CHAPTER ONE

1. 1 THESIS INTRODUCTION

This thesis analyses a substantial body of largely unpublished ceramic material from Dakhleh Oasis in the Western Desert, Egypt. The pottery was recovered during a survey of the oasis and from the excavation of selected sites in the oasis. The thesis establishes a ceramic typology for this material and divides it into two chronological sequences. The first sequence (Series 1) comprises the period from the end of the Twenty-fifth Dynasty to the Persian Period, a period hitherto relatively unknown in Dakhleh Oasis. The second sequence (Series 2) dates from the Ptolemaic Period to the early Roman Period.

To further the study of the socio-economic development of the oasis, surveyed and excavated sites have been catalogued and a comparative dating system developed. The Site Catalogue also describes separately each vessel and sherd recovered from the sites. In addition, the ceramic assemblages from sites of different utilisation – cemetery, settlement and temple sites – have been compared and the distribution of these sites throughout the oasis analysed.

The thesis also endeavours to identify contacts between Dakhleh Oasis and other regions. For this purpose, a comprehensive survey of comparative material from sites in the Nile Valley, neighbouring oases, Nubia and other regions has been undertaken in conjunction with a discussion of the location and environment of the oasis.

A section of the thesis is concerned with the ethnography of ancient pottery-making and adds to the growing body of information on this important topic. Pottery vessels from the oasis and other sites have been examined and traditional modern pottery techniques have been investigated. This research has been combined with a working knowledge of pottery-making to replicate some of the ancient techniques. The results of

this work are described in Chapter 6.

The description of the fabrics and wares has been augmented by the petrographic analysis of clay samples and sherds that are specifically relevant to this thesis. It has, however, been designed for incorporation into the on-going investigation of the clays and fabrics from Dakhleh Oasis.

Ultimately, it is intended that the chronological analysis of the ceramic material and the subsequent comparison and dating of the surveyed sites in this thesis will assist in the selection of sites for future excavation in Dakhleh Oasis. The vessel typology will provide a corpus of ceramic material to facilitate the classification and processing of the ceramics recovered from these excavations. It is also hoped that it will assist other analysts working in the field of Egyptian ceramics.

1.2 THE BACKGROUND TO THE THESIS

The survey of Dakhleh Oasis was conducted by members of the Dakhleh Oasis Project (DOP) under the direction of A. J. Mills from 1977 to 1983. Large quantities of pottery vessels and sherds, dating from the Old Kingdom to the Islamic Period, were recovered during the testing of archaeological sites and from the surface surveys conducted at these sites. C. A. Hope, co-investigator of the Project with responsibility for the study and publication of the ceramics, recorded and drew the pottery finds, assisted by other members of DOP. Pottery from selected sites was published by Hope in annual reports (Hope 1979, 1980, 1981, 1983 and 1987a). In these reports, Hope provisionally distinguished and described four assemblages extending from the Late Dynastic Period to the late Roman Period (Hope 1981, 233-236).

The excavation of three selected sites by members of DOP commenced in 1985 and, in the season of 1986–87, I was invited by Colin Hope to join the Project as ceramics analyst for the site of Ismant el-Kharab. Subsequently, I was given access to the pottery drawings and the records relating to the ceramics of Hope's first and second assemblages of the survey material for research and publication.

Numerous texts dating to the late third and the fourth century AD were recovered during the excavation of selected houses at Ismant el-Kharab, and confirmed the site as the ancient town of Kellis (Worp 1995, Gardner 1996, Bagnall 1997). Large quantities of ceramics from Hope's third assemblage were also recovered from these occupational levels of the houses, thereby confirming the dating of this material (Hope 1985, 114-125; 1986, 74-91). Excavations conducted during subsequent seasons provided stratified material in three contexts, two of which underlay the fourth century AD levels of the houses. The recorded pottery recovered from these levels provides the dated assemblages (SS17–19) and forms the last phase (Phase 4) of the chronology typology for this thesis.

1.3 THE SITES (Maps1 and 4)

For the identification of surveyed sites, the Dakhleh Oasis Project adopted a system based on a set of detailed maps of the oasis made available to the Project by the Egyptian Antiquities Service. This system locates each site within a given square kilometre (Mills 1979, 167–8). It employs a grid set out in one kilometre intervals with zero point at Gebel Uweinat, which lies at the junction of the borders of Egypt, the Sudan and Libya (Map 1). Each map sheet is identified by a numbering system that denotes the bottom or south margin and the left or western margin. Thus, the map sheet locating Ismant el-Kharab is numbered 31/420.

Each map sheet covers 15 km E–W and 10 km N–S. The fifteen kilometre intervals are successively lettered A to P (omitting O) across from left to right, and the ten intervals down are numbered 1 to 10 from the top. Therefore, any individual square can be identified by the combination of its letter and number, for example D6. A square kilometre in the oasis can be identified, first, by the map number and, second, by the grid reference designation, for example 31/420-D6. Individual sites within each square kilometre were numbered consecutively in the order of their finding during the survey and the complete designation of Ismant el-Kharab is 31/420-D6-1 (Map 4).

In this work these designations needed to be further lengthened by numbers and

letters to distinguish individual vessels. Therefore, I have identified the sites by their type; for example cemetery site (CS), settlement site (SS) and temple site (TS). These are then numbered as they occur in the Site Catalogue (for example CS1, CS2, CS3) and do not occur in chronological order or in relation to their location in the oasis.

1.4 THE MATERIAL

In 1983, a division of the archaeological finds from the survey was made between the Egyptian Antiquities Service and DOP. The material allotted to the Project was presented to the Royal Ontario Museum and, during visits to North America, I have been able to study the ceramics held by the museum. The material retained by the Egyptian Antiquities Service, now the Supreme Council for Antiquities (SCA), is not easily accessible for study and information from record cards has been used for the description of these vessels. A large number of sherds recovered from tests and from surface collections has also been included in the study; however, the records for this material are less detailed than those available for registered vessels.

As the fieldwork was limited by the terms of the survey (Hope 1979, 188), no stratified material was recovered. The majority of the intact pottery vessels was recovered from cemetery sites and all the tombs were found to be disturbed either by reuse or by plundering.

During the season of 1988, the fieldwork at Ismant el-Kharab included the excavation of a large mud brick building in Area B. It soon became evident that the sherds coming from the lower levels of these deposits were from types of vessels not recovered during the earlier excavations of the houses (Hope 1988, 172–8). In 1992, a test trench was dug in the courtyard of House 3 in Area A (Hope, Kaper and Bowen 1992, 41–2) and in House 4, also in Area A, during the 1992–3 season (Bowen, Hope and Kaper 1993, 25–6). These two deposits from below the fourth century AD house levels contained stratified ceramic material similar to that recovered from Area B. Altogether over one hundred and fifty diagnostic sherds from these three early Roman Period deposits have

been incorporated into the typology, and provide the last chronological phase (Phase 4) of this thesis. No complete or intact vessels were recovered from these levels.

In conjunction with the work at Ismant el-Kharab, the adjacent cemetery sites situated to the north-west (Site CS13) and to the north-east of the town site were investigated (Birrell in press). The latter cemetery provided very little ceramic material apart from 'pigeon pots' reused in the burials but a number of vessels were recovered from the tombs and the surface at CS13. Pottery from these two sites has been included in the analysis.

During the survey of Dakhleh Oasis, approximately thirty tombs at the large cemetery of 'Ein Tirghi (Site CS15) were investigated and selected pottery was published by Hope (Hope 1983, 144–9, figs 2–6). After the completion of the survey fieldwork, the cemetery was one of the three sites chosen for further excavation. The clearing of the tombs at the site continued over a number of years and the site has yet to be fully studied. However, as I had the opportunity to record some of the later finds, and to examine the pottery vessels from the site held in the collection of the Royal Ontario Museum, a large number of vessels from these tombs has been included in this work.

CHAPTER TWO

2.1 THE LOCATION OF DAKHLEH OASIS (Map 1)

Dakhleh Oasis is situated in the Western Desert of Egypt approximately 800 kilometres south-south-west of Cairo with latitude 25°30'N just north of Mut, the capital of the oasis. It is one of the oases which form a chain of depressions in the desert region between the Nile Valley and the Libyan border. The long narrow depression which shapes Dakhleh Oasis is nearly 2000^2 kilometres in area and is oriented west-north-west to east-south-east (Mills 1985a, 125). A limestone escarpment, roughly 400 metres in height, forms the long northern boundary of the oasis. The escarpment continues in a south-easterly direction to form the northern boundary of the neighbouring depression of Kharga Oasis. The southern boundary of Dakhleh Oasis rises gently up to the Nubian sandstones of the southern Western Desert and is, therefore, not as well defined as the northern boundary. The elevation of the depression ranges from 100 to 135 metres above sea-level (Mills 1979, 165).

2.2 ENVIRONMENT

The modern climate of the oasis is hyperarid. The annual rainfall is negligible, usually measuring less than one millilitre in a year, with the relative humidity seldom exceeding 50 per cent (Mills 1979, 166). When rain does occur it is frequently the outcome of storm activity accompanied by strong winds. The rainfall may be heavy for a time but seldom continues for long periods and it is the water from artesian wells and springs that makes agriculture in the oasis possible. This water comes from the Taref sandstone member of the Nubian Formation, which forms the floor of the Western Desert, and is one of the largest ground-water reservoirs in the world (Wendorf and Schild 1980, 170). In antiquity, the water rose to the surface of the depressions and, in time, spring mounds formed around

the water outlets. In modern times, as in the Roman Period, the water reserves are reached by drilling and in Dakhleh Oasis it has only become necessary to pump the water to the surface in the past eight years. The rich clay soil of the depression was originally deposited as a lake bed and still provides the modern population of the oasis with its main occupation of agriculture (Mills 1985, 125). Plant remains recently excavated at Ismant el-Kharab include the field crops—emmer, barley, beans, cotton and flax—and the garden crops—olives, pomegranates, grapes, coriander and dates (Mills 1993, 9; Bagnall 1997).

2.3 ROUTES OF THE WESTERN DESERT (Maps 2 and 3)

Although the oases are separated from each other and the Nile Valley by vast tracts of desert, an ancient network of trading routes links the oases with each other and with the Nile Valley. Two desert roads connect the neighbouring oases of Dakhleh and Kharga, which are separated by a distance of some 175 kilometres. One road, known as the Darb el-Ghubari, leaves the village of Teneida at the eastern end of Dakhleh Oasis (Map 3) and runs in a south-easterly direction to avoid the limestone plateau. It then turns north-east until it reaches Kharga, the principal town of Kharga Oasis (Map 2). No wells or springs are known to have existed along this route. In 1908, H. E. Winlock travelled the Darb el-Ghubari route from Kharga to Dakhleh Oasis, taking three days to travel the 140 kilometres with a camel train. Among broken and abandoned pottery vessels at the stations or resting places established along the road, Winlock noted the presence of sherds from Nile Valley amphorae (Winlock 1936, 14–5). The modern road between Kharga to Dakhleh follows this route.

The second route is the northern road that runs across the top of the Abu Tartur Plateau, which is situated between the two oases (Map 2). This road is called the 'Ain Amur Road after the well located on this route above Kharga Oasis (Fakhry 1941, 761–8). A small stone temple was built near the well and both temple and well were fortified by a mud-brick wall. The walls of this irregular four-sided enclosure are estimated to have been originally about 80 or 90 metres in length. The size of the enclosure and the height of the walls indicate that the construction was not only a secure camping ground for caravans

but also may have contained a fort or military station to control and defend the route. Fakhry dated these installations and temple to the Roman Period although he thought there may have been an earlier temple on the site. When Winlock visited the area in 1908, the wall was 2.75 metres thick and still preserved, in parts, to a height of 10 to 11 metres. He was also of the opinion that the quality of the work indicated a date early in the Roman Period for the decoration of the temple (Winlock 1936, 48-9).

The 'Ain Amur road continues in a south-easterly direction to Kharga, where the large stone temple of Hibis is located, and further on to the other towns in the oasis. In addition, the road has a branch that goes north-east via the well of Umm ed Debadib to link up with the Darb el Arbain (Map 2). The Darb el Arbain, or the Forty Days Road, is thought to be the 'Oases route" that ran through Kharga Oasis to connect the southern borders of the Egyptian empire to the northern administrative centres during the early Pharaonic Period (O'Connor 1986, 27-50). This route made the Oases of Dakhleh and Khargeh important links in the chain of communications that allowed exploitation of Upper and Lower Nubia and regions further to the south and west (Grimal 1998, 87 and fig. 3). This desert trade route was also an important means of interaction between these regions during the Twenty-fifth Dynasty (Grimal 1998, 340; Janssen 1968, 171–2). It was familiar to travellers in the last century (Harding King 1925, here Map 2) and has undoubtedly remained in use.

The importance of the 'Ain Amur Road during antiquity, probably due to the presence of water, was evident to early archaeological researchers, who saw the dense pottery scatters along the road and the heaps of sherds that had accumulated at resting stations. They also noted that the route was still in use at the time of their journeys (Fakhry 1941, 761; Winlock 1936, 45-51; Wendorf and Schild 1980, 2).

A direct route, the Darb el Tawil or the Long Road, connects the eastern end of Dakhleh Oasis to the Nile Valley (Map 3). In 1819, the Darb el Tawil was the route taken by Sir Archibald Edmonstone (Edmonstone 1822), who was the first modern European traveller to visit the Oasis of Dakhleh. His camel caravan left the Nile Valley in the region

of Manfalut and took just under six days to make the journey. There is no known source of water on the desert section of this route. During his visit to the oasis early in this century, Winlock (1936, 19) noted that caravans carrying imports such as sugar, tea and coffee, were still using the Darb el Tawil.

The Dakhleh Oasis terminus of the road begins in a wadi north of Balat, the archaeological site of 'Ain Aseel (Map 3). This site, excavated since 1977 by the Institut Français D'Archéologie Orientale (IFAO), includes a large town known to have been the residence of the governors of the oasis region during the early Pharaonic Period. Reports of the work at this site are published regularly in *BIFAO*.

In the western end of the oasis a branch of the Darb el Tawil, the Darb el Khashabi, leaves Qasr el Dakhleh (Map 3) and joins the Darb el Tawil before it reaches the Nile Valley (Harding King 1925, 203 and Map 2). Two other caravan routes leave the western end of Dakhleh Oasis: the more easterly route is the shorter, being 200 kilometres in length. It starts at Qasr el-Dakhleh and travels in a north-westerly direction to the well of Bir Dikkar before going on to Qasr Farafra, the largest village in Farafra Oasis (Map 2). This ancient caravan route was still in use in recent years with caravans taking four days to complete the journey (Fakhry 1974, 162). Other routes continue east from Qasr Farafra to reach the Nile Valley in the region of Assuit, 280 kilometres distant: camel caravans took seven or eight days to travel this route. Farafra is also connected to the Nile Valley by routes that travel north-east through Baharia Oasis.

The second route leaves Dakhleh Oasis at Mut, the present capital of the oasis and the ancient site of Mut el-Kharab (SS20: 31/405-G10-1). It goes to a well at Abu Mingar (Bu Mungar) situated south-west of Farafra Oasis before it branches (Map 2). One route goes to Qasr Farafra and the other continues in a north-westerly direction to the ancient spring of 'Ain el Dallah (Iddaila), situated 75 kilometres north-west of Farafra Oasis (Fakhry 1941, 871 and fig. 90). This route is important as it links the oases of Dakhleh and Farafra with a wider network. It connects the oases of the Western Desert with the

Nile Delta and the North African coastal regions by way of Siwa Oasis, and it connects the Egyptian oases with those far to the west in the Libyan Desert.

Harding King (1925, 305) also noted an old road that left Dakhleh Oasis at Mut and went in a south-westerly direction to the oasis of Uweinet at the present junction of the Egyptian, Sudanese and Libyan borders (Map 1). John Ball, a director of the Desert Survey Department, was exploring this region in 1916 when he discovered an accumulation of pottery vessels at the foot of a conspicuous hill, which he named 'Pottery Hill'(1927, 122).

In 1923, C. S. Jarvis joined an expedition directed by Prince Kamel el Din Hussein which included Ball and others to explore the desert west of Dakhleh Oasis (Jarvis 1936, 105). Jarvis writes that this group again located Pottery Hill and on approaching noticed a large number of small red circles flush with the surface of the ground. On closer inspection these proved to be large 'earthenware' pots that had been buried in the sand at the foot of the hill. The walls of the vessels were 'nearly an inch thick' and some 'three feet high' but the friction of the wind had cut through and eroded any exposed surfaces. The party excavated about two hundred vessels, of which about fifteen were in perfect condition. Jarvis reports that some were taken to Cairo where they were identified as belonging to approximately the fourth century BC. The author, C. S. Jarvis, surmises that the jars may have been connected with the expedition said to have been sent into the desert by Cambyses to subdue the inhabitants of the oases (Jarvis 1936, 115).

However, when Ball wrote up this trip (Ball 1927, 122) he notes that Prince Kamel el Din Hussein was later able to identify incised marks on the pots as being 'tribal marks of the Tebus'. Two photos published in Ball's article between pages 124 and 125 include some of the pottery – one of which shows the author with a group of pots in 1916. Although the photo in not very clear, some of the vessels appear to be from the Late Period, and possibly early in the period. The pieces that can be seen in the photo do not look handmade and it is possible that the vessels were incised after they had been left at Pot-

tery Hill. Unfortunately, neither Jarvis nor Ball mentions the fate of the excavated vessels or the ones sent to Cairo.

In this thesis, the survey of comparative material from contemporary periods shows that, during the Late Period, contact was maintained between Dakhleh Oasis and Upper and Lower Egypt, and included Nubia. In the Ptolemaic and early Roman Periods, interaction with the Nile Valley continued while foreign influences reaching the oasis became more extensive, involving the Eastern Mediterranean region. The network of desert roads and tracks traversing the Western Desert of Egypt provided the channel for this intercourse and explains how communications could be kept up between the seemingly isolated Oases and the Nile Valley, with Nubia in the south, and with regions to the north and west.

CHAPTER THREE

3.1 THE CULTURAL AND HISTORICAL SETTING OF DAKHLEH OASIS: AN OVERVIEW

The survey conducted by members of the Dakhleh Oasis Project discovered abundant evidence of human activity in the oases dating back to prehistoric periods. Palaeolithic and Neolithic sites were sampled by the members of DOP (Mills 1979, 169–71; 1980, 255; 1981, 176–9; 1982, 94–7; 1983, 122–8; 1984, 81–3). Since then, surveying has continued in specific areas and selected sites have been excavated (Kleindienst 1985 and in press; McDonald 1985 and in press).

The Old Kingdom Period is very well represented in the archaeological record of the oasis. The pottery evidence, in particular, indicates that Egyptian contact from the Nile Valley reached the oases during that period (Hope in press). By the end of this period at the latest, Dakhleh Oasis was administered from the Nile Valley with a residence for officials at 'Ain Aseel (Giddy 1987, 174–212). Moreover, the testing of sites during the survey has shown that a large number of other sites dating to the Old Kingdom exist throughout the oasis (Mills 1985a, 127).

A significant involvement is indicated for the Second Intermediate Period by the ceramics recovered from cemetery sites (Hope 1980, 293–8, pls XIX–XXII; 1983, 144–7, fig. 2–3, pls X–XI). The large cemetery at Ein Tirghi, included in this thesis as CS15: 31/435-D5-2, is one of the sites from which pottery of the period was recovered. Material from the New Kingdom is not yet plentiful, but was present in the ceramic material from Ein Tirghi (Hope 1983, 147–8, pl. XI: c).

Two hieratic stelae in the Ashmolean Museum were acquired in Mut, the principal town of Dakhleh Oasis (Gardiner 1933; Janssen 1968). Although the exact context of the stelae is not known, it is certain that they originated from the oasis. These stelae have been dated to the Twenty-second and Twenty-fifth Dynasties and show the presence of temples and priests in the oasis during those times (Fakhry 1974a, 218). Nevertheless, during the survey, ceramic material dating to the Late Period appeared to be largely absent. However, the analysis of the material in this thesis shows that pottery from the period was recovered from a number of sites tested during these years, including settlement sites (SS6 and SS14) as well as cemetery sites (CS7 and CS15). This material, some of which (Marchand in press) has recently been confirmed by the IFAO excavations at Balat (Map 3), provides the basis for a better understanding of the Late Period in Dakhleh Oasis.

