital of the Aramaean state of Bit Adini. Tell Ahmar was conquered by king Shalmaneser III in 856 B.C. and subsequently became an Assyrian provincial capital. One research objective of the current excavations is to retrieve a complete stratigraphic sequence for all the attested periods represented at the site. Part of this research involves a detailed examination of the stratigraphically defined ceramic remains. So far a large quantity of ceramic material, principally dating from the third (Early Bronze Age/c. 3000-2000 B.C.) and first (Iron Age/c. 1000-600 B.C.) millennia has been retrieved. To complement the study of the ancient pottery from the excavations at Tell Ahmar a series of related research tasks have been established in order to better understand different ceramic processes which may have been utilized in antiquity[4].

Observations on one North Syrian village potter

As part of the research program an attempt was made to locate any village potters still practising in the Tell Ahmar region so that insights into traditional pottery making techniques might be gained[5]. Inquiries made during the first two seasons in 1988 and 1989 were unsuccessful in obtaining information concerning traditional pottery making at Tell Ahmar. It appeared from observations made in the village that this traditional activity had been made redundant by the introduction of more modern materials such as plastic and metal[6]. However, the presence of

Newsletter of the Department of Pottery Technology (Leiden University) 11/12, 1993/94, 75-82.

large clay water jars in many of the houses at Tell Ahmar indicated evidence to suggest that limited pottery production still existed.

During the 1990 season at Tell Ahmar, the present writer was fortunate to observe and document over a five day period one village potter still practising in the region. The potter, whose name is Aisha Khallel al Hussein, comes from the village of Buras which is roughly 10 kilometres from Tell Ahmar. Aisha is of Kurdish origin like most of the inhabitants of Buras and is approximately forty-five years of age. She is the mother of thirteen children of which three are girls. Aisha learnt the necessary skills of pottery production from her mother and grandmother and has instructed her two oldest daughters in the craft, however both girls have since married and left the village and are believed to be no longer producing pottery. Aisha does not appear to make pottery on a regular basis and only when required or requested by other members of the village or neighbouring region. According to Aisha she is the only potter in her village. Further research has suggested that pottery making, in this part of the upper Euphrates valley at least, is a female dominated activity and that the relevant skills are passed on from mother to daughter[7].

Day 1 - Clay collection and preparation

The clay Aisha used for the manufacture of the vessels was gathered a short distance from her house beside a nearby cultivated field. After the initial top soil was removed a darker red-brown coloured earth was exposed. The depth and colour appeared to determine the suitability of the clay. The material was removed, with the use of a spade, and taken to a flat area of her compound where it was broken down into smaller pieces. Extraneous stones and sticks were removed. Fine grey river sand and chopped straw were combined with the dry crushed clay as tempering agents (Figg. 1 and 2). Water was added and the compound was mixed together by hand into a manageable and pliable state. To extract and prepare the clay took approximately three hours.

Days 2-3 - Manufacture and drying

The following day the manufacturing process began. A circular flat disc of clay was prepared and short, thick coils were shaped in the potter's hands and attached to the slab to build up the vessel body. Additional water was used when required to smooth the exterior surfaces. After the first row of coils had been completed the pot was set aside and Aisha proceeded to start making a second vessel, continuing in the same manner as before, until four vessels were in progress. This allowed each pot sufficient time to dry before adding a further row of coils. No tools were used in the shaping process. Once the pots reached the height of approximately 15 cm they were left to stand in the sun. Later that afternoon manufacturing resumed. The

Fig. 1. Adding sand.

Fig. 2. Adding straw.

half completed pots had by this stage become leather-hard. More coils were added in the same manner as before until they were roughly 30 cm in height. The pots were carefully finished by adding a thick coil which was compressed to reinforce the rim (Fig. 3). Two loop handles were applied to the top of the rim and upper body. An elaborate decorative scheme was then added which consisted of a series of applied alternating diagonal coils smoothed onto the body forming a diamond pattern (Fig. 4). A small stick was then used to impress a series of notches on the coils. Knobs were added to the vacant spaces between the applied coils. The end of a metal spoon was used to impress a pattern around the top of the flattened rim. When the decoration was finished the pots were left to dry for two days.