Over one hundred and forty sites surveyed by Dakhleh Oasis Project investigators produced material dating to the Roman Period. However, Dakhleh Oasis does not appear to be mentioned directly by the early Greek and Roman historians and geographers before the fifth century AD (see Wagner 1987 for a discussion of the texts). The only mention of the oases by Herodotus was in connection with the description of the expedition despatched by Cambyses against the Ammonians. In his account, the army of 50 000 men reached as far as 'the town of Oasis', which Herodotus (III, 26) observed was known as 'the Island of the Blessed'. After their departure from this place the entire army disappeared, presumably lost in a sandstorm. Herodotus placed the land of the Ammonians west of Thebes at a distance of ten days (IV, 181). In his essay on the classical geographers, John Ball had little doubt that 'the town of Oasis', referred to by Herodotus, occupied the site of modern Kharga, which is the principal village in the oasis of the same name about 220 kilometres west of Thebes (Ball 1942, 21). Ball contended that the use of Thebes and not Memphis for the embarkation point to Siwa Oasis could be explained as, at the time Herodotus was writing, Siwa Oasis was mistakenly thought to be located due west of Thebes, not at its higher latitude.

The geographer, Strabo, observed that there were many oases in Libya and that three of these were situated close to Egypt and were controlled by Egypt (Strabo II. 5. 33 and XVII. 1. 5). He situated the first of the three oases opposite Abydos at a distance of seven days journey away from there. Strabo appears to be unaware that there were, in reality, two separate oases and his account seems to confirm that the two oases of Dakhleh and Kharga were customarily considered to be one entity at the time. Strabo also noted that an abundance of both water and wine, as well as a supply of other necessities, could be obtained in this oasis. He located the second oasis, Bahariya, near Lake Moeris and the third oasis to be mentioned was Siwa, the oasis famous for the oracle of Amun. Strabo described all these oases as settlements of some size (XVII. 1, 42).

Pliny lists the names and the geographical position of the nomes of Egypt in his *Natural History*. The list includes two oasis nomes, which are placed next to the Arsinoite and Memphite nomes on the African side of the Nile, but are not further identified (II. V, 48). In his *Geography*, Claudius Ptolemy gives the latitude and longitude of the Lesser Oasis and the Great Oasis (quoted in Ball 1942, 115). The Lesser Oasis has been identified as Bahariya and the Great Oasis as Kharga (Wagner 1987, 121–37).

Olympiodorus of Thebes was writing in the first half of the fifth century under Theodosius II. He referred to Dakhleh as the 'interior' oasis and Kharga as the 'exterior' oasis and appears to have been the first person to distinguish between the two oases of the Great Oasis (Wagner 1987, 131).

Other sources pertaining to the oases include the *Notitia Dignitatum*, which dates from the reign of Valentinian III, although the earliest surviving copy is from the fifteenth century AD. This document notes the six provinces of Egypt and the places where sixty-five military garrisons were stationed (Ball 1942, 160–2). These include Hibeos-Oaseos Maioris or Hibis in Kharga Oasis, Trimtheos, now identified as Amheida following the positive identification of Ismant el-Kharab as Kellis (Hope 1987, 163), and possibly a place named Mutheos. The latter is not yet firmly identified as being situated in the oases

but may be the site of Mut el-Kharab in Dakhleh Oasis (Wagner 1987, 189, n. 12). The *Synecdemus* or Travel-Companion of the grammarian, Hierocles, was written around AD 535 and catalogues most of the notable towns in the Eastern Empire. He divides Egypt into eight eparchies and, in the eparchy of Lower Thebaid, names ten places including Oasis Megalê or Kharga Oasis (Ball 1942, 163–6). George of Cyprus's *Description of the Roman World*, written around AD 606, lists dioceses including the eparchy of Upper Thebais. Four towns in this diocese are named: Ibeôs (Hibis), Mathon (probably Mut el-Kharab), Trimunthôn (Amheida) and Erbôn. The latter is not yet identified (Wagner 1987, 192; Ball 1942, 176).

After the collapse of the Roman Empire, little information about the oases of the Western Desert is available until the early years of the nineteenth century. Although European interest in Egyptian antiquities had revived during the Renaissance, it was the French victories over the Mamelukes at the end of the eighteenth century that provided the stimulus to bring Egypt into the sphere of scientific investigation then gathering momentum in Europe. During the French conquest of Egypt, the *Commission des Sciences et des Arts* did invaluable work recording all aspects of the life of the country; and the publication of the many volumes of the *Description de l' Egypte* between 1809 and 1828 provided accurate descriptions and drawings of the ancient monuments and have been of great value to archaeology. After the French were forced to evacuate their armies in 1801, the control of Egypt was grasped by Mohammed Ali. With the aid of his sons, he subdued Upper Egypt and the Sudan and subordinated the Bedouin tribes who had held sway over the desert areas of Egypt. By the early nineteenth century, the increased security provided in these areas generated exploration of more remote destinations.

Sir Archibald Edmonstone arrived in Egypt late in 1818. He was encouraged by the settled conditions and on hearing that a Frenchman, M. Drovetti, intended to set out for the oases determined to mount a rival expedition. He and his two companions left the Nile Valley near Assiut and, travelling by the Darb el Tawil, arrived in Dakhleh Oasis six

days later. They were the first modern Europeans to visit the oasis (Edmonstone 1822, 1-28) but were to be closely followed by the French expedition and other explorers. These early visitors copied the inscriptions and drew plans and sketches of the monuments, performing a valuable service for the future benefit of archaeology. At some sites little now remains of above-ground structures due to stone-robbing by the local population and the erosion of the reliefs by the strong winds so prevalent in the oases.

At the end of the nineteenth century and in the early decades of the twentieth century, geological and mapping surveys of the Western Desert were carried out by the Egyptian government, then under the control of Britain. Action against Senussi attacks during the First World War and management of the Frontiers District Administration after the war by the Camel Corps increased knowledge of the area (Jarvis 1936). Since the 1960s, a number of geological surveys have been conducted in the Kharga and Dakhleh area as these oases form part of a major reclamation project, 'the New Valley Project' (Hermina 1990, 259).

3.2 THE ARCHAEOLOGICAL SETTING OF DAKHLEH OASIS: AN OVERVIEW

Early this century, the first scientifically planned archaeological excavation in the oases of the Western Desert was undertaken at the temple of Hibis in Kharga Oasis. This work was conducted by H. E. Winlock for the Metropolitan Museum of Art (Winlock 1941) and, in 1908 during a break in these excavations, Winlock set out from Kharga to explore and survey the neighbouring oasis of Dakhleh (Winlock 1936). The Egyptian archaeologist, Ahmed Fakhry, began systematic archaeological investigations in the Western Desert in the late 1930s and early 1940s and continued this work in the late 1960s and early 1970s. The reports on this work were regularly published in *Annales du Service des Antiquités de l'Egypte* (Fakhry 1942, 1950, 1974), and the publication of volumes on all the major oases was planned. However, not all his work was published before his death and his notes on Dakhleh Oasis have been researched and published in the volume *Denkmäler der Oase Dachla* (Osing et al. 1982). The discoveries made by Fakhry at Balat

(Map 3) during his investigations in Dakhleh Oasis also led to the excavations undertaken by IFAO at the site of 'Ain Aseel and Qila el-Debba, on which a number of archaeological reports have been written and published in volumes of *BIFAO* and elsewhere.

In 1976, D. B. Redford and other members of the Akhenaten Temple Project received an invitation from the governor of the Western Desert region to visit Kharga and Dakhleh Oases (Redford, 1976, 7) and as a result the Dakhleh Oasis Project (DOP) was established. Jointly sponsored by the Society for Study of Egyptian Antiquities and the Royal Ontario Museum and primarily funded by the Social Sciences and Humanities Research Council of Canada, the first full season of survey work was conducted in 1978 directed by A. J. Mills (Mills 1979, 163–85).

The publications of earlier travellers remain an important source of information on the oases. One of the outstanding sites investigated by early travellers to Dakhleh Oasis is the temple of Deir el-Haggar (Map 4). The temple is a well-built structure of sandstone, situated in a wide plain in the western part of the oasis. The back wall of the sanctuary was decorated with reliefs in the reign of Nero and the inscriptions on the front and side walls were completed in the reign of Vespasian. Under Titus a porch was built onto the east front and its decoration completed during his reign. The doorways of the sanctuary and pronaos were decorated in the reign of Domitian and, except for alteration in their inscriptions perhaps carried out under one of Domitian's immediate successors, no further additions were made to the temple (Winlock 1936: 29–33). The site (SS3: 33/390-F9-1) includes a sizeable settlement surrounding the temple and was tested by DOP in the first season of survey (Mills 1979, 178). The temple has recently been recorded and restored in a joint project undertaken by members of DOP and SCA, under the direction of A. J. Mills (1993, 9).

Texts from the temple of Deir el-Haggar and Ein Birbiyeh, a temple in the eastern sector of the oasis, have recently been researched by Olaf Kaper, a member of DOP (Kaper 1987). This study demonstrates the manner in which the mythology depicted in

these temples commemorates two visits of the Egyptian god Amun to the oasis, and how the mythology emphasises the links between Dakhleh Oasis and the Nile Valley.

The Roman cemetery known as el-Muzzawaka (Map 4) is situated approximately two kilometres from Deir el-Haggar. This large cemetery comprises about five hundred tombs which were cut into three adjacent small hills. Early last century Edmonstone (1822, 47) had noted the plundered state of the cemetery and the immense amount of bones and other burial materials strewn over the area. Two tombs, belonging to Petubastis and Petosiris, have been dated to the late second century AD (Osing 1982b, 71–94). They are decorated with designs which combine Pharaonic and Classical styles. Both have zodiac ceilings and that of Petosiris has possible Mithraic symbols as well as the Egyptian and Greek elements (Neugebauer et al. 1982, 96–101). Ahmed Fakhry cleared these tombs for the Egyptian Antiquities Organisation in the early 1970s and, during this work, discovered a group of twenty-nine demotic ostraca in the vicinity of the tombs (Nur-el-Din 1982, 102–117). The site of el-Muzzawaka (33/390-H7-1) was surveyed by DOP (Mills 1979, 178) and sherds collected from the surface are included in the typology.

Early visitors to Dakhleh Oasis also noted and described the remains of substantial towns in the oasis. One ruined town site is known locally as Amheida (Map 4). Also situated in the western part of the oasis, it is surrounded by an open flat plain suitable for agriculture. The ancient name of the town has been identified as Trimithis from texts recovered from the excavations at Ismant el-Kharab (Hope 1988, 169, n. 35). The site (33/390-L9-1) occupies an approximate area of 1500 metres by 750 metres and was surveyed and tested in 1979 (Mills 1980, 271–2). Some buildings that have been completely buried by sand are preserved up to three metres in height. Testing carried out in a large complex of domed and vaulted rooms disclosed wall paintings with motifs drawn from popular subjects of the Hellenistic-Roman repertoire. The paintings have been dated to the end of the third or early fourth century AD (Leahy 1980, 331-378, pls XXXI–VI). A decorated sandstone block and an extensive scatter of sandstone and limestone chips

with architectural details indicate the location of a temple near the centre of the northern side of the town site. Edmonstone (1822, 49) also remarked on a fragment of a marble statue which he saw on the site and considered to be of Greek workmanship. A number of sherds collected from the surface of the site have been incorporated into the typology.

At the southern end of Amheida, there is an extensive cemetery (33/390-K9-4) that contains a number of large tombs, as well as the more usual pit graves. The site was surveyed and tested in the same season as Amheida (Mills 1980, 269–270). One of the tombs investigated was found to be an above-ground, mud brick structure comprising two rooms, the walls of which were covered in fine white plaster and decorated with traditional Egyptian funerary scenes. The decoration of this tomb is stylistically Egyptian and does not show the Classical influence seen in the decorated tombs at the cemetery of el-Muzzawaka. The study of the tomb is not yet complete but it is possibly of a late Ptolemaic or early Roman Period date (Mills 1980, 270).

A town in the central part of the oasis, Ismant el-Kharab, was surveyed and tested by DOP in the 1981 season (Map 4). Since 1985, the site (31/420-D6-1) has been extensively excavated by C. A. Hope and reports on this work are published regularly (see entries for C. A. Hope in bibliography). The larger part of the site lies on a natural raised terrace of red Nubian clay. The surface is densely scattered with pottery sherds, faience and other artefacts. The impressive mud brick walls that still stand on the site comprise formal buildings, domestic structures and tombs. Papyri, codices and pottery ostraca, which have been recovered from the excavations over a number of seasons, have provided valuable textual material (Worp 1995, Gardner 1996, Bagnall 1997). From the study of this material, it is now known that the ancient name of the town was Kellis and that Dakhleh Oasis was a separate nome named after the capital city Monthis, the modern town of Mut (Hope 1988, 169 and 178). Scripts recovered from the site so far include Demotic, Greek, Coptic and Syriac.

The ceramic material from three stratified deposits at the site has been included in this thesis (SS17, SS18 and SS19). The material indicates that the town of Kellis was occupied in the first century AD; however, a few sherds, particularly from SS18, and surface finds suggest that the site was probably occupied during the Ptolemaic Period. In one of the standing mud brick tombs at this site, Winlock noted a sandstone sanctuary, the north wall of which was painted with a seated figure and offering bearers (Winlock 1936, 21 and pl. XII). Although these tombs still stand, little remains of the decoration.

Many other sites, ranging from the isolated mud brick ruins of habitations to temples and churches, were surveyed by the Dakhleh Oasis Project. Other work undertaken by DOP at this time was the preservation and repair of the decorated tomb of Kitines (Zielinski 1984, 86–7). One of at least eight stone-built tombs largely built over and buried beneath the houses of the modern village of Ezbet Bashendi (Map 3), the site was unknown until revealed by Ahmed Fakhry. The sanctuary, door jambs and entrance to the six-roomed structure retained their decoration and the tomb is, at present, the only one known to be decorated with relief carving in the New Valley (Mills 1984, 83–5). Ahmed Fakhry's work on the tomb has been published by Moursi and Osing (Moursi 1982, 57–8; Osing 1982a, 58–69) and the tomb provisionally dated, on palaeographic grounds, to the Ptolemaic–Roman Period. Because the name of Kitines is unusual, Wagner (1987, 195) has suggested that a Kitines, known from graffiti on the temple of Hibis, may be the same person as the Kitines of the tomb at Ezbet Bashendi.

Not far to the east of the tomb of Kitines is one of the three sites chosen by DOP for excavation in 1985. Traces of stone-built walls on the site of Ein Birbiyeh (31/435-K5-1) were originally thought to be the foundations of a temple. However, when the site was tested in the 1982–1983 season, these remains were found to be a nearly complete sandstone structure that had been buried to the roof (Mills 1983, 132–4). Excavation has also revealed the friable condition of the sandstone, which has required careful conservation;

nevertheless, excavation continues slowly and the study of the temple proceeds (Mills 1985, 109–113; 1986, 70–3; 1987, 145–150; 1998, 86–8).

3.3 NEIGHBOURING ARCHAEOLOGICAL SITES

In the neighbouring oasis of Kharga, the sandstone temple of Hibis makes an impressive monument. Located in the ancient capital of the oasis in a site that covers over a square kilometre, it was excavated in the early years of this century by H. E. Winlock (Winlock 1941) for the Metropolitan Museum of Art, New York (MMA). The temple was built in the Saite Period, during the reign of Psammetichus II. The sanctuary was later completely rebuilt and decorated, probably by Darius I. In the reign of Nectanebo I, another building phase began and was completed by Nectanebo II (Cruz-Uribe 1988, 196–7). An impressive gateway to the temple was added in the Ptolemaic Period and an outer gateway by the first century AD. During the Roman Period, decrees were inscribed in Greek on the Great and the Outer Gateways (White and Oliver 1939). A Christian church, which had been built against the north wall of the portico, was destroyed by the raids of nomadic peoples in the fifth century AD. The pottery from Winlock's excavations is held by the Metropolitan Museum of Art, New York where it is being studied.

As in Dakhleh Oasis, many archaeological sites dated to the early and late Roman Periods can be seen throughout Kharga Oasis. Near Hibis Temple are two mud-brick temples of Nadura, both of which were built in the Roman period, the larger one during the reign of Antoninus Pius. The fortress of Douch (ancient Kysis) is located about one hundred kilometres south of Hibis. The site, which also includes a stone-built temple, a mud-brick temple, houses and cemeteries, is being excavated by IFAO. As yet, the earliest known text from the temple is an inscription of Domitian (Wagner 1987, 155–88). However, ceramic material has been dated to the Persian Period from its association with texts in recent excavations at the site (Marchand 1996, 1998). As there are many similarities in the pottery from this site and the Dakhleh material, the excavations in Kharga Oasis have played an important role in dating the pottery in this thesis.

CHAPTER FOUR

4.1 INTRODUCTION TO THE VESSEL TYPOLOGY

The Vessel Typology (Part II) comprises both text and plates and provides the description for 337 registered vessels and 290 sherds with complete sections recovered during the survey of the oasis. In addition, over 350 more fragmentary sherds, mainly collected during surface surveys, have also been included in the typology and were selected on the following criteria:

- Sherds recovered during the testing of a site;
- Sherds from a context that contained at least two or more identifiable finds;
- Sherds from distinctive or recognisable vessels;
- Sherds from ceramic types known from other assemblages in the oasis;
- Sherds that could be paralleled with dated vessels from outside the oasis.

As well as the pottery recovered from the survey, the Vessel Typology contains material from excavated sites: three deposits at Ismant el-Kharab, the cemeteries adjacent to Ismant el-Kharab and the large cemetery at 'Ein Tirghi. The pottery from the Ismant el-Kharab deposits was in sherd form. All this material was recorded on site and, although it was not the practice to draw every sherd from a frequently occurring type, examples of all the types have been included in the typology. The Vessel Typology is intended to be used in conjunction with the Site Catalogue (Chapter 5 and Part 2), in which the pottery vessels are grouped by context. Although the tested tombs had been disturbed or reused, the context of the vessel remains an important, if not decisive, chronological marker.

4.2 OBJECTIVES

The Vessel Typology has been formulated with the following aims in mind:

- To organise the large and varied quantity of intact vessels and sherds from Dakhleh Oasis into a classification system that will enable efficient cataloguing and processing of recovered material from future excavations in the oasis;
- To order the pottery types into a chronological sequence which will translate into the dating of sites tested during the survey of Dakhleh Oasis and assist in the selection of sites for further excavation;
- To describe this ceramic material in terms of form, fabric, ware, decoration and manufacture;
- To provide the foundation for future socioeconomic analyses based on the ceramic data;
- To provide descriptive and comparative material for other ceramic analysts working in the Western Desert, in the Nile Valley and further afield.

4.3 THE ARRANGEMENT OF THE VESSEL TYPOLOGY

The typology has been arranged by chronology, size, shape, morphology, technology, fabric and provenance. Each of these factors is discussed below.

4.3.1 Chronology

As analysis of the ceramic material from the survey progressed, it became evident that a longer period of time was involved than was at first anticipated. Consequently, the Vessel Typology has been divided into two sections: Series 1 and Series 2, each of which has been further divided into two phases. At present, it is not possible to give absolute dates for the beginning and end of each phase and it is to be accepted that most forms would overlap from one phase into another.

4.3.1.1 Chronological Sequences Of The Vessel Typology

Series 1: Phase 1

Phase 1 comprises forms that have parallels dated from the eighth century to the sixth century BC at other sites. The phase equates with Complex IIA at Karnak North (Jacquet-Gordon in press); Aston's Phase III S and Phase IV S (Aston 1996c, 87–93), and French's Second Phase (French 1992a, 86-8; 1996, 8-10). There are a few vessels from the early part of the phase that have parallels in late Complex I from Karnak North (Jacquet-Gordon in press) and Phase II (Aston 1996c, 87–93). Although this material not extensive, it could be made into a separate phase when more forms are added to the corpus.

Series 1: Phase 2

Phase 2 comprises forms that have parallels generally accepted to be dated to the period from about the end of the sixth century BC to the fourth century BC at other sites. The phase would extend from late in the Twenty-sixth Dynasty through the Persian Period to the Twenty-ninth and Thirtieth Dynasties. Phase 2 in this thesis equates with Complex IIB at Karnak North (Jacquet-Gordon in press); Aston's Phase V (Aston 1996c, 91–3) and French's Third Phase (French 1992a, 83-93; 1996, 8-10).

Series 2: Phase 3

This phase approximates the last four centuries BC. The material comprises a few forms recovered with early Roman Period material from Dakhleh Oasis and includes some forms frequently designated 'Ptolemaic–Roman' at other sites. At present, except for Hellenistic fine wares, the pottery from the Ptolemaic Period in Egypt is not well published; however, work on the period is progressing and the publication of material from a number of sites is imminent. In the absence of stratified material from Dakhleh Oasis, it is particularly difficult to differentiate between late Phase 2 and early Phase 3 material, when parallels from other sites are not available. In some cases, the placing of forms into these phases is provisional until more material from the period has been published.

Series 2: Phase 4

Phase 4 comprises forms that occurred consistently in three stratified deposits (SS17, SS18, SS19) at Ismant el-Kharab. Also included in Phase 4 are forms that, although not present in these three deposits, have been recovered in other assemblages which do include the forms present in the Ismant el-Kharab material. The ceramic material from the three Ismant el-Kharab deposits is similar in form, fabric and manufacture techniques. It is, however, recognisably different from the material recovered from the occupational levels of the houses at Ismant el-Kharab, which has been dated to the fourth century AD (Hope 1988, 178 and Hope forthcoming a).

In addition, ceramic material recently excavated from other areas of the site forms a transitional stage between these two assemblages. One of these deposits yielded an ostracon dated to the late third century AD and a coin from the mid-third to late third century AD. Another deposit contained nineteen ostraca dated to the mid-third century AD (Dunsmore forthcoming). The changes in technology and fabrics, which were taking place during this transitional phase, would have needed time to evolve and these developments must have started some time early in the third century AD. On this basis and the evidence of parallels, the assemblages from the stratified deposits (SS17, SS18 and SS19) excavated from Ismant el-Kharab have been placed in the first and second centuries AD.

4.3.1.2 Parallel material

The dating of the pottery had presented difficulties as it is unstratified except for the three deposits at Ismant el-Kharab. Finds from the tested sites, other than ceramics, have not been published except for the preliminary dating of some coffins (Mills 1983, 128–9, pl. VIII, a–d; Frey 1986, 92–102). Consequently, the use of parallels from other sites has provided one of the main methods of dating forms. The list of parallels in the typology represents a survey of the material and, in some forms, the dates given for parallels vary considerably. Although the dating of parallels is important, the assemblages and contexts of vessels in this corpus are also significant factors and these have been taken into ac-

count. In addition, some vessels which appear to be related have been included as parallels to demonstrate the possible range of forms. Some of the variations exhibited by the pottery from Dakhleh Oasis, in relation to forms of the Nile Valley, are possibly due to the isolation of the oasis which fostered preferences for different features and manufacturing techniques in the local pottery.

The following ceramic studies have been particularly helpful in providing parallels for the Dakhleh Oasis material and brief outlines of the dating schemes adopted by the authors most frequently quoted in this work are given: (D. A. Aston's publication of the pottery from Elephantine had not been published during the preparation of this thesis).

Parallels for Series 1

Phase 1 and Phase 2

Aston 1966c, 91-93.

Phase I	c.1200 – c.1000/950
Phase II	c.1000/950 – c.800/750
Phase III N	c.775/725 – c.650/625
Phase III S	c.775/725 – c.650/625
Phase IV N	c.650/625 – c.575/550
Phase IV S	c.650/625 – c.575/550
Phase V	c.575/550 – c.400 ?

French 1992a, 83-93 and 1996, 8–10.

First Phase of the Late Dynastic Period began 750 BC or shortly after.

Second Phase of the Late Dynastic Period began early in the seventh century BC.

Third Phase of the Late Dynastic Period started by 500 BC.

Jacquet-Gordon in press.

Complex I includes material from the end of the New Kingdom to the beginning of the Twenty-sixth Dynasty.

Complex IIA includes material known in the previous period but which develops during the Late Dynastic Period.

Complex IIB includes material which develops at the end of the Late Dynastic Period and continues into the Ptolemaic Period.

Spencer 1993, 50.

Level 3 dated to 950–850 BC

Level 2 dated 850–750 BC

Level 1 dated 750–650 BC

(It has been suggested by the author (Spencer 1993, 50) that these divisions are to be seen as guides with some overlap between all levels. Most of the pottery from Level 1 has been dated by D. A. Aston (1996c, 42) slightly later to 700–600 BC).

Marchand 1996, 415–30; 1997, 20–4.

Some of the ceramic material recently published from the site of 'Ayn Manawir in Kharga Oasis has been dated to the Persian Period. The material from this site is particularly important as the pottery technology in the neighbouring oases followed a parallel development. That this is the case can be seen in the material held by the new archaeological museum in Kharga, and also in the pottery from Hibis Temple excavated by H. E. Winlock held by the Metropolitan Museum of Art, New York.

Parallels with vessels from older publications are made primarily on the basis of shape as descriptions of fabrics are mostly inadequate, if not entirely absent. The dates given for the parallels in the publications have generally been left in the original format so as not to misrepresent or confuse the author's or authors' dating. It may also be more convenient for ceramicists who have developed their own system for translating the older dating systems.

In a few instances there is only one example to represent a form in the typology and parallels for some forms have not been found. However, these examples have been included as they stress the diversity of the ceramic material from Dakhleh Oasis and, in time, other examples may be recovered by future excavations.

Parallels for Series 2

Phase 3 and Phase 4

Marchand 1997, 20–4 and Marchand 1998, 437–442.

The work being conducted by the IFAO in Kharga Oasis and the Faiyum is invaluable for the period of Phase 3. The understanding of the material from the unstratified contexts in Dakhleh Oasis will become clearer as more material, particularly domestic or 'coarse ware', from these stratified sites is published.

Phase 4

Whitcomb and Johnson 1979 and 1982.

In the publications of the site of Quseir al-Qadim, some loci have been dated to the first century BC and to the first century AD by the presence of well-known imported wares. These contexts have provided parallels for the late Phase 3 and Phase 4 material.

When dating the site of Quseir al-Qadim, the excavator considered that:

> The evidence collected to present uniformly indicates an occupation beginning around the turn of the millennium and continuing not later than the very beginning of the third century, a period of approximately 200 years. (Whitcomb in Whitcomb and Johnson 1982, 52).

The Quseir al-Qadim material is especially useful as, during a short visit to Chicago in 1991, I was able to study the material held at the Oriental Institute with the assistance and generosity of Dr. Whitcomb.

Dunand et al. 1992.

The pottery from the large cemetery at Douch in Kharga Oasis shows that similar types of pottery were made in these neighbouring oases. However, only one of the tombs contained any textual material that could be dated and the pottery recovered from the site has not been fully published. When parallels are cited from the tombs at Douch, the tomb number is given thus: 'T4'.

4.3.2 Size

A modified version of the method chosen by Holthoer (1977, 58 and pl. 5) to classify size has been adopted for this study. The height of jars and restricted vessels and the maximum diameter of unrestricted vessels and non-containers, such as bowls, lids and stands are used to assess the size. Small differences in the measurements of small vessels reflect fairly large size variations, while larger size differences must exist in large vessels to reflect similar size variations. To compensate, Holthoer calculated the measurements on a logarithmic scale transformed into a curve and transposed on a metrical scale.

The size classes were obtained from this scale and the range of measurements and size classes chosen for this study are as follows:

'Small' covers the range of measurements less than 174 mm;

'Medium' covers the range between 175 and 362 mm;

'Large' covers the range larger than 363 mm.

4.3.3 Shape Classification

The shape of the vessel provides one of the main criteria for classification in the Vessel Typology and the general approach taken follows the comprehensive treatment of the subject by Nordström (1972, 68-74) and Holthoer (1977, 43 ff.). At present, the number of examples of most forms is not adequate for further comparative analysis. However, the vessel indices for intact and complete vessels have been established for future reference when additional material is added from further archaeological work in Dakhleh Oasis. In

the present typology the vessel indices appear at the top right-hand side of the vessels in the figures and the range of indices is given in the description of the forms. Generally the vessels have been arranged relative to the vessel index and progress from deeper to shallower vessels. However, in some forms this arrangement conceals the similarity of the vessels and, in particular cases, vessels have been arranged by semblance rather than vessel index.

The arrangement of forms has kept to the traditional format of unrestricted to restricted and small to large vessels. Some forms span both Series 1 and Series 2 of the Vessel Typology and the numbering of the forms has been continued through the two series. This format also indicates the forms that have their basis in an earlier period although some of the characteristics have changed.

4.3.3.1 The following measurements have been taken to determine the relative proportions of the vessels:

Rim diameter at its widest (Rd);

Maximum body diameter (Md);

Base diameter (Bd);

Total height of the vessel (Ht).

The vessel index expresses the relationship of the width of the vessel (Md) to the height (Ht). It is calculated as follows: $\frac{Md \times 100}{Ht}$

4.3.3.2 The following terminology has been used:

Unrestricted forms are those in which the rim diameter equals or is larger than the maximum diameter (U);

Restricted forms are those in which the rim diameter is smaller than the maximum body diameter (R).

4.3.3.3 The classification for unrestricted (U) vessels and restricted (R) bowls:

Very deep (V) – Vessel index is smaller than 200;

Deep (D) – Vessel index varies between 200 and 250;

Medium deep (M) – Vessel index varies between 250 and 315;

Shallow (S) – Vessel index is larger than 315.

4.3.3.4 The classification for restricted (RN) containers such as flasks and jars:

Slender (S) – Vessel index is smaller than 60;

Medium broad (M) – Vessel index varies between 60 and 80;

Broad (B) – Vessel index varies between 80 and 110;

Very broad (V) – Vessel index varies between 110 and 200;

Flat (F) – Vessel index is larger than 200.

4.3.3.5 The classification for neck height:

Very (V) short - Neck height is < 35% of Rd.

Medium short (SH) - Neck height is between 35 and 50% of Rd.

Tall (T) - Neck height is between 50 and 80% of Rd.

Very tall (VT) - Neck height is > 80% of Rd.

The system of symbols used by Nordström (1972) and Holthoer (1977) to express different shape classes has not been adopted and the more traditional description of 'bowl', 'beaker' or 'jar' has been used. In many cases, where the function of a form is unknown, it has seemed more appropriate to limit the description to 'vessel'.

4.3.4 Morphology

Following Holthoer (1977, 49–50), morphological details are those traits which were produced either during the throwing process or before the vessel was fired, and which could indicate a functional aspect. Attributes, such as spouts and handles, as well as the arrangement of these parts in terms of function, have been taken into account in the formation of the Vessel Typology. (The making and the attachment of spouts, handles and other appendages are discussed in the section on pottery making in Chapter 6.)

4.3.4.1 Thrown spouts

Forms 85 to 92: Spouted bowls and jars.

A number of different types of spouted vessels occur in both Series 1 and Series 2 of the typology and were popular in Dakhleh Oasis during earlier periods, particularly in the Second Intermediate Period. Relatively large numbers of spouted hemispherical bowls and carinated bowls, some of which have ring bases, have been recovered from 'Ein Tirghi (CS15) and other tomb sites in the oasis (Hope 1987a, 42–3: pl. XX: j-l and pl. XXI: d; and 85: fig. 2: k, l). The unrestricted spouted bowls of Form 85 in the Series 1 typology may have developed from the earlier carinated bowls.

Form 172 (Series 1): Funnels with spouts.

The only example of the form in this corpus, SS6 1c, is in the Royal Ontario Museum. The spout appears to have been thrown not hand-modelled. Funnels occur occasionally in the material from the houses at Ismant el-Kharab and the vessel in this typology is probably an early model of the type. Vessels made in this way would have functioned quite efficiently.

4.3.4.2 Modelled spouts

Form 102 (Series 2): Jugs.

The rims of the vessels were modelled to form a pouring lip or spout.

Form 179 (Series 1): Lamps.

Lamps were made from small bowl-shaped vessels which were deformed into an oval shape with the narrow part of the rim modelled into a spout to hold the wick. Other small vessels, particularly those of Form 1, were used as lamps but these vessels do not show any morphological change, and the vessels may have been used as lids or small bowls as well as lamps.

4.3.4.3 Handles

Two types of handles occur on the pottery in the corpus: loop handles and lug handles. A loop handle is formed from a strip or roll of clay and makes an enclosed space by itself or

with the wall of the vessel. A lug handle is a piece of clay attached to the vessel and is often modelled into place (Hamer 1975, 152).

4.3.4.3.1 Loop handles

Forms 70 to 76 (Series 2): Cooking pots.

A number of cooking pots had small vertical handles attached to the rim and upper body. Most of the cooking pots in the corpus were recovered in sherd form, and it is probable that a larger number of the cooking pots originally had handles than those illustrated. However, some complete or near complete vessels do show that vessels of the same type were made both with and without handles.

Form 77 (Series 2): Flasks.

The small oil or perfume flask retained a loop handle attached from the neck to the top of the body.

Form 78 (Series 1): Flasks.

The flask, CS5 Fj, originally had loop handles but not enough remains to be certain of the type or number.

Forms 88 to 89 (Series 1): Spouted vessels with vertical handles.

Form 91 (Series 2): Spouted vessels with vertical handles.

Forms 94 to 100 (Series 1 and 2): Vessels with two vertical handles.

The modelled bosses on the handles of the Form 100 vessels act as thumb stops and serve a functional as well as a decorative purpose.

Forms 101 to 106 (Series 1 and 2): Vessels with one vertical handle.

Forms 152 to154 (Series 1): Flasks with small loop handles.

The small loop handles were placed vertically from the base of the neck onto the shoulder. These forms have two handles except one Form 153 vessel, which has three. In some instances, the handles were flattened against the body of the vessels and effectively formed vertical lugs. The loop handles on some of the smaller flasks of Form 152 may

have functioned as handles but would not have been strong enough to serve this purpose on the larger vessels. The loop handles may have been used to secure a sealing or stopper.

Form 158 and Form 159 (Series 2): Kegs.

Some examples of these retain a vertical loop handle attached from the rim to upper body.

Form 160 (Series 2): Kegs.

Some kegs have a vertical loop handle attached to the barrel-shaped body, The handles may have been attached in this manner to make pouring from the vessel easier.

Form 161 (Series 2): Lentoid flasks.

The lentoid flasks have two vertical loop handles attached from the upper neck to the shoulder of the drum-shaped body. The flasks were made from a light-weight fabric and the large handles were securely attached and were probably sufficiently functional to transport the vessel.

Form 188 (Series 2): Skyphoi.

The two vertical loop handles on the vessels have upper and lower bosses which may have been primarily decorative although they would also have provided a secure grip.

Form 189 (Series 2): Amphorae with two vertical loop handles.

The handles on the smaller vessel had been firmly attached to the body of the vessel. The bosses on the handles of the larger vessel appear to be made from small wads of clay and may have been more decorative in intent than functional.

4.3.4.3.2 Lug handles

Form 70 (Series 2): Cooking pots.

Two examples of the form retain horizontal lug handles.

Form 78 (Series 1): Flasks with lugs.

The lugs were made from small wads of clay and modelled onto either side of the body.

Those on the only example, L3-1/1/1, appear to be too small to be functional and may have become a decorative feature.

Form 85 (Series 1): Spouted bowls.

The largest example of this form, CS3 1c, is in the Royal Ontario Museum. A very small loop handle was flattened against the wall of the vessel to form a type of vertical lug that does not appear to have had a functional purpose, although it could possibly have secured a lid.

Form 151 (Series 2): Flask with lugs.

The lugs were made from small wads of clay modelled onto the body at the junction of lower neck and shoulder. This type of lug seems to have become non-functional.

4.3.4.4 Forms with a pierced base

Form 170 (Series 2): Large jars or 'pigeon pots'.

The hole in the base was intentionally made during the throwing process, probably to provide ventilation for the nesting birds. Smaller vessels are still made in the oasis for rabbit breeding (Henein 1997, 131, fig. 35).

Form 171 (Series 2): Unrestricted vessels of unknown function.

The bases of two examples of this form were pierced after the vessel had been cut from the wheel but while the clay was still soft. The edges of the hole were not neatly finished and are quite ragged. The base of one vessel, similar in size and shape, was left intact. The function of these vessels is not known. The closest type of vessel that I have been able to find occurs in the New Kingdom and is thought to have been used for bread making (Holthoer 1977, 83–4).

4.3.4.5 Spouted forms with a pierced wall.

In order to pour from spouted vessels, an opening needed to be made in the wall. One hole was cut for some types, in others a series of smaller holes was made to form a strainer.

Forms 85 to 88 (Series 1 and 2): Spouted vessels without a strainer.

Form 89 (Series 1): Necked spouted jars with handles and without a strainer.

Form 90 (Series 2): Necked spouted jars (one example has a one-holed spout and the other a strainer).

Form 91 (Series 2): Necked spouted jars with handles and without a strainer

Form 92 (Series 2): Thick-rimmed basins; these vessels do not have a strainer.

4.3.4.6 Either one hole or a series of smaller holes (to form a strainer) were made in the body of some kegs and flasks before the neck was thrown on from additional clay (Chapter 6 and Pl. 165, figs 1–2).

Form 150, possibly Form 151, Forms 152 to 154: Series 1 Lentoid flasks

Forms 155 to 159: Series 1 Kegs

Form 103: Series 2 Necked water jugs or flasks

Form 151: Series 2 Lentoid flasks

Forms 157 to 160: Series 2 Kegs

Form 161: Series 2 'Drum-shaped' lentoid flasks

Possibly Form 162: Series 2 Kegs (body shape unknown)

4.3.4.9 Vessels with modelled additions

Form 82 (Series 1): Femino-form vessels.

Plastic clay was added to the body and crudely modelled into arms and breasts. The function of these vessels is not certain but they are thought to have been containers for milk.

Form 190 (Series 1): A small body sherd from a thrown vessel with the features of a Bes jar made from hand-modelled plastic additions.

Form 91 (Series 2): Necked spouted jars with handles.

A thin round layer of clay was inserted into the neck of these vessels which was then pierced to form a strainer.

4.3.4.10 Vessels with attached decorative appendages

Form 186: Jar or kernoi.

Five miniature jars were thrown and attached around the rim of this vessel. Although the function and date of the only example in the corpus is not certain, the vessel has some semblance to a number of published offering vessels or kernoi.

4.3.4.11 Manufacturing techniques

One of the aims of this thesis is to provide a basis for research into the chronological development of the pottery-making techniques employed by the potters of Dakhleh Oasis. Accordingly, the characteristics of the different manufacturing methods were taken into account in the formation of the typology. These have been based on the accessible material —pottery from the survey held in the Royal Ontario Museum, material recorded from Ismant el-Kharab and 'Ein Tirghi — and the technical features of the form are discussed when one or more examples have been examined. However, it must be acknowledged that the pottery types formed in the typology would not necessarily be those recognised by the makers of the pottery vessels. All the pottery in this typology was thrown on the wheel except for the Form 188 skyphoi and probably the Form 176 platters. (The techniques of pottery making and associated terms used in the Vessel Typology and the Site Catalogue are discussed and explained in Chapter 6.)

4.3.4.12 Fabrics and surface treatment

Although it is one of the most important characteristics of a ceramic study, separate typologies have not been formed for each of the different fabrics in this thesis. This decision was made for two reasons: first, the sherds from the survey and approximately half the registered vessels were not accessible to me for examination; second, in the period relevant to this thesis, several types of vessels were made from different types of fabrics. In

Series 1, vessels (Forms 43, 45 and 53) were made from both red-firing fabrics and light-firing fabrics. In Series 2, most types of cooking pots were regularly made from two fabrics – red-firing fabrics, R-F1 and R-F2, and the lighter-firing shaly fabric, L-FS. Other vessels (Forms 2 and 66) were made from the red-firing fabrics and the cream or green firing fabrics, L-F2 and L-F4.

Consequently, for this research it was deemed more appropriate to keep the pottery forms together and detail the specific fabrics in the Vessel Typology and in descriptions of the individual vessels in the Site Typology. The red-firing fabrics (R-F) are the most common in the corpus and, on the plates of drawings, these are understood to have been used unless indicated otherwise ('L-F' denotes light-firing marly fabrics, 'R-FS' and 'L-FS' red-firing and light-firing shaly fabrics respectively). In the future, the Vessel Typology can be separated into different fabric sections when needed for recording purposes or as more material becomes available. (Clays and fabrics are discussed in Chapter 7 and Appendix 1.)

The surface treatment of a vessel or sherd is given wherever possible. However, a considerable amount of the material consists of sherds recovered in surface collections and the records for sherds are not as detailed as those for registered vessels.

4.3.4.13 Provenance

Small numbers of sherds from imported amphorae and other vessels were recovered, mostly from surface collections. Generally there is only one example of each type and these have been placed in the section of Miscellaneous Forms.

4.4 FORMAT FOR THE ILLUSTRATED DRAWINGS

One of the aims of this study is to provide information in a readily accessible format for future work in Dakhleh Oasis and for ceramics analysts working at other sites in Egypt. Consequently, the corpus exists as electronic files and it is envisaged that sections can be either transmitted electronically or printed for use in the field as required. In addition, this format means that both the site typology and the vessel typology can be expanded as

more material becomes available. For this reason, in places throughout the Vessel Typology, numbers have been left vacant so that additional forms can be incorporated as further work in the oasis results in the recovery of new ceramic forms.