Day 4 - Firing

On the afternoon of the second day of drying preparation for the firing commenced. A slight depression on the edge of the cultivated field near Aisha's house was deemed suitable for the firing area. A space was and broken mud bricks and other discarded material was used to form the ends of a roughly shaped rectangular pit. This was then lined with dry sheep and goat dung which had been collected from the animal pens during the year and dried and stored in irregular shaped pieces. The raw pots were laid close together directly on the first layer of dung (Fig. 5). Smaller pots were placed inside the larger ones. Extra dung was also put inside the vessels

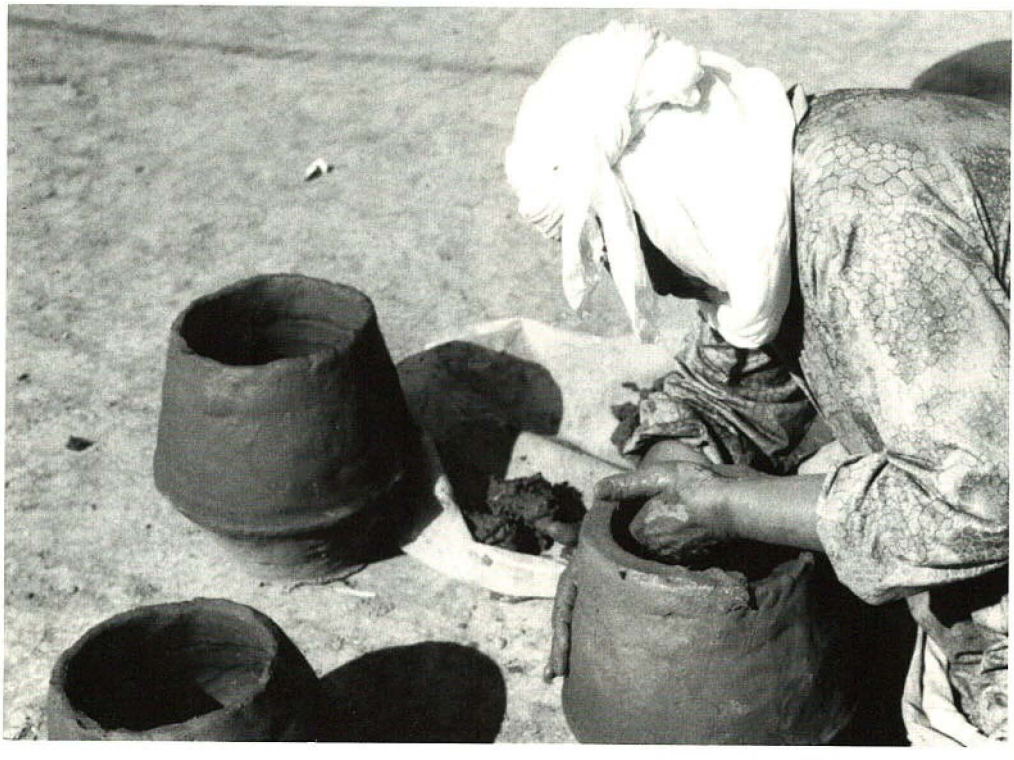

Fig. 3. Manufacture: finishing rim.

and then heaped all over the arranged un-baked pots. When completely covered the dung was set alight. The fire at first burnt vigorously because flammable liquid had been added to assist ignition. The flames eventually subsided and the heap was left to smoulder throughout the night. The potter considered late afternoon to be a desirable time to begin firing since the prevailing winds, which are common at this time, fanned the fire and facilitated reaching a high temperature. No further dung or fuel was added once the firing had commenced.

Day 5 - Post firing

By the following morning the firing process had finished and a thick layer of ash covered all of the baked pots. Most had fired to a yellowish green or light brown to buff colour. The lighter yellowish green colour was more common on the pots situated in the centre of the pit where the fire had been the most intense. The pots situated at the ends of the pit were less evenly fired and more often a light brown colour. The yellowish colour was thought to be more desirable by the potter. This may be because they were more highly fired and therefore more durable. An

Fig. 4. Adding decoration.

examination of the fired pieces indicated that a temperature in the range of 600 degrees Celsius had been reached during the firing. Many of the vessels had a 'woody' to slightly 'metallic' resonance when tapped.

Conclusion

Observing the village potter and the processes involved in clay collection and preparation, methods of manufacture and firing provided significant insights into traditional pottery making practices. It was observed that the necessary raw materials were readily available and suitable for production. An inherent knowledge of the relevant processes involved was demonstrated and exhibited by the potter. More importantly perhaps are the parallels which can be drawn between the study of the ancient ceramics and the manufacturing of the modern pottery. One of the vessels produced by Aisha closely resembles in shape, fabric and manufacture cooking pots retrieved from the excavation at Tell Ahmar dating to the first millennium B.C. (Fig. 6). These vessels are characterized by their hand-made

Fig. 5. Preparation for firing: adding animal dung.