4.5 DESIGNATIONS AND ABBREVIATIONS

4.5.1 All registered vessels from the survey, relevant to the period, have been included in the typology. A few were the only vessels recovered from a site or were from very small assemblages and the site has not been included in the Site Catalogue. In this instance, a shortened site number coupled with the registration number is given, for example L9-1/0/4. If the example was a sherd and not registered, the shortened site number is coupled with the drawing sheet number, for example A2-1/82/30i.

4.5.2 The following abbreviations have been used:

'CS' indicates a cemetery site;

'SS' indicates a settlement site;

Surface collections are indicated by '0', for example L9-1/0/4 and SS20 0a;

'(nr)' not reproduced in the catalogue.

4.6 EXPLANATIONS

Munsell Soil Colour Charts were used for colour readings.

Hardness has been measured in terms of the Mohs Scale.

4.7 ARRANGEMENT OF THE DESCRIPTIONS

The Form number and a brief description

Measurements and vessel index

Identification of examples: vessels and sherds

Identification of registered vessels

Identification of vessels in the collection of the Royal Ontario Museum

Fabrics and wares

Observations on manufacturing techniques

Context

Dating

Parallels.

4.8 ARRANGEMENT OF THE FORMS

The order of the forms proceeds by the following criteria:

Type of vessel – unrestricted to restricted

Size of the vessel – from small to large and shallow to deep

Type of base – flat bases to ring bases to round or pointed bases

Profile – from simple to complex to composite

Morphological details – spouts and handles

Height of neck – neckless, short, medium and tall.

When sherds are examined, these have been compared with intact or complete vessels with similar rim, body or base formations and placed accordingly. However, it is to be expected that future finds of intact vessels may alter the classification of some sherds.

4.9 INDEX OF FORMS

Forms 1 to 4	Small to medium shallow vessels: flat or ring bases
Form 5	Small bowls with modelled rims: flat bases
Forms 6 to 10	Small to medium shallow vessels: flat bases
Form 11	Small to medium deep vessels: flat to rounded bases
Forms 12 to 17	Small bowls: flat or ring bases
Forms 20 to 26	Small bowls 'fine or imported wares': flat or ring bases
Form 31	Small open vessels or censers: flat bases
Form 32	Footed goblets with a tall ring base
Forms 33 to 35	Small carinated bowls and open vessels: flat or ring bases
Forms 36 to 37	Small open vessels with restricted rims: flat or rounded bases
Forms 38 to 42	Small to medium bowls: ring bases
Forms 43 to 44	Small bowls and open vessels: round bases
Forms 45 to 46	Small shallow vessels: rounded bases

Forms 47 to 48	Small bowls and open vessels: round or pointed bases
Form 49	Small carinated vessels: round bases
Form 50	Shallow bowls or open vessels: round bases
Forms 51 to 59	Medium to large bowls: ring bases
Forms 61 to 62	Medium to large bowls with restricted rims: ring bases
Forms 63 to 65	Small deep vessels or beakers: round bases
Form 66	Small deep vessels: round bases
Forms 67 to 69	Small to medium deep vessels: round bases
Forms 69 to 76	Cooking pots
Forms 77 to 79	Small to medium 'oil or perfume' flasks: round bases
Forms 80 to 84	Small to medium flasks or slender vessels: pointed bases
Form 85	Spouted bowls: ring bases
Forms 86 to 87	Spouted vessels: flat or ring bases
Form 88	Spouted vessels: round bases
Forms 89 to 91	Spouted necked vessels: ring bases
Form 92	Large spouted bowls: ring bases
Forms 94 to 100	Two-handled vessels
Forms 101 to 106	One-handled jugs and flasks
Forms 108 to 111	Small to medium necked vessels or jars: flat bases
Forms 112 to 115	Small to medium necked jars: round bases
Form 116	Small necked jars: composite profiles: round bases
Forms 117 to 119	Medium jars: cylindrical profiles: short to tall necks: round bases
Forms 122 to 124	Medium to large jars: neckless to short: round bases
Form 125	Large jars: neckless to short: round bases
Form 126	Large jars with wide apertures: round bases
Forms 127 to 138	Large jars: short to medium necks: round bases
Forms 142 to 143	Large jars: medium to tall necks
Form 150	Flasks (globular)
Forms 151 to 153	Small to medium flasks (lentoid-shaped)

Form 154	Large flasks (lentoid-shaped)
Forms 155 to 160	Kegs (barrel-shaped)
Form 161	Lentoid flasks (drum-shaped)
Form 162	Flasks or kegs (type unknown)

Miscellaneous Forms

Form 170	Large restricted jars or 'pigeon pots'
Form 171	Unrestricted vessels (function unknown)
Form 172	Funnels
Form 173	Lamps
Form 174	Potstands
Form 175	Braziers or stands
Form 176	Platters or troughs
Form 185	'Incense burners'
Form 186	Ornamental vessels or kernoi
Form 188	Handmade skyphoi
Form 189	Amphorae
Form 190	Decorated sherds
Form 192	Sherds from imported amphorae and other vessels.

CHAPTER FIVE

5.1. INTRODUCTION TO THE SITE CATALOGUE

Maps 4 to 9: Charts 1 to 2

The Site Catalogue was designed to facilitate the dating and comparison of the sites and comprises two sections. The text (Chapters 11 to 13) provides descriptions and data for individual pottery vessels and gives an outline of the sites from which the assemblages were recovered. The site information includes that published by the director of the Dakhleh Oasis Project supplemented, wherever possible, by the unpublished fieldnotes of the investigators who participated in the survey. The assemblages of pottery vessels are illustrated in Volume II.

Over ninety sites in the oasis provided ceramic material dated from the Late Period to the early Roman Period. Within the limits of this thesis it was not possible to include every site and, to provide the most effective information, sites were selected by the following
criteria:

- Sites that yielded registered finds were selected first as more information is available for these vessels;
- Sites with large assemblages of vessels and sherds;
- Smaller assemblages, which included vessels of special interest or with parallels in the larger sites, that would assist in building up a body of chronological and typological information;
- Assemblages recovered from tests were chosen in preference to surface collections (sherds from surface collections are included in the Vessel Typology);

- The three early Roman Period deposits from Ismant el-Kharab did not provide any intact material; however, they were from sealed stratified contexts and form an important chronological basis for the catalogue. They are included as the settlement sites SS17, SS18 and SS19.

Twenty cemetery sites (CS), twenty settlement sites (SS) and three temple sites (TS) were selected to be included in the catalogue. (A few vessels of special interest from a fourth temple site (TS4) have been included.) The four chronological phases (Series 1: Phases 1 and 2; Series 2: Phases 3 and 4) are represented but the sites are not arranged in chronological order.

The format of descriptions in the Site Catalogue is as follows:

Vessel number and identification;

Fabric and wares;

Dimensions in centimetres;

Remarks on the form, manufacture and condition of vessel;

Registration number when applicable;

Accession number for the Royal Ontario Museum when applicable;

The Form and the chronological phase in which the vessel has been placed.

A summary given at the end of each site entry discusses the dating of the site and the parallels for the finds. Detailed information on the parallels for each form is provided in the Vessel Typology and is not given in full in this section.

A series of maps has been compiled to show the location of sites for each chronological phase. These maps are based on Map 4, which illustrates the grid system used in the survey of the oasis. If the ceramic material indicates that a site was utilised over an extended period, it is entered on more than one map. In addition, Charts 1 and 2 plot the distribution of vessel forms at different sites.

5.2 SUMMARY OF THE SITES AND THEIR DATING

Dating system

Phase 1 — eighth to sixth century BC (Twenty-fifth Dynasty and Saite Period)

Phase 2 — late sixth to fourth century BC (Persian and late Pharaonic Period)

Phase 3 — fourth to first century BC (Ptolemaic Period)

Phase 3 — first and second century AD (early Roman Period)

5.2.1 Phase 1 Sites (Map 5)

SS14: 32/390-M4-1. The ceramic material recovered from this site indicates that some activity occurred on this settlement site as early as the eighth or seventh century BC.

CS19: 31/435-G2-2. Although the two assemblages from the site are very small they indicate that this site in the eastern zone of the oasis was in use in the eighth or seventh century BC.

CS7: 31/405-F9-3. The earliest burials seem to have been made in this tomb complex in the late eighth or seventh century BC (Phase 1). The tomb probably continued to be used at times during the Persian Period (Phase 2) with the last burials or offerings made around the end of Phase 2 or early in the Ptolemaic Period (Phase 3).

TS2: 32/405-A2-1. Sherds only were recovered from this site, however, the forms are similar to some of those from sites CS7 and SS14 and indicate that this temple was in use during the late eighth to early in the sixth century BC (Phase 1).

CS15: 31/435-D5-2. A number of vessels show that the cemetery was in use during the eighth or seventh centuries (Phase 1). In addition, pottery from the late sixth and fifth century BC was also recovered (Phase 2).

CS11: 32/390-K2-3. The pottery from the site included in the corpus is from Phase 1 and dates to around the seventh century BC. (The tomb had been used in earlier Pharaonic Periods.)

SS6: 33/390-K9-2. The vessels recovered from the tested building at this settlement site indicate that it was occupied in the seventh century BC (Phase 1). Two sherds from the surface also support a date around the seventh or sixth century BC.

SS16: 31/405-M9-1. Material recovered from Test 3 in the temple area indicates that the site had been occupied over a long period from around the eighth or seventh century (Phase 1). The material from two other tests is dated to Phase 4.

CS20: 31/405-K6-1. This very small assemblage indicates that the cemetery was in use around the sixth century BC (late Phase 1 or early Phase 2).

5.2.2 Phase 2 Sites (Map 6)

CS15: 31/435-D5-2. The majority of the vessels recovered from this large cemetery site are dated to the sixth and fifth centuries BC (Phase 2). However, burials also took place during Phase 1.

CS8: 31/405-E8-2. The material from the tomb generally indicates a date in the late sixth to fifth century BC (Phase 2). However, if the identification of CS8 2a is correct burials may have been made in Phase 1.

CS1: 33/390-E9-2. The assemblage from the tomb complex at this site indicates that it was in use late in the sixth or the fifth century BC (Phase 2).

CS3: 32/390-K4-1. The tomb at the site was used during the later part of the sixth or the fifth century BC (Phase 2) with burials continuing into the early fourth century BC.

CS4: 31/405-D7-1. This small assemblage, which is dated to the sixth or fifth century BC (Phase 2), may indicate that a settlement on another side of the spring mound was occupied around the same time.

CS5: 31/405-F6-1. A date in the late sixth century or the fifth century BC (Phase 2) seems appropriate for the vessels from the tested tomb at 32/405-F6-1. A few early Roman Period sherds from the fill indicate that there was some later activity at the site.

CS10: 31/405-H10-3. The ceramic material appears to have been deposited in Tomb 1 at the site during the late sixth or the fifth century BC (Phase 2).

CS6: 31/405-F9-1. Tomb 3 at this large cemetery was in use around the sixth or fifth century BC (Phase 2). (Tomb 1 was used or perhaps reused during Phase 4.)

CS17: 31/420-I6-1. Two vessels were recovered from the tomb: parallels for one are dated to Phase 2, and the other may be dated to the Ptolemaic Period (Phase 3, Map 8).

CS16: 32/390-F7-1. The small group of vessels suggests that there was use of the cemetery around the sixth or fifth centuries BC (Phase 2 Map 6) with some activity at the site in the early Roman Period (Phase 4, Map 9).

5.2.2.1 Late Phase 2 Sites (Map 7)

CS12: 30/405-M1-1. Tomb 1 at the site was in use towards the end of Phase 2.

CS14: 31/420-D10-1. The tomb at the site appears to have been used late in Phase 2 around the fifth or fourth century BC.

CS2: 32/390-K1-1. The material from this site seems to be late in Phase 2, perhaps the end of the fifth into the fourth century BC.

SS10: 32/390-I4-2. Although a collection of surface finds, the small group of vessels suggests that the site was in use towards the end of Phase 2. The occupation at the site may have continued through the Ptolemaic Period (Phase 3) and into the early Roman Period (Phase 4).

SS7: 32/390-E1-1. A few sherds recovered from the site suggest that there was some activity at the site around the end of the fifth century (Phase 2). Most of the material comes from later occupation.

CS7: 31/405-F9-3. Early use of the tomb complex occurred during Phase 1 (Map 5). However, a Form 111 jar, CS7 2m, indicates use of the tomb towards the end of Phase 2.

SS2: 33/390-F8-1. A date in the fourth century BC (late Phase 2 or Phase 3) is suggested for most of the vessels from this site. However, if the identification of some sherds is correct there may have been earlier activity at the site.

5.2.3 Phase 3 Sites (Map 8)

CS13: 31/420-C5-1. Burials may have been placed in the tombs at this cemetery near Ismant el-Kharab late in Phase 2 or early in the Ptolemaic Period (Phase 3). The sherd material from the surface indicates that use of the area continued into the early Roman Period.

CS9: 31/405-H9-2. A date early in Phase 3 is suggested for the vessels from Tomb 1 at this site.

CS18: 33/390-F10-3. The burial excavated at the site appears to be dated to Phase 3, but surface sherds suggest that there was earlier activity at the site.

CS17: 31/420-I6-1. A small bowl from the site may be dated to the Phase 3. (Parallels for another vessel are dated to Phase 2.)

SS15: 31/435-N3-1. This is a small surface assemblage dated to the late Ptolemaic Period (Phase 3) or the early Roman Period (Phase 4).

SS10: 32/390-I4-2. This small group of vessels suggests that the occupation of the site occurred during Phase 3 and continued into the early Roman Period (Phase 4). There had been earlier activity at the site towards the end of the Persian Period (Phase 2).

TS3: 31/435-K3-1. This ceramic assemblage indicates that there was activity at the temple of the site late in the Ptolemaic Period (Phase 3) and in early Roman Period (Phase 4).

SS7: 32/390-E1-1. The majority of the vessels in the assemblage are dated to Phase 3. A few sherds suggest that there was activity at the site towards the end of Phase 2.

SS8: 32/390-D1-1. The small assemblage from the site indicates that the tested building was occupied late in the Ptolemaic Period (Phase 3) or the beginning of the Roman Period (Phase 4).

SS12: 32/390-J3-2. The tested house at the site appears to have been occupied around the end of the Ptolemaic Period (Phase 3) or the beginning of the early Roman Period (Phase 4). It may be possible to narrow the time when the cache of Demotic ostraca is published.

5.2.4 Phase 4 Sites (Map 9)

SS20: 31/405-G10-1. A few forms indicate the earlier use of the site 31/405-G10-1 while the forms with parallels from Ismant el-Kharab show that activity at the site continued at least until the first and second century AD. (It is probable that the site of Mut el-Kharab dates from the Pharaonic Period.)

SS17, SS18, SS19: 31/420-D6-1. The ceramic material from the deposits SS17, SS18 and SS19 has established that the settlement site of Ismant el-Kharab was occupied in the early Roman Period.

TS4: 31/420-D6-1. The small number of ceramic finds from the temple at Ismant el-Kharab is dated to the early Roman Period and perhaps late in the Ptolemaic Period (Phase 3).

SS11: 32/390-I6-2. The vessels and sherds recovered from the tested building testify that it was occupied during the early Roman Period.

SS1: 33/390-E9-1. Most of the ceramic material from the site is dated to the early Roman Period (Phase 4) although some sherds indicate that the site was in use a little earlier, perhaps late in the Ptolemaic Period (Phase 3).

SS3: 33/390-F9-1. The similarity of some of this material to that recovered from the early Roman Period deposits (SS17, SS18 and SS19) at Ismant el-Kharab establishes that the site was occupied in the first and second centuries AD. However, a few sherds suggest that the site was also occupied in the Ptolemaic Period (Phase 3).

SS4: 33/390-F10-1. Sherds from the surface of the site have parallels in the Phase 4 deposits at Ismant el-Kharab. However, the lack of parallels makes it difficult to place other material securely and the tested house may have been occupied early in Phase 4 or late in the Ptolemaic Period (Phase 3).

SS5: 33/390-H5-2. The ceramic material from the tested house and the surface at 33/390-H5-2 indicates that there was activity at the site around the early Roman Period. Unlike a number of other surveyed sites, there is no indication in the assemblage to suggest an earlier occupation at the site.

SS9: 32/390-H9-1. The ceramic material recovered from the site is contemporary with that from the three early Roman Period deposits from Ismant el-Kharab.

SS13: 32/390-L3-1. These two very small assemblages indicate the tested buildings at the site were occupied during the early Roman Period.

SS16: 31/405-M9-1. The assemblages from Test 1 and Test 2 are contemporary with the early Roman Periods deposits from Ismant el-Kharab and show that the tested houses were occupied during the early Roman Period. There was also earlier Phase 1 and 2 material from the temple at the site (Test 3).

TS1: 31/405-L4-1. The cache of pottery recovered from the site is similar to the early Roman Period deposits from Ismant el-Kharab, and is dated to around the first and second centuries AD.

CS16: 32/390-F7-1. The small group of vessels suggests that the cemetery was in use around the sixth or fifth centuries BC (Phase 2) and there was also activity at the site in the early Roman Period.

CS6: 31/405-F9-1. The architectural evidence suggests an early use of Tomb 1; however, the ceramics recovered are dated to late Phase 4 and possibly indicate reuse of the tomb.

CS13: 31/420-C5-1 Several forms from the early Roman Period deposits at Ismant el-Kharab were recovered from the nearby cemetery, CS13. These were mainly sherds recovered from fill or from the surface.

5.3 COMPARISON OF SITES **Charts 1 to 2**

In the early stages of research on this project it seemed that the pottery vessels from the cemetery sites were, on the whole, different from those recovered from settlement sites. The idea that the potters working in the oasis made vessels specifically for burial purposes began to appear possible. However, as more material from the survey was collated, this theory no longer seemed valid. In particular, vessels in assemblages from two of the early settlement sites have proved to be similar types to those from cemetery sites of the same phase (Chart 1 and Map 5).

To make the comparison of sites clearer, Charts 1 and 2 have been compiled for this section. The charts combine information from the Vessel Typology and the Site Catalogue and compare the distribution of vessels at sites of different usage and the relationship of sites to each other. The relevant sites appear in the left-hand column and vessel forms that occur in more than two sites head the columns.

5.3.1 Phase 1 **Chart 1**

The Phase 1 assemblages from the settlement sites SS6, SS14 and the temple site TS2 are similar to those from the cemetery sites CS7, CS11, CS15 and CS19. The assemblage recovered from the test at the settlement site SS14 is particularly important in this respect, as it is relatively large and contains a number of forms.

5.3.1.1 Settlement and cemetery sites

Chart 1 shows nine forms that are common to this site (SS14) and cemetery sites:

Forms 32, 43, 51, 67, 80, 86, 118, 154, 155

5.3.1.2 Cemetery and temple sites

The chart also shows that three forms are common to SS14, cemetery sites and the temple site (TS2):

Forms 43, 67, 86

The material in Phase 1 clearly shows the similarity of the ceramics recovered from settlement, cemetery and temple sites.

5.3.2 Phase 2 to Phase 3 Chart 2

The uniformity that occurs in the early assemblages is not as evident in later phases. Although more ceramic material from Phase 2 was recovered at cemetery sites than from settlement sites, a greater ratio of cemetery sites had to be brought into the equation to make a meaningful comparison with the settlement material. There are also fewer forms common to the different types of sites. In addition, some of these forms appear to have been made over a considerable period and, at present, it is difficult to differentiate between late Phase 2 (Persian Period) and Phase 3 (Ptolemaic Period) forms. The settlement sites that have the most forms in common with cemetery and temple sites in Phase 2 to 3 are SS2 and SS7. These assemblages also contain later material: Phase 3 material at both sites and Phase 4 material was recovered from one test at SS7. The assemblages from two other sites (SS10 and SS3) contain two forms and another site (SS4) one form in common with Phase 2 to 3 cemetery sites.

5.3.2.1 Settlement and cemetery sites

Chart 2 shows the forms common to settlement and cemetery sites in Phases 2 to 3:

Forms 13, 41/2, 52, 61, 87, 113/4, 130

5.3.2.2 Settlement and temple sites

The forms common to settlement sites and temple sites (SS16 3 is the test in the temple at site SS16) in Phases 2 to 3 are:

Form 87 (if the identification of the sherd, SS16 3c, is correct) and Forms 113/4.

5.3.2.3 Temple and cemetery sites

Test 3 in the temple at SS16 contains three Phase 2 forms (including the sherd not certainly identified) that were recovered from the cemetery sites. The temple at TS2 has rim sherds from two small jars, Form 113-4. The difference in the number of entries in Chart 1 and in Chart 2 clearly indicates that most of the material from these two temple tests belongs to the earlier phase, Phase 1.

The four forms common to cemetery sites and temple sites in Phases 2 to 3 are:

Forms 47, 85, 87 and 113/4.

Although the material in the corpus does not, at present, allow definite conclusions for the Phase 2 or Phase 3 period, the charts do not clearly indicate that pottery vessels were being produced for specific functions. When examining the pottery held in the Royal Ontario Museum, it was noted that many vessels from the cemeteries were asymmetrical, others had quite obviously been patched before firing and several were very low-fired and soft. It seemed fairly obvious that these vessels would not have functioned well in domestic usage and, although not produced specifically for burial equipment, they may have been put aside and sold as 'seconds' for that purpose.

5.3.3 Phase 4

5.3.3.1 Settlement and cemetery sites

In contrast to the material from earlier phases, Phase 4 is dominated by the sherds recovered from the three deposits from the settlement of Ismant el-Kharab. However, a few small collections of pottery were recovered from cemetery sites and the sites with the forms are listed below:

CS6: A registered Form 137 jar was recovered from Tomb 1 and rim sherds of the Forms 134, 135, 137 and 138 from the fill of Tomb 3. These jar types are found in the Ismant el-Kharab deposits.

CS13: Several forms known in the early Roman Period deposits at Ismant el-Kharab were recovered from the nearby cemetery CS13. These were mainly sherds recovered from fill or from the surface. The forms common to both the settlement and the cemetery include Form 62 bowls, a Form 105 jug sherd, jar sherds Forms 123, 132, 138 and Form 157 keg sherds. The intact registered material from Tombs 2 and 13 is dated earlier, probably late in Phase 2.

CS16: A Form 62 bowl was recovered from Grave 2 and a sherd possibly from a Form 115 jar from Grave 1.

CS18: Most of the material from the site is from Phase 3; however, a rim sherd from a Form 115 jar would be dated around Phase 4 if the identification is correct.

5.3.3.2 Temple and settlement sites

The pottery from the cache at the temple site, TS1, is very similar to the sherd material from the early Roman Period deposits from Ismant el-Kharab. However, the derivation of this cache of pottery is unknown. It may have been an intrusive burial dug in a room of the temple, although burial materials were not recovered with the cache. The only forms in the group of eleven pots not found at Ismant el-Kharab are Forms 69, 77 and 91. The latter vessel is a *gargoulette* and a smaller variant of the form was recovered from CS13, the cemetery near Ismant el-Kharab.

The assemblage from the temple site, TS3, also contains a number of forms present in the Ismant el-Kharab material. These include Forms 2, 6, 38, 135 and, in addition, several small Form 110 vessels were recovered from the temple area of Ismant el-Kharab (TS4).

5.3.4 Summary

In Phase I, the ceramic material shows that much the same types of pottery vessels were recovered from settlement, cemetery and temple sites. However, in material from the later periods of Phase 2 and 3, the correspondence is not quite as clear. In Phase 4, some of the

forms from settlement sites were present in the deposits recovered from cemetery sites, but the data at these sites is obscured to some extent by surface finds. There is, however, a noticeable similarity among the three early Roman Period deposits from Ismant el-Kharab (SS17, SS18 and SS19) and the material from the temple sites TS1 and TS3.

CHAPTER SIX

6.1 TECHNIQUES OF POTTERY MAKING

A number of valuable technical studies on Egyptian ceramics have been published in recent years (Arnold 1993, Brissaud 1982, Golvin 1982, Henein 1992 and 1997, Nicholson 1993 and 1995, Powell 1995). However, the descriptions of manufacturing techniques that follow are, to a large extent, based on my experience as the ceramic analyst at Ismant el-Kharab and on the study of the vessels from Dakhleh Oasis held by the Royal Ontario Museum. The opportunity to study the collections of Egyptian pottery in museums overseas and in Australia has added to this experience. Nonetheless, the major stimulus to look at the ancient craft of pottery making has come from my work over a number of years as a professional potter. The manuals and books written by practising potters such as Bernard Leach, Daniel Rhodes and Frank Hamer were then, as now, a valuable source of information on all aspects of pottery making.

During excavation seasons in Dakhleh Oasis, it was possible to make a few visits to the pottery at Qasr el-Dakhleh and, when in Cairo, to the potteries at Fustat. Some of the vessels made by the modern potters at Qasr el-Dakhleh can be related to those recovered from the archaeological contexts, in particular, from the excavations at Ismant el-Kharab. Consequently, the techniques and production methods used by the Qasr potters are a valuable source of information for the archaeological record. The potters and their assistants in the oasis are still producing a range of domestic wares for local use. However, with the increasing development and modernisation of the New Valley, including the popularity of plastic containers, the livelihood of the artisans may not continue for much longer. The work of Brissaud (1982), Henein (1992 and 1997), Nicholson (1993) on pottery making in the Nile Valley and the oasis are important ethnographic records and I

hope the following remarks will contribute to their investigations.

6.2 POTTERY WHEELS

From the examination of the wheel-made pottery in this corpus, it is apparent from technological indications that all the vessels were made on a kick wheel or 'fast wheel'. This type of wheel is also sometimes called a 'combined wheel' or a 'double wheel' as it comprises an axle and two flat discs. One of the discs, the flywheel, is much larger and heavier than the other disc, which serves as the wheel-head. Both discs can be made of wood but the wheel-head could also be made from clay. The axle or shaft goes through the flywheel and the end is secured into a pivot in the ground (Brissaud 1982, 90 and fig. 22; Henein 1997, figs 18-9; Wood 1990, 101, fig). A stone in the British Museum (BM 55310) is possibly a pivot from a kick wheel (Powell 1995, 312 and fig. 10.1).

The potters at Qasr el-Dakhleh use small-headed kick wheels sunk into pits that run along the length of the mud brick walls of the pottery (Pl. 163, Fig. 1). For each wheel placement, two wooden planks are placed across the pit. One plank serves to stabilise the axle or spindle connecting the wheel-head to the large flywheel. A shorter plank, placed at right angles across the two planks, enables the potter to sit and kick the large flywheel. The Dakhleh potters have the axle in a more vertical position than some wheels seen at Fustat, which have about a 10° tilt. The axle needs to be long enough to accommodate the length of the potter's legs and to allow the potter to sit approximately at the same level as the wheel-head. The exact length of the axle may not be crucial but there is, undoubtedly, a distance from seat to flywheel that allows for the maximum efficiency in the same way as a bicycle rider adjusts the seat to gain maximum power for energy expended.

Most parts of the framework of ancient kick wheels would have been made of wood and examples are not known in the archaeological record. However, a relief from the temple of Hibis in Kharga Oasis depicts Khmun throwing a pottery vessel on a kick wheel. This relief, which has been dated to the time of Darius I, is the earliest known de-

piction of a kick wheel in Egypt and the Mediterranean region (Arnold 1993, 79). Illustrations of kick wheels (Holthoer 1977, figs 31-33, 37, 39-40) in ancient reliefs vary and the actual construction is difficult to decipher; however, two figures (32 and 40) show a block-like construction around the axle of the wheel. Many centuries later, a similar structure was depicted in a Meissen porcelain figure in the Fitzwilliam Museum, Cambridge (Arnold 1993, fig. 95B). The action of this figure is more fluid than that given in the reliefs to the god, Khnum, whose posture is static, perhaps as more befitting to a god, and has none of the power of a real working potter. Nevertheless, the reliefs verify that, in Egypt, potters' kick wheels were in use at the end of the sixth century BC at the latest.

6.3 WORKSHOP LAYOUT

The workshop at Qasr el-Dakhleh opens onto a large open area for clay preparation, the drying of the raw pottery vessels and the location of kilns. Clay is prepared by soaking in a number of round pits dug into the ground (Pl. 163, Fig. 2) which are used for mixing the pulverised dry clay with water. These are not nearly as large as the settling tanks seen at Fustat, where a considerable area is taken up for this process. The soaked clay is spread out on the ground near the soaking hole. When it has reached the right consistency it is kneaded and taken inside to the four or five potters, who usually can be seen working at one time. The finished pots, as well as those that require some drying between the different stages of throwing, are placed in tidy rows around the area. Some vessels are put in the shade under the trees, and others are left in the sun, although this might only be for a short period (Pl. 163, Fig. 2). The activities of clay preparation, throwing, drying and firing need not have changed substantially, even over a long period, and the layout of the pottery workshop at Qasr el-Dakhleh may be very similar to the workshops of ancient times (see Hope 1980, 303–11, pls XXVI–II and XXIX; 1999, 62–5, fig. 3 for kiln sites and workshops).

6.4 POTTERY MAKING

Except for two sherds from Form 188 skyphoi and possibly Form 176 platters, all the vessels in this corpus of pottery from Dakhleh Oasis are wheel-made. To my knowledge, there is no evidence to show definitely that any vessels were made in sections as even the large jars seem to have been made in one piece (Pl. 164, Fig. 1). Although most of the vessels would be classed as coarse ware, and much of it is very casually finished, it is also obvious that the vessels were made with dexterity by skilled potters, who worked at a considerable rate to produce pottery for daily use. This type of production is termed repetition throwing by modern potters and the techniques described below include some of those traditionally used by potters to produce vessels in large numbers. Moreover, I have carried out a number of experiments, using a kick wheel, to test the feasibility of throwing techniques suggested by the study of the archaeological ceramics. The following explanations on the techniques of pottery making are based to a large extent on those experiments.

6.5 THROWING TECHNIQUES

6.5.1 Method 1

Balls of clay of the same weight are prepared and placed within reach of the potter. A ball of clay is attached to the wheel-head, centred, thrown into the required size and shape and is then removed from the wheel-head. Another ball of clay is attached to the wheel-head and the process repeated. This method is frequently used by modern craft-potters as the balls of clay can be accurately weighed and the finished vessels made to a standard size.

6.5.2 Method 2

The second method is usually referred to as either 'throwing off the hump' or 'throwing off the stem'. A large lump of clay is placed on the wheel-head and manoeuvred to the centre of the wheel-head. It is patted and shaped into a tall cone but it is not necessary to centre

the clay completely as long as it rotates evenly and does not throw the wheel-head out of true. Beginning at the top of the cone, sufficient clay is centred, opened up and thrown into the required vessel. A knife or pointed tool is inserted into the slowly revolving clay under the base of the pot so that it can be removed from the rest of the clay. A length of thin flexible wire or string can also be used for this process. Pots are successively thrown from the top of the cone until the clay has been used. It requires practice to judge the amount of clay needed to make vessels of a standard size, but experienced potters have been known to throw hundreds of pots in a day by this method (Pl. 163, Fig. 1, and see Cockle 1981, 96 for a contract to supply wine jars for an annual vintage at Oxyrhynchus in the third century AD).

Examples of vessels made by Method 1 or Method 2:

Either Method 1 or Method 2 would be suitable for making any of the vessels with flat bases, such as the small bowls and the Form 31 censers. Unless a slip or decoration was required, these vessels would need no further treatment before firing. If the wheel was still rotating when the vessel was cut off, a spiral pattern or 'shell' pattern will be left underneath the base of the vessel (Pl. 166, Fig. 1). This pattern would be similar regardless of whether the vessel was thrown directly on the wheel-head or off the stem. This makes it difficult to recognise which of these methods had been used and, of course, the pattern may have been obliterated either deliberately or accidentally.

6.5.3 Method 3

At Ismant el-Kharab, large numbers of jars and cooking pots have been excavated and recorded from the early Roman Period levels of the houses. The round bases of these vessels show no traces of turning, nor do the rounded ends of the large barrel-shaped kegs that are such a feature of these excavations. After working with this material for a while, I realised that the kegs could not have been made in separate sections as joins were never found on sherds from any part of the vessels. When a number of kegs had been restored, it was even more intriguing to discover that both the rounded ends of the kegs were thrown and not turned. On returning home, I experimented with different throwing meth-

ods to test the feasibility of possible answers to this problem, and it was rewarding when the solution was confirmed during a later visit to the pottery at Qasr el-Dakhleh (Patten 1991, 38).

Method 3 possibly developed from Method 2 as that method would have accustomed the potters to using relatively large lumps of clay on the wheel. When making vessels by this technique, the first step is to centre a clay lump large enough to make the entire vessel on the wheel. The clay is opened up in the normal way except that some clay is left at the bottom above the wheel-head: the thickness depending on the type of vessel to be made. The rest of the clay is pulled up to make a cylindrical shape of the required size. In the next step, the potter closes in the upper edge of the cylinder by gently collaring in or squeezing the clay to form an enclosed shape that looks like a domed beehive (Pl. 164, Fig. 2; Pl. 173, Fig. 1).

When experimenting, I found this sequence to be the easiest to manage as the closure of the clay seals air in the dome and makes it very stable. The dome can be shaped with a rib or altered if necessary, easily lifted from the wheel and safely moved around. However, it appears that potters from other areas work in a different sequence by making the upper body of the vessel in the first stage. The potters from Faqus in the Nile Delta make at least some types of vessels this way (Arnold 1993, 66, figs 80A and B). It has also been suggested that this sequence was used at Pella in Jordan (Edwards 1992, 296). The shape and type of vessel and, perhaps, the properties of the clay may be the factors that influence techniques adopted by the potters. At the Qasr el-Dakhleh pottery, the vessels are carried outside the pottery and allowed to dry for a while after the first stage has been completed (Pl. 163, Fig. 2).

To continue making the vessel, the clay shape is brought back into the pottery workshop and inverted so that the rounded end can be held in a chuck on the wheel. A chuck is essentially any form that is of a suitable size and shape to hold another object. In pottery making, chucks can be quickly thrown or turned from clay to a shape similar to a shallow pot stand. The chuck should be in a fairly soft condition so that it grips the clay

of the vessel, thus chucks are not usually fired (Pl. 173, Fig. 2).

To begin the second stage of throwing, the potter opens up the thick layer of clay that was left at the bottom of the lump in the first stage. The clay is then pulled up adding height to the wall of the cylindrical form (Pl. 164, Fig. 3 and Pl. 173, Fig. 3).

As many different types of vessels can be made by this method the subsequent steps vary accordingly. For instance, if a run of necked jars is in production, the wall is thrown into the upper body, neck and rim as required by the vessel type. To make kegs, the wall of the second cylinder is collared in by the same method as in the first stage, completing the other end of the barrel-shaped body. After a period of drying, the kegs are returned to the wheel. An opening is made in the side of the barrel-shaped body and the neck thrown on from additional clay (Pl. 165, Figs 1, 2; Pl. 171, Fig. 1, 2). If smaller vessels are in production, the first stage is more likely to be thrown from the hump or stem rather than from separate balls of clay (Pl. 165, Fig. 3).

In this corpus, Method 3 was used to make medium and large vessels more often than smaller ones. This also seems to be the practice at the modern Qasr el-Dakhleh pottery.

Two characteristics of Method 3 help to indicate if a vessel was made by that method. First, the technique of collaring in the clay leaves a characteristic spiral and dimple in the floor of the vessel (Pl. 166, Fig. 2). This pattern is different from the spiral that results when clay is opened up by Methods 1 and 2. It is obviously easier to see the spiral and dimple in unrestricted vessels and base sherds than in intact restricted vessels. However even with open vessels, it is not always possible to be sure of the pattern, especially if it has been partly obliterated by deposits or damaged in some way. Second, the other good indication that Method 3 was used occurs when the exterior surface of the vessel retains traces of clay or marks from the use of a chuck (Pl. 167, Fig. 1). If both of these characteristics are present on the same pot, it is very fortuitous.

Examples examined and recognised as made by Method 3 include:

Series 1: Forms 53 (Pl. 167, Fig. 1) and 61 (bowls); 64 (beakers); 69 (round based vessels); probably 80 (flask or bottle); 87 and 88 (spouted vessels); 94 and 95 (handled jars); 105 (large jug); 113 and 114 (small jars); 116 and 119 (medium jars); 122 to 130 (large jars).

Series 2: Forms 11 (bowls); 62 (bowls); 66 (bowls); 69 to 75 (cooking pots); 87, 90 and 91 (spouted vessels); 105 (jug); 112 and 113 (small jars); 123 to 143 (large jars); 157 (kegs); 170 ('pigeon pots').

6.5.4 Production

A large part of a potter's output is traditionally made up of utilitarian vessels that have a low economic value and the rate of production needs to be substantial for the operation to be financially viable. In a study of modern pottery workshops, potters in Upper Egypt were estimated to produce close to two hundred pots in a day (Lacovara 1984, 52).

A tomb painting from Beni Hasan indicates that the technique of throwing vessels off the stem (Method 2) was one of the pottery techniques practised at least by the Middle Kingdom (Holthoer 1977, 12, fig. 14 top right). The adoption of this method would have increased the rate of the production for the pottery workshops of the time. New Kingdom potters, possibly with the help of an assistant, were throwing sizeable amounts of clay into relatively large vessels. In the 1970s, potters in some Chinese villages were still using ground-level, hand propelled wheels to throw very large vessels at a viable production rate and probably continue do so.

The pictorial evidence from the reliefs in the Hibis temple verifies that, in Egypt, kick wheels were used by the end of the sixth century BC at least. The adoption and use of a kick wheel would have added appreciably to the rate of pottery production as the heavy flywheel increased power as well as speed, enabling more vessels to be thrown. The ability to control and regulate the momentum of the wheel, which was gained from the use

of the kick wheel, would have been of equal importance to the potters. Without this capacity to maintain a slow steady rate over time, the technique of collaring in the clay--which the modern potters at Qasr el-Dakhleh do with such apparent ease--is considerably more difficult to achieve. Therefore, as some Phase 1 forms in this corpus were made by the Method 3 technique, it seems very likely that the kick wheel was introduced into Egypt considerably earlier than the reliefs at Hibis suggest. In addition, an illustration of a Nineteenth Dynasty amphora, a much earlier vessel, indicates that the base of this vessel had been thrown by Method 3 (Arnold 1993, 69 and fig. 81). The kick wheel is known from archaeological evidence to have been used in Palestine during Iron I and Iron II and is judged from the examination of pottery to have been in use as early as the MB II period (Wood 1990, 21–22). Although it cannot be suggested that the kick wheel was in use in Egypt by 1500 BC, it can be postulated that it was introduced around the end of the new Kingdom.

Method 3 was not only an efficient production method, it would also have been more economical as the time and effort involved in reclaiming the clay parings left from turning vessels would be saved. Nevertheless, in Jordan it is thought that the technique was not adopted until the Roman Period (Edwards 1992, 296). It may prove in time that, although the kick wheel was introduced into Egypt from outside, the throwing technique of Method 3 was an innovation developed in the workshops of Egypt.

However, the introduction of the kick wheel must have added appreciably to the rate of pottery production as the heavy flywheel increased the power and speed enabling more pottery vessels to be thrown. More importantly, the mechanism gave potters the ability to control and regulate the momentum, allowing a slow steady rate to be maintained. Without this facility, the technique of collaring in the clay--which the modern potters seem to do with such apparent ease--is considerably more difficult to achieve.

Method 3 would be an efficient and economical production method. Not only could more vessels be made in less time, but the time and effort involved in reclaiming dried clay parings, turned from leatherhead vessels, would be saved. When this throwing

technique was developed is an important question. Many forms in this corpus indicate that the technique was being used to make Phase 1 vessels, particularly the large jars but also Form 80. However, a base from a Nineteenth Dynasty amphora has all the indications that it was thrown by Method 3 (Arnold 1993, 69 and fig. 81), so it would appear the method had been developed considerably earlier. Nevertheless, in Jordan it is thought that the technique was not adopted until the Roman Period (Edwards 1992, 296) and it may prove that this throwing technique was developed in the pottery workshops of Egypt.

6.6 HAND MOULDING

The two Form 188 skyphoi were handmade (Form 176 platters were also likely to have been handmade but these were not available for examination). The skyphoi were recovered from the surface of neighbouring sites – both are sherds and not complete. The fingerprints left inside the body of the vessel SS4 0f (Pl. 168, Fig. 1) show that these vessels were made by pushing soft clay into a mould. The prints and marks are particularly noticeable behind areas of raised relief where extra pressure was applied to fill the impressions in the mould with clay. Although an attempt had been made to smooth the surface, it remained irregular with quite obvious scraping marks. The other skyphos, SS3 0a, had been made by the same method but was more neatly finished. The extant handle of this vessel was modelled by hand. A line was incised under the rim of both vessels and the unevenness suggests that this had been done free hand.

6.7 SECONDARY FINISHING TECHNIQUES

6.7.1 Hand Finishing

Three Form 37 shallow bowls are in the Royal Ontario Museum. The potter shaped the base of one (CS5 2n) by dragging his fingers through the wet clay (Pl. 169, Fig. 1). This is the only instance of the practice in the corpus.