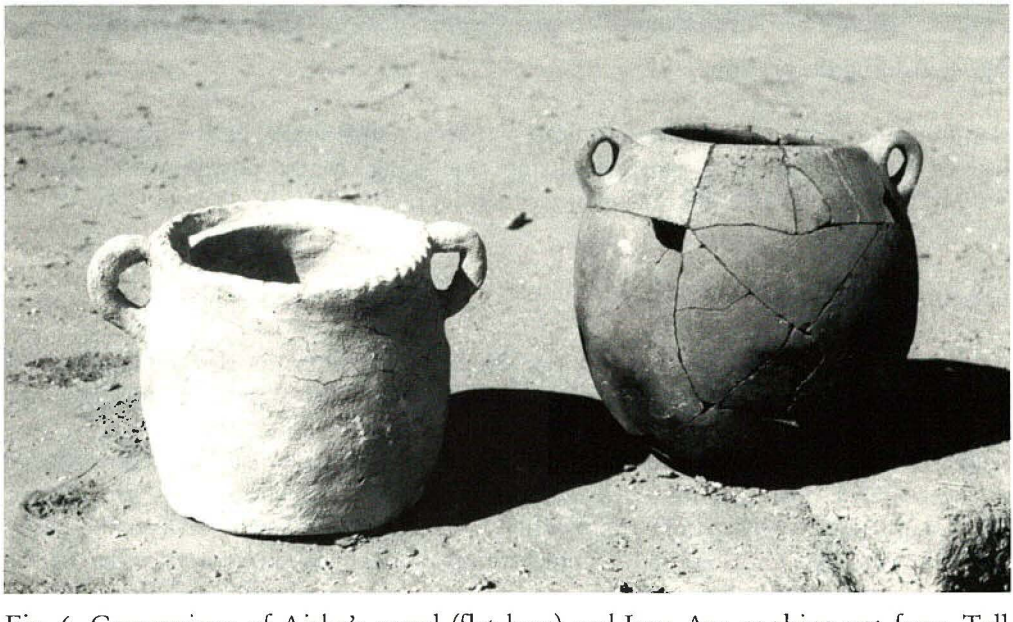

Fig. 6. Comparison of Aisha's vessel (flat base) and Iron Age cooking pot from Tell Ahmar (round base).

method of construction, hole-mouth shape and distinctive coarse textured fabric. The intention is not to suggest a direct evolution of this tradition, but rather to note that cooking pots, like the ones made by Aisha and those found in antiquity, were possibly produced on a similar localized and domestic basis by individual households. In the early Bronze Age pottery from Tell Ahmar it is possible to distinguish two traditions, one of which is characterized by a restricted range of hand-made vessels that were presumably produced on a basis similar to Aisha's. The other is represented by a more highly developed assemblage which features mass produced, standardized wheel-made types suggesting a more sophisticated and widespread industry.

P.J. Watson stated that "The theoretical basis for ethnoarchaeology is the use of analogies derived from present observations to aid interpretation of past events and processes. It is essential however to resist the temptation to make wholesale transfers from the ethnographic to the archaeological"(Watson 1979). In light of these comments observations on the traditional village potter from the upper Euphrates valley do assist our comprehension of localized pottery production and supplies some concept of the potter's role within the village context. A better understanding of this contemporary Euphrates valley potter may hopefully lead to more informed insights and a greater understanding of the ancient pottery from Tell Ahmar.

Notes

1. This article is an expanded text of a paper presented at the 1992 International Ceramic Conference convened in Melbourne (see Jamieson 1992). The author would like to thank Dr. Guy Bunnens and Dr. Arlette Roobaert-Bunnens who have supported and encouraged the study of the pottery from Tell Ahmar and facilitated aspects of this research to be undertaken. Appreciation must also be expressed to Dr. M. Trokay who helped document the processes observed and Ms. F. Hill who acted as translator.

2. Tell Ahmar was first excavated by a French expedition in the late 1920's and early 1930's (Thureau-Dangin and Dunand 1936).

3. On the sites to be flooded in the Tishreen Dam zone see McClellan and Porter (in press).

4. Other projects currently in progress involve the collecting, sampling and firing of potential local clay sources and a series of experiments emulating techniques of manufacture and decoration (Jamieson 1989/1990).

5. This has been successfully demonstrated elsewhere (see for example Birmingham 1967; Bresenham 1985; Mershen 1985; Nicholson and Patterson 1985; Annis 1985; Annis and Jacobs 1986.

6. It is likely that localised village pottery production had already begun to decline by the early 1950's with the increasing industrialization of modern Syria (Sweet 1960).

7. Since documenting Aisha in 1990 several households at Tell Ahmar have been discovered which also produce pottery. The clay preparation and manufacture at Tell Ahmar is undertaken by the women, although some male members of the family assist with the firing process.

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