6.7.2 Turning

Turning is the process of removing unwanted clay to achieve a particular shape or form, to thin the wall of a vessel or to make a ring foot. Turning is usually done on thrown vessels at the leatherhard stage. The pot to be turned can be inverted onto the wheel-head, centred and secured by a few wads of clay. Another method is to place the inverted pot on a chuck if it is an open shape, or in a chuck if it is an enclosed shape (Pl. 173, Fig. 2). A variety of metal turning tools can now be bought; however, very efficient tools can be made from pieces of wood and strips of metal and Egyptian potters in antiquity most likely made their own from similar materials. A fast speed is not necessary for turning and any wheel capable of maintaining a steady momentum is suitable.

Turning can leave virtually no trace on the surface of the finished pot if it is done with sharp tools and with clay in the right state. However, these optimum conditions are not always possible to achieve and turning frequently leaves recognisable facets and ridges in the clay surface (Pl. 167, Fig. 2). These marks are not necessarily even and parallel as many factors, such as the clay body, the asymmetry of the vessel and the accuracy with which it was centred, can influence the process. In addition, pieces of grit are often dragged through the clay by the turning tool (Pl. 169, Fig. 2) and can leave grooves in the surface sometimes mistaken for an indication that the base of the vessel was thrown.

If the vessel is not rotating truly, undulations will be generated and once these occur they are very difficult to correct (Pl. 170, Fig. 1). Although considered highly undesirable on most occasions, an exaggerated rippling can be used to produce the effect know as 'chattering' which is seen on a number of red slipped fine wares.

6.7.3 Turning Techniques

6.7.3.1 Flat bases

The vessels with flat bases, whether made by Method 1 or 2, were usually left as they came from the wheel. In a few examples, the outside edge of the base was made neater by turning on the wheel, probably after it had been allowed to dry for awhile (Pl. 168, Fig. 2).

6.7.3.2 Round bases

Before being turned, round based vessels were probably thrown off the stem (Method 2); larger ones may have been made directly on the wheel-head (Method 1). The list given at the end of Section 6.5.3 shows that the throwing technique of Method 3 had eliminated the need for turning on many types of vessels.

Examples of turned round bases:

Series 1: Forms 45, 47, 48, 50, 65 (Pl. 167, Fig. 2) and probably 78 (CS5 Fj).

Series 2: possibly Form 78 (it was difficult to see how the vessel, CS13 13b, had been made as the surfaces were coated with residue; dated early in Series 2 or even late in Series 1).

6.7.3.3 Ring bases

Possible methods for making ring bases during the period covered by this study are explained below from examples either recorded or seen in the Royal Ontario Museum. The suggestions are tentative as it was often difficult to see exactly how the ring base on the vessel had been made.

6.7.3.3.1 Method A

The vessel is inverted either onto the wheel-head, centred and secured with a few wads of soft clay or inverted into or over a chuck. Using an appropriate turning tool, the wall of the lower body (but not the base) is turned and thinned until the required profile is achieved. The ring foot is then turned from thick clay purposely left at the base of the vessel during the throwing process. If the vessel is leatherhard and the clay fine, the turning marks will be sharp and definite but if the clay is softer and not so fine, the marks are usually blurred and more rounded. This turning technique carried out at the leatherhard stage was used in antiquity for fine wares and is the method modern potters mostly use.

Examples of ring bases made by Method A:

Series 2: possibly Form 4 (very little of this base was extant), Forms 24, 25.

6.7.3.3.2 Method B

This method is carried out before the clay has reached the leatherhard stage and, as the rims are soft and prone to damage, vessels are inverted into or over a chuck. The wall of the lower body and base is turned to the shape required, and the bottom of the vessel thinned and perhaps rounded. A piece of clay is then added and the ring base thrown to shape. The marks left on the surface of the softer clay after this process are not as sharply defined as when the clay is leatherhard. The Form 35 bowls recorded at Ismant el-Kharab were made this way and neither the edges of the ring bases nor the turning marks have the crisp look that comes when leatherhard clay is turned (Pl. 170, Fig. 2).

Examples of ring bases made by Method B:

Series 1: Forms 39, 51 (possibly 52), 85

Series 2: Forms 35 and 40

6.7.3.3.3 Method C

Method C looks similar to Method B except that the ridges on the exterior surface are more rounded and indistinct. These ring bases appear to have been thrown from thick clay left at the base. The bowls were probably thrown off the hump or stem and experiments have shown that it soon becomes quite easy to determine how much clay to leave at the base.

Examples of ring bases made by Method C:

Series 1: Forms 42, 86

Series 2: Form 87

6.7.3.3.4 Method D

Round based vessels, including bowls, made by Method 3 would not need to be turned prior to having the ring base attached. The vessel would be inverted either onto the wheelhead or into or over a chuck and the ring base thrown on using a small amount of additional soft clay. If the vessel were allowed to dry too much before the ring base was

added, the softer clay of the base would probably crack as it dried and could possibly separate from the body.

Examples of ring bases made by Method D:

Series 1: Forms 53, probably 61, 87, 94, 95

Series 2: Forms 62, 87, 90 to 92

6.8 APPENDAGES

6.8.1 Spouts

6.8.1.1 Spouts thrown separately and attached to the vessel

Thrown spouts occur on a number of forms. In most instances, the spouts were attached when the clay was still soft and the edges smeared quite roughly onto the wall of the vessel; however, the joins usually remain secure. The larger spouts attached to some Form 86 to 88 vessels were modelled to form a flaring lip. The smaller spouts on the Form 89 and 91 vessels taper towards the tip but were not modelled or cut. Either one larger hole or four to five smaller ones (Form 90) were cut in the wall of the vessel over which the spout was luted.

Examples of thrown spouts:

Series 1 and 2: Forms 85 to 92

6.8.1.2 Modelled spouts

The rims of some vessels were modelled to form pouring lips or spouts: a simple technique if done soon after throwing when the clay is still soft.

Examples of rims modelled to form spouts:

Series 1: Form 173

Series 2: Form 102

6.8.2 Handles

Two types of handles occur on the pottery in this corpus: loop handles and lug handles. A loop handle is formed from a strip or roll of clay and makes an enclosed space by itself or with the wall of the vessel. A lug handle is a piece of clay attached to the vessel without leaving an enclosed space and often modelled into place (Hamer 1975, 152). On some vessels in the corpus, the loop handles are so small that they effectively become lug handles.

Loop handles were usually pulled, but often had some modelling to finish the shape, and a few vessels have handles made from rolls of clay or cut from strips of clay, for example the handle on the small jug, CS13 2a (Pl. 167, Fig. 3). It was the usual practice to attach handles, like spouts, to vessels when the clay was fairly soft. The thicker end of the handle was butted to the rim or neck of the vessel and the more tapered end pressed onto the body. Although the handles appear to be carelessly made, they are generally firmly attached.

The small handles on cooking pots are fairly roughly modelled by hand and applied to the vessels in a relatively soft state. The handles on two Form 88 spouted vessels in the Royal Ontario Museum were roughly made and did not appear to be firmly attached to the body of the vessel. Nevertheless, the handles remained, which indicates that they had been used only for the burial purposes and not in a domestic context.

The only Form 85 spouted bowl in the Royal Ontario Museum had a very small loop handle that had been flattened against the body to form a vertical lug. The handles on some of the other vessels of this form appear in the drawings to vary from small loops to very small wads of clay. On two vessels, a part of the rim seems to have been squeezed or modelled to project above the rim edge to make a false lug. The lugs on the lentoid flask, CS18 1a, (Pl. 79) were modelled from small pieces of solid clay that had been attached at the junction of lower neck and shoulder.

Examples of loop handles:

Series 1: Forms 78, 88, 89, 94, 95, 97, 98, 101, 104, 105, 152, 153, 154

Series 2: Forms 71 – 76, 77, 91, 95 – 106, 158 – 161

Examples of lug handles:

Series 1: Forms 78, 85

Series 2: Forms 70, 151

6.9 SLIPS AND DECORATION

A slip is a homogeneous mixture of clay and water used for coating pottery vessels to give colour and/or a smoother texture to the surface (Hamer 1975, 274). A slip can be made from the same clay as the pottery vessel or a different clay can be used especially if a contrasting colour is wanted. The viscosity of a slip depends on the ratio of clay and water: the consistency of a mixture of approximately equal proportions of clay and water would be thick enough to adequately cover the surface of a vessel. The texture of the fired slip depends on several factors: the fineness of the clay, the ratio of clay and water, other added ingredients such as oxides that might act as fluxes, and the firing temperature. A thin mixture of clay and water is sometimes termed a 'wash' although this term is not generally used by modern potters. A self-slip is also a mixture of clay and water, but it is made from the same clay as the pottery vessel, and can be the slurry created during throwing. Thin washes and self-slips can be difficult to detect on excavated material with degraded surfaces.

The usual modern practice is to allow the raw pottery to become leatherhard before slipping. It is impossible to tell from the archaeological material if this was the custom in antiquity; however, it is likely that the vessels were allowed to dry at least for a short period to make handling easier. Slip can be applied by several methods: the vessel can be dipped into the slip or the slip can be poured, brushed or wiped onto the vessel.

It is difficult to know if a self-slipped surface is intentional or if the vessel had be-

come coated with slurry during the throwing process. Consequently, in this thesis, the term 'slip' is used when the coating on a vessel is thick enough to be recognised as a slip and considered to have been applied intentionally.

6.9.1 Cream Slips

Cream slip was applied to a wide range of vessel types in the Series 1 corpus, but was not applied to all examples of the one form. The slip, particularly on larger vessels (bowls, jars and kegs), was often quite thick but did not always have a good fit with the clay body and frequently flaked from the surface. The slip is usually too uneven for the vessels to have been dipped and was probably applied with a cloth or painted with a brush. The size of some vessels would also have made dipping difficult and uneconomic.

In Phases 1 and 2, the fired slips are quite soft and their application would not have increased the impermeability of the clay to any noticeable extent. Their aim may have been to imitate the cream-coloured surface of marl clay vessels which had become increasing popular from the beginning of the Saite Period (Jacquet-Gordon in press, 1). The appearance must have added sufficient value to the vessels to motivate the potters to expend the extra time and effort involved in the slipping process.

In the Roman Period, the cream slips were usually applied more thinly and can be difficult to distinguish from surface deposits and salt blooms.

6.9.2 Red Slips

The red clays from Dakhleh Oasis may have been used to make red slip or the grey clays may have been mixed with red ochre or similar material containing red iron oxide. The same methods would have been used to apply either red or cream slip. Both were applied before firing, and fugitive (or impermanent) slips are infrequently encountered in the archaeological material from the oasis.

The red slips were generally quite thin but the slip used on a few forms, including some Form 152 pilgrim flasks (Pl. 37), was thick with a matt surface. Series 2 vessels

made from the shaly fabric, L-FS, were regularly coated with a red slip, which was usually thin but could be saturated with oxides to make a very dark red to nearly black colour.

6.10 DECORATION

6.10.1 Painted Decoration

Decorative bands were applied to the vessels in this corpus by painting either onto the raw clay surface or over a slipped surface. Deposits of manganese oxides are known to occur between the oases of Dakhleh and Kharga (personal communication received from A. J. Mills) and ochres are plentiful in the desert surrounding Dakhleh Oasis. These minerals could have been used to make red and reddish brown pigments of varying saturation or mixed to make purplish black colours (Berry forthcoming). Brushes, probably made by the potters from fibrous plant materials or possibly pieces of discarded material, were used to apply the pigments. The painting appears, in most cases, to have been applied while the pot was rotating on a wheel and was usually carelessly done, indicating that only a short time was allowed for the decorating process.

The decoration on small bowls in the Series 1 corpus was mostly confined to painted rim bands, although one Form 47 bowl (not in the Royal Ontario Museum) has a series of bands painted on the body. One Form 54 bowl, two Form 61 bowls, a Form 78 flask and most Form 101 jars have horizontal bands on the body and some of these vessels have a rim band as well. Customarily one colour was used and only a few vessels were painted with two or more colours.

A few vessels have vertical bands connecting the horizontal ones: the Form 54 bowl (CS15 34c), a Form 111 jar (CS12 1h) and the small Form 189 amphora (CS2 2jj). The 'vertical' decoration on the latter vessel (not in the Royal Ontario Museum) may be a floral motif, representing petals, rather than a linear design. One Form 111 jar (CS2 2hh) has thin diagonal lines connecting horizontal bands. The decoration on the Form 186 ves-

sel (CS6 1a), provisionally placed in Phase 4, is rather more elaborate and consists of diagonal lines forming crosses painted over horizontal bands.

Banded decoration occurs on material from Kharga Oasis dated to the Persian Period (Marchand 1996, 422, Group 12: 47 and 425, Group 13: 48), at Karnak-North during Complex II Phase B (Jacquet-Gordon in press, fig. 14, 3 and 4; fig. 18, 2; fig. 19, 1 and 2) and at Elephantine from the Twenty-fifth – Twenty-sixth Dynasties to the Ptolemaic Period (Aston 1990, 240–2, fig. 15: 19–20). A jar with similar decorative techniques has been dated to the Ptolemaic Period at Assassif (Mysliwiec 1975, 21, fig. 11).

Floral motifs occur on the spout (SS16 3q) and the Form 190 body sherd (SS16 0f). The former is difficult to date as the type of vessel from which it came is not known. The motifs on the sherd, SS16 0f, most likely included horizontal bands.

Floral motifs and banded decoration occur on a Form 89 flask (CS2 kk) and a large Form 130 jar (CS9 1c). These vessels probably span the period from the end of Phase 2 (Series 1) to the early part of Phase 3 (Series 2): CS2 kk has been placed in Phase 2 with other vessels from its context and CS9 1c in Phase 3. The combination of linear and floral motifs occurs only rarely at Karnak-North and the style postdates the bulk of the Karnak-North material (Jacquet-Gordon in press, 9, and fig. 14: 5). However, these decorative motifs may have been popular over a long period and have a number of parallels which include: Arnold 1966, 87, fig. 5 (dated to the Ptolemaic Period); Arnold 1993, 99 and fig. 106 A-B (dated from the Saite to the Ptolemaic Period); Marchand 1996, 428, fig. 61 (dated to the Ptolemaic Period); Mysliwiec 1987, 83–7 and especially no. 907 (dated to the late Roman Period or the Coptic Period). Motifs of horizontal bands, floral motifs and net patterns are also represented on Egyptian amphora (Bourriau 1981, 85, no. 167 dated from 304 to 30 BC; Bietak and Reiser-Hauslauer 1978, figs. 10 and 16).

In the early Roman Period (Phase 4), similar methods of decoration were employed although the motifs are more often linear than floral. The rims of large and small bowls were regularly decorated with dots or bars. These were usually applied over a

painted rim band or sometimes on a slipped surface. This style was present from late in the Ptolemaic Period (Musée du Louvre 1981, 300, no. 325). Red pigments were most popular although a darker purplish black was also used. A number of large jars, particularly Form 135, were decorated with bands, swags, rim markings and other designs, all casually executed.

6.10.2 Incised Decoration

Grooves that have been incised into leatherhard clay will have sharp, well-defined edges while softer clay gives more blurred outlines. Pointed pieces of metal or sharpened strips of wood make excellent pottery tools and either could have been used for the process.

In Series 1, the decorative grooves on the faces of flasks (Forms 151 and 152) were incised with the vessels placed horizontally on a rotating wheel. A number of Form 15 bowls have the rim set off by a groove incised while the vessel rotated on the wheel. The grooves on the Form 42 bowl, CS1 7d, were neatly incised but the vessel was not truly centred and the ends of the grooves overlapped. The groove at the transition of the rounded body and neck on Form 65 vessels were incised to imitate the manufacturing traits of metal ware prototypes. In the Series 2 corpus, a groove was incised into the upper body of some cooking pots (Forms 71 and 72) and jars (Form 135). A plant motif was incised into the body of the reconstructed Form 135 jar (SS1 0e).

In the material from Karnak-North, incised grooving occurs during Phase A and Phase B of Complex II (Jacquet-Gordon in press, 9–10, fig. 15, 1 and 3; fig. 18, 1 and 4; fig. 19, 3 and 4).

6.10.3 Plastic decoration

Plastic decoration modelled from soft clay occurs on a few vessels in the corpus. If the moisture content of the clay were more or less the same as that of the vessel, the decoration would adhere firmly to the surface. The technique was used to form the breasts and arms of two small femino-form vessels (Series 1 Form 82), the facial features on a sherd from a Bes jar (Form 190) and the 'pie-crust' band on a Series 2 bowl (Form 58).

6.11 KILNS AND FIRING

During the survey a number of kilns were excavated (Hope 1979, 196–201; 1980, 303–11; 1981, 238–40 and 1993, 121–7) and kilns at Ismant el-Kharab have also been located (Hope 1999, 62).

The following brief remarks are compiled from observations made during visits to the pottery at Qasr el-Dakhleh (see also Henein 1997). The kilns at Qasr el-Dakhleh are grouped together on the further side of the preparation area and, judging by the deposits around the kilns, are used for slaking lime as well as for firing pottery. The kilns, which look well constructed, are the open-topped updraft type made from mud bricks and clay and are approximately two metres in circumference. The raised floor of the firing chamber is perforated to distribute the heat more evenly through the kiln. The raw pots are placed on the perforated floor and more are stacked into a dome shaped pile. The modern pottery is not glazed, nor was the pottery in this corpus, which means that many more vessels can be stacked in a kiln as raw pottery will not stick together as it is fired. When the kiln is full, large sherds from broken pots are used to cover the top layer of pottery (Pl. 172, Fig. 1).

Tamarisk bushes were used to fire the kiln although other types of fuel are probably used when available (Pl. 172, Figs 1 and 2). We were told, through an interpreter, that the firing lasted about four or five hours, which is longer than the time recorded to fire the kiln in the village of Deir Mawas (Nicholson 1995a, 293–7). However, a number of potters work at Qasr and the kilns would need to be larger to take more pots in a load. Judging by the fired pottery, the temperature reached between 800° and 900°C. The rate of firing these kilns remarkably fast – studio potters fire a biscuit kiln between 900 and 930°C but take eight hours or more to reach that temperature. Fuel in the oasis is a relatively scarce resource and was most likely also scarce in antiquity. Potters would have developed clays and firing techniques to minimise the use of fuel and the clay bodies would have needed to be resilient to withstand the fast firing and irregular temperature changes.

The kilns at Qasr el-Dakhleh were not measured but the dimensions appear to be within the range of the Roman kilns excavated during the survey. The pottery at Qasr el-Dakhleh is the largest one now working in the oasis although a smaller pottery is located in the eastern part of the oasis and others operate seasonally (Henein 1997, 5). It is probable that, during the period covered by this study, there were many more potteries working in towns and villages throughout the oasis.

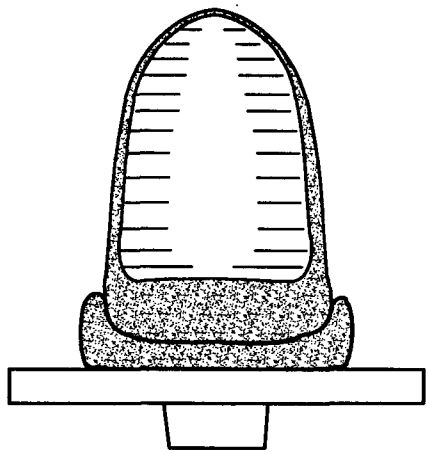

Fig. 1. Closing up a thrown shape

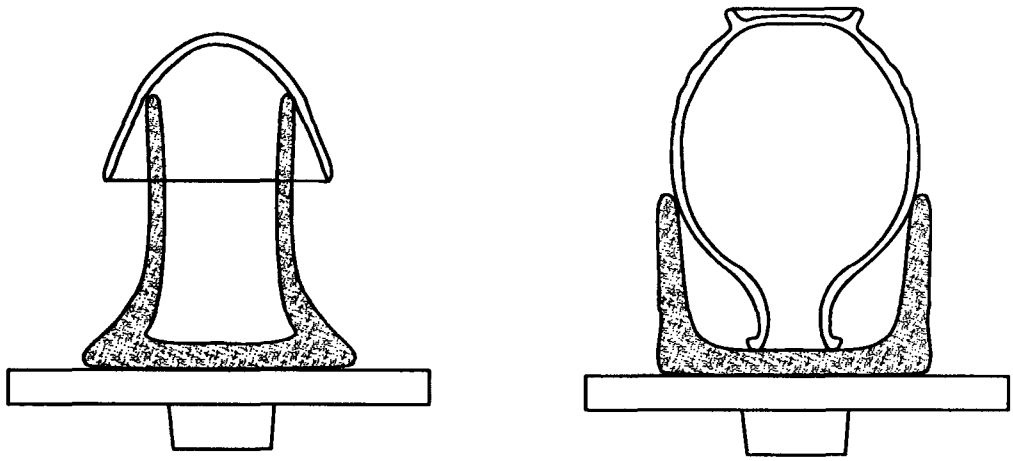

Fig. 2. Chucks for turning thrown vessels

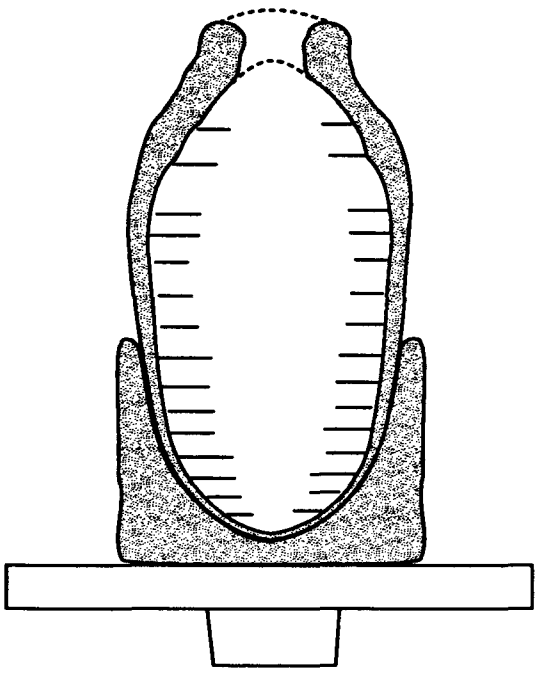

Fig. 3. Opening up a closed shape

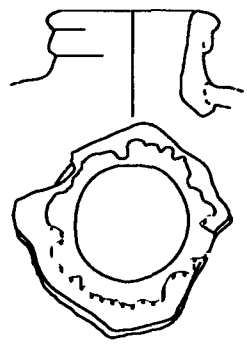

Fig. 4. Neck of a Form 162 keg
Scale 1:4

CHAPTER SEVEN

7.1 FABRICS AND WARES

Pottery manufacturing traditions reflect the clays and other raw materials available in a locality and the following notes on the geological structure of the Western Desert give a brief overview of the natural resources available to potters in Dakhleh Oasis. Preliminary reports on the geology of the oasis have been published by C. S. Churcher (1980, 379–395; 1981, 193–211; 1982, 103–114) and I. A. Brooks (1983, 167–177).

7.1.1 The Geological Setting of Dakhleh Oasis

The Western Desert is essentially a plateau desert with vast flat expanses of rocky ground. Generally of a low altitude, the plateau obtains its greatest altitude in the extreme south-west of the country where the plateau is disturbed by the mountain mass of Gebel Uweinet. To the north of Gebel Uweinet the ground slopes gradually down to the deep and extensive depressions cut nearly to sea level in the almost horizontal rocks of the Western Desert plateau. It is in these hollows that the oases of Abu Mungar, Dakhleh and Kharga lie. Beyond the oases, the extensive plateau of Eocene limestone stretches northward to form the dominant feature of the northern desert west of the Nile. The oases of Baharia and Farafra lie in depressions in this limestone plateau. The southern edge of the plateau forms the high and much embayed escarpment that delineates the northern boundary of Abu Mungar, Dakhleh and Kharga Oases (Said 1962, 11–13).

The cliff face of the escarpment at Dakhleh Oasis exhibits the geological stratigraphic sequence of the northern plateau. The upper section, the Tarawan Formation, forms the top of the scarp and the surface of the plateau. It obtains a thickness of 60 metres and is made up of limestones and bands of chert. The formation is fossiliferous and belongs to the Palaeocene age. The Tarawan unit is underlain by the Dakhla Shale Forma-

tion. This unit is 250 metres thick and consists of yellow to greenish-grey coloured shales interspersed with calcareous and mudstone beds. The Dakhla Shales are highly fossiliferous containing fauna showing an age ranging from lower Maestrichtian to lower Palaeocene. The third layer, which forms the foot slope of the escarpment, is the Phosphate Formation. This unit is composed of two or three main phosphate beds interbedded with shale, limestone and sandstone beds (Issawi 1977, 11–7). These formations continue east across central Egypt to the Red Sea in a band, some 150 kilometres wide, outcropping at different locations (Appendix 1, A–Fig. 1). A mine, which works the phosphates from the Phosphate Formation, can be seen from the road running between Kharga Oasis and Dakhleh Oasis.

In Dakhleh Oasis, the floor of the depression is formed by the red clays and mud pans of the Quseir Shale Formation which is the upper layer of the basal unit, the Nubia Formation. The clays of this unit are the basis of cultivation in the oasis. They cover an area extending from Teneida in the east to el-Qasr in the west with a width of some 5 to 10 kilometres. No fossils are recorded from this unit. The lower member of the formation is the Taref Sandstone Member, which is also the unit that forms the floor of the plateau stretching to the south. It is made up of alternating beds of sandstone, quarzitic sandstone and quartzose sandstone in which intercalations of clay and siltstone are not uncommon. Fossil wood is the only organic remains in this unit. The ground water reservoirs that give life to the oases are contained in the Taref Sandstone Member (Wendorf and Schild 1980, 168-171).

The exploitation of the clays and other raw materials in this environment has been comprehensively described by Henein in his work on the modern potters of Dakhleh Oasis (Henein 1997).

7.2 BACKGROUND

The survey of Dakhleh Oasis, which was conducted by members of the Dakhleh Oasis Project, opened virtually a new area in Egyptian ceramic studies. A brief visit to Dakhleh Oasis had been made by H. E. Winlock in 1908 (Winlock 1936) and preliminary investiga-

gations made by the Egyptian archaeologist, Ahmed Fakhry (published posthumously by Osing et al. in 1982). During the DOP survey, hundreds of sites dating from the Neolithic Period to the Islamic Period were located and tested: C. A. Hope, as co-investigator for ceramics, was responsible for establishing a ware typology for the varied ceramic material recovered from the sites. Reports on this work were published regularly in volumes of JSSEA from 1979 to 1983 (see bibliography, in particular Hope 1979, 189–91; 1980, 285) and were republished in a collected volume (Edwards, Hope and Segnit 1987). The typology and type collection established to process the survey material formed the basis of the system used to record the ceramics from the sites subsequently selected for excavation.

All the available data on the vessel and sherd material that was recorded during the survey of Dakhleh Oasis has been included in the following fabric typology. More recent material that I recorded, as ceramics analyst for Ismant el-Kharab, includes the early Roman Period (Phase 4) material from the site (SS17–19) and some Late Period (Phase 1 and 2) ceramics from 'Ein Tirghi (CS15). However regarding the material recovered during the survey, it has only been possible for me to examine personally the registered vessels that are held in the Royal Ontario Museum. Therefore, the comments I have made on these vessels are more detailed than for those not seen or on the sherd material, which was not kept for lack of storage facilities.

The normal practice for recording pottery at Ismant el-Kharab is to make visual inspections of fresh breaks, whenever possible, in both sunlight and shade with a hand-lens of 10x magnification. A pocket microscope with a magnification of 30x also proved useful. Colour readings are taken from the Munsell Soil Colour Chart (1973 edition). It is also the practice to describe colours as seen by the recorder and, as these colours are subjective, they are not necessarily the same as those given in the charts. The hardness of fabrics is measured according to Mohs scale of mineral hardness. The examination of the pottery in the Royal Ontario Museum was necessarily done in the laboratory under artificial lighting and, as this material was for the most part either intact or restored complete,

fresh breaks were not visible. It is also to be noted that colour readings by P. J. Conaghan (Appendix 1) were taken in artificial light.

Most of the vessels recovered from the survey of the oasis and from the excavations at Ismant el-Kharab were locally made and this chapter concentrates mainly on these fabrics. However, sherds from imported amphorae and fine wares were collected from the surface of a number of sites during the survey, and later also from the surface of Ismant el-Kharab. A small selection of these imported vessels comprises Form 192 of the Vessel Typology (Pl. 88) and a preliminary description is given of the fabrics; however, further study of these sherds is to be undertaken in the future.

The type of petrographic analysis for this work has been largely influenced by the sherds available and economic restraints. Therefore, analysis using polished thin-sections was chosen, as this method is relatively inexpensive and allows for the identification of minerals and the description of size, sorting, shape, and frequency of inclusions. The thin-sections will also form a permanent record which can be used later for electron-microprobe analysis to determine the elemental composition of specific mineral grains and other research projects. I have been aided and encouraged by members of the Department of Earth and Planetary Sciences (DEPS), Macquarie University: Tom Bradley made the thin-sections free of charge, J. Cleasby took the photographs of the sherds and P. J. Conaghan undertook the petrographic study of the thin-sections (Appendix 1).

The tested sherds were selected to provide a description of the local oasis clays and fabrics and, as far as possible, sherds were selected from vessels included in the corpus. These include nine samples (S1, S2, S5–11 and S13), five of which were recovered from Ismant el-Kharab. The sample S3, which is a body sherd from a large Form 154 flask (Pl. 38), was a surface find from the settlement site, SS16. The two remaining samples, S4 and S12, were raw clays from the oasis – S4 was unmixed clay from the modern pottery at el-Qasr, and S12 was a small sample from a quantity of clay recovered from House 3 at Ismant el-Kharab. There was no evidence of pottery making in House 3 and the lumps of clay may have been kept for the sealing of storage vessels. These two samples of clay

were modelled by hand into small tiles and fired in an oxidising atmosphere to between 930 or 950 °C.

Because of the size and orientation of some sherds, it was not possible to cut all the thin-sections at right-angles to the vertical axis of the vessel. It was, therefore, deemed more appropriate to have all the sections cut at the same angle – parallel to the vertical axis of the vessel. The samples were to be photographed before preparation for thin-sectioning, unfortunately, S13 was omitted from this step and a colour photograph is not available for the sherd. The numbering system given to the sherds during thin-sectioning (T/S) differs from the given sample (S) numbers and these are included in brackets in the descriptions below.

The sherds and clay samples were also tested with dilute hydrochloric acid and negative results were obtained except for a finely ground test of S8 which showed a slight reaction to warm acid. They were also chemically tested for the presence of phosphatic minerals for which all tested positive (see Appendix 1). However, the small size of the samples limited the number of other petrological tests.

The tested sherds were chosen for their relevance to this corpus but represent only a small number of fabrics from Dakhleh Oasis. Research on the complete range of fabrics is under way and will be published in due course.

The sherds and clay samples were photographed before they were prepared for thin-sectioning and do not necessarily have the same orientation as the thin-sections. (The magnification is x 4). The magnification of the photomicrographs is as follows:

S1, S3, S6, S7, S10, S11, S13 x 4.25

S5 x 5.5

S2, S4, S8, S9, S12 x 6.25.

7.3 CLAY BODIES

In pottery terms, a clay body may be defined as a mixture of clays or clays and other earthy mineral substances that are blended to achieve a specific ceramic purpose. Clays that contain iron and other mineral impurities in sufficient quantity to cause the clay to become dense and hard-fired at about 950 to 1100° C are known as earthenware clays. This type of clay is the most common and vast quantities outcrop on the earth's surface. The raw clay can be red, brown, greenish or grey as a result of the presence of iron oxide and when fired the colour may vary from pink to buff to tan, red, brown or black depending on the clay and firing conditions (Rhodes 1957, 4–22).

Many clays, particularly earthenware clays, can be used with little or no addition made to them and such clays can be called natural clay bodies. However, if required, adjustments can be made for better working properties and additions, such as sand, can be added to reduce shrinkage and to lessen the tendency of the clay to warp when dried and fired. Additions purposely added to improve the workability or firing qualities are known as 'temper'. Frosted quartz grains in the tested sherds may be an indication that sand was added to temper certain clay bodies. However, as these also occur in the clay samples, S4 and S12 (although rarely in the latter), it seems that some proportion of well-rounded frosted quartz grains were a natural component of the clays as dug (Appendix 1, Table 2).

Modern potters in Dakhleh Oasis temper one of their clay bodies with sand and another with ash (Henein 1997, 29–30, 33–4). The frothy/vesicular glassy material or ?slag detected in some samples (S2, S3, S9 and S10) is thought to have originated from carbonised plant material (Appendix 1, A-16) and would indicate that the practice of adding ash to clay bodies dates back to antiquity.

7.4 FABRICS AND WARES

The classification of the fabrics and wares in this corpus is based on the work of a number of researchers; in particular, the comprehensive studies by Nordström and Bourriau (1993) and Aston (1996c).

> "The concept of pottery fabrics refers to the physical and technical properties of the ceramic material, such as clay texture, non-plastic inclusions, colour, porosity and hardness." (Nordström 1985, 631).

In a later work, Nordström and Bourriau (1993, 162) emphasised that the relevant technical features include those properties that result from firing conditions and wall thickness.

The terminology used in the fabric descriptions below has been adopted for the purpose of this corpus and will, in time, be incorporated into the ongoing research into the clays and fabrics of the oasis by members of the Dakhleh Oasis Project.

7.5 FABRICS AND WARES MADE FROM RED-FIRING CLAYS

Red-firing Fabric 1 (R-F1)

(See also Tables 2–4, Appendix 1 for all the tested samples)

Examples tested:
Sample S2 (T/S No. 6), Appendix 1, A-5, Pl. 174 = SS19i, Series 2, Form 6, Pl. 41.
Sample S10 (T/S No. 13), Appendix 1, A-11, Pl. 182 = CS13 6a, Series 2, Form 62, Pl. 51.

The fabric, R-F1, is relatively coarse and poorly sorted. It contains frequent medium to fine quartz grains and less frequent coarse ones. White inclusions of varying sizes are very noticeable but are also less frequent. Some fine to medium red particles of hematite and shale and coarse to medium reddish-yellow shaly particles are visible. Darker coloured phosphatic materials are also present and some of these are very coarse. Vesicular glass or slag is present in both samples.

The fabric was generally fired to a red or red-brown colour but a grey core can be present especially in thicker sections (Pl. 182). Variations in the surface colour occur quite frequently and these may be due to differences in firing conditions or other factors, such as cooking use and weathering. The fabric is medium hard: Mohs scale 3.5 to 4.5.

The fabric, R-F1, was recorded throughout all periods represented in this corpus and was used for a wide range of vessel types. It was the most frequently recorded fabric in the early Roman Period material (Phase 4) from excavations at Ismant el-Kharab (SS17–19) and, although new fabrics were introduced in the late Roman Period, it continued to be popular. The fabric was recognised during the survey of the oasis (Hope 1979, 194; 1980, 298–9) and was recorded as the fabric type 'A1a'.

Typical colour readings recorded for fabric R-F1 in the early Roman Period material at Ismant el-Kharab:

Surface:	pale red (10R 6/2; 10R 6/4; 10R 6/6; 2.5YR 6/6)
	brown-red (10R 5/6; 10R 5/8)
	red (2.5YR 5/6; 2.5YR 5/4)
Core zone:	grey (10R 4/1 to 10R 6/1)

Wares associated with the fabric R-F1

R-F1.P	=	plain surface
R-F1.P.D	=	decorated on a plain surface
R-F1.RS	=	red slipped
R-F1.RS.D	=	decorated on a red slipped surface
R-F1.CS	=	cream slipped
R-F1.CS.D	=	decorated on a cream slipped surface
R-F1.Bl	=	hard-fired variant with very dark reddish-black surface zones.

Red-Firing Fabric 2 (R-F2)

The fabric, R-F2, has abundant mineral inclusions, with quartz grains the most evident, but the particles are smaller and the fabric better sorted than the fabric, R-F1. Conse-

quently the texture is denser although the hardness is similar or only slightly higher than that fabric. The fired colours range from light reds and browns to stronger reddish-brown colours and the fabric can be zoned with a grey core, especially in thicker sections.

The fabric, R-F2 was recorded during all the periods in the corpus but for a more restricted range of vessels than the fabric, R-F1. However, the types include small bowls, large jars and kegs. The fabric was described during the survey of the oasis (Hope 1979, 194; 1980, 298) and recorded as the fabric type 'A2a'. There is no clear visual division between the fabrics R-F1 and R-F2 and the fabric of some vessels was recorded as intermediate between the two. A sample of the fabric was not available for testing.

Typical colour readings recorded for fabric R-F2:

Surface:	pale pink beige (5YR 6/4-6)
	muted brown/beige (2.5YR 4/5; 2.5YR 5/6; 2.5YR 5/8)
	brown-red (10R 5/6)
	red (7.5YR 5/6)
Core zone:	grey to brown/grey (10R 4/1; 10YR 3-7/1)

Wares associated with the fabric R-F2:

R-F2.P	=	plain surface
R-F2.P.D	=	decorated on a plain surface
R-F2.RS	=	red slipped
R-F2.RS.D	=	decorated on a red slipped surface
R-F2.CS	=	cream slipped
R-F2.CS.D	=	decorated on a cream slipped surface

Red-Firing Fabric 3 (R-F3)

The fabric, R-F3, has a similar composition to R-F1 but was fired in a reducing atmosphere. This process changed the stable form of iron oxide, ferric iron (Fe_2O_3), to the ferrous state (FeO) giving the fabric a black, grey or sometimes dark reddish-grey colour throughout the section, although a blurred core can be present. The fabric, R-F3, was used

mainly in the early Roman Period (Phase 4) to make large jars and kegs and its use continued at Ismant el-Kharab into the late Roman Period. Firing in a reducing atmosphere increased the hardness of the fabric to some extent. This must have been seen as an advantage as the frequent use of this fabric during Phase 4 and later denotes a specific type of fabric purposely achieved by the potters. The fabric was described during the survey of the oasis (Hope 1979, 194; 1981, 234) and recorded as the fabric type 'A1b'. A sample of the fabric was not available for testing.

Colour readings recorded for fabric R-F3:

Surface: grey (5Y 5/1; 2.5YR 4-6)

Core zone: grey to brownish red (2.5YR 5-2; 10R 4/3)

Wares associated with the fabric R-F3

R-F3.P = plain surface

R-F3.CS = cream slipped

R-F3.CS.D = decorated on a cream slipped surface

Red-Firing Fabric 4 (R-F4)

Example tested:

Sample S11 (T/S No. 4), Appendix 1, A-12, Pl. 183 = CS13 3b, Series 2, Form 136, Pl. 75.

The fabric, R-F4, has a relatively dense texture with predominantly fine quartz grains and some medium ones. Fine to medium red hematitic grains and a few white coloured particles are also present. The fabric has a distinct firing pattern with the red surface zones clearly contrasted with a grey core. The inner surface zone is generally thinner than the outer surface zone but that of the tested sherd is perhaps thinner than typical for most sherds of this fabric. The fabric, R-F4, was most frequently used in Phase 4 to make the large jars of Forms 123, 132, 134, 136; however, it was also used to make a few other forms in the Series 2 corpus. The fabric is one of the harder fabrics in the corpus, measuring Mohs scale 4 to 4.5, with Form 123 jars at the higher end of the scale (no samples of

these jars were available for testing).

Typical colour readings recorded for fabric R-F4:

Surface: clear red (10R 5/6; 2.5YR 5/6-8)

Core zone: grey (10R 4/1; 10R 5/1; 5YR 5/1-2)

Wares associated with the fabric R-F4

R-F4.P = plain surface

R-F4.CS = cream slipped

Red-Firing Fabric 5 (R-F5)

R-F5 is a relatively fine fabric similar to R-F2 but fired in a heavily reducing atmosphere. As with the fabric R-F3, the reduction process changed the iron oxides in the clay and greyed the colour of the fabric throughout the section. R-F5 was used for large jars and kegs in the early Roman Period (Phase 4) and continued to be used during the late Roman Period at Ismant el-Kharab. The fabric was described during the survey of the oasis (Hope 1979, 194) and recorded as type 'A2b'. A sample of the fabric was not available for testing.

Wares associated with the fabric R-F5:

R-F5.P = plain surface

R-F5.CS = cream slipped

Red-firing Fabric 6 (R-F6)

Example tested:

Sample S1 (T/S No. 3), Appendix 1, A-3, Pl. 173 = CS2 2oo, Series 1, Form 53, Pl. 11.

Macroscopically, the break of fabric, R-F6, has an even open, sponge-like texture from the abundant and mainly fine quartz grains. Grains of hematite, hematitic shale, phosphatic material and calcium carbonate are also present. The fabric was generally fired evenly to a pale reddish brown or soft brown colour although a greyish core can be present in thick

sections. It is not as hard as R-F1 and the hardness rarely exceeds 3.5 on the Mohs scale. This fabric was used to make a large range of vessels during Phase 1 and Phase 2. It was recognised during the survey of the oasis (Hope 1979, 194) and recorded as a variant of fabric type 'A1a'.

Typical colours recorded for fabric R-F6:

pale red (10R 4-5/6)

red brown (2.5YR 3-4/6; 2.5YR 5/6)

dull reddish brown (5YR 5-6/4; 7.5YR 5-4/6)

Wares associated with the fabric R-F6:

R-F6.P	=	plain surface
R-F6.P.D	=	decorated on a plain surface
R-F6.RS	=	red slipped
R-F6.RS.D	=	decorated on a red slipped surface
R-F6.CS	=	cream slipped
R-F6.CS.D	=	decorated on a cream slipped surface
R-F6.RS.B	=	red slipped and burnished

Red-Firing Fabric 8 (R-F8)

The fabric, R-F8, is very coarse with voids from burnt out chaff and other organic matter a characteristic of the fabric. The surface frequently exhibits colours of cream, pink and even blue tones. The fabric was occasionally recorded as cream slipped but the surface colours were possibly from the high percentage of organic matter in the clay body which caused the migration of excess salts to the surface. In this corpus, the fabric was used almost exclusively for Form 176 platters (Pl. 86), although one Series 2 Form 1 vessel, SS2 Ac, and Form 175 vessel (Pl. 85) were recorded in the fabric. In the late Roman Period platters and troughs continued to be made from a similar type of fabric at Ismant el-Kharab. The fabric was recognised during the survey of the oasis and recorded as the fabric type 'A4'. No samples were tested.

Wares associated with the fabric R-F8:

R-F8.P = plain surface

R-F8.CS = cream slipped

Red-Firing Fabric 9 (R-F9)

The tested example was an undiagnostic body sherd from a Form 154 flask (Pl. 38) from the surface of site, SS16.
Sample S3 (T/S No. 10), Appendix 1, A-5, Pl. 175.

The fabric, R-F9, is the hardest of the fabrics in this corpus (Mohs scale 5.5 to 6) and was used exclusively to make flasks and kegs. It has abundant inclusions including rounded coarse and medium quartz grains, red hematitic shale particles and creamish-white grains/enclaves of calcium carbonate and phosphatic materials. Frothy, glassy particles with a slag like appearance are also present in the tested sherd; these are considered to result from the addition of ashes to the clay body (Appendix 1, A-16).

The fabric fires a dark brownish-red and frequently has very thin dark bluish-grey, almost black (2.5YR 5-4/0), surface zones. This thin zone occurs more often on the exterior of sherds but, as it also occurs on the inner surface, it is unlikely to be a slip and must result from either the firing process or the composition of the clay. A wide uneven grey core can be present and different parts of the same sherd often have some variation in colour and firing pattern.

Some examples of the fabric exhibit elongated flattened pores that give a laminated appearance to the section. The petrographic analysis of the thin-section (Appendix 1, A16–17) also revealed the growth of crystal clusters in the fabric. Both this phenomenon and the laminated texture suggest that, when firing the vessels made from this fabric, kilns were held or 'soaked' at peak temperature for a period of time to allow for maturation of the clay body to develop (Rhodes 1974, 152).

The fabric, R-F9, was used to make flasks (Form 154) and kegs similar to Form 155 (Pls 38–39 and 171). These flasks and kegs have also been reported from a number of sites in Egypt (Aston 1996c, 3, 9 and 42, fig. 106-7: 102-11; Darnell and Darnell 1994, 49, fig. 3). As yet no intact flasks have been recovered from Dakhleh Oasis but sherds are so numerous on the surface of Ain el-Azizi, site SS16 (Hope 1983, 149), that the site must be considered at least one of the sources of these vessels.

Sherds from the broken vessels were reused as chinking sherds, numbers of which have been recovered from collapsed mud brick vaults during the excavation of the shrines associated with the Temple of Tutu at Ismant el-Kharab (Hope 1995, 51–6). They were also used in the building of the vaults in some of the standing mausolea at that site (Winlock 1936, pl. XI).

Colours recorded for fabric R-F9:

Surface: dark red brown (10R 3/6)

very dark grey to black (2.5YR 5-4/0)

Core zone: dark reddish grey (10R 4/1)

Wares associated with the fabric R-F9:

R-F9.P = plain surface

Red-Firing Fabric 10 (R-F10)

The fabric, R-F10, was fine and dense with very small quartz and fine limestone inclusions. It was fired red-brown. The only examples of the fabric in the corpus are two Form 125 jar sherds from site, SS7. The fabric was recognised and recorded in the survey material as 'A6'. No samples were available for testing.

Wares associated with the fabric R-F10:

R-F10.P = plain surface

7.6 FABRICS AND WARES MADE FROM LIGHT-FIRING CLAYS

Vessels made from marly clay fabrics have been recovered in Dakhleh Oasis during all phases in this corpus and from the earlier Pharaonic periods (Hope 1979, 190 and 1980, 291). However, these fabrics are not as well represented in the corpus as red-firing fabrics. The most common light-firing fabric, L-F4, continued to be used extensively during the late Roman Period at Ismant el-Kharab to make lentiod flasks and necked flasks (Hope 1987, 79, pl. XII: c and d). The potters at Qasr el-Dakhleh still make a number of different types of water flasks from light-firing clays (Henein 1997, 21, 120–3).

Light-Firing Fabric 1 (L-F1)

The fabric, L-F1, is a medium to fine textured fabric which fires from pale reddish-brown to a yellowish-pink, sometimes with greenish tones. The fabric has naturally occurring cream surfaces, the thickness of which varies considerably from one vessel to another and can vary on the same vessel. The thickness of this surface zone affects the colour of the surface and can be more reddish rather than cream. The fabric contains frequent fine and medium quartz grains and some fine dark-coloured grains are usually visible while calcium carbonates are infrequent. It is light-weight and quite soft (Mohs scale 2.5–3).

Although the fabric, L-F1, was not used as frequently in Phases 1 and 2 as the red-firing fabrics, R-F1 and R-F6, it was popular for a number of different vessel types including small Form 43 vessels (Pl. 6), medium-sized Form 51 bowls (Pl. 8) and Form 86 spouted jars (Pl. 19). Several of these vessels are in the collection of the Royal Ontario Museum but no sherds were available for testing; however, the fabric shares some similarities with the later fabric, L-F3 (S6 and S7).

The fabric, L-F1, was recognised during the survey of the oasis and recorded as the fabric type 'B3a'. It has not occurred in the material from the late Roman Period at Ismant el-Kharab.

Typical colour readings for fabric L-F1:

Surface: cream (5Y 8/2)
creamish grey (5Y 8/2)
greenish cream (5Y 7/2)

Inner zone: pale red-brown (5YR 8/3)
pinkish (7.5YR 6/4)
pink-brown (2.5YR 4-5/8)
light reddish yellow (5YR 6/6)

Wares associated with the fabric L-F1:

L-F1.P = plain surface.

Light-Firing Fabric 2 (L-F2)

Example tested:

Sample S9 (T/S No. 2), Appendix 1, A-10, Pl. 181 = SS20 0h, Series 2, Form 66, Pl. 54.

The fabric, L-F2, has a relatively dense texture; however, small flattened voids are apparent in the fabric. It contains quartz grains of all sizes, some dark mineral grains and finer white grains. The fabric generally fired evenly to a pale reddish-brown. The fabric has thin cream surfaces that seem to be naturally occurring although sometimes these appear more pink than cream, especially on weathered sherds where the patches have been worn thinner. The fabric is harder (3 to 3.5 Mohs scale) than L-F1. The petrographic analysis (Appendix 1, A-11) suggests this fabric may be a marly clay mixed with hematitic clay (Appendix 1, A-17).

The fabric occurs in the Series 2 corpus in Forms 25 (Pl. 44) and 66 (Pl. 54). The fabric was recognised during the survey of the oasis and recorded as the fabric type 'B4a'. It has not occurred in the material from the late Roman Period at Ismant el-Kharab.

Typical colour readings for fabric L-F2:

Surface: pale yellow (2.5Y 8/4)

Inner zone: pink (7.5YR 6/4-6)

light red (7.5YR 5-6/6)

pinkish brown (2.5YR 6/6-8)

pale greenish grey (5Y 6/2-3)

Wares associated with the fabric L-F2:

L-F2.P = plain surface

L-F2.P.D = decorated on a plain surface

Light-Firing Fabric 3 (L-F3)

Example tested:

Sample S6 (T/S No. 11), Appendix 1, A-8, Pl. 178 = SS3 Kf, Series 2, Form 55, Pl. 48.

The fabric, L-F3, fires pale reddish brown and has naturally occurring cream surfaces. The thickness of the surface zones can vary on different sherds and the thinner surface on the inside of the tested bowl, S6, shows how surface zones can also vary on different parts of the same sherd. The fabric contains frequent quartz grains of all sizes, red hematitic particles and black mineral grains. White particles (limestone fragments or enclaves) are also frequent and a few of these are very coarse. This Series 2 fabric appears to be related to the Series 1 fabric, L-F1, and it seems likely that the similar types of clay beds were still being exploited. The hardness of L-F3 is 3.5 on the Mohs scale and, although not a hard fabric, has a denser texture than L-F1 and was probably fired a little higher.

Typical colour readings for fabric L-F3:

Surface: cream (2.5Y 6-7/2)

pinkish cream (5Y 8/3)

Inner zone: reddish yellow (5YR 6-7/6)

pale red (5Y 7-8/2)

pale red (2.5YR 5/6-8)

reddish brown (5YR 6/2)

Wares associated with the fabric L-F3

L-F3.P = plain surface

Light-Firing Fabric 4 (L-F4)

Examples tested:

Sample S7 (T/S No. 12), Appendix 1, A-9, Pl. 179, A7a and A7b = D6-1/86/14h, Series 2, Form 25, Pl. 44.

Sample S8 (T/S No. 9), Appendix 1, A-9, Pl. 180 = TS1 1q, Series 1, Form 96, Pl. 23.

The fabric, L-F4, is an open-textured, light-weight fabric typically fired to a pale green colour; however, the colours can have pale greyish-yellow or the pinkish-grey tones of the sample, S7. The surface zones are naturally occurring, not an applied slip, and are usually cream but can also vary with greener or greyer tones. The fabric contains abundant rounded quartz grains of all sizes. Medium and fine fragments of red and black minerals are also frequent with coarse ones less frequent. White or light-coloured particles are present but are not very conspicuous due to the pale colour of the fabric. The fabric is soft (2 to 2.5 on Mohs scale). The fabric has frequent rounded voids but these are not characteristic of burnt out organic material added to the clay body but appear to be a characteristic of this type of clay. A finely ground sample from a sherd of the fabric showed a slight reaction to warm hydrochloric acid.

The fabric is relatively common in the repertoire of the Dakhleh Oasis potters, and different types of pottery vessels have been recorded in earlier Pharaonic periods (Hope 1979, 190 and 1980, 291), as well as in all phases of this corpus. In Phase 1 and 2, the fabric was used to make a variety of forms – small Form 43 vessels, spouted vessels, jars and flasks and the sample (S8) is a fairly typical example of the fabric in these earlier phases. In Phase 3 and 4, it was mostly used to make small bowls and water-flasks. The tested sherd (S7) from the Form 25 bowl, D6-1/89/14h, was a surface find from Ismant el-Kharab but was the best available example of the fabric from this series. The fabric has a pinkish-grey colour rather than the light green usually associated with the fabric in Series 2, and may have been fired to a slightly higher temperature. The rim of the bowl was decorated with red dots, a type of decoration very common on bowls made from this fabric and other fabrics in Phase 4.

The fabric was described during the survey of the oasis (Hope 1981, 234; 1983, 149) and recorded as 'B10'. The fabric continued to be used, particularly for water containers, during the late Roman Period at Ismant el-Kharab.

Typical colour readings for fabric L-F4:

Surface: cream (2.5Y 6-7/2)
pale greenish yellow (5Y 7/2-3)

Inner zone: light greyish green (2.5Y 5-6/2)
pinkish grey (2.5YR 6/2 to 5YR 6/4)
greenish cream to pale green (5Y 7/2-3 to 5Y 6/3)

Wares associated with the fabric L-F4:

L-F4.P = plain surface

L-F4.P.D = decorated on a plain surface.

Light-Firing Fabric 5 (L-F5)

The fabric, L-F5, is an open-textured fabric similar in texture and composition to L-F4. However, the surface colour is greenish-grey rather than clear green, sometimes with creamish-pink firing blushes, and the section is usually dark grey. Although it is still quite soft, the fabric tends to be slightly harder than L-F4. The difference in colour and hardness could be due to higher kiln temperatures, either accidental or intentional. However, as the fabric has been observed mostly, but not always, in vessels used for the storage of water, it is possible that the differences were caused by salts in the artesian water permeating the pores of the fabric. No samples of the fabric were available for testing.

Typical colour readings fabric L-F5:

Surface: cream green (10YR 6-7/4)
greenish grey (5YR 7/2)

Inner zone: greyish green (5Y 3/2)
pinkish grey (10R 6-5/1)

L-F5.P = plain surface

7.7 FABRICS AND WARES MADE FROM SHALY CLAYS

Red-firing Shale Fabric (R-FS)

The fabric, R-FS, is characterised by the presence of tabular-shaped grains of yellow and red shale that are large enough to be visible to the naked eye. The other inclusions, which are also abundant, include white particles, rounded quartz and other dark-coloured mineral grains. The fabric was generally evenly fired to a strong dark red with a hardness of around Mohs scale 3 and was used to make small bowls and jars in Phase 2. This fabric was seen in registered vessels in the collection of the Royal Ontario Museum but no samples were available for testing.

Colour readings for fabric R-FS:

red brown (2.5YR 5/6; 5YR 5-6/4; 5YR 4-4/6)

Wares associated with the fabric R-FS:

R-FS.P = plain surface

R-FS.RS = red slipped

Light-Firing Shale Fabric (L-FS)

Example tested:

Sample S5 (T/S No. 8), Appendix 1, A-7, Pl. 177 = SS4 0s, Series 2, Form 75, Pl. 59.

The fabric, L-FS, is also characterised by its abundance of red and yellow shale inclusions, however, this fabric was fired evenly orange-red. It contains quartz grains of all sizes with medium grains the most frequent and fine to medium dark coloured mineral grains. White particles are not as frequent as in some fabrics, such as R-F1, but are present and a few are very coarse. The fabric has a medium dense texture with frequent flattened voids. The hardness is 3.5 to 4 on Mohs scale. The fabric was used to make bowls, cooking pots and small to medium jars, particularly in Phases 3 and 4. These vessels were frequently covered with bright red to dark red slip and the rims of bowls were decorated

cooking pots and small to medium jars, particularly in Phases 3 and 4. These vessels were frequently covered with bright red to dark red slip and the rims of bowls were decorated with dark red, almost black, pigment. The fabric was recognised during the survey of the oasis and recorded as 'B3b'. It does not occur in the material from the late Roman Period at Ismant el-Kharab.

Typical colour readings for fabric L-FS:

orange red (2.5YR 5-6/6)

pale red (2.5YR 5/6-8)

yellowish brown (10YR 6-7/6)

Wares associated with the fabric L-FS:

L-FS. P = plain surface

L-FS.RS = red slipped

L-FS.RS.D = decorated on a red slipped surface.

7.8 FINE FABRICS AND WARES

Fine Fabric 1 (F-F1)

Example tested:

Sample S13 (T/S No. 1), Appendix 1, A-14, Pl. 179, A13a and A13b = TS4 1/Da, Series 2, Form 24, Pl. 44.

The fabric, F-F1, is a relatively fine fabric that contains fine angular quartz and quite rare rounded coarse and medium quartz grains. Other inclusions include fine to medium red and black particles and some white particles or enclaves, a few of which are medium to coarse. The texture is quite dense but it does have fairly frequent voids, some of which are flattened. The hardness is Mohs scale 3 to 3.5. The surface of the tested sample, TS4 1/Da, was weathered and bleached but still had traces of red slip on a few sections.

Two small Form 24 bowls, TS4 1/Da and SS20 0c, are the only vessels made from the fabric and its rarity in the Dakhleh Oasis corpus suggests that it was not a local

may have been produced in Kharga Oasis or in that part of the Nile Valley which lies within the same geological formation (Figs A–1 and A–4).

Colour readings for fabric F-F1:

brownish pink (5YR6-7/4)

pale reddish brown (7.5YR 6/4-6) and (7.5YR6/4-6)

light red (2.5YR 6/6)

Wares associated with the fabric F-F1:

F-F1.RS = red slipped

Fine Fabric 2 (F-F2)

The fabric, F-F2, is denser than the previous fabric, F-F1. The quartz inclusions are predominantly small with only a few medium grains visible. Infrequent small dark coloured grains are also present. The fabric fires light red to red and one sherd had a slightly darker core (10YR 4-5/4). The fracture is smooth with sharp edges and the hardness about Mohs scale 4.5. The surface was coated with red slip and two sherds were recorded as burnished. The three examples are Form 24 bowls (L10-2/85/68f, SS4 0l and SS4 0m) and all were weathered surface finds. The sigillata forms and the fabrics of these bowls suggest they were imported from the eastern Mediterranean region. The fabric was recognised during the survey of the oasis and recorded as 'A20'. No samples were available for testing.

Colour readings for fabric F-F2:

Surface: light red (2.5YR6/6)

red (5YR 7/8; 10R5-4/6)

dark red (10R3/6)

Wares associated with the fabric F-F2:

F-F2.RS = red slipped

F-F2.RS.B = red slipped and burnished.

Fine Fabric 3 (F-F3)

The fabric, F-F3, is very dense with a few grains of quartz and small black particles visible. The example (F10-2/0/69d) was a bleached and weathered surface find. The recorded colours were: surface, greenish (5Y 6/3-2), core, brown (10YR 5/2-3), interior, pale brown (10YR 7/4); however, these colours may be due to the weathered condition of the sherd. The fabric was hard (Mohs scale 4.5) and the fracture was smooth with sharp edges. A few traces of red slip remained on the surface. The vessel has an Eastern Sigillata form and was probably imported into the oasis. The fabric was recognised during the survey of the oasis and recorded as 'B14'.

Wares associated with the fabric F-F3:

F-F3.RS = red slipped.

Fine Fabric 4 (F-F4)

The fabric, F-F4, is a fairly fine dense fabric which was evenly fired dark red. The only vessels in the corpus made from the fabric are the two skyphoi of Form 188 (Pl. 87). The fabric contains fine quartz grains, a few scattered white particles and dark red particles that are probably fine grains of shale. It is much finer than the other red-firing fabrics, such as R-F1, R-F2 and R-FS but appears to be related to the latter fabric, R-FS. Another fabric, Oasis Red Ware, which occurs frequently in late Roman Period material at Ismant el-Kharab (Hope 1986, 87–91, figs 8–9), is not as fine but may also be related to F-F4. No sherds were available for testing.

Colour readings for fabric F-F4:

dark red (10R 6/8)

Wares associated with the fabric F-F4:

F-F4.P = plain surface.

7.8 CLAY SAMPLES

Sample, S4, Appendix 1, A-6, Pl. 176.

The sample, S4, has most of the characteristics of the red-firing fabric, R-F1, including rounded frosted quartz grains, white particles or enclaves, phosphatic and hematitic material. However, the vesicular glassy, slag-like particles seen in that fabric are not present in the clay sample. Their absence re-enforces the proposition that the glassy material in the fabrics came from the practice of adding ashes to some clay bodies (A-16). The tile, S4, was made from a small sample taken from a pile of clay at the modern pottery in el-Qasr. This clay had not been processed in any way and so was 'as dug'. The clay piece had the typical sheet-like bedding planes of shales but was soft and could easily be broken or crumbled into small pieces. The pieces of clay were mid-grey in colour but had darker grey and rusty brown stains or patches along the bedding planes. A small piece of clay was pulverised by hand in a mortar and pestle and mixed with water without any additions. The colour of the unfired but mixed clay remained mid-grey with a slight brownish cast. The tile was fired in an oxidising atmosphere to 930–950 ° C.

Sample, S12, Appendix 1, A-13, Pl. 184.

The composition of the sample, S12, is similar to that of S4 but all the inclusions are finer. The sample was taken from one of a number of clay lumps stored in House 3 at Ismant el-Kharab and probably kept there for sealing jars. The clay was in lumps not in shaly pieces like S4 and the shape of the lumps suggested that the clay had once been mixed with water. The colour of the raw clay was grey. The sample was treated in the same way as S4. The resulting tile, S12, has similarities with the fabric, R-F4 (S11, which was a sherd from a large Phase 4 jar). As it is unlikely that clay for sealing purposes would be imported from outside Dakhleh Oasis, the clay sample, S12, indicates that sources of finer clays were in the locality and available for exploitation by potters if required.